

BOOK REVIEW

Plant Reintroduction in a Changing Climate: Promises and Perils

Joyce Maschinski and Kristin E. Haskins, editors. 2012. Island Press, Washington D.C., U.S.A., 432 pages, \$100.00 (hardcover) \$50.00 (paperback), ISBN 978-1-59726-831-8 (paperback). Also available as Ebook

For ecological restorationists, it is axiomatic that biodiversity is a key foundation upon which ecosystem functioning depends. We accept that loss of diversity can have catastrophic effects on ecosystem processes and the services they provide (Duffy 2009). Indeed, conservation of biodiversity is virtually always either a stated or implied goal of ecological restoration projects. This is especially important given that recent rates of extinction may now far exceed those occurring throughout the period when humans have affected the Earth's ecosystems. One estimate is that nearly 20% of all plant species worldwide may now be threatened with extinction (Pennis 2010). Recognizing this reality, many restoration projects in the 1990s began to formally include active *reintroduction* of plant propagules into sites where the native population was absent. Such reintroduction has now become the primary tool for the recovery of endangered plant populations to viable levels in many areas of the world.

The nascent state of the science and practice of plant reintroduction was reviewed previously in *Restoring Diversity: strategies for reintroduction of endangered plants* (Falk et al. 1996). The current volume represents a thoroughly updated and expanded version of this review some 15 years on. In addition to examining the experience, knowledge, and data that have accumulated since, this work

more directly addresses the controversial topic of managed relocation (MR) where endangered organisms are purposefully introduced *outside* their native ranges. As the current title suggests, the omnipresent effects of changing climate also now play a more prominent role in all plant conservation activities and this is addressed in this work as well.

This volume, which is based on presentations and discussion at a symposium held in 2009, is divided into four parts. The first part includes two complementary reviews of available information derived from the majority of specific plant reintroductions conducted primarily since the mid-1980s. These summaries of success, failure, and accumulated knowledge provides valuable context for what follows. The existence of the Center for Plant Conservation (CPC) International Reintroduction Registry (2013) greatly facilitated these reviews and serves as a dynamic and valuable resource for plant reintroduction practitioners and scientists. The second part addresses advances in the science and practice of plant reintroduction. The sorts of topics restoration ecologists might expect are certainly here (e.g. the importance of genetics, associated microorganisms, identifying suitable habitats, propagule type and number, long-term monitoring, and dealing with extremely small population size and native ranges). Importantly, the role of volunteer and community outreach groups in facilitating reintroduction is also considered. The two chapters in part III directly consider the contentious and still emerging topic of MR, where introductions occur in novel locations, often to counteract the negative effects of climate change. Included here are discussions of the history and development of this practice and the possibility that plants involved in MR could become invasive. Part IV presents a summary of the volume, including the many areas where

additional research is needed, along with what may be its most valuable component, the CPC Best Reintroduction Practice Guidelines. This appendix provides a step-by-step process for practitioners to follow when planning and executing a reintroduction project.

While many chapters were focused on conservation science, each one had some portion dealing directly with the linkage of science with reintroduction practice and its connection with MR. Despite its prominence in the title, the effects of changing climate on reintroduction practice received relatively little direct treatment, although many authors recognized the urgency of reintroduction given what we understand about climate change and biodiversity loss. One theme does emerge from the volume as whole: as the rate of habitat repositioning exceeds that of plant migration, reintroduction that includes MR will necessarily become a much more prominent tool for those tasked with endangered plant management.

This book, especially the CPC Best Reintroduction Practice Guidelines, will serve as a very useful resource for anyone interested or involved in the management of rare plants. While the vast majority of plant reintroduction examples considered have occurred in relatively few countries (primarily in Europe, United States, and Australia). I believe the content and conclusions of this book would be valuable to those working in reintroduction worldwide. As would be expected from a volume based on symposium presentations, the most recent contributions to the field are absent although I see this as a minor limitation. Much of this book necessarily focuses on the conservation of individual species and not systems or processes. As a researcher not directly involved in plant reintroduction, outside of the Practice Guidelines I might have liked to see more explicit recognition that plant

reintroduction represents just one component of comprehensive ecological restoration. Overemphasizing conservation of rare species and not the totality of the environments they inhabit is unlikely to yield the self-sustaining and functional ecosystems the Earth requires.

LITERATURE CITED

Center for Plant Conservation. 2013. CPC International Reintroduction Registry

(available from <http://www.centerforplantconservation.org/reintroduction/viewreintroductionlist.asp>. Accessed May 28, 2013.

Duffy, J. E. 2009. Why biodiversity is important to the functioning of real-world ecosystems. *Frontiers in Ecology and the Environment* 7:437–444.

Falk, D. A., C. I. Millar, and M. Olwell, editors. 1996. *Restoring diversity: strategies for reintroduction of endangered plants*. Island Press, Washington, D.C.

Pennisi, E. 2010. Tending the global garden. *Science* 329:1274–1277.

Steven Smith

School of Natural Resources and the Environment, University of Arizona, Tucson, AZ, U.S.A.

E-mail: azalfalf@ag.arizona.edu