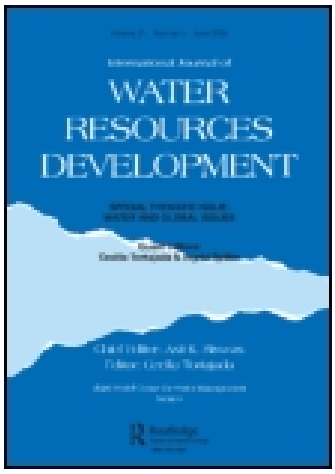

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Conference Report

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Conference Report

International Workshop on Hydropolitics and Impacts of the Aswan High Dam
Ministry of Water Resources and Irrigation of Egypt, Cairo, 14 February 2007

The Aswan High Dam (AHD) is one of the most well known, if not the most well-known, large dams in the world at present. Completed at the height of the superpower rivalry, the history and the intrigues behind its planning and construction are mostly unknown at present. When the USA declined to finance the construction of this dam, even after agreeing to do so initially, and then the UK and the World Bank followed suit, President Nasser decided to nationalize the Suez Canal and use its income to pay for the construction costs of the dam. This precipitated the Suez crisis, which subsequently led to the downfall of the British Prime Minister Anthony Eden. The Soviet Union then stepped in to provide financial and technical assistance to help Egypt with the construction of the dam, which became the first major Soviet-assisted development project in Africa. All these and other associated geopolitical developments are closely interlinked with the hydropolitics behind the construction of the AHD and its resulting worldwide notoriety.

The Third World Centre for Water Management, with the support of the Arab Fund for Economic and Social Development, and in cooperation with the Ministry of Water Resources and Irrigation of Egypt, is carrying out extensive analyses on the economic, social, environmental and political costs and benefits of the AHD, and the hydropolitics associated with its construction process. This will be the first time the positive and negative impacts of the dam are being assessed, both objectively and comprehensively.

The International Workshop on Hydropolitics and Impacts of the Aswan High Dam was organized in Cairo, 14 February 2007, to present and discuss the findings of the above analyses. Nearly 100 water professionals from many different countries such as Argentina, Australia, Brazil, Canada, China, Egypt, Finland, India, Turkey, South Africa, the UK and the USA, and disciplines participated in this workshop. The objective was to share the results of the study and receive feedbacks both from local and international experts for any mid-course action correction necessary.

The main presentations were as follows:

i. Introduction to the study and its importance to Egypt and the rest of the world, by H. E. Mahmoud Abu-Zeid, Minister of Water Resources and Irrigation of the Government of Egypt.
ii. Hydropolitics of the Aswan High Dam, by Dr. Cecilia Tortajada, Vice-President, Third World Centre for Water Management, Mexico.

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iii. Waterlogging and salinity, by Dr. Hussam Fahmy, Director, Drainage Research Institute, National Water Research Centre, Egypt.
iv. Groundwater and the Aswan High Dam, by Dr. Ahmed Khater, Director, Research Institute for Groundwater, National Water Research Centre, Egypt.
v. Overall environmental impacts of the Aswan High Dam, by Prof. Asit K. Biswas, President, Third World Centre for Water Management, Mexico.

The following are the main results and findings of the studies based on the analyses completed so far.

Hydropolitics of the AHD

In order to understand why the AHD has had a consistently bad reputation outside Egypt, it is necessary to understand the tortuous and convoluted negotiation process that Egypt had to go through to obtain the financing for its construction. Among these main issues were the following:

- The American and the British governments decided not to support the financing of the dam. The World Bank subsequently took the identical decision. This decision followed after Egypt decided to purchase arms from the Soviet Block, especially as the West dithered about a request for similar arms sale to Egypt. The initial American and British decision to support the financing of the dam was made primarily to ensure that Egypt did not become a supporter of the Soviet Block.
- Egypt decided to recognize communist China, which infuriated the leaders of the USA and the UK.
- The American Foreign Secretary Dulles, without any consultation with the British Government and the World Bank, reneged on the financing offer for the dam, and this information was conveyed to Egypt in a somewhat insulting manner.
- Dulles and the British Primer Minister Eden were annoyed with President Nasser because he became an important leader of the Non-Aligned Movement (NAM), together with Prime Minister Nehru of India and President Tito of Yugoslavia. The Western powers also did not know how to handle an independent, charismatic and popular Egyptian leader like President Nasser, who quickly became the leading political figure and spokesperson of the Arab World. Thus, they planned ways to overthrow him. Financing of the AHD quickly became enmeshed with the overall superpower manipulations of the region and their confrontation with President Nasser.
- Immediately following the withdrawal of the Western offer to finance the construction of the dam, President Nasser nationalized the Suez Canal, and announced that the income from the Canal would be used for the construction of the dam.
- The UK, France and Israel attacked Egypt because of the nationalization of the Suez Canal.
- The USA refused to back the attackers, as did the United Nations. These developments ended the Suez crisis.
- The Soviet Union decided to help Egypt with the financing and construction of the dam.

- First Secretary Khrushchev joined President Nasser in a ceremony at Aswan that symbolized the last stage of the damming of the Nile. Later, President Podgorny was present in the official opening of the dam with President Sadat. In the entire history of the Soviet superpower period, two such top leaders had never gone to any developing country to inaugurate a major Soviet-supported infrastructure. The AHD became a triumph of the Soviet diplomacy, and this development was resented by the West.

The construction and operation of the AHD became intertwined with the continuing superpower rivalry. No major infrastructure development anywhere in the world, during the entire history of the superpower rivalry of the 1950s and the 1960s, played such a key role. In terms of superpower politics, the construction of the AHD rapidly became not simply an infrastructure development, but instead a very special issue in which the leaders of the Western World and the Soviet Union took personal interest.

Based on the research conducted thus far, it is almost certain that the current bad reputation of the dam directly stems from this superpower rivalry, and the Western decision not to support its construction. There were deliberate attempts to malign the reputation of the dam and, by proxy the Soviet support in its construction, by using half-truths, sweeping generalizations and outright lies. These were extensively published in influential Western media such as the *Washington Post*. These attempts, made at the beginning of a nascent global environmental movement, which strongly believed that 'small is beautiful', stuck a chord.

In order to understand what exactly happened, the politics of the time surrounding the construction of this dam are being critically, objectively and comprehensively analyzed through the support of the Arab Fund. The analysis will be finalized by December 2007.

Waterlogging, Salinity and the AHD: Cause and Effect

Waterlogging and soil salinity are natural phenomena associated with soil inundation. Waterlogging occurs when the amount of inundating water exceeds the natural soil drainage capacity. Capillary rise and evaporation are responsible for salt accumulation in the soil, especially in arid regions. Both problems have several adverse impacts such as soil degradation, loss of crop production, threats to infrastructure and ancient monuments, and human and animal health risks.

In the absence of proper drainage, soil salinity and waterlogging are inevitable because of the introduction of perennial irrigation in an arid country like Egypt. This is not only due to climatic conditions and high dependency on irrigated agriculture, but also due to its physiographic features. Most of the Egyptian agricultural lands are characterized by a heavy clay soil with a very low natural drainage. Since the flat terrain of the Nile Delta limits the natural drainage capacity of the soil, artificial drainage is mandatory to maintain its fragile ecological balance.

The AHD has been a turning point in the history of Egypt and its impacts have been, and, in the absence of an objective assessment, will continue to be debatable and controversial. One of the adverse environmental impacts that is widely attributed to the dam is soil deterioration due to waterlogging and salinity developments. There is no question that the AHD was a revolutionary development in Egypt's entire irrigation

history, but it has not been the only significant development. Egypt has practised perennial irrigation since 1872, when an area of 259 500 acres was converted from basin irrigation to perennial irrigation. By 1937, a total of 4.3 million acres, out of 5.5 million acres, were under perennial irrigation.

Development of waterlogging and soil salinity can be directly attributed to the introduction of perennial irrigation, unless appropriate drainage is provided. This has been well known for decades. Drainage in the flat lands of the Nile Delta started as early as 1909 due to the national economic crisis resulting from the cotton crop failure. Even before that, El-Max and Itssa drainage pumping stations were constructed in the low areas of the northern Delta in 1898 and 1902, respectively. Before the operation of the AHD, open drains covered almost 60% of the cultivated area and there were 56 operating drainage pumping stations serving approximately 3.1 million acres.

The AHD was conceived as a multipurpose project with the objectives of agriculture expansion, flood protection and power generation. The targets of the project were to convert 1 million acres to perennial irrigation, increase the cultivated area of the country by 2.6 million acres, and expand the rice cultivation area to more than 727 000 acres. The adverse environmental impacts were mostly anticipated prior to the construction of the dam, based on these targets, including salinity and waterlogging developments. The mitigation measures for these specific impacts were initiated almost from the beginning of the operation of the dam. The first Nile Delta Drainage Project was launched in 1971 to provide 986 000 acres with sub-surface drainage. Thereafter, mechanical installation of field tile drainage was practiced on a large scale, supported by intensive research to facilitate technology transfer and adoption. The then Ministry of Irrigation separated the construction and management of the drainage systems from the irrigation development activities, with the establishment of the Egyptian Public Authority for Drainage Projects. Currently, within the 9.0 million acres cultivated, surface drains networks serve 8.1 million acres and subsurface drainage covers 5.8 million acres.

Irrespective of these important efforts to successfully fight salinity and waterlogging, statements are still being made which claim that the problem is spread over large areas. For example, in its website, FAO claims, erroneously, that more than 2.2 million acres suffer from salinity. However, it attributes the problem to the poor soil conditions and inadequate water management practices rather than to AHD.

A pre-AHD national soil survey identified the potential extent of the problem. Nevertheless, recent surveys are lacking. Some experts have claimed that such surveys are not only expensive but also cannot be done due to the dynamics of the phenomena, as they are affected by irrigation cycles, seasons and management practices. Increase in cropped area from 10.4 million acres in 1960 to 15.6 million acres in 2006, in addition to an increase in agriculture production from 11.7 million tons in 1952 to 57 million tons in 1997, does not support FAO's claim. Other pilot surveys and studies show that salinity and waterlogging are now primarily local phenomena, rather than nationally widespread problems, as claimed by some authors. Furthermore, an annual salt balance for the Delta shows no salt accumulation during the last 10 years.

Historically, salinity and waterlogging problems have been inevitable problems in Egypt, and they have existed during the pre- and post-AHD periods, and cannot be attributed to the construction of the AHD alone. Mismanagement and rapid expansion of irrigated agricultural areas following the construction of the dam contribute to the

occurrence of soil salinity and waterlogging in some areas. The adverse impacts of AHD, at least in this regard, were anticipated and now have been generally mitigated.

Impacts of the AHD on Groundwater

When large dams are constructed, the river regimes change and influence the behaviour of the entire hydraulic systems, resulting in modifications of the environment. Therefore, environmental impacts related to dams have become an important societal concern. The AHD has been widely blamed for negative impacts on the environment, including the rise in groundwater levels, and waterlogging and salinity development. An objective overview of the impacts of the AHD on the groundwater regime is thus necessary.

Groundwater Regime

Pre-AHD conditions. Before the construction of the AHD, the flood wave of the Nile was the major factor affecting groundwater levels in the Nile aquifer system in the Valley and in the Delta. The water table in the clay cap and the aquifer piezometric heads fluctuated seasonally according to the Nile stages. Groundwater levels used to rise after the flood wave with reduced amplitude and a time lag depending upon the distance from the Nile channel. Then these levels used to decrease gradually to a minimum just before the occurrence of the next flood.

Post-AHD conditions. Since the AHD, the Nile water stages have become mostly stable all year around, and the cyclic fluctuations of groundwater levels have been greatly reduced. However, the expansion of perennial irrigation has resulted in an increase of deep percolation. The lack of effective agricultural drainage in some areas of the Valley and Delta has resulted in a continual increase in both water table and groundwater levels. A rise in groundwater levels has been identified in the observation wells in the Nile Valley and Delta.

Analyses of groundwater levels recorded before and after the construction of the AHD indicate that an increase in groundwater levels in the Valley and Delta occurred during the period 1968–78. The recorded total rise has been a maximum of 2 m in the Nile Valley and a maximum of 0.40 m in the Nile Delta. After 1978, the system has approached a steady-state condition. No significant regional changes could be attributed to the impacts of the AHD in the groundwater regime.

Examples of Controversial Issues

Waterlogging in West Nile Delta: Nubariya Project. The West Delta contributed 40% of all the new lands whose reclamation was made possible by the construction of the AHD. In most of the newly developed lands, drainage was usually not included. Accordingly, waterlogging and salinity problems surfaced in parts of the reclaimed areas. The case of Nubariya is illustrative in this respect.

The groundwater levels were at a depth of 20 to 60 m when land reclamation in the area started in 1968. Very soon, after irrigation was introduced in 1968, a rapid rise in water tables and severe groundwater and salinity problems were reported. The water table gradually rose in some areas to less than 2 m below the ground surface. Over a period of

three years, the water table rose 12 m. The problems were thoroughly investigated and the main reasons found were: (1) over-irrigation; (2) seepage from the main canals and the conveyance system; and (3) presence of gypsum layers close to the soil surface in many parts of the area.

Historical monuments in Luxor: Karnak Temple. The problem at Karnak is mainly attributed to the dramatic rise of the water table and not directly linked to the post-AHD rise in groundwater, as it has been claimed. Rising up close to the ground surface, the water table adversely impacted upon the stone structure of the temple. Studies have revealed that the main reasons for the water table rise were seepage from land reclamation areas in the east, and leakages from poor sanitary drainage conditions in the increasingly expanding housing areas.

The problem at Karnak is an example of the deterioration of monuments due to both inadequate land-use planning and lack of protection from increasing human activities. Yet, many have blamed the AHD for such damages.

Historical monuments in Cairo: The Sphinx. The Sphinx is in the plateau of the pyramids. The rising water table is bringing salts into the pores within the sandstone and limestone foundations of the monuments. As the water evaporates, these salt crystals cause blisters in the structures and thus cause surface flaking. The problem was first identified in the early 1980s as badly affecting the Sphinx. The post-AHD rise in groundwater has been blamed for the damage.

Measurements indicated that the water table levels were higher than those of the groundwater. Studies revealed the main sources causing a rise of the water table in the Sphinx area were: (1) leakage of sewage water from the surrounding residential developments east of the sphinx area; (2) seepage from EL-Mansouria canal, north and west of the Sphinx area; (3) and downward percolation from irrigated agriculture south of the sphinx area.

Overall, the studies have identified that the above negative impacts often attributed to the dam have other explanations. As noted earlier, waterlogging and salinity were noted in Egypt well before the AHD was constructed, even from as long ago as 1800. Adverse impacts that are attributed to the AHD are primarily due to poor soil and water management. The mitigation measures are now mostly in place.

Goundwater has been an important consideration even before the construction of the AHD. After the construction of the dam, with time, the expansion of perennial irrigation resulted in an increase in deep percolation. The lack of effective agricultural drainage in some areas of the Valley and Delta have resulted in a continual increase in both water table and groundwater levels. Examples are given where it is explained that waterlogging in the West Nile Delta (Nubariya Project), damage to the Karnak Temple, and damage to the Sphinx, are not due to the AHD, but primarily due to poor land and water management practices.

Overall Impacts of the AHD

The AHD was built not only to meet Egypt's agriculture expansion plans, but also to achieve other objectives such as satisfying industrial power demand, flood control and navigation improvement. The main objectives of the dam are as follows:

- Optimizing and rationalizing the Nile flow at Aswan.
- Regulating and controlling the daily, monthly and yearly discharge downstream of the dam to match the actual water needs.
- Protecting the Nile Valley and Delta from hazards of high floods and perils of droughts.
- Generating cheap and clean hydroelectric power, sorely needed for development.
- Increasing the limited cultivated area by horizontal land expansion and reclaiming new lands.
- Changing the system of basin irrigation (one crop per year) to perennial irrigation (two or more crops yearly).
- Expanding rice and sugarcane cultivable areas.
- Improving navigation through the Nile and navigable canals.
- Creating a greater flexibility in agricultural planning and crop patterns.

The AHD saved Egypt from the socio-economic destruction that could have happened due to the persistent nine-year drought from 1979 to 1987. It also guarded the country from the 1964, 1975, 1988 and 1996 high floods. The dam has proven to be a very economically efficient project. During the first 10 years after its construction, the national income increased by 10 billion L.E., that is, 20 times the cost of the AHD. Most of the benefits of the AHD, as a national project, reached the majority of the Egyptians. These benefits were oriented to rural communities where poor people live. Short, medium, and long-term results, including resettlement, have been largely positive.

In the last few decades, the GOE has been adopting policies aimed at increasing exports, enhancing the quality of life of the population and creating new career opportunities. Nevertheless, to curb the problem of unemployment the rate of national growth has to be increased to a minimum of 6% annually.

In terms of population increase, there has been a considerable reduction in the growth rate curve from 3% in 1985 to 2% in the year 2000. However, this percentage is still insufficient, and attempts should be intensified to reach a reduction down to 1% at the end of the next decade.

The strategy of the agricultural sector aims to realize comprehensive development in order to achieve food security and provide raw materials for industry. For example, self-sufficiency in the wheat crop has increased from 25 to 55% in spite of the tremendous population growth, due to the increase in wheat production from 2 million tons in 1982 to more than 7 million tons in the year 2005. However, more needs to be done.

All the above challenges have put increasing pressure on water availability in Egypt. During 1997–2005, the Ministry of Water Resources and Irrigation (MWRI) prepared a National Water Policy up to the year 2017, including three main policy themes: (1) optimal use of available water resources; (2) water quality protection and pollution abatement; and (3) development of new water resources in cooperation with the Nile Basin riparian countries. The Ministry is currently executing many projects, translating these policies into a reality. An overall vision is being developed at present for the national water resources up to 2050.

The National Water Policy of Egypt includes both supply and demand management. Within supply management policies, the MWRI has developed scenarios for better operation of the dam. The operational rules of the AHD are a priority since they are directly

linked with saving enormous amounts of the evaporation losses (10–14 billion m^3) from Lake Nasser.

Finally, the impacts of a major project like AHD, both positive and negative, need to be assessed at the local, national and regional scales, mainly with the objective of learning from past experiences and adjusting both policies and planes.

The main conclusions and recommendations of the workshop included the following:

(1) All major water development projects have benefits and costs. These should be carefully assessed, including intangible benefits and costs. Final decisions should be made only after these have been carefully assessed. The project analysis should also include the nature of the beneficiaries; that is, who benefits and who pays for the cost of the project.
(2) As the analysis of the AHD has indicated, the social, economic, environmental and political implications extend well beyond the dam catchment area. These implications and impacts should be properly considered within the decision-making process.
(3) It is necessary to consider what are likely to be the impacts for both with and without infrastructure development scenarios.
(4) Monitoring and evaluation of a large dam should be a regular process. It should not stop after the dam is constructed. Regular impact evaluation should be considered every 5 to 10 years, depending upon specific situations. The evaluations must be fed back to the policy makers in order that appropriate steps can be taken to further maximize the benefits and minimize the costs.
(5) The impact evaluations carried out should be comprehensive, transparent and easily available so that anyone wishing to read or review them has access to these studies.
(6) The hydropolitics of the construction of the AHD is very interesting. This solid, well-researched and properly documented study for a major dam is unique in the world: no such analysis has ever been done before. Thus, the results of this study should be very widely disseminated.
(7) Because of the uniqueness and excellent quality of this study, and the fact that the dam is an Arabic-speaking country, every effort should be made to make an Arabic version of the study available in the Middle East and North African (MENA) region. The Arab Fund for Social and Economic Development should be complimented for supporting this groundbreaking study. A special request is being made to the Arab Fund to provide additional funding support for the publication of an Arabic version of this study immediately upon its publication. This will very significantly enhance the impacts of the study since many more people will be able to read and appreciate the Arabic version, compared to exclusive publication in the English language only, especially as the dam is in an Arabic-speaking country.

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