Save Our Soil: Analysing the efficacy of land interventions to prevent agricultural soil loss in the Wear catchment

Edie Vernol
Supervised by Professor John Wainwright, Department of Geography, Durham University

A. Introduction

Soil loss is a key issue facing agricultural land today, producing a wide range of issues on and off-site. On site, there is a financial cost to fertiliser reapplication due to soil loss, and off-site, displaced soil can increase flood risk and damage local ecosystems. It is therefore essential to understand how best to reduce agricultural soil loss.

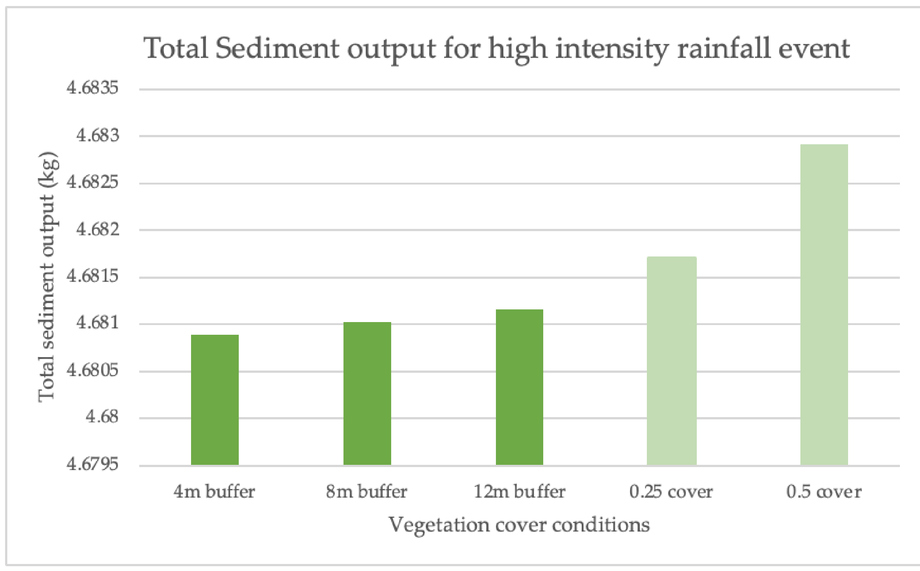
C. Methodology

The main component of this investigation was completing a series of runs of the MAHLERAN soil erosion model, using different land intervention scenarios (buffer strips and cover crops) in two different rainfall events.

The secondary component to the investigation was the creation of a SCIMAP sediment risk map to identify key high-risk source areas within the catchment area being studied.

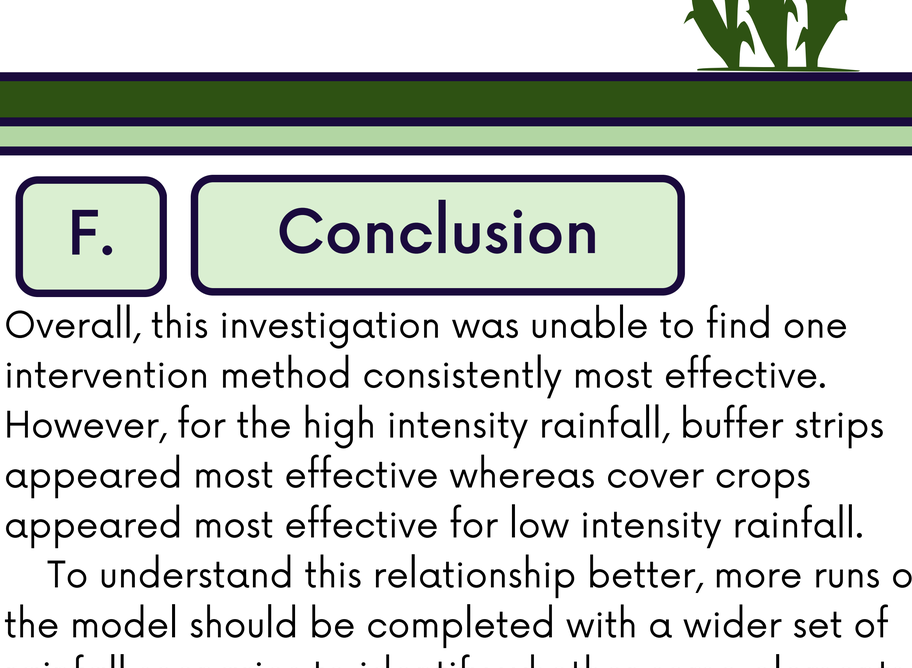
The platform QGIS was also used extensively to create inputs for the model and create maps for the report.

D. Results



All runs for the high intensity rainfall, regardless of intervention scenario had a very similar total sediment output, all at just over 4kg after the 5 hour high intensity storm. There was a marginal pattern of increasing output volume with buffer strip width. The cover crop scenarios produced marginally greater total sediment output.

Due to time constraints, the full set of scenarios could not be completed for the second rainfall event. Overall, the total sediment loss was much lower than for the high intensity event, and there was no difference between runoff within the buffer strip scenarios.



However, the cover crop scenario did yield lower total sediment mass, which is the opposite to what occured for the high intensity rainfall scenario.

E. Analysis

The high intensity rainfall event producing more runoff and therefore more sediment was consistent with the literature surrounding runoff dynamics. However, the results regarding the most successful intervention are conflicting between rainfall events, with buffer strips producing the most sediment after low rainfall, but cover crops producing the most sediment after high rainfall. The literature also does not support the results of wider buffers producing more sediment. This could suggest that different intervention methods are successful dependent on rainfall conditions, but also suggests further investigation should be done.

F. Conclusion

Overall, this investigation was unable to find one intervention method consistently most effective. However, for the high intensity rainfall, buffer strips appeared most effective whereas cover crops appeared most effective for low intensity rainfall.

To understand this relationship better, more runs of the model should be completed with a wider set of rainfall scenarios to identify whether some elements of this investigation were outliers to a general trend.

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The full report, inlcuding references can be found here:

Durham University