

Conjunctive water use in an African river basin: a case study in poor planning

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Abstract A number of water related projects have operated, independently and at various times, over the River Rokel (Seli) basin in Sierra Leone, West Africa. These include a hydroelectric power scheme and mining and agricultural projects. It has not been adequately determined what the consequences of conjunctive water use within the basin are in terms of quantity and quality. Poor water management practices, however, are evident from a review of methodologies employed by the various operations. The need for effective project monitoring and evaluation through data collection and compilation is well recognized. The problem lies in overcoming the many identified factors preventing the achievement of these goals. This paper basically describes the schemes and highlights some of the limitations to sound river basin management as evident from this case study. Some recommendations are made for future basin planning.

INTRODUCTION

The ability to extract and utilize natural resources is often dependent on the level of development and management of available water resources. The harnessing of hydro-power, for example can lead to the establishment of agro-based and mining industries. Clean drinking water prevents diseases and provides an able workforce.

The country of Sierra Leone, West Africa experiences a humid tropical climate with annual rainfall averaging 3000 mm. Nine main river basins are found, ranging in size from 14 145 to 2979 km². As such, water availability is not a major problem. Water resources planning at basin level, however, taking into account the conjunctive use of water is generally not done.

The varied bodies involved with water often have overlapping terms of reference as regards water use and hydrological data collection. Policy on the compilation and dissemination of data is not effectively implemented. Further, poor communication and coordination between government departments, research institutions and the mining and geotechnical sectors is a common situation that precludes widespread accessibility to technical information.

Despite recommendations to this end, made in national development plans (Carney, 1964; GOSL, 1974) and by the establishment of a national committee of the UNESCO International Hydrological Programme, this goal has not yet been fully achieved. Consequently, water related projects continue to operate independently within basins.

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Application of Geographic Information Systems in Hydrology and Water Resources Management Karel Kovar, H. P. Nachtnebel, 1996 *Workshop proceedings, Evaluation of Irrigation Management Transfer Process and Performance, Lalitpur, Nepal, 11-12 October 1999.* Parajuli, U. N, Krishna, C. P. ,1999-10-01 *Remote Sensing and Geographic Information Systems for Design and Operation of Water Resources Systems* International Association of Hydrological Sciences. Scientific Assembly, 1997 **Level I Stability Analysis (LISA) Documentation for Version 2.0** Carol Hammond, David Hall, Stanley Miller, Paul Swetik, 1992 **Assessment of COWFISH for Predicting Trout Populations in Grazed Watersheds of the Intermountain West** Craig R. Contor, 1991 The COWFISH model developed and applied in selected Montana streams was tested on 14 streams in Idaho Nevada and Utah where it proved to have little value for predicting numbers of trout in watersheds grazed by livestock The model holds promise for estimating the health of stream channels and riparian complexes **Proceedings and Recommendations of the Workshop on Ground Water Problems in the Ohio River Basin** ,1981 **Port of Houston** Akey Chang-Fu Hung, C. Wendell Horne, David Hugh Kattes, Donald S. Moore, Herman Sidney Mayeux, Jack L. Jones, John G. McNeely, John R. Beverly, Lanny Olen Ashlock, R. J. Hodges, Robert Aston Gordon, Sally Springer Coble, Samuel Don Cotner, Stephen Fuller, William Carlisle Welch, J. Rod Martin, 1979 *Annual Report - Office of Water Resources Research* United States. Office of Water Resources Research, 1969 **Competition for Water Resources** Jadwiga R Ziolkowska, Jeffrey M Peterson, 2016-09-09 Competition for Water Resources Experiences and Management Approaches in the U S and Europe addresses the escalation of global issues regarding water scarcity and the necessary cost effective strategies that must be put in place in order to deal with escalating water crisis The book evaluates use and competition for water resources in the U S and Europe emphasizing the problems and challenges of dealing with tradeoffs in water In addition the book discusses water management strategies that can be used to optimize water use and allocation mitigate water scarcity and adapt to water scarcity Supplementing the numerous case studies the book includes lessons learned from applying specific strategies and approaches This comprehensive overview and comparison of management practices across two continents is an invaluable resource for researchers policymakers and educators in water Provides a national and regional perspective through the use of country specific case study examples Includes a comparative analysis between the U S and Europe illustrating experiences in water management from two sides of the Atlantic Covers interdisciplinary topics related to water such as agriculture and energy Bibliography on the Hydrology of the Himalaya-Karakoram Region Gordon James Young, Bhanu Neupane, 1996 *Workshop on Permafrost Data Rescue and Access* Roger Graham Barry, J. Alan Heginbottom, Jerry Brown, 1995 Innovative approaches to agricultural water use for improving food security in Sub-Saharan Africa A. Inocencio, H. Sally, D. J. Merrey, 2003 This paper provides an overview of innovative options for developing and using water for food

production in sub Saharan Africa SSA in light of the growing scarcity and competition for water resources These options include rainwater harvesting selective development of wetlands for agriculture exploitation of shallow groundwater and recycling urban waste The options are largely based on low cost individualized technologies which lend themselves to private sector promotion Water demand management approaches are also discussed Solving the Groundwater Challenges of the 21st Century Ryan Vogwill, 2016-04-21 Groundwater is integral to many human and environmental systems but there are significant challenges in dealing with the impact of anthropogenic activities on groundwater systems These challenges need innovative solutions This book contains a wide range of content from a discussion of the Australian regulatory framework for unconventional hydroc **Democratic Political Process** ,2009 In Indian context **Regionalization in Hydrology** IAHS International Commission on Surface Water, 1990 *Hydrology and Water Resources of India* Sharad K. Jain, Pushpendra K. Agarwal, Vijay P. Singh, 2007-05-16 India is endowed with varied topographical features such as high mountains extensive plateaus and wide plains traversed by mighty rivers Divided into four sections this book provides a comprehensive overview of water resources of India A detailed treatment of all major river basins is provided This is followed by a discussion on major uses of water in India Finally the closing chapters discuss views on water management policy for India *New Publications of the U.S. Geological Survey* ,1998 Selected Water Resources Abstracts ,1991 **Riverbank Filtration** C. Ray, G. Melin, R.B. Linsky, 2006-03-01 Chittaranjan Ray Ph D P E University of Hawaii at M noa Honolulu Hawaii United States J rgen Schubert M Sc Stadtwerke D sseldorf AG D sseldorf Germany Ronald B Linsky National Water Research Institute Fountain Valley California United States Gina Melin National Water Research Institute Fountain Valley California United States 1 What is Riverbank Filtration The purpose of this book is to show that riverbank filtration RBF is a low cost and efficient alternative water treatment for drinking water applications There are two immediate benefits to the increased use of RBF Minimized need for adding chemicals like disinfectants and coagulants to surface water to control pathogens Decreased costs to the community without increased risk to human health But what exactly is RBF In humid regions river water naturally percolates through the ground into aquifers which are layers of sand and gravel that contain water underground during high flow conditions In arid regions most rivers lose flow and the percolating water passes through soil and aquifer material until it reaches the water table During these percolation processes potential contaminants present in river water are filtered and attenuated If there are no other contaminants present in the aquifer or if the respective contaminants are present at lower concentrations the quality of water in the aquifer can be of higher quality than that found in the river In RBF production wells which are placed near the banks of rivers pump large quantities of water **Scoping Report for the Delta Export Water Contracting** ,1987

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