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**Case Studies of Sustainable Water Resources Development,
Rio Grande Basin, New Mexico**

edited by

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PREFACE

The case studies were prepared by graduate students in the summer 1998 capstone course of the Master of Water Resources degree, Water Resources Program, at the University of New Mexico. The instructors were Drs. Michael E. Campana, O. Paul Matthews, and Clifford N. Dahm.

New Mexico is in a unique setting to examine issues of sustainable development because of its physical environment, cultural mix, and potential jurisdictional conflicts. In this dry region, water is the key to sustainability and the Rio Grande is the focus of the state. Although other surface-water and ground-water systems exist, the ribbon of the Rio Grande is the cultural and economic heart of the state. Pueblo Indians, traditional Hispanic farmers, modern corporate farmers, endangered species, urban development interests, Mexico, the federal government, Texas, and Colorado all have a stake in the way the river and its tributaries are managed. Managing the river is no easy task because water rights are not clearly defined and water quality regulations are a mix of federal, state, and Indian law. Principles of sustainable development are often ignored because of this piecemeal approach to management.

New Mexico also has a diverse mix of cultures and communities that view sustainable development from different perspectives. Cultural divisions such as Native American or Hispanic are oversimplifications. For example, Indian tribes do not all have the same goals in managing the river. The contrast is strongest when comparing the diverse traditional communities with the modern ones. The main challenge to sustaining these traditional communities is the increased need for water in urban areas. Cities such as Albuquerque grew because residents believed their water supply was inexhaustible. Recent studies have shown there is not enough water to support current development on a sustainable basis. The city has three options: 1) buy water from the traditional communities; 2) change the way the city uses water; or 3) develop new sources of water, which is unlikely. This is a major challenge for the city and could have a major impact on the traditional communities. Again, the decisions on water reallocation are not based on

principles of sustainable development. Even if they were, the tradeoffs between urban needs and rural community needs are difficult to evaluate.

New Mexico is a good location to examine sustainable development for another reason. The dry climate makes water a critical element in both development and environmental protection. Minor fluctuations in annual rainfall create serious conflicts. Long-term climate change could be disastrous. The potential for management conflicts resulting from water shortages is exacerbated by the diversity of jurisdictions controlling water use. The potential for international conflicts, existing federal/state conflicts, existing state/state conflicts, the unresolved Indian jurisdiction questions, and the unresolved Hispanic water rights created by antecedent sovereigns, makes New Mexico a good region to study.

The complexity of sustainable development and the complexities within New Mexico make it impossible to examine all aspects of the issue within this collection of student papers. The six case studies that follow do show the complexity of the issues. Two papers deal with the urban water supplies for Los Alamos (Chapter 1) and Santa Fe (Chapter 5). For the immediate future both cities can supply their needs but both will have to seek new sources in the long term. The surrounding traditional communities may chose to sell their water rights in order to satisfy this demand. Two papers are about watershed management. The Spring Creek watershed (Chapter 3) will be logged, and the impacts of the logging are examined. Because locals will do the logging, the economic benefits will go to a "traditional"community. In La Cañada watershed (Chapter 4) overgrazing has caused significant erosion and recommendations are made on how to correct this problem. The Cochiti Dam paper (Chapter 2) deals directly with the equities involved in constructing dams and the impacts they have on traditional communities. The paper on wastewater treatment in Albuquerque's North Valley (chapter 6) examines alternatives to traditional treatment methods.

The project directors would like to thank the students for their work. We hope their efforts can mitigate some of the problems the Rio Grande basin faces in the years ahead.

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