

Foreword

The incredible beauty of southwestern landscapes exists because of pollinators. Plants and their pollinators began evolving their intricate dance of codependency over 100 million years ago with the origin of the flowering plants (angiosperms). They fine-tuned it during the Cenozoic era (beginning 65 million years ago) as flowering plants began to dominate all the world's living landscapes. These millions of years of plant-pollinator coevolution have produced a world in which flowers have their anatomy and scents finely tuned to their pollinator partners. In exchange for pollination services, flowers provide food (nectar, pollen), shelter, and chemicals used by insects to produce such things as pheromones (chemicals produced by animals and released into the environment to stimulate a behavioral response from another animal). The relationship between flowering plants and their pollinators is so intimate that, should pollinator populations decline (or worse yet, go extinct), the impact on their plant associates would be immediate and profound. Because pollinators are species upon which the lives of so many other species depend, they are regarded as "keystone species." Pollinators are thus essential to the stability of the global ecosystem itself. In fact, without pollinators, life on planet Earth would be very different.

Not only are our native plants dependent upon pollinators for their continued existence, but so are our crops. Eighty percent of the world's crop species, including food, beverage, medicine, dye, and fiber crops, rely on animal pollinators. The critical importance of pollination has been recognized since humans first gave up nomadic lifestyles. That great symbol of human-pollinator partnering, beekeeping, began long ago, at least by 600 B.C. in the Nile Valley and probably well before that. The first beekeepers were most likely Egyptians who floated hives up and down the Nile to provide pollination services to floodplain farmers while simultaneously producing a honey crop. Domestic honey bees (*Apis mellifera*), introduced to North America from Europe in the mid-1600s, now play a role in pollinating 80 percent of the crop varieties grown in the United States. However, the story is complex. Because European honey bees have been introduced worldwide they now compete with native bees (and other native insects) around the world, and it is now virtually impossible to find an area free of managed or feral honey bees. Honey bees out-compete native insect pollinators by overwhelming them with their sheer numbers and superior ability to detect and direct one another to pollen and nectar sources. Further complicating the story, at the same time that the United States has allowed itself to become dependent on domestic honey bees, U.S. populations of these bees are beginning to plummet due to exotic (introduced) bee parasites (e.g., mites, beetles), loss of habitat, use of

pesticides, and the invasion by highly aggressive Africanized bees (*A. mellifera scutellata*) into the United States (since 1990). The aggressive Africanized bees out-compete the European honey bees but do not pollinate all the same plants and crops. The direct competition between European and Africanized honey bees with native species is reducing the numbers of native pollinators, and it is adding to the pollination crisis that the world faces today.

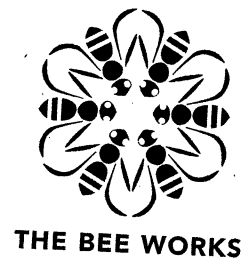
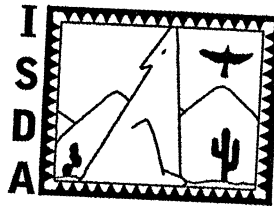
Like many other animals on Earth, pollinators today face growing threats of extinction. Disruption of habitat, widespread and often inappropriate use of pesticides, and the development of certain genetically engineered plants further add to the crisis, as pollinating insects are locally extirpated and native plant and domestic crop reproduction and fruit production plummet. It is suspected that many thousands of pollinator species have become extinct over the past century as a result of worldwide, rampant land-use change and deforestation. With accelerating global biodiversity losses, estimates of the number of insect species alone that will go extinct by the year 2050 range into the hundreds of thousands. The impact on native plants and on crops cannot be predicted in detail, but will surely be enormous.

What can you do to help slow the loss of pollinators? In this book you will find some answers. Remember: everything you do to help pollinators will also enhance the quality of your own living space. By adding native plants and flowers to your yard and garden, creating oases that will attract hummingbirds, butterflies, and other beautiful wildlife to your home, you will create a natural "outdoor classroom" for you and your family to enjoy and learn from. Join the growing number of people who are working to protect pollinators while at the same time improving our overall quality of life.

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POLLINATORS OF THE SONORAN DESERT

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