Angolan Stew

Researchers help African nation address environmental and political problems.

BY JANE M. SANDERS

Brewing in the remote African jungle of Cabinda, Angola, is a boiling pot of political and environmental stew. Its ingredients are a precarious mix of oil and money with trees and fish.

As difficult as it may be to digest, this stew has become the diet for a group of hearty Georgia Institute of Technology researchers determined to find an acceptable, even sustainable, blend of these competing elements.

Ravaged by decades of foreign control and civil war, Angola has been relatively peaceful for only the past several years. Its government wants to develop a healthy economy, improve Angolans’ quality of life — its people are among the poorest in the world — and maintain a united nation. The nation’s challenges include natural resource and waste management, environmental restoration and an independence movement in its oil-rich state of Cabinda, which is isolated from the rest of the country by the Congo River.

Faced with these formidable challenges, the government sought the expertise of environmental engineer Joe Hughes several years ago when he was a professor at Rice University in Houston, the headquarters for Angola’s consulate in the United States. Now chairman of the Georgia Tech School of Civil and Environmental Engineering, Hughes has gotten internal funding to involve researchers in his department, as well as the Georgia Tech Research Institute (GTRI) and the College of Architecture.

Their top priority now is to restore thousands of acres of mangrove forest that once provided safe haven for fish, crabs and shrimp and food for Cabinda’s people. Angola’s government hopes that such a project may help ease political tensions and aid the Cabindan people. Then, with researchers’ expertise, Angola can focus on its other civil and environmental challenges.

To unravel the mystery of Cabinda’s mangrove destruction, GTRI funded an aerial imagery study led by senior research scientist Kevin Caravati. Archived U.S. intelligence images show thriving mangrove forests in 1953 that were wiped out by 1984. During this period, U.S. oil exploration began and roads were built into Cabinda from the Congo Republic to the north.

“It is a critical question as to when the habitat destruction began in trying to understand the cause-effect relationship,” Hughes says. “It is well known that oil spills can kill mangroves, and there have been significant oil spills in this area…. So a lot of people are pointing fingers at the oil companies, and the oil companies are saying they didn’t cause it.”

From the aerial imagery study, Caravati found that a wide beach of several hundred feet, as well as the...
Mangroves are one of the few plant species that can tolerate salt-water conditions. They have amazing roots that hold onto loose sediments, allowing them to stand in the mud. . . . We know oil could coat these and the trees basically drown.

— Prof. Joe Hughes, presenting his hypothesis to people in Cabinda and Angola's capital city of Luanda

Cabinda's once-thriving mangrove forests were wiped out by the mid-1980s. Professor Joe Hughes (inset) is leading environmental restoration efforts.

direction of ocean currents, hinder spilled oil from migrating inland to the mangroves. Also, he notes that spilled oil would have had to move through still-healthy mangroves to get to the destroyed habitat that is farther inland.

Caravati and his colleagues also are considering whether excessive salinity in the water circulating through the mangroves forests may have killed them. “But salinity doesn’t appear to be a driving factor because we still have some healthy mangroves in the area,” Caravati adds.

Instead, researchers are working from the hypothesis that Cabinda’s destroyed mangrove forests were cut off from the circulating water — both from the ocean and from inland drainage — they need to survive. The researchers attribute that cutoff to road building without culverts on the east side and sediment buildup from the Congo River on the west side.

Hughes has proposed to Angola’s government that it fund researchers to travel to Cabinda next spring to set up a mobile laboratory and collect environmental samples. They are hopeful mangrove restoration efforts would soon follow.

“We could do just a little bit, and it will have a huge impact,” Caravati says. “I don’t think it will be that hard to restore these mangroves. If we can restore their fishery, it will bring back a way of life that’s been gone for 30 years.”

Efforts may include the addition of culverts — to improve drainage — in existing roads in Cabinda, dredging of the estuary and replanting of mangroves. Hughes hopes Georgia Tech’s mangrove restoration work will provide the opportunity to broaden researchers’ work in Angola to address a full range of civil and environmental infrastructure issues, including management of petroleum production wastes, which are often dumped on the ground.

Angola’s environmental pollution problems don’t have the same level of priority within the government as the mangrove restoration because it could solve a political problem, Hughes says. “But the long-term problem that is lurking is Angola’s waste management,” he adds.

“We’re concerned with the sustainability of a fledgling economy,” Hughes explains. “They need oil production revenues to do good things for the people there. But if their quality of life is further degraded, it won’t be a sustainable industry.”

Researchers hope they can provide additional expertise — perhaps in bioremediation, sustainable construction and education — to make Angola a self-sufficient and thriving nation, Caravati says.