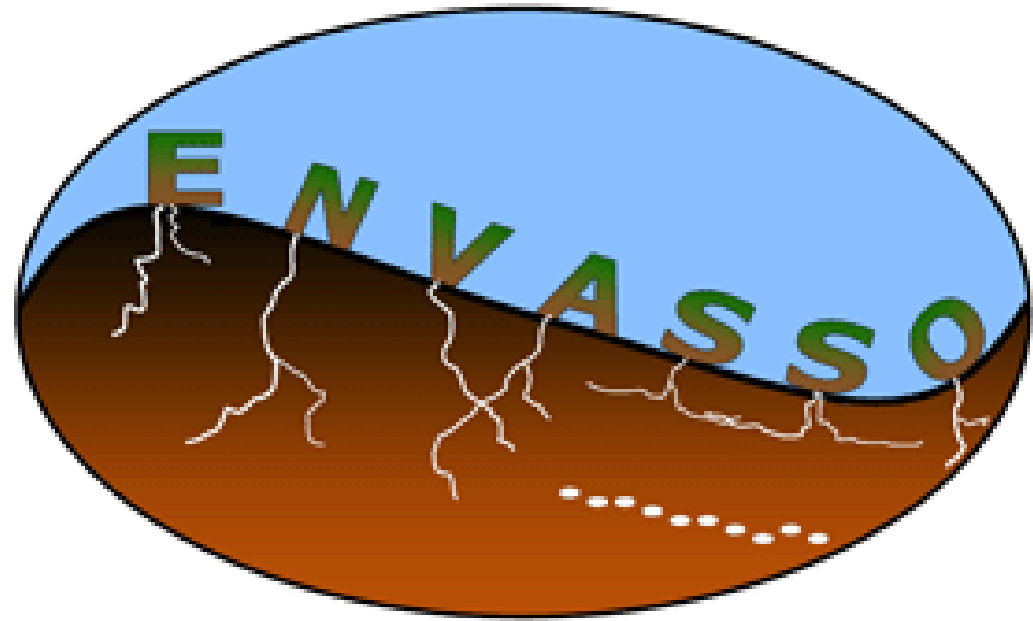


# ENVASSO ESBN Plenary 2008

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# ENVASSO outputs

- A framework for continental-scale monitoring of European soils
  - 1 site per 300 km<sup>2</sup> ; repeat sampling at 10 year intervals
  - 27 indicators defined for erosion, organic matter decline, contamination, compaction, salinisation, decline in biodiversity, soil sealing, landslides and desertification
  - Qualified indicators ready for early implementation covering soil erosion by water, decline in soil organic matter, soil contamination, soil sealing, compaction, salinisation and desertification.
- Recommendation: a tiered approach to European-wide soil monitoring, with the more resource-intensive parameters included in a second tier

# Soil Monitoring Networks (SMN)

- Harmonisation and co-ordination are essential in view of the present heterogeneity of SMNs in Europe.
- Where existing member state SMNs are sufficiently dense (1 site per 300 km<sup>2</sup>) the requirement is to include additional parameters to allow a full set of indicator estimations. For many member state SMNs, however, new sites are also required.

# Sampling conclusions

- Selecting an area for sampling, ranging from 100 m<sup>2</sup> to 1 ha and being homogeneous with regard to soil profile development.
- Take at least 4 subsamples, and adapt sub-sampling density by taking from 10 to 100 subsamples depending on the size of the site. Record the exact location of cores within the sampling plot to avoid these same locations in a future re-sampling campaign.
- Generally, use fixed-depth increments for core sampling rather than sampling of identified pedogenic horizons.

# Sites to complete network

	Total
Austria	0
Belgium	0
Bulgaria	12
Czech Republic	0
Denmark	2
England & Wales	2
Estonia	21
Finland	209
France	452
Germany	205
Greece	330
Hungary	0
Ireland	0
Italy	656
Latvia	89
Lithuania	79
Luxemburg	0
Malta	0
Netherlands	2
Northern Ireland	0
Norway	417
Poland	247
Portugal	38
Romania	14
Scotland	4
Slovakia	0
Slovenia	0
Spain	914
Sweden	407
TOTAL	4100

Number of new sites needed to reach the minimum density of 1 site per 300 km<sup>2</sup>

# Sampling interval

- If the maximum re-sampling interval is 10 years, this would allow nearly all the SMNs to be incorporated into a common framework
- Reducing the re-sampling interval to less than 10 years will not deliver much more reliable rates of parameter change

# SoDa (Soil Database)

- Harmonisation and inter-operational effectiveness requires communication between databases that have: varying approaches to storage of repeated measurements, descriptions and meta data; variety in parameter selection.
- A set of generic design principles and the development of a model solution were implemented in SoDa

# Priority Indicators

- Available
  - Agreed definition
  - Agreed measurement methodology
  - Pilots completed (28 in total)
- Non-available
  - Agreed definition
  - Measurement methodology not qualified



# Indicators classification

- Green – established networks already exist
- Blue – rely on current remote-sensing and models
- Brown – require statistical inventories
- Purple – spatial-temporal variation is high and / or measurements are complex
- Red – inadequate measurement methods

# Non-available indicators

Issue	Indicator
Wind erosion	Estimated soil loss
Tillage erosion	Estimated soil loss
Soil organic matter status	Peat stocks
Landslides	Occurrence of landslide activity
	Volume / mass of displaced material
	Landslide hazard assessment

# Available indicators: soil condition 1

Issue	Indicator(s)
Water erosion	Estimated soil loss by rill, inter-rill, and sheet erosion
Soil organic matter status	Topsoil organic carbon content (measured)
	Soil organic carbon stocks (measured)
Diffuse contamination	Heavy metal contents in soils
	Critical load exceedance by S and N

# Available indicators: soil condition 2

Issue	Indicator
Compaction and structural degradation	Density
	Air-filled pore volume at specified suction
Causes of compaction	Vulnerability to compaction
Species diversity	Earthworm diversity and biomass
	Collembola diversity
Soil microbial respiration	Microbial respiration

# Available indicators: soil condition 3

Issue	Indicator(s)
Soil salinisation	Salt profile
	Exchangeable sodium percentage
	Potential salt sources

# Indicators: Built-environment

Issue	Indicator(s)
Local soil contamination	Progress in management of contaminated sites
Soil sealing	Sealed area
Land consumption	Land take [to urban and infrastructural development]
Brownfield re-development	New settlement area established on previously developed land

# Indicators: Desertification

Issue	Indicator(s)
Desertification	Land area at risk of desertification
	Land area burnt by wildfire

# “Oven-ready” soil condition indicators

- **Water erosion** (estimated via modelling with land cover change as driver for change)
- **Sealed area** (via remote sensing)
- **Land take** (via remote sensing)
- **Topsoil organic carbon contents**
- **Heavy metal contents in soils**
- **Critical load exceedance by S and N**



# Recommendation 1

- Establish a first tier network with a site density of 1 per 300 km<sup>2</sup>, for estimation of green and blue indicators.

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- Establish a first tier network with a site density of 1 per 300 km<sup>2</sup>, for estimation of green and blue indicators.
- Establish a second tier (sub-set of first tier)
  - for indicators requiring demanding measurement procedures (e.g. some biological, gaseous flux and physical measurements, including measurement of soil erosion)
  - intensive sampling to describe soil processes (e.g. detailed assessment of sub-soil and lower horizons, or connectivity to landscape processes such as catchment inputs and outputs)
  - special investigations of error sources
  - proficiency exercises to assess variability associated with different field teams (e.g. estimates of stone contents and texture).
  - The second tier network could also provide reference sites for soil typological units

Thank you