



LAND SUBSIDENCE AND SEA LEVEL RISE

Turning the tide

Of the 33 major deltas in the world, 24 are sinking as a result of land subsidence and rising sea levels, and 28 have experienced severe flooding in recent years. In Asia coastal villages are being abandoned as people move further inland. Climate change is compounding these risk factors.

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A storm lashes the temple of Khun Samut Chin Village before the new sea defence. HH / RICHARD CRAMPTON

Global delta flooding could increase by 50 percent by the end of the century

In coastal Thailand, the Buddhist temple Wat Khun Samut is slowly sinking below sea level. Local workers are building a brick wall around the temple – it's a race against time and there is little money. But Abbot Smonuk Attipanyo is not willing to surrender. "If I quit defending the temple and leave, all the work that has been done will be lost forever", he says in an Al Jazeera report. The local fish farmers have moved two kilometres inland – their houses have been destroyed and electricity pylons mark the location of a flooded road. Here, coastal erosion is a result of climate change that brings rougher seas, with intensified waves causing severe flooding. All along the 600-kilometre Thai coastline, land is being lost to the sea. Breakwaters and pylons have been constructed to weaken the power of the waves, but this will probably not be enough for local fishermen. They fear they will have to move even further inland.

Wild shrimp

Locals in the Indonesian village of Rejorsori face similar misfortunes. The land they live on is sinking by at least ten centimetres every year. The flooded village, which lies just 15 kilometres from Java's fifth largest city Samarang, has only one family left. They catch and sell wild shrimp that has colonized the area since salt water entered a nearby river.

Thousands of kilometres away in the US, subsidence has been a problem for decades in the old swamps and peat lands that were dewatered for farming in the San Francisco Bay area. Settling created unstable conditions, and there are areas that lie up to 7.5 metres below sea level. Ingenious structures protect the farmland from flooding, but as the land subsides and the sea level rises, there is a growing risk that one day the dikes will burst.

New study

A study published in 2009 by the University of Colorado at Boulder indicates that human factors are causing deltas in Asia and America to sink significantly. The study concludes that this problem is exacerbated by sediments being trapped upstream by reservoirs and dams, man-made channels and levees that whisk sediment into the oceans beyond coastal floodplains, and the accelerated compacting of floodplain sediment caused by the extraction of groundwater and natural gas.

About 500 million people in the world live in river delta areas. According to the study, 24 of the world's

33 major deltas are sinking and 85 percent have experienced severe flooding in recent years, resulting in the temporary submergence of about 250,000 square kilometres of land.

Sediments

The authors predict that delta flooding could increase by 50 percent under current projections of a 45 cm sea-level rise by the end of the century, as forecast by the 2007 Intergovernmental Panel on Climate Change. The flooding will increase even more if reservoirs and other water diversion projects continue to capture sediments upstream from deltas, as this prevents the growth and buffering of deltas, according to the study.

Dr Jan Vermaat of the VU University Amsterdam: "In the Yangtze-Kiang and Ganges-Brahmaputra deltas, space needs to be provided for flood retention engineering, sedimentation and diversion channels, refuges and safe economic hotspots. In deltas with a high population density and limited space, like that of the Chao Praya in Thailand, adaptation measures must be sought outside the delta. In deltas with low population densities, such as the Lena, Yukon or Fly, natural delta dynamics can prevail."

Possible solutions

In southwest Taiwan, about 100,000 inhabitants living on the coast of Chiayi county are being informed about possible solutions for severe land subsidence. "In less than twenty years their land has subsided by more than two metres", says Dr Sinite Yu of the Taiwan International Institute for Water Education. The county government is planning land-use reformation, flood control measures and green adaptation at an estimated cost of 560 million USD. Three pilot projects have already been planned. ■

For further information on sinking deltas, download the Delta Conference audio-readings via the magazine website: www.deltatimes.org

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