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INTERNATIONAL DROUGHT MITIGATION

AN INTRODUCTION

For centuries human beings have struggled to develop economic systems that are in harmony with the environmental constraints imposed by semiarid lands. Although most scientists would agree that harmony between the environment and agricultural development in these ecologically-sensitive zones is an achievable goal, historically such a goal has rarely been attained. Witness, for example, the recent expansion of the African deserts into the marginal rainfall zones of the Sahel. Semiarid zones make up approximately 8.2 million square miles, or about 16 percent of the earth's total land surface. However, the natural variability of climate in these zones causes them to expand and contract annually, fluctuating between greater and lesser aridity. Drought is a normal feature of their climate. In March 1985 a symposium Social Adaptation to Semiarid Environments was sponsored by the Center for Great Plains Studies at the University of Nebraska-Lincoln. The symposium explored the ways in which societies have adjusted in the past, are currently responding, and can adapt more effectively in the future to the problems of semiarid environments.

This special issue of *Great Plains Quarterly* includes the papers from the international sessions of the symposium, beginning with the keynote address by J. M. Powell, "Abideth Forever?" Global Use of Semiarid Lands in the

Interwar Years." Powell's thesis is that the new nationalisms, old imperial networks, and burgeoning successes and ambitions of scientists combined between the two world wars to create new systems of land use in semiarid regions. In his introduction, Powell poses an interesting question: Were decisions about the management of these fragile ecosystems developed within the region as a result of experience, or outside the region in response to planners' hopes for the society as a whole? His conclusions are revealing and provide challenges for the future management of semiarid lands.

A. A. den Otter's article, "Adapting the Environment: Ranching, Irrigation, and Dry Land Farming in Southern Alberta, 1880-1914," examines the views on land use prevalent during the settlement period as well as the social and political conflicts that arose between the special interest groups representing ranching, dryland farming, and irrigation. The author views the process as one of adapting the environment rather than adapting to the environment. Historians and others will be interested not only in the experiences of the early settlers of southern Alberta but also the parallels between their experiences and those of their peers to the south.

In "Rural Social Organization in a Semiarid African Country: The Case of Botswana,"

Louise Fortmann examines relationships between the structure of rural social organization in the semiarid regions of Botswana and climatic, social, political, and economic factors. Despite the impact of new technologies that mitigate its effects, climate remains an important influence on social organization in Botswana, although Fortmann views social, political, and economic factors as important in mitigating the effects of climate. She argues that the spatial and economic flexibility that continues to be an integral part of the system of social organization in the semiarid region of Botswana is largely responsible for the successes in adapting to this environment.

In recognition of the fiftieth anniversary of the Dust Bowl, the symposium featured a special session that compared the specific drought mitigation strategies adopted on the North American Great Plains to those adopted in other semiarid environments. In "Adaptations to Adversity: Agriculture, Climate, and the Great Plains of North America," N. J. Rosenberg discusses drought as the primary constraint to agricultural development in the region. He presents both examples of drought strategies such as irrigation that have enabled agriculturalists to evade some of the effects of drought and examples of techniques such as the modification of plant architecture with the potential to improve still further our adaptation to drought. He divides these strategies into two groups—those that increase water supply and those that reduce demand. Rosenberg concludes his paper with a discussion of the implications for Great Plains agriculture of the climate change humans may be inducing by increasing concentrations of atmospheric carbon dioxide.

Huang Bingwei's article, "Water Conservancy and Agricultural Development of the North China Plain and Loess Highlands: Strategies and Research," examines the water management problems resulting from the conflict between the need for greater agricultural development and the pressures of increasing urbanization and industrial development in the North China Plain. As it does in the

North American Great Plains, drought represents the primary hazard to agricultural production in the North China Plain and irrigation is the primary drought-mitigating strategy. However, at times, flooding is also a significant hazard, reducing agricultural production and threatening human lives, especially along the Yellow River. The current challenge is to optimize the use of existing water resources through improved management by, for instance, expanding the multiple and other cropping systems that take full advantage of temperature and soil moisture regimes and improved irrigation efficiency.

The Australian adaptive process has been significantly different from that of the North American Great Plains and the North China Plain because irrigation has not been a feasible strategy for reducing the vulnerability to drought of the semiarid lands. R. L. Heathcote's article, "Drought Mitigation in Australia: Reducing the Losses but Not Removing the Hazard," concludes that drought and high rainfall variability has significantly retarded land settlement. Heathcote views past, present, and future applications of technology as providing fewer opportunities for the mitigation of drought impact in Australia than does Rosenberg for the North American Great Plains.

Randall Baker examines the circumstances surrounding the current drought situation in Africa and the "crisis management" mentality applied to society's response to this catastrophic event. His article, "The African Experience: Drought and Famine in the Dry Zone," is critical of the view that the recent rainfall patterns that have characterized the semiarid zones of Africa are anomalies and that problems will disappear when conditions return to "normal." He also discusses the relationships between drought and mismanagement, the inappropriate use of technology, and the expansion of peoples into fragile marginal areas. Baker suggests that technology, particularly irrigation, in the semiarid lands in Africa has led to overgrazing rather than to a reduction in drought impacts. He identifies the

focus of agricultural research on cash crops rather than grain crops as one of the fundamental problems retarding the development of sustainable agriculture in these dry zones.

P. E. Lydolph presents the final article of the series, "Comparative Drought Strategies: The Soviet Union." He provides a fascinating comparison of the agroclimatic regions of the Soviet Union and the United States, centering on how the climatic characteristics impose greater constraints on agriculture in the Soviet Union than in the United States because fewer combinations of adequate heat and moisture supply exist. Thus, marginal semiarid lands in the Soviet Union are under considerably more pressure to produce foodstuffs than are similar regions in the United States. Lydolph also explores Soviet application of technologies such as irrigation, shelter belts, conservation tillage, and development of drought resistant varieties to counter drought. He concludes that Soviet agriculture will continue to operate under stricter environmental constraints than American agriculture.

This special issue of *Great Plains Quarterly* describes the adaptive process in semiarid environments under different sociopolitical and economic systems and gives an insightful look at future prospects. These articles suggest that although there is a certain commonality in this process, the experience of each region is unique, indicating there is a great deal that can be learned about the management of semiarid environments from past experiences. Increasing population pressures dictate that semiarid environments will continue to be important agricultural regions. However, the knowledge and insights gained from the contents of this volume offer a better understanding of the roles that climate, sociopolitical, and economic forces play in this adaptive process. The challenge is to develop an agricultural system that is sustainable given the presence of these forces.

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