

BOOK REVIEW

S. A. Changnon (ed.): *Review of The Great Flood of 1993: Causes, Impacts, and Responses*, Westview Press, Boulder, CO.

The United States appears to have a flood problem. Extensive and costly floods have occurred repeatedly around the nation in each of the last several years. According to data kept by the National Weather Service, annual flood related losses have increased steadily from about \$1.5 billion in 1930 to more than \$3.0 billion today (in constant 1993 dollars). Similarly, annual fatalities related to floods have steadily increased from about 80 in 1930 to more than 130 today.* The twin trends are problematic from the standpoint of the nation's ability to meet the goal recommended by the Federal Interagency Floodplain Management Task Force to "reduce, by at least half, the risks to life, property and the risks to the natural resources of the nation's floodplains" (FIFMTF 1994, 31).

Development and implementation of solutions to the problems associated with flood impacts on society and the environment will be difficult because many of the dimensions of the national flood problem are lacking important data. For instance, the trends in and causes of flood impacts on society and the environment are relatively poorly understood. Often, trends in flood-related damages and fatalities are presented as indicators of the magnitude and scope of the U.S. flood problem. Yet, this can mislead. The increases in lives lost and property losses have occurred in a broader context of population growth, increases in the amount and value of public and private property and infrastructure, and significant policy and social change at national, state, and local levels. In addition, the social indicators occur against the background of variability and changes in climate. A more accurate measure of societal risk to floods would be an assessment of trends in the number of people inhabiting and the amount and value of the property in the nation's floodplains. Surprisingly, there is little in the way of reliable data on either trends in or the current state of floodplain occupancy (FIFMTF 1992). The lack of data will make achievement of the Federal Task Force's goal to reduce risks by half difficult because it is difficult to reduce something by half if its size is not known.** Furthermore, the lack of reliable data on floodplain occupancy and structures makes difficult useful definition of the U.S. flood problem.*** Lacking such aggregate trend data,

* The damage and fatality figures reported here refer to 25-year averages. The National Weather Service records date to 1903.

** The Task Force recognizes the need for a 'baseline inventory' and calls for the collection of such data on all floodplains by 2000 (1996 for urban areas).

*** The Scientific Assessment and Strategy Team is a possible prototype for the collection of such information. See SAST (1994).

meaningful definition of the U.S. flood problem will require careful assessments of flood impacts on a case by case basis.

With this volume, Stanley Changnon has produced such an assessment of the environmental and societal impacts of the Great Midwest Flood of 1993. More broadly, Changnon has tapped an impressive range of expertise to produce a unique and valuable collection of papers that provide a number of important insights to the interrelation of humans, environment, and atmosphere. The volume is multi-disciplinary, problem-oriented, and wide reaching. It will likely be the definitive study of the extensive 1993 Midwest floods. The book “diagnoses the social and economic impacts of this monumental disaster, assessing how resource managers, flood forecasters, public institutions, the private sector, and millions of volunteers responded to it. . . The emphasis here is on the flood’s many impacts and the policy issues that they raise” (Chapter 1, p. 3).

The book has thirteen chapters. Ten chapters (2–11) focus on particular aspects of the flood: meteorology (Rodenhuis), climatology (Kunkel), hydrology (Koeller), physical effects (Bhowmilk), ecosystem effects (Sparks), agricultural impacts (Zacharias), transportation impacts (Changnon), economic impacts (Hewings and Mahidhara), human and governmental response (Wilkins), and effects of the flood on national policy (Wright). The remaining three chapters (1, 12, 13 by Changnon) provide valuable context and synthesis in focusing on the flood’s chronology, losers and winners, and lessons of the flood.

The nineteenth-century English critic John Ruskin observed that “to know anything well involves a profound sensation of ignorance.” In this way the story of the 1993 flood is provocatively paradoxical. It is a testament to the scientific and technical advances made by society that allow for coping, responses to, and understanding flood impacts. But at the same time the story of the flood leaves one with a humbling view as to the limits of our knowledge and the effectiveness of flood policy and decision making.

The flood of 1993 was not one massive event but a sequence of events that begin several seasons prior to the greatest inundation. In some respects the flood’s impacts continue years after. The flooding itself occurred in nine midwestern states, but was related to atmospheric circulation patterns of global scale. As Rodenhuis (p. 44) notes, “many of the meteorological features found in 1993 appear every year.” It was the particular combination of events that made 1993 exceptional. More than “1,800 miles of rivers experienced record high flows” (Koellner, p. 68). Many of these flood peaks reached the Mississippi River at about the same time. The “resulting massive crest approached St. Louis from the north where it was joined by high water entering from the Missouri River” (p. 73). The simultaneous confluence of record crests had never before been documented. The flood disappeared at Cairo, Illinois where the Mississippi joins with the Ohio in a larger river channel (Bhowmik).

In its wake the flood left massive impacts on society and the environment. Assessment of these impacts is, as Changnon (p. 8) warns, fraught with “considerable difficulty” and thus requires “alert and caution” by the consumer of such

data. In the immediate aftermath of any disaster there are attempts and demands to quantify the magnitude of the event “in billions of dollars, thousands of acres, and the U.S. economy; all of which are certainly the facts, but none of which the average citizen can relate to on a personal level” (Wilkins, p. 225). Hewings and Mahidhara (Chapter 10) cogently point out that impacts related to extreme events can be direct and indirect (i.e., primary, secondary, tertiary). They note further that in the process of economic impact assessment “at each spatial level (state, region, or national), it is possible to derive rather different assessment of the effects” (p. 206). For instance, a flood may lead to devastating agricultural losses in a particular region, but “through the reduction in goods and supplies, elevate prices for the output for the rest of the country, thereby actually yielding a positive net [economic] impact on the nation as a whole” (p. 206). The lesson is that aggregate data on the economic impacts of climate and weather is always laden with assumptions, simplifications, and presuppositions that rarely accompany the numbers – buyer beware!

Several chapters underscore that the range of impacts goes well beyond those that can be effectively or meaningfully quantified in monetary terms. For example, the floods were a boon to riverine ecosystems that “benefitted fishes that spawned on the inundated floodplain, and wading birds, in turn, exploited the huge crop of young fish” (Sparks, p. 132). The floods also provided a natural disturbance essential to ecosystem health, for example “cottonwood seeds only germinate on moist mud” (Sparks, p. 147). The record inundation also accelerated the downstream transport of the zebra mussel from the Great Lakes into the Mississippi River system. The zebra mussel was introduced to the Great Lakes system in the mid-1980s by ocean vessels and into the Illinois River system through canals. The mussel “will have serious environmental and economic effects because they overgrow and kill native clams and mussels, plug engine cooling systems and municipal and industrial water intakes” among other impacts (Sparks, p. 152). Other human/environmental impacts whose effects are still unknown include the release of Asian black carp into the river system and the massive delivery of nutrients picked up by the flood into the Gulf of Mexico. The flood also has significant impacts, both positive and negative, on transportation systems (Changnon, Chapter 8), agricultural production (Zacharias), and the physical landscape of the floodplain (Bhowmik).

An important consequence of the flood was its impact on flood-related policies. Zacharias (pp. 180–181) notes that while “in one sense, the Great Flood of 1993 did not tell agricultural policy makers anything new. . . . The flood provided the impetus for agricultural policy makers to reform both the funding and management of weather-related disasters in agriculture.” More broadly, the flood initiated debate over the influence of levees on flooding, what to do with substantially damaged buildings, buy-outs of floodprone communities, and the role of insurance (Wright). The flood occurred as the Federal Interagency Floodplain Management Task Force was finalizing its Unified National Program for Floodplain Management (an update from previous versions in 1966, 1976 and 1986). Yet, Wright (p. 260) reports that

“no entity exists to act upon the report’s recommendations and those of the previous national assessment.”

Some policies have changed in the aftermath of the floods. For instance, the National Flood Insurance Program and Federal Crop Insurance Program were both amended by the 103rd Congress. In addition, the floods stimulated Congress and the President to request studies by the Army Corps of Engineers, the Congressional Bipartisan Task Force on Funding Disaster Relief, and the Administration’s Floodplain Management Task Force (Wright). These reports were produced in 1994 and 1995 (FPMA 1995, BTFFDR 1995, IFMRC 1994). The knowledge gained from the floods was extensive, but also revealed the limitations of current knowledge and the efficacy of present policy. Wright (p 270) concludes that

several matters of concern emerged from the Midwest floods and deserve continuing attention in the policy arena. These include problems related to disaster relief and subsidy programs, the lack of viable alternatives to structural control projects, the need for restoration of natural systems and functions, the question of how individuals and their local communities perceive and deal with their flood risk and management programs, overreliance on insurance as a mitigation and loss reduction approach, and the lack of accurate knowledge of the full costs and benefits of occupying floodplains. *Until and unless these matters are adequately dealt with, including their underlying causes, there is little prospect for meaningful changes, no matter how well intentioned the motives of the policy makers.* (emphasis in original)

In conclusion, this volume is an important study of the impacts of the Great Midwest Flood of 1993. While it focuses on the events of 1993, it draws on the broader context of environment, politics, and society to give the lessons of those events more general significance. At the same time it provides meaningful analyses drawn from the case that help to shape how we think about the bigger picture. Changnon (p. 312) observes in the Conclusion that “thoughtful past recommendations of how to attain flood mitigation had not been adequately implemented.” This volume is one such thoughtful work. It deserves a wide audience.

References

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