

The Hazards of Scientism: A Review Article

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Natural Hazards: Local, National, Global. By Gilbert F. White. Oxford University Press, New York, 1974, 288 pp. and figures, \$7.00 (paper).

The Sahel drought, earthquake in Guatemala, earthquake in Italy, frosts in Brazil, hurricane in the Gulf of Mexico Natural disasters hit the headlines of the world with relentless frequency and provoke considerable debate as to locating both ultimate cause and responsibility for them. Through them all, politicians present us with facile technological solutions ("Kissinger proposes war on the Sahara"), while the new nations continue to sedentarize nomads in the interests of economic development and political stabilization, and the affluent of the Western world flock in ever greater numbers to lava flows, flood plains, and unstable shorelines in the quest for exotic homesites. In the circumstances, a book that seeks to summarize the state of knowledge on human adaptation to "extreme geophysical events" is indeed much needed. Whether Gilbert White's *Natural Hazards: Local, National, Global* meets the need is another matter.

In his introductory essay, White outlines a series of concepts which, reinforced by a prescribed methodology, sets the tone of the whole volume if not of disaster research in general, this by virtue of the influence he and his associates have in the major national and international agencies involved in relief work and disaster prevention. Natural hazards are defined as "extreme geophysical events" (for example, avalanches, coastal erosion, drought, earthquakes, floods, fog, frost, hail, landslides, lightning, snow, tornadoes, tropical cyclones, volcanic eruptions, and wind), which constitute "hazards" because man's adjustments to them are based on "imperfect knowledge." In his opening statement, White asserts this framework to be an ecological one: "Extreme natural events illuminate one aspect of the complex process by which people interact with biological and physical systems" (p. 3). In fact, the approach is a resolutely deterministic one where the active forces are vested in nature and the passive in man. Catastrophes are presented as being caused by natural phe-

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nomena, their gravity being attributed to man's "imperfect knowledge" of them. The underlying duality and the fundamental association of cause and effect are apparent from the opening paragraph and pervade the entire text.

This elementary, and ancient, equation is modified by a single observation, that "man is responding to the risks and uncertainties of natural events . . . in a way which leads to increasing property losses. This is striking in many countries where economic growth is rapid, and especially so in areas where modern technology is spreading vigorously" (pp. 10, 13). This observation is repeated toward the end of the book in Anne White's review of global responses to tropical cyclones in Chapter Thirty, which begins as follows:

As population grows, technology expands, and society becomes more complex, man becomes more vulnerable to damage from the occurrence and uncertainty of extreme events in nature. Social losses from avalanches, earthquakes, tropical cyclones, and many other natural hazards are increasing. This is the case even though scientific investigation of the causes of the extreme events depends and even though new techniques for dealing with hazards multiply . . . (p. 255).

Such remarks, however, do not provide the cue for reconsidering the basic paradigm. They simply serve, on the one hand, to justify an acceleration of research of a collaborative nature — "to gain greater knowledge of the processes by which people do, in fact, cope with hazards in nature" (p. 3) — and, on the other, to seek greater cooperation between researchers and appropriate national and international agencies, to ensure that findings are translated rapidly into "public action." The "lessons" to be learned from the increasing damage consequent on natural disasters are very orthodox ones; first, there must be a greater sharing of knowledge (the problem is a "communications" one), and, second, successful adjustment involves "the skillful, sensitive use of a wide range of adjustments, including engineering devices, land management, and social regulation" (p. 13). (Complex problems dictate, in other words, complex solutions; technology is not enough.) The Cartesian framework of reasoning is all too apparent, and the tone is set, in terms of both theory and method, for the multitude of studies that constitute the text. Together they form a clearly defined "school" bearing the imprint of its founder and of the context of the school's earlier studies, with all the strengths and limitations that this implies.

Gilbert White's research into natural hazards commenced at the University of Chicago in the mid-1950s. Directed to explaining why people occupy hazardous flood plains in the United States, it led "to the troublesome finding that the net effect of heavy federal investment in flood-control works . . . was to increase the total national losses from floods" (p. 3), this because the provision of government protection and relief tends to lead to further encroachment on hazardous areas. This discovery provided an automatic guarantee for the future of disaster research. A practical problem, of providing "the means of enabling *individuals* to take intelligent action" and "*governments* to design and carry out effective programs of assisting individuals," dictated recourse to pure research aimed at acquiring "greater knowledge of the processes by which people cope . . . with

hazards in nature” (p. 3, my italics). Inquiry spread progressively to the investigation of other natural hazards and to research in different national and cultural contexts. This was formalized in 1967 when collaborative research was initiated with Ian Burton at the University of Toronto and Robert Kates at Clark University. (White subsequently moved to the University of Colorado and now operates his program from there.) Its primary purpose was to establish the general applicability of the North American flood plain study findings with respect to human responses and to government policies.

Prosecution of the research was assured through the sponsorship of the Commission on Man and Environment of the International Geographical Union. This organization solicited the participation of individual geographers and the preparation of national reviews on hazards in its member countries. More recently, it sponsored a meeting in Calgary, Canada, as part of the 1972 International Geographical Congress on human adjustments to natural hazards; this volume is, to all intents and purposes, the product of that meeting. A companion volume (Burton *et al.*, 1977) summarizing regional, national, and international policies for dealing with hazards is the other major product of this collaborative research program. Together all this work has led to collaboration between the Commission on Man and Environment of the International Geographical Union and the United Nations Office of Disaster Relief Coordination on the matter of natural hazards.

A presumably representative selection of the studies in this ambitious research program is published here. As indicated by the title, the studies fall into three categories describing hazards and responses at the community, national, and global levels. In the first category are 21 field studies spanning ten different hazards and 11 nations. Eight of the 21 studies concern the Third World and ten the United States. Among hazards, drought, floods, hurricanes, and frost are the focus of more than one study; five of the six dealing with drought concern Third World nations. The national reviews cover Japan, New Zealand, Canada, the United States, and the Soviet Union. The global summaries, comprising three chapters written by members of the University of Colorado faculty, address themselves to tropical cyclones, floods, and earthquakes. Several papers of purely theoretical or methodological intent are scattered through the volume: first, White’s initial programmatic statement which also outlines the methodology utilized in the community studies; second, a review of the merits of using this same methodology cross-culturally (Chapter Twenty-three); and, third, two papers elaborating decision-making models for natural hazards research (Chapters Twenty-four and Twenty-five).

The papers vary considerably in both quality and length. In general, the national and global reviews are the most informative (although the one dealing with New Zealand is only two pages long and restricts itself to the evaluation of a government natural hazard insurance scheme), providing the reader with useful syntheses with respect to major hazards and the mechanisms commonly

used for dealing with them. In terms of exchange of information among major industrial nations, the Japanese and Soviet contributions are particularly rewarding. Since all the papers are avowedly factual, however, little thought is given to process, beyond allusions to a relationship between increasing societal complexity (development, urbanization) and vulnerability to and gravity of natural hazards. Not surprisingly, this view is not shared by the Soviet contributors. For them, "almost all natural hazards develop beyond any direct dependence on man's activity" (p. 250).

The community studies are much more problematic because of an overriding concern with a particular geographical methodology developed out of the flood plain studies of the 1950s and an implicit, but nevertheless transparent, ideological basis. The approach, common to all the community studies, is characterized by a high degree of scientific rigor—paradigms, concepts, and hypotheses that are operationalized in field methods centered on what are designated as "site description" and "basic interview." The former is designed to generate both contextual and historical material about the community, its environment, and the hazard to which it is subject. The latter, a formal questionnaire administered to a sample of 120 household heads, is designed to elicit information on attitudes and adjustments to the specific hazard and to account for variations in responses in terms of such variables as social and economic status, personality traits, and site differences. The questions solicit facts and opinions, involve selection from multiple choices and commenting on stories, and include a sentence completion test. There are in all 42 items plus 11 sentences to be completed. According to Gilbert White (p. 5), "the interview typically takes about an hour." I am skeptical!

The whole approach exudes a certain scientism, of late *de rigueur* in American geography, where the dictates of the model transcend those of the real world and the task of implementation becomes a somewhat painful exercise. Several of the studies bear witness to this, a good example being the verbalism in Jackson and Mukerjee's paper on adjustment to the earthquake hazard in San Francisco. They experienced a 78% refusal rate in their initial stratified sample, something they attribute to "the minimization of the earthquake threat through a process of dissonance response" (p. 163). In a number of papers there is evidence that statistically or otherwise prescribed methods precluded effective investigation of attitudes. Rowntree, in his study of coastal erosion in California, remarks that many of his informants in the low hazard zone "felt that the interview questions were couched in such a way as to be unanswerable or ambiguous," and he points out, most significantly, that "only when the questionnaire portion of the interview was completed and open discussion was generated was it possible to glimpse the context in which the concept 'coastal erosion' resided in the respondent's mind" (p. 75). In places, systematized questioning verges on the absurd, as in Erikson's inquiry as to whether his flood-prone New Zealand householders would leave the borough "assuming that all socio-economic constraints were magically removed" (p. 67)!

Sophisticated questionnaires designed to generate data to which correlation analyses, χ^2 tests, Markov chains, game theory, and other techniques can be applied often provide only the most banal results which might have been obtained with much less effort and which, viewed dispassionately, are notable only for their naivete. Individual studies abound with statements such as that 31 members of Earney and Knowles' Marquette, Michigan, sample "prepare" when a heavy snowfall comes, 19 "put on snow tires," and 18 "shovel snow" (p. 172). Wow! By contrast, far away across the Atlantic, 43% of Dupree and Roder's Northern Nigerian farmers "when asked to whom they would turn for help to recover from drought losses . . . indicated they would turn to God" (p. 118).

Earney and Knowles also were frustrated in their survey by a failure on the part of many of their informants to consider snow as a hazard at all, because for them it is a seasonal reality and adjustments to it are routinized. And yet at the other extreme it is solemnly reported in several studies that the more pronounced the hazard the greater the awareness of it! When does a hazard cease to be a hazard? When it occurs at regular, predictable, and frequent intervals? When coping becomes an integral part of the adaptive strategy? The issue is perhaps a semantic one. Or maybe it is that the wrong questions are being asked, or that the level of explanation being sought is too superficial. Something is certainly amiss. Reading between the lines of Saarinen's chapter evaluating the utility of the standardized questionnaire approach in cross-cultural inquiry, one gets the clear impression that he shares these misgivings. Yet he voluntarily restricts his discussion to matters of detail—what happens to individual questions in different field situations—and refuses to comment on either the value of the answers or the overall validity of the approach. He thus aborts what might have been a crucial contribution.

If one disregards the limitations imposed by the "rigor" of the approach, it can reasonably be argued that the basic assumptions and method are appropriate to the type of society for which they were originally conceived—a Western, urban-industrial, capitalist state characterized by a resolutely antienvironmentalist ideology, a population that both is massively mobile and has lost most of its sensitivity to the natural world, and a central government whose responsibility for managing environmental problems is ill-defined. The approach suits literate people, who are accustomed to thinking abstractly with respect to preferences and choices and whose reality is in flux. In this situation, it is absolutely necessary to ask the most elementary questions regarding attitudes and responses to hazards. Where the approach loses all credibility is when it is applied to rural communities in other cultures, that is, unless one's view of the Third World is an ethnocentrically developmental one whereby traditional societies are regarded as incapable of coping with natural hazards and therefore as dependent on modernization and the transfer of know-how and technology for their future.

What kind of impression does one obtain from the eight studies that address themselves to the Third World? The overriding one is of a certain naivete, reflected both in the difficulties several researchers acknowledge to have en-

countered in administering the questionnaire and in the uncritical presentation of the results. Imagine asking an illiterate member of a closed corporate community in Africa to do a sentence completion test or to express a preference as to his future place of residence! Gilbert White's collaborators did it. A certain lack of confidence in their data lead both Hankins and also Heijnen and Kates, in the case of Tanzania, to suggest that conclusions can be drawn only from cumulative evidence and not from single variables. Yet nowhere are the data rejected, however questionable they may appear; so Dupree and Roder draw the confident conclusion that "farmers in the Yelwa area [of Northern Nigeria] see themselves at the mercy of the elements and in the hands of God" (p. 118).

This naivete can be explained only by a basic unfamiliarity with the principles of cultural adaptation among preindustrial societies and a slavish commitment to a prescribed methodology. Only Kirkby casts this latter openly aside in her study of drought in Mexico. She obtained her information

from informal interviews with a random sample of 45 cultivators who were met as they worked in their fields, without any prior arrangement. No interpreter or formal questionnaire was used and no notes taken in the presence of the informant. Questions were asked in any order as they occurred naturally in the conversation. (p. 121)

And yet even she subscribes to an essentially negative view whereby Third World societies are seen as hampered by low capital resources, illiteracy, and the persistence of local languages (Kirkby, p. 120). Elsewhere in the volume Bangladesh peasantry are characterized as having "a traditional inborn fatalism" and not caring, often, to hear information on the availability of employment opportunities outside the hazard zone (Islam, p. 23).

If Third World peasant communities are "prisoners of tradition," then, predictably, the solution to their environmental problems is to be seen in "progress." Dupree and Roder recommend "general economic development and tying this region [of Northern Nigeria] more closely into the Nigerian economy [in order to] provide the best protection against future need" (p. 119). Commercialization of agriculture, involving production for export and increased capitalization, is everywhere invoked. Heijnen and Kates (p. 114) even write with obvious approval of the prospects of shipping vegetables from Northeastern Tanzania to Europe by air as a way of improving capacity to withstand drought. Wisner and Mbithi (pp. 96-97) write in purple prose ("the camels rock and sway into the thorn bush haze") of the good life that they see as the likely outcome of a proposed comprehensive Eastern Kenya drought prevention program that includes irrigation and water-conservation schemes, cooperative society stores, kin-group silos, communal trucks, Jomo Kenyatta memorial literacy manuals, dispensaries, and well-baby clinics.

Occasionally it is remarked that traditional strategies are reasonably well adapted to hazards. According to Hankins (p. 104), farmers in the drier areas of Sukumaland (Tanzania) are "more capable of sustaining drought effects"

than those in the wetter because their strategies are preadapted to drought. Oaxacan peasants of Southern Mexico are observed to have various traditional community-level mechanisms that ensure wealth-sharing and hence minimize individual risk in the event of drought (Kirkby, p. 127). But the consensus is that “progress” is inevitable and that planned adjustment to hazards is needed to facilitate the transition from traditional to modern:

The most vulnerable period in the life of a developing country is when the reliable mechanisms of the folk society are weakened by change and when the new institutions and practices are still in their formative stage. The agriculture along the road from Mombo to Kulasi [Tanzania] is conservative agriculture; it needs change, not only to improve well-being but to prevent rural involution. (Heijnen and Kates, p. 114)

The community studies in general are characterized by strict mechanistic analyses that transmit little sense of the collectivities under investigation and lead, then, to no questioning of the basic assumptions of the research. This applies as much to the studies in developed nations as to those in the Third World. Notable exceptions are Kirkby’s study of Oaxacan peasantry, which conveys a clear understanding of the fabric of the community, and Rowntree’s discussion of coastal erosion in Bolinas, California. Through his description of the various interest groups in the community, Rowntree even embarks on a critical discussion of the notion “natural hazard.” For the rest, and this includes the national and global surveys, the papers serve uncritically as vehicles for Gilbert White’s conceptual framework and assumptions—assumptions which are of very questionable validity.

If one assumes disasters generated by extreme geophysical events to be purely “natural” in origin and simpler societies to lack the means (in terms of organization, technology, know-how, or will) of coping with them, it is inevitable that one should approach the problem empirically and seek solutions through recourse to “development.” Such an instrumentalist approach, which pervades the volume, is not, however, necessarily dictated by reality, but rather by a social scientific tradition in the West which fragments reality and which promotes a type of functional analysis that is profoundly *ahistorical*. Thus White *et al.* give no thought to the processes and forces that underlie the objective phenomena “natural hazard” and “disaster.” The possibility that human action might accentuate the gravity of hazards or that the political and economic structures associated with a favored capitalist strategy of development (the massive production of commercial crops, profound population dislocations, and social transformations) might amplify the effects of hazards is nowhere considered.

As far as geography is concerned, this volume brings us back to the epoch and ideas of Pierre Gourou (1953)—of Third World vulnerability that is to be accounted for in terms of environmental constraints and the limitations of capital and technology. And as far as the development literature is concerned, it is re-

miniscent of the same period, in its espousal of an uncritical and elitist Western world view. It completely disregards the human ecological literature that is developing predictive generalizations about responses to hazards among simpler societies, or the Marxist literature that seeks to identify the structural causes of natural disasters through reference to the historical conditions of dominance and dependence that have long prevailed in the Third World. Much of this literature is, admittedly, nongeographical, recent, and in French, and deals with the Sahel, but this is no excuse for a team which seeks to build an empire out of disaster research. Indeed, given the team's interests, it is astonishing that the Sahel gets no mention whatsoever. The vast majority of the hazard situations reviewed are in fact of trivial dimensions, underscoring the fact that the configuration of the problem is dictated by the constraints of the methodology.

In sum, the volume exudes a professionalism and sophistication that poorly conceal a blind faith in a jingoistic kind of geography, an orthodox model of development, and a conventional (and increasingly untenable) view of natural hazards. It is a manual that legitimizes the appearance of a new generation of experts operating in a new field of specialization. *Natural Hazards: Local, National, Global* bears witness to the chaotic situation prevailing in natural hazard management in the Western world and to the emergence of a new form of imperialism in the Third World. It is at once an important and a dangerous book, and, for those who have the courage and the desire to put it into some kind of critical perspective, I would urge that they read a little Malthus, some René Dumont, Nicole Ball's recent article in *The Ecologist*, and, above all, *Sécheresses et Famines du Sahel*. I would also urge that Gilbert White and his associates do the same before it is too late, if it is not already so. They might discover that natural hazards take on a different meaning, and that adjustment to them may lie elsewhere than in increasing interdependence, development, and governmental intervention.

REFERENCES

- Ball, N. (1975). The myth of the natural disaster. *The Ecologist* 5: 368-371.
- Burton, I., Kates, R. W., and White, G. F. (1977). *The Environment as Hazard*, Oxford University Press, New York, in press.
- Copans, J. (ed.) (1975) *Sécheresses et Famines du Sahel*, Maspero, Paris.
- Gourou, P. (1953). *The Tropical World*, Longmans, Green, New York.