

SPRINGER BRIEFS IN ENVIRONMENTAL SCIENCE

Pu Wang · Shikui Dong
James P. Lassoie

The Large Dam Dilemma

An Exploration
of the Impacts
of Hydro Projects
on People and the
Environment in China

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Preface

Published in 1987, the Brundtland Report, *Our Common Future*, culminated over 2 decades of concern and debate about environmental degradation and human welfare and posed a challenge for societies worldwide to seek sustainable approaches to development. Solutions to the Earth's most difficult and recalcitrant environmental problems were identified as falling at the nexus of the scientific disciplines, which set the agenda for developing interdisciplinary approaches to research and development that continues today. The relatively simplistic notion of "interdisciplinarity" promoting the optimization of environmental, social, and economic needs has now been replaced by the more complicated and realistic concept of "coupled human and natural systems (CHANS)." The CHANS theory approach interconnects human activities and ecosystem functioning and acknowledges the true complexities facing environmental conservation and sustainable development in the twenty-first century.

Meeting the needs of a growing human population for economic development without compromising the long-term integrity of the environmental foundation for all life is the essence of society's search for sustainable development strategies. Among the many environmental challenges facing humankind, including global climate change, deforestation, rangeland degradation, energy production, and loss of biodiversity, those related to the globe's water resources are perhaps the most acute. People sicken and perish and nations stagnate and decline without adequate supplies of clean freshwater. Many believe that water may have already replaced oil as the Earth's most precious and endangered liquid and that the formation of international "water cartels" to control its distribution is not far off.

Water and energy come together in the building of large dams intended for the generation of hydroelectricity. Often termed "clean energy" large-scale hydropower projects are not without their sustainability critics. While it is difficult to counter their ability to produce efficient and effective power in the service of national economic development, the construction of dams and power stations are also known for their negative environmental impacts and mixed effects on the socioeconomic conditions of local people. Hence, it is not surprising that proposals promoting the

construction of major hydroelectric dams often face public and scientific scrutiny that sometimes leads to widespread civil unrest, protests, and legal and political repercussions. Understanding the social, economic, and environmental impacts arising from large-scale hydro-projects is a much-needed step toward sustainable development, not as a deterrent to their construction, but as a means for reducing their potentially negative effects.

I am very pleased to see the publication of this timely and informative book, *The Large Dam Dilemma: An Exploration of the Impacts of Hydro Projects on People and the Environment in China*. I congratulate the authors for their presentation of new research findings from a recent study mainly on the Upper-Mekong River, and their synthesis of other investigations of large dams elsewhere in China. China is currently leading the world in the construction of large-scale dams and it is most appropriate that China also takes the lead in helping improve the sustainability of such important hydro-projects. This book provides a compendium of information and insights that will prove valuable during the planning phase for such projects worldwide. I highly recommend it to scientists, planners, government officials, and public organizations concerned about the protection and sustainable development of the Earth's fragile water resources.

Beijing, People's Republic of China

Hao Wang

The image shows a handwritten signature in black ink. The top part of the signature consists of three Chinese characters: 王浩 (Wang Hao). Below the Chinese characters, the name 'Hao Wang' is written in a cursive, handwritten English script. The signature is positioned to the right of the printed name 'Hao Wang'.

Academician, Chinese Academy of Engineering
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and Hydropower Research

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Abstract

Large dam construction has significant environmental and social impacts at different scales. This book first summarizes and updates information about the history, distribution, functions, and impacts of large dams, both globally and at China's national level. It then addresses the environmental and social impacts of large dams in China and introduces an empirical study conducted during 2010 in areas affected by dams along the Upper-Mekong River, China. We present innovative methods for assessing the impacts of dams on biological diversity at the watershed scale and impacts on ecological integrity of rivers at the ecosystem scale. Then we developed a framework to assess the impacts of dam construction on different dimensions of wealth of dam-affected households, namely material (land, houses), embodied (knowledge, skills), and relational (infrastructure) wealth; and compare losses and compensations for each dimension. Results indicated that large dam construction has significant negative impacts on biological diversity and ecological integrity; local communities often suffer from wealth loss in all three characterized dimensions, but government compensation policies typically consider only material wealth; and this inequity leads to dissatisfaction on both sides and is the root cause for disagreements and conflicts. These results will prove important to future dam projects in China, and possibly elsewhere, as they suggest that more comprehensive environmental and social impact assessments are needed for large dam projects, and less dissatisfaction will arise from community relocation projects when the affected villagers and decision-makers acknowledge and agree on the degree of losses and resulting compensations in all three dimensions of wealth.

Keywords Large dam • environmental impact • social impact • biodiversity • resettlement • compensation policy