

## **A Tale of 4 Rivers**

Five rivers serve of examples of the human relationship to rivers and the problems associated with trying to manage and develop rivers. These are the Colorado and Tennessee Rivers in the U.S., the Nile River in Egypt and the Yangtze River in China.

### **The Colorado River**

The Colorado River in the Southwest U.S. is the principal water resource in this desert region. The river is such an important water resource that it is completely used up. There has not been a drop of water from this river that has reached the ocean in over 70 years. The water is diverted and used by the following groups:

1. Cities. The region contains some of the fastest growing cities in the nation.
2. Irrigation districts for agriculture.
3. American Indian Nations.
4. Industries.
5. State and Federal Government Installations.
6. Mexico

The demand for Colorado River water is so great that it took a U.S. Supreme Court decision to allocate the water between the various states but especially between California and Arizona. As part of this, scientific studies were conducted to determine what the historic flows of the Colorado River were. They allocated the water based on these long-term predicted flows. However, the amount of water actually flowing in the river remained less than predicted, so the river was, in fact, over-allocated. This only served to increase the political tension concern the river water. More recent studies have shown that the long-term flow is substantially less than originally estimated.

Finally, there is the additional problem of salt content and water quality. The classic problem with agriculture in a desert environment is that the fields must be irrigated for the crops to survive and grow. Because of the high rates of evaporation in desert environments, salts build up in the soil. Additional water is necessary to dissolve or "flush" these salts from the soil. These salts end up in the water that will be used for irrigation further down stream. The U.S. has a treaty with Mexico which provides them with a specified amount of water from the river. However, since they are at the end of the pipeline, the water provided is saltier than the water upstream. This makes the Mexicans unhappy and adds to the political tension over the use of water from the Colorado.

### **The Tennessee River**

The Tennessee River is one of the major tributaries of the Mississippi River. The river begins in the Appalachian Mountains and flows across the state of Tennessee. The Tennessee Valley historically has been one of the poorest and most backward regions of the United States. The river was relatively wild and untamed. It was legendary for its spring floods and these contributed to the poverty in the region. During the 1930s, the

federal government created the Tennessee Valley Authority (TVA) as one of its New Deal programs. They decided to build several major dams along the river and many smaller dams on the tributaries. Essentially they would control flooding on the river by flooding the entire Tennessee River Valley. For some 600 miles, the river is a nearly continuous series of reservoirs. The TVA was the largest engineering project the federal government had ever conceived. Due to its scale, the project had not only important engineering objectives but also social objectives, hence the term "social engineering". The idea was that electricity would be generated at the dams and it could be sold cheaply. This would provide electricity to parts of the rural South where it did not exist. Cheap electricity would also attract industries to the region which would further spur economic development. The Appalachian region would change for the better and be brought into the mainstream of the American economy. At least this was the plan.

Then World War II came along. Many war industries were located in the TVA because of the cheap electricity. One of these was Oak Ridge National Laboratory where the uranium for the atomic bomb was processed. After the war, additional industries located in the South. The South did change both economically and socially and became the New South of today.

### **The Nile River**

The Nile River is the soul of Egypt, and this is as true today as it was in antiquity. Egypt is a desert. The Nile River flows across this desert. The river is almost the only source of water in the country. Over 95% of the population lives within 5 miles of the river and its flood plain. The key to understanding the history of Egypt is the annual flood of the Nile. On almost any other river in the world, flooding is a disaster for agriculture; but, historically, the flood of the Nile was a blessing to Egypt. Most rivers flood only occasionally, but the Nile flooded every year. The people were used to it and, indeed, benefited from it. The flood fertilized the soil by adding a new layer of silt and also leached out the salts that had accumulated over the previous year. It is important to remember that agriculture, in most cases, can only be practiced for a few years before the soil is exhausted of nutrients. This has been true in the history of the United States until modern times. Colonial farmers farmed until they exhausted the soil and then packed up and moved west to better soils where they started the whole process all over again. However, in Egypt, agriculture has been practiced continually in the same place for literally thousands of years. This fact means that the agricultural regime is unique. The annual flood made it possible.

In the 1950s, the Egyptian government started planning one of the largest dams in the world. It would be across the Nile at Aswan in southern Egypt. The government cited the perceived benefits. The annual flood would be stopped and this would make it possible to grow more than one crop a year, perhaps as many as three. The electricity generated at the dam would be important for economic development and would represent about half the electricity generated in the country. Criticisms came from every quarter. The scientists said salts would build up in the soil, and artificial fertilizers would have to be applied to maintain fertility. They claimed the entire base for Egyptian agriculture, one

that had sustained the country for thousands of years, would be destroyed. Doctors claimed that malaria and other diseases would proliferate. Biologists said the fishing grounds in the Mediterranean Sea would disappear. Some critics claimed the Nile delta would erode away without a fresh supply of silt each year. In the 40 years since the dam was built, some of these predictions have occurred and some have not, but, overall, the Egyptian government has no regrets about building the dam. Whether the dam will be a good thing over the long term remains to be seen.

### **The Yangtze River**

The Yangtze River is one of the three principal rivers of China and one famous for its floods. The most recent big flood killed thousands of people and stretched the financial resources of the country to the breaking point. The Chinese government decided to build the largest dam in history across the river. The project is so controversial that it could not be funded by the usual international agencies, but the government decided to go ahead anyway. The dam has been described as the biggest thing ever built. It will be 550 ft. tall and 3 miles long. (In contrast, Hoover Dam, is 600 feet tall and maybe 1500 feet long.) It will inundate an especially scenic part of China called the three gorges. This region has attracted tourists since antiquity for its beauty. It will displace an estimated 1.5 million people. It will disrupt navigation on the Yangtze River. Some scientists have claimed that all the silt the river usually carries will be deposited in the lake and fill it in very rapidly.

The government feels that flooding on the River must be reduced and the massive amounts of electricity generated will be important for the economic development of the country. Construction continues, but it is perhaps the most controversial such project in the world.

### **Back in the U.S.**

Back in the U.S. many government agencies have become convinced that some older dams have outlived their usefulness and should be torn down. Since this is not really feasible, holes have been blown in several of these to allow the river to return to a more natural state. One benefit in the Northwest has been an increase in the number of salmon that migrate upstream, and this has resulted in some economic benefit for commercial fishing.