

# Review of tropical reservoirs and their fisheries

The cases of Lake Nasser, Lake Volta and Indo-Gangetic Basin reservoir



**Cover photograph:**  
Akosombo Dam, Lake Volta, Ghana.  
Courtesy: Joe Lapp ([www.lappjoe.com](http://www.lappjoe.com)).

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The cases of Lake Nasser, Lake Volta and Indo-Gangetic Basin reservoir

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## Preparation of this document

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The present document draws upon three individual desk-based reviews that cover the Indo-Gangetic Basin reservoirs, Lake Nasser and Lake Volta. These individual reviews were prepared by the partners of the project, with major contributions from E.K. Abban, H. Adam, K. Agboga, H.R. Dankwa, O. Habib, P. Katiha, I. Omar, M. Sherata, H.A.R. Soliman, K.K. Vass and M. Zaki.

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## Abstract

Freshwaters contribute 15 percent of the world's reported fish catch, or about 10.1 million tonnes in 2006, most of which comes from tropical systems. The true contribution of tropical inland fisheries is likely to be higher, as less than half of the inland capture production is actually reported. While reservoir fisheries are already an essential component of this production, the potential of most of them may even exceed their current catch levels. Opportunities exist to increase productivity, provided that environmentally and socially sustainable management systems can be adopted. To realize this untapped potential, it is necessary to improve understanding of the processes influencing reservoir productivity in such a way as to involve both biological principles and stakeholder participation, as each reservoir has different properties and different research and management institutions.

Seen in isolation, catch and productivity data of individual reservoirs may be difficult to interpret. The present technical paper attempts to address this issue by reviewing the knowledge accumulated in reservoirs in some very different tropical river basins: the Indus and Ganges/Brahmaputra Basin in India, the Nile River Basin in Eastern Africa and the Volta River Basin in West Africa. In particular, it focuses on many of the reservoirs of northern India and Pakistan in the Indus and Ganges systems, Lake Nasser in the Nile River and Lake Volta in the Volta River.

Information collated from grey and published literature on the three basins is synthesized and standardized with reference to wider knowledge and up-to-date information on tropical reservoir fisheries. A considerable quantity of data and information were collected on many aspects of the systems of the three reservoirs, including hydrological, biophysical and limnological features, primary production, and fish and fisheries data. This information was condensed and synthesized with the aim of providing a baseline against which the ecological changes that have taken place since impoundment can be described and analysed. Efforts are made to explain changes in fish catch in relation to climatic variations, ecological succession and fishing effort. The review shows that biological data and information are generally available.

However, as is also common elsewhere, all three cases suffer from the general tendency to isolate and compartmentalize research into separate disciplines. Usually, there is very limited cross-disciplinary flow of information or recognition of how results of various disciplines can contribute to a more comprehensive understanding of the behaviour of fish populations, human communities and ecosystems and the productive activities that depend on them. This uniform tendency severely hampered the identification of relevant management actions.

A more pragmatic and holistic understanding of reservoir ecosystems is needed in order to guide the choice of indicators and the development of monitoring systems that can inform management of changes in reservoir productivity and, hence, the potential catch. The next step would be to devise a hierarchy of indicators describing the different ecological and economic processes influencing fisheries catches and to organize monitoring systems around those indicators. Only by combining information across sectoral disciplines will it be possible to reach a better understanding of the processes that drive fish stocks, fisheries and reservoir productivity.

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## Abbreviations and acronyms

BOD	biochemical oxygen demand
C	carbon
CaCO <sub>3</sub>	calcium carbonate
CIFRI	Central Inland Fisheries Research Institute
cm	centimetre
COD	chemical oxygen demand
CPUE	catch per unit effort
CV	coefficient of variation
DO	dissolved oxygen
FFDA	Fish Farmers Development Agency
FiB	fishing in balance (index)
g	gram
ha	hectare
IDAF	Integrated Development of Artisanal Fisheries (Project)
IGB	Indo-Gangetic Basin
IMC	Indian major carps
K	potassium
kg	kilogram
km	kilometre
LNDA	Lake Nasser Development Authority
m	metre
masl	metres above sea level
MEI	morpho-edaphic index
mg	milligram
mm	millimetre
MSY	maximum sustainable yield
N	nitrogen
NIOF	National Institute of Oceanography and Fisheries
P	phosphorus
pH	the negative logarithm (base 10) of the molar concentration of dissolved hydronium ions (used to indicate acidity or alkalinity)
ppm	parts per million
RLLF	relative lake-level fluctuation
STEPRI	Science and Technology Policy Research Institute
TDS	total dissolved solids
TL	trophic level
UNDP	United Nations Development Programme
VLRDP	Volta Lake Basin Research and Development Project
VRA	Volta River Authority
WRI	Water Research Institute
µg	microgram
µS	microsiemens