Journal Title: Flood Hazard Management in the Government and Private Sector

Volume:
Issue:
Month/Year: 1985
Pages: 60-66

Article Author: Rogers, G.O.

Article Title: Community Response to Recurring and Nonrecurring Floods

Call #: TC423 .A87 1985

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COMMUNITY RESPONSE TO RECURRING AND NONRECURRING FLOODS[1]

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Abstract

Analysis of community response to recurring and nonrecurring floods has significant implications for flood preparedness programs. Comprehensive flood preparedness takes advantage of the most adaptive characteristics of public response to floods. In dealing with the community subjected to a flood, perhaps for the first time in recent history, lessons from recurring flood communities can be utilized in enhancing adaptive response. Conversely, the adaptive aspects of response to nonrecurring floods can be used to increase adaptive behavior in areas where floods recur with some regularity. This paper examines the nature of this cross-over effect and its implications for community preparedness programs.

Introduction

Flooding may well be one of the least problematic hazards confronting human society. While it effects a large proportion of the population, frequent experience with floods and its relatively predictable nature, reduces the band of uncertainty associated with community exposure to floods. Rossi et al (1983) describe the victimization rates for various hazards. Flood victimization by region of the country ranges from a high of 31.7 in the Middle Atlantic States, to 10.7 victimizations per 1,000 households in the Pacific States. Like emergency preparedness officials, people use their database of (emergency) experience in responding to the impending hazard. Rogers (1984) concludes that the experience of living near nuclear power plants has a direct impact on our attitudes about their operation, safety and acceptability. A minimal linkage between prior experience with various hazards, and perception and recognition of other hazards has been suggested (c.f. Rogers, In Press). This paper addresses the general issue concerning the use of experience with a single hazard in making an adaptive community response. To what extent can emergency preparedness take advantage of the

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1. This research was partially supported by the Federal Emergency Management Agency (Cooperative Agreement No. EMW-K-1024). This paper has not been reviewed by FEMA and in no way reflects the views or policies of the Agency. The Author accepts full responsibility for th contents herein and gratefully acknowledges the support, comments and criticisms offered by colleagues at the University of Pittsburgh and the Association of State Floodplain Managers Ninth Annual Conference.

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experiences of communities with different flooding histories. The more specific question examines community response to floods, how the experience gained in communities stricken with recurring floods may be used in responding to floods in nonrecurring communities, and how experience with relatively rare floods can inform emergency preparedness plans in communities of recurring floods.

Experience and Recognition of Hazard

Public recognition of hazard reduces the uncertainty associated with hazards by delineating the relatively risky and potentially risky from the less risky. Public recognition of hazard seems to rest on a foundation of experience and social values (Rogers, In Press). Historically people have relied on actual experience with hazard as the primary mechanism for recognizing potentially hazardous situations. Many hazards have limitations on actual experience, either because of the limited duration of the experience, or because of the delayed or hidden aspect of the consequences of particular (usually technology based) risks. Because ordinary knowledge is comprised of experience, and the perception of hazard rests firmly on this data-bank of knowledge, prior experience, hazard perception, and emergency response are inherently related. While it might be argued that prior emergency experience has historical meaning beyond the particular hazard, by reflecting a self-efficacy associated with dealing with crisis, reported experience and estimated likelihoods seem to be most strongly related among similar hazards (Rogers 1983 and In press). Furthermore, the strongest relationships among experiences and estimated likelihood of risk result under conditions of exposure to single hazards, particularly flooding and hurricanes, in that order. Hence, the examination of community response to recurring and nonrecurring floods addresses the implications of prior experience for emergency preparedness under favorable conditions. This paper considers the extent to which prior aggregate flooding experience in a community may be used to enhance emergency preparedness for flooding under other circumstances.

Adaptive Response to Flooding

Typically adaptive response to flooding is considered as either structural or nonstructural. Another way of classifying adaptive responses to flooding describes the nature of the response in terms of required level of investment, effort, and coordination. Structural mechanisms are usually employed at the community, or regional level. Technological in nature, they often require considerable investment in achieving effectiveness. Primary examples include the achievements of the Tennessee Valley Authority and the extensive technological accomplishments in the New Orleans area. Technological responses to flood also include weather monitoring

technologies (e.g. satellite and ground station weather monitoring). These technological systems are typically designed to enhance warning time, and monitor flood progression in an area (Curtis 1985).

Organizational responses are usually directed at regional, community or neighborhood level adaptation to flooding. While some communities and neighborhoods take advantage of technological mechanisms, organizational responses are predominantly used by local governments. Organizational responses such as zoning laws and flood insurance programs are well known (Lally 1985), but other efforts at large-scale sandbagging and sheltering (e.g. Salt Lake City, UT) also reflect organizational effort. More indirect organizational responses include the monitoring of weather, snowpack and river systems, warning and information systems. While many of these systems are technological in nature, reasonably effective organizational systems can either stand alone or work in conjunction with available technology.

Individual or household response to flooding is comprised of adaptive mechanisms employed by individuals or small groups, often families. Because people tend to respond to impending crisis in family groups, the individual/household responses to floods play a central role in overall flood mitigation (Rogers and Nehnevajsa 1984, Mileti, Drabek and Haas 1975, Perry Lindell and Greene 1981, Flynn and Chalmers 1980, Drabek 1984 and Drabek and Stephenson 1971). Hence, it is extremely important that flood plain managers understand the dynamics of public response to flooding so that they are able to develop effective emergency plans. Individual/household level adaptive action usually consists of relatively simple actions taken in response to impending danger. Laska (1985) examines public awareness and perceived usefulness of a broad range of flood mitigation actions, while implications of residential choice, as one individual/household mechanism for flood mitigation, is discussed in terms of purchase behavior (Cross 1985).

Public Response and the Cross-Over Effect

Public response to recurring flooding is characterized by an experiential based understanding of the subjective meaning of the impending event. Prior flood experience under relatively unchanged local conditions creates a contextual meaning for flood warnings (e.g. flood stages interpreted in terms of the meaning established by prior reported or anticipated water levels). The prior flooding experience in a given community or region also establishes the nature of adaptive responses in terms of the timing of potential onslaught and utility of specific actions. People exposed to recurring floods are likely to be operationally better equipped to deal with the implementation of emergency procedures. For example, they

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are likely to know how to fill sand bags, what things to move, where, how and when to turn off utility service, and in general, the effectiveness of alternative actions. In essence, they have had the opportunity to learn from their past experience with the hazard. Conversely, to the extent that prior experience is inadequate, in the sense of being significantly different from the impending hazard, potentially adaptive response is degraded. This arises when: a) inappropriate responses succeed in prior experience, or b) the impending event is potentially devastating beyond expectations fostered by prior events, or c) prior experience is with particularly devastating events. Success of prior inappropriate activities and impending rare events tend to render inadequate response to hazard, while prior experience with particularly devastating events can lead to over response and misuse of scarce resources. The critical point is to help people, emergency officials and public alike, distinguish between the relatively "rare" and "routine" emergencies.

Public response to nonrecurring floods is characterized by a marked need for information concerning adaptive activity. Without prior experience people are left to adapt rather spontaneously to the changing environment. Hence, the public must be alerted as to the potential for hazard, and notified concerning appropriate actions to be taken in response to the impending hazard. The absence of hazard experience provides the emergency manager with some advantages. For example, it is somewhat easier to contrast crisis with the relatively normal, than it is to distinguish varying degrees of hazard. The lack of hazard experience can leave people to improvise appropriate emergency action, but the emergency manager can emerge as the authoritative leader by directing the response to effective ends. People without experience may indeed turn to the emergency official for guidance in the emergency period. People in nonrecurring flood communities are likley to need greater specification of activity than their experienced counter-parts --- including the appropriate timing of adaptive response. People are likely to find suggestions regarding appropriate actions useful (e.g. locating and unifying family, areas of potential flooding, where to go, what to take, where to meet with family, actions to take prior to evacuation). In essence, a need to teach people concerning their response to the impending flood is likely, but emergency officials must exercise care not to patronize their constituents.

The cross-over effect from recurring to nonrecurring flood situations takes advantage of enhanced knowledge associated with prior experience. The experience of communities subjected to repeated flooding provides information concerning the effectiveness of individual/household acts of protection and avoidance. Such experience provides direct opportunity for evaluation of existing programs (e.g. zoning, flood insurance, and existing emergency plans and preparedness). In short, repeated flood experience provides information concerning the programs that work,

and may suggest modifications needed for communities with different flood problems. People in communities with recurring flood situations have an existing knowledge base which helps them distinguish the utility (vs. futility) of specific behaviors. This is in marked contrast to the need for information (i.e. locus and timing of impact, and adaptive behavior) in nonrecurring flood communities. Establishing the experiential context for flooding situations serves not only to get people's attention, but determine their information needs. Providing too much information can be patronizing, while providing too little may leave people unable to respond effectively. People respond to emergencies on the basis of how the warnings stimulate them to behave (Rogers and Nehnevajsa 1984 and White and Haas 1975), but that behavior is directly influenced by the prior experience context. Hence, it is fundamentally important to understand that context and compare and contrast the anticipated event with prior flooding experience in the community. The experience of other communities besieged by floods is important in repeatedly flooded communities when the impending flood is a "rare" or particularly devastating event. By establishing the experiential context, and comparing the impending event to prior experiences emergency officials are most likely to elicit an adaptive response from potentially impacted people.

Conclusions and Implications

In communities where the knowledge base is rather extensive, like it often is in communities with a recurring flood problem and a relatively stable population, emergency officials are primarily responsible for making existing programs available to the public, accurately comparing impending events with prior experience and assisting the public response. Hence, people in recurring flood communities share the responsibility for knowing about appropriate behavior and available institutional support systems in the community. Emergency managers may effectively rely on institutional support when these support systems are relatively well developed --- as they often are in communities besieged by repeated floods. While emergency preparedness drills are very important for effective emergency preparedness, they may be less important for communities impacted by recurring floods because of the experience of repeatedly responding to actual hazards. In nonrecurring flood communities, flood drills comprise a significant part of the contextual experience, and are thus extremely important in obtaining adaptive public response.

Emergency management based on a comprehensive understanding of underlying social processes places emphasis on programs that work effectively with a minimum of authoritative control. Emergency management officials can systematically take advantage of likely adaptive responses while avoiding associated pitfalls, by

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understanding the existing knowledge base created by prior experience. Emergency managers may minimize costs by identifying clear need for specific programs, using standards and regulations to fill significant gaps in "natural emergency" preparedness. Regulations and standards set without such identified need are likely to be ineffective at best. Regulations, standards and social process associated with emergency management are local abominations of global and more abstract measures of flood plain management. A national policy of flood plain management cannot be used without careful consideration of local circumstances any more than water resource policy can be established nationally. People, like watersheds, have different character, they bring different resources and understanding to emergency situations. When flood plain management accounts for these differences it is most likely to be effective. Establishing the existing knowledge base and effectively relating the pending event to events of the recent past are fundamentally important in maximizing adaptive public response in emergency situations, while minimizing cost.

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