UK must abandon or adapt in face of floods

by Catherine Brahnic

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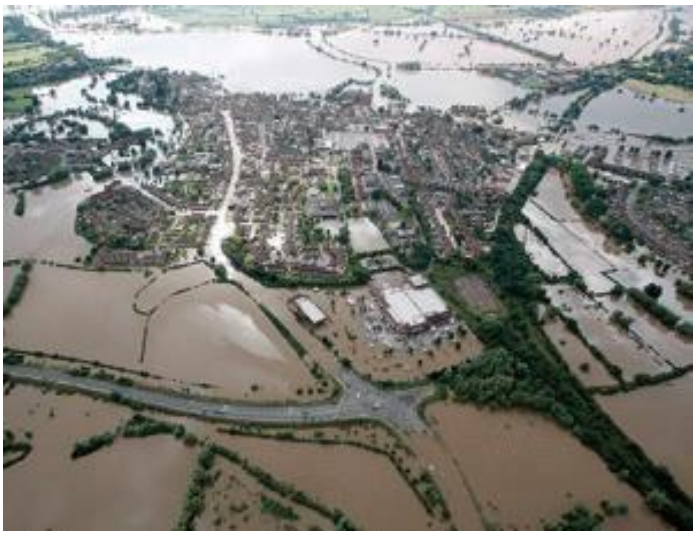
The UK's future is wet. How can Britons learn to live with the water, and who will have to move to higher ground?



MAKE room for the water. Major floods are causing havoc in the UK, and such events will keep happening. The country's future is wet, according to the latest models, and even in typical conditions it is prone to flooding (see map).

Can the UK stand firm against rising waters, or must we sound the retreat? Engineers and hydrologists contacted by New Scientist say it is now time to discuss this openly.

"This discussion isn't taking place with the public," says Tim Fox, head of the environment and energy division of the Institution of Mechanical Engineers in London. He says people need to know what it would cost to make the UK completely resilient. Then the question is "how much of that the public are willing to bear".

Since December, a strong jet stream has battered the UK with storm after storm, delivering violent ocean surges and record amounts of rain. Entire stretches of coastline have been dragged into the sea, and low-lying regions are waterlogged. Last week, the River Thames burst its banks, spilling water over thousands of properties. It is too soon to say whether climate change made these events more likely (see "Warmer and wetter?"), but such floods will surely recur.

There are ways to hold back the tide. London has the huge Thames Barrier at the mouth of the river that keeps down water levels in the city. Pumps can also help. In London, pumps remove about 30 million litres of water every day to stop the Underground's tunnels filling with water.

But engineering projects on the scale needed to stop flooding over large areas are expensive, and despite what UK prime minister David Cameron said last week, the public purse is not bottomless. The Committee on Climate Change, an independent advisory body, says £500 million is needed over four years to adapt to climate change. That cash will not be forthcoming. "The era of big flood schemes seems to be over," says Andy Burton of the Institution of Civil Engineers in London. "There's just not the money."

The calculations used by government officials compare the cost of flood defences with the value of what is being protected. To be funded, flood defences must avoid £8 of damage for every £1 spent. In practice, cities with dense populations and high economic values benefit, while rural areas with fewer homes and businesses do not. Damage to farmland is not factored in.

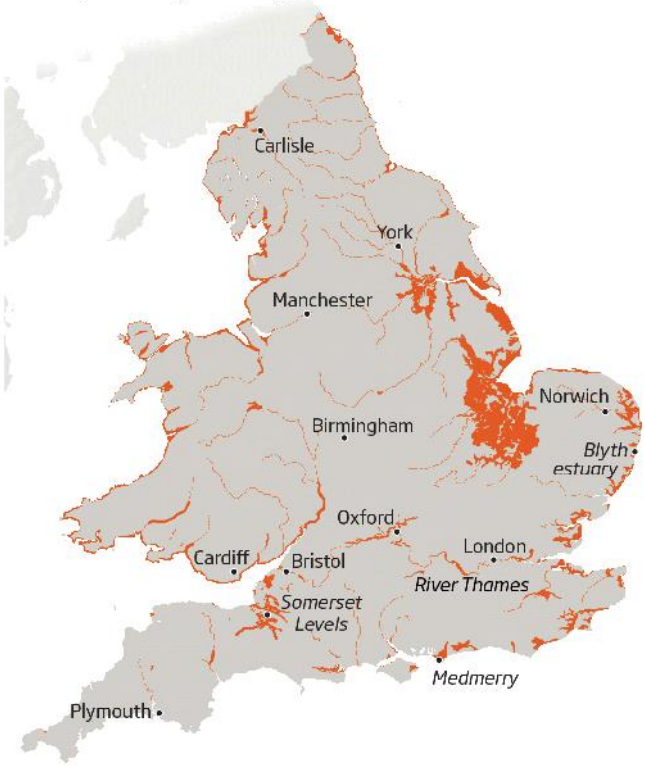
But even projects to protect densely populated areas are struggling for funding. The River Thames Scheme, approved in 2011, would dig a new flood channel to reduce the risk of flooding to 20,000 properties upstream of London. But the floods are here, and the scheme is still largely on the drawing board.

So for sheer lack of money, it's likely that in the event of prolonged flooding, parts of the UK will simply be returned to nature. "If sea levels go up, and waves get bigger, and the rain gets heavier, some areas will be very difficult to live in," says David Ramsbottom of HR Wallingford, a consultancy that advises the UK government on flood defences. "Under the present regime, abandonment may well happen by default."

Coastal areas with few houses will be the first to go. Coastal floods are most clearly linked to climate change, as rising temperatures mean rising seas. In the English Channel, between England and France, sea levels have already risen by 12 centimetres since the early 20th century, and up to 16 cm more is expected by 2030. Higher seas bring bigger storm surges and more land lost.

The flood zones

Areas of England and Wales that have a 1 in 100 chance of flooding in any given year. Climate change may make flooding more severe in the future, but exactly how things will change is unclear



SOURCE: THE ENVIRONMENT AGENCY

Some regions are already planning their retreat. Around the Blyth estuary in Suffolk, the authorities decided in 2009 to abandon flood defences, allowing an area mostly used for grazing to become marshland. In Wales, after a 2010 report on coastal flood risk found it would cost £135 million per year just to prevent the risk rising, some local authorities are drawing up similar plans.

Managed retreat can itself be a form of defence. Turning the Blyth estuary back into a wetland will create a buffer, protecting buildings further inland from storm surges. "It gives water somewhere to go," says Fox. At Medmerry in West Sussex, the Environment Agency has built an inland sea wall and allowed everything on the ocean side to become a wetland. "It's the idea of making space for water," Fox says.

Away from the coast, things get more complicated. But for civil engineers one thing is clear: we should not be building on floodplains and should expect flood damage if we do. Some councils are adopting policies that forbid development on high-risk areas, which amounts to gradual abandonment. But that will not help the thousands of homes already nestled up against rivers. Two-thirds of the houses in which we will be living in 2050 have already been built, says Fox.

Ultimately, we will have to get creative, says Ramsbottom. In China, floodplains are dotted with built mounds that serve as refuges for people and animals. And when superstorm Sandy wiped out much of New York City's power grid in 2012, Co-op City in the Bronx had its own generators and grid, so its lights stayed on.

Such things create resilience. But without government funding, people must fend for themselves. Kieran Millard of HR Wallingford lives in the Thames floodplain. In 2009, he built an extension to his house, with raised floors. When a flood comes, he simply moves his furniture into the extension.

Some behaviours that sound like disaster preparation are just a matter of being prudent, says Fox. All areas have their risks, so it's smart to have a torch in a safe place, plus dry food and bottled water. In California, it's common to keep an earthquake survival kit, with blankets and food. Ground floors in Venice are not inhabited. In Asia, where tropical cyclones are common, people are much more aware of the risks and alert to hazard warnings. "That's something we don't do in the UK," says Fox. "It's realistic though."

In the UK, the city of York lives with water. The bar at the King's Arms has a measuring post showing the high point of each annual flood. It's just part of life.

In future, life in other low-lying parts of the UK may also have to make way for water. The engineers would like an open discussion of how that happens.

Warmer and wetter?

So far it is not clear whether the current UK floods were made worse by climate change.

But there are signs that more floods will come. For starters, higher seas will increase coastal flooding. And climate models predict wet regions will become wetter and dry regions drier, which means more rain for all of the UK, not just the coasts. Figures for the last 50 years from the Met Office, the UK's weather agency, suggest heavy rain events are now more frequent. UK rivers are also carrying more water in winter months (Journal of Hydrology, doi.org/rhq).

That may or may not mean more river floods. A 2012 study of the Thames river basin found no increase in extreme flooding over the last 130 years (Hydrology Research, doi.org/rhr). That might be because climate change has raised temperatures and so reduced the snowmelt flowing into rivers, says author Terry Marsh of the Centre for Ecology and Hydrology in Wallingford, UK. "If snowmelt was a factor in some major floods in the past but no longer features today, you could expect to see such an apparent inconsistency."

Other studies suggest that we may see more sustained periods of rain and flooding. In 2009, the Institution of Mechanical Engineers in London published a report on the threats climate change will pose to UK infrastructure. It put increased risk of flooding at the top of the list.