

# THE PROXIMATE, UNDERLYING AND ULTIMATE CAUSES ACCOUNTING FOR THE INCREASING COSTS OF WEATHER RELATED DISASTERS: A DIAGNOSIS AND PRESCRIPTION

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## 1. Climate Change Among a Wide Array of Factors.

“**W**hat factors account for increasing costs of weather related disasters in recent decades?” “What are the implications of these understandings for both research and policy?”

A small part of the answer to the first question is that anthropogenic climate change is adding further and increased destabilization to the climate system, and resulting in some places in more extreme and perhaps more frequent events. This in turn contributes to increasing costs of weather related disasters. It is not possible to specify with any precision or confidence what this causal fraction is but it is probably quite small at the moment. Given projected increases in greenhouse gas concentrations over the next few decades the amount of costs attributable to climate change may confidently be expected to increase. One policy implication of this is that efforts to reduce emissions of greenhouse gasses and to adapt to inevitable climate change should be strengthened and accelerated.

There are many other reasons for adopting stronger and more effective policies of mitigation and adaptation in relation to climate change. Prominent among them are the catastrophic and irreversible (on a human time scale) longer term consequences such as considerable rise in sea level and displacement of millions of people and the loss of species and ecosystems. In the case of weather related disasters the policies that are needed should be directed not only to climate change (as a relatively minor but growing contributor) but also to the other causes of weather related disaster.

The argument of this paper is that these causes can be divided into three types or levels. These can be termed the immediate or proximate causes; the underlying causes; and the ultimate causes. Climate change belongs for the present in the first two categories, which means that these form part of the context for climate change policies. At some point in the future changing climate may come to overwhelm the other causes and so qualify as an ultimate cause. We appear, fortunately, to be some distance from that point.

## 2. Immediate or Proximate Causes.

The immediate or proximate causes of the increase in disaster losses have been well rehearsed. They include generic factors such as the growth in human populations, and increases in wealth and real property. These factors lie beyond the reach or domain of the disaster management community. The size and growth rate of human populations are the business of demographers and experts in human health and fertility, and the governments and agencies that they advise; increases in wealth and real property are similarly the domain of economists and the financial and investment worlds, and development specialists. It has not been considered the business of the disaster management community to advocate the reduction of human population growth or the reduction of economic growth and increases in wealth and real property. Perhaps this should be questioned. The disaster management community might make common cause with those who want to curb the growth in human populations, (and rejoice when growth is low or negative as in some countries?) and those who question the headlong rush to growth at any price and make common cause with the supporters of sustainable development or those who eschew high mass consumption and opt for lives of voluntary simplicity.

In addition to these broad generic causes of population growth and increases in wealth there are other proximate causes of the growing disaster losses that are more nuanced and which vary considerably in character from place to place. These are clearly within the domain of the disaster management community. These include the disproportionate occupation of hazardous zones and the continuing invasion of such lands by human settlements despite their known risks. The proximate causes also include the poor quality of construction, or when a minimal standard of construction is mandated by governmental authorities, the systematic avoidance or evasion of such regulations, usually for short term benefit. In recent decades there has been a considerable expansion of knowledge about natural disasters including those that are weather related. Why despite this increased understanding have costs continued to rise if climate change is ruled out for the time being as a major contributor? The simple answer is that there are some underlying causes which inhibit or prevent the adoption of good and effective policies and measures. Beyond these underlying causes are some even less tractable ultimate causes which pose greater challenges to policy. Disaster management therefore involves understanding and actions on many levels ranging from the immediate or proximate causes, to the underlying and ultimate causes.

### **3. Underlying Causes.**

What explains the apparently ineffective efforts of the disaster management community to curb the growth in losses despite several decades of expanding concern and allocation of resources? Why did the International Decade for Natural Disaster Reduction (1990 – 1999) have so little effect, and why has the successor institution, the International Strategy for Disaster Reduction, similarly enjoyed slow progress at best, despite the compelling evidence of more calamities, and more conferences, and the much promoted Hyogo Declaration?

In a recent paper (White, Kates, and Burton 2001) four hypotheses have been identified as possible underlying explanations. The four hypotheses have to do with the existence of knowledge; the use of knowledge; the ineffective use of knowledge; and the time-lag problem.

- To what extent is knowledge lacking and disaster management flawed or rendered ineffective by simply not knowing? Recent decades have seen a dramatic increase in understanding and predictability of atmospheric weather-related hazards. Satellite tracking of storms has enabled timely forecasts and warnings to be issued, and this has undoubtedly contributed to a significant reduction in fatalities world wide. Nevertheless an unacceptably high loss of life still continues and property losses continue to rise at an apparently exponential rate. To some extent this may be explained by lack of knowledge. Hazard zones have not everywhere been well mapped or identified, and the probabilities of extreme events are not well estimated, and perhaps not estimated at all. There is a case to be made for more research on the “natural” causes of disasters, and for the identification of high risk places. While lack of knowledge might be offered as a partial explanation for growing losses in developing countries such an excuse is much less valid in developed countries, but losses continue to grow in developed countries as well. The recent losses in the United States from Hurricane Katrina (2005) and other extreme events cannot be explained by a lack of knowledge.
- To what extent is knowledge available and not used? Clearly the knowledge that exists could be more effectively used. In developed countries and in the more highly developed regions of developing countries there is more reason to attribute rising losses to the failure to act appropriately, than to the lack of knowledge. Yet there is evidence that in both developed and developing countries disasters continue to take people by surprise and that insufficient preparations have been made to deal with emergencies, even though this has been a major thrust of international activities. In developing countries this likely reflects the lack of resources, and the lack of adaptive capacity. There has been a rhetorical shift to arguing for more than emergency disaster relief and rehabilitation towards the long-term strengthening of the capacity to design and

execute mitigation and vulnerability reduction efforts. As the climate changes and as the need for adaptation becomes more evident and recognized, there is clear opportunity for synergies between climate change adaptation and disaster prevention and mitigation. In developed countries the failure to use available knowledge can rarely be attributed to the absence of financial resources or adaptive capacity. Other explanations are needed.

- To what extent knowledge is used ineffectively?

Whereas in developing countries available knowledge may not be used due to lack of resources and capacity, in developed countries there are often major programmes designed to use knowledge that do not work effectively. At times this almost can be described as a pretence at using knowledge. Even where the knowledge is considerable, and the resources and capacity are available the administrative functions fall short of what might be expected. Land use planning and building regulations frequently exist “on the books” but have often been applied with a lack of conviction or are subject to frequent variances obtained by legal or political means. Building codes have similarly not been properly enforced. Insurance, even when coupled to land use regulation, as in the case of the US National Flood Insurance Programme, may have increased and in any case not reduced losses for similar reasons. Variations in the application of regulations can grow under conditions where there are conflicting interests and lack of political will. This may account for much of the failure to apply knowledge effectively.

- To what extent may the growth in costs be a time-lag problem?

A further possible explanation is that knowledge is increasing and becoming more widely available and is being used with growing effectiveness, and that with trial and error and a slow learning process the underlying situation is improving and it is only a matter of time before the positive results become manifest. While it would be reassuring to attribute rising disaster losses to a time-lag effect in the effective use and application of knowledge there is little room for complacency on this score. While the record of attempts to manage disasters is at best a slow success story proceeding in very small increments, there is little reason to expect fundamental change in the near term. Beyond these underlying causes there are more profound and intractable factors at work.

#### **4. Ultimate Causes.**

The foregoing hypotheses concerning the proximate and underlying causes of the growing costs of weather related disasters are based on an assumption that a combination of scientific understanding, and the application of a rational approach can and will prevail, or on the hope that this will eventually prove to be the case. The International Decade for Disaster Reduction in the 1990s was based on this sort of belief, and the work of the Kobe Disaster Conference (January 2005) and the Hyogo Declaration which it produced, seem to have been similarly inspired. It is appropriate therefore to take a step back and ask if there are other factors that lie behind the persistent and evidently growing failure to control the growth in disaster losses. This question has been asked before and the answer seems to fall into three parts – the nature of the problem; the deficiencies of human society or human nature; and the lack of measures to offset the situation.

Disaster events by definition occur infrequently in any one place. Human society has proved to be remarkably effective in adapting to variations in the natural environment. It is one of the distinguishing traits of our species. Humans have effectively spread and occupied virtually all the environments on the planet from sub-artic to semi-desert, to mountains and coasts. That successful livelihoods have been achieved in all these environments is testimony to adaptability and adaptive capacity. Throughout history there have been sudden losses and setbacks and perhaps even collapse due to environmental extremes to which people were not adapted. The fact that this obtains today is therefore not new. It is the scale and speed of human development and the globalization of communications which makes the failure to adapt to extremes so costly and more visible. Elsewhere this has been described as the “adaptation deficit”. But the phenomenon itself is not new. It stems from the nature of rare events in concert with the nature of human society. There probably

has always been some level of adaptation deficit – greater exposure to extreme events and greater vulnerability due to the failure to adopt the right kind and enough mitigation measures. Due to the proximate and underlying causes identified above the adaptation deficit is now growing at an apparently exponential rate (Burton 2004).

People have, and always have had, as noted by economists among others, a short term time preference. Notwithstanding our knowledge of the future and our capacity to anticipate, we tend to have a strong preference for the immediate and the short term. Indeed our time preference is probably getting shorter over time. Discount rates as applied in most economic analysis reflect such preferences and their use in planning and decision making encourage societies and governments to take little account of the future beyond three or four decades. By such calculations the present value of an asset or a risk avoided that can only be obtained over a fifty year or longer period is practically zero. This is of course reflected in the behaviour of our political institutions.

While the cannons of economic benefit-cost analysis help to explain some short sighted decision making they are a reflection of other characteristics of the human species. Elsewhere some of these have been listed as the tendency to cater to vested interests as expressed for example in the power structure; as the propensity to resort to wishful thinking of the “it won’t happen to me”

genre; as a failure of imagination or on the use of scientific uncertainty as an excuse for inaction or the avoidance of unpopular actions. (Burton and May 2004). Some of these psychological and perception dimension have been recognized for decades at least (Burton and Kates 1964).

What is to be done? We can throw up our hands and say – that is the nature of the human condition and it cannot be changed. Or we can turn our attention to finding the antidote, at least as far as disasters are concerned.

## **5. Policy and Research Implications.**

The policy and research implications of the foregoing diagnosis can be summed up in terms of the old fable – we must be both hedgehog and fox. The hedgehog you will recall knows one thing, one big thing, and the fox knows many things.

- i) The first the big thing. Some sort of cultural transformation is needed that permits us to incorporate the rare and the long term into the everyday. Ken Hewitt (Hewitt 1997) was among the first in the disaster field to argue that disasters are not just rare events but that they are built into our everyday decisions. Dennis Milette (Milette 1999) has echoed this in his call for a “redesigned national culture” and a “cultural shift”. In recent years many other voices have repeated this message, but it is one thing to identify a need and a direction and quite another to know how to get there. The recognized need and the direction involve moving to sustainable development; to the an order of magnitude increase in respect for and harmony with the environment; to the achievement of much greater social equity on a global scale; and to the creation of a world managed by the rule of law and to an expansion and strengthening of international law. The case for such changes would be more easily understood if people could come to adopt a longer term view and the willingness to reduce the demand for instant gratification.

Such hopes and expectations it will be argued are well beyond the scope or capacity or even the interest of the disaster management community, although they are increasingly heard among disaster specialists and perhaps even more assertively in the climate community. On the other hand if any such transformation is to be achieved it will require the combined efforts of many communities of interest. The disaster community is one such community and we can most help by making common cause with like-minded groups. One of the foremost to be considered is surely the climate change community. While probably only a very small part of the increase in disaster losses over the past few decades can be attributed to climate change, there is now evidence that climate change is affecting the intensity and frequency of some weather extremes and this trend is projected to continue and accelerate. If the

costs of weather related disasters are not to rise further and faster with climate change then a fundamental shift in values, attitudes and behaviour is essential.

Beyond working with the climate change and adaptation community to achieve such ends the disaster mitigation community can design its own work to achieve such results through incremental means. This requires not one big thing but many smaller and clever things.

ii) Smaller and Smarter.

Clearly there is much to be done in further advancing knowledge and scientific understanding of the causes of the increased costs of disasters in recent decades, and more needs to be done to ensure that the knowledge is disseminated and available and that the capacity to use it is strengthened. More and better is also needed to ensure that knowledge is used effectively and in a timely way, and that the political will to act accordingly is generated and supported.

The creation of the political will is perhaps the most crucial element and since there are many obstacles this cannot be achieved without the growth of public awareness. Many of the efforts of the recent past have been directly or indirectly aimed at creating public awareness including the UN Decade on Disaster Reduction, the work of the International Strategy for Disaster Reduction (ISDR), and the Kobe Conference and the Hyogo Declaration. Similarly the work of the Red Cross/Red Crescent in promoting grass roots attention to natural hazards and community based risk and vulnerability assessment contributes from a bottom-up perspective.

Beyond these efforts some new and additional ideas might be advocated and adopted. These involve institutional change. If a culture shift is to be brought about the aspirations of scientists; those at risk, and those with social concern should be supported by institutional change.

It has been suggested that an Intergovernmental Panel on Natural Disasters (IPND) (Burton 2001) would be a helpful way of periodically updating scientific knowledge and bringing it to the attention of the public and decision makers. This is modeled on the Intergovernmental Panel on Climate Change which has been so effective in assessing and articulating the science of climate change. It could also work together with the Planning Group on Natural and Human-Induced Environmental Hazards and Disasters now being established by the International Council of Scientific Unions. An Intergovernmental Panel could also be augmented by a more popular institution such as an annual or periodic international forum on disasters similar to those that now exist for water resources (World Water Forum) and forests. These fora have been effective in calling attention to their respective issues and to the need for policy shifts that are in line with what is required to curb the growth in disaster losses.

Other institutional innovations could include the specific incorporation of natural weather-related disasters into the post-2012 regime of the UN Framework Convention on Climate Change, including a new legal instrument for adaptation. The use of insurance as a social policy instrument has received little serious consideration, and the work of the Munich Climate Insurance Initiative (MCII) could be further developed and widely promoted.

## **6. Conclusion and Summary.**

There are many factors, proximate, underlying, and ultimate, that can account for the increased costs of disasters in recent decades. The implications for research and policy that stem from the diagnosis made in this white paper are that the efforts directed at the proximate and underlying causes should be redoubled without delay, and that the more basic or fundamental causes must also be addressed through the generation of public awareness and the strengthening of political will. Recognizing that this is a slow process some immediate attention could be focused on institutional changes at the international level.

## References

- Burton, Ian. 2001 "The intergovernmental panel on natural disasters (IPND)". *Environmental Hazards*. Vol 3. No. 3. 2001. pp. 139-141.
- Burton, Ian. 2004. "Climate Change and the Adaptation Deficit", Occasional Paper No. 1. Adaptation and Impacts Research Division. Meteorological Service of Canada. Downsview, Ontario, Canada. November 2004
- Burton, Ian. and Robert W. Kates. 1964. "The Perception of Natural Hazards in Resource Management". *Natural Resources Journal*. Vol 3. January 412-441. Reprinted in Howard Kunreuther and Adam Rose, 2004. *The Economics of Natural Hazards*. Volume 1. pp. 53 – 82. Edward Elgar. Northampton, Massachusetts.
- Burton, Ian. and Elizabeth May. 2004. "The Adaptation Deficit in Water Resource Management". *IDS Bulletin*. Vol 35. No. 3 July.
- Hewitt, Kenneth, 1997. *Regions of Risk; A Geographical Introduction to Disasters*. Addison Wesley Longman. Harlow, Essex. 1997.
- Mileti, Dennis S. 1999. *Disasters by Design*. Joseph Henry Press, Washington D.C. 1999.
- White, G. F., Kates, R. W., and Burton, I. (2001) "Knowing better and losing even more: the use of knowledge in hazards management." *Environmental Hazards*. Vol 3. 2001 pp. 81-92