



# GERD and Ecosystem in the Nile Basin

AFRICA WATER FOR PEACE  
NILE FOR PEACE INITIATIVE



# Nile for peace Initiative

## Introduction

The Nile Valley region is currently witnessing a major challenge that disrupts its natural path from the upstream country, Ethiopia, to the downstream country, Egypt, due to the former's water project recently established on the Blue Nile stream near the eastern side of the Sudanese borders. This situation is even exacerbated by the lack of communication between the downstream and upstream countries and the limited amount of data and information provided by Ethiopia on this project, especially with regard to the amount of water that is reserved behind the dam. All this will inevitably take a devastating toll on the Nile Valley region and the environment. These effects vary from drought to desertification and migration, along with the increased risk of climate change, changing soil fertility, and threatening biodiversity in the riverine environment, which of course will be hugely felt in all other aspects.

"Nile for Peace" initiative presents this study to address the environmental risks of the GERD in the three countries, Ethiopia, Sudan, and Egypt, and provide objective solutions to reduce these environmental risks and disasters, which would not only affect the ecosystem, ecological and biological system in the East African region and the Nile Basin, but also would extend to affect different regions of Africa and multiple regions in the world.

This study comes within the framework of the efforts of the "Nile for Peace" initiative to end the state of conflict in the Nile Basin region and to present a set of recommendations and general principles that would return the Nile River to its normal position as a source of cooperation and not an engine of conflicts. The initiative reviews the efforts of civil society organizations in the three countries, in addition to civil society representatives from different African countries.

## The environmental impact of the GERD on Ethiopia

Unfortunately, some Ethiopians are looking forward to reaping the harvest of the huge water project without considering the dark side of the coin, represented by the devastating consequences of the GERD, particularly on the environment. However, this belief is not true at all, given that the Ethiopian dam has environmental impacts on Ethiopia itself, some of which have already appeared and others are expected to occur within the next few years, which portends an environmental threat to Ethiopia.

Since the Blue Nile is a river that depends heavily on seasonal water supply, the dam will reduce flooding, including 40 km from within Ethiopia, so Ethiopia will be affected



## Nile for peace Initiative

environmentally by building the dam<sup>1</sup>. On the one hand, the dam will reduce flooding; this is useful because it protects the settlements from flood damage, but on the other hand, the dam can be harmful, as it will reduce the proportion of agriculture due to the receding of the floods in the river valley to the downstream, thus depriving the fields of water and from then disruption of the cycle of the environment as a whole.

### Environmental impact on Sudan

The Ethiopian dam will have a significant impact on Sudan. Sudan is the first country of the two downstream countries that will feel the repercussion of the dam and its environmental impacts. This is due to the dam retaining quantities of silt behind it, and therefore the use of dams in Sudan will increase, such as the Roseires Dam, Sennar Dam and Merowe Dam, and thus will be directly affected by the flood seasons. The beneficial and harmful effects of flood control will affect the Sudanese part of the Blue Nile, just as it will affect the Ethiopian part of the Blue Nile downstream of the dam.<sup>2</sup>

On the other hand, the quantity of groundwater will also negatively be affected. Groundwater

is considered one of the most important sources of water in Sudan, as about 80% of the population of Sudan depends mainly on it. Since the dam has changed the composition of the groundwater as a result of its formation of a lake behind it that prevents the transfer of water and thus the recharge of groundwater in Sudan, so the state of the hydrochemistry of groundwater was examined and its spatial distribution was determined to assess the suitability of groundwater as main sources for drinking and irrigation purposes in a number of countries such as the town of “Arba Minch” in “Abaya Shimo” sub-basin of the Great Rift Valley in Ethiopia, the following conclusions were drawn:<sup>3</sup>

The results of hydro chemical analysis showed that the current condition of the groundwater in the town is safe and suitable for drinking and irrigation purposes. However, the excessive concentrations of hardness, chloride, nitrate and dissolved solids in very few locations make some groundwater undesirable for drinking and daily life uses. Hence, there is a need for sufficient preconditions because the dynamic urban development in the region is the main factor for the deterioration of

<sup>1</sup> Atlantic Forum, Nile Basin's GERD dispute creates risks for Egypt, Sudan, and beyond, 2020, available at: <https://www.atlanticcouncil.org/blogs/menasource/nile-basins-gerd-dispute-creates-risks-for-egypt-sudan-and-beyond/>

<sup>2</sup> Op.cit

<sup>3</sup> Elsayed Ramadan and others, Environmental Impacts Of Great Ethiopian Renaissance Dam On The Egyptian Water Resources Management And Security, available at: [https://www.researchgate.net/publication/262674871\\_Environmental\\_Impacts\\_Of\\_Great\\_Ethiopian\\_Renaissance\\_Dam\\_On\\_The\\_Egyptian\\_Water\\_Resources\\_Management\\_And\\_Security](https://www.researchgate.net/publication/262674871_Environmental_Impacts_Of_Great_Ethiopian_Renaissance_Dam_On_The_Egyptian_Water_Resources_Management_And_Security)



groundwater quality in the future, and therefore the northeastern part of the famous Gezira region of Sudan needs some serious monitoring to protect the deterioration of groundwater quality from pollution risks from depleted agriculture and lack of control of waste dumps, as the interaction between rocks, water, and evaporation, which are two main dominant processes that control the chemical composition of groundwater in the study area, were not working well during the period following the construction of the dam, thus affecting the water quality and the ability to use it.<sup>4</sup>

About 87% of the water samples have recorded high salinity hazard but having low sodium hazard, which calls for the need of proper drainage, the specific absorption rate values varied in the range of 0.53 to 6.02 which is clearly less than 10, which represents that the groundwater is suitable for irrigation, but not in all cases. In addition to the studies published by Kyoto University in Japan, which warned of the drying up of the Sudanese water reserves in Lake Nasser within a few years<sup>5</sup>.

Another study was also prepared on the extent of the impact on the three countries regarding the construction of the dam, the first degree of

effects was to prevent the silt from reaching Sudan and reduce the water quantities and the natural water flow system, then Egypt was in the second degree, where the deterioration of water quality and pollution, while the third-degree effects include Egypt and Sudan with regard to the wild environment as a result of the deterioration of water quality, which reaches, in turn, the invertebrates and then fish, while the negative effects of mammals and birds come at the top of the pyramid.

Looking at the developments in the short term, we find that it is expected that the course of the Nile River towards Sudan will decrease by more than 5 meters below the GERD within ten years, and then the erosion of the river course threatens the Mediterranean coast, which will overwhelm and drown the lands of the delta, making it necessary to take rapid engineering and environmental measures before the final completion of the project in order to preserve the Sudanese lands from erosion.<sup>6</sup>

## Environmental impacts of GERD

Egypt is the most affected at all, as it is the last downstream country that the Nile reaches after a long journey from the main sources, in addition to the impact on the Egyptian northern

<sup>4</sup> Ibid

<sup>5</sup> Abbas Sharaki, Impact of the Grand Ethiopian Renaissance Dam (GERD) on Gezira Groundwater, Sudan, 2017. Available at: [https://www.researchgate.net/publication/322127055\\_Impact](https://www.researchgate.net/publication/322127055_Impact)

<sup>6</sup> Ibid

<sup>6</sup> Ibid



## Nile for peace Initiative

coast of the Mediterranean Sea, and the water will dry up in many areas and its access to others will be scarce, along with the danger of its subjection to any damage that affects its ecosystem, with the spread of information about fractures and cracks in its foundations, which makes it more dangerous on Egypt than building the dam itself.

There is no doubt that the GERD project will markedly reduce the water level in Lake Nasser if the floodwater was stored instead in Ethiopia and this would reduce the current evaporation of more than 10 billion cubic meters annually, which would be reflected on Marine environment, fisheries, and biodiversity in Lake Nasser.

Taking into account the possible scenarios of climate change during the next century, the results of a simulation model prepared by environmental experts indicate that if the period of filling the reservoir will be three years, it will severely affect Egypt and Sudan's share of water, with a shortage of about 24 billion cubic meters per year.

The study warns that after the completion of the construction of the dam, Egypt will be deprived of five billion cubic meters of water annually divided between Egypt and Sudan. In addition, climate change may increase the risks of the project and other risks related to it with the expected climate changes, which is the

increase in the occurrence of minimum levels of water in the reservoir of the High Dam. It is also expected that the water level needed to operate the High Dam will decrease by 10% until 2070, and increasing the decline to a percentage representing 40% from 2070 until 2099, and the expected effects on the hydroelectric power generated from the High Dam were also calculated.

There is no doubt that all of these factors will affect the amount of energy, which will decrease by 10% in the period until 2040, and that the decline increases until it reaches between 16% and 30% in the period between 2040 and 2070, as the model recorded a severe shortage of energy that reaches between 30% and 45% in the period from 2070 to 2099.

On the other hand, the environmental crises of the Mediterranean will affect the population of the region, and then accelerating the displacement of 4 million Egyptians living in coastal cities, as the average level is currently rising from 1 centimeter to 2 centimeters annually, while in contrast, the lands of the delta in Egypt decrease by one millimeter to 3 millimeters, and these percentages will increase by the decline of the Nile water levels.

The environmental studies indicate that the GERD will reserve 136.5 million tons of silt and various weeds that will decompose behind it every year, which causes terrible microbial



activity and depletion of oxygen from the Nile water, as well as Sudan's tendency to compensate the silt shortage by using agricultural chemical fertilizers, similar to what Egypt did after the construction of the High Dam, which will double the crisis of agricultural drainage polluting the Nile in both countries.

As confirmed by the African expert who contributed to the preparation of the 2013 report of the International Committee of Experts on the GERD, fish will disappear from the Nile River in Sudan and Lake Nasser in Egypt for 5 years following the operation of the GERD, which needs to find other jobs for fishermen.

## **How can the environmental impacts of the GERD be avoided?**

In light of the foregoing, and with reference to the disastrous environmental impacts of the GERD on Ethiopia and the two downstream countries, Egypt and Sudan, and as a part of the solution and work to avoid the exacerbation of negative impacts on the ecosystem in the Nile Valley, the Nile for Peace Initiative makes the following recommendations to be submitted to the attention of stakeholders.

a. The need of providing other water resources, such as the Upper Nile projects, in cooperation with the Nile Basin countries, to fill the water

deficit resulting from the construction of GERD, with the succession of modern methods of rationalizing water consumption in agriculture, and changing the crop composition, especially for water-hungry agricultural crops.

b. Taking into account similar international experiences such as the Mekong River, where China was following the same Ethiopian approach to construct a group of dams that harm Vietnam as a downstream country, however, the designs of the dams were modified to generate electricity with the same capacity and less harm to Vietnam by changing the size of the reservoirs of those dams to small reservoirs.

c. The three countries should develop a joint plan to manage crises related to environmental and natural disasters, especially those resulting from storing large quantities of water behind the dam, and thus the possibility of occurrence of earthquakes and volcanoes in that area and the surrounding areas.

d. Expedite the completion of the environmental, hydrological, and social impact assessment studies of GERD because they are insufficient and unclear.