The Nuclear Energy Arena

Chain Reaction. Expert Debate and Public Participation in American Commercial Nuclear Power, 1945–1975. BRIAN BALOGH. Cambridge University Press, New York, 1991. xii, 340 pp. $34.50.

In the last decade or so, American historians and political scientists have interested themselves in the strategies and structures of U.S. federal governance. Where do public policies come from? How are government programs implemented? Do governmental structures influence policy outcomes? What are the relative contributions of public administrators, private interest groups, and political entrepreneurs to the process? How has the institutional universe of policy-making and program administration changed over time? To what end?

Brian Balogh uses the history of policy debates over commercial nuclear power to explore these major themes. Research into archival records and manuscript collections enables him to address a number of specific empirical issues. These include the origins and development of the Atomic Energy Commission and Joint Committee on Atomic Energy; the early concern among AEC professionals with matters of reactor safety, site review, and radiation surveillance; the contrasting political styles and ideas of AEC chairmen David Lilienthal, Lewis Strauss, and Glenn Seaborg; and the persistent economic obstacles to private nuclear power development. But the book deserves attention as much for its generalizations on the structure of postwar policy-making as for its close analysis of the politics and personalities of commercial nuclear power.

As the author notes, World War II altered fundamentally Washington's relationship to a wide range of public issues. In the case of big science, federal funds and public agencies displaced private philanthropy and voluntary organizations as key sources of policy leadership and administration. Balogh outlines the contrast in an interesting opening chapter.

At the end of the war, policy-making for nuclear power resided with a handful of central decision-makers, and the successful merger of scientific, engineering, and managerial professionals in the Manhattan Project guaranteed them widespread public trust. There were also high hopes for atomic-generated electric power, for civilian administrators and politicians had heightened expectations during their successful fight against military control of postwar nuclear power policy. In 1946, their victory was institutionalized in the civilian-dominated Atomic Energy Commission and congressional joint committee.

The new agencies then launched a frustrating, decade-long effort to generate support for their policies from economic interest groups. In so doing they reversed the usual pattern of "iron triangle politics," where private economic groups and congressional oversight committees combine to pressure government agencies for action. What is striking about nuclear energy politics, and by implication other postwar policy issues, is the significance of federal initiative and federal money in shaping the policy agenda. This is one of the book's guiding interpretative themes.

Of course, by the mid-1970s everything looked very different in the field of nuclear power, and much of *Chain Reaction* is devoted to explaining why this is so. By then, the comparatively self-contained universe of early policy-making for nuclear energy had cracked apart; the initial consensus style of closed politics had yielded to a more adversarial approach. And though some commercial development did materialize, it fell below original expectations. Reactor technology had depended from the start on military, especially navy, funds in any case, and civilian demand languished until the 1960s, after which the industry stumbled into public controversy over safety and environmental issues.

In the meantime, claims to a government monopoly on nuclear expertise could no longer be sustained. Competition for policy-making authority increased. Nuclear experts seemed to be everywhere. In addition, representatives from competing scientific disciplines such as biology and environmental engineering also insisted on being heard. So did grass-roots citizen organizations, along with state governors and public health officials, as well as competing federal agencies and congressional committees. Whereas an ideology of national security protected early administrators from public scrutiny, skeptics could now use environmental concerns and health and safety issues to get a hearing and force accountability. By the end of Balogh's story, the politics of nuclear energy had become as much a struggle about equal access to policy-making and due process as a debate over arcane technical questions. Fragmentation and interdependence, not coherence and autonomy, characterized the process.

A number of factors external to the policy-making process can help to explain these developments, including rising public skepticism about government bureaucracy after Watergate and the Vietnam war. Balogh's contribution, however, is to focus on pressures within the policy-making process itself. The accumulation of information and growing application of scientific techniques among competing professional experts both inside and outside the AEC generated its own dynamic. Internal agency disputes spilled into the public press. Squabbles among scientists undermined the consensus critical to sustaining expert political authority. As well, competing scientific experts reached out to different parts of the political system for institutional support. The network of opposition and controversy widened. The idea of autonomous decision-making for nuclear power policy gave way before the pluralism of American politics and the proliferation of expertise.

As this brief summary suggests, *Chain Reaction* is a complicated piece of historical narrative and analysis. The story line is sometimes difficult to follow. But this is a significant work, and one that deserves to have a major influence on subsequent attempts to write the history of administrative politics in the United States since World War II.

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Pre-War Ecology

Pioneer Ecologist. The Life and Work of Victor Ernest Shelford, 1877–1968. ROBERT A. CROKER. Smithsonian Institution Press, Washington, DC, 1991. xviii, 222 pp. + plates. $27.50.

During its first half century, the new science of ecology in this country was intellectually dominated by a group of botanists who grew up or were trained in the Midwest. Most prominent among them was Frederic Clements of Nebraska (born

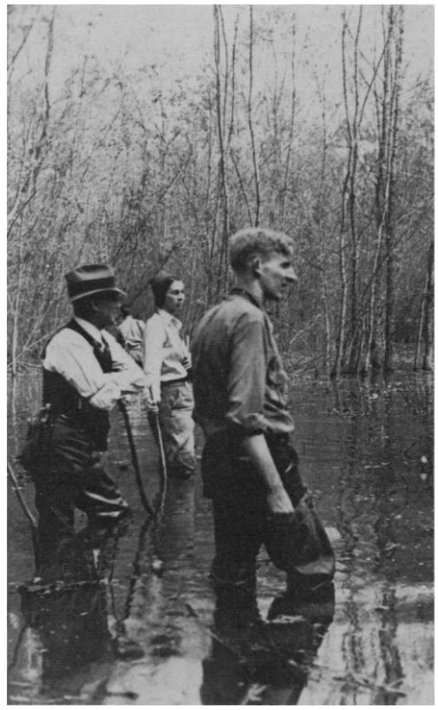
in 1874), who created a systematic classification of vegetation around the enduring metaphor of the plant community as a living "superorganism" that arises and develops through predictable phases (succession) into a mature form (the climax formation). To Victor E. Shelford, the senior animal ecologist in the country before the Second World War, fell the task of integrating animal communities into Clements's classificatory scheme. In 1939 this culminated in the publication of *Bio-Ecology*, co-authored by Clements and Shelford. Within a decade, the grand ecological vision embodied in this work would be eclipsed by a new generation of ecosystem and population ecologists motivated as much by mathematical theory as by empirical observations gathered in the field.

Robert Croker, who teaches environmental law and conservation at the University of New Hampshire, has produced a relatively short, and most readable, biography of Shelford, chronicling his long career at the University of Illinois. Having been trained as a physiological zoologist at the University of Chicago (Shelford was fascinated with the natural history of tiger beetles), he moved to Illinois in 1914, where he remained for the rest of his life.

Shelford was best known for the vast amount of descriptive information about the plant and animal communities of North America published in numerous papers and several books. Among his students he is fondly remembered for the military precision with which he organized extensive field expeditions each summer. These cross-country ventures exposed a whole generation of budding ecologists to the diversity of natural habitats that were the real love of Shelford.

This biography is organized by themes: Shelford's scientific development at Chicago, his life-long career at Illinois, his challenging collaboration with Frederic Clements, his Continental travels with students, and his role in the developing conservation movement through the Ecological Society of America and the National Park Service.

While this biography focuses more narrowly on the life of Shelford, it identifies, but does not fully engage, two broader issues. Despite his empirical and pragmatic inclinations, why did Shelford (like so many of his colleagues) fall under the dominant spell of Clements's "superorganism" metaphor for the natural community, and what caused this paradigm to change so dramatically between 1940 and 1950? Equal interest surrounds Shelford's failure, during the same decade, to move the more conservative leadership of the Ecological Society of America to an activist role on behalf of conservation in this country. This subsequently led to the creation of the Ecologists' Union, the first $300 check for which was written by Shelford in 1945. Five years later the organization was renamed The Nature Conservancy, which is today one of the largest private conservation organizations in the world. *Pioneer Ecologist*, with its clear narrative and extensive footnotes, provides a fine point of embarkation for future explorations of these issues.



"The Easter field trip to Reelfoot Lake, Tennessee, in 1937. [Victor] Shelford (wearing the hat) is with Jane Dirks and Eugene Odum." [From *Pioneer Ecologist*; courtesy of Eugene Odum]

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Elephants and Forerunners

Mammoths, Mastodonts, and Elephants. Biology, Behavior, and the Fossil Record. GARY HAYNES. Cambridge University Press, New York, 1991. xii, 413 pp., illus. $49.50.

These are difficult days for African and Asian elephants. The effects of poaching, drought, and habitat encroachment by humans have reduced the number of African elephants (*Loxodonta africana*) from 1.3 million to 650,000 in the last decade. Fewer than 50,000 Asian elephants (*Elephas maximus*) remain. Yet these two species themselves are really just stragglers, surviving remnants of a much greater diversity of elephant-like animals that perished 10,000 to 11,000 years ago, at the end of the Pleistocene period. The extinction killed the woolly mammoth (*Mammuthus primigenius*) in Eurasia and North America, the columbian mammoth (*M. columbi*) and American mastodont (*Mammut americanum*) in North America, three species of gomphotheres in South and Central America, and an African species of *Elephas*. The cause of this extinction has long been controversial. Some camps blame dramatic climate shifts at the end of the glacial period, and others argue that human hunting was responsible. The goal of *Mammoths, Mastodonts, and Elephants* by Gary Haynes is to study "the ecology and behavior of modern elephants to create models for reconstructing the lives and deaths of extinct mammoths and mastodonts."

Modern elephants have complex social lives. Related adult females (mothers, daughters, sisters, and cousins) and their young offspring live together in groups. Each group is led by an elder female, who through the years has gathered extensive knowledge about sources of food and water in times of adversity, when to begin migrations or daily travel, how to avoid predators, and so on. Young males are ejected from groups when they reach sexual maturity; they may cluster together to form bull herds. Adult bulls generally live alone, but consort with female groups for breeding.

The book documents the profound influence of this social organization on elephant mortality in Hwange National Park, Zimbabwe. During droughts, elephants congregate around water holes, and they even dig wells when natural water sources dry up. Haynes discovered that juveniles and adult females are the primary victims of drought. Apparently bachelor living gives adult males greater mobility, increasing their access to scarce food and water. Likewise, when park officials decided to reduce the elephant population by 9000, they shot entire family groups, creating bone heaps dominated by adult females and calves. In contrast, when hunting elephants without the benefit of numerous high-powered rifles, African people usually target isolated adult males, because attacking family groups is too dangerous. Natural predators, such as lions and hyenas, can only kill naïve young males who have recently been thrown out of family groups.

Several chapters are devoted to long-term comparative studies of bone modification, articulation patterns, and popula-