The Aswan High Dam: Egypt's Giant Leap Forward

Located about 10 miles south of the city of Aswan, Egypt, for which it is named, the Aswan High Dam is a major feat of engineering and is one of the marvels of the modern world. Completed on July 21, 1970, the Aswan High Dam is 3,600 meters long, 980 meters wide at its base, 40 meters wide at the top, and 111 meters tall. It contains 43 million cubic meters of building material. Construction of the dam cost over $1 billion and took 10 years to complete.

The reservoir behind the Aswan High Dam is named Lake Nasser, after the president of modern Egypt who first ordered its construction. Lake Nasser is 480 kilometers long and 16 kilometers wide at its widest point.

The Nile River is the base for the Aswan High Dam. The world's longest river, the Nile runs 6,695 kilometers from its source in Burundi, in Central Africa, to the Mediterranean Sea. The Nile Valley basin covers nearly 3 million square kilometers between its three main branches: the White Nile, the Blue Nile, and the Atbara River. The Nile Valley basin covers 10 countries in northeastern Africa. The
branches of the Nile come together in Sudan, and flow north across the Sahara desert into Egypt.

Most of the water contributed to the Nile comes from the Blue Nile, which originates at Lake Tana in Ethiopia. Heavy rainfall washes away the rich, fertile soil of Ethiopia’s highlands and sends it downriver in the form of silt, which eventually collects in the Nile Delta in Egypt. Only a small percentage of the water carried down the Nile eventually reaches the Mediterranean. The rest either evaporates or is diverted for use in irrigation and farming, as drinking water, or for other purposes.

The average flow of the Nile River is about 50 million cubic meters per day. During the rainy season, however, the three branches of the Nile River increase their flow to just over 700 million cubic meters per day.

There were several reasons that the government of Egypt wanted to build a dam across the Nile. Since the days of the pharaohs, the Nile has flooded every year, depositing a layer of rich, fertile silt washed downriver from Ethiopia. But the flooding wasn’t consistent—one year, the floods might be low, resulting in weak soil that produced few crops. The next year, the floods might be high, destroying buildings, homes, roads, and washing away important features of the land. At the beginning of the twentieth century, the British colonial administration built a dam near Aswan to control the flooding. By the 1950s, however, it was clear that this dam wasn’t going to help with the needs of a growing country.

The construction of the Aswan High Dam has had many positive effects on Egypt. The dam is also a hydroelectric power plant, and is equipped with 12 turbines, each capable of producing 175 megawatts of electricity, or 2.1 gigawatts total. The power plant began operating in 1967, and by the mid-1970s, the Aswan High Dam was producing half of Egypt’s electrical supply. The new electrical production allowed many villages to have electricity for the first time. The Aswan High Dam is still a major part of Egypt’s electrical supply, and produces about 15% of the country’s needs each year.

Another benefit from the construction of the Aswan High Dam is that agricultural production can now take place year round. Since the Nile floods have been stopped, many farmers can now squeeze in three growing cycles each year, tripling the amount of crops that can be harvested. In a country that is 94% desert, the ability to triple wheat and cotton each year has been a huge benefit.

Some people have questioned whether the Aswan High Dam has created a dangerous situation. Although earthquakes are not common in Egypt, they do happen from time to time. If the Aswan High Dam were to be destroyed, the Nile Valley would be hit with a wall of water that would not be able to stop until it reached the Mediterranean Sea. A destructive wall of water moving north would reach every major city in Egypt, and afterwards the country would have little access to clean water. Others point out that the dam was built to withstand strong earthquakes and that there is very little chance that the dam could ever be destroyed either by natural or human forces.
The Down Side of Building Massive Dams

The Water Table:
The water table is the upper level of underground water. If you dig a hole nearly anywhere, you will eventually strike water. In swampy areas, the water table is very close to the surface (or ground level), which is why marshy conditions are found there. In other areas, the water table is very low, which is why deep wells must be dug to reach water and bring it to the surface. In desert areas, places where the water table comes close enough to the surface to allow plants to grow are called oases.

In many places in Egypt’s Nile Valley, the water table has been rising much closer to the surface than before and, in many places, the rising levels are threatening ancient monuments. One particular danger is the formation of salt. The sand and soil of the Nile basin are naturally salty. Before the Aswan High Dam was built, the annual flooding of the Nile would wash the salt into the Mediterranean. But now that the flooding has stopped, the natural salt, along with salt added from artificial fertilizer usage, has been building up over time.

There are two problems with the buildup of salt in the soil. First, the salty soil makes the ground water salty, which means that it can’t be used for drinking or irrigation because too much salt is harmful to humans, animals, and plants. Second, salt causes limestone to decay much quicker than normal, and most of Egypt’s ancient monuments are built of limestone. Archaeologists fear that the rising water table could cause the destruction of many of these structures, from the temples of the pharaohs in Luxor to the great Sphinx in Giza.

There are several possible solutions, such as installing wells to lower the water table, replacing the foundation stones with other materials, or injecting a chemical sealant between the structures and the soil to create a barrier. All of these are very expensive and risk possible damage to the ancient monuments.

Soil and Fertility:
Although one of the benefits of the Aswan High Dam was the ability of farmers to grow crops year round, the stoppage of the Nile floods has had negative effects as well. The yearly flooding deposited a layer of rich, fertile soil that was excellent for growing crops. Without the flooding, farms in Egypt have had to begin using artificial fertilizer to enrich the soil every year. Many fertilizers consist of harsh and dangerous chemicals that can leak into the ground and drinking water systems if not used properly.

Disease:
Another side effect of the construction of the Aswan High Dam is an increase in the rates of people infected with a disease called schistosomiasis, or bilharzia (bill-HAR-zee-ya). Bilharzia is caused by a parasite carried by snails that bores itself into the skin of humans, and it flourishes in standing water. Bilharzia has been a problem in Egypt for millennia—some mummies from the Pharaonic period show visible symptoms of advanced stages of the disease.

The flow of the Nile once helped with the problem, because bilharzia needs slow moving or standing water to develop. However, with the construction of the dam, the parasite has found a new home in
the standing water of Lake Nasser. From there, it is sent with the Nile water downriver and is often transmitted into the feet of farm workers in their fields. This caused the rate of infection to increase rapidly.

Bilharzia is a disease that is easy to treat if it is caught in its early stages. The problem is that it can take as long as 20 or 30 years for symptoms to develop, at which point the disease is incurable and can eventually lead to death. By the early 1980s experts estimated that nearly 70% of the population in some rural communities was infected with the disease.

From the mid 1960s until the mid 1980s, a nationwide campaign to treat the infection and spread awareness of how to prevent it was organized in villages throughout the country. The campaign was made popular by an announcement that one of Egypt’s most beloved celebrities, actor/singer Abdel Halim Hafez, suffered from it. Patients came to small clinics where they received a series of ten injections to remove the parasite from their system. An educational campaign alerted people not to swim in the Nile or work barefoot in the fields. In the late 1980s, an oral treatment was introduced, finally bringing the disease under control.

Although the campaign was very successful in reducing the rate of bilharzia infection, it had another result. In the mid 1980s, it was still not known that blood-borne diseases such as AIDS could be spread by using needles that were not sterilized properly between uses. As a result, Egypt now has one of the highest infection rates of Hepatitis C, an incurable and potentially fatal disease of the liver, which has been directly linked to the campaign to eradicate bilharzia. It is estimated that 12–15% of Egypt’s population has the disease, one of the highest rates of infection in the world. (The rate of infection in the United States, for example, is about 1.8%.)