

Tools to improve planning for flood emergencies

Work done in the UK on decision support for flood emergency planning has so far been limited. The “Risk to People” method is the most commonly used tool in the UK to assess flood fatalities. However, it is an empirical, generalised model that does not use detailed information on each individual receptor in its “broad scale” estimates of loss of life. To provide a more accurate assessment of loss of life, an agent-based model is required.



An agent-based model is a computational model that simulates the interactions of autonomous agents to assess the overall system, in this case a flood incident. It can model the simultaneous operations of multiple agents (in this case people and vehicles) with the flood wave, to re-create and predict the actions of complex phenomena such as those that occur in flood emergency.

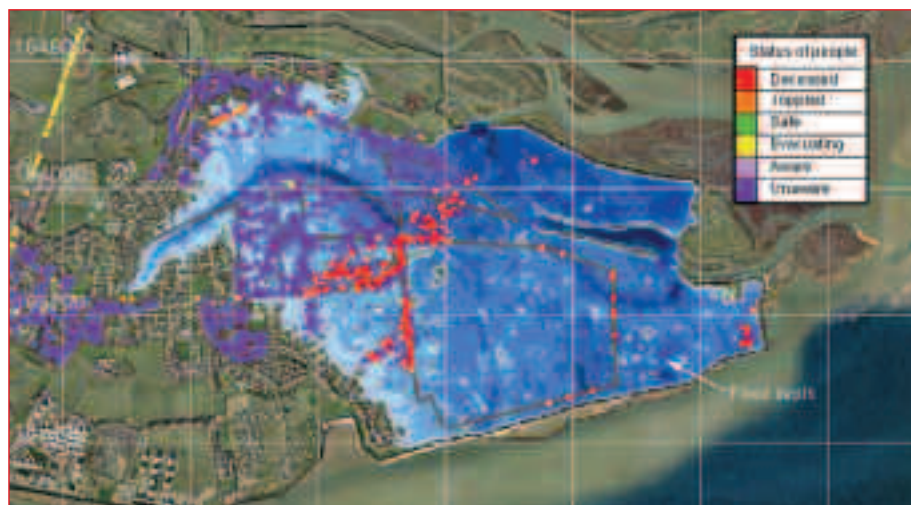
HR Wallingford has been piloting a prototype, agent-based Life Safety Model (LSM). The LSM models individual receptors (e.g. people, buildings and cars) and their dynamic interaction with the floodwater. It is currently the only emergency planning model for floods currently available that allows this important interaction to take place. The LSM estimates deaths from drowning, exhaustion, building collapse and from vehicles being swept away, as well as individuals’ evacuation times to reach safety.

The LSM offers a scientifically robust method of assessing residual risk to life in areas at risk of flooding and from dam breaks. The algorithms used in the life safety simulator are based on the latest research results. Importantly,

the LSM allows comparison of different emergency management strategies (e.g. use of shelters, improved warnings, changes to escape routes) that can assist in reducing the loss of life during future floods. Local authorities’ emergency plans for floods often do not identify evacuation routes and safe havens. The LSM is a tool that can help emergency planners both improve their plans and carry out simulation exercises with the blue light services.

The LSM has been validated against historical data from the Canvey Island flood in 1953, during which 58 people lost their lives, and was found to give accurate estimates of what actually occurred during this disaster. Over the next 24 months HR Wallingford will be further developing the LSM both to improve its user-friendliness and its functionality via the introduction of improved modelling methods such as random walk models for pedestrians.

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Life safety modelling of the 1953 Canvey Island flood showing the status of people during the event.