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Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function.

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this book is not afraid to say so. Rather like the genome itself, among all the redundancy, there is an important and engrossing message that this book manages, with considerable effort, to get out.

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A GUIDE TO A HABITABLE PLANET

Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function. Brian Walker and David Salt. Island Press, 2012. 248 pp., illus. $28.00 (ISBN 9781597268011 paper).

Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function by Brian Walker and David Salt follows their successful earlier book, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World* (2006). This sequel offers a user's guide for readers who are concerned about the increasing frequency and severity of shocks and stresses that we are imposing on our planet and for those seeking ways to manage change. These thinkers, stakeholders, and decisionmakers are increasingly gravitating toward the idea of *resilience*, a concept more dynamic and multifaceted than *sustainability* or *stability*, but as the agricultural ecologist Sir Gordon Conway points out in his foreword to the book, the term *resilience* has been picked up in political rhetoric as a buzzword, and widening usage risks obscuring and discounting its meaning. Walker and Salt strive in both books to frame the term in useful, operational language for accessible discussion, and they describe general features and controls that make the concept recognizable in concrete, diverse cases. Reprising their "anyone can do it" claim from *Resilience Thinking*, the authors continue in *Resilience Practice* to show how clearer thinking about resilience in systems can be drawn from anyone's life experience.

Born and raised in Zimbabwe, Walker was for many years the chief of Australia's Commonwealth Scientific and Industrial Research Organisation's Division of Wildlife and Ecology. He is currently the science program director of the Resilience Alliance (*www.resalliance.org*), a small group of eminent international ecologists, economists, and ecosystem scientists who, inspired by C. S. "Buzz" Holling and Lance Gunderson, have worked together since 1999 to develop science that can increase the resilience of social–ecological systems and to communicate that science to the public. As in the previous book, Walker partners with science writer David Salt to write plainly and eloquently—yet avoiding oversimplification—about how we can recognize and manage features of social–ecological systems that enhance their resilience to shock and stress.

The practice of resilience is presented in the book as a life- and, potentially, world-changing practice—a habit of perception, thought, and action. Despite the complex and adaptive nature of social–ecological systems, Walker and Salt recommend searching for "requisite simplicity": finding a small number (three to five) of key variables that "redefine the futures of regions and whole communities" (p. 23). The authors practice this advice by showing their readers how to describe a system in order to assess its resilience using just five specifications: system components (i.e., the entities and processes that constitute it); the scales that bound the system, players, power, and rules; the focal response variables (i.e., a resilience of what?); key causal variables (i.e., a resilience to what?); and drivers and trends (i.e., its history and its future). To develop this description is to seek simplicity, but the quest itself is neither quick nor simple. The authors explain that the description of a system for resilience analysis must be done carefully and in a comprehensive way, such that disparate points of view of diverse stakeholders (a term they dislike but cannot avoid) are incorporated. Continuing with Alfred North Whitehead's dictum, *Resilience Practice* urges us to seek such simplicity but to mistrust it, acknowledging the need for our ongoing vigilance ("Working with resilience requires you to constantly reflect on what you're doing and why you're doing it," p. 1) and continuous adaptation to change ("It's *not* about not changing," p. 3). The capacity of systems to recover resiliently from disturbance requires that these systems have experience with disturbance.



Resilience Practice begins with an explanation of resilience thinking using rigorous, operational definitions in language nearly devoid of jargon, easily intuited case histories, and graphs. Readers are introduced to or reminded of complex adaptive systems, thresholds, hystereses, reversible and irreversible change, and the different definitions of *resilience* used in social science, psychology, physics, engineering, and ecology. Walker and Salt also emphasize the importance of considering interrelationships among scales that strongly affect resilience. To focus on only one scale, we are warned, can be a trap. Lessons can be drawn from our experience with cheap pesticides in forests, mosquito control, or agroecosystems that select for resistance in target pests and synchronize successional states of patches, causing vulnerability to megaoutbreaks in larger landscapes. Synchronizing change among system components works against resilience-conferring

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portfolio effects, the importance of which has been convincingly demonstrated in analyses of forest pest outbreaks (e.g., Holling 1992) and of the Bristol Bay sockeye salmon fishery (Hilborn et al. 2003, Schindler et al. 2010).

Diversity, ecological variability, modularity, tight (but not too tight) feedbacks, social capital, trust, networks, innovation, experimentation, equity, and fair trade are among the attributes that are argued to confer resilience but that may be difficult to prescribe quantitatively. Nonetheless, the authors give useful practical advice: Think across multiple scales—local, regional, global. Focus on thresholds, either to maintain systems or to restore flipped systems. Figure out where ecosystem services come from and how are they linked. Celebrate change. Embrace uncertainty. Foster innovation. Graft new thinking onto prevailing institutional structures.

These generalities and suggestions are made more concrete with a wide array of case histories. A number of these are focused on how scarce water is used and shared in irrigation systems in Sri Lanka or New Mexico or under water management plans in Australia that draw on Walker's life experience with rangelands challenged by drought and overgrazing. Crossing an economic threshold can increase the probability of crossing an ecological one in coupled social–ecological systems, such as farms or ranches. A graph on page 31 deftly illustrates how social and ecological variables interact to affect system resilience and management. It shows how debt might force ranchers to overgraze, but replanting tolerant native grasses or diversifying ranch income could each increase their "safe operating space." Later, we return to water issues at regional scales with the Okavango Delta, the Tonlé Sap, the French Camargue, and the Aral Sea presenting a spectrum of resilience or degradation of wet places under different kinds of governance.

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Further intriguing examples show how resilience is applied and practiced at the scale of individual lives—in disaster relief, in engineering (e.g., aircraft design), and in public health.

Chapter 2 will appeal to those interested in community organizing for resilience in social–ecological systems. It addresses the touchy issues of determining who gets to sit at the table as a stakeholder and of identifying the key knowledge holders. Walker and Salt point out the iterative nature of getting these groups organized with proper representation. They give general but useful advice for characterizing cross-scale human relationships; for example, systems are scaled in part by where people get their resources and where they deliver what they make or harvest. The authors point out the inconvenient truth that the element or dimension of trust is slow to build but is quickly lost when it is violated or mismanaged.

The last chapter addresses resilience on a planetary scale. The authors note that during the entire Holocene, Earth and its atmosphere absorbed human impacts on an increasingly global scale: the harvest of vegetation, the reduction in species diversity, and an alteration of the distribution and abundance of key elements and compounds. The corrective feedbacks that regulated the Earth system despite these impacts are not likely to persist in the Anthropocene, given that we have transgressed safe operating limits for at least three variables (Rockström et al. 2009, of which Walker was a coauthor). The authors call for an establishment of an adaptive global governance, "to which nations and global corporations pay allegiance." Those working together to protect or build resilience features at a global scale, like those working locally and regionally, will need to figure out how to reposition thresholds (between good and bad basins of attraction) to increase resilience against stressors such as greenhouse gases, abuse or exploitation of human beings, loss of native species or cultures, or pandemics.

The book ends with a postscript called "A view from the Northwest Passage." Brian Walker sailed through the passage over 6 days in July 2010, reflecting with scientists, businessmen, and government officials on what the opening of this passage across the Arctic Ocean would mean for the planet. Briefly but cogently, the authors spell out how observed, ongoing, and anticipated changes could fundamentally destabilize the global thermohaline ocean circulation and the entire climate system. Throughout the book, the authors have avoided charged language or dire predictions, and this choice should broaden their reading audience and perhaps the influence of their message. *Resilience Practice* emerges as a readable, friendly guide to planetary preservation, intended to foster hope and corrective action in order to improve future prospects for a human-friendly Earth. Unfortunately, the words "Don't Panic" do not appear on the cover.

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ARE WE FUELING POVERTY?

Biofuels and Rural Poverty. Joy Clancy. Earthscan, 2012, 206 pp., illus. $79.95 (ISBN 9781844077199 cloth).

The primary question addressed in Joy Clancy's book *Biofuels and Rural Poverty* is this: Are biofuels inherently

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