LEADERSHIP IN DISASTER

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Learning for a Future with Global Climate Change

Raymond Murphy

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To Ruth,
Patricia, Lorrie,
Kiernan, and Maya

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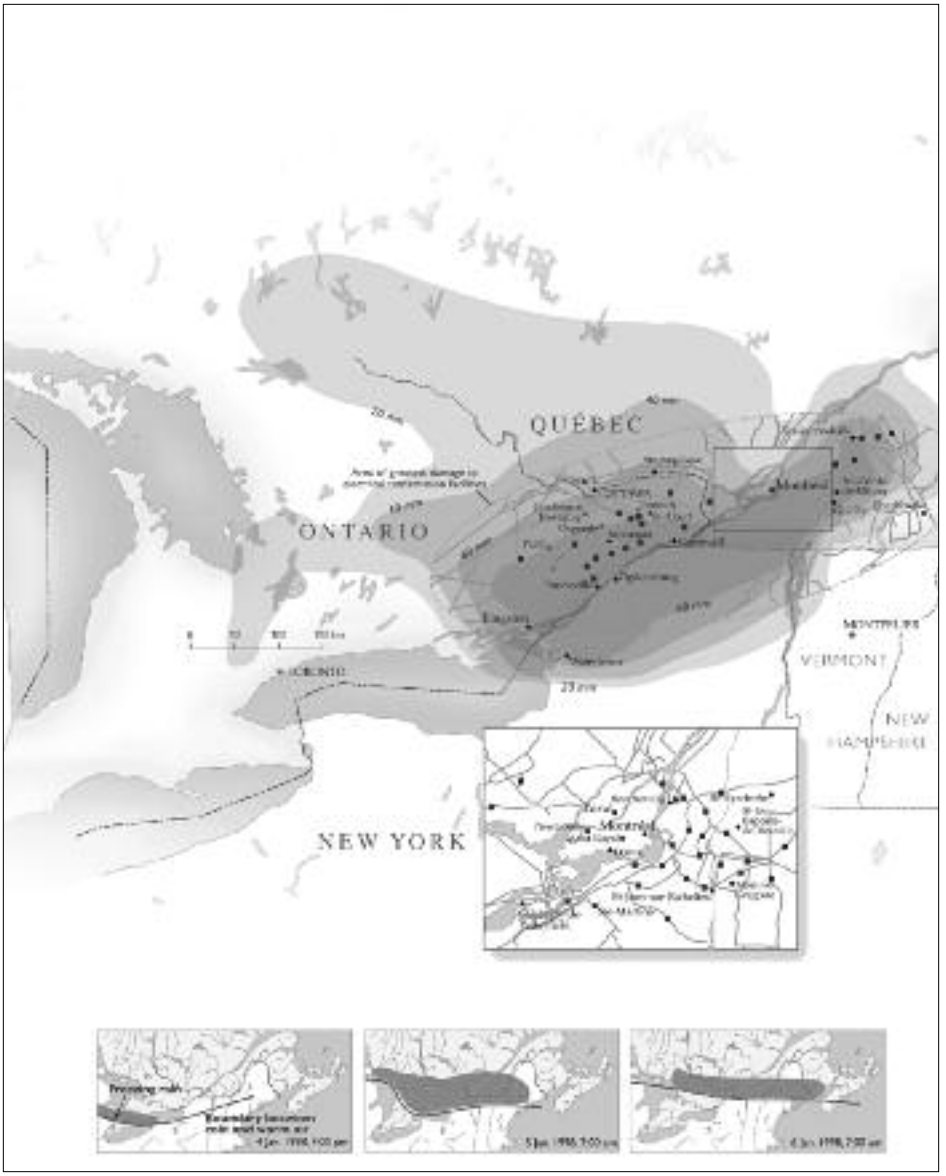
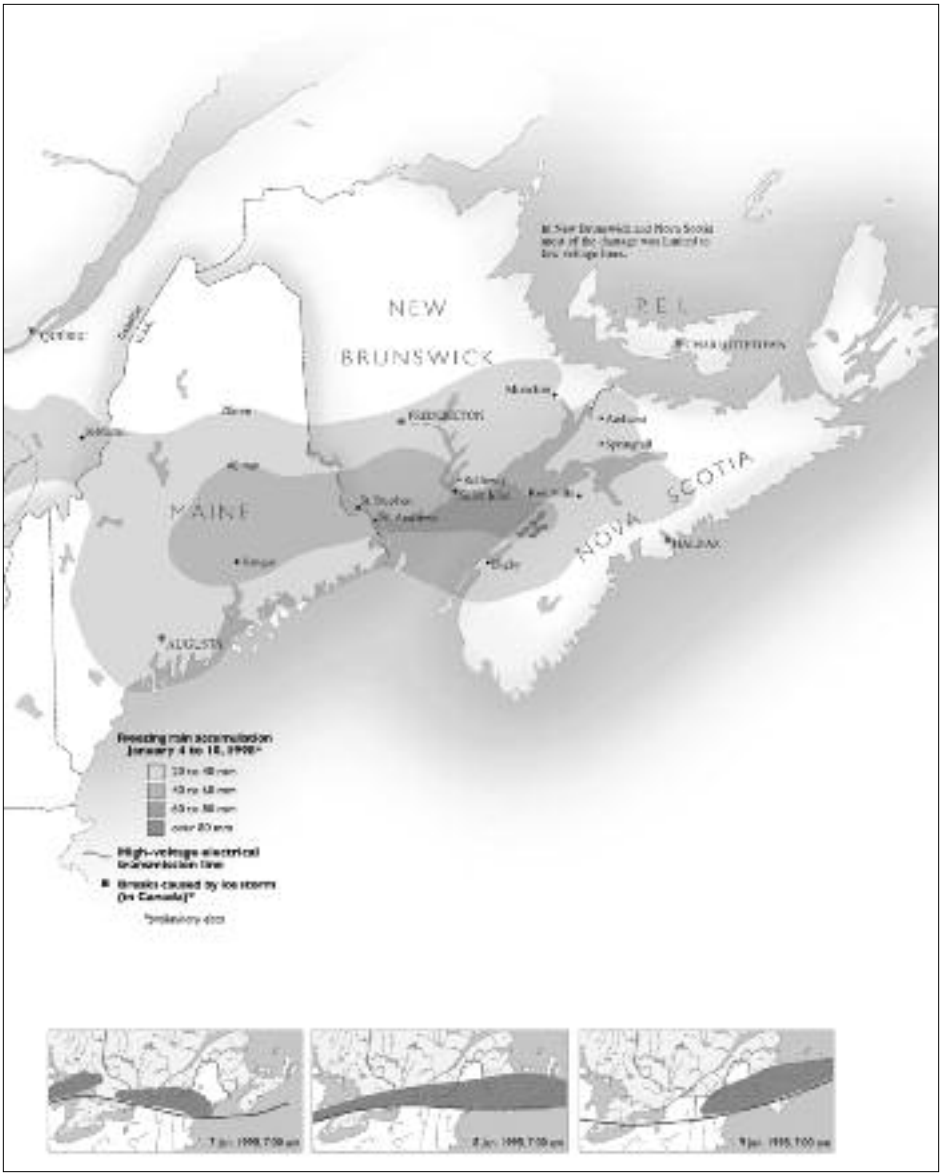


Map of the area affected by the ice storm of 1998. Canadian Geographic.


NEW
BRUNSWICK
P.E.I.
MAINE
NOVA SCOTIA
AUGUSTA
HALIFAX
Freezing rain accumulation
January 4 to 10, 1998*
High-voltage electrical transmission line
Breaks caused by ice storm (in Canada)*

LEADERSHIP IN DISASTER

INTRODUCTION

Disastrous ice storms are rare, especially when caused by warming. Disasters are, however, not so rare, and ice storms are part of that category. Both natural and technological disasters, even terrorist-induced ones, involve the interaction of nature's hazards with vulnerabilities that have been constructed inadvertently or recklessly. We usually think of disasters as sudden events, but they can also be slow-onset, such as droughts. There is scientific consensus, albeit not unanimity, that global warming provoked by human activities is likely to produce a variety of disastrous results: more intense extreme weather, hundred-year storms becoming fifty-year storms, flooding from the rise of ocean levels, extensive drought, wildfires, abnormal insect infestations, and so on. The perils are too numerous to list. Changes are predicted to be slow at first until positive feedback loops and tipping points are encountered; then changes will become rapid, irreversible, and perhaps disastrous. Mitigation is easiest when carried out early, whereas if it is delayed, it will require greater sacrifice because the problems will be cumulative. And global warming is but one effect of human activities on the environment in which we live. The chronic and the acute, the slow-onset and the sudden, environmental problems and disasters, nature's hazards and socio-technological vulnerability are now coupled together in what Kai Erikson calls "a new species of trouble."[1]

We need not worry about nature per se. It is robust and will persist no matter what humans do. The issue is the kind of environment that will result from the interaction of human activities with nature's dynamics. Will global environmental change induced by human activities produce a mate-

rial context for humans and other species that is harmful? For such deep and broad issues that involve the future, science provides valuable indications but not certainty. Yet leaders and the population must make sense of these issues and decide what to do. In these contested matters, even ignoring the risk and pursuing business as usual constitutes a choice. It is commonly assumed that the success of modern society in manipulating nature's forces makes it more robust and resilient. In some ways that is true, but we need also to explore the ways in which those recombinations of nature's processes to satisfy human desires render society more vulnerable.

This study deals with the consequences of an extreme weather event in an enormous region and the response of the modern societies of Canada and the United States to it. The event consisted of wave after wave of intense freezing rain that fell on a large part of northeastern North America and lasted for five days in early 1998. It was caused by warm, moist air, resulting from the El Niño phenomenon in the Pacific Ocean, that was carried by wind currents across to the other side of the continent.

The first part of the book examines general issues concerning the modernization of the risk of environmental calamities and disasters. It begins with a critical assessment and synthesis of the literature drawn from general social theory, environmental research, and disaster research. These theories and studies offer insight from different and in some cases opposed perspectives concerning the creation of risk, its mitigation, and preparation for danger. This analysis is followed by my own contribution to the elaboration of concepts and a framework to help bridge the culture/nature divide, which has left much of the social sciences restricted solely to the culture side. Thus Part One presents analyses of risk and vulnerability that are significant for understanding the concrete interaction between constructions of nature and social constructions of humans during a disaster and for understanding socio-political questions involved in global warming. It provides a framework for the empirical investigation that follows.

I propose the metaphor of a dance to help us to comprehend the interaction between movements of the material world of nature and the social practices of humans. In the dance examined here, nature's constructions of weather prompted actions, expectations, and even emergent beliefs on the part of humans. Part Two provides a comprehensive description of that dance between nature's movements and the associated movements of humans – a dance that was partly choreographed by humans in anticipation of hazards and partly improvised. The dance was at times adroitly performed but at other times awkwardly executed. The description seeks to give the feel of what it is like to live through a disaster of massive

scope, intensity, and duration as the freezing rain crept up on leaders and the population unexpectedly, leaving them, as it dragged on, with the question, "will it never end?" – so hard to imagine years after it ended. Our understanding of social practices can be deepened by closely examining how human groups responded to the extreme movements of their dance partner, nature. Understanding practices in their biophysical context is particularly significant at a time when human actions are provoking the emergence of movements of nature that create the challenge of a response by humans.

Underlying the description of the disaster in Part Two is a theoretical argument. That documentation calls into question mastery-of-nature and end-of-nature hypotheses, showing, on the contrary, that technological development internalizes new dynamics of autonomous nature in modern societies. It demonstrates that the advance of science, the market, and rational organization has led to dependence on a centralized electrical grid, which enabled freezing rain to have disastrous consequences for society. Vulnerability to nature's forces was constructed, and a natural disaster was manufactured by humans because of that dependence. Extreme forces of nature that result in disasters make visible social-natural relations which are often ignored in normal dynamics of nature, much as we ignore breathing until we no longer do it well.

All citizens are equal in a democracy, but some are more equal than others. Modern societies have a hierarchical structure in which the choices, both good and bad, of a leader are more consequential than decisions by an ordinary citizen. Part Three investigates the overall performance of key leaders in this disaster, as well as specific aspects of leadership – transparency transformed into withholding information when the crisis became grave, conflict between leaders, and other behaviour. That section is based on interviews with major leaders in the management of the disaster, and they do not fail to provide insider knowledge as the lead dancers in society's response to the movements of extreme weather and as actors in performance with other important actors. It examines the ways these leaders made sense of the crisis and arrived at decisions and actions. Jean-Bernard Guindon, director of the Civil Security Centre (Centre de sécurité civile) for the Montreal Urban Community, concluded that this disaster was "one of the most extraordinary life experiences that I have ever lived. It taught me a great deal about everything: about people, about life, about organizations." Learning from the strengths and weaknesses of leadership can contribute to preparing better for difficult-to-foresee hazards of the future and reducing vulnerability.

Learning is especially important if global warming turns out as predicted by consensus science to be a huge environmental problem affect-

ing all others, with extreme weather disasters and slow-onset calamities the outcome. Leaders must decide whether to continue business as usual, to prepare for disasters (adaptation), or to prevent disasters from occurring by changing practices that exacerbate global warming (mitigation). Part Four examines how these leaders who experienced an extreme weather disaster made sense of the contested issue of global warming. Though not caused by global warming, the weather event examined here could well be a harbinger of life under it. The two countries studied, Canada and the United States, are the leading greenhouse-gas emitters internationally. Do these leaders have insights that can help in mitigating global climate change, adapting to it, or at least in understanding why mitigation and/or adaptation is not occurring? The answer is in the affirmative. In the interviews they increase our understanding of not only the management of risks but also the politics, economics, ethics, and cultural habitus involved. They reveal how modern societies unleash risks and then adapt to and/or mitigate them. Thus Part Four shifts from the level of managing disaster to that of policy to prevent future disasters. Chapter 13 investigates communities that were struck by intense, persistent freezing rain without suffering a disaster. Our comprehension of modern societies in which the same construction of nature proved disastrous is deepened by this unusual comparison. It provides an opportunity for modern societies to learn how to avoid disaster and environmental calamities.

In light of the empirical investigation in the book, the final chapter returns to an analysis of general issues concerning risk and survival in the new frontier of global environmental change resulting from human activities – that is, the emerging new dance between humans and nature. To give a preview of the conclusions, this study calls into question two misleading oversimplifications common in the cultures of modern societies: an idealized representation of nature and wishful thinking concerning the outcome of technological development.

Climatologists contend that ice storms are likely to occur from central Missouri across central Illinois to central Indiana and northern Ohio, extending into upper New York State and southern Canada. This prediction has led the North American insurance industry, through the Institute for Catastrophic Loss Reduction in Canada and the Institute for Business and Home Safety in the United States, to conclude as follows: "Experts concur that freezing losses similar to those which devastated Montreal in 1998 could impact Toronto, Boston, New York City, Buffalo, Detroit, Cleveland, Chicago, Minneapolis and/or St. Paul."[2] This ice storm just missed Boston. Ice storms are but one of many hazards of nature, some of which humans are unleashing.

PART ONE

Social Action in Its Biophysical Context

CHAPTER 1

The Modernization of Risk

The interaction between human activities and nature's dynamics has become one of the key social issues of our time. Humans are consuming resources, polluting, and recombining nature's processes and materials at a frenetic pace. The activities of a six-billion population, which is still rapidly growing, are unleashing new forces of nature such as climate change which are so massive that some geologists argue our epoch should be called the "anthropocene" period to distinguish it from the "halocene" era prior to the industrial revolution. Humans and their machines have become the principal forces modifying the planet. What this activity will produce is uncertain, involves novel risks for humans, and is a principal subject of public debate.

Environmental issues are problematic because they bring the risk of disasters, whether sudden or slow-onset. Even natural disasters, which, as we shall see in this study, are not as natural as they seem, incite a socially constructed response in both citizens and leaders. The effects on a society of a calamity involving nature's constructions reveal the strength or weakness of preparations for danger, as well as improvised, emergent social constructions. The central element in the theoretical framework used here to elucidate both environmental problems and disasters is based on Ulrich Beck's theory of reflexive modernization and the "risk society" because it remains the most general and penetrating conceptualization of the potential material threats unleashed by modern society and the possible mitigation of those dangers. Beck's theory has an affinity with Max Weber's concept of the paradoxical magnification of irrationality under rationalized modernity.[1] Other important theories are relevant as well:

the theory of the social reconstruction of nature by market forces and modern technology to achieve cornucopia; ecological modernization theory; the theory of the treadmill of production; and discourse analysis. These theories and perspectives in many ways contradict one another, but they each provide plausible accounts from different angles that are important for situating in a broader context the detailed empirical investigation that will be presented in subsequent sections. They give, on an abstract level, the basis for arguments that could have been used by the leaders who were interviewed. Disaster research will be integrated with these social theories, which are central to environmental research in the social sciences.

WEBER'S CONCEPTION OF RATIONALIZED MODERNITY

Weber, in his well-known theory, contended that modern capitalism and formal rationalization were launched by the inner logic of Protestant religious asceticism: "since asceticism undertook to remodel the world and to work out its ideals in the world, material goods have gained an increasing and finally an inexorable power over the lives of men as at no previous period in history."[2] This is a truly paradoxical result with enormous consequences in terms of consumption of resources, production of waste and pollution, and other environmental problems. Economic rationality and consumerism have become a force with its own inner logic: "victorious capitalism, since it rests on mechanical foundations, needs its support [of religious asceticism] no longer."[3] Weber argued that rational structures contained an inherent dynamic: they provided technically better solutions to problems and induced a motivation for the further development of those structures.[4] Specialized occupations are required by the logic of machine production, whether we like it or not. "The Puritan wanted to work in a calling; we are forced to do so."[5] Weber argued that rationalization – in terms of searching for the best means to accomplished goals through science and technology, the market, formal organization, and the legal system – was the key distinguishing feature of the modern world. It enabled an extraordinary economic development, in particular of consumption. But he also pointed out the unintended harmful consequences of this development. The intensification of formal rationality brought with it a magnification of substantive irrationalities judged according to particular values. A century after Weber wrote, irrationalities that provoke environmental calamities and new vulnerabilities to disasters have confirmed his analysis.[6]

Weber characterized the intellectualized culture in the modern, rationalized world as the following belief: "there are no mysterious incalcula-

ble forces that come into play, but rather that one can, in principle, master all things by calculation … Technical means and calculations perform the service. This above all is what intellectualization means."[7] He contended that the modern economic "order is now bound to the technical and economic conditions of machine production which to-day determine the lives of all the individuals who are born into this mechanism, not only those directly concerned with economic acquisition, with irresistible force. Perhaps it will so determine them until the last ton of fossilized coal is burnt. In Baxter's view the care for external goods should only lie on the shoulders of the 'saint like a light cloak, which can be thrown aside at any moment.' But fate decreed that the cloak should become an iron cage."[8] Here Weber comes close to a theory of a treadmill of production and consumption. But he did not draw the conclusion that destiny is predetermined by these technical and economic conditions. For him, the future is open-ended and to be constructed. In his critique, Weber gave a glimpse of how the door of the iron cage could be opened. "No one knows who will live in this cage in the future, or whether at the end of this tremendous development entirely new prophets will arise, or there will be a great rebirth of old ideas and ideals, or, if neither, mechanized petrification, embellished with a sort of convulsive self-importance."[9] New ideals and the rebirth of old ones can help mitigate this mechanized petrification, unlock the gate of the iron cage, and prevent the depletion of resources.

Weber ended his theory of the importance of Protestant asceticism in the rise of modern capitalism with the following words: it is "not my aim to substitute for a one-sided materialistic an equally one-sided spiritualistic causal interpretation of culture and of history."[10] He had a nuanced, complex view of the interaction between material interests and ideas: "not ideas, but material and ideal interests, directly govern men's conduct. Yet very frequently the 'world images' that have been created by 'ideas' have, like switchmen, determined the tracks along which action has been pushed by the dynamic of interest."[11] Human agents constructing the switchmen of world images determine whether rationalization occurs and, if so, whether it will interact with the dynamic forces of nature in a perilous or harmonious way. Economic rationalization was not the only social dynamic that emerged from Protestant asceticism. There was an intervening switchman of world images that resulted in a bifurcation of the tracks leading from Protestant asceticism. Much can be learned about modern, rationalized society, its interaction with nature's constructions, and the new risks this interaction engenders by comparing it with another social construction that emerged from Protestant asceticism, namely, Amish communities. These two results of Protestant asceticism pushed the dynamic of interest along very different tracks with dissimilar environ-

mental and disaster outcomes. That comparison will be made in a later chapter.

Weber also argued that "the various value spheres of the world stand in irreconcilable conflict with each other … here too, different gods struggle with one another, now and for all times to come."[12] By "value sphere" he is referring to a domain of activities that has its own requirements: the economic sphere, the political sphere, the religious sphere, the ecological sphere, and so on. The switchmen of dominant images determine which value sphere will have precedence in this conflict. Technological rationalization varies according to the value sphere that steers it. Developing and implementing costly disaster-mitigation practices and rationalization in an ecological sense requires a world image that gives high priority to these spheres in their conflict with the economic sphere and hence makes more secure and environmentally benign the tracks along which interest is pursued. W.J. Mommsen argued that Weber's dire predictions should be seen, not as an irresistible deterministic force leaving humans no choice for their fate, but rather as a "self-denying prophecy" to foresee and avoid the harmful consequences of proceeding along the path of economic rationalization.[13] In other words, they can be interpreted as a precursor to Beck's analysis of the transformation of primary modernity.

REFLECTIVE MODERNIZATION AND THE RISK SOCIETY

Ulrich Beck argues that the structuring of the future is occurring surreptitiously and indirectly in laboratories and boardrooms, rather than in parliaments and in political parties.[14] He contends that there has been a profound change in the past half-century from primary modernization to reflexive modernization. In the early stage of modernization, societies perceived only progress in their development of science, technology, rational organizations, and the market. Pollution occurred, but this was a local problem near factories and could be avoided by fleeing to the many pristine areas that remained. Moreover, many of the adverse side effects of the technological manipulation of nature's dynamics involve delayed-action consequences and were not visible, so people were unaware that they were occurring in this primary stage. There was a time lag before the reactor at Three Mile Island produced a near disaster and the reactor at Chernobyl generated a complete one. Those experiences educated technical experts and the population concerning the risks of nuclear energy and modernization in general. It was only after antibiotic-resistant bacteria emerged because of the overuse of antibiotics that awareness developed of the threatening side effects of that innovation. It took time

for fossil fuels to have an impact on something as vast as the world's climate, for the ozone layer to become depleted as a result of the use of CFCs, for DDT to produce cancer, and for all of these consequences to become visible through science or/and experience. When cumulative consequences involve something as massive as the oceans, the atmosphere, and all the land of the planet, the delayed-action harm can take decades or centuries. This is brief on a geological or evolutionary time scale, but it appears lengthy compared to a human lifetime. The long, intensifying effect unfortunately implies that it will also take a very long time for humans or nature to undo degradation and to restore the environment to its previous state.

According to Beck, the time lag is over. Now, in this new period of reflexive modernization, the harmful secondary effects of the successes of science and modernization are turning back against the very societies that have developed them, creating the "risk society."[15] Human societies have always faced risks from nature's dynamics, but the type of risk is different under reflexive modernization: "the risks emerging today are distinguished firstly from all the earlier ones by their *society-changing scope*, and secondly by their particular *scientific constitution*."[16] The present period of modernization has become reflexive in that the very successes of science, the market, and rationalized organization, not their failures, are turning back to threaten society. Hence the distribution of "bads" becomes as important for society as the distribution of goods. The exceptional human capacity to manipulate nature's processes, combined with our unexceptional incapacity to master nature, have unleashed threatening new dynamics of nature that have hitherto been held in check by nature itself. At first these new risks were legitimated as latent side effects, but they have come out of the closet and are subject to scientific investigation and public criticism. Beck contends that now the "*latency phase of risk threats is coming to an end*. The invisible hazards are becoming visible. Damage to and destruction of nature no longer occur outside our personal experience in the sphere of chemical, physical or biological chains of effects; instead they strike more and more clearly our eyes, ears and noses."[17] Risk threats that previously operated in a latent phase are becoming manifest to our senses.

Beck proposes a solution to these self-inflicted problems, namely, modernization that anticipates environmental problems and possible disasters and intentionally takes measures to avoid them in advance. He refers to this approach as reflective modernization and ecological enlightenment. The important issue is whether risks are scientifically displayed and objectively interpreted or are instead concealed and dismissed. Science is the creator of new, emergent problems in human interaction with nature's

constructions, but it provides, as well, the capacity to be the potential solution. It makes available the cognitive resources to diagnose problems as well as the means for overcoming the dangers. Whether those capacities will be used to deal with the threats is, however, not automatic and becomes a source of conflict and a socio-political issue: as the destructions of nature "are universalized by industry, they become social, political, economic and cultural contradictions inherent in the system."[18] Beck himself admits that there is what I would call a "treadmill of risk production" that makes it difficult to foresee risks: "under the surface of risk calculation new kinds of *industrialized, decision-produced incalculabilities and threats* are spreading within the globalization of high-risk industries … *Along with the growing capacity of technical options grows the incalculability of their consequences.*"[19] This is an extension of Weber's thesis that the intensification of rationality (in particular, through calculations) leads paradoxically to a magnification of irrationalities and incalculabilities. Reflective modernization requires risk calculability, but reflexive modernization spreads new incalculabilities. Therein lies a major contradiction of modernization.

The distinctive feature of industrialization and modernization is that "risks depend on decisions … society today is *confronted by itself* through its dealings with risks. Risks are the reflection of human actions and omissions."[20] People, businesses, state agencies, and politicians are responsible for risks. Hence human agents can be blamed for environmental problems and disasters. Accepting risk is not compelled by technology and is instead the result of "the system of organized non-liability"[21] that turns the institutions which have the mandate to control the production of hazards into accomplices. Beck gives the legal system as an example of organized irresponsibility. The legal requirement of proof beyond a reasonable doubt and the built-in bias that the accused is innocent until proven guilty place the burden of proof on potential victims. In practice, they translate "difficulty to prove danger" into assumptions of "safety." These requirements and biases of the legal system, understandable though they may be in their own sphere, are very different from the scientific requirement of eliminating bias and of conclusions based on the weight of the evidence.

Beck concludes that societies need to "install *brakes and a steering wheel* into the 'non-steering' of the racing techno-scientific development that is setting explosive powers free."[22] He argues that safety will be enhanced only if consequences are debated before major decisions are taken, if the injured do not have an impossible burden of proof, and if perpetrators are required to prove that their commodities and production are not hazardous. The debate will have to involve "the inclusion of experts and counter-experts, finely balancing a variety of disciplines, so that their

systematic errors throw one another into relief."[23] Although Beck's solution of debate between experts and counter-experts has a pleasant ring to it, such debate can in practice throw the population and decision-makers into a state of confusion and indecision. Despite all the risks and obstacles under reflective modernization, he draws an optimistic conclusion: "the enlightenment is beginning anew … from the industrial stone age of the past to an enlightened, future industrialism of actions where the basic questions of 'progress' are extricated from the anonymity of organized non-responsibility, and new institutions of attribution, responsibility and participation are created."[24]

Socially constructed discourse claiming safety must not be confused with its material referent. If discourse concerning safety is erroneous, "there remains only the social construction of non-toxicity. It does not, admittedly, inhibit the effect, but only its designation … That might be a momentary consolation, but it is no help against poisoning."[25] Beck adds that hazard forces people to rediscover humans as beings embedded in nature's dynamics, implying that in periods without visible hazards, humans tend to assume they are free-floating socio-cultural entities. A disaster or even a threat can teach humans, through the pressure of necessity, about the contradictions of managing hazards in risk society. He argues that risk awareness is time and again shored up by "the objective counter-force of hazards: it is constant, enduring, not tied to the interpretations that deny it, present even where the demonstrations have long since weakened."[26] Denouncing talk about hazards as alarmist or hysteria does not make the hazards go away. Biophysical events undermine assumptions of safety and mastery of nature. Public relations campaigns and skilled rhetorical claims of safety run up against unintended, unwanted biophysical consequences. These strategies can suppress "the *perception* of risks, but only the perception, not their reality or their effects; risks denied grow especially quickly and well."[27] Material consequences send shock waves through institutions as well: "Disasters, near-disasters and suspected disasters expose to public view, and thus render fragile, the technological backwardness of policy and law."[28] Disaster and the risk of disaster inspire the mass media with the possibility of high circulation levels. Thus they create the basis for reflection and the potential to change. Anthony Giddens also argues that "bads generated by industrialism provide an impetus to change in and of themselves," giving as an example traffic congestion that leads city authorities to create traffic-free city centres.[29]

Usually, consciousness precedes action: we think, then we act. But this order is reversed under modernization's manipulation of nature's processes: action occurs, danger changes the world, and then people become

conscious of it; this awareness provokes further social change. Similarly, "manufacture precedes research … Test-tube babies must be produced, genetically manipulated beings engineered, reactors built, before and in order that their characteristics and safety may be studied."[30] Repercussions are examined in a field setting. The planet has become a real-life testing grounds where few, if any, experimental controls are possible. Beck argues that political action gains influence through the detection and perception of risks. Hence social structural change involves "the creation of awareness of the autonomous revolution of hazard that industrialism has turned into in its phase of technological self-creation."[31]

There are, nevertheless, major problems in perceiving risks because everyday life is culturally blinded: culture promotes the belief in normalcy even where threats lurk. Much of the construction of modernity is faith-based, but not on religion. Faith in progress leads to "the continuous changing of society into the unknown, without a program or a vote. We assume that things will go well, that in the end everything we have brought down upon ourselves can be turned back into progressiveness … Consent without knowledge of wherefore is the prerequisite … The productive forces, along with those who develop and administer them, science and business, have taken the place of God and the Church."[32] More than ethics is required to steer the development of applied science. Beck argues that an ethical renewal of the sciences would be no more effective than a bicycle brake on a jetliner because of the power of technological development and its connections with economic interests. He suggests a hypothesis: "as the hazards increase in extent, and the situation is subjectively perceived as hopeless, there is a growing tendency not merely to accept the hazard, but to deny it by every means at one's disposal."[33] The state may go into a mode of defensive aggression in which talking about hazards is discouraged. The hypotheses may be correct in some cases, but in other cases disasters and threats impel insight and action, rather than denial and despair. As described above, Beck himself contends that the experience of biophysical consequences can jolt the socio-cultural into change. Thus his denial hypothesis is contingent and can be modified by becoming aware of the tendency to deny hazards that seriously threaten ways of life.

Many of the dangers created by applied science are knowable only through science. These hazards are "invisible and yet all too present – and they now call for experts as sources of answers to the questions they loudly raise."[34] Science is required to increase awareness of the problems it has itself created and to have the cognitive means to deal with them. "Perhaps there will be a variety of alternative forms of science, of which we have as yet no conception, in the future of scientific-technological civilization, but not an alternative to science."[35] Beck's critique of science

leads, not to the rejection of science, but instead to its expansion. Paradoxically, faith in science is a necessary part of the critique of modernization. Thus it is not the proponents of a new Stone Age culture who are warning of perils but often people who are themselves scientists. An anti-science ideology leads to perverse consequences, such as the obfuscation of risks. The complexity of risks under reflexive modernization in the risk society, however, leads Beck to specify a social danger. "The democratic institutions sign their declaration of surrender, and in the splendour of their formal responsibility they delegate power over matters of safety to the technocratic 'alternative government' of corporately organized groups."[36] He has a nuanced, complex assessment of science in the modern world, whereby science is becoming more necessary but less sufficient.[37] Democratic institutions are needed to check and balance science. They have the difficult task of mitigating the risk of becoming subservient to scientific institutions that commit their own errors and have their own vested interests.

Peter Dickens has elaborated a theory about the interaction between modern communities and nature that adds further important elements.[38] The development of modern technology has transformed nature, and this effect turns back and modifies humans psychically: efficient technology has prompted large groups to presume their invulnerability and omnipotence, to become unconcerned with the future and obsessed with the present. Industrial development and massive consumption have led to an egocentric, self-absorbed form of individualism that creates the illusion people are independent by obscuring their deep dependence on other people and on nature's dynamics. They are alienated from material reality. Industrial capitalism has created a personality type of passive selves engaged in pursuing commodities, which has led to serious environmental problems, including global climate change, and is not conducive to sustainable communities. Dickens argues that "it will take the breaking in of reality, in the form of, for example, a substantial transformation of weather systems, for the culture of narcissism to be transformed."[39] Thus he ominously implies that it will take a disaster to break the culture of consumerism based on a presumption of invulnerability.

THE SOCIAL RECONSTRUCTION OF NATURE UNDER MODERNITY

A very different theory has been and still is the basis of most practices in modern society. The theory of what I would call the social reconstruction of nature holds that there is nothing to worry about concerning the depletion of resources, pollution, and other environmental problems: future dis-

coveries and inventions will solve them all. Why? Because human reason is the ultimate resource.[40] Scarcity has been made obsolete: when one resource is depleted, reason can in a timely fashion transform something else into a substitute, so that there will be no problem of depletion of resources. Unlimited economic growth is possible if the infinite substitutability of resources is assumed. Similarly, waste sinks will be invented as needed. Thus the economist Julian Simon argues that "within a century or two, all nations and most of humanity will be at or above today's Western living standards."[41] Rationality leads to cornucopia if one assumes that nature can be mastered, moulded, and recombined at will to satisfy the increasing desires for consumption by a still-growing human population. Extrapolations from the recent past and short-term time series data are given as proof that present trends are robust and will continue into the future. Economics, which previously was called the "dismal science" because it dampened aspirations by calculating the costs of projects, has in environmental matters become the euphoric science, predicting wealth for everyone forever.

This theory has been applied to disaster readiness as well: the wealthier the country, the greater capacity it has to be robust and resilient when confronted by nature's forces. Wealthy nations have the resources to protect their citizens, so they need not be concerned about environmental problems such as sea-level rise from global climate change. Bjorn Lomborg argues that "it seems likely that rich countries (as almost all countries will be by the end of this century) will protect their citizens at such a low price that virtually no one will be exposed to annual sea flooding."[42] He claims that the continued growth of economic wealth has occurred almost automatically because of our fundamental organization in a market economy, and that environmental problems will be solved more by the World Trade Organization than by the International Panel on Climate Change. Lomborg contends that the precautionary principle must be strictly circumscribed to allow the market to create wealth.[43] Progress consists of humans as anti-nature beings freeing themselves from the constraints of nature and of animality and ascending to the sphere of culture and reason.[44] The only danger seen in this theory is a scarcity of rationality if anti-market, anti-technology ideologies gain ascendancy.

Some versions of this theory frame the ethical dimension in terms of dealing with one problem (AIDS) rather than another (global warming), but not both. Other versions dismiss the ethical problem of high greenhouse-gas emitters harming low emitters. Both argue against policies that would limit the growth of consumption by high emitters, and instead place all their hope in the unregulated market producing technological innovations that will make clean energy cheap.

The above theory has been a continuing refrain in wealthy societies, with slight variations on the same theme being advanced by different authors, typically economists, business futurists, and philosophers.[45] Although the broader population does not articulate the theory in an abstract fashion, it too often expresses the same views. For example, the most popular talk-show host in the United States preaches it regularly.[46] Many, and in some societies most, politicians are predisposed to accept this cornucopian theory rather than the opposite message that present consumption in wealthy societies is unsustainable and needs to be reined in. Corporations, states, and the population act as if this theory were the basis for their social practices, even when their discourse appears concerned about environmental problems. Assumptions of nature's malleability and its mastery by science, the market, and rational organization have been and remain the central organizing creed of modernity and postmodernity. The premise is that nature's dynamics have been tamed and harnessed by reason to safely fulfill human desires. The belief that technological inventions will appear in a timely fashion to solve problems threatens, however, to make the population and leaders complacent about such issues and to discount risk. This is why disasters are so shocking: not only is there physical destruction but also, on the cultural level, the hubris of reason mastering nature is challenged.

THE MODERN TREADMILL OF PRODUCTION

The previous theory focuses on the way the modern market and applied science reconstruct nature in new technologies and in the broader environment, and it predicts that those institutions will generate an ever-increasing quantity of wealth. Other theorists, however, view this development as a source of danger. Allan Schnaiberg, Alan Gould, and Adam Weinberg use the metaphor of a "treadmill of production,"[47] which draws attention to the need of the market to produce a profit by continuously creating consumer demand for new commodities: for example. through advertising to enhance lifestyles. It "refers to a type of political economy that comprises a set of practices, assumptions, and structures which are geared toward economic growth, technological innovation, and diffusion and, therefore, continued ecological destruction."[48] They contend that a treadmill of production not only of commodities but also of pollution and emissions is an inherent feature of the modern market which is transforming human interaction with the environment from surplus to eventual scarcity. This treadmill is a complex mechanism that propels further expansion even when confronted by environmental prob-

lems such as pollution and resource depletion. Resource shortages are temporarily solved, not by conservation and reducing consumption, but instead by extracting resources from new geographical areas and substituting new materials. This apparent solution only displaces problems to new sites, depletes additional sets of resources, and shifts risk to a broader level: the global scale. Disaster mitigation and preparedness are also limited by requirements of profitability.

When environmental problems threaten, the state does what it can as regulator so as to avoid having to diminish economic growth.[49] There is a dialectical tension between the treadmill of production and demands for environmental protection, a contradiction that governments deal with through environmental managerialism.[50] Gould and colleagues contend that "the support of private capital, labor, and the state for economic growth implied conscious or unconscious support for ecological disruption and environmental degradation. This was true even when those social actors claimed an awareness of and concern for such negative impacts."[51] The conclusion of the treadmill perspective is that environmental problems cannot be solved or modern risks diminished by new technologies because increases in efficiency per commodity produced are more than offset by growth in the production of more commodities. "The driving force is the private sector's economic search for profitability, which has been expanded to a global quest for markets."[52] They refer to this process as an increased tilt or acceleration of the political-economic treadmill. Only by a sustained political mobilization against the treadmill of growth and hence a major structural change of the market, they argue, will environmental problems be solved.

ECOLOGICAL MODERNIZATION

Another theoretical perspective pitches itself between the previous two theoretical poles. The problems generated by technological innovation and the market are not automatically solved by increasing the wealth of nations. Nor is the treadmill of risk production a necessary feature of market forces, solved only by the elimination of the market. The modern world can, according to this theory, deal with environmental problems such as global climate change if and only if ecological goals are explicitly and intentionally integrated with economic goals in the market and in technological development so as to attain sustainable development.[53] Ecological modernization theory is related to the sustainable development theory of the Brundtland Commission.[54] Early versions of ecological modernization emphasized technological innovations, more efficient produc-

been tried and found wanting; rather, the dilemma is that most societies have refused to try it because of lifestyle habitus and consumption aspirations. The significant question is, will risk be perceived and acknowledged,[72] expectations about nature's dynamics improved, foresight developed, and mistakes diminished? We turn now to the study of cases where that did not happen.

DISASTER

Charles Perrow has shown that the incongruence between socially constructed expectations of safety and nature's autonomous constructions has led to high-technology accidents: "we acted in terms of our own designs of a world that we expected to exist – but the world was different."[73] Diane Vaughan described her study of the Challenger Space Shuttle disaster as "the sociology of mistake" in arguably the world's foremost institution of scientific knowledge, NASA.[74] Disaster research has found that there has often been a "failure of foresight" during "the incubation of disasters" which has led to "man-made disasters."[75] Thus researchers argue that disasters occur when there is a divergence between socially constructed expectations about nature's energy and nature's movements resulting from that energy.

Conceptualizations of Disaster

It is important to note that "disaster" and "hazard" are defined by humans in terms of severe adverse consequences on human communities. For example, the extinction of the smallpox virus is not referred to as a disaster in human discourse. An earthquake, volcano, or extreme weather event that threatens land or ocean so remote from humans or so pristine that it has no effect on humans is not viewed as a hazard.[76] There are many perturbations of nature, as ecologists use the expression,[77] but only the fraction of them that threaten human communities constitute hazards.

Severe adverse consequences for human communities can occur in different forms. Some researchers focus on fatalities.[78] If disasters are indicated by huge numbers of fatalities (many tens of thousands), then disasters only occurred in the past or now in developing countries.[79] About 1,300 Americans died as a result of Hurricane Katrina, there were 2,941 fatalities from the terrorist attacks on the World Trade Center, and about 15,000 died as a result of the 2003 heat wave in France. Horrible though these statistics are, they constitute a different order of magnitude from the 220,000 killed by the 2004 tsunami in the Indian Ocean, the 87,000 who

died in the 2005 Pakistani earthquake, the 242,000 fatalities in the 1976 earthquake in China, the 131,000 who died in the 1991 cyclone in Bangledesh, and the 300,000 who died there in the 1970 cyclone.[80] In Japan the number of fatalities from natural disasters has significantly decreased since modernization began. Modern technology and organization have dramatically reduced the death toll, making modern communities largely disaster-free according to the indicator of many tens of thousands of fatalities. That pattern may not remain true, however, if global environmental change occurs or if an epidemic escapes control. Modern mitigation of fatalities is impressive but tenuous.

If disasters are defined by social disruption and destruction of property, however, modern communities are severely afflicted by disasters – indeed, by ever-more-costly and highly disruptive ones. Hurricane Andrew caused enormous disruption and damage in Miami and bankrupted several insurance companies. Hurricane Katrina triggered even more serious consequences. The escalating costs of disasters are causing serious concern among global reinsurance companies, governments, and the United Nations. Modern technological and organizational methods used to avoid the acute problem of fatalities have also created chronic, painfully expensive problems of disaster preparedness and the monitoring of nature's dynamics, yet the costs of disasters are increasing.[81]

The most basic distinction concerning disasters has to do with their source, such as differentiating between natural disasters, technological disasters, and those having terrorism at their origin, all three affecting the local sustainability of communities. This distinction has explanatory usefulness: some researchers argue that natural disasters promote community solidarity, whereas technological disasters and terrorist attacks arouse condemnation and conflict.[82] However, these tendencies should not be exaggerated, and the opposite propensities occur as well. Natural disasters frequently result in governments being blamed for an inadequate response or preparedness. The consequences of Hurricane Katrina on New Orleans reminded everyone that the impact of a natural disaster depends not only on the force of a hurricane but also on the effectiveness of preparation and response. Furthermore, Barry Turner and Nick Pidgeon have shown that what is commonly referred to as a technological disaster often consists of nature's dynamics, which had been assumed to be technologically harnessed, slipping their leash.[83] Terrorists, too, use nature's dynamics embedded in technology (e.g., jet-fuel-filled airplanes and gravitational forces on skyscrapers) to cause a disaster. Thus there is some explanatory usefulness in the distinctions between natural, technological, and terrorist disasters, but it must not obscure the fact that the interaction of social constructions with nature's constructions is involved in all three and needs to be unpacked case by case.

embedded in a material world of nature's own dynamics, the character of nature's precipitant has major consequences for society. Social life is premised on socially constructed expectations about nature's dynamics, whose independent actions at times contradict those expectations, with disastrous consequences, because essential material infrastructures depend on the premises being met. Naturalizing risks and disasters yields a weak analysis of them, but so does the opposite fallacy of sociologizing them: "disasters are totalizing events … [that] bring about the conjunction of linkages in causal chains of such features as natural forces or agents, the intensification of production, population increase, environmental degradation, diminished adaptability and all their sociocultural constructions."[116] Disasters and environmental calamities are not just nature's constructions, nor are they just social constructions; rather, they consist of an extreme interaction of the two.

When the vulnerability approach is integrated with the hazards approach, analysis focuses on the conditions and structures that make a society vulnerable to both socio-economically and environmentally generated hazards. Modernization is a fallible attempt at adaptation to the environment, the success of which varies among communities and over time. "The same patterns of adaptation, while reasonably effective for some or many in the short run, may equally sow the seeds of future vulnerability and disasters in the long run."[117] Thus modern "development is the prime medium of vulnerability and its reduction."[118]

Disasters and Environmental Problems

Environmental problems and disasters are related. Hurricane Katrina's devastation along the coast of the Gulf of Mexico was so great because wetlands, which play a crucial role in absorbing storm surges from hurricanes, and barrier islands, which protect the coast, had been degraded by decades of development. Fossil-fuel emissions threaten to exacerbate the greenhouse effect, thereby causing sea-level rise and more energy in ocean waters, which in turn have been predicted to lead to more frequent and intense extreme weather and hence disasters in vulnerable places. For their part, disasters cause environmental problems. Hurricane Katrina overwhelmed technological controls, thereby releasing a cesspool of sewage and toxic materials in New Orleans.

Investigations of natural disasters have concluded that the intensified activities of industrialization have exacerbated vulnerability and will increase the frequency and cost of disasters in the twenty-first century.[119] Choices of development inappropriate for nature's dynamics lead to "disasters by design,"[120] "repeat disasters,"[121] and "unnatural disasters."[122]

Those studies documented that disasters are fostered when the state's role has been restricted to post-disaster reimbursement rather than the regulation of development that lies in harm's way. Environmental problems are catalysts of disasters; hence it is necessary to link protection against natural hazards[123] and disaster reduction[124] to sustainable development. As one researcher put it, "sustainable development is about disaster reduction."[125] Conversely, disaster reduction is about sustainable development. Disasters have been referred to as "the monitor of development … Whether these processes [of development] have been planned or whether they have been fortuitous, whether they have caused or exacerbated vulnerability, or whether they have reduced vulnerability, will be exposed in the manifestation of natural hazards."[126] Disasters have been called "unpaid bills" and an externalized "debt of development"[127] because costly preventative measures were not implemented.

APPENDIX ONE

Methodology: Doing Interviews at the Top and Listening to Plain Folk

Before I undertook this study, I had written several books about social theory and debates in the field of sociology.[1] My discipline prides itself on taking into account the broader context in which social and cultural life occurs, rather than specializing narrowly in one area like economics or political science. I had come to the conclusion that sociology and a large part of the social sciences had, however, ignored and abstracted out an important set of contextual influences on social and cultural life. It had, to use its own language, "put in parentheses," "bracketed," and "suspended" the effects of the biophysical context. That was a mistake because humans are beings embedded in biophysical dynamics. Although they can culturally construct any beliefs and social practices they want, these have material consequences because they interact with the constructions of the biophysical world. It is important to take into account material consequences and the interaction between the socio-cultural and the biophysical, rather than restricting investigations to discourse alone.

Expectations and beliefs do not exist in a biophysical vacuum. Humans are not pure socio-cultural spirits. Culture mediates material experience, but we must not lose sight of the fact that there are material dynamics of nature within and outside of the human body to mediate. When biophysical phenomena are experienced, material consequences can affect cultural beliefs and social practices. Such beliefs and practices can not be explained only on the basis of prior beliefs and practices. Humans should not be assumed by the social sciences to be blind and senseless. Beliefs about the material world are fallible, some more false than others. Since beliefs shape practices, mistaken expectations about the physical world can lead

to particularly harmful consequences. The appropriateness or fit between our cultural representations of the dynamics of the biophysical world and their material referents have to be included in the analysis, even it this can only be done tentatively or retrospectively.

INDICATING THE REFERENTS OF DISCOURSE

The terms "nature" and "risk" are cultural constructs, but they have biophysical referents. Investigations miss an important dimension if they proceed as if those referents do not exist. The term "nature" is admittedly an umbrella concept, much like the word "sick." It refers to a complex aggregate of biophysical dynamics. Like many other words, it is used in this book as a shorthand designation to prevent the writing from becoming too heavy.

This book, like all such studies, is necessarily socially constructed discourse. The material upon which it is based is discourse: social science theory, empirical research studies, interviews, media reports, and other sources. But the book does not treat this discourse as if it had no referents, as if the world and, in particular, the extreme weather disaster were fiction existing only in the minds of the authors or speakers. So how can research document the referents? Does it have to be agnostic about the existence of disasters, extreme weather, and environmental problems? That approach would not be very convincing. It would ignore important phenomena and would have the same social consequence as denying risk and environmental problems. It would be limited to the question of how discourse is constructed and give only a partial answer to even that question by neglecting biophysical contextual contingencies that affect the social construction of discourse.

The best way of indicating the referent of discourse is to take into account in the analysis the best available evidence about the phenomena referred to and to use triangulation. Concerning the dynamics of nature, this means using rather than ignoring the results of natural science research in the social sciences, that is, taking interdisciplinarity seriously. Triangulation, in turn, means getting at the referent from various sources and angles. This process solidifies documentation of the phenomena under investigation, but it can lead to repetition in the writing of a book. Hence a balance was sought, with a great deal of empirical material being shaved off in the final revision to minimize repetition. The result will not completely satisfy everyone; some readers will conclude that there is still too much repetition and others that the referents should be documented further.

A RESEARCH PROJECT FALLS FROM THE SKY

By January 1998 I was looking for an empirical research project that would not be limited to the socio-cultural but would instead examine the socio-cultural in its context of the natural world in which we live. I had concluded that this approach was crucial for the study of many areas where the interaction between the socio-cultural and the biophysical is central: science, technology, risk, health, aging, and so on. In fact, it is difficult to find an area where that interaction is not important and can be ignored. With all these concerns in mind, I had become particularly interested in studying environmental problems resulting from the interaction between social constructions and nature's constructions, rather than examining environmental issues as solely socio-cultural discourse.

One morning during the week of 5 January 1998 I was teaching a graduate course on environmental sociology at the University of Ottawa when we were told that the university was being shut down because the head of the regional government, Bob Chiarelli, had declared a state of emergency. We were instructed to go home. At the time I found this decision strange. True, there was freezing rain, but the area experiences that phenomenon about a dozen times a year. I must admit my first thought was that Canadians had become wimps, so preoccupied with comfort they could not withstand what their hardy ancestors would have seen as a minor inconvenience.

But I was wrong and Mr Chiarelli was right. Our ancestors were not dependent on a centralized electrical grid to supply heat, light, energy for production, entertainment, and other activities. They did not teach and learn in a windowless classroom dependent on heat exchangers, air recyclers, and florescent lighting. Our modern society had inadvertently made itself more vulnerable to nature's infrequent but massive disturbances. The scope, intensity, and duration of the freezing rain that crushed electrical transmission and distribution lines and disorganized modern society demonstrated the power of nature's autonomous dynamics, with which we humans interact. The unexpectedly intense, persistent freezing rain falling on societies that had become reliant on a centralized electricity network resulted in the most expensive disaster in the history of Canada and the state of Maine. This danger, which was not perceived in advance, showed that risk cannot be reduced to threats that are foreseen and debated. Its autonomy reminded everyone – and, it is hoped, social scientists – that only our symbolic representations of nature but not the referents are social constructions. There is a major difference between, on the one hand, assuming that nature's independent dynamics can be abstracted out of the analysis of the social and, on the other, making

material reality conform to that premise. I had found my research project: namely, integrating research on environmental problems and on disasters through an investigation of the management of this extreme weather disaster in northeastern North America.

I read up on research about disasters and found it fascinating. It had developed intriguing concepts such as "failure of foresight," "disasters by design," "man-made disasters," and the "sociology of mistakes" that are particularly relevant for the study of the consequences of socially constructed discourse when it encounters dynamics of autonomous nature which cannot be reduced to discourse about it or, stated more simply, "when nature objects to what has been said about it."[2] Most disaster sociology had seen that social practices based on discourse have material consequences even if judgments have to be made post facto. Hence determinations were made that one discourse is correct (there is an iceberg in the path of the *Titanic*) and that the opposite discourse is wrong (clear sailing for the *Titanic*). Once we admit that mistakes have been made rather than assume a relativist equivalence of all discourses, learning can begin.

PUBLISHED MATERIAL

I wrote up a project to investigate governance during and following this extreme weather disaster and to study learning by key leaders from their experience. It was awarded a grant from the Social Sciences and Humanities Research Council of Canada in a national competition, which made this research possible, and I am very grateful for that funding. The first part of the project involved collecting and analyzing all the written material on the subject. Much information had appeared in newspapers and magazines, books of stories and photos had been published, a Quebec scientific commission had issued a five-volume report based on its research,[3] meteorological studies had been done, and insurance companies had undertaken analyses from their perspective. This material provided the documentation for Part Two.

DOING INTERVIEWS AT THE TOP

The next and main part of the research consisted of interviews with leaders who had had key roles in the management of their society during its interaction with this extreme weather. The interview material forms the basis of chapters 7 to 12. Leadership during a crisis is crucial for determining its outcome and is particularly revealing about how a society is

APPENDIX TWO

The Interview Guide

Note: The following guide was prepared for the interview with Bob Chiarelli, chair of the Regional Municipality of Ottawa-Carleton.

- Could you give your name and the position you held at the time of the ice storm of January 1998.
- Did you and the other decision-makers around you expect freezing rain of the intensity and duration of the one that occurred in January 1998?
- Could you describe the damage and the disruption that followed the freezing rain.
- Could you describe your participation in the decision-making and in the management of the consequences of the ice storm.
- If I remember correctly, one of your first acts in power was to declare a state of emergency. Was that a difficult decision? Could you describe how a state of emergency is declared in Ontario and in Ottawa and what it implies. Was the federal government shut down? For how long?
- Could you describe the communication of information between political leaders like yourself and the population. Did you appear on TV and radio in news conferences to give the population the latest information? Were there any problems in this exchange of information? Is there anything that you feel should be improved?
- Could you describe communication between political leaders like yourself and emergency management planners and technical experts. Are there any examples of friction or tensions that you could describe? Is there anything that you feel should be improved?
- What was the worst moment of the ice storm for you in your position, and what was the most difficult decision you had to make? What were the best

decisions and what were the worst ones that should be made otherwise in the future? Were there any decisions you would now with the benefit of hindsight make differently? Were you worried about panic or looting?

- In Montreal the mayor and directors of emergency measures told me that their worst moment occurred when two major water-filtration plants lost their power, water pressure decreased rapidly, and the risk of fire and water contamination increased. Was there anything equivalent here? When the filtration plants went down in Montreal, however, those decision-makers chose to hide it from the population and even from mayors in affected areas for fear that people would fill their bathtubs. Was there anything that decision-makers here withheld from the population?
- In Montreal the political leaders and emergency measures leaders were examining worst-case scenarios, including evacuation of the island city of Montreal, but they decided this was not feasible even in the worst case. Were you planning worst-case scenarios and what were they? Were they feasible?
- Was there an emergency management plan prepared in advance? Was it followed? Could you give me examples of improvisations that were necessary.
- What were the strong points and the weak points in the relations between municipal, provincial, and federal governments in the management of this crisis?
- Were you in contact with the premier of Ontario during the disaster, and if so, was there anything in your joint effort that could be improved?
- Were you in contact with the prime minister of Canada during the disaster? Did the fact that you were the head of the regional government in Canada's capital make your work easier or more difficult during this disaster? In what way?
- Did you and your organization receive all the expected cooperation from other organizations: federal and provincial governments, police, fire department, power companies, etc.?
- Did your perception of risk change as the storm developed, and if so, how did it change?
- Did the experience of this ice storm lead to improvements in the management of such crises? Which improvements?
- Could you elaborate on your views about (a) what was learned from this disaster as well as (b) what should have been learned but does not seem to have yet been learned.
- Before the ice storm, was there a culture of security here where leaders and the population were willing to invest money and time in emergency preparedness? Did the ice storm have an impact in promoting such a culture? Did 9/11? How do the two compare in the promotion of such a culture?

NOTES

INTRODUCTION

1 Erikson, *A New Species of Trouble*, 22.
2 Lecomte, Pang, and Russell, *Ice Storm '98*, 8.

CHAPTER ONE

1 See Murphy, *Rationality and Nature*.
2 Weber, *The Protestant Ethic and the Spirit of Capitalism*, 181.
3 Ibid., 181–2.
4 Albrow, *Max Weber's Construction of Social Theory*, 196.
5 Weber, *The Protestant Ethic and the Spirit of Capitalism*0 181.
6 See Murphy, *Rationality and Nature*, chapter 2.
7 Weber, *From Max Weber*, 139.
8 Weber, *The Protestant Ethic and the Spirit of Capitalism*, 180–1.
9 Ibid., 182.
10 Ibid., 183.
11 Weber, *From Max Weber*, 280.
12 Ibid., 147–8.
13 Mommsen, "Personal Conduct and Societal Change," 41.
14 Beck, *Risk Society*; Beck, *Ecological Enlightenment*; Beck, *Ecological Politics in an Age of Risk*; Beck, *Democracy without Enemies*.
15 Beck, *Risk Society*.
16 Ibid., 154.
17 Ibid., 55.
18 Ibid., 154.
19 Ibid., 22.
20 Ibid., 183.
21 Beck, *Ecological Politics in an Age of Risk*, 160.
22 Beck, *Risk Society*, 180.

23 Ibid., 177.
24 Beck, *Ecological Politics in an Age of Risk*, 84.
25 Ibid., 50–1.
26 Ibid., 99.
27 Beck, *Risk Society*, 45.
28 Beck, *Ecological Politics in an Age of Risk*, 168.
29 Giddens, *Beyond Left and Right*, 195–6.
30 Beck, *Ecological Politics in an Age of Risk*, 123.
31 Ibid., 103.
32 Beck, *Risk Society*, 214.
33 Beck, *Ecological Politics in an Age of Risk*, 48–9.
34 Beck, *Risk Society*, 54.
35 Beck, *Ecological Politics in an Age of Risk*, 127.
36 Ibid., 117.
37 Beck, *Risk Society*, 167.
38 Dickens, "Changing Our Environment, Changing Ourselves"; Dickens, *Society & Nature*.
39 Dickens, "Changing Our Environment, Changing Ourselves," 104.
40 Simon, *The Ultimate Resource*; Simon, *The Ultimate Resource 2*.
41 Julian Simon, "What Does the Future Hold?" in Simon, ed., *The State of Humanity*, 642.
42 Lomborg, *The Skeptical Environmentalist*, 290.
43 Ibid., 348–50.
44 Ferry, *Le nouvel ordre ecologique*; Ferry, Review of *Entre la nature et l'homme, je choissis l'homme*.
45 Kahn and Weiner, *The Year 2000*; Clark, *Starvation or Plenty?*; Maddox, *The Doomsday Syndrome*; Hamilton, *Technology, Man and the Environment*; Krieger, "What's Wrong with Plastic Trees?"; Beckerman, *Two Cheers for the Affluent Society*; Clark, *Population Growth*; Vayk, *Doomsday Has Been Cancelled*; Smith, ed., *Scarcity and Growth Reconsidered*; Simon, *The Ultimate Source*; Simon, *Immigration;* Simon, *The State of Humanity*; Simon, *The Ultimate Source 2*; Simon and Kahn, *The Resourceful Earth*; Sjoberg, *Risk and Society*; Ray and Guzzo, *Trashing the Planet*; Maduro and Schauerhammer, *The Holes in the Ozone Are Scarce*; Bailey, *Eco-Scam*; Ray and Guzzo, *Environmental Overkill*; Easterbrook, *A Moment on the Earth*; Beckerman, *Small Is Stupid*; Huber, *Hard Green*.
46 Limbaugh, *The Way Things Ought to Be*.
47 Schnaiberg, *The Environment*; Schnaiberg and Gould, *Environment and Society.*
48 Gould, Schnaiberg, and Weinberg, *Local Environmental Struggles*, 18.
49 Novek and Kampen, "Sustainable or Unsustainable Development?"
50 Redclift, "Redefining the Environmental 'Crisis' in the South."
51 Gould et al., *Local Environmental Struggles*, 7.
52 Ibid., 8.
53 Mol, *The Refinement of Production*; Mol, *Globalization and Environmental Reform*; Mol and Sonnenfeld, eds., *Ecological Modernization around the World*.
54 World Commission on Environment and Development, *Our Common Future*.
55 Mol, *Globalization and Environmental Reform*, 211.

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