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### **Holding back the floods: can we engineer a way out of this?**

R J Rickson, PhD, CEnv, HonFIAgrE, FHEA, Professor of Soil Erosion and Conservation Cranfield Soil, AgriFood and Biosciences and Honorary Fellow of the Institution of Agricultural Engineers asks can agricultural engineers help mitigate the damage caused by flooding?

This headline is taken from the Guardian newspaper (Saturday 27th January 2024). Parts of the country have been devastated - again - by flooding, causing damage to properties and livelihoods.

The article argues that increasing expenditure on physical flood defences such as the £11 million aluminium barrier system to protect the town of Bewdley, on the River Severn may not be cost-effective. Despite being designed and built to withstand exceptional events such as the '1 in 200 years' storm, the exceptional rainfall, peak river flows and flooding associated with climate change mean "it is a matter of when, not if, the barriers are breached". The situation is likely to get worse: The Centre for Ecology and Hydrology estimate flood peaks will rise by 15 – 25% over next 20 years.

The Guardian article quotes a retired Environment Agency employee: "We cannot engineer our way out of this. Raising existing defences won't be technically, financially or environmentally possible".

But maybe we need a broader look at 'engineering' solutions? Specifically, agricultural engineering can have a really important role here. How we manage the rural landscape upstream of places vulnerable to flooding can help reduce the volume and speed of water flowing downstream. In these catchments, 85-90% of the land is down to agriculture or forestry.

Soil damage from harvesting and field operations when fields are too wet increases surface water runoff and risks of flooding. For example, winter cereal establishment in late autumn in South West England often results in damaged soil, with degraded structure and enhanced

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surface-water runoff found in three of every five cereal fields<sup>1</sup>. Better application of soil and water engineering principles, with real-time prediction of soil conditions and innovative machinery options, can help. The Institution of Agricultural Engineers has made this point many times in relation to river catchments generally. Indeed, back in November 2019, the Institution of Agricultural Engineers issued a press release on how agricultural engineers can help mitigate the damage caused by floods.

Given that hydrological data shows that “no artificial defence will be enough to stop the water”, it is time to focus more on agricultural engineering to design, build and test better land management systems (including low-impact machinery, cover cropping, reduced tillage and controlled-traffic operations) that control flooding at its source.

Note:

1 Palmer, R.C. and Smith, R.P. (2013), Soil structural degradation in SW England and its impact on surface-water runoff generation. *Soil Use Management*, 29: 567-575.

<https://doi.org/10.1111/sum.12068>



An example of flooding

<http://iagre.org/upload/1707302245.jpg>



Professor Jane Rickson

<http://iagre.org/upload/1707303789.jpg>

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