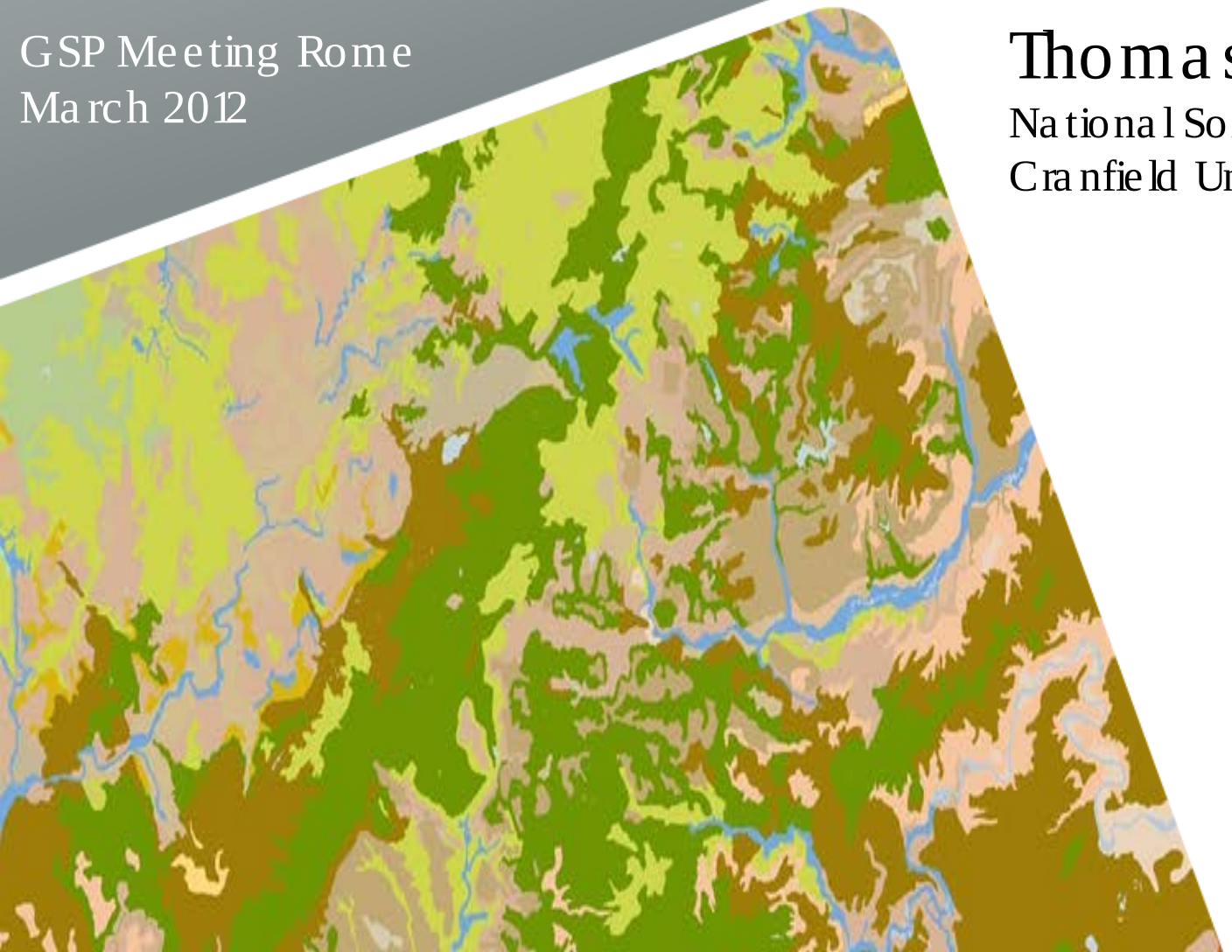
Digital Soil Assessment

-from data to information and knowledge

GSP Meeting Rome
March 2012



Thomas Mayr
National Soil Resources Institute
Cranfield University

Cranfield UNIVERSITY

Rationalisation and harmonisation of soil legacy data
(Jack Hannam)

Digital soil assessment for class and property information

Soil information systems meeting stakeholder requirements
(Steve Hallett)

From data, to information and knowledge

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Soils Data - For Who and For What??

- **Soil mapping**, enabling the identification of areas of land for optimal management purposes.
- **Soil inventories**, providing soil condition assessment of soil conditions, and **soil monitoring**, providing assessments showing soil conditions varying in time.
- **Soil thematic mapping,** providing for policy-relevant maps for soil protection and environmental reporting.

INSPIRE Data Specification on soil

Soil Mapping

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The Challenge

- 1:250,000 soil map for the Republic of Ireland
- 40 % coverage field mapping
- No national soil classification system

The Solution

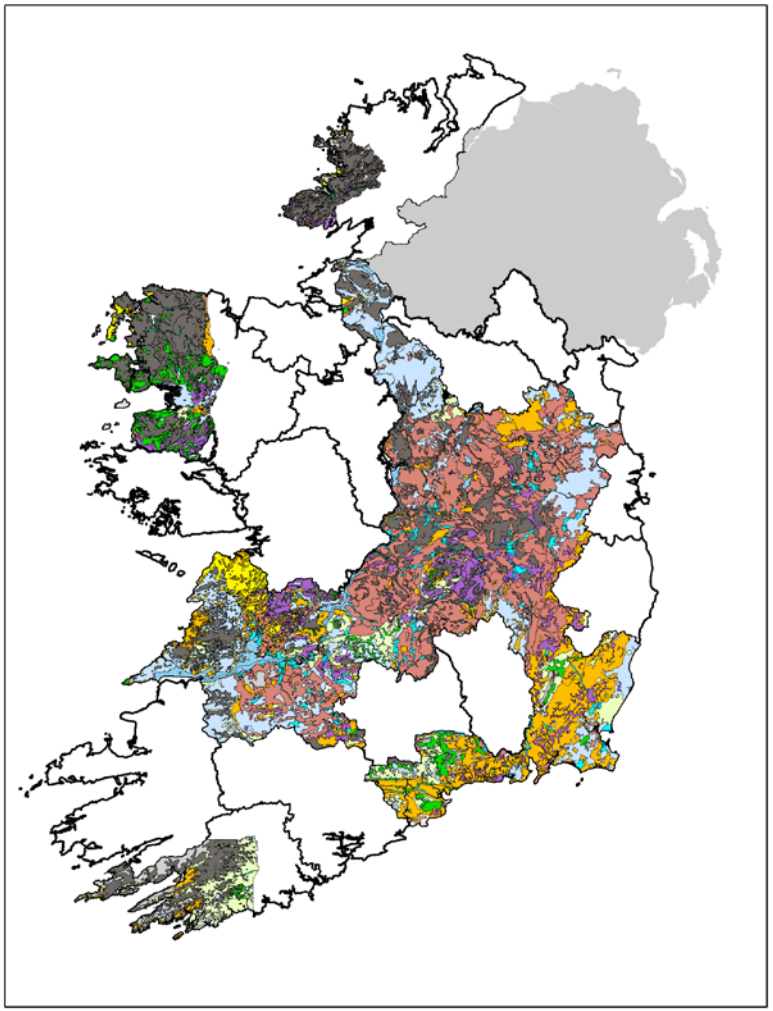
- Rationalisation and harmonisation of legacy soil maps
- Stratification of landscape
- Predictive Mapping
- Validation

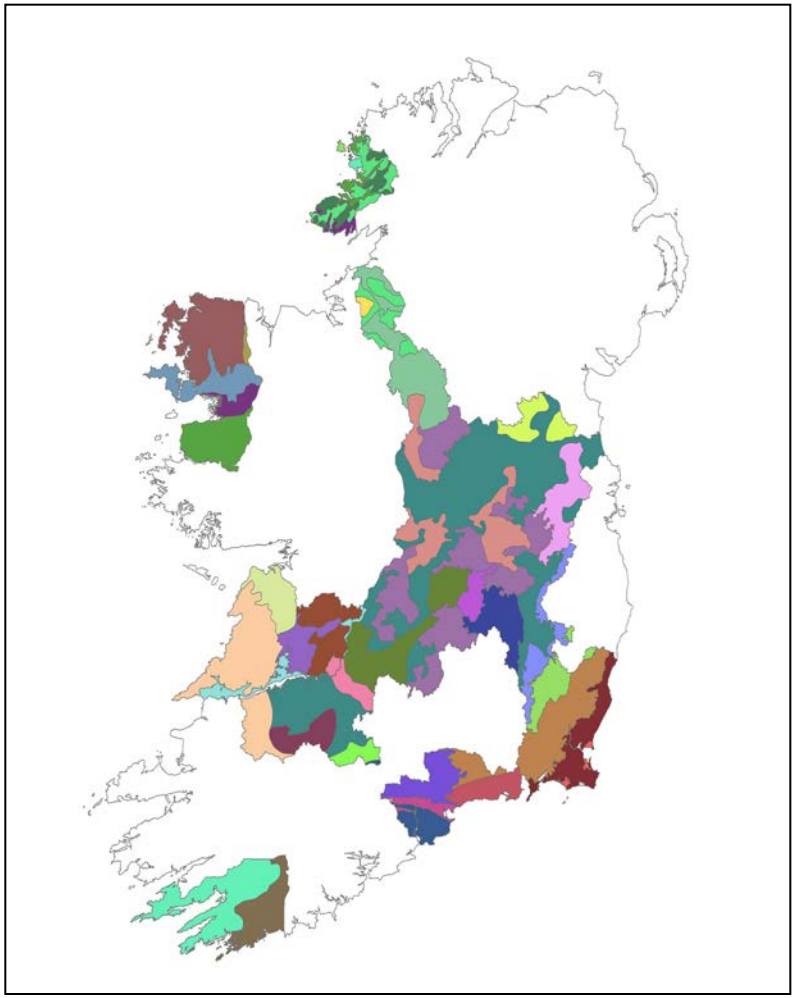
Stratification

Irish Soil Information System

Environmental Protection Agency

The Science of Farming and Food



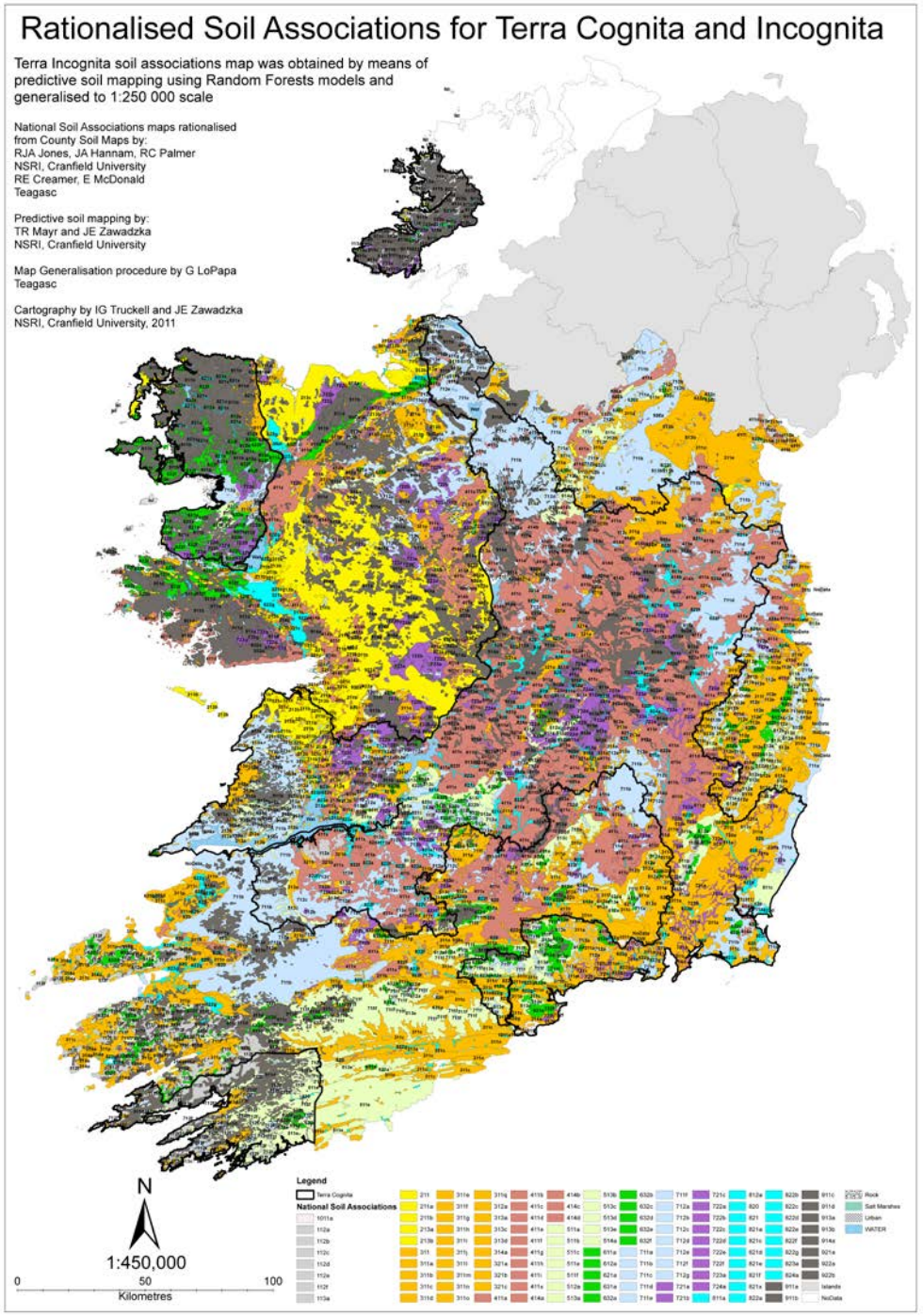


Predictive Mapping

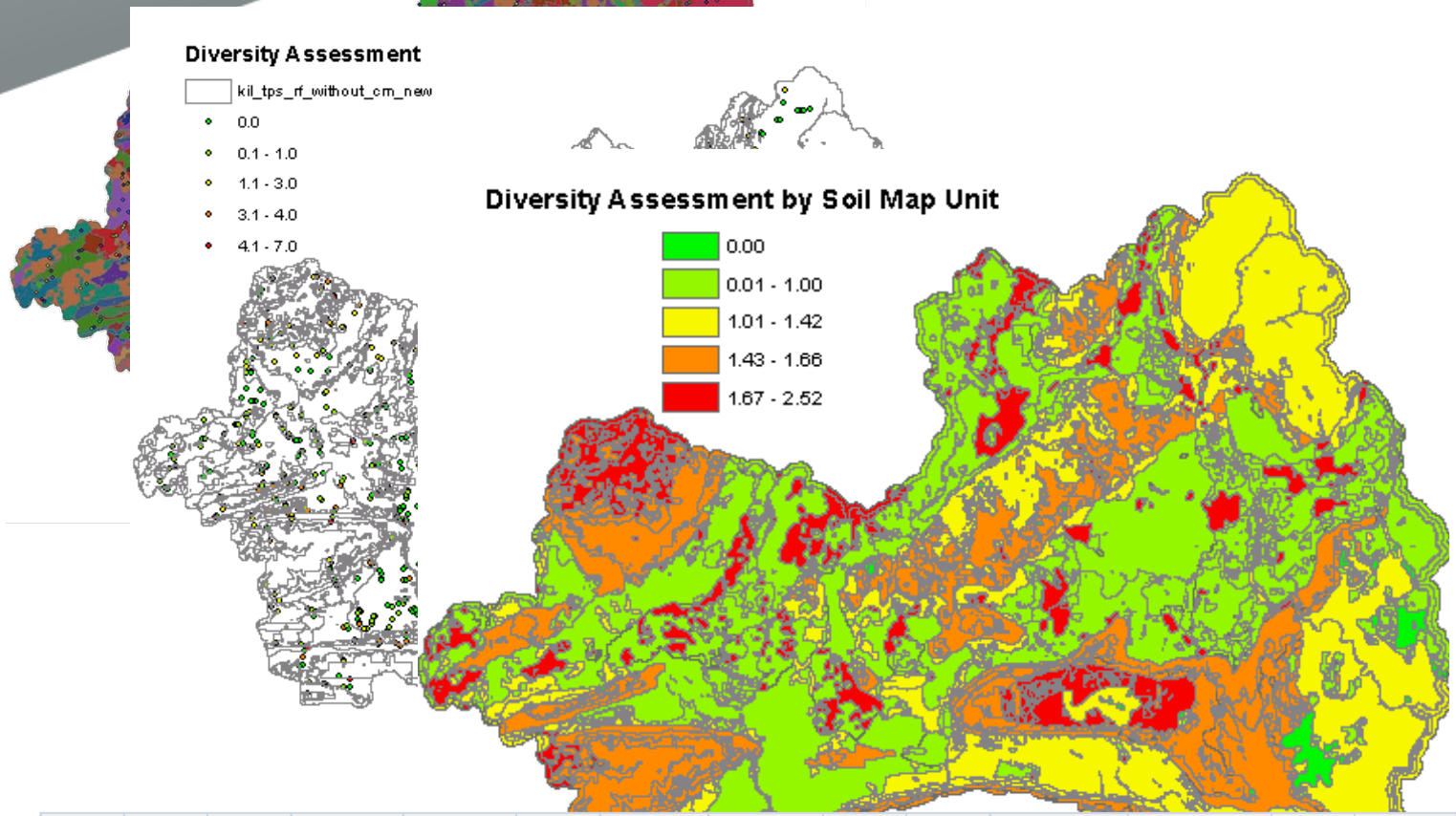
Irish Soil Information System

Environmental Protection Agency

The Science of Farming and Food



Validation



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INSPIRE Data Specification on soil

Soil inventories

The Challenge

- Mapping of carbon stocks

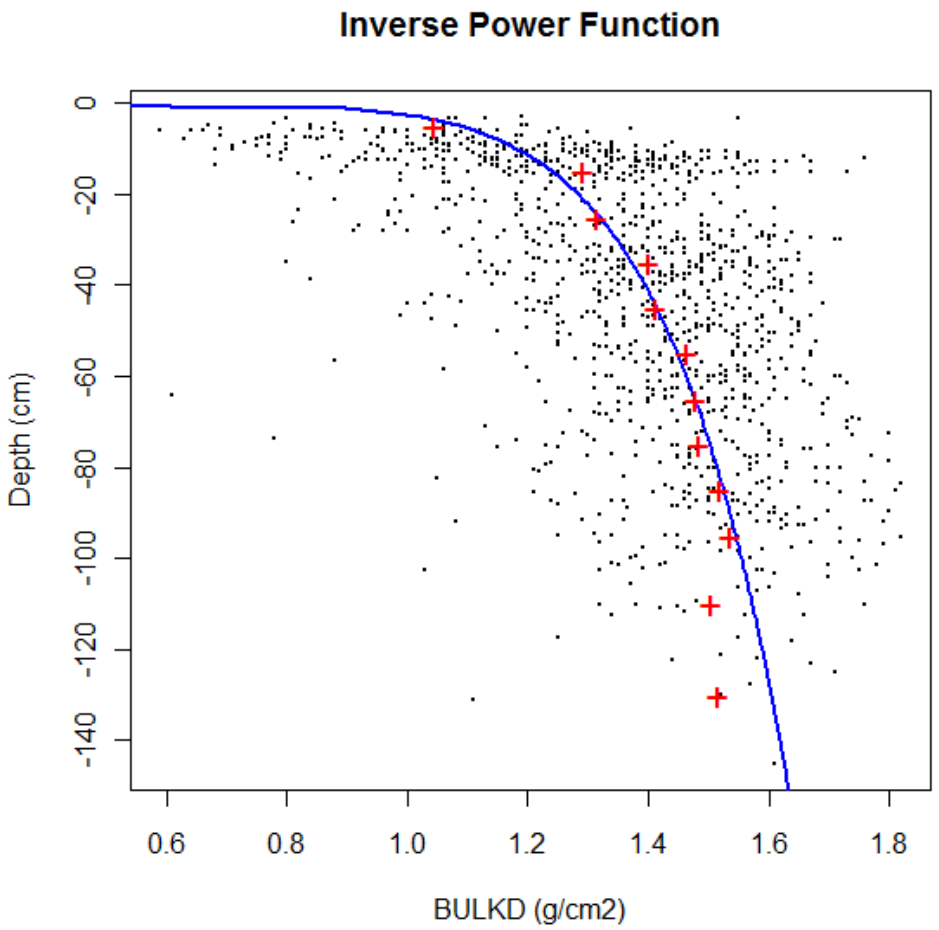
The Solution

- Depth functions for characterising organic carbon and bulk density
- Predictive mapping of coefficients

Bulk density

- Inverse Power Function for BD:

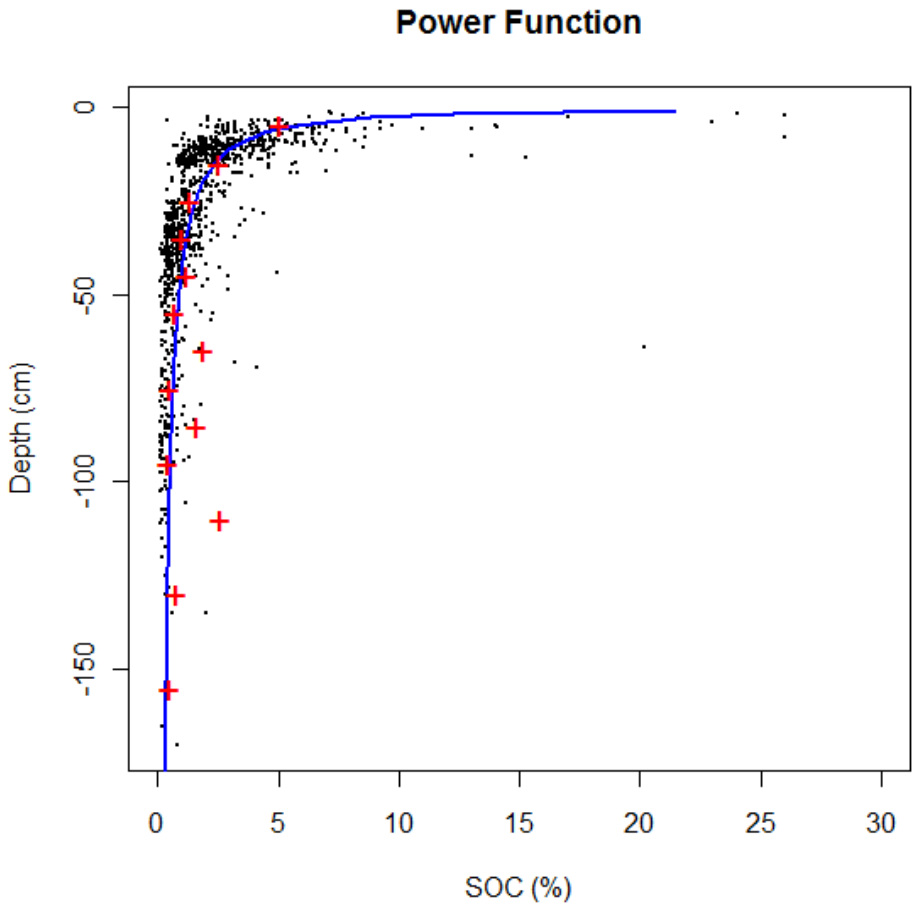
$$f(x) = \frac{1}{a \cdot x^{b}}$$



Soil organic carbon

- Power function for SOC:

$$f(x) = a \cdot x^{b}$$



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Thematic mapping

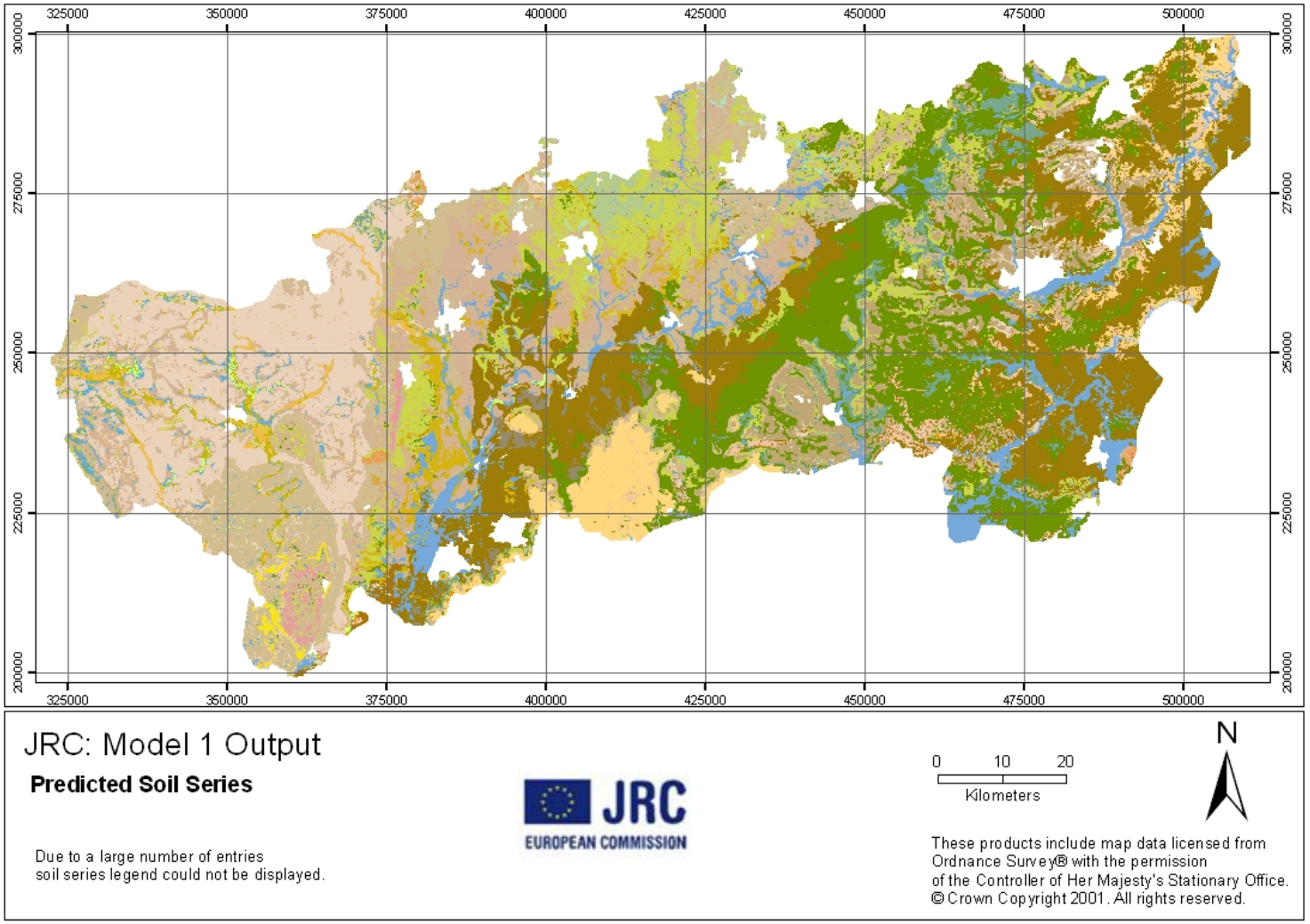
The Challenge

- Biomass production potential

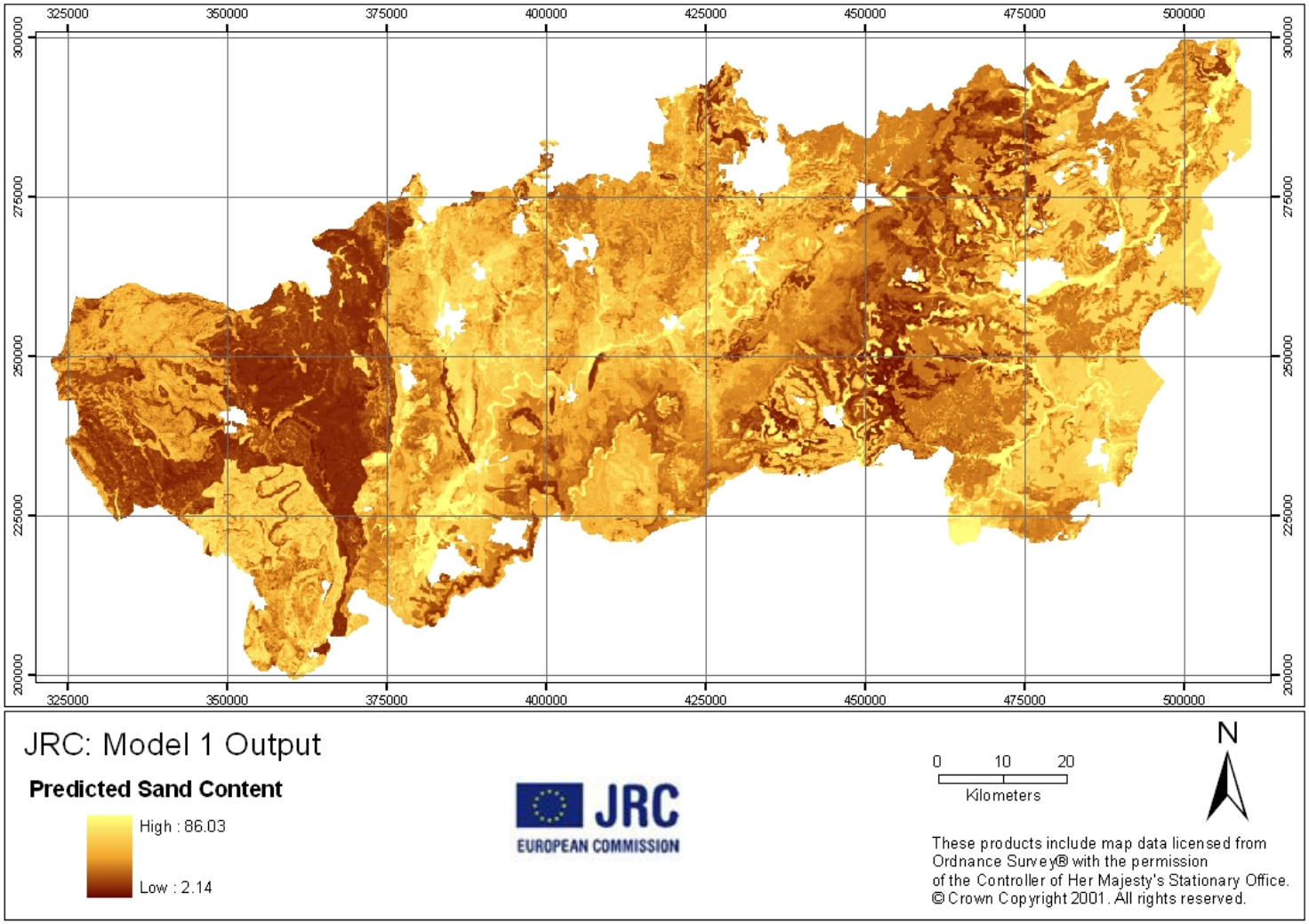
The Solution

- Rationalisation and harmonisation
- Stratification
- 2-step mapping approach
- Pedotransfer functions and yield models to estimate biomass production

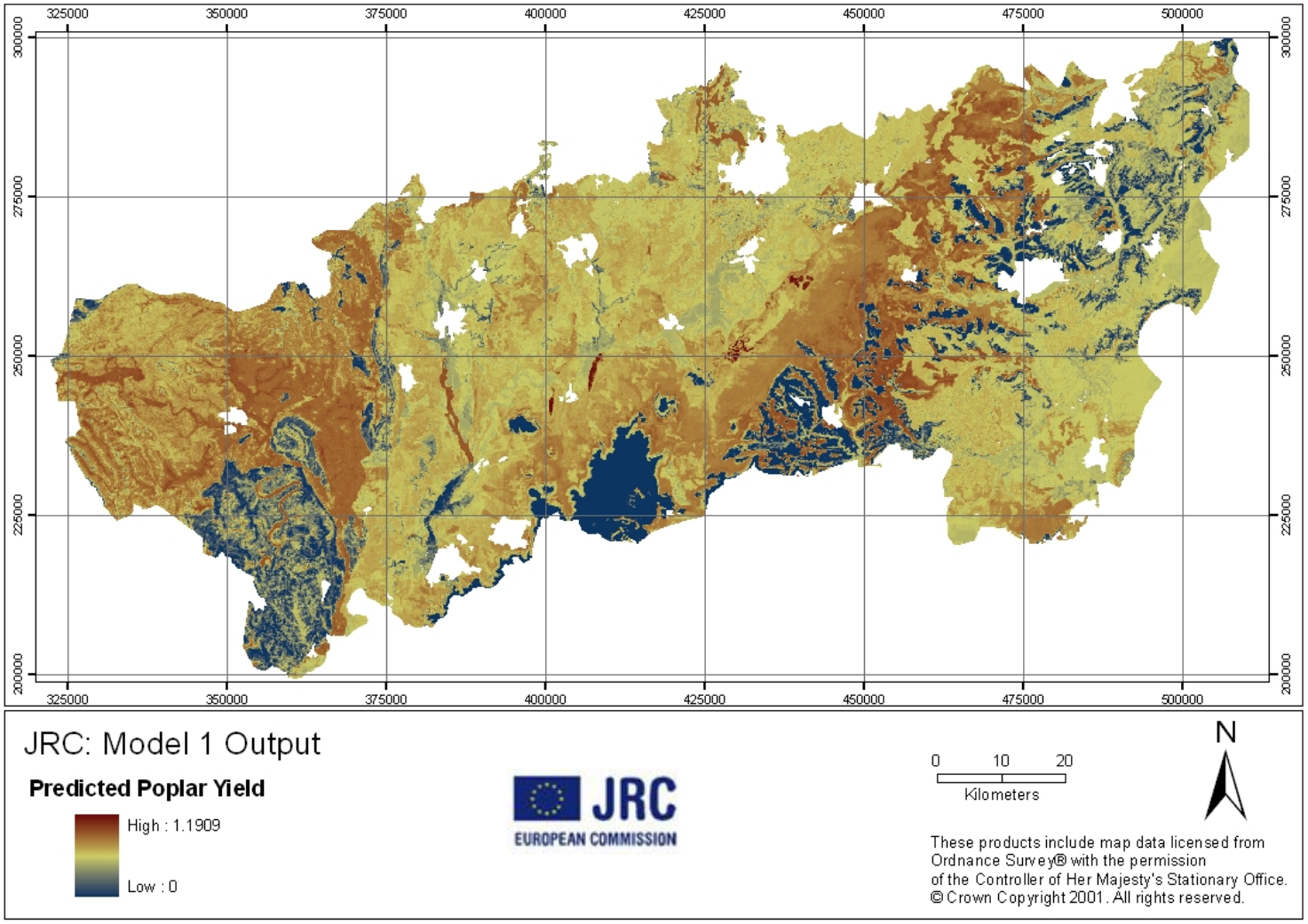
Soil class mapping



Primary property mapping



Biomass mapping



Soil Functions

The Challenge

- Multi-functionality of soils

The Solution

- Digital Soil Mapping
- Individual soil functions
- Multi-functionality of soils

Soil functions

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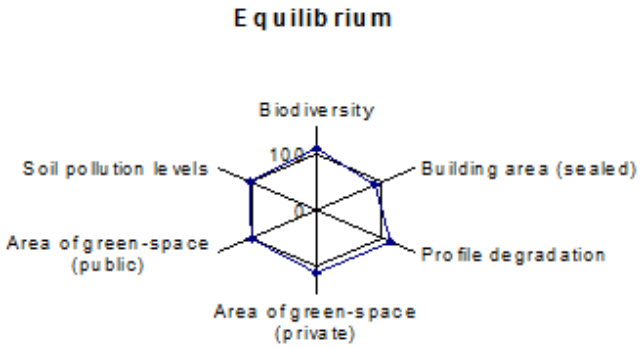
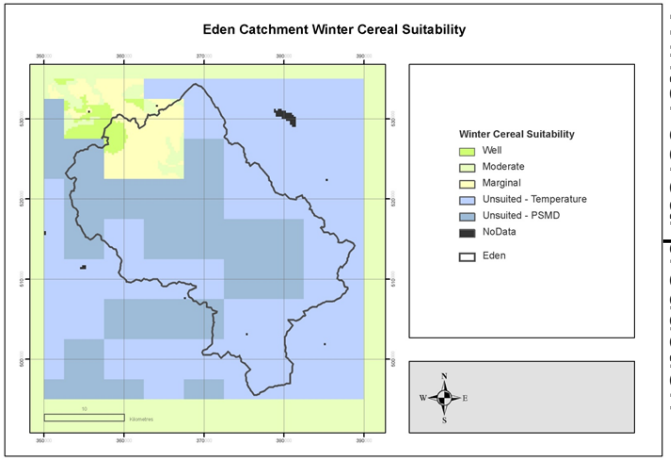
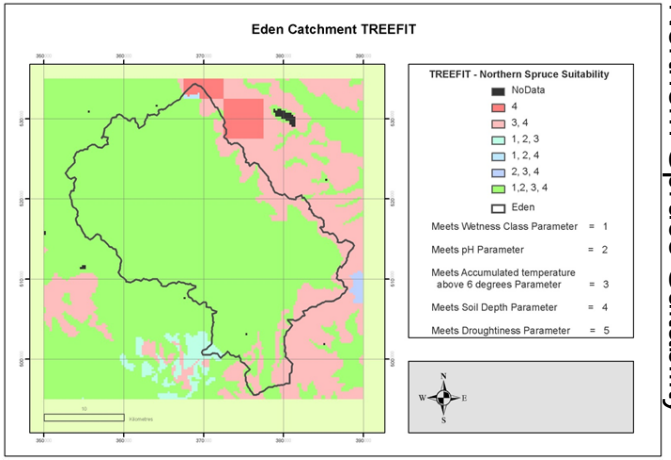


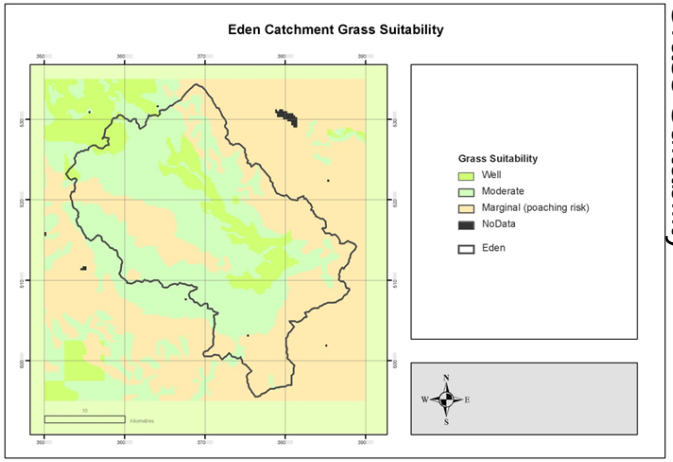
Soil Functions mapping



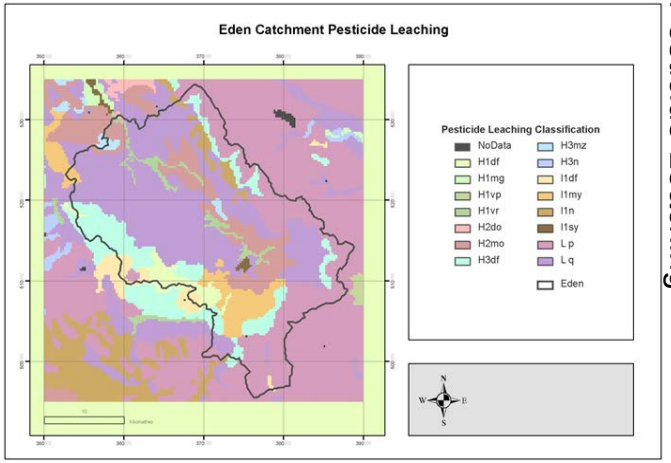
Winter cereal production



Northern Spruce Suitability



Grass Suitability



Pesticide Leaching

defra Department for Environment Food and Rural Affairs

SCOTTISH EXECUTIVE Environment and Rural Affairs Department

CEH Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL

The James Hutton Institute

www.cranfield.ac.uk

Multifunctionality of soils

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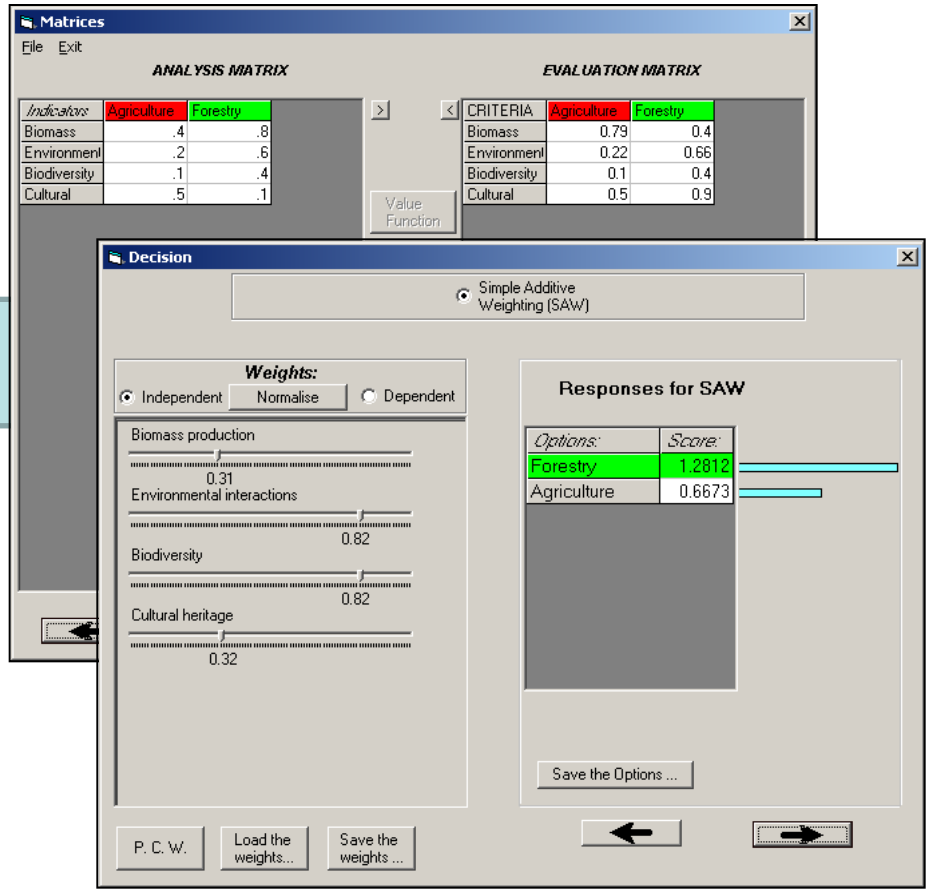

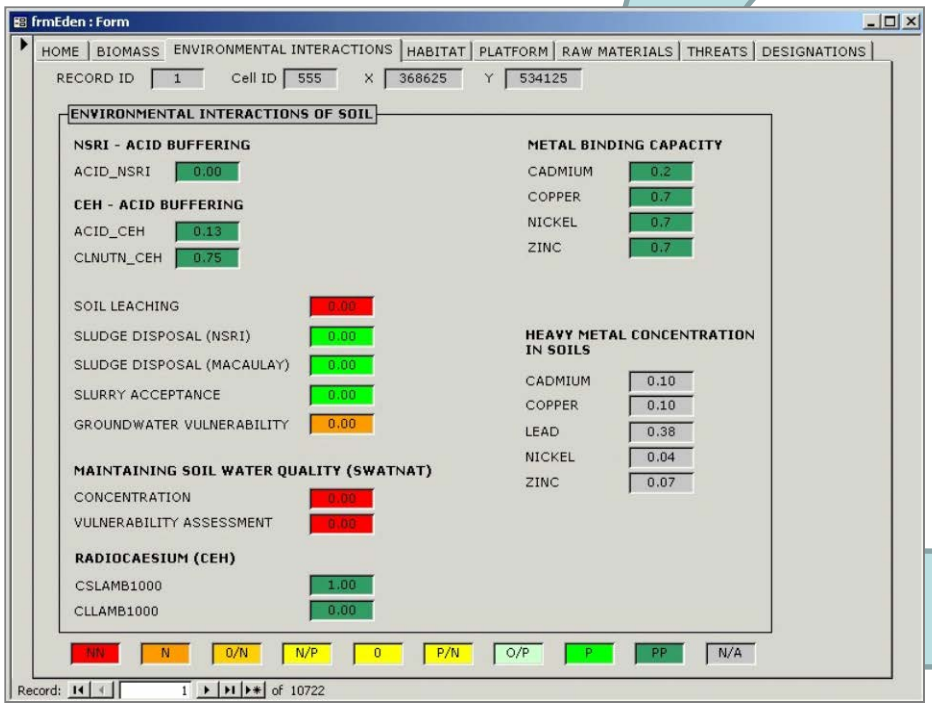

Soil Multifunctionality

Biomass production

Environmental Interactions

Biodiversity

Cultural heritage

etc..

Summary

There is still a lot of life in legacy data - “boots on the ground”

Lixic Vertic Ferralsol (Ferric, Rhodic)

Need more “pedo” in “pedometrics”

Any Digital Soil Mapping programme will fail if it is not supported by pedologists/surveyors