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Egypt's Water Security – Future Vision 2030 Using Delphi Method

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Purpose

This study was an activity within the framework of Egypt's Vision 2030 project carried out by the Center for Future Studies in the Egyptian Cabinet's Information and Decision Support Center. Using Delphi Method, the study aims at identifying, analyzing and foreseeing potentials of Egypt's water security as ground to thinking of pilot solutions aimed at evading problems and crisis as well as developing a set of procedures whereby Egypt's water security is attained.

Increasing Gap between Water Supply and Demand

The Nile stands as Egypt's main source of water whereby it secures 80% of Egypt's water yield per year-according to the 1959 Nile Agreement, Egypt's fixed quota of Nile water comes to 55.5 billion m³/year. In Egypt, water security tops the national agenda whereby studies reveal that estimations of available water and water needs for differ-

ent purposes are heading towards an increasing gap between water supply and demand, not only because of the anticipated increase of water demand, but also due to the impact of other factors on the available quantity of Nile water. The study at hand contributes to foreseeing the future of Egyptian water security, by analyzing the impact of varied factors influencing Egypt's water security in terms of the political, economic, environmental, hydrological, legal and strategic aspects, developing an integrated vision, and forming a new approach for further research in this area and providing comprehensive knowledge.

Combining Forecasting and Delphi

The study applied the "Delphi Technique" - an important qualitative tool of future studies - which relies on collective intelligence and scientific forecasts, by deriving knowledge from a group of experts, directing them to consensus on aspects of the issue at hand, and providing verifications for the relatively extreme positions. This technique was used to identify the main factors of uncertainty that will affect the future of Egypt's water security, and to forecast potentials of these uncertainty factors, their different expected impacts, and proposed recommendations. A Delphi web site was developed allowing

access to 25 experts in the areas of water, economic and political science.

The study also used forecasting (futures analysis) which does not seek foreseeing or planning the future, but rather conducts a set of conditional forecasts or scenarios assuming either the reality or desired ones. Hence, the research does not conclude to achieving any of the aforementioned scenarios but aims at allowing societal players to learn about the requirements of achieving one of the desired scenarios according to their relevant preference in order to work on giving it precedence over other alternative scenarios.



Main Factors Affecting Water Security

Based on the theoretical review of the issue of Egypt's water security, the most important factors affecting Egypt's water security were identified by applying Delphi Technique as follows:

1. Relations between countries of the Nile basin towards either cooperation or struggle:

The regional hydrological system of the Nile basin lacks a comprehensive legal or institutional framework deemed acceptable by all Nile countries because of their conflicting outlook on the legitimacy of the existing agreements and international conventions - the 1929 and 1959 Agreements in specific. Accordingly, countries of the Nile sources divide the River Nile's water according to the area of River Nile basin passing through the given country, and the contribution of each country to the river's water yield. However, Egypt and Sudan refuse reviewing the distribution of water quotas in the Nile basin based on calls for justice and equity.

Additionally, some of the Nile basin source countries are calling for enforcing the principle of international water sale on the Nile basin system including that Egypt and Sudan, pay financial compensation in return for their water quotas if they wish to maintain them, while Egypt and Sudan refuse this principle on the ground that water is a socio-economic commodity that should not be subjected to market mechanisms.

On another level, countries of the Nile basin sources reject the condition of advance notification when developing water projects or taking water measures within their national borders, which is seen as necessary by Egypt and Sudan.

2. Impact of external powers:

External powers, mainly USA and Israel play a crucial role in affecting international water interactions in the Nile basin, and carry out a motivating role for struggle. In this regard, Israel adopts two main strategies: "Quota based system" considering projects involving water that eventually aims that Israel receives fixed water quota from the Nile and "Seizure Strategy" which implies surrounding the Egyptian policy and using water as a pressure card against Egypt and Sudan. European countries, specially Italy, Holland and some Asian countries particularly Japan are playing a motivating role for water cooperation in the Nile basin putting down inclinations towards water related conflicts by providing financial and technical support for a number of water related projects in the Nile countries.

3. The impact of the separation of South Sudan:

Opinions vary on the impact of south Sudan separation on Egypt's water security. Some opinions perceive minimum negative impact resulting from the separation on the Egyptian water yield from the Nile and others are seriously concerned about the potential impacts.

4. Shifts to irrigated agriculture and minimizing pressure on the blue water:

All countries of the Nile sources wish to follow Egypt's footsteps in terms of cultivating spacious irrigated agricultural areas. However, this type of agriculture requires costly technical expertise. In this context, funding and technical assistance provided through investors, local, regional or international entities might have a hidden agenda for helping poor citizens of the Nile countries, destabilizing some countries and creating tension in a manner that impacts development plans.

5. Change in the economic:

As a main feature of the Nile basin countries- except Egypt- extreme poverty reflects on the capabilities in terms of providing water related infrastructure. According to 2007 World Bank data, Burundi had the lowest GDP (US\$0.97 billion) among Nile Basin countries, whereas annual GDP per capita growth rate was highest in Ethiopia and Sudan at 8.4% and 7.7% respectively. Egypt comes next with a growth rate of 5.2%. Nevertheless, GDP per capita share decreased in Burundi by 0.3% and in Eritrea by 2.3%.

6. Water reservoirs or control utilities:

If dams are constructed to serve as reservoirs, it is necessary to ensure that the stored water affects Egypt's water quota in the long term.

7. Impact of climate change on water of Nile basin:

The most important climate changes affecting the Nile's water are increasing temperatures which will cause rising rates of evaporation, and changes in the rates, locations and seasons of water fall will cause the loss of quantities of rain that were to be used in agriculture and human consumption in the northern coast.

8. Political stability of the Nile basin countries:

Continuous or aggravated forms and indicators of domestic instability in the Nile basin countries will push them to adopt struggle based foreign policies. It is projected that countries of the Nile basin sources will resort to adopting aggressive foreign policies towards both mouth and stream countries-Egypt and Sudan-every now and then. This is in an effort to divert the domestic public opinion away from internal problems and failures suffered in each country relatively.

Egyptian Water Security Scenarios

Given the aforementioned main factors affecting Egypt's water security, the future of water in the Nile basin will

likely be shaped according to three alternative scenarios as follows.



Business as Usual Scenario

The current situation of struggle relations between Egypt and the Nile Basin Countries, will continue but will not escalate to war because of political expertise, and countries of the Nile basin maintain a reasonable margin of rationality with their neighbours. Furthermore, the domestic political, economic and social circumstances of the Nile basin countries will not permit potential escalation of conflicts.

According to the outcomes of Delphi survey, a change in the current situation of cooperation or struggle regarding water is unlikely (there were no sharp deviations regarding the potential full cooperation or struggles that may escalate to war over water), where 46%, 38% and 50% is the probability of increasing the normal yield of Nile water before 2030 via cooperation where Egypt develops projects in the Ethiopian Plateau, Equatorial Lakes Plateau and Bahr el Ghazal. But the probability of reaching an agreement on some of the conflict areas by amending the existing legal agreements of the Nile basin countries is 48%.

Also, lack of current sufficient funding will affect the ability of benefiting from green water and relieving the pressure off blue water in Nile Basin countries. And in light of the outcomes of Delphi survey, Egypt's probability of developing projects -in cooperation with donor international organizations-aimed at assisting other countries in benefiting from green water is 49%, 52% and 53% respectively in the Ethiopian, Equatorial Plateaus and Bahr el Ghazal.

It is unlikely that the basin countries will experience an economic boom on the short term, since economic development requires stable political regimes and local, regional and international capital, capacity building, technical calibres and improvement of institutions and laws.

There is low probability of an impact from the separation of south Sudan on Egypt's yield of the Nile water, as the new State will be bound by all past conventions related to the River Nile. Needless to mention, South Sudan is advantaged with abundant rain which spares it the need for this water. According to Delphi Survey, the probability of a relevant impact on Egypt's Nile water supply is 45%.

It is likely that climate changes will continue without an impact on the normal yield of Nile water in Egypt, at least during the coming twenty years. According to a study by the Organization of Economic Cooperation and Development (OECD) in 2004, there is limited confidence regarding changes in amount and direction of rainfall on the future on the Nile basin countries. Based on the survey results, the probability that climate changes will move the rain belt far from the Ethiopian, Equatorial Lakes Plateaus or Baher Al Gazal are 40%, 35% and 44% respectively.

Optimistic Scenario (Regional Cooperation)

This is the scenario of optimization of available opportunities for developing shared water resources and building a regional water system capable of securing the needs of

the region's countries without undermining the fixed historical and legal rights of some of the countries.

This scenario involves the potential of expanding cooperation areas among Nile basin countries within the Nile Basin Initiative, which includes all ten Nile basin countries, provides an institutional framework for collective cooperation, receives governmental and political support, and pays great attention to projects and mechanisms aimed at building mutual trust among basin countries, as well as capacity building and training projects.

There is an increased possibility of establishing water related projects in collaboration with the basin countries via building and connecting dams on a unified electricity network in those countries, aimed at generating power for agriculture and industrial production purposes rather than storing water and assist in regulating water supply to Egypt. Survey results indicate that probability of completing Gongli Canal is 56%, in addition to the possibility of redirecting Congo River to benefit from its water is 60%.

Pessimistic Scenario (Conflict)

This scenario is based on the possibility that variables motivating struggle will lead to raising chances of conflict of national interests in the Nile basin countries to an extend of inter struggle. The struggle inclination might rise given the following variables:1) A strong and sharp inclination of the Nile basin sources countries towards enforcing the principle of "selling Nile water" to the two countries of the mouth and stream will cause an eruption of international water struggle and wars among the countries.2) Escalated role of the external motivating powers for Nile-Nile struggle based on the following considerations:

Israel will play a motivating role for water struggle in the Nile basin in addition to the indirect role of the USA, where it will work on besieging and pulling the parties of Egyptian policy, on the regional level, in a way that serves coining the American power on the political and strategic levels in preparation for an effective Israeli role.

Countries of the upper Nile basin will seek to constitute external coalitions aimed at changing the current situation; these are mainly Ethiopia, Kenya, Tanzania, and Uganda.

Separation of south Sudan will be at the expense of projects dedicated to exploiting the wasted Nile water in the Egyptian and joint upper parts, such as the Gongli Canal project.

The political tensions in the Ethiopian Plateau will negatively affect the Egyptian water yield as well as failure to implement any proposed projects. According to the survey, the probability of the eruption of a civil war (due to ethnicity, religion, political or tribal affiliation) in the Ethiopian Plateau and bearing an impact on water projects and management is 53% and 57% respectively.

Based on the Delphi Survey outcomes, the probability of increased Nile basin countries' demand for Blue water for agricultural, industrial, drinking, tourism, and fish wealth purposes by 2030 in the Ethiopian, Equatorial Plateaus

and Bahr El Gazal Region are 60%, 61% and 59% respectively. As for the probability that those countries construct dams or other projects in the Ethiopian, Equatorial Plat-

eaus and Bahr El Gazal Region-to meet the increased demand for water -that will eventually affect Egypt's Nile water quota by 2030 are 63%, 59% and 54% respectively.

Cooperation for Water Security

1. Cooperation among the Nile Basin Countries

Regional cooperation should depend on balancing the distribution of benefits and duties in the context of a cooperative Win-Win Approach, which will eventually lead to optimizing the benefits among all Nile countries enabling a relevant improvement and development.

2. Endorsing the Soft and Diplomatic Instruments

This ensures avoiding the struggle scenario, and can be supported by developing the mutual dependency mechanism between Egypt and Ethiopia via joint projects where Egypt provides the technical expertise in irrigation currently being provided by Israel.

3. Enhancing Cooperation between Egypt and Sudan

The mutual dependency mechanism between Egypt and Sudan, in light of separation, can be achieved through establishing strong ties with both north and south via joint cooperation in agriculture, power production, health, education and industrial projects in addition to military. This entails developing railways, river naval lines and unified electricity networks, and that Egypt grants southern citizens all advantages equal to Sudanese citizens in terms of education, work, residence, and entry into Egypt, and redrafting the projects to exploit wasted water in the upper Nile in Bahr El Gabal, Bahr El Gazal, and Mashar Swamps situated in south Sudan.

4. Benefiting from Green Water

This entails that Egypt: cooperates with the international donor organizations for developing projects in the source countries, transfers agriculture technologies to all Nile basin countries by availing technically qualified irrigation and agriculture engineers, and developing rain harvest technologies and introducing selected seeds and chemical fertilizers.

5. Creating a social, economic, political observatory

This should be in charge of monitoring changes immediately, analysing indicators and presenting relevant plans. In the event of any internal political tensions in the Nile basin countries, Egypt should adopt a neutral position, stimulate mediations in ethnic and border conflicts taking place in the Great Lakes and African Horn regions to evade the potential sensitivities that might emerge due to aligning with any of the conflicting parties.

6. Egypt's Role in Developing Economies

It is recommended that Egypt carries out development projects in Nile Basin countries and cooperates with international organizations in areas of improving health care, and eradicating Endemic diseases that affect public health and consequently productivity.

8. Forecasting the Impact of Climate Changes

Developing a local model for forecasting the impact of climate change on the Nile basin water yield, in cooperation with the British Meteorology Office.

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