

# Preface

With the increasing concern of global environmental and ecological degradation, there has been an urgent need to investigate the related water cycle changes. Designed for both academic and business sectors, this book examines the major issues in water resources research in Northwest China, approximately one fourth of the nation's entire land area and one of the world's largest arid regions. The arid region of Northwest China is characterized by its extremely vulnerable water resources and associated ecological environment. The large alpine snow and ice cover has contributed to the development of numerous inland streams, forming a unique landscape characterized by mountain-oasis-desert ecosystems. Water, largely originated from the mountain areas, has been a most critical factor to drive the energy and mass circulation in this region, which responds sensitively to the global climate change. This book focuses on some possible impacts of climate change on hydrology and water resources in the arid region of Northwest China. The contributing authors for this book include Yaning Chen, Weihong Li, Zongxue Xu, Zhongqin Li, Jianhua Xu, Xianwei Wang, Yanjun Shen, Zhi Li and Huaijun Wang, all of whom are active researchers in water resources research in arid and cold environments.

This book comprises 11 chapters discussing various aspects in water resources research, which can be divided into five major parts. Specifically, the book begins with an introductory chapter (Chap. 1) discussing the physical geography and socioeconomic aspects in Northwest China. The second part of the book (Chaps. 2–7) discusses the climate system and hydrologic system changes, some implications of these changes in relation to potential evapotranspiration, the hydrological cycle, and the spatiotemporal variations of the snow cover and glaciers through remote sensing, geographic information systems, and statistical analysis. The third part of the book (Chaps. 8 and 9) focuses on the model description and experimental design to interpret the hydro-climatic process, emphasizing the integration of water, climate, and land ecosystems through field observations and computer-based simulations. The fourth part (Chap. 10) examines some extreme hydrological events and presents a study using the historical trend method to investigate the spatial and temporal variability of changing temperature and precipitation extremes in the hyper-arid region of Northwest China. And the last part (Chap. 11) of this book discusses some

possible strategies for sustainable watershed management. We believe that the lessons from this study area can be useful for other arid areas in the world.

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