Guidance or regulation in soil management – analysis of the system by DPSIR

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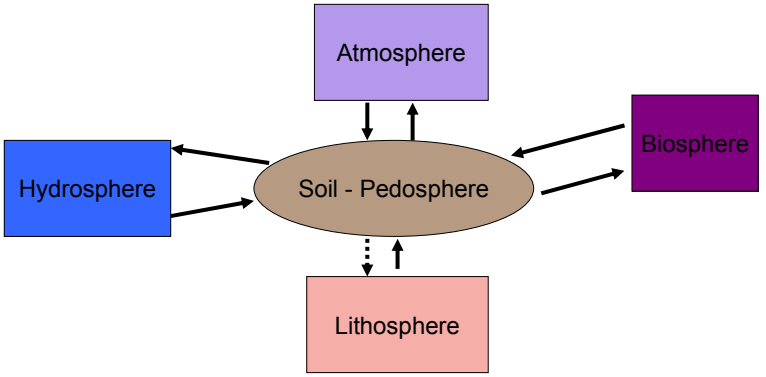
Soils at the Interface Natural system



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Soil is a finite, non-renewable resource!

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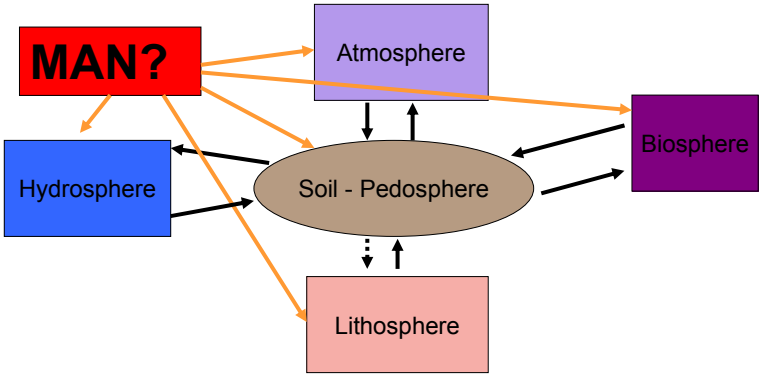
Our Impact on the Natural System?



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Soil Functions 1

Ecological Functions

- Production of Biomass → a. human food b. fodder c. renewable energy d. raw materials
- Filtering, buffering and transformation – between the atmosphere – ground water – plant cover (protection of humans and the environment)
- Regulation of the flux of water, gases and energy
- Biological habitat and gene reserve –the basis for terrestrial ecosystems

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Soil Functions 2

Technical, Industrial and socio-economic functions

- Platform for development of technical, industrial and socio-economic structures and their development (e.g. industry, housing, transport, sport and recreation, etc.)
- Source of geogenic energy, raw materials such as clay, sand, gravel, etc.
- A reservoir for water
- Geogenic and cultural heritage – influencing landscape and an essential part of landscape

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Priorities (threats) in the EC Soil Thematic Strategy

- Erosion
- Decline in soil organic matter
- Soil contamination (local and diffuse)
- Soil sealing
- Soil compaction
- Decline in soil biodiversity
- Salinisation
- Floods and landslides

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Soil erosion in England

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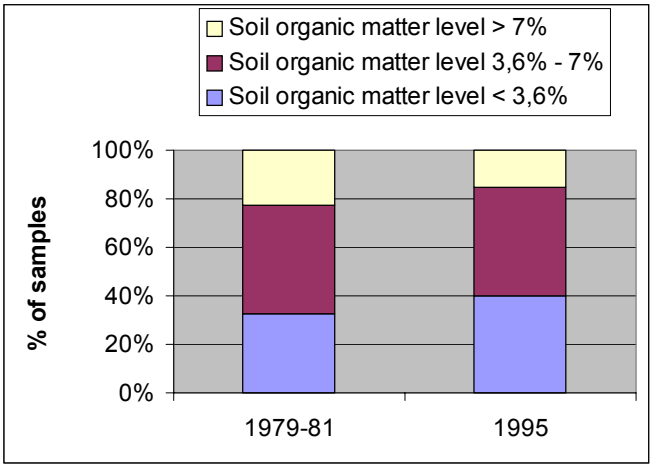
SOM decline in England and Wales



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Soil contamination in Devon

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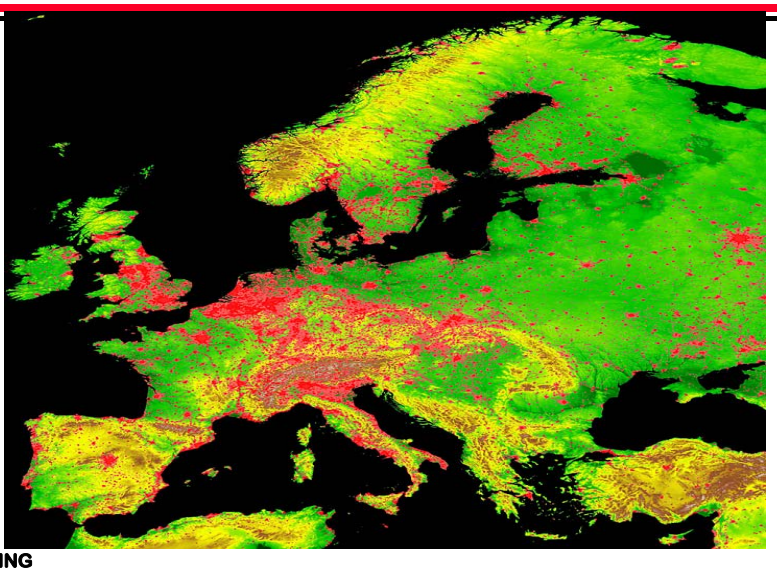

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Soil compaction leading to waterlogging

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Reversible and Irreversible Threats

Irreversible

Sealing through urbanisation and industrialisation; intensive local and diffuse contamination; erosion by water and wind; deep reaching compaction; landslides

Reversible or potentially so

Decline in SOM; Loss of biodiversity; salinisation; alkalinisation

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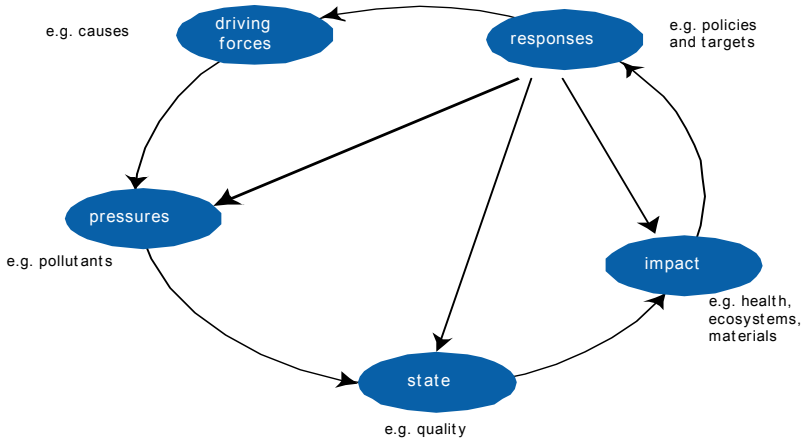
The DPSIR Framework



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Drivers

- Human population
- Land development
- Tourism
- Agricultural Production
- Transport
- Industrial Energy
- Climate Change
- Water Stress

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Pressures

- Emission to air, water and land
- Urban expansion (soil sealing)
- Construction
- Deforestation
- Nutrient Mining

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State

Soil Degradation

Local and diffuse contamination
Soil acidification
Salinisation
Nutrient load (eutrophication)
Nutrient depletion
Physical degradation
Biological degradation

Soil Loss

Soil sealing
Soil erosion
Large scale land movements

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Impacts

Indirect (effects on other media)

Changes in population size and distribution
Loss of biodiversity
Climate Change
Water stress

Direct

Changes in soil function

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Response

Primary Protection

Conventions e.g. Desertification, Biodiversity

Development of national, regional soil protection policy (land stewardship)

Secondary Protection

Reform of agricultural programme

Specific regulation or directives

Good Agricultural Practice

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Do we need regulation or guidance?

The **soil** is probably the farmer's most valuable resource.

Without the **soil** the farmer will not be able to farm.

Can the farmer afford to misuse the **soil**?

Surely we should be aiming to provide **guidance to the farmer** to maintain the soil resource base?

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Soil degradation an example

Nutrient depletion

Driver – Poor market conditions for commodities

Pressure – Nutrient mining and insufficient addition of fertilisers or other nutrients

State – Depleted soil

Impacts – Reduction in soil quality, lower harvests, reduced returns

Response – Changing market conditions, changing land use

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Where does this leave us?

Do we need regulation?

If we allow the land resource to reduce in quality there are no winners.

Maintenance of good soil quality and linked to this production does not need regulation – it is simply sensible **best practice.**

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GAEC the way forward

Guidance on what constitutes Good Agricultural and Environmental Condition seems to satisfy all needs.

Soil is easily damaged, it has an in built resilience. Do we know when this resilience is exceeded?

It is the best interest of the farmer to maintain the soil in the best condition.

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Some considerations to protect the soil - 1

Rotations:-

The ideal rotation would include a balance of crops from different crop groups:-

- Cereals
- Legumes
- Root crops
- Broad leaved arable crops

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Some considerations to protect the soil - 2

A Diverse Crop rotation:-

- Breaks cycle of pests and disease
- Improves weed control options
- Provides cover to prevent erosion
- Improves nutrient cycling and crop conditions

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Some considerations to protect the soil - 3

Soil concerns

- Manage residues from previous crops
- Cultivation – seek to maintain good structure (including timing)
- Compaction (at harvest e.g. root crops on wet soils)

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Some considerations to protect the soil - 4

Nutrients

- Need nutrient budget through the years
- Spring rape generally has low N demand
- Legumes fix N – returned to soil in residues
- Careful application of manures

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Incentives?

- Agri-environment payments
- Maintain agricultural production
- Minimise additional land management costs
- Maintain soil's resilience or robustness under adverse environmental conditions

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Conclusion

1. Soil is the farmer's most valuable resource.
2. The task is to provide the guidance to the farmer to ensure that the soil resource value is maintained or improved.

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Thank you!

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