RainGain 2nd National Observers Group Meeting, UK

Tuesday 16th April 2013, 09:00 to 16:00, London City Hall, The Queens Walk, London, SE1 2AA

QUESTIONS FOR DISCUSSION DURING BREAKOUT SESSION

1. General approach to surface water flooding forecasting and warning systems

There are two potential general approaches for the implementation of surface water flooding forecasting and warning systems in the UK: (a) a single national service or (b) a two-tier (national/local) service.

QUESTION - Which approach do you consider more appropriate?

ANSWER: Delegates were of the view that a two-tier system was most suitable.

2. General roles and responsibilities

Depending on the selected approach (Section 1), please answer the following questions regarding the organisations that should be responsible for the implementation and operation of the surface water flood forecasting and warning system.

QUESTIONS

In the case of approach (a):

- Who would be responsible for leading the single national forecasting system?
- What inputs would be required from other organisations?

In the case of approach (b):

- Who would be responsible for leading the forecasting at the national level?
- Who would be responsible for leading the forecasting at the local level?
- Who would be responsible for the integration of the two forecasts?

ANSWER:

Delegates were of the view that, in the main, forecasting and warning needed to be a nationalised system as the technical skills and expertise did not exist locally or regionally. The point was made that, at the regional level, LLFAs should be focused on management of flood risk rather than prediction. To improve the local sensitivity of prediction, LLFAs could identify "hotspots" for the EA to target.

However, delegates also expected that some urban authorities with the most significant risk of surface water flooding may develop their ability to forecast and warn local residents about these events in future, particularly as the cost of technology falls given the highly localised character of surface water flood risk.

Delegates were of the view that response to flood risk was best managed at the local level. Delegates emphasised the fact that authorities were best placed to interpret the appropriate response to forecasting data and warnings in response to their own local context and, crucially, level of risk tolerance. Delegates emphasised that responses to different scenarios must be planned in advance - including acceptance of flooding in some circumstances.

3. Type of forecasting systems and resources required for their implementation:

In general, forecasting systems can be of three types (in increasing order of complexity and cost):

a) Empirical scenarios-based system: real-time flood forecast system with no hydraulic model involved in any part of the process. Warning thresholds are based on historical flood events and/or knowledge of the area (similar to the current service provided by the Flood Forecasting Centre)

b) Pre-simulated scenarios-based system: real-time flood forecast system with scenario and results catalogue built from previous hydraulic simulations (for example, data driven models trained with results from hydraulic models)

c) Real-time simulations-based system: real-time flood forecast system with real-time hydraulic model(s).

QUESTIONS - Based on the information provided:

- Identify the main resources needed for the implementation and operation of each of these surface water flood forecasting systems.

ANSWER:

a) Empirical scenarios-based system:

- Similar to the system/service currently provided by the Flood Forecasting Centre. It could be made more localised by defining local flood thresholds based on local knowledge and experiences of previous flood events
- Could be complemented by real time telemetry data (e.g. raingauges and flow/depth gauges located at critical locations of the catchment). This would enable better definition of thresholds for issuing warnings and implementing response actions (while collecting useful data for future model calibration and verification)
- Resources required for the implementation of this system for specific urban areas include:
    - A person (most likely from the local authority) with knowledge of the area and technical expertise who can lead the implementation and operation of the system. This would entail coordination of the following actions: identification of critical areas, definition of local flood thresholds, identification of appropriate location for sensors, coordination of sensor installation and operation and definition of actions to be implemented at different levels of alert
    - Funding for installation and operation of telemetry sensors
    - Building capacity of local authorities to adopt and make appropriate use of the forecasting and warning system
    - Engaging local community members so that they are ready to use the warnings.

b) Pre-simulated scenarios-based system:

- Would constitute an improvement over the previous system and would be more localised and accurate yet not as complex as a type ‘c’ system
- Could be complemented by real time telemetry data
- Resources required for the implementation of this system for specific urban areas include:

- A person (most likely from the local authority) with knowledge of the area and technical expertise who can lead the implementation and operation of the system
- A consultant or academic institution would most likely need to be involved who can build the urban drainage model of the area and develop the pre-simulated scenario catalogue and the corresponding warning thresholds and response actions (in collaboration with local authorities and water company). Thames Water is currently working on updating and improving the models of the sewer system of the London Boroughs, so the improved models could be used for developing the pre-simulated scenarios catalogue
- Funding for installation and operation of telemetry sensors
- Building capacity of local authorities to adopt and make appropriate use of the forecasting and warning system
- Engaging local community members so that they are ready to use the warnings.

c) Real-time simulations-based system:

- More sophisticated and complex
- Could also be complemented by real time telemetry data
- Resources required for the implementation of this system for specific urban areas include:
  - A person (most likely from the local authority) with knowledge of the area and technical expertise who can lead the implementation and operation of the system. The operation of a system of this type is more costly and requires more modelling skills than those required to operate type 'a' and 'b' systems
  - A consultant or academic institution would need to be contracted to implement the forecasting system including setup of models and automatic linkage of rainfall forecasts to models
  - Software licence to run the hydraulic models in real time (the annual cost of urban drainage software packages commonly used in the UK is around £40,000)
  - Funding for maintenance of the hydraulic models
  - Funding for installation and operation of telemetry sensors
  - Building capacity of local authorities to adopt and make appropriate use of the forecasting and warning system
  - Engaging local community members so that they are ready to use the warnings.

- Determine whether these resources are currently available to the organisations responsible for the implementation and operation of surface water flood forecasting and warning systems.

ANSWER:

The monetary resources required for implementing type 'a' and type 'b' systems could be available at present, but it would still be challenging to put these resources aside for the implementation of such system. Type 'c' systems are too expensive to implement and operate and the resources currently available to lead local flood authorities do not seem to be enough for it.

Monetary resources could be available for implementing a simple forecasting system. However, the lack of skills and capacity at lead local flood authorities would hinder the implementation, operation and use of such a system.

- Analyse alternatives for optimising resources and overcoming some of the constraints for the implementation of the different forecasting systems.

ANSWER:

- Synergies between local authorities and water companies could lead to mutual benefits and would make the implementation of forecasting and warning systems more efficient. For water companies, having improved forecasting systems would enable implementation of real time control schemes which could lead to cost savings (e.g. in energy bills). Moreover, water companies already have sensors in place which could be used by local authorities for the implementation of warning systems. In turn, local authorities could help with the maintenance and quality control of the sensors as they would be using the telemetry data on a regular basis. In addition, combining the expertise and local knowledge of water companies and local authorities would lead to improved forecasting and warning systems. In conclusion, both water companies and lead local flood authorities would benefit from having forecasting and warning systems. Working together would enable the implementation of better systems while making efficient use of the resources that are available to each organisation
- Academic institutions could lead the development of forecasting systems and could 'outsource' this service to lead local flood authorities
- Lead local flood authorities of neighbouring areas (e.g. London Boroughs) could work together to jointly implement forecasting and warnings systems and build the capacity required for operating and adequately using them.

- Considering the current needs and resources available (including funding, human resources, quality and lead time of the rainfall forecast, and hydraulic modelling tools), which of these three systems would you find most appropriate for surface water flood forecasting and warning in the UK?

ANSWER:

- A type 'b' system is considered more appropriate and represents a good balance between costs and benefits at present
- Once capacity has been built in lead local flood authorities, and improved weather forecasting products and flood forecasting tools become available, it will be possible to switch to more complex systems

4. Local monitoring for improved surface water flood forecasting and warning

To what extent do you agree with the following statements?

- "Real-time telemetry data (including flow depths and rates at critical points and local rainfall data) are essential for the reliability of surface water flooding forecasting and warnings"

Strongly disagree	Disagree	Agree	Strongly agree

ANSWER: Strongly agree

- "The implementation of real-time accessible local monitoring systems which can support local surface water flood forecasting and warning systems should be given priority over the implementation of sophisticated modelling and forecasting tools"

Strongly disagree	Disagree	Agree	Strongly agree

ANSWER: Agree

Additional comments: telemetry data is seen as a 'quick win' which would enable the implementation of simple yet practical flood forecasting and warning systems (while at the same time collecting data for future model calibration and verification)

5. Engaging stakeholders and ensuring best use of warnings

Community ownership is at the heart of any future service. Increasingly, the public will be required to take responsibility for the protection of their properties. Reforms to insurance, in particular, will lead to homeowners in at-risk properties facing higher bills. If correctly managed, this raised awareness and delegation of responsibility could encourage self-help and community flood planning that improves the resilience of at-risk communities.

Considering this, please answer the following questions:

- What role do communities currently expect to play in flood risk management?

ANSWER: Communities are hard to define so it is necessary to think of the group of people affected instead. On the whole, communities are not interested if they have not been recently flooded or threatened by flooding. Communities that have been flooded see themselves as victims with the relevant agencies (EA), government and water authorities as being the perpetrators. Most people are ignorant of the causes of flooding. Overall, there is a general sense that communities do not see themselves as having a role in flood prevention. When it comes to flood response, especially in the immediate aftermath, people tend to react very positively and help out but that effort and enthusiasm wanes. Sometimes enthusiasm is maintained by community activists and the process of drawing up community flood plans.

- What role do communities need to play in flood risk management?

ANSWER: At one extreme, the view was expressed that communities should not have a role. Citizens pay their taxes and the state should protect them. It was acknowledged however, that some personal responsibility is important especially when it comes to property level protection and finance. It was felt that area based levies to finance flood protection will become more important.

- What are the barriers to communities playing an active role in flood risk management?

ANSWER: Lack of knowledge about flooding was seen as the most important barrier. This could be seen as a lack of awareness of the nature of floods, flooding and water management and a lack of access to detailed immediate information about imminent floods. Though the democratic process could resolve some of these issues there was a feeling that flooding should not be a political issue.

The other main barrier was money and where the money should come from.

- What kinds of actions will help close the gap between what communities do now and what they need to do in future?

ANSWER: It was recognised that awareness needs to be raised through information programmes, demonstration projects and local experts. A local government officer capable of understanding technical issues, council politics, civil service procedures and community activism are rare.

Financial solutions ranged from increased levies and taxes to the use of incentives. In the Netherlands, home owners are paid €10 per square metre to unpave impermeable surfaces and in Scotland households off the sewage network get a discount on their council tax.

Flood maps can inform communities but need to be handled sensitively and help given with interpretation.

6. Constraints for the implementation and effective use of surface water flood forecasting and warning systems:

Please rank the following constraints for the successful implementation and effective use of surface water flood forecasting and warning systems with one being the most important constraint and 9 being the least important.

ANSWER: All constraints were ranked equally high. It was hard to come up with an actual ranking.

Number	Constraints	Ranking	Additional Comments
1	Insufficient accuracy of rainfall estimates and forecasts	1	If inputs cannot be trusted, forecast and warning is not possible
2	Budgetary constraints (considering cost of implementation of different forecasting systems)	1	
3	Low awareness and low engagement of local stakeholders in surface water flood risk management	1	If awareness is low, timely accurate warning are still not useful. Population turnover is a concern – on-going campaigns needed.
4	Lack of good quality data for calibration of flood models, forecasting and warning systems (this may hinder the definition of appropriate warning thresholds)	4	Possibly more calibration data available for urban areas but access could be an issue. Social media potentially useful. Is it possible to model where future sensors would give most benefit?
5	Lack of expertise in the organisations responsible for surface water flood forecasting and warning systems	5	Given irregular nature of events is there sufficient work to maintain skills? Does this suggest a greater role for wider area partnerships?
6	Insufficient resolution of rainfall estimates and forecasts	6	Temporal resolution more an issue with increased spatial resolution. Forecast model resolution still an issue
7	Difficulty of communicating warnings effectively	7	Increasingly easy with social media and technology.
8	Insufficient quality (high uncertainty) of hydraulic flood models	8	Good models exist but costs are an issue
9	Long runtimes of models	9	Possible trade -off between runtime and accuracy
10	**Additional constraint:** Access to data		
11	**Additional constraint:** Ability to respond		Timeliness of warning is an important factor.
12	**Additional constraint:** Statutory responsibility and legal obligations		