



Soil Erosion and Crop Productivity

European researchers have recently assessed the effects of soil erosion on agricultural productivity. They found that soil erosion has little impact on crop productivity. Nevertheless, they highlight that other parameters such as ecological and social impacts should be taken into account when assessing soil erosion impacts.

Soil is a natural resource of great importance in agriculture, especially because it provides crops with water, nutrients and rooting space. Nevertheless, soil degradation is accelerating, with negative effects on human health, natural ecosystems and climate change, as well as on the economy. Recently, researchers have estimated soil loss from farmlands at about 6 tonnes per hectare, per year. In this context, the Commission adopted in September 2006, a comprehensive EU strategy¹ specifically dedicated to soil protection.

Several field experiments have been performed on particular plots and have shown that soil erosion is correlated with a decrease in crop yields. However, the variability of these results does not make it possible to extrapolate to a regional or national scale.

In this regard, European researchers have investigated the links between crop productivity, soil depth and water content, and soil erosion on a regional scale. To this end, they focussed on soft wheat, whose susceptibility to erosion is representative of many other common crops with similar rooting depths and water requirements. They collected annual yield data for about 300 zones distributed across France, Germany and Greece. Soil Water Available to Plant (SWAP) data was taken from the European Soil Database². Finally, soil erosion data was taken from the Pan European Soil Erosion Risk Assessment project³. The authors then tried to relate SWAP data to crop yields.

They found that:

- At the 300 sites studied, the crop yield varies between 1.43 t/ha/y and 9 t/ha/y. Soil erosion varies between nothing and soil loss of 18 t/ha/y.
- A decrease in SWAP of 1mm results in a decrease in crop yield in 47 kg/ha/y.
- As a soil loss of 0.1m corresponds to a SWAP reduction of 15 mm, a loss of 0.1 m of soil results in an average yield loss of 4.9%.
- For the next 100 years, the decrease in crop yield is predicted to vary from close to 0 in the Netherlands to 3.8% in Greece.

The authors conclude that Europe's agricultural sector has developed innovative technologies that allow agricultural productivity to resist soil erosion and that the effect of soil erosion on crop yields will not be significant during the next century. Nevertheless, they suggest that soil erosion is likely to have negative effects on the environment. In particular, they highlight that to compensate for nutrient losses, soil erosion induces an increase in fertiliser usage, which might impact the environment.

Overall, the researchers note that the impacts of erosion should be looked at on a broader scale, including not just productivity impacts but also agricultural needs and ecological and social impacts.

¹ For more information on the Thematic Strategy for Soil Protection: <http://ec.europa.eu/environment/soil/index.htm>

² To access the European Soil Database: http://eussoils.jrc.it/ESDB_Archive/ESDB/index.htm

³ PESERA project "Pan European Soil Erosion Risk Assessment"

(http://eussoils.jrc.it/ESDB_Archive/pesera/pesera_download.html), supported by the 5th framework programme, contract QLK5-C L-1999-01323.

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Contact: martha.bakker@wur.nl

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