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GERD's Repercussions On Climate – And COP27 Agenda

Dr. Abdel-Tawab Barakat

Changes in water resource access, quality and quantity, have become a key challenge to economic, political, environmental, and societal stability; given that water security is a key component of human security. Human security and water security, according to the [Copenhagen School of Human Security](#), may be seen as interrelated concepts, and that climate change must be taken into account when considering water security, as water resources security is a necessary component of stable human systems.

In his remarks to the Senate Select Committee on Intelligence regarding the U.S. Intelligence Community's "Worldwide Threat Assessment", James R. Clapper, the [U.S. Director of National Intelligence](#) (DNI), identified climate change – leading up to competition for natural resources, food insecurity, and others – as a threat to U.S. national security.

He said that the "Environmental stresses are not just humanitarian issues, but they legitimately threaten regional stability ... Food security has been aggravated partly because of the more frequent and extreme floods, droughts, wildfires, tornadoes, coastal high water, and heat waves."

"Persistent droughts during the past decade have also diminished flows in the Nile, Tigris-Euphrates, Niger, and Amazon ... Frequent droughts are undermining long-term plans to increase hydropower capacity, where with climate change, these conditions will continue to deteriorate," Mr. Clapper added.

Many climate experts agree that global climate change may have major and dramatic impacts on freshwater resources. However, these impacts are unlikely to be on the same scale in various geographic regions. Even within a single river basin, the effects may vary according to various locations. Consequently, this will escalate uncertainty and concern about water availability in the Nile Basin. Unfortunately, "both domestic and international water laws and policies are inadequate to meet the challenges posed by climate change, or adapt to the seemingly inevitable additional consequences", whether in the Nile Basin or in other international river basins in the Southern Hemisphere.

Climate change threatens water resources

Climate change is the most challenging crisis for humankind in the current century, where it threatens the balance of life on Earth. High temperatures, flash floods, devastating storms, widespread drought and rising sea and ocean levels have led to decimation of agricultural crops, food insecurity, water scarcity, increased poverty, displacement and migration.

At the start of the twenty-first century, human consumption constituted 54 per cent of all available renewable water resources and, with population growth, this percentage is projected to increase to 70 per cent by 2025 and to 90 per cent by 2030. These consumption figures do not represent total potential demand as more than 1.2 billion people lack access to safe drinking water.

The use of water resources is divided between ecosystem, domestic, subsistence, municipal, agricultural, industrial, energy, cultural, and commercial demands, and is often allocated according to political interests. Before 1950 there were five thousand large scale dams worldwide, by 2000 this number stood at more than forty-five thousand, and by 2006, five thousand more had been constructed to bring the total to over fifty thousand large-scale dams.

Water resources are threatened by contamination, [climate change](#), groundwater exhaustion, uncoordinated and unsustainable development, imbalances of political power, lack of stewardship, and aging or inadequate delivery and treatment infrastructure .Moreover, rising demand is coupled with an estimated 2.4 billion people who lack access to proper sanitation. Adding to this existing complexity, climate change may further stress water resource systems. Given current conditions, we are approaching a scenario where available water resources will not meet projected demands.

Large hydropower projects are particularly vulnerable to the impacts of [climate change](#) .Droughts have crippled hydropower generation all over the world, leading to energy rationing and blackouts from the U.S. to China, and from Brazil to southern Africa. This trend is only expected to increase in the current changing climate scenario being witnessed globally. Meanwhile, increasingly common extreme weather events make large dams dangerous for people living downstream, as they become vulnerable to dam failures.

GERD threatens climate in Nile Basin

Recent studies also provide evidence that tropical dams produce large amounts of methane, thereby contributing to greenhouse gas emissions. In a 2017 study, tropical ecologist Claire Salisbury shows that [all dams](#) worldwide do emit some greenhouse gases. This work debunks previous justifications for including hydropower dams under climate funding initiatives. There is now irrefutable evidence that methane and other greenhouse gases are unintended by-products of large dams.

Jennifer Veilleux, a Ph.D. candidate in the College of Earth, Ocean, and Atmospheric, Sciences at Oregon State University, says that the case of the [Grand Ethiopian Renaissance Dam](#) (GERD) demonstrates the complexity of the challenges that dam development presents for human security at different scales and in different sectors. Dam development creates changes that are not necessarily beneficial to related human and environmental systems. In fact, water development usually results in a multiplicity of unforeseen changes as well as predicted and regrettable shifts in the mid and long term. Rivers are dynamic systems, and the surface water that we can see and use is only part of the entire water in a river system.

Rivers host a myriad of biologically dependent systems, and also affect non-biological systems. The latter include economic, political, environmental, and socio-cultural systems. In the case of local communities, the river can play the central role in their society, culture, and economy, as in Egypt. Forcing change on the river systems, through building dams, can result in immeasurable and unforeseen changes to these dependent (biological) or affected (non-biological) systems, based on the size of changes and the systems' resilience and adaptation capabilities. But, even the most resilient and adaptive systems have a tipping point—the point at which a system is irreversibly altered into a new state—and this is largely unpredictable.

Temperature rises might reduce the productivity of major crops, and increase their water requirements. The Nile basin is also going to be severely affected by the impacts of climate change. The entire basin may receive increased precipitation early in the century, followed by decreases later in the century. This will also be reflected in the annual average Nile River runoff, which is projected to increase from 11 to 14% in the first half of this century, and decrease 7 to 16% in the second half. Thus, the agricultural sector in the basin, in particular, will experience increasing shortfalls by the mid to late 21st century.

Ashok Swain, specialized in peace and conflict research at Uppsala Centre of Sustainable Development, Uppsala University, Sweden, states that for most of the 20th century, the Nile River has been the source of political tensions and low-intensity conflicts among three of its major riparian countries (Ethiopia, Sudan and Egypt). However, since the late 1990s, the Nile basin countries—with the encouragement and support of the international community—have made some attempts to establish basin-wide cooperative institutions. This process of engagement and collaboration is presently under severe stress due to increasing demand and decreasing supply of water resources in the basin. This situation may be complicated further by the [global climate change](#), which is anticipated to result in long-term changes in the volume and pattern of runoff in the Nile River system.

The [United Nations Environment Program](#) (UNEP) considers the Nile basin system as one of Africa's most important ecosystems, and one of the most complex river basins affected by the climate change, amid its size and varying climate and topographies, and the fact that it hosts 40% of Africa's population (about 238 million people). The Nile Basin suffers challenges emanating from climate change in the Nile Basin include uncertainty as regards precipitation and river flow, land degradation, reduced river flow, flooding, droughts, deforestation, and loss of species and ecosystems, increased incidences of disease, and deterioration of the population's public health.

In March 2014, International Rivers received a [leaked copy of the report](#), prepared by the international panel of experts established to evaluate the GERD's scheme and explore its impact on Egypt and Sudan. The report, which was issued on 31 May 2013 documented numerous critical issues related to the dam and climatic changes in the dam area and the Nile Basin. Regarding the risks of climate change, the report proved that the Ethiopian studies did not assess the project's sensitivity to climate change assess the sensitivity of the project and the risks from the climate change.

The panel said that a project of this scale and with such heavy reliance on rainfall patterns requires a better understanding of future hydrologic conditions to ensure the highest degree of flexibility and resiliency in its design and operation, in order to face its repercussions on the population of Egypt and Sudan. The panel stressed that the [climate change](#) risks constitute concerns that must be taken into account, as dams in Ethiopia do not take into account their vulnerability to climate change, nor the repercussions of reduced water on the downstream countries and their ability to adapt to climate

change. It recommended conducting more studies to evaluate the hydrological impacts of the dam, its effects on the water supply and the risks of climate change in the two downstream countries.

The panel recommends "a full transboundary environmental and social impact assessment ... conducted jointly by the three countries."

The panel also recommended assessment of the dam's transboundary environmental and social impact, as well as the impact of potential climate change on the water flow system in the GERD region and downstream countries. Despite the fact that the Declaration of Principles (DoP) signed in March 2015 stipulated the need to implement the recommendations of the panel and other environmental and climate studies, they have not been completed so far, and it seems that it will never be completed as construction in the dam is nearing completion, amid Egypt's failure to demand implementation of the panel recommendations despite continuation of construction. Over time, Egypt has completely exceeded these demands.

In fact, the possibility of the Nile Basin environment and water resources being affected by climate change is not new. The report of the US Bureau of Reclamation, which proposed dam projects on the Blue Nile in the 1950s and 1960s, stated that the Blue Nile had the capacity to generate 10,000 megawatts of hydroelectric power through a series of dams. The Grand Ethiopian Renaissance Dam was the first in the proposed series. But the report warned that "climate change could play a dangerous role in the success or failure of the proposed hydropower and irrigation projects, because climate change scenarios indicate the possibility of significant decreases in rainfall rates after studying the historical climatic conditions in the region."

In November 2014, 17 scientists from the [Massachusetts Institute of Technology](https://www.mit.edu/) in the United States and specialists in Nile Basin studies proved that the Nile River is known for its autocorrelation in its annual floods, where a high flood comes after another high flood, and a low flood comes after another low one, to be in total semi-fixed cycles with seven years of abundant floods, followed by seven years of drought and famine. In 100 years, seven cycles of drought have been recorded. Certainly, the GERD negotiations did not address the share of water that could be released by Ethiopia during the prolonged drought years.

"Given the current infrastructure changes on the Blue Nile, it is not clear how the Grand Ethiopian Renaissance Dam can significantly alter the ecosystems of the Nile River basin downstream in Sudan and Egypt. There is a high probability that GERD will provoke armed conflict," the experts say, if the basin countries do not cooperate together and if Ethiopia continues to impose a fait accompli.

Environmental repercussions on Egypt

On the other hand, studies carried out by the Egyptian Agricultural Research Center confirmed that climatic changes alone, away from the Grand Ethiopian Renaissance Dam, and the rise in the earth surface temperature will cause a severe decrease in the productivity of most of the main food crops in Egypt, with increasing water needs. [Climate changes](#) are also expected to decrease the productivity of wheat by about 18%, barley and maize by about 19%, and rice by about 17%.

In fact, Egyptian and Sudanese water security is extremely fragile, which will further worsen in the presence of the body of GERD in the course of the river, taking into account that Egypt and Sudan are almost exclusively dependent on the Nile River's water resources for agriculture, industry, power generation, national economies, drinking consumption and livestock, and that most water comes from the Ethiopian highlands, as an estimated 82-95 percent of the basin's annual water contribution comes from the Blue Nile, its tributaries, Atbara, and Sobat in Ethiopia. The Blue Nile alone accounts for 59-68 percent of the Nile River's water resources, depending on the volatile monsoon season in the highlands of Ethiopia.

Egypt suffers from an increasing [water deficit](#) from year to year due to the rising population growth in light of the stability and even decline of water resources. The water deficit in 2022 is estimated at about 21 billion cubic meters on an annual basis, according to a statement by Egyptian Minister of Water Resources and Irrigation Hani Sweilem on 17 October.

Last year, Egypt's imports of fodder, especially yellow corn and soybeans, reached 15.5 million tons, with an average of 11 million tons of yellow corn, and 4.5 million tons of soybeans, according to a report issued by the [Central Administration of Plant Quarantine](#). Imports of wheat amounted to 12 million tons, and those of rice to 600,000 tons, according to an official estimate by the [US Department of Agriculture](#), while the [crude cooking oil](#) imports were amounted to 1.7 million tons.

During the first seven months of 2022, Egypt's imports of wheat, corn and soybeans hiked up to worth of \$5.448 billion, compared to \$5.174 billion during the same period in 2021, according to indicators of the Foreign Trade Bulletin issued by the [Central Agency for Public Mobilization and Statistics](#). This means that imports of the three commodities will reach \$9.4 billion by the end of the year, a huge cost that exceeds Egypt's foreign currency capabilities, that will even double after the GERD operation.

The Grand Ethiopian Renaissance Dam (GERD) will rapidly escalate the ongoing accumulation of salts in the agricultural lands of the Nile Delta which leads to deterioration of their productivity. In addition, GERD will enable Sudan to increase irrigation withdrawals upstream, which further reduces the water available to Egypt. Studies are urgently needed to identify the magnitude of these potential problems, and to mitigate their impact, according to the [Massachusetts Institute of Technology](#) experts.

The [German Institute for International and Security Affairs](#) (SWP), the largest European policy institute, also showed concern about the dire repercussions of the Grand Ethiopian Renaissance Dam on the security and stability of the European continent, and the dangers of illegal immigration as a result of the dam's direct threat to security and stability in Egypt and Sudan.

The [Climate Diplomacy](#) Group states that the climate change's contribution to the current conflict in the Nile basin is still limited. However, the current pressures demonstrate how the impacts of climate change might play out in the future, since the disruption caused by dam building is similar to the predicted disruptions from climate change. Climate change is likely to result in greater variability in seasonal flows. Increased consumption is likely to lead to reduced flows downstream, with several consequences, including relatively less available water and increasing salinization.

Environmental repercussions on Ethiopia

Ethiopia is not far from the climate change crisis, rather it is in the crosshairs of extreme [climate change](#). At the early eighties of last century, the Blue Nile sources in northern Ethiopia were hit by a drought that lasted for seven lean years. As a result, a famine occurred in 1983, the worst in the country's history in a century, and left one million deaths, 400,000 refugees permanently abandoned their country, 2.5 million homeless, and nearly 200,000 children orphaned, all because of drought and climate change. Egypt also suffered from the drought cycle in Ethiopia, where rice cultivation and

Nile tourism were affected, and the situation continued until the rain came back in 1988, and the flood saved the country from a famine similar to the one that hit Ethiopia, were it not for the High Dam lake stocks, which were completely depleted in the seventh year of the drought cycle.

In 2010, [Oxfam](#), which is concerned with addressing poverty in Ethiopia and in many countries of the world, stated that "rain no longer comes at the usual times in Ethiopia due to climate variability, which is one of the causes of poverty there. Ethiopians living in poverty are additionally suffering the effects of climate change – both more variable climate and more extreme weather events".

In mid-2020, the [BBC](#) published a classified document that it had obtained under the Freedom of Information Act in Britain, revealing the British Foreign Office's interest in the problems of the Nile waters after the drought of the eighties. According to the document, the Minister of Foreign Affairs asked for a situation assessment on the Nile Basin. The Middle East Department's Research and Analysis Department Research and Analysis Department prepared the study under the title "The Nile River", which was included in British foreign policy documents.

The British study states that "in drought years, Ethiopia could have a potential strategic weapon that would allow it to lock up water from Egypt and Sudan, which justifies the Egyptian state's fears of being held hostage by the upstream state." "The threat of the strategic use of Ethiopian reservoirs during times of drought has greatly complicated the negotiations aimed at concluding an international agreement on the future development of the Upper Nile Basin," it stated.

The British document revealed that this view was one of the conclusions of a similar study conducted by the US Bureau of Land Reclamation between 1958 and 1963. The study said that "the effects of drought in Egypt in the eighties were evident in three sectors: agriculture, power generation and navigation, as one of the sources of hard currency coming from Nile tourism."

GERD will have negative effects on the environment in Ethiopia. The dam could reduce human security in the area of human health via a potential rise in malaria. At present, [malaria](#) is a seasonal problem in the basin, and people live in scattered settlements, which inhibits the spread of disease. Resettlement plans will concentrate people together in new settlements and water will be present year-round, creating a double risk of an increase in malaria regardless of the Ethiopian government's

supplying of free nets and medicine and its plans to establish a five-kilometer buffer around the reservoir.

The Grand Ethiopian Renaissance Dam could, on a local scale, destabilize economic and socio-cultural human security. Local communities will lose their traditional livelihoods of flood-recession farming, gold-panning, and fishing in the river. Local dwellers just over the border in Sudan are also an unknown factor. Research is needed to determine how many people currently rely on subsistence practices and the measures necessary to help these communities adapt to regulated flow regimes and other disruptions of flood-recession farming and/or river fishing. The environmental sector will be completely altered on a local scale. How this will affect [ecosystems](#) reliant upon cyclical water-flow patterns is unknown.

In a statement on the United Nations Climate Conference (COP27), the [Egyptian Minister of Environment](#) stated that climate change is the most challenging crisis of our century. Rising temperatures, severe storms, increasing drought, rising ocean levels and flash floods lead to loss of species, food insecurity, water scarcity, increased health risks, increased poverty, and displacement. Therefore, the expected drought in the Nile Basin countries and the threats posed to water security and their direct impact on food security, poverty, water wars and illegal immigration towards Europe, are issues that are directly related to the Grand Ethiopian Renaissance Dam.

Due to this impact as well as other existential impacts of the Renaissance Dam on the climate and environment in Egypt and Sudan, the opportunity is ripe for Egypt, which is hosting the 27th United Nations Climate Conference (COP27) in Sharm El-Sheikh on the sixth of November, 2022, to include the issue of the dam on the agenda of the conference with the aim of gaining international support that could back its demands for an assessment of the dam's environmental effects, reviewing its design and reducing its size to a level that may cope with its repercussions on life in Egypt and Sudan, The question is: Will Egypt seize the opportunity?!¹

¹ The views expressed in this article are entirely those of the author's and do not necessarily reflect the views of the Egyptian Institute for Studies