The Coupling of the Chronic and the Acute: Environmental Problems, Disasters, and Leadership[1]

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The intensified activities of a growing human population have resulted in dangerous new linkages between the slow-onset and the sudden. Social constructions are in continual interaction with emergent and only partially understood constructions of nature. Human activities now unleash nature's constructions on a planetary scale. For example, greenhouse-gas emissions let loose the chronic environmental problem of global warming, which gives rise to acute hazards such as more intense and frequent extreme weather events. This paper first develops a theoretical framework for integrating environmental sociology and disaster sociology. It starts from some key concepts suggested by Max Weber and incorporates conceptions developed in environmental sociology and disaster sociology. The second part uses this theoretical framework to analyse interviews with political and emergency management leaders who had to manage an extreme weather disaster.

A Weberian Analysis of Modern Hubris

Weber argued that rational structures provide technically better solutions to problems, which leads to the motivation for the further development of those structures (Albrow 1990: 196). He (Weber 1958: 139) characterized the intellectualized culture in the modern, rationalized world as the following belief: "there are no mysterious incalculable 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." But Weber developed a nuanced analysis. He (Weber 1930: 182) did not uncritically accept the development he explained. He argued that the intensification of formal rationality (as embodied in the market, applied science, bureaucratic organization, and the legal system) has led to the magnification of substantive irrationalities in terms of specific values (Albrow 1990, Murphy 1994). For example, rationality assessed in terms of economic growth and consumption has resulted since Weber's time in the use of the atmosphere as a dump for pollution and carbon emissions. This has inadvertently produced a greenhouse effect and global heating with dangerous consequences, which has been judged irrational in ecological terms.

Moreover an even deeper reading of Weber's work is possible. Weber's portrayal of intellectualization can be interpreted as more a description of modern hubris than of objective mastery by calculations of previously mysterious forces. Thus it is a depiction of "mechanized petrification, embellished with a sort of convulsive self-importance" (Weber 1930: 182) where Weber concludes that "this nullity imagines that it has attained a level of civilization never before achieved". Those were strong words indeed. Intellectualization is a <u>belief</u> in the mastery of all things by calculations and technical means and the <u>expectation</u> that mysterious forces have thereby been eliminated. It should not be equated with all things having been mastered or mysterious forces eliminated. The belief must not be mistaken for its referent any more than the belief in flying saucers be mistaken for their existence. Intellectualization does not imply that calculations are infallible nor technical means omnipotent. Analysis should not abstract modern intellectualization out of its biophysical context. The presumption that modern social

constructions now master the biophysical constructions of nature is put to the test in its material context. Do modern societies eliminate mysterious forces through calculations and technical means? If not, what can be learned from the failure of action and practices to match discourse?

Risk

Risk is the concept that unites environmental research and investigations of disasters. For example, greenhouse-gas emissions constitute an environmental problem causing global climate change that brings the risk of disastrous sea-level rise, extreme weather events, drought, wildfires, and other difficult-to-foresee threats (Broecker 1997; IPCC 2001, Webster et al. 2005). Risk is widely understood as the chance of harm. There are many ways of attempting to estimate in advance the chance of harm, or of its opposite, namely, safety. Two generic types are particularly important.

First, routine lay estimates of risk and safety are done all the time, as when jaywalkers assess the risk of walking across a busy street where there is no traffic light. When the Mount St. Helens volcano threatened to erupt, a few residents refused to evacuate because they had lived there for decades and never had a problem, so they expected it wouldn't be so bad. Their bodies are now buried under the lava and debris (Fischer 1998: 20). Influential talk show hosts in North America (Limbaugh 1992) continually make lay assumptions about the safety of fossil fuels and dismiss as junk science the risk of global warming. These illustrations are given intentionally to correct the predilection of some social scientists to assume that lay knowledge is on the side of the environmental angels, which is often not the case. Routine lay assessments of risk and safety are trial-and-error estimates based on past experience, often short-term experience, and on sociocultural habitus. They have validity when the situation is continuous, but for discontinuous situations they can be misleading and be the basis of a failure of foresight.

Second, scientific calculations of possible harm are more formal, sophisticated means of assessing safety or risk. They strive to attain a deeper understanding of the underlying mechanisms. Thus meteorologists calculate probabilistic estimates of the chance of rain or the chance of extreme weather events. Scientists make measurements of the depletion of the ozone layer. Climatologists construct computer models of the likelihood of global warming and its consequences. Typically scientific calculations and technical means have provided more accurate risk assessments, as well as estimates where no other estimation is possible, and this is the basis of their appeal. However, assuming that risk is identical to its probabilistic calculation would be equivalent to assuming that risk calculations are infallible. The knowledge upon which risk calculations are founded is typically incomplete (Murphy 2009), hence they are sometimes wrong.

Assessments of risk and safety, whether lay or scientific, are fallible estimates. They do not constitute material risk or safety itself. The risk discourse society is a significant adjunct to the risk society, but the most important characteristic of the risk society consists of new modern material risks. Risk is not only what society thinks it is and what society talks about as risk. The risk society is not merely a society of risk calculations and new perceptions of danger, although it is that. It is more significantly a society that has unleashed new chance of harm through letting loose new unmastered constructions of nature, like global climate change.

It is important to distinguish between the plausible and the accurate when analyzing risk. Plausibility is a socially constructed discourse based on framing, culture, power, and prior material experience. It is partly in the eye of the beholder and varies according to the audience. The risk hypothesis that human activities are causing global warming and harmful consequences is accepted as plausible by some groups, rejected as implausible by others, and acted upon as if it were implausible by many. The proportion in these three categories varies from society to society. Both lay and scientific claims vary in their plausibility. Most importantly, plausibility is only a rough approximation of substantive accuracy. The chance of material harm is the referent of risk discourse. That referent refers to the coupling of socially constructed vulnerability with either i) nature`s construction of hazards for humans, such as earthquakes, or ii) hybrid constructions of both humans and nonhumans, such as human activities like fossil-fuel emissions that interact with atmospheric dynamics causing a greenhouse effect and global climate change.

The assumption of acceptable risk is also a social construction that varies between societies and within them. It may be plausible but inaccurate when socially constructed vulnerabilities confront nature's still mysterious forces. How can the accuracy of risk discourse or safety discourse, whether lay or scientific, be verified? This consists of the same issue as concerning intellectualization at the beginning of this paper, indeed it is a subset of the same question. How can it be determined whether modern societies master all things by calculations and technical means, and whether they have eradicated mysterious, incalculable forces? Are intellectualization and assessments of safety statements of fact or expressions of modern hubris?

Disaster Sociology

Nature's dynamics provide reference points for distinguishing between plausible but erroneous risk assessments and accurate ones. Death is one such reference point that prompts reassessments of what was assumed to be safety and acceptable risk. Autopsies are conducted to increase understanding of what led to a particular death and also to learn the causes of mortality that can be used to reduce the risk of fatalities in the future. Similarly disasters constitute another reference point that prompts re-evaluations of assumed safety. Disaster research has conducted post mortems of calamities in order to comprehend why they happen and take measures to mitigate risk and increase robustness and resiliency. Disasters are particularly instructive in prompting learning about differences between risk assessments and the referent: material risk itself. Learning from hindsight analyses of the acute is the basis of better foresight for the chronic problem of preparing to avoid calamities. Disasters can teach scientists that their previous risk calculation was wrong, and in some cases, that risk was unknowable under the state of knowledge prior to the disaster. If nothing else, this has the potential to diminish modern hubris and to promote more accurate humility when social constructions interact with nature's constructions.

Environmental sociology can learn a great deal from disaster sociology, especially from the conceptual framework of Turner (1978). He studied technological disasters, and argued that the interaction between socially constructed expectations and nature's construction of energy is particularly important for explaining disasters or safety. If expectations of nature's energy are appropriate, whether they be about nuclear reactions in reactors, icebergs in a ship's path, explosiveness of a hydrogen blimp, etc.,

then vulnerability can be reduced, robustness enhanced, mitigating or evasive action taken, and a disaster avoided. But if expectations of nature's energy are wrong, whether out of ignorance, wilful blindness, or recklessness, then this is the source of disaster. I have argued elsewhere (Murphy 2009) that Turner's theory of the incubation or avoidance of disaster explained by the interaction of socially constructed expectations with nature's construction of energy can be developed as an extension of Weber's theory of social action. This can be elaborated through an expansion that takes into account non-social action oriented to nonhuman actants.

The interaction of Turner's two key variables – human expectations and nature's energy – is also key to explaining natural disasters and their mitigation. This is especially true for wealthy modern societies. Japan is located in a hazardous area where typhoons, earthquakes, and tsunamis often strike. This energy of nature is now expected, defences have been erected, and Japan is therefore much safer than it was in the past. The interaction of expectations and nature's energy is in addition crucial to explaining potentially disastrous environmental problems. Fisheries disappeared when expectations of limitless fish were contradicted after more efficient fishing technologies were used. CFCs were expected to be safe when launched on the market, but as Latour (2000) would say, those chemicals objected to what the CFC industry said about them. Ozone-layer depletion was subsequently revealed by science. Fortunately expectations are not written in stone, the risk of disaster led to altered expectations by political leaders, the Montreal Protocol was enacted, CFCs were phased out, and the ozone layer is now replenishing itself. Fossil fuels are following the same trajectory, but with an unknown end point. They were at first expected to be safe, but now science is discovering troubling evidence they bring harm, and visible lay observations of glaciers and permafrost also point in the direction of looming danger. Fossil fuels are, however, deeply embedded in modern societies, so the temptation is great to ignore futuristic risk assessments and base action on expectations of safety founded on recent past experience and cultural habits. Despite all their calculations, modern societies could fail to base their practices on accurate expectations of risk, just as they have done in cases of disasters. Hence it is important to investigate these cases.

The Chronic Burden of Protecting Against the Acute

The disaster studied here resulted from intense, persistent freezing rain, which paradoxically was produced by warming, that crushed the electrical grid and led in the winter of 1998 to the most expensive disaster in the history of Canada and of the State of Maine in the United States affecting the most people in both those places.[2] It just missed Boston. Amish communities in the area experienced the same intense, persistent freezing rain but not a disaster. For them, the consequences were trivial instead of devastating because they had rejected dependence on that centralized grid for religious and social reasons. The comparison of the United States and Canada with Amish communities demonstrates that these two intellectualized modern societies inadvertently manufactured an acute natural disaster by constructing dependence on an electrical grid. The practice of technological and commodity triage by Amish communities resulted, on the other hand, in the avoidance of disaster. Similarly, such triage has led them to activities that make little contribution to greenhouse-gas emissions, whereas the activities of modern societies are manufacturing chronic environmental problems like global warming that risk becoming acute disasters. The comparison with the Amish also demonstrates that the

modern treadmill of production is based not on a technical imperative but rather on value choices. This implies that modern communities too could make a technological and commodity triage to avoid acute disasters and chronic environmental problems like climate change. This does not mean they have to convert to Amishness; instead it could be based directly on ecological values.

Reliance on a centralized electrical grid for essential needs, including heat in a frigid winter climate, increased vulnerability to this extreme weather. Such reliance internalized this disturbance of nature into society. This was a hybrid techno-natural disaster caused by the interaction of a hazard constructed by nature and vulnerability constructed inadvertently by those modern societies. Society could be said to have societized nature by recombining nature's dynamics in waterfalls and nuclear reactors to produce electricity. But in doing so it naturized society by thereby making society more vulnerable to nature's extreme disturbances (see Murphy 209).

The electrical grid in northeastern North America could have been made sufficiently robust to withstand the ice loading from this freezing rain, but such loading was judged improbable and robustness would have been costly to construct. So the risk was deemed acceptable, safety was assumed, and robustness was not constructed. This risk assessment was wrong. What occurred was worse that the worst-case scenario that had been socially constructed (Murphy 2009). The consequence of the resulting vulnerability in these modern societies was the most costly disaster in the history of this region. This is not to blame the risk assessors for incompetent calculations. The major technical post mortem concluded that the risk was unforeseeable given the state of knowledge at the time. Foreseeable or not, the risk was indeed present, as confirmed by the harm that occurred. Risk was actualized into a destructive event. The experience of disaster demonstrated that some forces of nature remain mysterious, incalculable, and beyond the mastery of technical means. After the disaster, this was recognized by the leaders I interviewed and much of the population, at least for a time. Modern hubris was temporarily diminished. This experience is now being factored into risk calculations, and some technical and organizational improvements are being made to diminish vulnerability. But not all recommendations are being implemented because of cost. Moreover much risk is still unforeseeable despite the best available science, especially the timing of the chance of harm. So risks are judged acceptable and are still being run.

There are both similarities and differences between the issues underlying this acute disaster and the chronic problem of global warming, which could lead to acute disasters. Risk calculations of climate change are being made, and some attempts at mitigation and adaptation are being done. But most social practices are based on a generalized presumption of safety and acceptable risk. Timid cap-and-trade mechanisms have been contested as harmful to the economy, carbon taxes have been largely rejected, regulations have been inadequate, all because of projected costs and changes to lifestyles. Even when these measures are efficient environmentally, they have been judged politically unfeasible (Jaccard 2005). When the melting of the Arctic and the temperature and carbon content of the atmosphere are investigated, the results show that the situation has become near to or worse than the worst-case scenario that was previously projected by the IPCC (2001). This raises the question: do acute disasters have to be experienced to prompt leaders and the population to deal effectively with chronic problems like climate change?

The Assessment of Risk Assessments

Presumptions of safety based on risk calculations can be very different from biophysical safety. On 4 January 1998 in Northeastern North America, decision-makers and the population presumed safety would continue, but it turned out to be the threshold of a disaster. Risk calculations have to be assessed in the light of the subsequent experience of safety or disaster.

Similarly the risk of climate change needs to be anchored biophysically. The success or failure of the mitigation of environmental calamities and disasters by societies can be assessed in different ways, but they are not equally valid. First, mitigation and adaptation discourse can be used as the reference for appraising it, for example, plans and/or policies. However, this can not be equated with solving the material problem or diminishing risk. Plans and policies can be left on the shelf to gather dust. Leaders sometimes use greenwashing discourse to cover up brown practices, such as in Canada at the present time. Greenwashing can create a false consciousness of environmental safety leading to risks being either unacknowledged or unperceived by the population.

Second, social practices can be used as the barometer of success, for example, mitigating and/or adaptation policies that are implemented. Although less superficial that assessing success or failure by the presence or absence of environmental discourse, it can not be assumed that environmental problems and disasters are mitigated by improvements in environmental practices. For example, it has been well documented that making technologies and commodities somewhat less dangerous or harmful leads the population to use more of them, which can actually increase danger or harm. Making GM Camaros or Ford Mustangs slightly more fuel efficient will save consumers money and enable them to buy more of these gas guzzlers. Hence the stricter fuel efficiency regulations introduced by the Obama Administration are necessary but not sufficient to deal with climate change. They could even worsen the problem if gas remains cheap in North America. Hence to be effective in reducing greenhouse-gas emissions they need to be complemented by a carbon tax to discourage the consumption of gas. Similarly intensity based measures of success, whereby technological improvements enable each unit of production to be more environmentally friendly, are often associated with greater emissions and pollution because they legitimate the production of more units. For example, the Chinese government prides itself on intensity based indicators of environmental protection, even though this has not prevented its GHG emissions per capita from increasing (Zhang and Zhong 2007; Zhou 2007). Similarly Canada's improvements in emissions per unit of production of tar sands oil have not decreased the absolute level of Canadian emissions because more units of oil are being produced.

The only valid way to assess the success or failure of risk mitigation is through objective absolute indicators that the material problem is being solved. For example, the success or failure of the Montreal Protocol can be assessed by examining whether ozone-layer depletion is decelerating and replenishment is occurring. The appraisal in that case is positive. The success of the Kyoto Protocol to diminish global warming can be best evaluated by measurements of the carbon content and temperature of the atmosphere. Since the greenhouse effect of the atmosphere is determined by its carbon content and hence largely by the level of greenhouse-gas emissions, this is a convincing indicator of success or failure of risk mitigation. Here the assessment is hitherto negative. This material indicator requires truly interdisciplinary research whereby sociologists make use

of the best available research in the natural sciences rather than bracketing it. Of course, even this valid indicator will be contested by those who deny the risk. But contesting an assessment of risk does not make the chance of harm disappear.

Conclusions

Environmental problems are chronic in two ways. First, many are long-term cumulative problems, such as climate change, rather than being a relatively short-term cyclical problem like the recession. Second, both acute disasters and chronic environmental problems require unremitting monitoring, mitigating, protecting, and adapting to nature's constructions, some of which are being unleashed by social constructions. For example, mitigating global warming requires the chronic challenge of diminishing the use of fossil fuels and adapting to climate change.

The research reported in this paper leads to a nuanced conclusion concerning technical means and calculations, including risk assessments of acute disasters and of chronic environmental problems. They are valuable but incomplete because they are founded on partial knowledge and they are themselves risky because they promote the taking of risks that are deemed acceptable. Preparing for the future requires learning from cases where intellectualized societies that believe they can control nature by calculations have proven to be vulnerable to nature's forces beyond the understanding and mastery by those societies. It necessitates the investigation of cases where intellectualization has even made modern society more vulnerable than non-modern society to nature's forces that remain mysterious. Lessons are often learned from sudden acute disasters, but the challenge of slow-onset chronic environmental problems that risk becoming disastrous is to learn without suffering disaster.

References

Albrow, M., 1990. *Max Weber's Construction of Social Theory*. London: MacMillan.

Beck, Ulrich. 1992. Risk Society: Towards a New Modernity. London: Sage.

_____. 1995a. *Ecological Enlightenment*. New York: Humanities Press.

_____. 1995b. *Ecological Politics in an Age of Risk*. Cambridge: Polity Press.

_____. 1998. *Democracy Without enemies*. Cambridge: Polity.

Broecker, W. 1997. "Thermohaline circulation, the Achilles heel of our climate system". *Science* 278, 7.

Fischer, H.W. III. 1998. *Response to Disaster: Fact Versus Fiction & Its Perpetuation*. 2nd Edition. Landam, MD: University Press of America.

IPCC Intergovernmental Panel on Climate Change. 2001. *Climate Change 2001*. Cambridge: Cambridge University Press.

Jaccard, Mark.2005. *Sustainable Fossil Fuels*. Cambridge: Cambridge University Press.

Murphy, R. 1994. *Rationality and Nature*. Boulder: Westview. (It was translated and republished in Korean, Seoul: Hanul, 2000).

_____. 1997. *Sociology and Nature*. Boulder: Westview.

_____. 1999. "Unperceived Risk." *Advances in Human Ecology* 8: 99-123.

_____. 2002. "The Internalization of Autonomous Nature into Society." *Sociological Review* 50: 313-333.

_____. 2004. "Disaster or Sustainability: The Dance of Human Agents with Nature's Actants." *Canadian Review of Sociology and Anthropology* 41: 1-18.

_____. 2006a. "Realism: From Apologetics to Substance" in *Nature and Culture* 1(2): 49-72.

_____. 2006b. "The Challenge of Disaster Reduction." Chapter 7 of *Community and Ecology: Dynamics of Place, Sustainability, and Politics*. Edited by Aaron M. McCright and Terry N. Clark, JAI/Elsevier.

_____. 2007. "Thinking Across the Culture/Nature Divide: An Empirical Study of Issues for Critical Realism and Social Constructionism". Chapter 7 in Jon Frauley and Frank Pearce (eds.), *Critical Realism and the Social Sciences*. Toronto: University of Toronto Press.

_____. 2009. *Leadership in Disaster: Learning for a Future With Global Climate Change*. Montreal and Kingston: McGill-Queen's University Press.

Turner, Barry and Nick Pidgeon. 1978. *Man-Made disasters*. London: Wykeham.

Weber, Max. [1904-05] 1930. *The Protestant Ethic and the Spirit of Capitalism*. Translated by Talcott Parsons. London: Unwin.

_____. [1946] 1958. *From Max Weber: Essays in Sociology*. Eds. H.H. Gerth and C. Wright Mills (eds.). New York: Oxford University Press.

Webster, P.J., Holland, G.J., Curry, J.A., and Chang, H.-R. 2005. "Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment." *Science* Vol. 309, Issue 5742: 1844-1846.

Zhang, Lei and Zhong, Lijin, 2007, "Strategy for integrating environmental risk into China's risk management discourse", *Collection of Papers*, 2007 Beijing International Conference on Environmental Sociology, Beijing China, June 30-July 1, 379-396.

Zhou, Jian, 2007, "Environmental Situation and Environmental Policy in China Today", Keynote Speech at the First Beijing International Conference on Environmental Sociology, Beijing China, June 30.

Notes

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[2] A longer study of leadership during the disaster as a basis for learning for a future under global climate change can be found in Murphy (2009).