

Insurance Day – 2nd October, 2006

Deal effectively with complex risk

*Flooding is a serious issue for insurers and risk managers alike. It affects business processes including site and asset location, business interruption and insurance / reinsurance purchasing. **Dr Justin Butler**, looks at the many different ways flooding can affect a business and why insurers and risk managers should wary of relying on traditional methods to address this complex problem.*

Globally floods affect more people and cause more damage each year than any other natural disaster. However, many businesses still assume that if they haven't flooded before, they are unlikely to flood in the future.

With urban development altering the pattern of flood risk in many areas and climate change likely to increase levels of flood risk in many parts of the world, this is no longer a safe assumption for businesses (and insurers) to make. Indeed, insurers and risk managers will increasingly need to provide answers to the following types of question:

- **Where** is flooding likely to occur and to what extent?
- **What** assets / policies do I have that are vulnerable to a flood, and how well protected are they?
- **How** will a flood of a given type affect my business / portfolio, and how much will it cost?
- **What** tools and methods can I use to mitigate the risk?

Increasingly, insurers and risk managers will come into contact with, and be required to understand, the many environmental (and socio-economic) factors associated with flood risk.

Changes in legislation

It is important to remember that flood risk does not just mean water pouring through the front door of your office. For example, new legislation in the UK (e.g.

Planning Policy Guidance 25) means that development in floodplain areas is now subject to approval by the Environment Agency.

This will affect where a business can locate new sites and assets. Other areas where flood risk can affect business interests include supply chain management, workers health and safety liability, business interruption, mortgage and financing and insurance and reinsurance acquisition.

In order for insurers and risk managers to start addressing the issues outlined above, an assessment or analysis of the degree of flood risk to a location(s) must be undertaken.

Risk is a function of hazard and vulnerability. Hazard is a function of the physical properties of an event, and the likelihood of it occurring. Vulnerability, on the other hand, can be expressed in terms of the resilience or susceptibility of built structures and people to that hazard.

However, there are a number of unique factors associated with water flow that mean traditional approaches to assessing risk are limited when applied to the flood-risk problem.

For example, Hurricane Katrina and the Asian Tsunami illustrated the changing nature of flood hazard across the globe. As climate change alters the intensity and frequency of flood generating events, the concept of 'return period' (in relation to describing the annual probability of a flood event of a given magnitude) will become increasingly redundant.

In terms of vulnerability, on the other hand, increased development in many urban areas around the world will mean that the natural flow of water in rivers and streams is altered / disrupted, thereby increasing flood risk to other, previously low-risk locations.

Further, it is worth pointing out that, unlike other natural phenomena such as earthquakes and windstorm, which are already covered in the risk analysis / risk modelling process, flood hazard and flood vulnerability are greatly affected by human actions, especially on the ground. For example, the construction of a new suburb and flood defence system along a river bank will greatly alter the flood risk at that location, and other locations further downstream.

However, recent developments in computing power and data collection methods (e.g. new satellite and airborne sensing technologies) are driving the development of techniques which greatly improve the accuracy and reliability of flood risk analysis.

Flood modelling for beginners

In simple terms, a flood risk model is used to determine the path and volume of water that can be expected for a given flood event. Depending on the scope and complexity of the model, the extent, depth, velocity and duration of the flood waters can also be estimated. Most flood models process information relating to some or all of the following factors: precipitation, rainfall-runoff, river flows, and channel / floodplain topography.

Hydraulic modelling, a key component for flood risk analysis, involves the simulation of water flow within a river channel, over a floodplain or along a coastline. It often involves two key components: a digital elevation model (DEM) representing floodplain topography and some form of mathematical procedure to simulate the flow of water across the flood-plain surface.

The latest flood risk models, such as those developed at Ambiental, can address many of the complex hazard and vulnerability issues associated with flooding.

FlowrouteTM, (Ambiental's proprietary, three-dimensional urban flood risk model) includes the ability to model multiple flow rates and flood hazard scenarios (including worst-case scenarios such as Katrina-type storm surges) and can also account for the influence of human structures on flow patterns (e.g. buildings and flood defences). To this end, information provided by flood risk models such as Flowroute will help insurers and risk managers to answer the business questions posed above.

Risk mitigation

Once an accurate risk analysis has been achieved for a business (or book of business for the insurer) this information can then be used to determine the type of insurance cover required, as well as to design potential risk mitigation strategies.

In terms of insurance pricing and underwriting, given the detailed level of information provided by models such as Flowroute™, accurate assessments of potential building damage along with potential evacuation routes and transportation problems associated with future flood scenarios can be identified.

In terms of risk mitigation strategies, depending upon the degree of flood risk, the business could initiate a number of actions. These can range from storing valuable equipment and stock above the predicted water line, to subscribing to a local flood warning system and preparing evacuation plans.

Which strategies to implement and where, will be informed by the level of flood risk at each location as determined by the flood risk analysis process. Both the physical and socioeconomic issues associated with flood risk will come to play an increasingly important role for businesses in the UK and abroad.

Unlike other natural phenomena, analysing flood risk requires a detailed approach to better understand how humans interact with the environment, especially at a local level. New developments in ultra high-detail, three-dimensional flood risk analysis techniques, can help to address these issues.

To conclude, it is not so much that insurers and risk managers need to think 'beware: flood risk', more so, that they need to 'be aware' about the complex issues associated with flooding, and the new ways to deal with this growing problem.

*Dr Justin Butler is Managing Director of Ambiental Technical Solutions
(www.ambiental.co.uk).*