

# Wetlands and disaster management

## Exaggerating the value of wetlands for natural disaster mitigation is a risky business



*As climate change increases the frequency and severity and heightens the risks of many natural hazards, the role of wetlands in disaster risk reduction is gaining prominence. Wetlands can reduce the impacts of natural hazards. In the aftermath of hurricanes, floods or tsunamis, they often play an important role in getting communities back on their feet, write Matthew McCartney and Max Finlayson.*

Evidence shows that wetlands mitigate some natural disasters and lower the risks for people: first, by reducing the immediate physical impacts and second, by helping people survive and recover in the aftermath.

Controlled flooding of floodplain wetlands has long been used as a management strategy to protect the city of Lincoln, in the UK. The flood protection role of the That Luang wetland in Vientiane, Laos, has been estimated to be worth US\$2.8-million per year. Coastal wetlands have been shown to reduce the damaging effects of hurricanes on coastal communities in the USA.

Several global agreements, such as the Paris Agreement, Sendai Framework on Disaster Risk Reduction, and the Sustainable Development Goals, recognise the vital role that sustainable management of wetlands can play in mitigating the risks of natural disasters. Wise management of wetlands is thus an urgent imperative that merits all the attention it can get, but sweeping statements about their universal value to mitigate disaster can do more harm than good.

The reality is that differences between wetland types translate into very different outcomes. Wetlands are not a cure-all for natural disasters, and overstating their benefits could hinder rather than help.

Wetlands' effects on water flows and storm surges depend on many factors, including other land features, which vary widely across locations. They are dynamic, meaning that their role may change over time – mitigating disasters on some occasions, while on others contributing to the natural processes that enhances risk. Mangroves are a good example.

### **Do mangroves save lives?**

Some mangroves, especially the larger and more examples found around the coast of Sri Lanka, are widely believed to moderate the devastating impacts of storm surges and tsunamis – a major threat to low-lying coastal areas – by slowing water flows and reducing the energy of waves. Some have called them “bioshields”, but there is little tangible evidence to suggest that, in the face of large disasters, these wetlands significantly reduce human death tolls.



After the Indian Ocean tsunami of 2004, for example, studies showed that some areas suffering the least damage had been sheltered from direct exposure to the open sea by bays, lagoons and estuaries. This, rather than the mangroves themselves, was the most significant factor determining the extent of damage and loss of life.

Mangroves clearly have a role to play in mitigating hazards. But it also pays to consider alternatives, although often these are not without their own limitations.

In areas of high population density, such as along parts of the Japanese coast, sea walls and embankments may be a better investment. Where population is lower, advance warning systems, based on sensors at sea to detect tsunamis and effective communication systems to alert people to move to higher ground or purpose built shelters, may be more effective. Such a system, administered by the National Disaster Warning Centre, has been established along the Andaman coast of Thailand.

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### **A mixed picture of inland floods**

In contrast, wetlands do play a critical role in attenuating inland floods. Plenty of research has shown that floodplains can significantly reduce the flooding of cities and towns by providing space for inundation and storage of water upstream.

In the Netherlands, this recognition has led to the commendable Room for the River initiative, which protect urban centres by reversing many centuries of dyke building and reconnecting rivers to their floodplains to allow them to fill and store flood waters.

There is less clarity about other types of wetlands to mitigate flooding. For example, research conducted by the International

Water Management Institute in southern Africa’s Zambezi River basin has shown that upland wetlands tend to promote rather than reduce flood flows.

In northern England, some £500-million has been spent over the past decade on blocking drains to rehabilitate upland peat wetlands, partly to reduce downstream flooding. But there is little evidence that this measure has attenuated flooding. In fact, some research suggests that it may actually have increased the magnitude of the largest, most damaging, floods by raising groundwater levels and reducing the space for water storage. Many wetlands are also believed to play an important role in mitigating drought impacts, and this is undoubtedly true in some cases. Tanzania’s Mara River wetlands, for example, help communities cope with drought, because the soils remain moist much longer than in surrounding areas, thus providing a place to grow food.

Another widely held assumption about wetlands is that they sustain river flows during droughts, thereby providing a useful service for downstream water users. However, according to a comprehensive review of scientific studies, two-thirds of the projects concluded that, by promoting evaporation, wetlands tend to reduce downstream river flows during dry periods.

### **A false sense of security**

Advocating for wetlands alone is a simplistic approach to the reduction of natural disaster risks, and can create a false sense of security, potentially leading to policies that are ineffective or even dangerous, jeopardising people’s lives and livelihoods. But the opposite error of undervaluing wetlands and their many benefits can have equally tragic consequences, especially where resources are not available to construct other defences.

Investing in wetlands makes sense, when it is based on a sound case that takes into account their multiple benefits in relation to disaster risk reduction. Decision-makers must closely examine the evidence behind positive claims about risk reduction before drawing conclusions and implementing policies. In going forward, planners should view wetlands as just one component of a plan to reduce disaster risks.

In many cases, the best bet will involve a mix of wetland conservation with infrastructure development and other options, such as early warning systems, disaster relief and contingency planning, together with smart planning, aimed at minimising people’s exposure to natural hazards.

This builds on the benefit that wetlands can provide, and avoids the dangers of over-generalising by using a more tailored approach for specific conditions of a given location, designed on the basis of rigorous science.

*This article was originally published by The Conversation ([www.theconversation.com](http://www.theconversation.com))*