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Soils – the first line of defence against flooding – cost the UK up to £1.2 billion a year

We are witnessing some of the worst flooding on record in the UK, with damage costing the country up to £1.2 billion a year because of erosion, compaction and loss of organic matter.

Jane Rickson Professor of Soil Science at Cranfield University and President of the Institution of Agricultural Engineers takes a look at what's happening in our fields and why healthy soils can help in the fight against flooding.

“Soil is so important because it effectively acts as a sponge to take in these extreme rainfall events that we are seeing across the country at the moment. But for soils to be really effective they have to be healthy, able to receive the rainfall, retain it and release it gently and slowly over a longer time span,” says Professor Rickson.

There is a lot of debate about what we mean by a healthy soil. Soils have physical, biological and chemical properties and these interact to ensure the soil is well structured.

Some soils types will be very effective at absorbing and draining rainfall such as sandy soils and others such as clay or compacted soils, which have small pore sizes, may not be able to cope and that's when we get surface run-off that gathers in the valleys and can cause some of the flooding we are seeing at the moment.

We can change the pore structure by how we manage soils. For example, if we put very heavy machines onto soils while they are wet this will compress the soil leading to compaction, meaning you have got rid of the air spaces that could otherwise be filled with water. So it's very important to avoid compaction by trying not to go onto the land if it's too wet. But the 'window of workability' (when the soils are not too wet to traffic) may be shortened by more frequent rainfall events that are predicted, especially in winter.

Cover crops can really help too because their roots grow down into the soil and help bring in structures such as root canals which act as conduits for the water.

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Flooding can cause huge impacts on agricultural land. For example, if you have a saturated soil profile you haven't got any air space and roots can suffer if they are not able to get oxygen. Wet soils are also going to affect your soil biology and nutrient cycling because the microbes can't break down nutrients. Soil surface structure is affected by sediment being deposited on top of existing soil, which can lead to sealing of the soil surface, leading to more surface flow and flooding.

The flooding is having a real impact on farmers who may have to re-sow some of their crops because of flood damage. Here is the irony because you can't use machinery on wet soils to alleviate the damage: you have to wait until they dry out. Ponds of water remaining on the surface for weeks mean farmers won't actually be able to manage their land for some time to come.

Some of these issues are likely to become 'the norm' according to future climate change predictions for the UK. Agricultural engineers are well placed to identify ways to mitigate and adapt to the effects of increasing rainfall, through innovate machinery design and better field engineering.



Professor Jane Rickson Professor of Soil Science at Cranfield and President of the Institution of Agricultural Engineers

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[Analysis The total costs of soil degradation in England and Wales A.R. Graves *, J. Morris, L.K. Deeks, R.J. Rickson, M.G. Kibblewhite, J.A. Harris, T.S. Farewell, I. Truckle Cranfield University, Bedford MK43 0AL, United Kingdom](#)

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