SISTEMA NACIONAL PARA LA PREVENCION Y ATENCION DE DESASTRES DE COLOMBIA

CONFERENCIA INTERAMERICANA
SOBRE REDUCCION DE LOS DESASTRES NATURALES

CARTAGENA DE INDIAS, COLOMBIA
MARZO 21-24, 1994

A Perspective on Reducing Losses from Natural Hazards

Gilbert F. White *
Marzo 1994

* *Institute of Behavioral Science*
University of Colorado at Boulder

D-14

A PERSPECTIVE ON REDUCING LOSSES FROM NATURAL HAZARDS

Gilbert F. White
Institute of Behavioral Science
University of Colorado at Boulder

Two major problems associated with the current state of the International Decade for Natural Disaster Reduction are whether it will reduce losses worldwide from extreme events in nature, and whether that alone is the appropriate goal. As the Decade has taken shape since its planning in the late 1980's, the central issue might be paraphrased as "How can science and technology be used to reverse the growth in losses of life and property from natural hazards?". But, should that be the central question?

As the mid-term of the Decade activity nears, it is appropriate to ask how well the Decade is addressing the first question. The gathering at Yokohama in May, 1994 should provide a more solid basis for judgment than now is available. From the evidence of which I am aware, I offer a tentative observation. The Decade, on balance, is not leading to a significant reduction in property losses, and it will fall far short of meeting needs of the world community unless its approach is altered.

My observations grow out of review of the records of loss of life and property, and of the ways in which Decade activities relate to fundamental abilities to sustain the productivity of communities. That hinges upon social capacity to chart vulnerability, forecast events, communicate warnings, manage land use, design structures, and administer public

relief and insurance. I would like to be shown that I am unduly pessimistic, and that the Decade is fruitfully under way. If that is not the case, this is a good time to take stock of where the Decade stands, and to assess possible change in course.

The Decade is concerned with the whole range of extreme natural events, but the current losses are accounted for in large measure by four types of phenomena: flood, drought, hurricane, and earthquake.

Accurate and comparable data on losses of lives and property from extreme events are very difficult to assemble; standards and methods of data collection are far from uniform and consistent. Taking some of the calculations in which I was involved two years ago, three simple generalizations on a world scale may be ventured. (Burton, I., R.W. Kates, and G.F. White, 1992, pp. 11-15).

Total loss of life attributed to floods, droughts, and other natural events, and exceeding 100 deaths in any one event was great in the first half of the century (Fig. 1). After World War II the aggregate numbers declined.

In the latter period, however, the number of such recorded events increased. Even after recognizing that the reliability of reporting increased, there appears to have been a significant upward trend (Fig. 2). Improvements in forecasts, warnings, and emergency response have made it less likely that people in the path of water and wind will pay with

their lives. And earthquakes appear to exact a somewhat lower toll. The circumstances of fatal injuries changed. For example, in the United States as well as China, with improvements in emergency response, deaths from slow-rising floods dwindled while flash floods accounted for most of the victims.

While deaths were decreasing, recorded property loss was increasing (Fig. 3). It would be stretching the confidence limits to estimate the rate of change for either total damage (using constant monetary units) or the per capita damage. What seems clear is that property damage continued high.

When the current US contributions to the Decade are examined, they are found in very large measure to be a re-labeling of scientific and technical work already under way. A distinction may be made between activities that were already on process or projected, and activities newly designed to further Decade goals. The former predominate.

The activities stress the refinement of forecasts of atmospheric and hydrologic events, the mapping of areas vulnerable to extreme events of all kinds, the improvement of emergency response, the support of recovery measures, information dissemination, and research on all of those aspects. Methods and data developed in high-income countries are being shared more widely.

Progress continues to be made in mapping and public education concerning areas vulnerable to water, wind, and earth movements. Support and coordination of those efforts

are bound to be useful, and draw heavily from the geophysical sciences and engineering.

It is important to recognize the distinction between identifying hazard vulnerability and communicating the risk involved. It is the same distinction between forecasting and warning, and the current research emphasis on those functions is revealing. In a review last year of NOAA's Forecasting Systems Laboratory, attention focused on enhancing the temporal and spatial resolution and accuracy of products under the modernized Weather Service. With the exception of studies in one community, there was no research on how the improved forecasts are or could be used by the people concerned. A national analysis of estimated aggregated gains in economic activity from better forecasts was considered sufficient justification. Little emphasis was placed on the ways in which information in various formats and channels can or may influence decisions on emergency or mitigating action.

The private and public decisions with regard to location, design, and operation of productive activities in hazardous areas are crucial to long-term welfare. Understanding how those decisions are made and by whom, therefore, is basic to planning policy and programs that would maximize net benefits from resource use. Research on those processes and its application to political action is much less common than research on the natural events.

To the extent any new land use is in a vulnerable area it increases in some degree the potential for loss when the next event occurs. It is clear that loss is not necessarily net loss:

almost all uses of land yield some benefits. These must be compared with the costs of use, including the costs from coping with the occasional extreme event, in order to judge the net social cost of benefit of use. Just as a farmer may find it beneficial to cultivate crops that one year in twenty, for example, are destroyed by high water, a community may plan to suffer the damages of such an event when those are less than the economic gains from the floodplain location.

A somewhat similar relationship exists with regard to the design and building of structures in vulnerable areas. When there is technological opportunity to make the structure resistant to high water or high wind or earth movement, a reasonable question is whether or not the expense involved is offset by the prospective gains. These rudimentary observations on the circumstances in which society decides or continues to expose its members to natural hazards may seem to over-simplify the world picture, but they are fundamental to understanding the interactions that account for the persistent increase in property damages.

When public and non-governmental assistance policy seeks to aid those who knowingly or unknowingly have exposed themselves to hazard with little or no regard for the feasibility of measures to reduce its severity, an important incentive to avoid vulnerable locations and structures is diminished. It is further weakened when insurance - subsidized or not - fails to offer strong encouragement for mitigation. These are conditions just as real as the physical processes. As public involvement in providing emergency and recovery assistance has become more extensive and comprehensive whenever or wherever disaster

occurs, there has been less encouragement of basic prevention and mitigation.

In the United States, for example, if President Bush in visiting the sufferers in the wake of Hurricane Andrew had gone beyond his assurance of Federal sympathy and assistance, and his concern that the government emergency agencies act efficiently and had pointed out that much of the damage was the result of private violation of building codes combined with public laxity in enforcement, his leadership role would have been quite different than it was. Likewise, President Clinton in visiting Northridge earthquake survivors might have noted the small proportion of sufferers carrying earthquake insurance and the large proportion of single-family homeowners who might, with confidence, have reduced their losses by having taken small structural measures, had those been pushed by local governments. At the same time he could have recognized that the advanced science that had warned of danger from slip faults had missed the vertical fault hazard.

It is heartening that the new administrator of the Federal Emergency Management Agency has announced a shift in primary emphasis from emergency preparedness and response to mitigation. This is so far reflected only to a minor degree in the US Decade activities.

It is difficult to discern in the present Decade planning an intent to go beyond the more traditional and prevailing emphasis upon charting vulnerability, improving forecasts, and expediting preparedness for and execution of response to and recovery from disaster

when it strikes. Those are all important. They are not sufficient. The net effect of their execution in the absence of strong mitigation efforts could be counter productive. People - individually and groups - could be encouraged to enlarge still further their uneconomic use of hazard areas. During much of the 20th century the threat of loss of life was progressively reduced while property losses climbed. This seems likely to continue in the United States unless policies and programs are altered significantly. Thus far, the Decade preparations and participation show little sign of doing so. If anything, they offer a deceptively comforting message that the country is on the right track. The same applies in some other geographical areas. A recent commentary from the Asian Disaster Preparedness Center, for example, questions whether or not the Decade is itself a "slow onset disaster in the making" (Jeggle, 1994).

It is common to talk about truly sustainable development that achieves productive resource use without impairing the quality of the environment for future generations. Perhaps this is the goal the Decade should be pursuing. Capacity of the resource use to be productive is affected by the nature of its adjustment to hazard: it need not avoid losses entirely so long as the gains outweigh them, and a disaster may, but does not necessarily, erode the quality of the environment. What is to be avoided is occupation of a hazardous area that to remain viable requires uneconomic support in the way of resource degradation, subsidies, and public assistance. The approach taken in some Latin American countries of starting with a community school and asking what combination of action-encompassing research, information, planning, and program-would achieve optimal risk for the facility and

students is more likely to lead the way to reduction in damages as an outcome of socially wise use.

The extent to which the science and technology communities may at times fail to recognize the full range of factors making for economic and sustained resource use is illustrated by the report of the National Research Council committee that in 1987 supported US involvement in the proposed Decade. It read, in part:

> The Decade effort in the U.S. was intended to
>
> > provide knowledge and mitigation practices that could cut impacts of natural hazards at least 50 percent by the year 2000. Achieving this national goal requires a major program of research, technological development, project applications, and public information activities; a nationwide assessment of natural hazards and their risks; collection, analysis, and dissemination of information on hazards; an assessment of current knowledge and practices and identification of gaps in knowledge; a research program to fill those gaps; effective educational programs; and cooperative research activities in and among all relevant disciplines and professions. (National Research Council, 1987, p. 4)

Quite aside from the lack of an analytical basis for the estimate of 50 percent reduction in

impacts by the year 2000, the recommended program fails to come to grips with some of the major factors at work. The program embraces research, technological development, project applications, education, and information. Activities directed at land use, building design and construction, public assistance, and insurance are not stressed. It is not surprising that in the first three years of the Decade when losses in the United States were viewed as being susceptible to be cut "at least 50 percent", the three largest disasters, damage-wise, (Andrew, Midwest floods, and Northridge) took place.

From the perspective offered here, the current US Decade program promises neither any large reduction in property losses nor in number of major disasters. Perhaps more important, the heavy emphasis on loss reduction diverts attention from the goal of making wise use of hazardous areas now- and for the indefinite future. That will call for earnest examination of the information and policy affecting development decisions and the ways in which they will shape a sustainable society in an unimpaired environment. Better hazard maps, more refined forecasts, and more efficient emergency operations will be important but they will not necessarily reduce damages, and they neglect the measures that might assure sound use of hazardous areas.

REFERENCES

Burton, I., R.W. Kates, and G.F. White, 1992: The Environment as Hazard. 2d Ed., Guilford Press, New York. 290 pp.

Jeggle, T., 1994: "Is the IDNDR a Slow-Onset Disaster in the Making? - an invited comment", Natural Hazards Observer, 18, March, 1-2.

National Research Council, 1987: Confronting Natural Disasters: An International Decade for Natural Hazards Reduction. National Academy Press, Washington, D.C., 60 pp.

U.S. Office of Foreign Disaster Assistance, 1991: Disaster History: Significant Data on Major Disasters Worldwide, 1990-Present. Agency for International Development, Washington, D.C.

FIGURAS

Figure 1 - Estimated deaths from natural disasters exceeding 100 deaths, 1900-1990. (Burton, Kates, and White, 1992, p. 11).

Figure 2 - Estimated number of natural disasters exceeding 100 deaths, 1900-1990. (Burton, Kates, and White, 1992, p. 12).

Figure 3 - Economic and insured losses in 1990 dollars from major natural disasters, 1960-1990 Drought is excluded. (Burton, Kates, and White, 1992, p. 15).

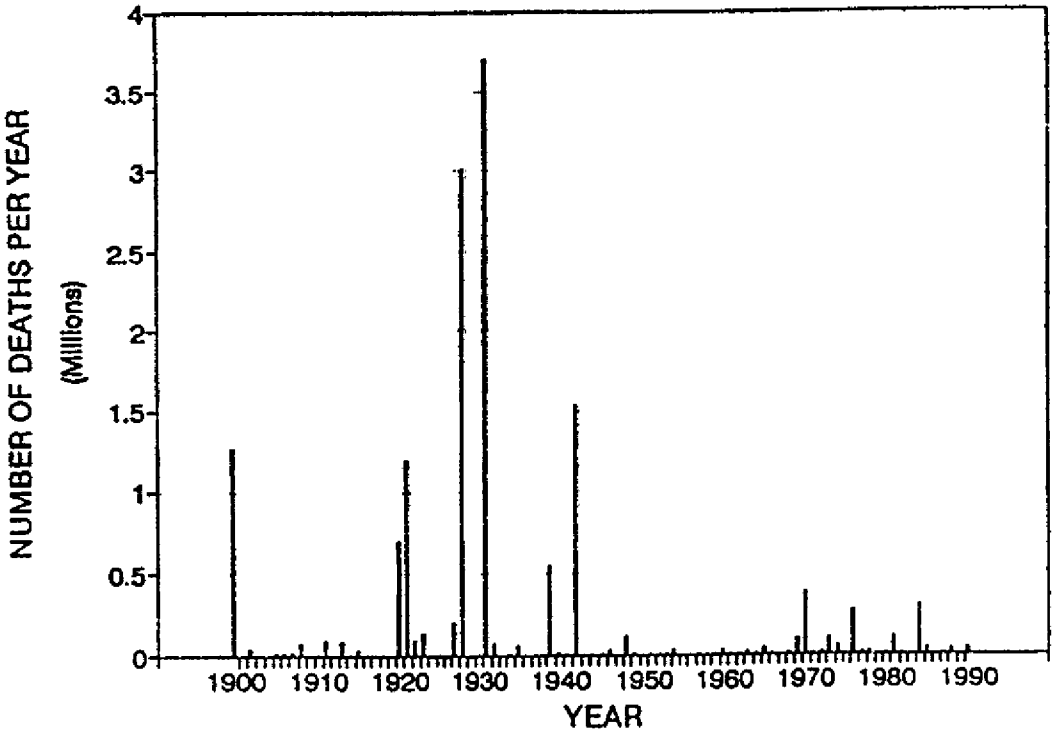

FIGURE 1 . Estimated deaths from natural disasters exceeding 100 deaths, 1900-1990. Data drawn from press and government reports for all countries. Deaths from lesser events are not counted (U.S. FDA, 1991, and other sources).

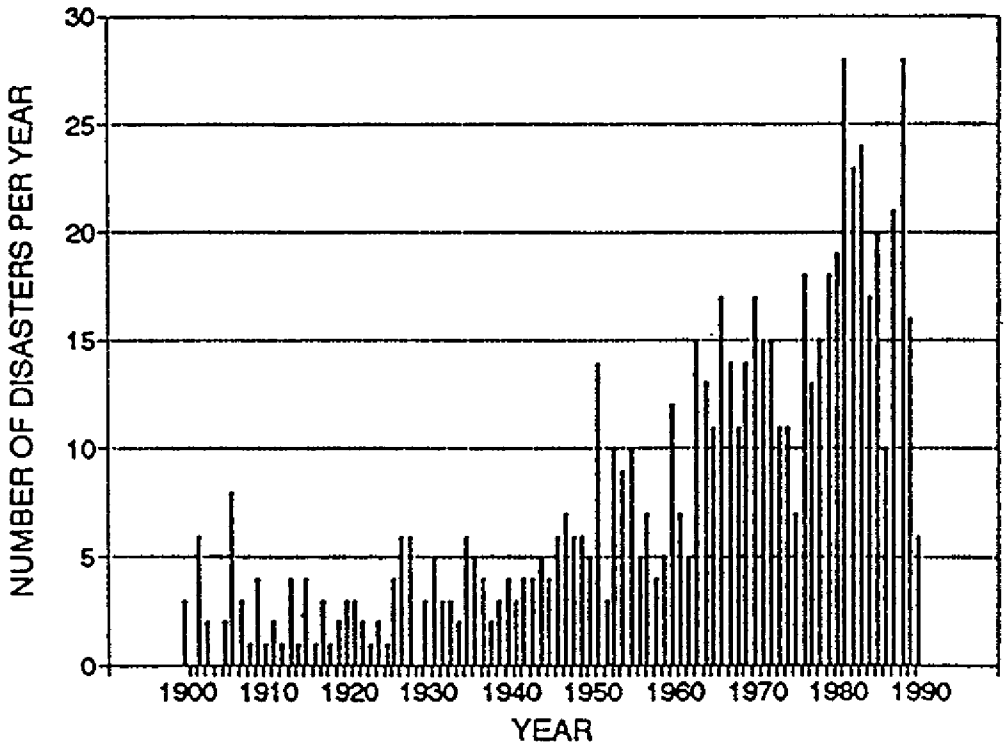

FIGURE 2. Estimated number of natural disasters exceeding 100 deaths, 1900-1990. Data for all countries are probably much more complete for the decades after World War II than for preceding years (U.S. FDA, 1991, and other sources).

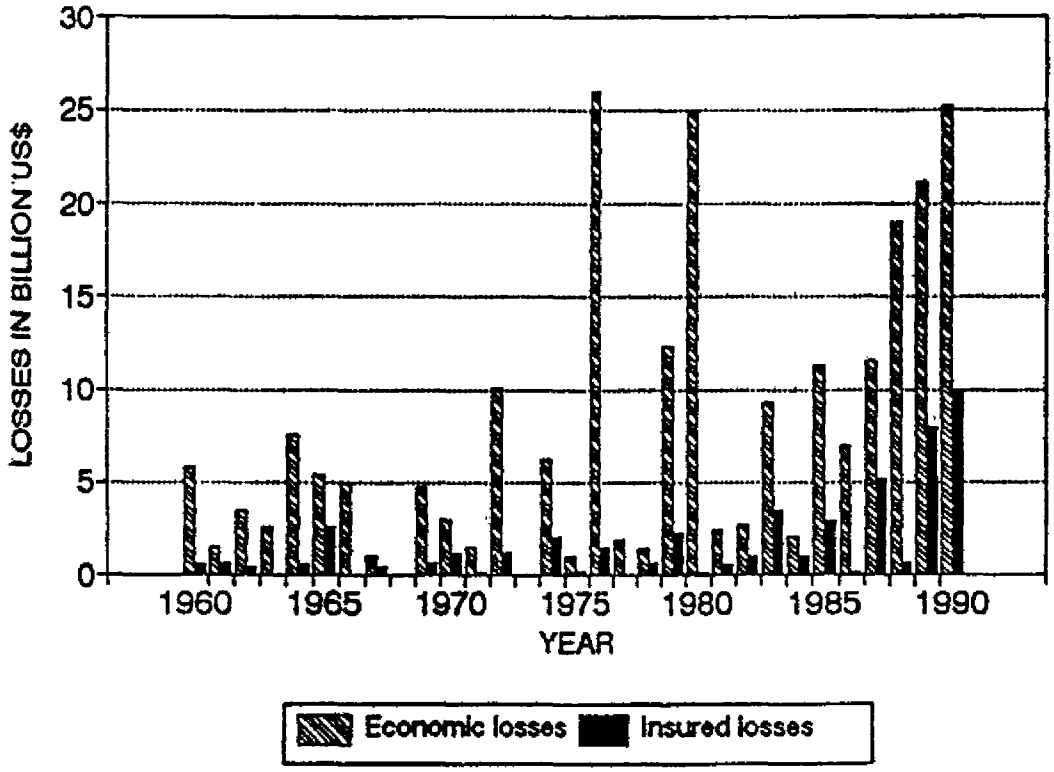

FIGURE 3 . Economic and insured losses in 1990 dollars (major natural disasters, 1960–1990). The averages by decade for both losses and coverage mounted consistently. Drought is excluded.