Robert W. Kates

1929–2018

BIOGRAPHICAL *Memoirs*

A Biographical Memoir by
B. L. Turner II
and William Riebsame Travis

NATIONAL ACADEMY OF SCIENCES

ROBERT WILLIAM **KATES**

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By B. L. Turner II and William Riebsame Travis

Robert W. Kates, by education a geographer, was a preeminent human-environmental scientist. Throughout his career, beginning in natural hazard studies and culminating in sustainability science, he pursued a big question—What is and ought to be our relationship with nature? To answer this question he gathered collaborators from natural and social sciences and built institutions to support their work. A boundless fount of important ideas, he formulated broad hypotheses, stating them clearly and seeking evidence for or against. He urged social scientists to engage in environmental research, and his projects inevitably straddled the natural and social sciences, though his curiosity was drawn to puzzles of human behavior in the environment. He believed that a notion widely held—that natural sciences could model and explain their systems better than social scientists—was scientific myth. The social-environmental behaviors he probed stemmed from complex interactions, rife with uncertainty but also with potential for understanding and betterment.

Kates studied economics at New York University for two years before dropping out in 1948, becoming a steel worker for the next 12 years. He began taking night classes at Indiana University and gained admission to the doctoral program at the University of Chicago, where he earned a Ph.D. in 1962. That year he joined the faculty of the Graduate School of Geography at Clark University, where he remained for the next 24 years. In 1986, he moved to Brown University to become director of its new Alan Shawn Feinstein World Hunger Program. He left Brown in 1992, and for the rest of his professional life worked as an independent activist and researcher.

A native of Brooklyn, Robert Kates enrolled in New York University in 1948 to study economics, but dropped out after two years. At the age of 19, he married Eleanor "Ellie" C. Hackman, who dropped out of Indiana University. The couple moved to Gary, Indiana, where they worked in a steel mill for 12 years, engaging in union activities and

racial-justice movements. On a family vacation to a state park, a chance meeting with a naturalist shifted Bob's direction to becoming a schoolteacher. With that goal in mind, he enrolled in night school at Indiana University, where his intellectual talents eventually led him to Gilbert F. White, then chair of the Department of Geography at the University of Chicago. Bob was permitted entry into that program in 1958 to pursue a doctoral degree, which he achieved in 1962. Only 13 years later, he was elected to the NAS. Rarely on a normal academic path, spending much of his late career as an independent scholar untethered to a university, Bob may be the only NAS member to have held no undergraduate degree and who may have achieved membership in such a brief time after gaining his doctorate.

What impressed Professor White to permit a steelworker lacking an undergraduate degree to pursue a doctorate? Bob shared White's interests in human-environmental problems and the vision that the role of academe should include more than academic curiosity but also direct attention to resolving societal problems. Bob ultimately articulated these problems in "Queries on the Human Use of the Earth" by way of three major thematic questions: Why do people occupy areas of persistent natural and technological hazard? Why does hunger exist in a world of plentiful food? Can the world transition towards sustainability?[1] Bob's professional career can be segmented by these three queries.

The Nature of Hazards

Bob's initial work on hazards began on a White-led project characterizing people's perceptions of floods and adjustments in La Folette, Tennessee. Bob concluded "that the perceived frequency of flooding is not a continuous function, but…fall[s] within discrete classes that affect adjustments in floodplain management, along with the idiosyncrasies exhibited in humanity."[2]

He found evidence among floodplain residents of problems that bedevil hazard mitigation to this day: the residents' greatly limited ability to envision any event much larger than those of the recent experience, and the atrophy of concern and adaptation among them that sets in with time following a hazard occurrence. He distinguished technical definitions like maximum flows and flood return periods from the residents' experience with floods, writing in his 1962 dissertation that:

> *For some, either by ignorance or the denial of the common shared experience, floods do not exist at all. For others, floods do not occur as repetitive events but as true acts of God and are not subject to the ken of*

> *man....If they have pondered their future personal relationship to a potential hazard, it is only then to shrug it off. They have but pondered one more of life's many imponderables.*

He followed this study with research on the Great Alaskan Earthquake of 1964 (9.2 magnitude), participating in an NAS effort to learn lessons, both natural and social. The fieldwork in the earthquake zone, precursor to the Academy's National Research Council Committee on Natural Disasters post-event investigations, impressed on Bob the large differences in physical and social vulnerability to disaster impacts, a theme he would apply in subsequent studies of the Managua, Nicaragua, earthquake, coastal storms in the mid-Atlantic region, the drought in Africa's vast Sahel region, and Hurricane Katrina.

Not content with the scanty notice given to earthquake predictions, Bob turned his attention to reducing earthquake losses, recognizing, as in the case of floods, that society's alertness to the hazard diminishes during the long quiet episodes between events. He derived three principles and societal actions for a national policy addressing this hazard: (1) improve knowledge and application of loss reduction by training professionals in hazard mitigation; (2) improve preplanning, including especially planning for a post-disaster recovery that reduces future loss; and (3) make hazard exposure and loss reduction part of routine rather than emergency agency action—for example, developing and enforcing building codes—and of people's daily lives.[3]

The Chicago-linked triumvirate of Ian Burton, Kates, and White drew on these and other hazard studies in writing the foundational text of natural hazard research, *Environment as Hazard* (1978, Oxford Press). This work, intended also for the public at large, was well received, with a second edition issued by Guilford Press in 1993. On the other hand, the work drew significant criticism from social scientists, especially those wedded to critical social theory. They objected to the book's emphasis on perception, individual choice, and management structures that made people more or less vulnerable to hazards, as opposed to explanation of exposure and sensitivity rooted in economics and politics. Bob and his coauthors offered virtually no response to this critique, a silence marking another of Bob's professional attributes, shared similarly with White—the avoidance of public dispute. No matter how much he may have disagreed with critiques that came his way, Bob rarely, if ever, responded publicly, instead mostly commenting among his close colleagues and going on with his work. Indeed, Bob privately and gently admonished one of us (BLT) for engaging in aggressive public rebuttal, always insisting that if it was warranted publicly, it should be delivered in a measured and respectful way. Bob's

subsequent acceptance of some of the critiques of *Environment as Hazard* was subtle and largely ignored by the critics: he and his colleagues increasingly added adaptive capacity to their risk and hazard template, strengthening a vulnerability focus that would emerge in the climate change impact studies to come.

Bob used his first university post, in the Graduate School of Geography, Clark University (1962-1986), to further craft the hazards-research focus. In doing so, he also helped to influence one of the few major doctoral programs in the discipline at that time to adopt a human-environmental science orientation; subsequently a large number of geography programs relabeled their offerings using the term "environment" or "sustainability." Seeking to break up disciplinary silos addressing human-environmental problems, Bob and fellow geographer Roger Kasperson galvanized physicists, historians, engineers, psychologists, and others at Clark to create the Center for Technology, Environment, and Development (CENTED), which subsequently morphed into the George Perkins Marsh Institute, housing an even broader array of researchers, including economists and sociologists. CENTED championed risk and natural-hazards research, advancing the hazards framework to encompass questions about the risks of technology and resources and development, especially in Africa. This last quest arose from Bob's earlier selection by the Rockefeller Foundation to serve as the first director (1967-68) of what is now the Institute of Resource Assessment at the University of Dar es Salaam, Tanzania. His experience there enlarged his recognition both of what he needed to learn to address risk and hazards outside the Western world and the critical role of international collaboration, and amplified his long-term commitment to address the real-life challenges of people.

CENTED provided a base as Bob developed two research efforts that were to command his attention, and that of his many collaborators, for decades: the social dimensions of climate and climate change, and the nature of technological, as opposed to natural, hazards. Bob came early to the problem of climate change, delivering a call to social scientists to engage in the climate problem at the First World Climate Conference in Geneva in 1979.[4] Drawing lessons from natural hazards, he developed methods for assessing climate impacts[5] and focused especially on the many ways, from incremental to transformative, that society adapts or maladapts to climate variations.[6]

Bob combined a fondness for systems diagrams with his love of typologies to sort out the nature of technological hazard. In this pre-personal computer and internet era, he and colleagues created a physical typology in "banker's boxes" that lined the walls of the CENTED library, each labeled with a particular technology, from chain saws to nuclear

power, and crammed with relevant government reports, accident investigations, and newspaper and magazine articles. Bob and colleagues laid out the summative typology and theoretical causal chain by which technologies become hazardous in a benchmark paper, "The nature of technological hazard."[7]

A Certain Style of Research

Throughout these activities, Bob developed a style of research based on comparative case studies and conceptual models. The models provided the sketch of the problem and processes at play, derived from the patterns revealed in the synthesis of the case studies. At heart, he was a Bayesian—after the 18th-century English mathematician Thomas Bayes, who was the first to use probability as a way to predict outcomes—impressed by scientific intuition, or what he might call priors. His models of hazards and hazard management were some of the first to be advanced.[8] Consistent with his early flood perception work, these cases also revealed the behavioral inconsistencies within and among the studies, signaling the variations in the real world to which attention must be given if improvements in hazard outcomes were to be achieved. Although he sought generalizable answers to his problems, Bob was uncomfortable with the myopia engendered by the use of theory-and hypothesis-led approaches alone, culminating in his subsequent push for sustainability science to maintain "place-based" approaches to account for the local variance and idiosyncrasies of outcomes.

From his Alaskan earthquake studies onward, two attributes consistently marked Bob's research and writings. First was his persistent service on, contributions to, and initiator of panels, committees, and other activities to advance human-environmental science: 16 in number on behalf of the National Academy of Sciences and more than 50 others for national and international programs. Second, three would become a Katesian theme. Almost regardless of the problem or the study, Bob would pose or derive three outcomes, or advance three lessons and challenges—for example, the Alaskan work above—as he recollected that the audience tuned out beyond the third. For those of us who worked with Bob intimately, we knew a moment would come when he would make the request "give me three…" or provide "the three" products or key insights of the venture in question.

Bob also admired the ability of the natural sciences to identify important research questions and create community-based research agendas to advance understanding of a problem. As the questions of human-induced climate change and sustainability began to emerge, he urged the social sciences to think "big" and to enter these research problems

as full partners with the natural sciences. He was frustrated, however, by the difficulties in generating a robust, integrated human-environment science to address the problems in question, including the inequalities in funding the physical versus the social dimensions of the problem.

This frustration notwithstanding, he continued to marshal activities dedicated to social-natural science integration that he called for at the first World Climate Conference. Two of his early projects took on questions of climate and human population dynamics ("CLIMPOP") and society's experience of and adaptation to climate variation ("CLIMPAX"). Both were funded by the National Science Foundation's Atmospheric Sciences and Climate Dynamics program, run by forward-looking physical scientists like Alan Hecht, who early on saw the importance of integrating the human dimensions in the fashion of the Bretherton Diagram.[9]

The arrows of cause and effect go both ways in Bob's model of what he called the "human environment," and Bob was central to the development and orchestration of the symposium and volume, *The Earth as Transformed by Human Action*, using the centennial celebration of Clark University as a platform for this activity.[10] The base problem and approach—to document the human impacts on the states and fluxes of the earth system—were hatched with William C. Clark and called on the assistance of Gilbert White and others to generate the intellectual scope and sponsorship for the effort. Despite Bob's leadership, he insisted that the editorship leads of the volume be given to the two more junior partners of the project (BLT and WCC), and, continuing his mentorship, ensured that the other author of this memoir (WRT), one of Bob's Ph.D. students, wrote a chapter in the volume. Importantly, Bob envisioned this effort as a step toward the science of sustainability. Before that step was taken, however, he left Clark University to take on the challenge of "hunger in a world of plenty."

Hunger in a World of Plenty

In 1986 Bob became the first director of the Alan Shawn Feinstein World Hunger Program at Brown University, a decision that was assisted by his being awarded a MacArthur Fellowship and aided by his recruiting of Robert Chen as deputy. In this position, he grappled with his second major query, why hunger persisted in a world of plenty. He tackled this theme through a series of seminars at Brown aimed at teasing out the underlying structure of the problem, which most analysts had come to realize was not just about food-supply shortages. First the typologies, arrayed, of course, as threes:

hunger could be starvation, undernutrition, or micronutrient deficiency,[11] and the causes could be food-system breakdown, entitlement failure, and hazard.[12]

Imbued with Gilbert White's commitment to practice, Bob wanted the hunger program not only to provide an improved, deep understanding of persistent hunger, but also to change the trajectory of the problem. Rather than focus on the mantra of ending hunger, Bob envisioned an effort to cut hunger in half, founded in the understanding that hunger was woven not only into the fabric of human interaction with the vagaries of nature, but also class, gender, violence, and geopolitics. Despite this focus, though, he and the team at Brown soon were offering a recipe to effectively end hunger, one that included elements of what was to become sustainability science:

> *to achieve food security in the warmer, more crowded, more connected, but more diverse world of 2060 requires widespread acknowledgement of food as a human right, large increases in food production and income, a pervasive global safety net, and the capacity to cope with surprise.*[13]

A Science of Sustainability

In 1992, Bob "retired." Ellie and he moved to Maine, where many of his family reside. He took up his ultimate academic "post," as an independent scholar. He joined and championed the National Association of Independent Scholars, while also shifting his local/regional involvement "down east" through affiliations with the College of the Atlantic and the University of Maine, and contributing to Maine's climate-change action plan and the state's Sustainability Solutions Initiative.

No longer tied to institutional obligations, Bob was freed to undertake his third big query, on transitioning to sustainability and developing the science to support it. Again, he collaborated at length with Bill Clark and the NAS, as they co-chaired the National Research Council study that produced *Our Common Journey: A Transition toward Sustainability.*[14] He, Clark, and their co-authors made the case that this science was about both environment and human development—how to meet people's needs and reduce poverty while maintaining a functioning Earth system. The challenge for the work they advanced—laid out in "Seven Core Questions of Sustainability Science"[15]—was to ensure that the answers to those questions would be useful to communities making decisions about resource use, growth, and environment. To do so required better answers to such questions as:

How can the dynamic interactions between nature and society—including lags and inertia—be better incorporated into emerging models and conceptualizations that integrate the Earth system, human development, and sustainability?

Can scientifically meaningful "limits" or "boundaries" be defined that would provide effective warning of conditions beyond which the nature-society systems incur a significantly increased risk of serious degradation?

Sustainability science, therefore, involved a commitment to environment and development in which scientific exploration and practical application would occur simultaneously. As Bob noted:

> *[S]ustainability science is a different kind of science that is primarily use-inspired, as are agricultural and health sciences, with significant fundamental and applied knowledge components, and commitment to moving such knowledge into societal action.*[16]

As with his work on hunger, the goal of research was to help solve a problem confronting a human-environment condition.

Changing the Geographical Context

Bob's overarching question—what is and ought to be our relationship with nature—and his far-reaching impacts on the development of trans-disciplinary research addressing it—cannot be fully appreciated without understanding the context in which he worked, especially during the first half of his career. He resided in a relatively small discipline, geography, and operated within the smallest institution in the United States maintaining a geography doctoral program, albeit the program at Clark University has had an illustrious history. Neither situation proved a barrier to Bob. Within his doctoral field, he played a pivotal role in rebuilding his home program to prominence and making his institution a center for human-environmental science. As president of the Association of American Geographers (AAG) in 1993-94, with responsibilities from 1992 to 1995, he helped to generate pan-geography research funds and activities preparing the discipline for trans-disciplinary sustainability activities. Among these efforts was assistance in creating the association's Human Dimensions of Global Change Specialty Group. In keeping with his attraction to place-based work, Bob worked through the AAG, with support from NASA and a large group of geographers at small universities, on "Global Change in Local Places," flipping the process of the Intergovernmental Panel on Climate Change to start with local assessments and then link them to the global.[17]

Bob's vision and influence spread far beyond his home discipline. *Our Common Journey* proved to be a catalyst for national and international efforts to engage sustainability. He championed the creation of Section 64 of the NAS, the Human-Environmental Sciences, as well as various activities within NAS and the Social Science Research Council to engage sustainability. With Bill Clark, he helped to create the sustainability science section of the *Procedings of the National Academy of Sciences.* These activities were complementary too and intellectually integrated with efforts of international science programs to refocus parts of the research on global environmental change to questions of sustainability. In tandem, these efforts have given rise to sustainability science, complete with multiple international journals, programs of study, and robust applications of science.

The Individual and His Questions

Bob's exceptional career was marked by exceptional personal exchanges. Those of us who encountered him daily during his years at Clark recall his unusual demeanor. On any given day, an encounter with Bob on his walk to his office would yield the following. "Good morning Bob. How are things?" His reaction would take a few seconds, because he was invariably lost in thought. Recognizing the query, he would stop, turn his head toward the sky with his mouth open, to think through his answer. Sometimes the response was: "I'm not sure." More often than not, it was: "I have been thinking…" and off he would go on some plan of activity. One of us (WRT) experienced this tide of ideas as grad student, post-doc, and colleague, eventually learning not to be overwhelmed by the flow of good projects to be taken on, instead keeping a life list at which to chip away.

Of Bob's concerns—those at which to chip away—society is much better prepared to address the first part of his overarching query: What is our relationship with nature? It may be somewhat distant from a unified vision of the second part of his query: What ought to be our relationship with nature? Importantly, an increasing proportion of the global population appears to understand that a sustainable future for humankind requires significant attention to the ought. With this advance, Bob would smile.

Bob and Ellie lived 68 years together before Ellie's death in 2016. Bob died on April 21, 2018. They are survived by their children, Katherine Kates, Jonathan Kates, and Barbara Kates, six grandchildren, and four great-grandchildren.

Bob and Ellie Kates.

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