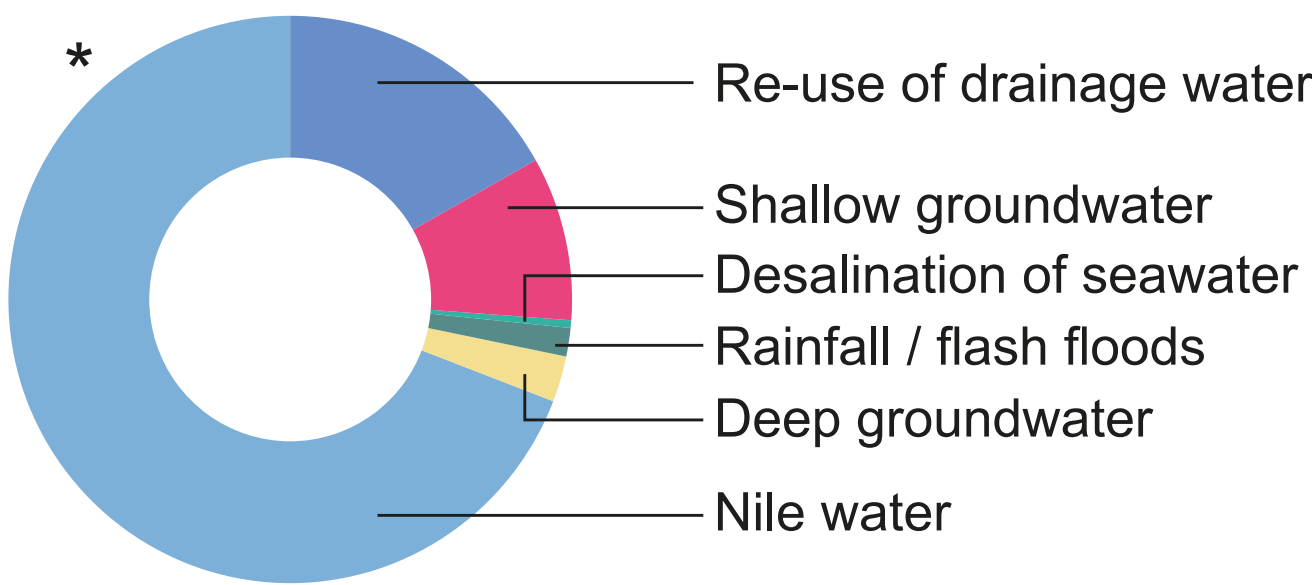


THE NILE UNDER PRESSURE

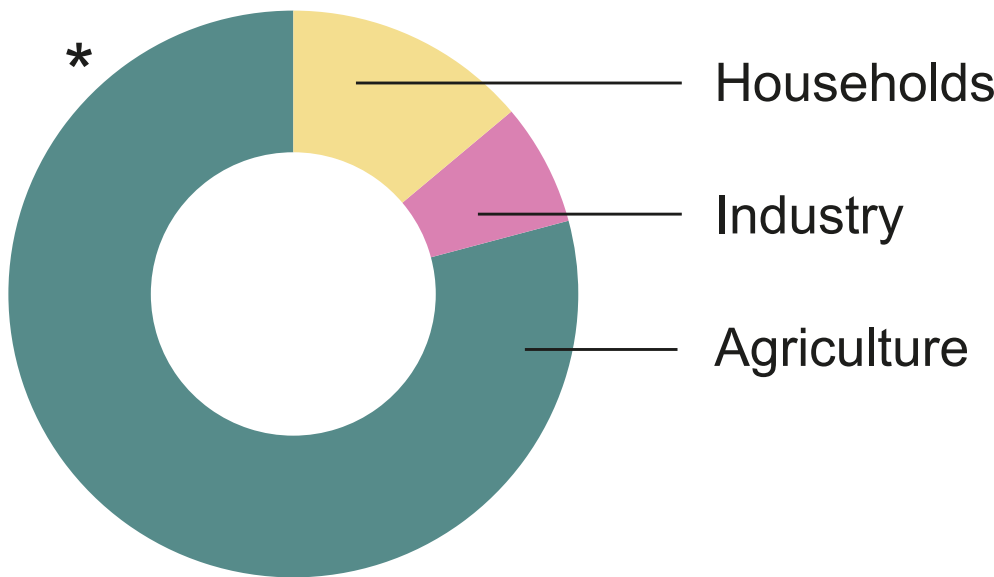
EGYPT'S WATER SHORTAGE

WATER RESOURCES AND FOOD SECURITY

Water resources ^[1]

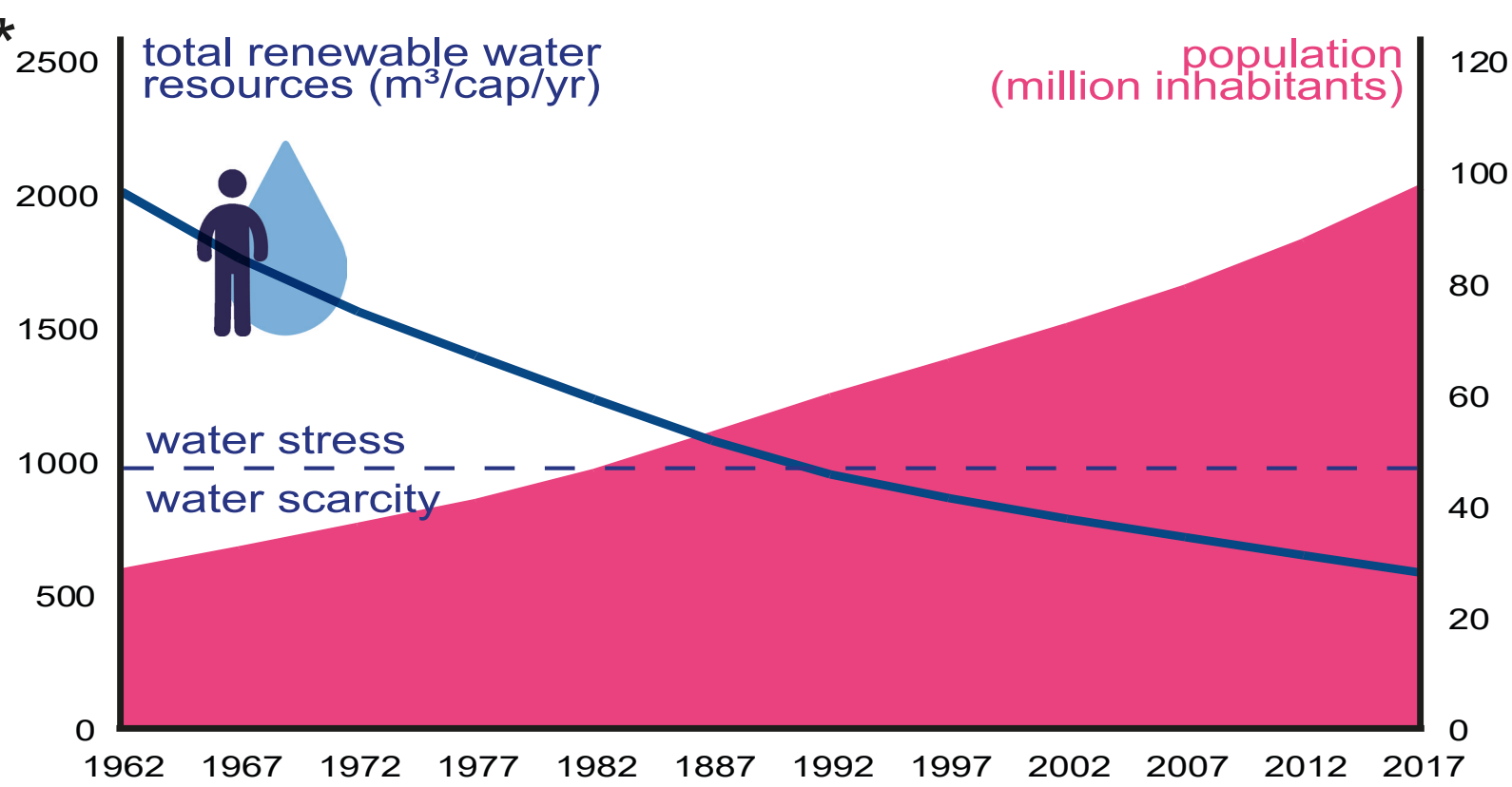


Water withdrawal by sector ^[2]

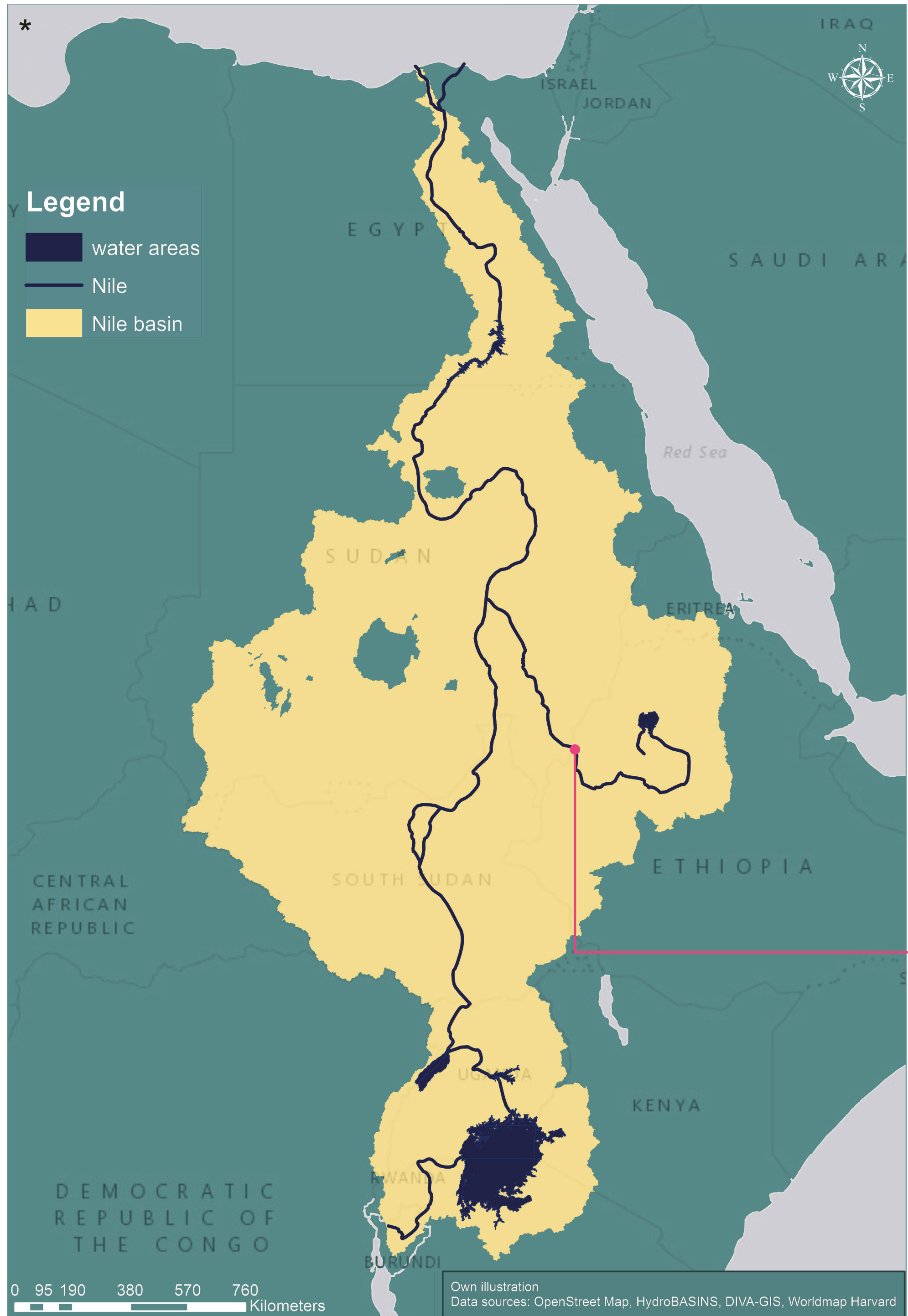


Population growth and declining water resources ^[2,4]

Egypt is the most populous country in the Middle East. If the water resources which mainly depend on the Nile decrease due to socio-political reasons or climate change impacts the balance of population and food security is highly affected. ^[3]

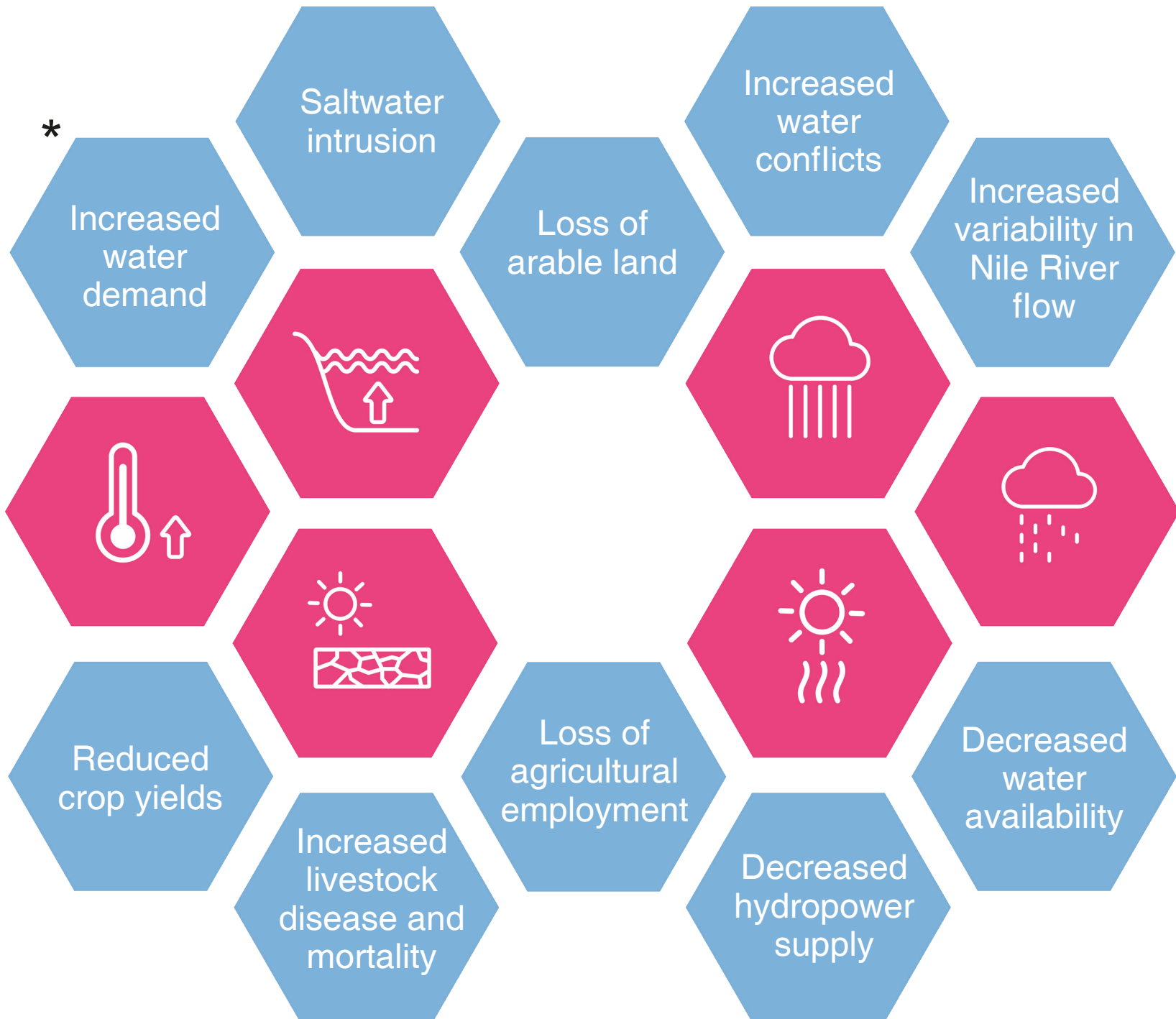


*Both, the actor human as well as the actant water, have influence on each other and on the stability within the whole **Critical Zone**.*



CLIMATE CHANGE

An external driver for water scarcity ^[5]



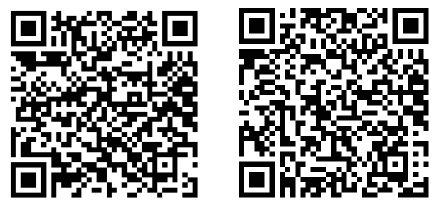
IS ETHIOPIA'S RENAISSANCE EGYPT'S DISASTER?



At the end of construction, the Grand Renaissance Dam in Ethiopia will be the largest hydroelectric power plant in Africa and the 7th largest in the world. Its reservoir will hold up 67 billion m³ of water and will take at least 7 years to fill. During this time period the flow of the Blue Nile river will decrease at least by 25% ^[6,7].

Dams, irrigation and climate change do not only play an important role for the Nile River. Many rivers worldwide, e.g. the Colorado River (USA and Mexico) or the Ganges River (India and Bangladesh), are struggling with an increasing water scarcity.

HAVE A LOOK!



ROADMAP TO SOLUTION - THREE APPROACHES

*In the **Critical Zone** research, the connectivity of zones should be considered. Particular in the globalized context of our world. Under stress, **Critical Zones** can break down or shift to other states. The water resources in the Nile basin experience many different influences that trigger stress, therefore parallel solutions have to be found at different spatial and temporal scales.*

VIRTUAL WATER IMPORT

Egypt's virtual water imports in 2011 ^[9,10] *

23% of Egypt's water resources consist of virtual water imports. Apart from possible economic gains, the country saves 3.6 Gm³/yr of water just by importing wheat instead of producing it. However, Egypt also loses its self-sufficiency in food production. ^[3,11,12]

In the short-term, Egypt has to manage its dependency on virtual water on the domestic and international level. Also, it should strengthen its economy to be able to cope with global market price shocks. ^[3]

Currently, Egypt is the largest importer of wheat in the world ^[13]

EFFICIENT IRRIGATION WATER USE

98% of Egypt's farm land are irrigated, but often in inefficient ways. The predominant irrigation method in Egypt is surface flooding which is much less efficient than modern sprinkler and drip irrigation technologies. ^[3,14]

Even if the modern technologies become increasingly affordable, farmers often lack the initial capital. Also, some systems are best designed for medium-large sized farms whereas 50% of the farms in Egypt are less than 1ha. ^[3]

In the mid-term, Egypt has to improve its irrigation techniques. Additionally, more Water User Associations which have already shown a successful impact in other MENA countries should be established. Therefore, support from the government is highly needed. ^[3,15]

DESALINATION

0.4% of Egypt's water resources originate from desalination, but the number of plants is rising. However, through its intensive energy consumption and brine discharge back into the ocean desalination plants can have negative environmental impacts. ^[1,16]

Virtual water: \$0,16/m³
Desalinated water: 0,5\$/m³

Comparing the costs of importing virtual water vs. producing desalinated water shows, that desalinated water for food production is not viable yet. ^[3,16]

In the long-term, global water prices have to increase and the cost of technology has to decrease to make desalination a profitable approach. Most importantly, Egypt should invest in renewable solar energy, e.g. Concentrating Solar Power, so that desalination becomes environmentally sustainable. ^[3]

Many arid countries worldwide are struggling with scarce water resources and also, many sustainable solutions have been found regarding national cooperation, efficient water use, food-water-energy use, etc. Some of them can be found here to discover a range of sustainable and creative approaches:



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