Water quality management in a vulnerable large river: the Nile in Egypt

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Abstract

We review the severe water management problems of the Nile Basin, where physical water scarcity is associated with high demographic growth, leading to a sharply-rising demand for competing water uses such as hydropower and large-scale irrigation. Rapid economic growth is perceived as the means to emerge from the poverty trap that afflicts livelihoods in the Upper Basin and vital wetland ecosystem services such as fish biomass, freshwater biodiversity, groundwater recharge, flow regulation and local climate moderation are threatened by the water development schemes and pollution that follow from this policy. Their cumulative impacts remain unaddressed. The High Aswan Dam’s impacts on freshwater biodiversity are incompletely understood; a significant number of species may have become threatened as a result of its construction. Today the reservoir water quality is high, it is thought to support 47 fish species, its local human activities are restricted by central government regulations and recent estimates indicate that eutrophication threats are unlikely. Sediment and nutrient inputs coming into it from upstream will, however, continue to decrease in the near future as a result of newly built and planned dams in the upper basin. The dams will also reduce discharge and cause further loss of connectivity between the river and its floodplain; exacerbated by the possible completion of the Jonglei Canal bypassing the Sudd swamps. These impacts will affect the Nile’s vulnerable aquatic biodiversity and regulatory services that are likely to affect local climate conditions. Under the current geopolitical scenario, management decisions that could favour participatory and sustainable options are over-ruled by high-level political trade-offs between the numerous riparian states. The financing of major hydropower developments by vested interests creates a scenario that is unlikely to favour sustainable resource management and conflict resolution.

Introduction

The phrase that Egypt is a “gift of the Nile” implies that the most populous nation in the Mediterranean and Middle East is entirely dependent on the ecosystem services provided by one of the world’s most vulnerable large river basins. It is widely recognised that water quantity is vital for the economic development of the agriculture-based societies in the Nile Basin, many of which become food deficient during unfavourable hydrological conditions.

The Nile is the longest river in the world, at 6,718 km, confirmed by an Anglo-New Zealand expedition in 2005, which measured its most distant source in the Rukarara, a Rwandan tributary of the Kagera River flowing into the South-western shores of Lake Victoria (Dumont, 2009). It flows through a 3,170,418 km² drainage basin (FAO 2011), nearly 10% of the surface of the African continent, which makes it the largest basin in the world, after the Amazon, the Congo and the Mississippi.