

New Orleans Times-Picayune
November 15, 2005

GIVE & TAKE

The Dutch found out the hard way: Flood control can cause as many problems as it solves.

By John McQuaid, Staff writer

LAKE VOLKERAK, NETHERLANDS -- The Grevelingen estuary was a mortal threat, so it had to go. During the 1953 Dutch flood disaster, the estuary, where the Meuse and Rhine rivers flow into the North Sea, was a conduit for a storm surge that flowed inland and killed hundreds of people.

So the Dutch government dammed Grevelingen in 1971 as part of its Delta Works flood protection plan. It built a dam to block off the North Sea and then still more dams that divided the estuary into compartments to make the waterway more manageable. But that solution created a different kind of disaster.

Grevelingen's tidal fluxes and sand flats had made it a perfect home for sea life, including shellfish. "All the mussels were dead within 14 days after the area was dammed," said Wim Schott van Sluis, 69, who had fished in the area.

Officials wanted to make up for lost fisheries by turning the lakes into magnets for recreation and tourism, but that plan also backfired. Lake Volkerak, a freshwater compartment, is regularly overloaded with nutrients flowing downstream from Germany and France, creating a kind of dead zone. "Every summer it's blue-green. It stinks. You can't swim there anymore -- it's toxic algae," said Arnold van der Wees, an environmental engineer for the Dutch Department of Public Works and Water Management.

As the Netherlands has used ever-more ambitious, large-scale methods to repel floods, people have come to realize that safety and security have a hidden price tag: The bigger the fix, the bigger the unintended consequences.

"When you interfere with natural processes, you have to keep interfering," van der Wees said. "If we knew then what we know now, we probably would have found other solutions to create safety."

The Dutch experience is a cautionary tale for south Louisiana, where engineers might have to intrude on the delicate marshlands surrounding New Orleans as never before, building new floodgates and levees to protect the region against a Category 5 hurricane. Hurricane protection and marsh restoration projects will have to be knitted together into a single system with divergent goals. Storm surge protection requires walls of one kind or another. But estuaries and marshes are living systems. Wall them off and they might die. Putting holes in the walls can help by letting water flow in and out. But no one really knows how -- or if -- these ambitious aims can be balanced.

Dutch scientists say it's imperative to anticipate long-term problems such as marsh erosion.

"You can delay it to a certain extent, but some of the processes cannot be stopped," van der Wees said. "It will never be the same here as it was before the 1953 flood.

Interfering with natural processes and natural systems is always a bad thing. Mother Nature is the best engineer.

"My advice would be not to interfere too much, but allow natural processes to continue."

Paying more attention

Though the Delta Works and other elements of the Dutch flood defenses are complete, the environment in which they sit is still a work in progress. Between 1900 and 2000, the total estuary area in the Netherlands, including marshlands, shrank by more than half, from 3,340 to 1,520 square miles. The Netherlands has repeatedly built dams and other barriers, then been forced to go back and clean up the environmental messes they have created.

Even the environmentally friendly Eastern Scheldt storm surge barrier, built with gates rather than dams to preserve the estuary behind it, has caused so many problems -- erosion of ecologically important sandbars paramount among them -- that some environmental groups are pushing for it to be dismantled.

Chastened Dutch officials and engineers are now more cautious about the negative impacts of flood protection. Those include not only endangered bivalves and birds but fisheries, tourism and the quality of life for the region's residents, many of whom belong to community groups involved in the government's decision-making process. It's called the polder system, polders being the reclaimed and diked areas most people live in.

"Shortly after 1953, there was one goal: We need to block this off as soon as possible. Then the environmental issues became much more important," said Marion Smit, the top water policy official for the Ministry of Transport, Public Works and Water Management. "If you had made a cost-benefit analysis then (that included the environment), I don't know that they could have done what they did."

Dams and dikes in the Netherlands traditionally served two purposes: land reclamation and flood protection. Those were the aims of the Zuiderzee Works, the giant project in the northwest part of the country that, in 1932, dammed the Zuiderzee, an inland sea, and created a giant freshwater lake, and in it, huge polders for farms and living space.

The aim of the Delta Works Plan, begun in the early 1960s, was similar: block storm surges and spur development. No huge polders would be created, but planners wanted to give the mostly rural area an economic boost by connecting its many islands with dams and bridges, said Kees van der Maas, retired editor of the Provinciale Zeeuwse Courant newspaper, who covered the Delta Works Plan during its formative years.

Authorities had little environmental knowledge. "Fresh water was seen as only something for human use, and saltwater was pollution," said Henk Saeijs, a biologist and former chief of the Delta Works environmental department.

Fishers sound off

The delta has four major estuaries, each with a complex ecology, each with a long maritime history. Damming them was a radical environmental and social change -- too radical, as it turned out.

By the late 1960s, the dams were losing their political support. Incensed at the certain destruction of oyster and mussel beds, for example, fishers in the Eastern Scheldt estuary started protesting the dam project there, forming an unlikely alliance with environmental groups.

Schott van Sluis, whose family has fished the area since the 1600s and who rescued hundreds of people by rowboat in the 1953 flood, had not been involved in politics before. Yet at one point he joined a protest flotilla that surrounded a boat carrying a provincial administrator.

"Though fishermen had done a lot in the disaster, saving people's lives, politicians did not remember what happened," he said. "They did not want to listen to the fishermen." The fierce opposition of fishers, the growing influence of the environmental movement, and a leftward shift in Dutch government combined in 1974 to end the dams-only policy.

The various stakeholders compromised on a more flexible approach: the gated barrier. Saeijs joined the Delta Works and oversaw the program's shift to ecological management. "We were jumping on a fast-moving train," the biologist said. "The Grevelingen estuary was lost -- everything was so rotten, so poisoned, that we had no desire to work there. In the second area, the north of the Oosterschelde (Eastern Scheldt), it still had tidal flow."

Saeijs recommended that Grevelingen be turned into a saltwater lake. A sluice was built into its North Sea dam, called the Brouwersdam, to allow sea water to flow in and out. Today, the lake is considered a relative success story; fish and some life have returned, and the clear water draws divers. But better environmental management didn't put a stop to the challenges. If anything, they were only beginning. Soon each of more than a half-dozen bodies of water created by the change in policy -- estuaries, freshwater and brackish lakes -- was asserting its own character and management demands.

The Western Scheldt estuary was left open, and dikes were built to protect the adjacent land, to allow easy shipping to Antwerp, Belgium. The Eastern Scheldt barrier had gates that were impassable to ships. At Grevelingen, there was a dam with a sluiceway. At Haringvliet, sluiceways let river water flow out but were not supposed to let ocean water flow in. And more dams were built to limit tidal flows further inland.

Foreign species invade

Behind the dams, pollution is a problem. More than 5 billion cubic feet of polluted sludge from the Rhine and Meuse has settled in the Haringvliet lake -- the only saving grace being that it didn't end up in the North Sea.

Marsh areas that depended on the right balance of saltwater and fresh water are slowly dying as fresh water takes over. Where shrimp, mussels and oysters once thrived, invasive freshwater zebra mussels, the same species that plagues U.S. waterways, have taken up residence.

Things are better on the Eastern Scheldt. But while building gates might have saved the estuary, it also played havoc with water flows and topography -- and that in turn has hurt the area's ecology. The barrier reduced tidal flows by about 30 percent. That cut down the regular silting of its deep channels, which in turn sped up erosion of nearby sandbars. Migrating birds depend on the sandbars for shellfish and other food. The less sand is exposed during a low tide, the less food there is and the fewer birds the area can support. Now birds such as stilt and the red breasted goose are slowly disappearing.

"We anticipate the sandbanks will disappear. We've got salt marshes -- they will all disappear," van der Wees said. "This is a migration route for birds to Siberia. This is a main route. They all eat on the sandbanks and tidal flats. Normally in an estuary there are two processes: sedimentation and erosion, and they are more or less in balance. But with the tidal (processes disrupted), what we get is erosion."

The mussel fishery continues, Schott van Sluis said, just in a different place. But it's threatened by another invasive species, a Japanese oyster that has spread to all corners of the estuary. When the tide recedes, clumps of oysters can be seen stretching for miles along the estuary's mud flats. They are displacing mussel and cockle beds that are depended on by fishers. Though they are harvested, demand for the oysters is limited so fishers can't just switch, and because birds can't eat them, the oysters' expansion is depressing the bird population.

No easy answers

Scientists at the Netherlands Department of Public Works and Water Management, roughly equivalent to the Army Corps of Engineers, have worked hard to address these problems. But often their solutions have fallen short.

Lake Volkerak was dammed in 1987 to eliminate tidal changes along a shipping link between the Scheldt and the Rhine. Authorities tried to create ecological stability by introducing pike into the now-fresh water lake to occupy the top spot in the food chain and eat other fish that were multiplying out of control.

But the lake proved a poor habitat for pike, and they never established themselves. Meanwhile, biologists hoped that water fleas in the lake would eat algae and keep it under control. But that also failed to pan out. Today, the lake is a fetid mess, and biologists are still searching for solutions. Water administrators propose opening up Lake Volkerak next year to allow some flow of saltwater in hopes of reducing the toxic algae problem.

In some spots, government scientists are trying to create new marshland habitats to replace the disappearing ones. They stop pumping out pastureland, and saltwater gradually seeps in and reclaims it. At one experimental site outside the town of Zeirikzee, the shift from pasture to marsh is embodied in the animals that dwell there. Cows stand alongside an area of grass, mud and water, and geese land and settle in the puddles.

Scientists are hoping to try this approach on a larger scale. The new philosophy calls for reversing the whole trend of Dutch history: giving up some reclaimed land and letting water reclaim it. The general idea is that if water has more space, it is less likely to flood

inhabited areas. That could mean removing dikes or dams or reconfiguring them. It could mean widening rivers that are likely to flood. It's another idea that could reverberate in New Orleans, where suggestions include abandoning some vulnerable areas rather than risking a future flood.

"Not only land reclamation is important, but to give land back to the sea is important," Saejis said. "If you give land back to the water, water will not come as high as when you reclaim it."