Book Reviews

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Intelligent tinkering: the breaching of bridges between science and practice

Cabin, Robert J. 2011. **Intelligent tinkering: bridging the gap between science and practice.** The Science and Practice of Ecological Restoration. Island Press, Washington, D.C. xv + 216 p. $70.00 (cloth), ISBN: 978-1-59726-963-6 (alk. paper); $35.00 (paper); ISBN: 978-1-59726-964-3 (alk. paper).

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Intelligent tinkering is first and foremost an autobiographical account of Robert J. Cabin's brief engagement of the highly complex and sometimes demoralizing world of Hawaiian conservation biology. In the first half of this book, the reader is introduced to Cabin—a desert ecologist fresh out of graduate school who in 1996 moved to Hawaii to take on the profession of restoration scientist and the avocation of part-time restoration practitioner. His prose is engaging and the initial story line compelling. Cabin is at his best when describing the daunting task of restoring what is perhaps the Earth's most imperiled ecosystem—the Hawaiian Dry Forest. Nearly all of this once vast (by Hawaiian standards) forest type is gone—plundered for sandalwood, degraded by a Pandora's Box of feral ungulates, and burned during wildfires spread by invasive African grasses adapted to both the dry climate and to the fires they carry across an expanding exotic savanna. Remaining fragments serve as precarious refugia to a highly endangered flora, with many species represented by just dozens of individuals left in the wild.

Readers new to ecology will be attracted by Cabin's folksy effort to relay an ecologist's daily life in a global extinction hot spot. Detracting from the writing is Cabin's enthusiasm for drama, and he is not always skillful or accurate in his efforts to weave biocultural elements into his discussions—most who call Hawaii home would disagree with his statement, "Hawaii remains poor, insular and reminiscent of a developing country." Similarly, the frequent digressions into the nuts and bolts of conducting ecological research, and sharing of his conflicted emotional and psychological status, may tire some readers. However, Cabin does succeed in conveying the difficulties associated with simultaneously building a restoration research program and participating in community-driven restoration, all the while knowing that even the best of efforts will not avert extinctions.

Taken together, Chapters 1–5 provide a nice foundation for what in subsequent chapters could have been a useful discussion on the bridging of science and practice. Unfortunately, what the reader finds is a dated and somewhat vague discussion of the failures of restoration science, and the claim that restoration science has little of direct value to offer to restoration practice. Many of Cabin's arguments are little updated from the arguments he made in his 2007 *Restoration Ecology* paper (Science-driven restoration: a square grid on a round earth? 15:1–7), to which he frequently refers. For example, he cites Ehrenfield's 2000 assessment (War and Peace and conservation biology. *Conservation Biology* 14:105–112) of the real impact of the journal *Conservation Biology* on the practice of conservation biology. I would have liked to see a modern engagement of *Restoration Ecology*. My own reading of this journal typically reveals many articles per issue that address practice-relevant restoration science.

There are other concerns regarding *Intelligent tinkering*. An obvious one is Cabin's regular reliance on unnamed sources, who, for the most part and not surprisingly, agree entirely with Cabin. A second is a lack of objectivity. For example, Cabin and colleagues conducted a survey of participants at a 2009 restoration conference (Cabin, Robert J., Andre Clewell, Mrill Ingram, Tein McDonald, and Vicky Temperton. 2010. Bridging restoration science and practice: results and analysis from the 2009 Society for Ecological Restoration International Meeting. *Restoration Ecology* 18:783–788). In reporting the results in this book, he selects almost entirely negative findings to present. But when one actually reviews the original paper, a large proportion of respondents actually see good progress in the bridging of science and practice—suggesting that restoration's science/practice glass is at least half empty. Perhaps most importantly, Cabin, in his portrayal of restoration science, fails to acknowledge that the simple experiments he implemented two decades ago have given way to complex research efforts that bring together the various fields of science that now constitute restoration ecology, including, ironically, landscape-scale studies that he so desperately wanted to conduct when he was in Hawaii. For example, research over the past decade in the application of new remote sensing tools has helped Hawaii managers map landscape-scale distributions of invasive species and identify restoration sweet spots where resources can be efficiently directed to achieve restoration objectives. Furthermore, Cabin ignores many types of restoration science in his critique—for example, the weed research identifying the correct herbicide type and formulation, the rat research identifying rat impacts on ecosystems and underlying mechanisms, and the avian ecology research establishing the habitat requirements needed for developing restoration prescriptions. These types of research apparently fall into another category for Cabin. Still other types of research are dismissed as testing ideas that are too obvious—for example pioneering exclosure work that has been conducted throughout Hawaii, as well as his own recent work (Weller, Stephen G., Robert J. Cabin, David H. Lorence, Steven Perlman, Ken Wood, Timothy Flynn, and Ann K. Sakai. 2011. Alien plant invasions, introduced ungulates, and alternative states in a mesic forest in Hawaii. *Restoration Ecology* 19:671–680). Interestingly, while this latest research again confirms that fencing can positively impact native plants, the resulting "Implications for practice" reveals not-so-obvious outcomes of the research:

- Responses of ecosystems to the removal of major perturbations such as alien ungulates are often complex and difficult to predict.
- Removing major perturbations should be considered a necessary but usually insufficient first step toward restoration of the ecosystem.
- Once the major threats have been controlled or at least mitigated, additional active management actions may be necessary such as control of formerly suppressed but potentially noxious alien species that emerge from the seed bank or disperse into fenced plots. Reintroduction of key

native species that cannot effectively establish on their own may be essential.

Cabin closes his book with chapters advocating two ideas that he believes will prove more beneficial to restoration practice than restoration science—a restoration-focused extension service and the "adopt-an-acre" program he previously proposed (Cabin 2007). These are good, but not new, ideas. For over a decade the State of Hawaii has supported an extension forester position at the University of Hawaii, whose job is, in large part, directed at supporting restoration projects relying on native species by passing on science-based knowledge, for example, new disease-resistant lines, improved site preparation techniques or nutrition formulations, and improved understanding of what constitutes genetically appropriate planting material. The Hawaii-based Pacific Fire Science Consortium is now cosponsoring with the University of Hawaii a second fire-focused Extension position, which also will be tasked with taking the best available restoration science and relaying that information to land owners in usable formats. With regards to the "adopt-an-acre" program, one could view the variety of federal and state Stewardship Programs as filling this role. These programs are creative, relatively well funded, but limited in impact because the real-world of land management requires a diversity of approaches—especially those suited to large public ownerships that cannot for legal or logistical reasons turn land management over to adopt-an-acre programs. There also are core restoration problems that cannot be solved by adopt-an-acre strategies. For example, a decade of restoration science has been invested into developing the recently released biocontrol agent for strawberry guava with the goal of thwarting the devastating impact of this invader on Hawaii's windward forests. If successful, this single development promises to provide the foundation for restoration of most of Hawaii's remaining native forests and so enhance habitat quality for countless native species. It is hard to envision how even a century of intelligent tinkering could achieve development of such an agent, let alone address, acre by acre, the large-scale and highly complex restoration problems facing Hawaii's ecosystems.

Does Cabin ask important questions about the ever-present gaps between practice and science? To this, the answer is clearly "YES." Bridging this gap will require continued evolution of both sides of the science and practice divide, but the real answer will involve stout-hearted and creative individuals serving in focused and committed partnerships such as the Hawaii Conservation Alliance and the many Watershed Partnerships operating across Hawaii. These groups are bridging the gaps between science and practice at local to regional scales. The dated analyses and impractical alternatives presented in *Intelligent tinkering* only serve to widen the divide and so set back conservation.

Christian P. Giardina

USDA Forest Service
Ecosystem Function and Health Program
Institute of Pacific Islands Forestry
Pacific Southwest Research Station
Hilo, Hawaii 96720 USA

E-mail: cgiardina@fs.fed.us