NYT, March 27, 2001 Lake's Rapid Retreat Heightens Troubles in North Africa
by ANDREW C. REVKIN

Near the dead center of North Africa, where water has long been scarce and long-term drought is making it scarcer yet, one of the last large water bodies, Lake Chad, has shrunk by 95 percent since the 1960's, and new research points to irrigation as a major cause. The rapid retreat of the shallow lake threatens fish stocks and crops and could raise political tensions because the lake and the rivers that nourish it are shared by four countries, say the scientists who conducted the study, which was published last month in The Journal of Geophysical Research.

The problem is feeding on itself, as a three-decades-and-counting dearth of monsoon rains that normally swell the region's rivers has prompted the construction of irrigation projects that divert ever more water from the same rivers, said Dr. Michael T. Coe, a hydrologist at the University of Wisconsin, and a co-author of the study.

The drop in precipitation and the rise in irrigation appear responsible for equal parts of the extraordinary shrinkage of the marsh-fringed lake, which has shriveled from an area of 9,700 square miles in 1963 to less than 580 square miles now. "We've shown that people are as big an influence as natural variability," Dr. Coe said.

The relative contributions of human activities and natural climate shifts were determined using computer models set up to simulate the natural water cycle in the region. The cycle starts from June to August, when an annual burst of monsoon rains falls in the mountains of Cameroon hundreds of miles south of the lake. This happens just as the lake reaches its shallowest, smallest size for the year.

It takes about six months for the pulse of rainwater to reach the lake, which then blossoms in January over the parched land, growing sixfold in area as it does so. Using 40 years of data on regional climate and water flows, the scientists found that the model closely replicated the actual changes measured in the lake level and extent — at least from the early 1960's until 1980 or so. From then on, though, the shrinkage far outpaced what was predicted.

The early 1980's also saw the start of a burst of construction of internationally financed irrigation systems diverting water from the Chari and Logone rivers, which carry 90 percent of the runoff that enters the lake. Together, the change in weather patterns and a fourfold rise in irrigation have since reduced the flow in the two rivers by 75 percent, the study said. The model consistently showed that about half the loss of lake water was due to the rise in irrigation.

In centuries past, the lake has varied enormously in area under natural influences alone, Dr. Coe said. Satellite photographs show submerged sand dunes that were once sculptured by wind. And, he added, ancient shorelines carved 60,000 years ago show that Lake Chad was once the size of the Caspian Sea, about 150,000 square miles. But in time spans relevant to the people living in the region today, he said, it is clear that trouble looms.

The population around the lake, in Nigeria, Niger, Cameroon and Chad, stands at about 750,000 people and is growing quickly, even as the water supply steadily drops. "The future there now depends on what people do," Dr. Coe said. "We're pretty much saying that they're working with really finite resources."