Energy crops and floodplain flows

Project Summary SC060092/S2

Modelling experts from JBA Consulting have carried out a study which used a modelling approach to investigate the possible impact on flood risk of growing energy crops in the floodplain. *Miscanthus* and short rotation coppice (SRC) willow were the energy crops considered during the project. The modellers worked with experts from the Environment Agency, Natural England, the National Farmers Union and the Department for Energy and Climate Change.

Landowners and farmers have been encouraged to grow energy crops through grants from the Energy Crops Scheme (closed in August 2013). This has increased the area of energy crops grown in England. Little is known about the impact, if any, on flood risk in the locality and/or further afield from the planting and management of energy crops on floodplains. In certain locations, new energy crop plantations could provide a flood risk management function and additional environmental benefits.

The project investigated the possible scale of the impact of miscanthus and SRC willow plantations on river and floodplain flows, flood depth and the overall impact on flood risk locally as well as upstream/downstream.

Linked one-dimensional–two dimensional (1D–2D) hydraulic modelling using ISIS-TUFLOW software was chosen as the most appropriate approach.

Scenarios were drawn up representing mature energy crop plantations in terms of size, location, distribution, orientation to flow and percentage cover on the floodplain. A scenario that assumed complete floodplain coverage with an arable crop cover (winter wheat) was included as a baseline for comparison.

Two existing Environment Agency flood risk management models (River Severn at Uckinghall near Tewkesbury and River Isle at Ashford Mill near Ilminster) were adapted for use as case studies in the project.

A simple theoretical model was also set up to help identify scenarios producing the greatest impacts. The model results were used to assess how new plantations would generate changes to river flow, flow pathways on the floodplain, flood depths, and flood velocities on the floodplain.

The modelling work produced the following key results.

- The impacts caused by miscanthus and SRC willow plantations are broadly similar.
- The dense nature of the mature plantation acts like a ‘green leaky dam’ to hold water back within and immediately upstream of the plantation and to slow the speed of water spread across the floodplain. In most cases, flood levels immediately downstream will see a corresponding, but smaller, decrease.
- The highest overall impacts on flood depth and velocity of flow are seen where the plantation covers the full width of the floodplain.
- Only localised effects are observed with well distributed plantations covering less than 30% of the floodplain, set away from the main channel, and not significantly blocking the flow of water across the floodplain.
- Uncultivated strips at the edge of the plantation (headlands) and rides (pathways) within the plantation provide faster, short circuit flow pathways than the main block of vegetation.
- Distributed blocks or a central plantation block did not change the maximum flood extent significantly.

The evidence presented in this report could be used to inform decisions about energy crop plantations on floodplains.

This summary relates to information from project NA050, reported in detail in the following output:

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