How the Netherlands Prepared for A 10,000-Year Disastrous Flood

by Richard Freeman and Nina Ogden

In February 1953, a powerful storm surge from the North Sea created a disaster in the southwest provinces of Zeeland, principally, and South Holland, secondarily, in the Netherlands. There were 1,835 people killed, and 70,000 evacuated; 10,000 head of livestock drowned, and 4,500 buildings were destroyed. Within three weeks, a commission was functioning, which formulated a far-ranging plan for flood protection. The Netherlands government acted boldly and decisively to implement this plan, known as the Delta Works, during the next decades.

The Delta Works plan serves as a working model to show what can be done when a government acts in a determined fashion, using technologically innovative ideas. It represents thinking big and acting with foresight. During the same time interval, from 1954-97, when the Delta Works was completed, the United States implemented some important flood protection plans in New Orleans, Louisiana, and elsewhere. But some plans were blocked by a combination of environmentalists and fierce budget-cutters, and other plans did not make it past the drawing board. America might look to the Netherlands for a sense of what can be accomplished, including in the near future, after Hurricane Katrina.

A Dutch government website proclaims, "The history of the Netherlands has been determined by the struggle against water." Water changed the physical topology of Netherlands. As one account of Netherlands history reports, "The 12th century . . . was characterized by a series of heavy sea surges that greatly altered the shape of the coast." In 1287, it is reported, a storm killed 50,000 people, and created the Zuiderzee in the northwest, giving Amsterdam direct access to the sea.

Today, approximately half of the Netherlands lies below sea level. In addition, the low-lying Netherlands is the delta which receives the flow from several of Europe's mighty rivers, including the Rhine from Germany, the river Meuse, Lake Usselmeer, and other water bodies. In broad terms, this topography is similar to the way in which southern Louisiana is the delta for the Mississippi River.

The Dutch are acutely aware of that fact that their survival depends on wise water management and flood protection—without which they would be washed away. Historically, the Dutch have built a series of dikes and canals, and they have fortified dunes and pumped out water (one of the primary functions of the windmill). In the 1930s, the Netherlands completed the Zuiderzee works, which blocked the former South Sea (Zuiderzee) from the North Sea. The nation has also reclaimed from the sea, tens of thousands of hectares of land, called polders, which are now used for agriculture and other purposes.

The 1953 storm and flood, disclosing holes and weaknesses in the flood protection system, was greeted by renewed determination to go to a higher level of technology: the Delta Works plan. This has 13 components, one of which is the strikingly original Maeslant storm barrier (as explained in the accompanying interview). The Netherlands has made significant advances in its ongoing "struggle against the water." The United States would do well to draw upon the best of the Netherlands' method.

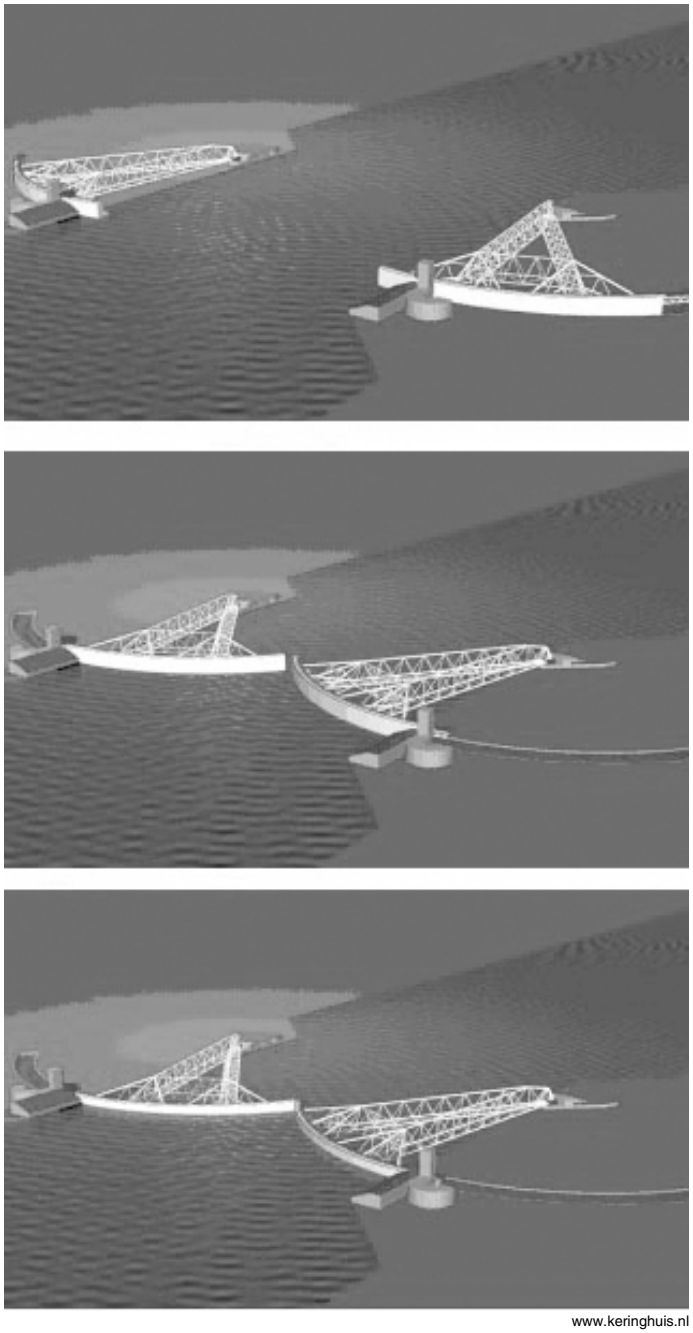
Interview: Alwin Nijhuis

Alwin Nijhuis is a senior advisor for the Netherlands Ministry of Transport, Public Works, and Water Management. He was interviewed by telephone in The Hague by Richard Freeman and Nina Ogden on Sept. 20.

EIR: We read that the Netherlands and the United States are conferring on flood control matters.
Nijhuis: Yes, this memorandum of understanding or memorandum of agreement has been finalized, after lots of international meetings, such as the world water forum in Kyoto in March 2003. We met there General Flowers of the U.S. Army Corps of Engineers, and we understand that our countries are very similar in the case of delta problems. We have made an agreement to exchange our experiences on the issue.

EIR: Where will these exchanges take place?
Nijhuis: In the month of November there are several people coming from the U.S. Army Corps of Engineers to the Netherlands. . . . We are also planning a visit of Netherlands experts, my colleagues, coming to the United States in October of this year.

EIR: You had said that five of your colleagues are in New



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In 1997, after six years of construction, the Netherlands opened one of the world's most daringly innovative flood control infrastructures: the Maeslant Barrier, a movable storm surge barrier, that does not prevent the passage of ships.

Most storm surge barriers are constructed to be settled and immovably fixed at some point in the sea. The Maeslant Barrier remains open most of the time, to allow freight-laden vessels to travel, via the New Waterway, into and out of Rotterdam, one of the world's most heavily trafficked ports. At the approach of a storm, the gates swing closed to provide excellent protection.

This requires great engineering ingenuity. On each of the two banks of the waterway, a separate gate sits in its own dock. At the approach of the storm, a mechanism moves each of the immense 210-meter (689-foot) gates, which are hollow, out into the waterway. The gates are arched. Once the gates meet, the cavities are filled with water, and the gates sink to the bottom, sealing off the 360-meter (1,181-foot) waterway opening. The photograph shows the closed gates. The very strong gates rise more than 5 meters (16.4 feet) above water level to intercept the storm surge. Advanced engineering is used to prevent the gates from oscillating with the water current. Once the high water is passed, the gates are returned to their docks.

The Maeslant Barrier is controlled by a computer, with a decision and support system. The computer calculates the expected water levels in Rotterdam, Dordrecht, and Spijkenisse on the basis of water and weather forecasts. If the water level is expected to rise 3 meters above NAP (the New Amsterdam Level, that is, the mean sea level), the barrier is closed. Although fully automated, the system is monitored carefully by specialists. (See animation at www.larouchepub.com or www.keringhuis.nl/engels/maeslantkering/body.html.)

Orleans helping with the flood cleanup.

Nijhuis: Yes, they called this afternoon and they are doing a lot of work, 24 hours a day, I would say, working three [mobile] pumps. It is very difficult, and very hard to do so, but they have a lot of experience with flooding in Poland, in Germany, but also in Africa and Southeast Asia. So they have lots of experience to deal with areas which have been flooded, and have to be de-watered [drained]. They have been in the United States for a week so far.

EIR: According to various documents that you have provided to us, in the Netherlands, you have a 2,000-year history struggling with flood waters. Then, after the flood of 1953 you launched the Delta Works, which is comprised of 13 different principal works. Could you tell us about this ambitious program?

Nijhuis: For the whole water works, there was a lot of planning before 1953 because there had been ideas in the Netherlands to deal with flooding over centuries. We had floods in 1916, so we had made plans then to shorten the coastline of the Netherlands, and carry out parts of those plans, like the Three Island plans in the southwestern part of

the Netherlands. When the Second World War came, these plans had disappeared as a leading priority. After the Second World War, people were again working on these plans, but . . . our priorities were to rebuild the Netherlands, to renew the Netherlands, so we had to renew the cities, to rebuild the agriculture sector, and so on. The plans to renew the water management in the southwestern part of the Netherlands were not the top priority.

But these 1,800 dead people from the 1953 storm made the problem very clear: that we have to deal with flooding in the southwestern part. Original plans from early in the 19th Century were discussed. Soon we adopted the Delta Act, which became law, so we made arangements, appointments, and the Dutch people have to pay for it in order to live safely.

EIR: I'm sure they wanted to pay for it.
Nijhuis: Because of ages and centuries of fighting against water, we learn in first grade, in primary school, that we have to deal with water. We are living below sea level. So, everyone in the Netherlands knows that we have a problem with water. We can fight against water, but also water is our friend—because of the economy, and so that everyone can ice skate in the wintertime and swim in the summer.

EIR: What year did you pass the Delta Act?
Nijhuis: The Delta Act was passed in 1954, and included plans for these works. The first delta project was started and finished in 1956, and the last one was in 1997. I would say we are living in safety, but we can't guarantee 100% safety.

EIR: What is the Oosterscheldt barrier and how does it work?
Nijhuis: There is a shelf dam; it's like the other dams, but it was initially to be built as a completely closed dam. . . . This would have meant that the tidal water would disappear and fresh water would enter, so the whole agricultural and fishery industries would disappear, and the economics of this area would change. During the 1970s, the environmental issue came up, and we discussed it, [so instead of a closed dam], this dam was made half open. With its 56 doors, we can close the dam in case of a super storm. There is a computer system, which we call the decision system. When there is an expectation of high water, and a very big storm . . . then there is a warning system, and the doors of the dam are closed.

EIR: How long does it take to close?
Nijhuis: I would say roughly . . . about two and a half hours to close the dam. But there are problems in closing them when the electricity is down. In this case, we do it manually, and it takes a little longer.

EIR: Hurricane Katrina made landfall on the Louisiana coast on Aug. 29, but it was already known that on Aug. 25, the hurricane had already struck Florida and killed six people.

Henri Cormont/Courtesy of Alwin Nijhuis

Alwin Nijhuis in what he described as an old Dutch fisherman's boat.

Then it went back out into the Gulf of Mexico, and by Aug. 27, it was gathering force, becoming what we call a Category 2 hurricane on its way to a Category 4. I would imagine, that if you had had a 48-hour warning, you would have been able to give the instructions, and your whole works would close, and block the incoming water?
Nijhuis: Let me first explain that we don't have hurricanes on the North Sea. We have something different—because we have high-pressure and low-pressure areas from the north, and with our weather forecast you can see these things happen. Our system is made so that we can close the gates in this dam rapidly, and on time, but we can't guarantee that it is completely safe. So you have to deal with risk every time.

EIR: There is a risk, but since these projects started to be built in 1956, you haven't had any more fatal tragedies?
Nijhuis: No, no tragedies. We have closed the gates 26 times since the shelf barrier was finished in 1986, and normally we close the dam once a year for maintenance checks, to maintain the doors, and so on. So there were 26 warnings to close these dams in time, and, I'd say, it's safety first. We are going from the point of view of prevention, so the design levels have been built to combat a super storm that maybe . . . can happen once in 10,000 years.

EIR: We've seen this phrase that you build for the 10,000-year storm. How was that idea developed?
Nijhuis: For the coastline in the Netherlands, we have a design level, that's very technical . . . for a storm that might happen once in 10,000 years, that we will be flooded. For our rivers, the dikes along the rivers, such a flood has happened once in 1,250 years. In the 10,000-year scenario, the risk to the coast, is very, very much greater than when it happens on the river. The coastal problem is much, much, much greater because everyone—60% of the Netherlands—is below sea level and, I would say, most of the people—60% of the people—live in the western part of the Netherlands because of

its economic centers like Rotterdam and Amsterdam, the great harbors. Everyone wants to live in the western part.

EIR: Are Delta Works projects around Amsterdam and Rotterdam?
Nijhuis: Yes. One of the largest storm barriers is near Rotterdam in South Holland [the Maeslant Barrier]. Its two arms are housed in docks, so there is no way, in a normal situation, that it impedes shipping and port activities. . . . Its design level is for a 10,000-year flood. When the water reaches above the normal 3 meters above sea level, then these doors close. Each door . . . has an arched arm which you can compare to the Eiffel Tower in Paris. It is like two Eiffel Towers lying along the riverside. When this storm situation happens, there are no ships entering because . . . it's a very extreme situation where there is no normal traffic possible on sea and on the rivers.

EIR: Can you tell us about the arms?
Nijhuis: The height of the doors is 22 meters and the length of each retaining wall or arm is 210 meters.

EIR: I know that the topography in New Orleans is not exactly the same; the land is very muddy because it is a delta area that goes into the Gulf of Mexico. But would it be possible to build a similar system in New Orleans? Has anyone thought of that?
Nijhuis: I will repeat what my colleagues in the U.S. Army Corps of Engineers have said. There are plans to close the [Mississippi] river to Lake Pontchartrain, and this lake has a little river to the Gulf of Mexico. You can close this area through a construction which is very similar to what we do in the Netherlands near Rotterdam [the Maeslant Barrier]. There are plans by the U.S. Corps of Army Engineers to make such a barrier.

That will also be discussed [in October] and this will be a memorandum of our agreement, so we can exchange our experiences and our conceptions with our colleagues in the United States. Then we can discuss what can we learn from you in the United States, and what the U.S. Corps of Army Engineers can learn from the Netherlands, how they built their conceptions. So, I can not say that these barriers will be a solution for the Americans, but the ideas behind this conception can help U.S. Army Corps of Engineers to construct a barrier near Lake Pontchartrain.

EIR: One thing that seems very interesting about this whole plan is that there is a certain automatic decision that takes place. You saw that in Hurricane Katrina, one of the big problems was that the chain of command fell apart, and people didn't know what to do. But it looks like, both in terms of the way the barriers work and also other things, you don't have to wait to talk to the President.
Nijhuis: I think the American situation is completely different in the chain of command. . . . You are talking now with me, a person in the Ministry of Transport, Public Works, and Water Management. But we are not responsible for the evacuation plan; that is up to the mayors of the Dutch cities. So, when there is a big disaster, such as you have in New Orleans, or like the tsunami in Southeast Asia earlier this year, and as we had in 1953, there is a chain of command. But you have to deal with evacuation plans: You can make them as good as they can be, and you can discuss them regularly, but when a disaster happens, you will have to deal with several problems, such as the digital systems, the telephones, the television, and so on, and that's also the case in Holland.

But when you make your plans for prevention—like the design level of the dikes and of the dunes and of the great barriers—you have to make them very solid. And when a disaster happens, we will have evacuation plans, but because lots of people are working and living in the western part of the Netherlands, we also have these problems to deal with after a disaster. And hopefully, the chain of command will be working.

The Netherlands

Source: Wikipedia.map

The North Sea has periodically surged against the extensive coastline, throughout the nation's history. In the February 1953 catastrophe, a North Sea storm overwhelmed the dikes and other defense systems of the province of Zeeland and, secondarily, the province of South Holland. Both provinces are located in the country's southwest. The Dutch government set up the Delta Work plan initially to protect Zeeland from future floods, and the plan was later extended to other provinces.

EIR: In addition to the storm barriers, how does your flood protection system work?
Nijhuis: The difference between the United States and the Netherlands is that we have made compartments within the polders [reclaimed land] and within the dikes, so when a disaster happens, like the flooding in 1953, the first polder fills up, and then there is another dike. Then, when this dike is flooded, then the second compartment—these little polders are like compartments—is filled. So that is completely different from the United States. We have the safety, because our land has been built up for centuries, during the last thousand years, and made by polders. When you see a chart or a map of our country, you see all these little polders, and they are working; they are still functioning like compartments, and that is possibly a safety chain. If the whole western part of the Netherlands is filled up at once . . . I would say, first save the polders and then go to the eastern parts of the Netherlands.


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An aerial view of the the Maeslant Barrier.

EIR: So the polders are reclaimed land from the sea, and act sort of like little reservoirs.
Nijhuis: Yes, you can say a polder is functioning then as a reservoir. When you are living in that polder . . . it could possibly be a big problem to escape. . . .

EIR: So there are houses on the polders?
Nijhuis: Of course, there are complete cities in such polders. But were a disaster to happen, the whole western part of the Netherlands would fill up at once. The deepest polders are, I would say . . . about 7 meters below sea level. . . . If it were very stormy and very disastrous, and in the unlikely case that the storm barriers were insufficent, the other polders can be filled up. At least the highest part of the Netherlands in the eastern area is above sea level, so these areas would not be affected by this flooding.

EIR: Do people live on the deepest polders?
Nijhuis: Yes, in the city of Rotterdam there is one area complete with lots of houses, which is 7 1/2 meters below sea level. Our new policy is not to build in the deepest polders, and when you have to build there, to take precautions and measures to build floating houses.

EIR: You have floating houses?
Nijhuis: Yes. You have this also in America, as in the ports of Seattle and Vancouver. So, it's not a new idea, floating houses.

EIR: You have reclaimed thousands and thousands of hectares of land to make them fertile for agriculture and also to live on. Can you say something about that?
Nijhuis: During the last thousand years, there were some monks living in polders whose monasteries had been flooded, and so they built the first dikes and they placed their monasteries on high areas. I would say that they built little mountains to build their houses and their monasteries on. Then they said to each other: "Let's make dikes"—and this was the first of public participation—"Let's face it together, let's work together, let's make dikes."

When you have to deal with three monasteries, you can build three dikes between these three monasteries like a triangle, and then in the middle, you can pump the water away, you can de-water this area. So that is the first idea of how to build a polder; and then you have to maintain this polder, and you have to make arrangements. So these people, a thousand years ago, had to work within these polders, and they have to pay to maintain these dikes and these polders.

That was first done in the Middle Ages, I would say, and now the system is the same, because everyone in the Netherlands has to pay for the legislation of water management. . . . So you have to pay for the water quality, but you also have to pay for safety against flooding. And with this money, the water board, the people who manage the water systems, can build the dikes and take measures like building the big barriers.

EIR: And through this process, you have been able to reclaim land that would otherwise be under the sea?
Nijhuis: Yes, and we reclaimed this land mostly for agricultural use, and also for safety. Because when there is lots of water around the city, you have a problem when there is a storm, because the houses are flooded, and so on. So they reclaimed land for agricultural use, but also for the safety of the cities. When you see our informational booklet, you can see this land reclamation, and how many lakes over centuries have been filled up, and have been reclaimed. They are now are serving as agricultural areas.