

The potential of the Nile River system

by Marcia Merry Baker

Figures 1 and 2 show the geography and the hydrological projects of the Nile River system.

The Nile system drains a watershed area of 3,030,300 square kilometers, constituting approximately 10% of all of Africa. The Nile Basin encompasses land in nine nations: Rwanda, Burundi, Zaire, Tanzania, Kenya, Uganda, Ethiopia, Sudan, and Egypt.

The Nile is the longest river in the world, running for 6,650 km. Two rivers—the White Nile and the Blue Nile—join together at Khartoum to form the Nile, which then makes the long journey northward to the Mediterranean Sea. The only tributary to this final course is the Atbara River, which rises in the Ethiopian highlands, and joins the Nile about 320 km north of Khartoum. From Khartoum north to the Egyptian border and Aswan, the gradient of the Nile is steeper than south of Khartoum, and five of the Nile's six cataracts occur on this stretch.

As measured at Aswan, the annual volume of water of the Nile is given as 84 billion cubic meters. The relative shares of use of this water between Sudan and Egypt were given in the 1959 treaty between the two nations, called "Full Utilization of the Nile Waters," which apportioned 18.5 billion cubic meters for Sudan, and 55.5 billion cubic meters to Egypt (this is based on net yield of water, after Aswan reservoir and other storage and regulation is taken into account).

Up to 70% of of the Nile's 84 billion cubic meters (at Aswan) comes from the Blue Nile system during its flood season, with the remainder from the White Nile and Atbara. The White Nile's flow is especially important because it arrives during the months when the Blue Nile is very low, when the Blue Nile may contribute only 20% of the flow to the lower Nile. The Atbara, during its flood stage, may contribute 13% of the annual flow of the Nile (11 billion cubic meters,) but from January to June the Atbara shrinks to pools and ponds.

The Blue Nile rises in Ethiopia, at Lake Tana, and proceeds for about 804 km through Ethiopia before beginning its course through Sudan to Khartoum. This is a fast-flowing river during the summer of torrential rains.

The southernmost source of the Nile River is in the White Nile sub-system. The White Nile proper begins at Lake No in south-central Sudan, from which it flows 1,000 km to

Khartoum. But the most distant origin point of the Nile waters is far to the south in the Kagera River Basin in Rwanda and Burundi, and the upper Nile flow comes from the catchment of the equatorial lake plateau. The Kagera flows into Lake Victoria, from which Nile waters then flow on to Lake Kyoga, then Lake Mobutu Sese Seko (Lake Albert), and northward across the Uganda-Sudan border. Then, at the town of Bor, the land gradient changes, and the great swamp, the Sudd, begins.

The extent of the Sudd varies greatly with the volume of water received. During the period of the great rains of 1961-64 over the equatorial lake district, the Sudd reached 29,800 square kilometers (of both permanent and seasonal river-flooded area), which is close to the size of Belgium. At other times, the Sudd has averaged 13,100 square kilometers, still quite vast.

Through the Sudd, the Nile flow makes its way through various currents, mainly the Bahr el Jabal, which eventually forms Lake No, at a point about 1,156 km from Lake Mobutu Sese Seko (Lake Albert).

Flowing into the Bahr el Jabal from the west is the Bahr el Ghazal (the "gazelle" river). Flowing northward parallel to the Bahr el Jabal on the east, is the Bahr el Zaraf (the "giraffe" river).

The swamp is characterized by floating or jammed up "islands," called *sudd*, of marsh vegetation, broken off from their moorings, and in various states of decomposition. There are vast chunks of *sudd*, some up to 30 km long. In the sluggish waters there are many varieties of malaria mosquitoes and waterborne parasites. The Sudd is almost impassable overland or by rivercraft.

A huge volume of Nile flow is lost to evaporation in the Sudd. The mean annual loss from evaporation from 1905 to 1980 is estimated to be 16.9 billion cubic meters, and can reach 20 billion cubic meters, which is nearly a quarter of the annual volume of the Nile at Aswan.

Waterworks

Figure 2 shows the major Nile River system projects—some completed, some proposed.

At the Nile Delta, there are barrages to protect the last available river water from the Mediterranean seawater intrusion.

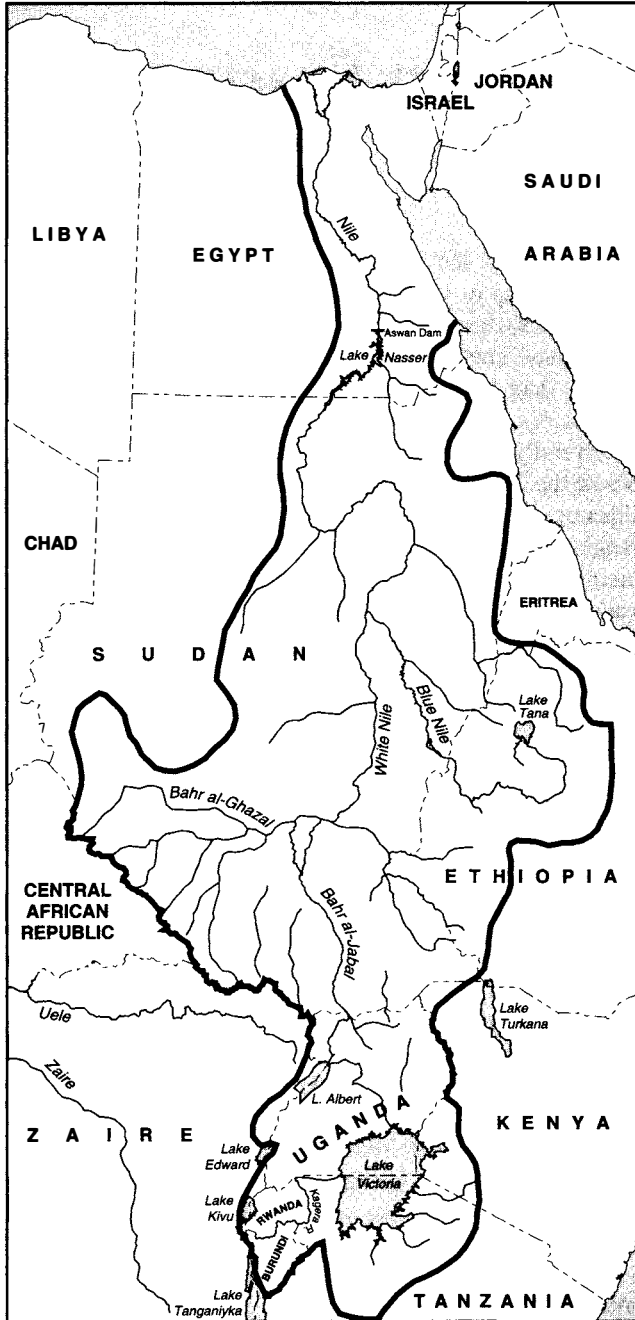
Farther south, the Aswan High Dam, completed in 1971, is used as a storage system, and to regulate flow between what hydrologists call the "timely" and the "untimely" annual periods of the Nile.

In Sudan, there is the Khashm al-Girba Dam and reservoir to store water on the Atbara River.

Not shown on the diagram is a project (between Russia and Sudan) announced this May, for construction of a dam at Keibar (400 km north of Khartoum) for irrigation and power.

South of Khartoum, the Gebel Aulia Dam and reservoir

FIGURE 1
Nile River System

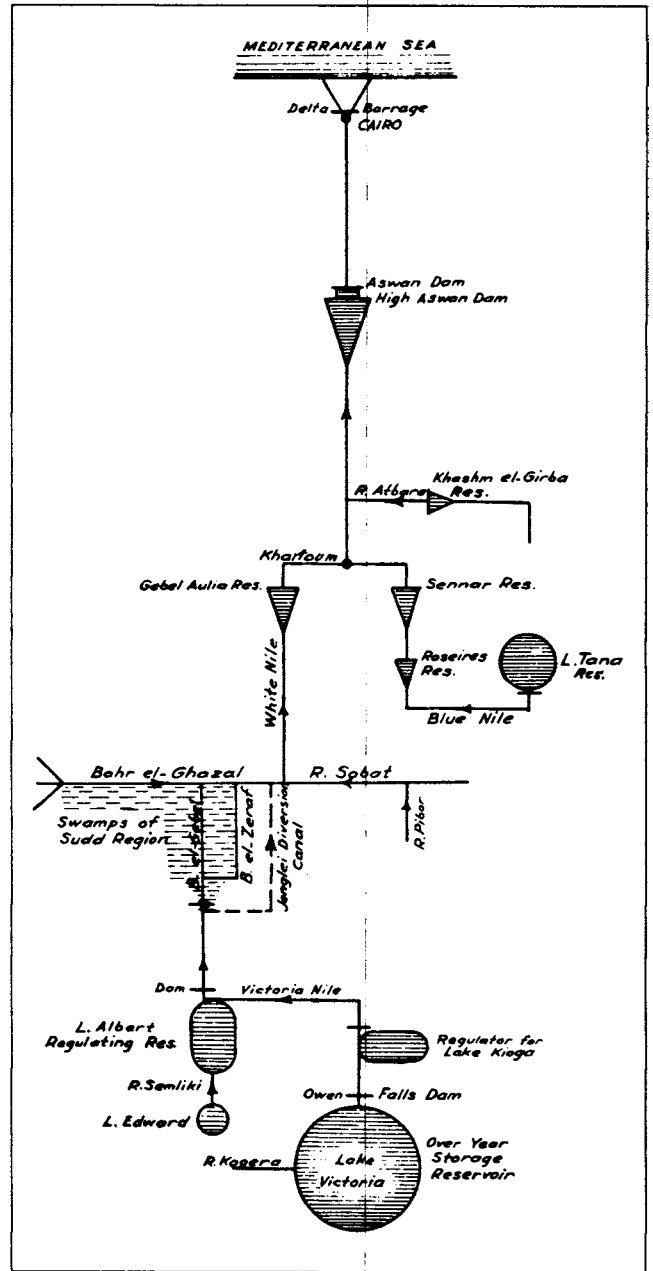


on the White Nile, and the Sennar and Roseires dams and reservoirs on the Blue Nile, store and regulate water.

In Uganda, there is the Owen Falls Dam, at the point that the "Victoria Nile" leaves Lake Victoria.

The proposals for waterworks in the Sudd, and in the upper Nile lake plateau region, are either partially built, or not built at all.

FIGURE 2
Major Nile River projects



Source: Van der Leeden, *Water Resources of the World*, New York: Water Information Center, Inc., 1975.

The route of the proposed Jonglei Canal—over half excavated in the 1980s—is shown on **Figure 2**. There are other swamp water diversion plans for the Sudd to the west. Completing the Jonglei Canal alone would add significantly to the downriver Nile flow by reducing the Sudd evaporation.

Likewise, the potential upper Nile waterworks in the lake plateau region have not been built.