Lessons learnt?

23 May 2014

Reflecting on the recent widespread flooding in the UK, David Balmforth asks: where do we go from here?

For the past few months, the media has been dominated by articles and video clips about floods. Scenes of devastation and personal grief have jumped out of our TV screens. Yet, when we compare recent events with the floods of 2007 the impact has been far less.

For example, around 5,000 properties were affected against 55,000 in 2007. The financial loss was also significantly more then, even when the impact on agriculture is taken into account.

...recent weather patterns (described in the media as extreme, exceptional and unprecedented) are likely to become the norm in the future

So why have the recent events caused so much concern? Undoubtedly, the concerted lobbying by interested parties has played its part, generating greater media interest and more challenges for government response. However, it is probably the longevity of the recent floods and their geographical extent that really captured our imagination. It was almost as if flooding were becoming a way of life. And the worry of this focused our minds.

This is no bad thing. As far back as 2004, the government's own research showed that the likely effects of climate change would lead to increased storm conditions, higher intensity rainfall, sea level rise and a greater occurrence of storm surges. In other words, the recent weather patterns (described in the media as extreme, exceptional and unprecedented) are likely to become the norm in the future.

So, if this was known in 2004, why was the country not better prepared for the floods in 2013-14?

Lessons learnt

A key lesson is that to some extent we have been well prepared. Last December, a storm surge along the east coast pushed sea levels up to those experienced in 1953, when more than 300 people lost their lives, hundreds were displaced from their homes and large swathes of land were flooded. In the recent event, no such loss of life was experienced. This was because such developments can now be predicted with much greater accuracy and warnings communicated more effectively. The flood defences built since that time, including the Thames Barrier, mean our coasts were much better defended.

The same is true for major rivers, where investment in flood defences has been shown to be both effective and good value for money. This is why government investment in flood defences needs to return to its pre-2010 levels and a long-term investment plan set in place.

The other important message is to understand that while high-priority areas are now defended from flooding, other communities remain at risk.

Resilience and engagement

What the 2004 research showed was that the scale of climate change would far outstrip the UK's ability to defend all communities from flooding. This would be unaffordable, but also undesirable in economic and social terms (the scale of the defences in some areas would itself risk destroying communities).

This then leaves the reality that many people will have to learn to live with floods. We need to look more carefully at how to make communities more resilient. This was recognised in the Pitt Review of the 2007 floods. Among its 92 recommendations were those designed to strengthen links between flood risk management, land use and planning. There is evidence to suggest that had these been better implemented since 2007, the consequences of flooding today might have been reduced.

So what needs to be done? Firstly, we need to recognise that there is no single panacea for future flood risk management. We need a range of interventions, tailored to local circumstances, if we are to safely accommodate flooding within communities in future. Some will be structural (involving physical works) and others non-structural(relating to flood warnings, response and active management). Above all, we will need to involve communities from the outset, because resilience cannot effectively be built without public engagement.

Way forward

When considering what action to take, it is useful to compare the process that nature uses to manage flood risk with the challenges faced in creating urban landscape and modern agriculture. The way land is drained can usefully be thought of in 3 stages:

- source,
- pathway and
- receptor.

'Source' describes the mechanism of run-off on land surfaces where rain falls. Natural land allows some of the rainfall to be intercepted by vegetation, some to infiltrate into the ground and some to be retained in surface depressions. This moderates both the rate and volume of flow into downstream channels and drainage systems.

Some modern farming methods inhibit these natural processes and urbanisation short circuits the natural run-off process by removing opportunities for surface storage and infiltration. Part of the answer to managing future flood risk is to recreate some of these natural processes, reverting to more traditional land management in rural areas, and incorporating sustainable drainage systems into urban development.

'Pathways' looks at the conveyance of run-off in watercourses, rivers and drainage systems. Natural rivers create their own channels to accommodate average flows. In extreme storms, these river channels overflow, creating flood plains that not only allow greater conveyance of flood waters but also create storage, attenuating floods and protecting downstream areas.

In the same way that natural rivers have a finite conveyance capacity, so too do drains and sewers

Many of the UK's flood plains have been populated by development and it is time to arrest this process. As a general rule we should not be building in the flood plain. Moreover, we should use urban regeneration as a means of retreating from the flood-risk fringes of our rivers (see the Dutch programme Room for the River).

In the same way that natural rivers have a finite conveyance capacity, so too do drains and sewers. They need space to accommodate excess storm water flows on the surface during extreme events. With careful urban design, excess flood water can be conveyed on the surface, by designating some roads and pathways as flood channels and by creating sacrificial flood areas. These may range from ground-floor areas of buildings to larger parks and town squares that can safely accommodate flood waters during extreme events (see CIRIA, Designing for exceedance in urban drainage , and Dutch water squares).

Such radical concepts have yet to gain much traction in the UK; yet, there is a need to get to grips with what this means for future urban design if the current levels of damage that flooding causes are to be avoided.

The term 'receptor' relates to the objects and fabric of society that are impacted by floodwater, both rural and urban. It covers what might be done to alter that fabric so that the impact of flooding can be reduced. In the context of urban development, current guides and standards do little to improve the resistance of buildings to flooding. What little was evident in the Code for Sustainable Homes is now to be repealed. With new development, creating thresholds that are above the level of the surrounding land can do much to reduce flood impacts.

In Singapore, the requirement for a minimum 1m threshold level has reduced the incidents of internal property flooding and has kept the city state?s metro system running during the previous three major floods. Self-sealing doors, concrete floors, and avoiding the use of gypsum-based materials can do much to reduce damage to buildings and, perhaps more importantly, ensure they can be reinhabited with minimum delay afterwards.

More innovative solutions include floating homes in the Netherlands and amphibious buildings in the UK.

Active management

More can be done to improve resilience by actively managing flooding when it occurs. Our ability to implement such non-structural measures has increased significantly in recent years with robust weather forecasting, better flood modelling and good communications (including social media). Good public engagement, backed by expert support, enables communities to better prepare for and recover from floods.

Having well-rehearsed plans in place not only addresses the short-term impacts of flooding, but they can also reduce the longer-term health impacts that can arise when flood risk is not effectively managed.

Not only engineers, but planners, architects and surveyors need to fully engage in this process. Only through this sharing of professional skills, and harnessing the energy of communities at a local level, will we succeed in addressing flood risk in the long term. We can no longer hope that the problem will simply go away. Every planning decision, every development opportunity and every commercial venture needs to look at its exposure to flood risk at the outset. Without this, the sad events of recent months really will become part of our everyday lives in the future.

David Balmforth is Senior Vice President of the Institution of Civil Engineers and Chair of the Inter-Institutional Flooding Group

Further information

Related competencies include:

- Planning & development : Planning, Mapping, Development/project briefs, Housing strategy and provision, Sustainability, Valuation, Development appraisals, Management of built environment, and
- Environment & resources : Management of natural environment and landscape, Environmental assessment, Environmental management.