

Science for Environment Policy

Who should pay for best management practices to reduce soil erosion?

Worsening soil erosion in north-western Europe may be the result of a switch from traditional dairy farming to cash crops. However, even if all dairy farming ceased, reductions in runoff of up to 76% could be achieved if best agricultural practices are employed, at a cost of approximately €45 per hectare for the first three years, new research from the Austreberthe watershed in France suggests.

Mudflows — mudslides that can smother roads and houses — are a serious problem in north-western Europe. They are the result of soil erosion in [agricultural](#) areas upstream of towns and cities and cause substantial damage. Rates of [soil](#) erosion vary depending on the form of agriculture. Dairy farming for example, using mainly permanent pasture, shows hardly any soil erosion, whereas most arable farming allows for bare soils during the cycle, prompting higher rates of runoff, which may result in concentrated erosion downstream.

For this study, researchers examined the effects of changing agricultural practices on soil erosion in the Saussay agricultural catchment, part of the Austreberthe watershed in northern France. In this region, rather than traditional dairy farming, agriculture is increasingly turning to crops such as wheat and oilseed rape, which entails the conversion of pasture land into arable land.

The researchers created three scenarios: 1) *the baseline*: farming practices as they were in 2007, at this stage the share of grasslands was 25% and arable land was 75%; 2) *no dairy*: all dairy production in the area ceased by 2015; and 3) *no dairy with best practices*: dairy production ceased by 2015 but farmers are funded to carry out best management practices to prevent erosion. Best practices include: 'catch' or cover crops (fast-growing crops grown between successive plantings of the main crops, which prevent the soil being left bare); grass buffer strips grown in the fields to prevent erosion; potato micro-dams — barriers between furrows to encourage rainwater to infiltrate into the soil rather than to run off; and hoeing (a fragmentation of the soil surface crusts with very low infiltration rates, which reduces runoff). The researchers then used a model to calculate runoff volume in December and May under the three scenarios.

The effect of the best practices was clear; the *no dairy* scenario led to a significant increase in runoff volumes, as expected (+37% in winter and +54% in spring). However, the *no dairy with best practices* scenario achieved runoff volumes that were even better than the baseline of 2007. Reductions in runoff for the *no dairy with best practices* were -62% in winter and -82% in spring, compared to the *no dairy* scenario (and -47% in winter and -76% in spring compared to the baseline).

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Soil and Water:
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(continued)

The researchers then calculated the costs of implementing the best practice for the entire Austreberthe watershed. The total cost was estimated to €640 000 year (with a range of between €540 000 and €773 000) over the first three years, approximately €45 per hectare. The researchers did not calculate the benefits of less soil erosion but these could include a reduction in silting of waterways and harbours, fewer fertility losses and greater crop yields.

As the cost of funding such measures is often borne by local taxes, the researchers also investigated how much local residents were willing to pay for reduced soil erosion. They used data from a parallel study which surveyed 220 residents in a nearby watershed. Although they acknowledge that using data from Austreberthe residents would have been preferable, they feel that the similarities of the two watersheds means they would give very similar results. For example, both areas are river basins tributaries of the Seine and have high population densities that are at risk of mudflow inundation.

The results showed that individual residents would be likely to pay around €22.63 per year for a 15-year erosion-prevention programme, which would equal €395 000 a year for the whole of the Austreberthe watershed. Although this is not sufficient to cover the full costs, the researchers point out that the cost of the programme could be reduced by half by using European subsidies from the [second pillar of the Common Agricultural Policy](#).



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