Cambridge Environmental Assessments

PS2233 – Surface Runoff

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Objective

The development of the surface runoff vulnerability index (VI) was designed to explore the potential spatial extent of surface runoff and identify sites and areas for more detailed analysis within later phases of the project

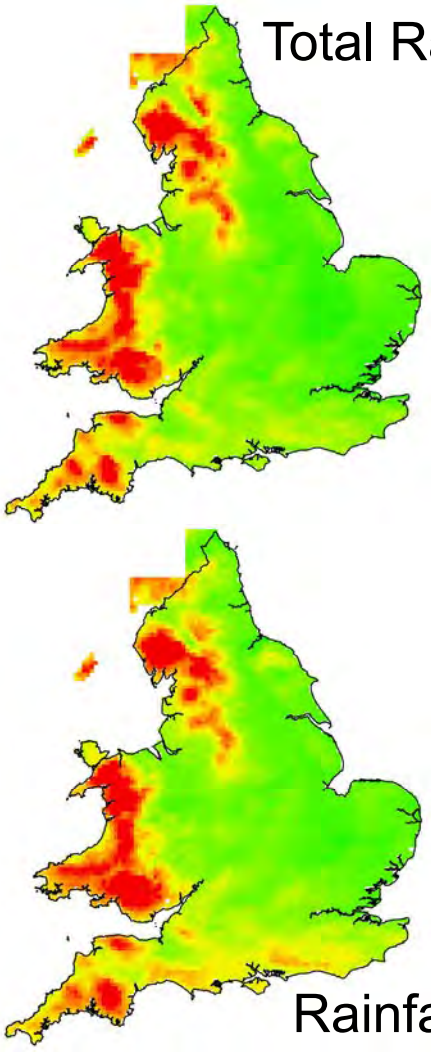
Vulnerability Index

- Vulnerability Index (VI) akin to GW VI's e.g. COP, DRASTIC, etc.

$$\text{Surface Runoff Vulnerability Index} = \sum_{i=1}^{4} F_i W_i$$

- Factors identified from the literature
- Climate, Topography (slope), Soil, Land use
- Equal weight owing to the relative importance of each factor not being known

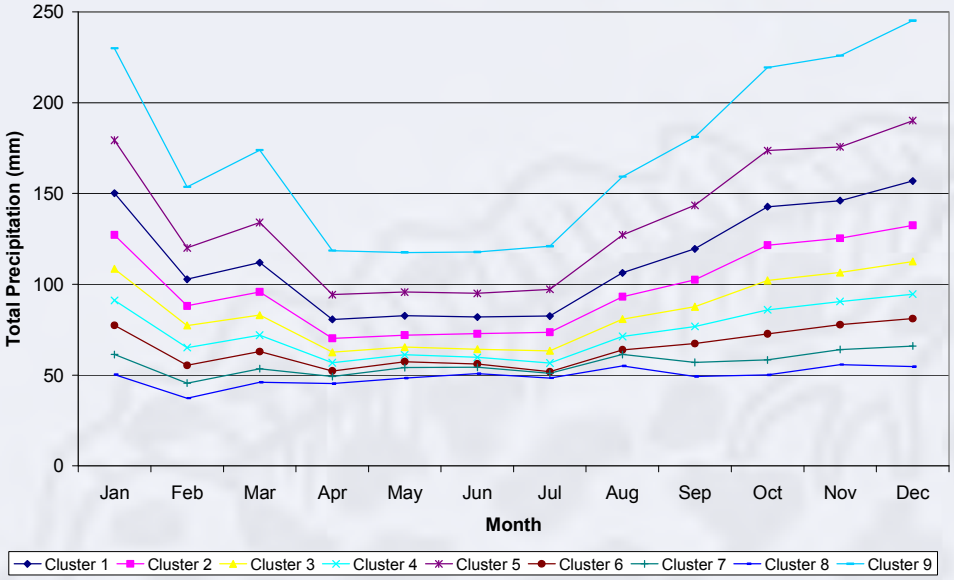
Factors - Climate



Total Rainfall

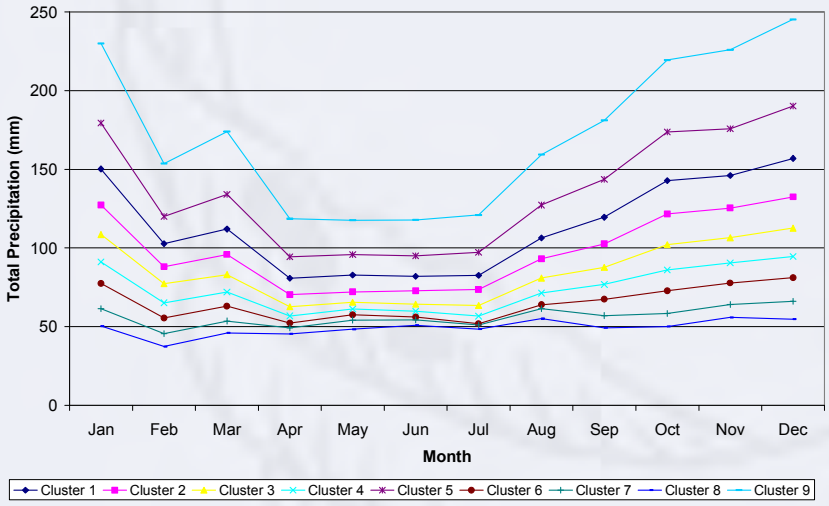
Rainfall Intensity ≈ SDII

Heirarchal K-Means Cluster Analysis

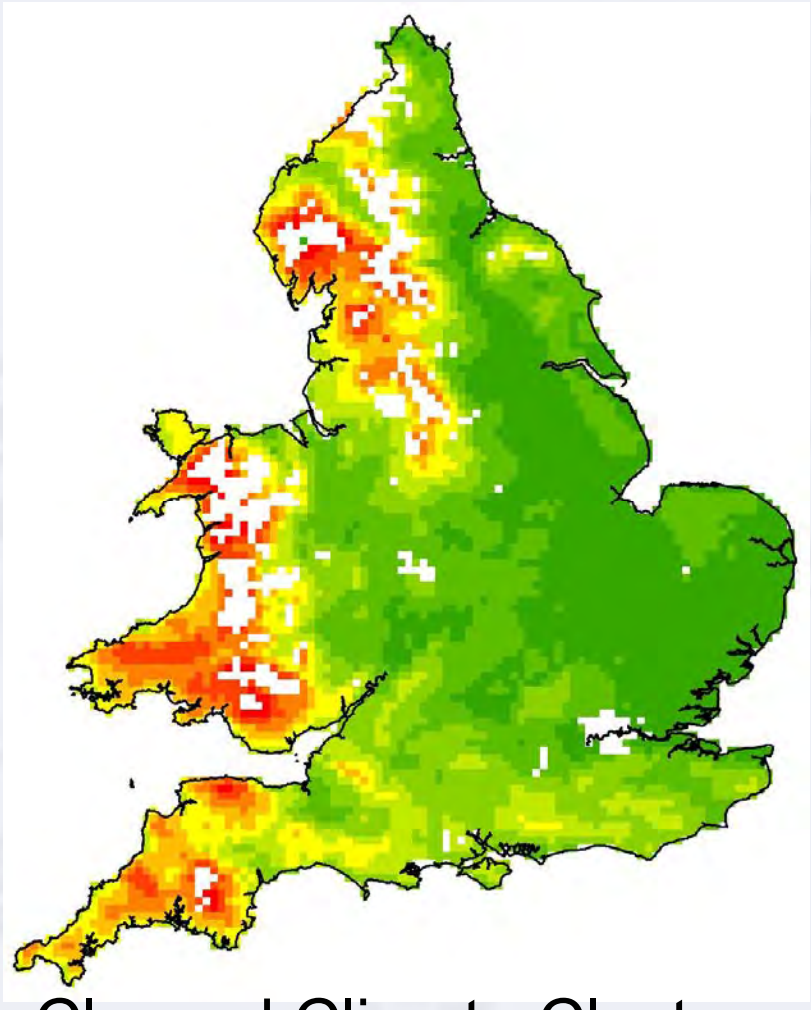


- SDII = Total rainfall / number of raindays
- 26 variables - monthly and annual total rainfall and SDII
- Dominant agricultural areas only – removed urban areas and mountain extremes
- 9 Clusters

Factors - Climate



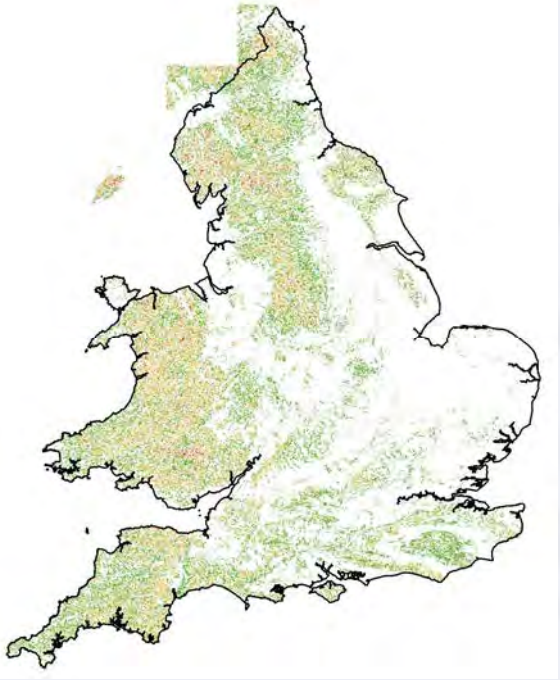
Ranked Clusters



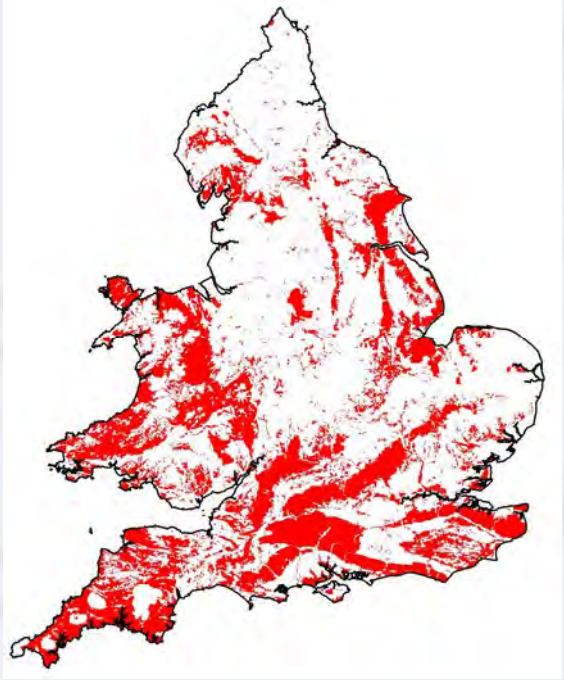
Classed Climate Clusters

Factors – Slope/Soil/Landuse

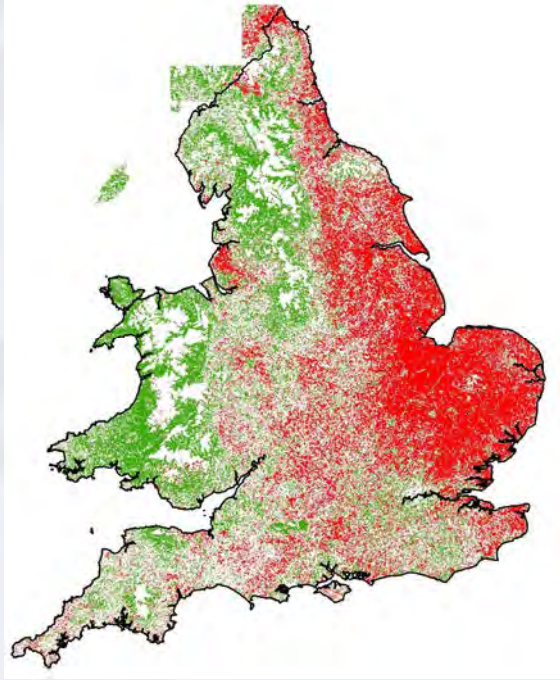
Environmental Factor	Rating (*F*)
Slope	5-12% = 3; 12-19% = 6; 19-39% = 9
Soil	All other soils = 0; R1/R3/R4 = 9
Landcover/Landuse	Managed Grass = 5; Arable = 9



Classed Slope

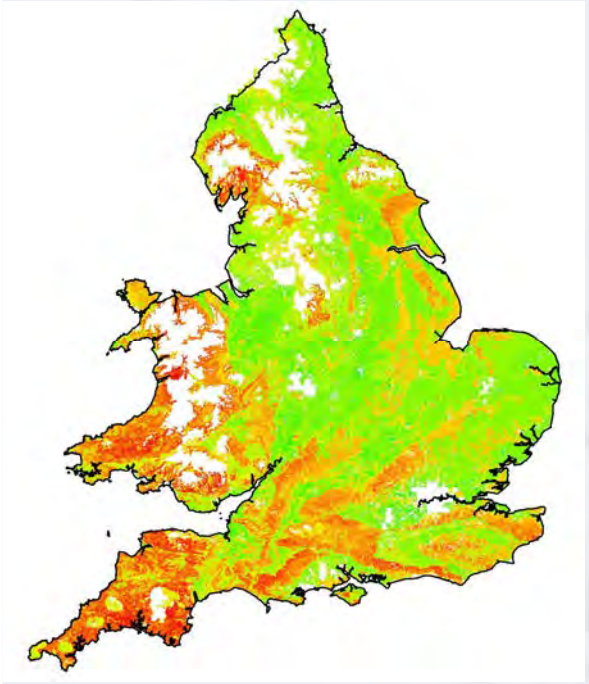


Classed Soil



Classed Land Use

Weighted Vulnerability Index



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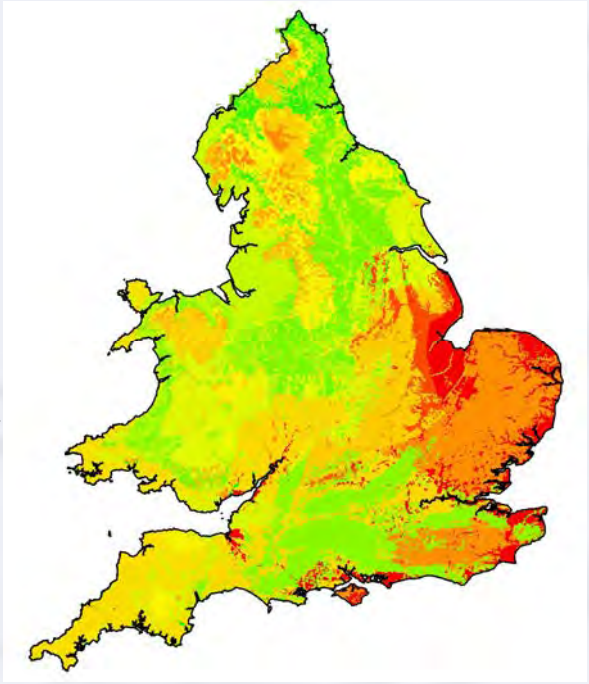

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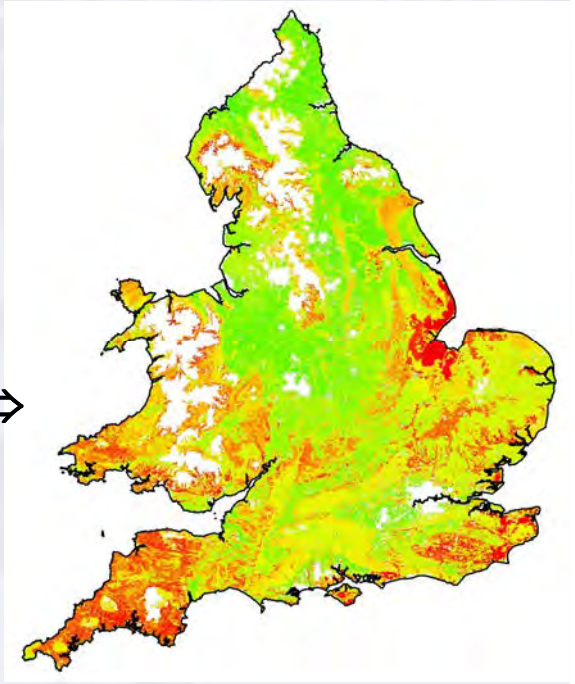
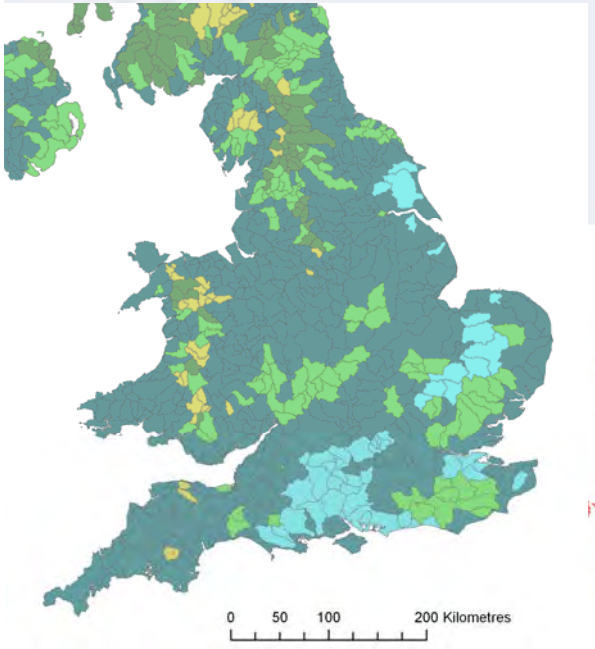
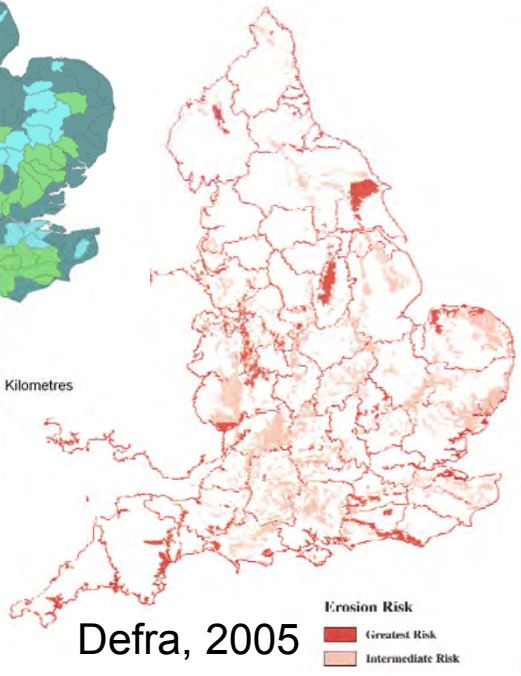


Vulnerability Index (50m) Water Body Prevalence Weighted Vulnerability Index

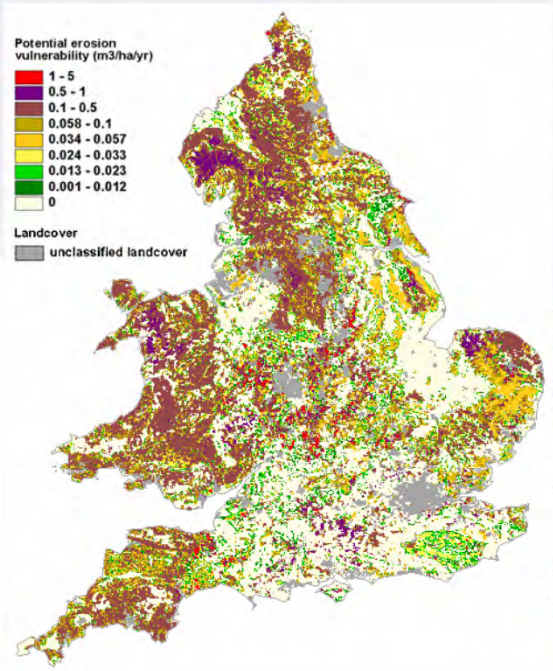
Comparison of Results



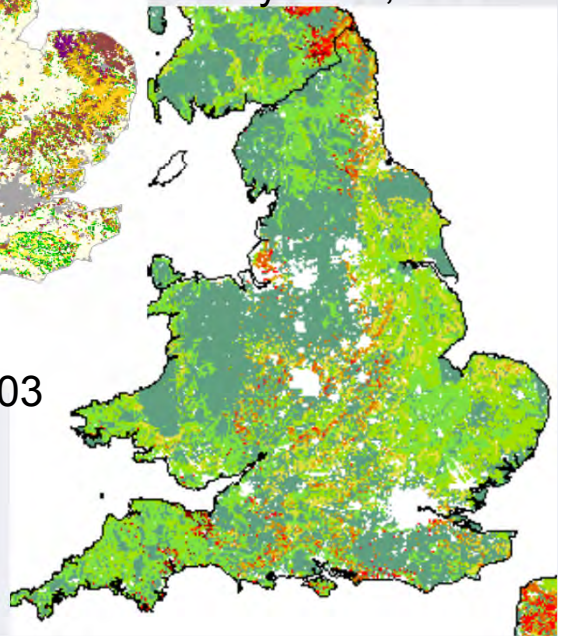
Cooper *et al*., 2003



Defra, 2005



McHugh *et al*., 2003



Kirkby *et al*., 2003

Cambridge Environmental Assessments

Field Scale Considerations

Summary

- A robust surface runoff VI has been successfully developed
- Comparison with other datasets (primarily erosion datasets) suggests the VI is realistic although direct comparison is difficult
- Field sites have been identified using the VI and more detailed spatial (10 m) and topographic analyses (e.g. slope shape) in high VI zones are currently underway
- The impact of these findings on the revised UK $FOCUS_{SW}$ scenarios (Price *et al*., 2007) is also being assessed