



## **Large-scale water projects in the developing world: Revisiting the past and looking to the future**

Bellie Sivakumar (1,2) and Ji Chen (3)

(1) School of Civil and Environmental Engineering, The University of New South Wales, Sydney, Australia (s.bellie@unsw.edu.au), (2) Department of Land, Air and Water Resources, University of California, Davis, USA (sbellie@ucdavis.edu), (3) Department of Civil Engineering, The University of Hong Kong, Hong Kong, China (jichen@hku.hk)

During the past half a century or so, the developing world has been witnessing a significant increase in freshwater demands due to a combination of factors, including population growth, increased food demand, improved living standards, and water quality degradation. Since there exists significant variability in rainfall and river flow in both space and time, large-scale storage and distribution of water has become a key means to meet these increasing demands. In this regard, large dams and water transfer schemes (including river-linking schemes and virtual water trades) have been playing a key role. While the benefits of such large-scale projects in supplying water for domestic, irrigation, industrial, hydropower, recreational, and other uses both in the countries of their development and in other countries are undeniable, concerns on their negative impacts, such as high initial costs and damages to our ecosystems (e.g. river environment and species) and socio-economic fabric (e.g. relocation and socio-economic changes of affected people) have also been increasing in recent years. These have led to serious debates on the role of large-scale water projects in the developing world and on their future, but the often one-sided nature of such debates have inevitably failed to yield fruitful outcomes thus far. The present study aims to offer a far more balanced perspective on this issue. First, it recognizes and emphasizes the need for still additional large-scale water structures in the developing world in the future, due to the continuing increase in water demands, inefficiency in water use (especially in the agricultural sector), and absence of equivalent and reliable alternatives. Next, it reviews a few important success and failure stories of large-scale water projects in the developing world (and in the developed world), in an effort to arrive at a balanced view on the future role of such projects. Then, it discusses some major challenges in future water planning and management, with proper consideration to potential technological developments and new options. Finally, it highlights the urgent need for a broader framework that integrates the physical science-related aspects (“hard sciences”) and the human science-related aspects (“soft sciences”).