Preface

When I undertook the challenge to produce a second edition of "Ecology of Desert Systems" it was because I had the support of the Long-Term Ecological Research Program at the USDA-ARS Jornada Experimental Range, and the collaboration of a former graduate student, Dr. Benjamin Duval, now an assistant professor at New Mexico Tech. As we discussed this project, it was apparent that climate change was affecting every aspect of the ecology of dryland systems and much of Dr. Duval's research is on the effects of climate change in agricultural systems and natural ecosystems. Another consideration is the increase in the human population to more than seven billion humans. More people on the planet results in rapidly increasing pressure on drylands for production of goods and services. Dryland resources are needed to support the burgeoning population. Pastoral societies are undergoing marked changes and there is a growing demand for food and fiber from the drylands of the planet. Selection of animals that are economically viable is a challenge for many inhabitants of drylands.

A population of more than seven billion humans on the planet and the rate at which the climate is changing presents serious challenges for economically advanced societies. Part of the problem is that social and political systems and even educational systems cannot change fast enough to deal with all of the problems resulting from these two overriding problems. Our climate change models cannot predict all of the impacts of climate change and their effects on the planet's productive systems. No political system seems to have the will to deal with either problem and many if not most political and social systems will become chaotic in the face of these seeming intractable problems. The drylands of the planet may be affected more than the more mesic environments by climate change. Just getting adequate nutrition to the human population will require considerable effort and may fail. This book presents the basics of what we understand about drylands but solutions will require efforts of not only scientists but all sectors of human society.

Humans place even more pressure on dryland which represents an escape from the frenetic pace of the rapidly growing cities for recreation and simple relaxation. The primary focus of this edition is to provide sufficient background on the functioning of dryland systems on which land managers can base decisions. This edition also serves as a background for scientists working in drylands and a text for students focusing on issues affecting dryland ecosystems. In order to make the book more useful, there is a glossary which should help nonexperts understand the science.

Much of the scientific literature from the United States and Mexico is focused on the effects of nonnative plants that are now invasive in the arid regions of these countries. Nonnative (exotic or alien) species were not considered in the first edition and after scanning the literature, it was obvious that nonnative species were a problem in most of the arid and semiarid regions of the world. This edition devotes a chapter to nonnative organisms and their effects on dryland ecosystems and includes some of

the current thinking on how best to manage or deal with the problem of invasive alien species.

The first edition of "Ecology of Desert Systems" provided the basic principles of desert ecology and the thinking about deserts up to year 2000. Some chapters are little modified from those in the first edition because there has been much less new research on adaptations, patch and mosaic dynamics, and desert climate but a considerable body of new work on climate change and deserts. China has obviously invested in managing drylands and in the science and management of deserts. Many of the publications from China provide corroborating evidence for processes and patterns described in the first edition. It is the hope of the authors that the second edition will provide the tools required for managing drylands in the 21st century, identify the most important problems facing drylands, and provide some guidance for sustainable use of the world's drylands.