

## Lessons in Innovation from Living Below Sea Level

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By Thomas Beck, AIA, NCARB

We recently returned from a trip to The Netherlands during which we toured the museum located at the Oosterschelde barrier, the largest of thirteen projects which make up the Delta Works, started after the 1953 North Sea Flood to protect the areas within and around the Rhine-Meuse-Scheldt delta. Deltapark Neeltje Jans ([neeltjans.nl/en/delta-works/](https://neeltjans.nl/en/delta-works/)) “lies at the foot of the largest storm surge barrier in the world.”

In 1953 The Netherlands experienced a massive flood from the North Sea. Prior to this the country had implemented a number of projects to overcome the inherent issues with a quarter of its land mass being below sea level. Another tricky detail was that much of the Dutch economy is based on shipping and fishing industries.

According to the website [7wonders.org](https://7wonders.org), the January 31, 1953, flood caused “1835 [Dutch] fatalities, 100,000 evacuees, and 200,000 hectares of land under water.” Following the flood some old previous plans were combined with new plans to create the Delta Plan. In 1958 the Dutch government unanimously accepted the Delta Act, and in 1959 the Delta Law was passed to organize the construction of the dams. The Delta Project is the largest project of its kind anywhere in the world and took 30 years to build. It is comprised of thirteen major projects: 3 locks, 6 dams, and 4 storm surge barriers. Delta Works was completed in 1997. The Ministry of Infrastructure and Water Management website, [rijkswaterstaat.nl](https://rijkswaterstaat.nl), has information about their management of water, including the Delta Works project and the earlier project Afsluitdijk. The site also includes information about the environmental responsibility exercised in the projects, and other infrastructure projects in The Netherlands.

In 1925 over 10,000 people were killed in flooding in the Zuiderzee. “Between 1200 and 1900 AD the Dutch reclaimed 940,000 acres of land from the sea and 345,000 acres by draining lakes, a total of 1.285 million acres.” Simon Whistler, host of the Megaprojects YouTube program titled “Delta Works: An Example For The Rest of Us” points out that during this same time period 1.4 million acres of lands had been lost to the Zuiderzee. Whistler says that in 1918 the Zuiderzee Act was passed to protect the area from the effects of the North Sea, to increase food supply and agricultural lands, and to create a fresh water lake to replace the salt water bay before it. The project, the Afsluitdijk, is a dyke which was completed in 1932. There is a current plan for upkeep of the 90 year old dyke due to sea level rise and intensified weather patterns due to climate change.

During our recent visit to The Netherlands, we visited Kinderdijk UNESCO World Heritage site with canals, mills and pumping stations. The [kinderdijk.com](https://kinderdijk.com) website invites us to “Dive into a world of windmills, water and willpower. The canals, mills and pumping stations of Kinderdijk have kept our feet dry for over 700 years.” We toured a museum mill, built in the 18<sup>th</sup> century. Many of the 19 mills, built around 1740, are still inhabited, with a waiting list for millers of 5 years. It takes 3 years to complete the training to be a miller. Modern pumping stations are now employed to keep up with the constant need to pump water.

We learned that one of the major industries of The Netherlands involves their expertise in water management. An article in [phys.org](https://phys.org) from March 2011, “World learns from Dutch to keep head above water”, tells us about many of the projects worldwide in which Dutch companies have been involved, including the Palm Jumeirah island in Dubai, New Orleans’ upgraded dykes and Australia’s water recycling plants. As of the article’s date in 2011 Dutch companies were “focusing efforts on projects in delta areas” in Mozambique, Egypt, Indonesia, Bangladesh and Vietnam.

While not suggesting we give up on responsible behaviors to slow down climate change affecting our planet, it is encouraging to see that innovations can be applied to make it possible to live with conditions that our past behavior has wrought. Learning from the past and innovating for the future is possible if we so choose.

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