

Natural Flood Management (NFM) strategies and agricultural production: a meta-modelling approach

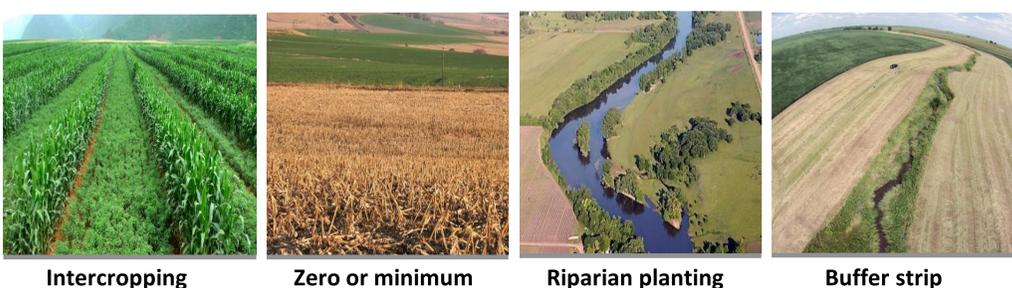
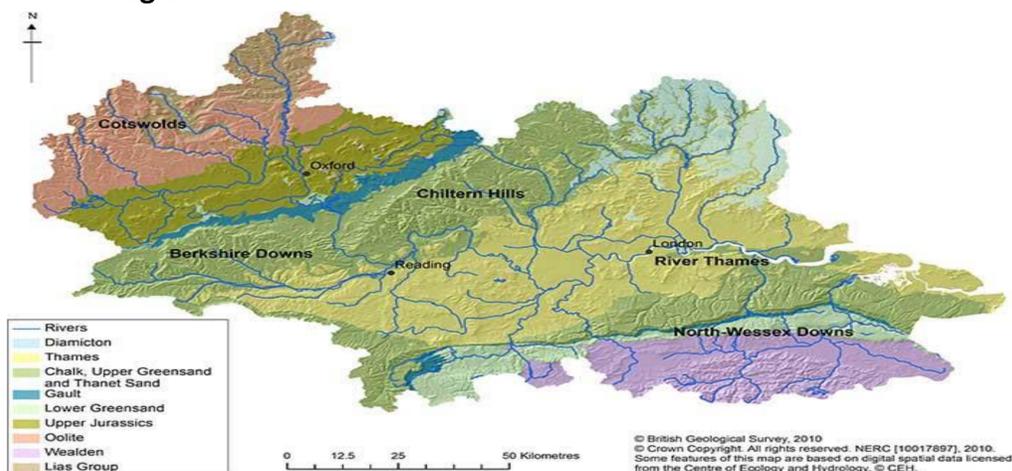
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Introduction

The research study is focused on the effect of natural flood management practices on agricultural production in the upper Thames catchment¹. In fact, farm land use offers huge potential in achieving multiple benefits like sustainable farm production and flood risk mitigates. Conventional farming practices are not only eroding our soils but also depleting soil fertility and hampering crop productivity. It is the need of hour to embrace diversification for achieving farm production in sustainable manners which also supports in flooding risk management. There is a gap in the literature where strategic management of agricultural production needs to be focused on sustainability whilst offering techniques to alleviate climate change impacts such as flood risk mitigation. The objectives of the study are as under.

❖ To explore an effective decision making tool *i.e.* meta-model for agricultural production with multiple benefits like sustainable production and natural flood risk management

❖ To interact with local farmers for identification and evaluation of effective NFM strategies



Methodology

The research study will use of range of datasets from various sources including open data bases and established data research stations in the upper Thames catchment. Time series of datasets for rainfall, temperature, existence of hardpans *etc.* and professional expert knowledge will be utilized involving mentioned steps.

Exploring a meta-model:

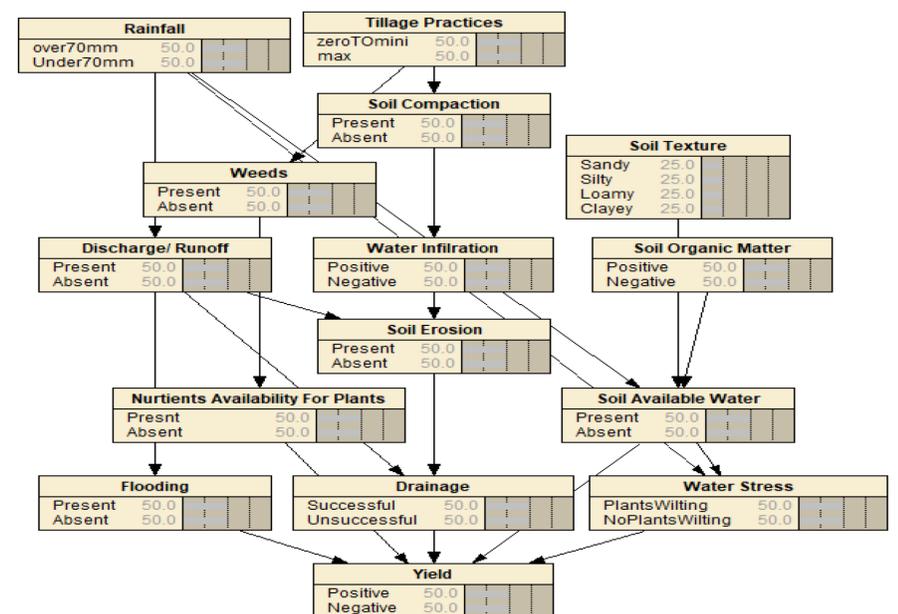
- Use of Bayesian Belief Network to evolve a meta-model offering effective & informed decision making tool

- Use of machine learning tools like coding language interpreting meaningful results from range of datasets from interacting variables to have their predictive impacts
- To explore quantifying effects of various natural flood management scenario upon farm production

Interaction with local farmers:

- Interviewing local farmers for consultation of various interactions
- To explore evidence from those interacting variables
- To discover effective NFM strategies for successful implementation solutions

Indicative Bayes' Net model for tillage practices:



Expected Results

We expect to identify the effect of a range of NFM strategies on agricultural production in the catchment. The strategies may likely involve type of farming practices or and land use. We will consider feasible application or implementation of these strategies in terms of achieving economic farm yield for farmers who need to maintain the profitability of their farm businesses.

However, it is expected that some successful NFM strategies may offer win-win solutions towards reasonable economic yield and flood management. This can potentially be impactful for natural flood risk mitigates at the same time. For example, intercropping can offer direct impact while tillage practices as indirect impact towards farm potential yield based of land use farming practices in the catchment.

References

¹Dadson SJ., *et. al.*, (2017) A restatement of the natural science evidence concerning catchment-based 'natural' flood management in the UK. *Proc. R. Soc. A* **473**: 20160706.

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