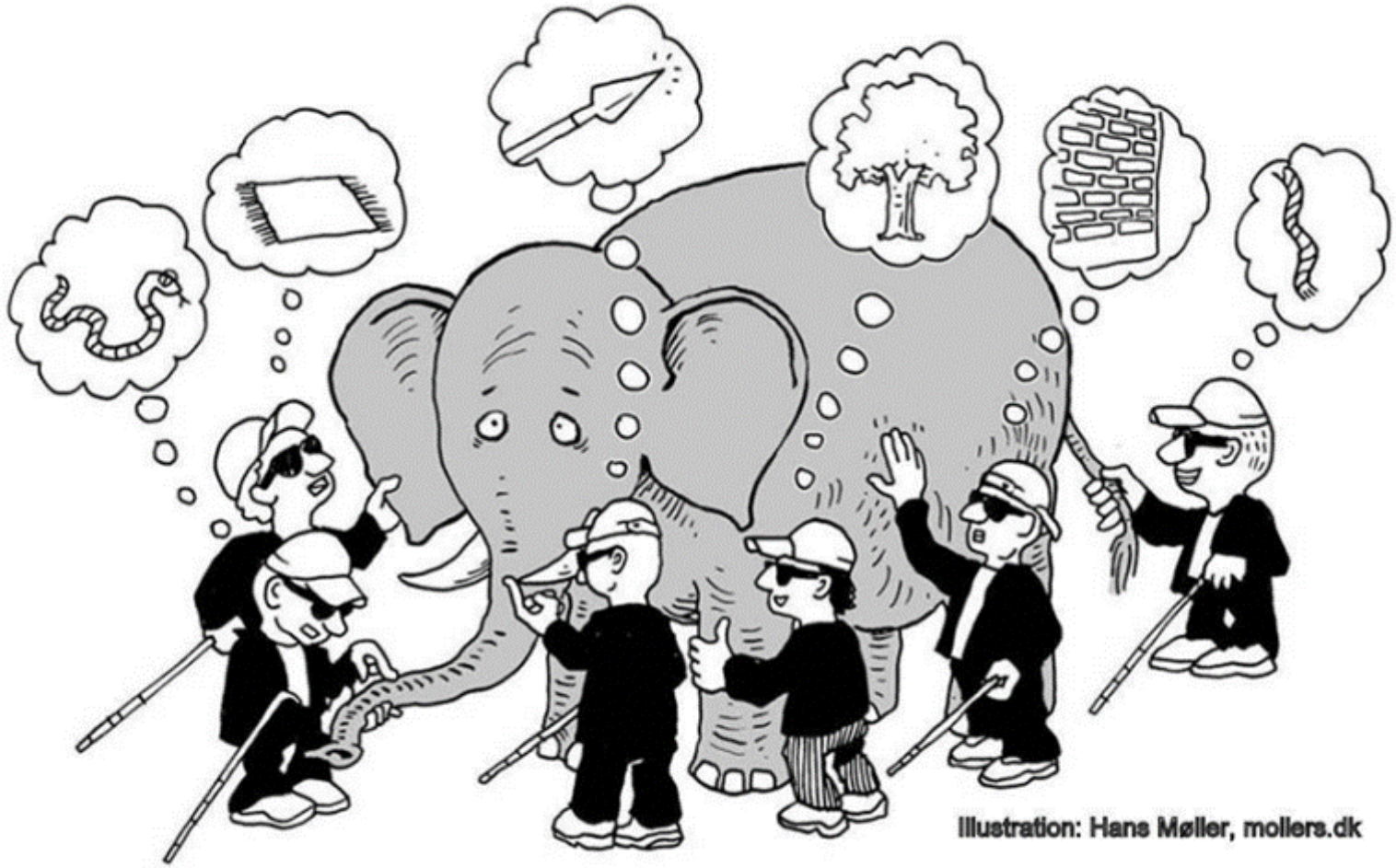
# Soil Monitoring Directive

Fenny van Egmond & Janjo de Haan

EJP SOIL
European Joint Programme

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652615.

# Bodemkwaliteitsbeoordelingen
## *Blinden op zoek naar de heilige graal*

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# WP6 Supporting harmonised soil information and reporting

EU Soil Policies for soil protection

Request for soil indicators

**CURRENT SITUATION**

ESDAC EU-WIDE SOIL MAPS & LUCAS SOIL MONITORING

May not be representative

NATIONAL SOIL MAPS & SOIL MONITORING

Not EU-Harmonised

EJP SOIL WP6

**SUPPORTING EUSO**

**EJP SOIL TECHNICAL SOLUTION**

EU-WIDE HARMONISED NATIONAL SOIL MAPS & SOIL MONITORING. WITH LUCAS AS *DE FACTO* STANDARD

MEMBER STATES DECISION

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# EU - Soil Policy after failed attempt in 2006

## Soil Strategy 2030 (adopted 2021)

### Vision and definition for healthy soil

- **Soil health**: good chemical, biological and physical condition and provision of as many ecosystem services as possible
- By 2050, soils are healthy and resilient, which requires decisive change.
- Protection, sustainable use and restoration of soil becomes the norm.
- Solution for climate neutrality, clean circular economy, biodiversity loss, protection of human health, desertification and land degradation.

European Commission

## Soil Monitoring and Resilience Directive (proposal 5 July 2023)

EUROPEAN COMMISSION

Brussels, 5.7.2023
COM(2023) 416 final

2023/0232 (COD)

Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on Soil Monitoring and Resilience (Soil Monitoring Law)**

{SEC(2023) 416 final} - {SWD(2023) 416 final} - {SWD(2023) 417 final} - {SWD(2023) 418 final} - {SWD(2023) 423 final}

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Co-financed by the Connecting Europe Facility of the European Union

# Monitoring Soil Health

*"'soil health' means the physical, chemical and biological condition of the soil determining its capacity to function as a vital living system and to provide ecosystem services."*

*(article 3(4) proposed Directive)*

# Attention for Soils in Europe

- Proposal for a Directive on Soil Monitoring and Resilience (europa.eu)

5 July 2023

  - Monitoring, soil health districts and indicators, incl. land take
  - Sustainable soil management practices
  - Soil contamination


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# Next steps

- Negotiations at EU level (EU parliament, Committees and Council)
- Possible adoption (aim before next EU elections?)
- Transposing to national legislation
- Implementation
- 2026/2027 next LUCAS monitoring campaign
- Continued improvement of EUSO Soil Health Dashboard
- End of Mission Soil in 2027
- Evaluation of the Directive in 2029?

Funded by the European Union

This project has received funding from the Horizon Europe research and innovation programme under Grant Agreement No 101112838

SoilWise
KNOWLEDGE & DATA FLOWS

# From a scientific perspective - general

## The Soil Monitoring and Resilience Directive:

### Scientific Response Document

**SUMMARY**

On the 5th July 2023, the European Commission presented its proposal for a new **Directive for Soil Monitoring and Resilience** (COM(2023) 416). This letter provides a **shared scientific evaluation** of the proposal which has been co-signed by scientific organisations across the European Union. We support that the proposal focuses on three main pillars: 1) the monitoring of soil health, 2) promotion of sustainable soil management practices, and 3) reducing risks related to contaminated land.

We **welcome this proposal for a Directive** as crucial means to legally protect soils as an essential part of the ecosystem. Nevertheless, we have concerns regarding the level of ambition with respect to sustainable soil use and soil health indicators, and the level of protection of sites with soil contamination. We also note that there are no legal provisions for compensation measures are included in the draft of the soil monitoring law.

As **60-70%** of Europe's soils are presently considered **unhealthy**, and in light of their continued degradation, we hope this evaluation and our recommendations for improvement will support the further development and discussion of the proposed Directive to ensure that the Directive is underpinned by the most recent scientific evidence on soil health. Finally, we would like to emphasise the importance of the Soil Mission and associated Horizon Europe, EJP Soil as well as relevant national research projects in delivering the urgently needed scientific and societal underpinning for this proposed Directive.

**RECOMMENDATIONS FOR STRENGTHENING THE PROPOSED SOIL MONITORING DIRECTIVE**

1. **Monitoring soil health**

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# Vragen Soil Monitoring Directive algemeen

# Soil Monitoring in the Directive

- Up to 20 % of soil monitoring by EC, rest by MS
- Minimum set of soil indicators
- Encouragement to monitor more, context specific
- Transfer functions and adjustment of criteria allowed (mostly)
- Accuracy per soil health district and the sampling design prescribed
- Evaluation and inclusion of new scientific insights in 5 years


EUROPEAN COMMISSION

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# What is a Soil Health District?

*Article 4*

**Soil districts**

1. Member States shall establish soil districts throughout their territory.

   The number of soil districts for each Member State shall as a minimum correspond to the number of NUTS 1 territorial units established under Regulation (EC) No 1059/2003.

2. When establishing the geographic extent of soil districts, Member States may take into account existing administrative units and shall seek homogeneity within each soil district regarding the following parameters:

   (a) soil type as defined in the World Reference Base for Soil Resources[74];

   (b) climatic conditions;

   (c) environmental zone as described in Alterra Report 2281[75];

   (d) land use or land cover as used in the Land Use/Cover Area frame statistical Survey (LUCAS) programme.

*Article 5*

**Competent authorities**

Member States shall designate the competent authorities responsible at an appropriate level for carrying out the duties laid down in this Directive.

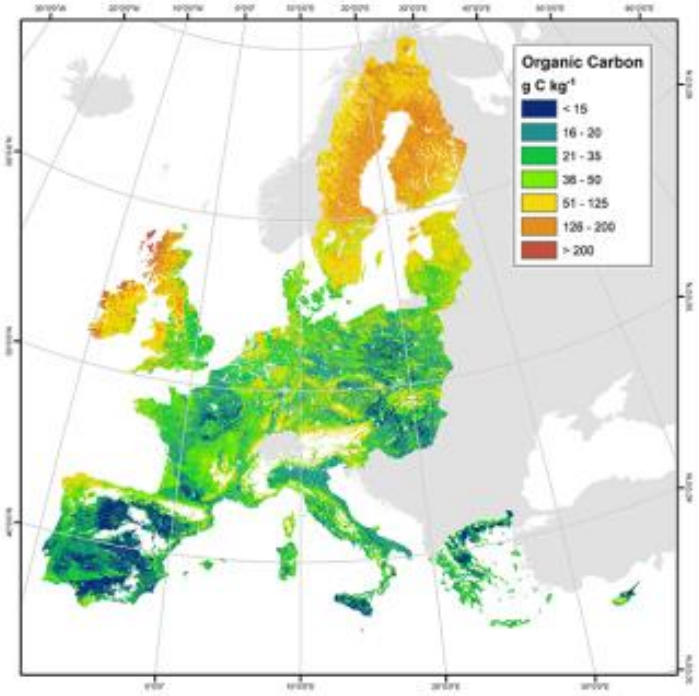
Member States shall designate one competent authority for each soil district established in accordance with Article 4.

# Minimum list Soil Health Indicators in EU Directive

| Descriptor | Threshold | Adaptive to country |
|---|---|---|
| Electrical conductivity (sat. paste) | < 4 dS/m | No |
| Soil erosion rate (modelling) | <_ 2 t/ha/y | No |
| Soil Organic Carbon (dry combustion) | Mineral soils SOC/clay ratio > 1/13<br>Organic soils: national level targets | Yes |
| Bulk density subsoil or equivalent | Range dependent on soil texture | No |
| Extr. Phosphorus (P-Olsen) | < national max value | Yes, between 30-50 mg/kg |
| Conc. of heavy metals | No unacceptable risk for human and env. risk | |
| Conc. of organic contaminants (MS) | No unacceptable risk for human and env. risk | |
| Soil water holding capacity | Flooding/drought impact mitigated | Yes |
| Nitrogen in soil (Kjeldahl) | - | |
| Soil Acidity (pH-$H_2O$ and pH-$CaCl_2$) | - | |
| Bulk density in topsoil | - | |
| Soil basal respiration or other biodiversity descriptor(s) | - | |

# LUCAS (Land Use/Cover Area frame statistical Survey)

- Europese landgebruiks en bodemmonitoring sinds 2009 op verzoek van het Europese Parlement
- Doel: gestandaardiseerd inzicht in staat en ontwikkeling EU bodems als basis voor beleid
- Uitgevoerd door EUROSTAT en JRC, ism DG-AGRI
  - 2009: 23 MS: 20.000 locations (~ 200 in NL)
  - 2015/2018: 28 MS: 22.000 locations (~ 200 in NL)
  - 2022: 40.000 locations (895 in NL)
- 2026: verdere integratie met nationale monitoring systemen naar EU Soil Observatory
- Puntdata wordt door JRC verwerkt naar kaarten en statistieken en wordt gebruikt voor reporting namens de EU



# LUCAS Soil Modules over the sampling years

| MODULE | Type of analysis | Year of survey | | |
|---|---|---|---|---|
| | | 2009–2012 | 2015 | 2018 |
| **MODULE 1** Physico-chemical properties | Coarse fragments (>2 mm)/% | | | |
| | PSD[1]: clay, silt, sand/% | | | |
| | pH ($CaCl_2$, $H_2O$) | | | |
| | Organic carbon/g $kg^{-1}$ | | | |
| | Carbonate content/g $kg^{-1}$ | | | |
| | Total nitrogen content/g $kg^{-1}$ | | | |
| | Extractable potassium content/mg $kg^{-1}$ | | | |
| | Phosphorous content/mg $kg^{-1}$ | | | |
| | Cation exchange capacity/cmol(+) $kg^{-1}$ | | | |
| | Electrical conductivity/mS $m^{-1}$ | | | |
| | Metals | | | |
| | Multispectral properties | | | |
| | Mineralogy | | | |
| **MODULE 2** Soil biodiversity | Bacteria and Archaea (16S rDNA) | | | |
| | Fungi (ITS) | | | |
| | Eukaryotes (18S rDNA) | | | |
| | Microfauna (nematodes) | | | |
| | Mesofauna (arthropods) | | | |
| | Macrofauna (earthworms) | | | |
| | Metagenomics | | | |
| **MODULE 3** Bulk density | Bulk density | | | |
| | Soil moisture | | | |
| **MODULE 4** Field measurements | Soil erosion by water and wind | | | |
| | Thickness of organic layer in Histosols | | | |
| | Soil structure | | | |
| **MODULE 5** Pollution | Organic pollutants | | | |
| | Pesticides residues | | | |

CC-NL monitoring in the Netherlands 2018:

SOM, SOC, TOC, TIC, texture, pH, Ntot, Stot, fractions of C

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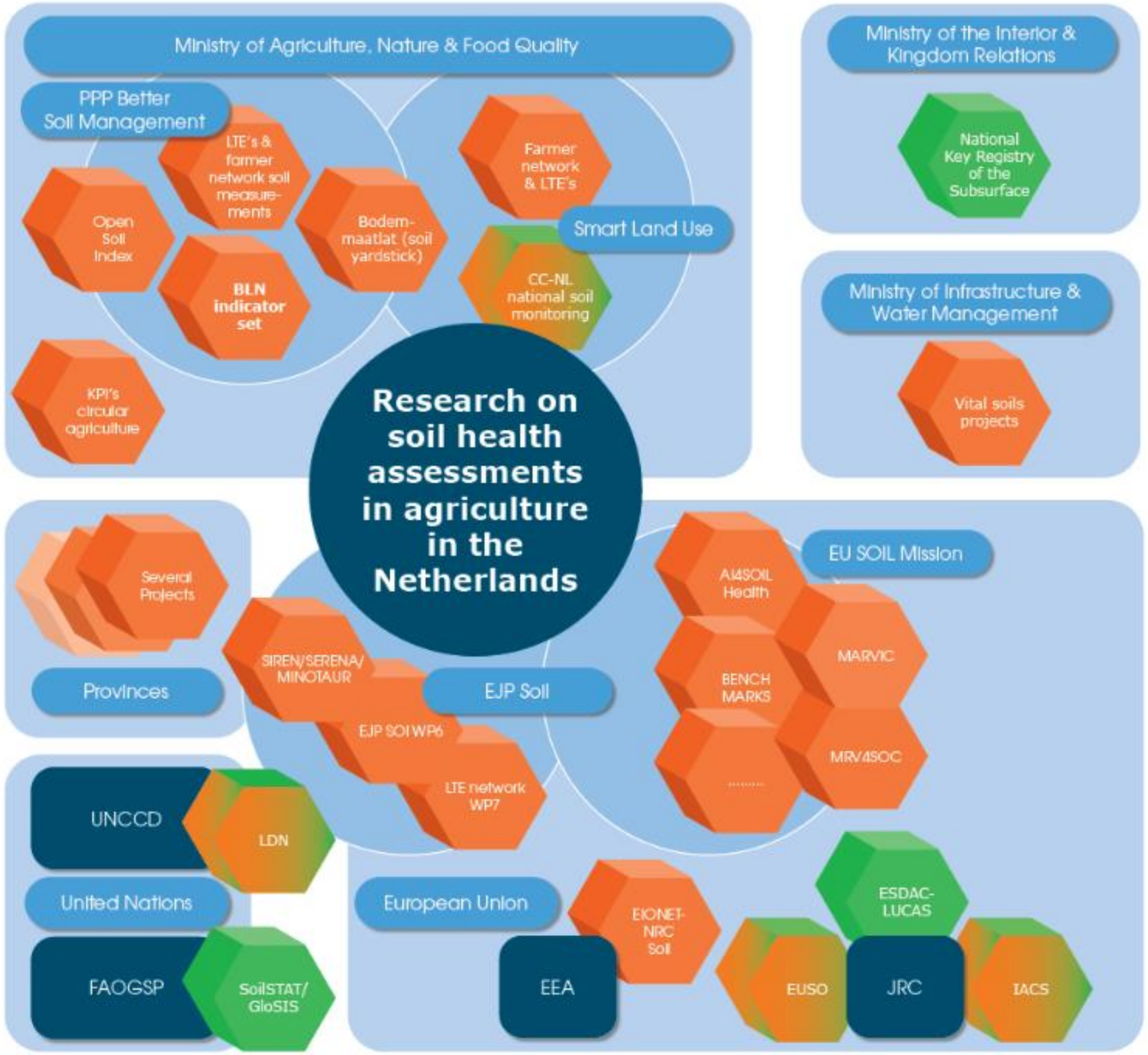
# Activities linked to soil monitoring

- Collaboration with LUCAS 2022 campaign to define/identify additional sampling points
- Stocktake the description of national soil datasets and monitoring networks across EJP SOIL partners. D6.1, D6.3, catalogue
- Comparison of monitoring results per country: national – LUCAS
- Double sampling campaign with LUCAS2022 to derive (validated) lab transfer functions: national – LUCAS
- Evaluation of evaluation criteria/thresholds
- Method development: combine data from different sampling designs/monitoring systems
- Soil indicator inventory, development to ecosystem services and soil biological indicators
- Harmonised national – EU soil mapping (method) development
- Soil data infrastructure development and standardisation in EU towards EU Soil Observatory, incl. guidance
- Soil sensing method improvement, cost/accuracy evaluation
- Science to policy workshops and webinars

# What does still need to be defined at the Member State level: in the Netherlands

- Soil health districts
- Data flows
- Adjust target values if justified
- Validated transfer functions
- Additional soil indicators needed
- Soil Monitoring System design: building blocks of current monitoring systems (BLN (CC-NL), NBI, BOBI, stedelijk/provinciaal, anderen?)
- Sustainable Soil Management Practices (database?)

# Een complex landschap van onderzoek naar beoordelen van bodemgezondheid

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# Vragen en discussie soil monitoring

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# Monitoringssystemen LUCAS, CC-NL

| EU Directive | BLN/ CC-NL | LUCAS |
|---|---|---|
| **Electrical conductivity** | - | Electrical conductivity |
| **Soil erosion** | only impacts part of the country -[1] | |
| **Organic carbon** | Organic carbon | Organic carbon |
| **Bulkdensity of the subsoil** | Bulkdensity of the subsoil | |
| **Extractable phosphorus (P_Olsen)** | Extractable phosphorus (P_CaCl2, P_Al, P-ox) | P (Phosphorus) |
| **Soil contamination (heavy metals)** | Data available locally -[2] | - |
| **Water holding capacity** | Can be calculated -[3] | - |
| **Bulkdensity of the topsoil** | Bulkdensity of the topsoil | K (Potassium) |
| **Soil basal respiration *or other*** | - | - |
| **pH** | pH | pH (CaCl2/H2O) |
| **N (Nitrogen)** | N (Nitrogen, N_total) | N (Nitrogen) |
| - | Aluminium oxalaat | Aluminium oxalaat |
| - | IJzer oxalaat (Fe-ox) | IJzer oxalaat (Fe-ox) |
| - | Zandgehalte | Zandgehalte |
| - | Kleigehate | Kleigehalte |
| - | Siltgehalte | Siltgehalte |
| - | Calciumcarbonaat | Calciumcarbonaat |
| - | Bindingscapaciteit kleihumuscomplex (CEC, CaCEC, KCEC, NaCEC, MgCEC) | - |
| - | Totale koolstof (C_totaal) | - |
| - | Inorganische koolstof | - |
| - | Organische stof (Gloeiverlies, NIRS) | - |
| - | PLFA totaal, PLFA schimmels, PLFA bacteriën | - |
| - | Fosfaatbindend vermogen (FBV) | - |

# LUCAS – National soil monitoring systems intercomparison - LUCAS double sampling campaign

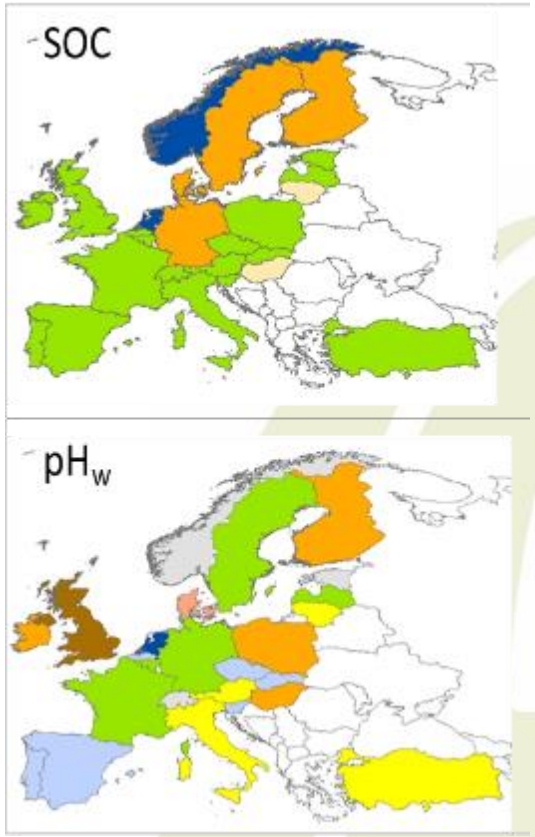
**Analytical procedures**

- **Double samples obtained from LUCAS 2022** samplers
- Between 100 and 200 sites will be analyzed depending on the countries
- 17 countries involved
- Comparison of EU and national results

**Sampling and analytical procedures**

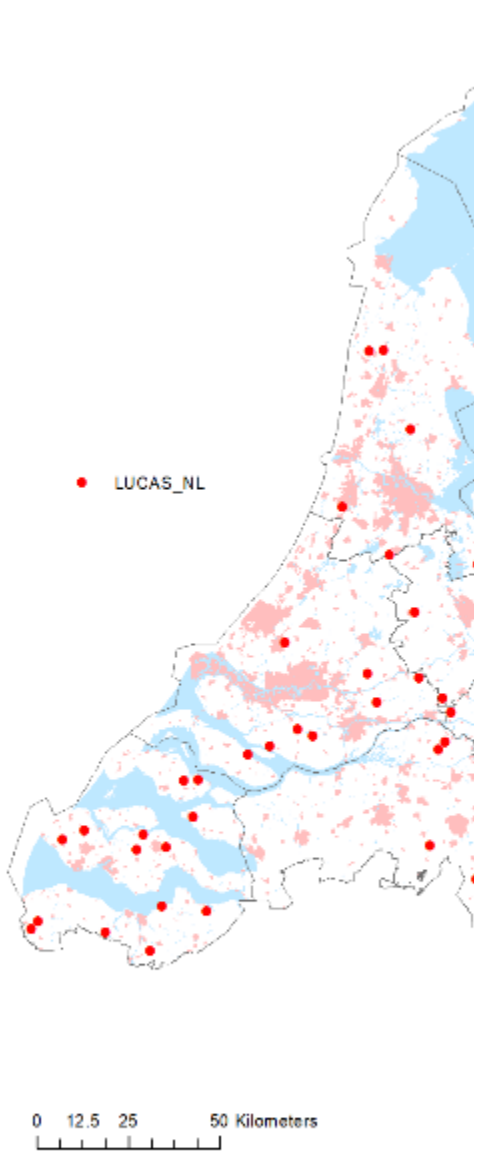
- Sampling (on national SMS and/or on LUCAS 2022 points) according to national and LUCAS sampling protocols
- 6 countries involved
- Compare the overall process

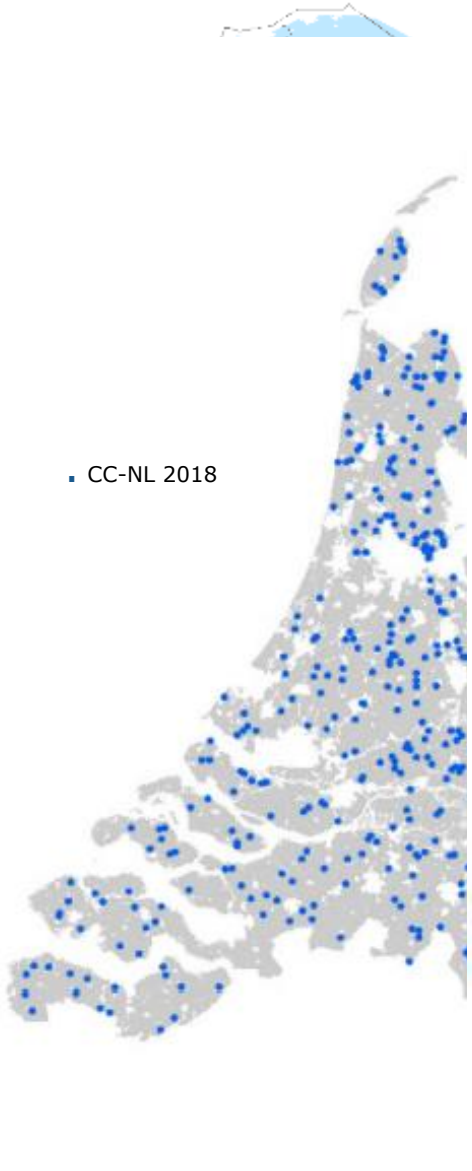
**THE EXPECTATION IS PRODUCING LAB METHOD TRANSFER FUNCTIONS**




Lab methods of national soil data

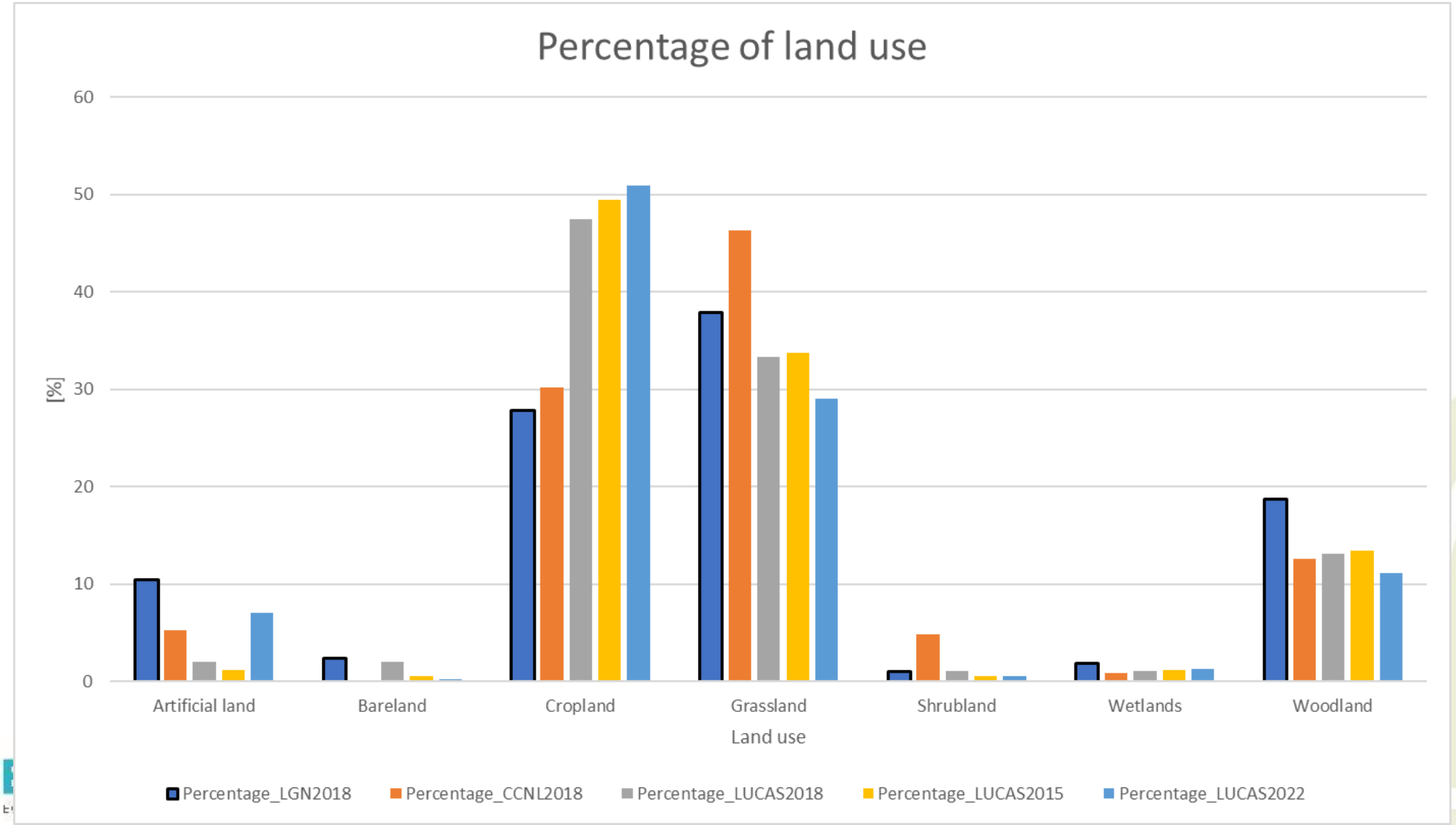
# Monitoring in the Netherlands - LUCAS





# Landcover percentages LGN (actual), Dutch CC-NL, LUCAS



# Soil monitoring

Significance of the proposed Directive to monitoring in the Netherlands:

- More detail spatially
- Once the monitoring system, incl. transfer functions has been established, up to 20 % free data
- Continuation of existing systems possible
- Learning from other countries easier
- Joint assessment of different land uses

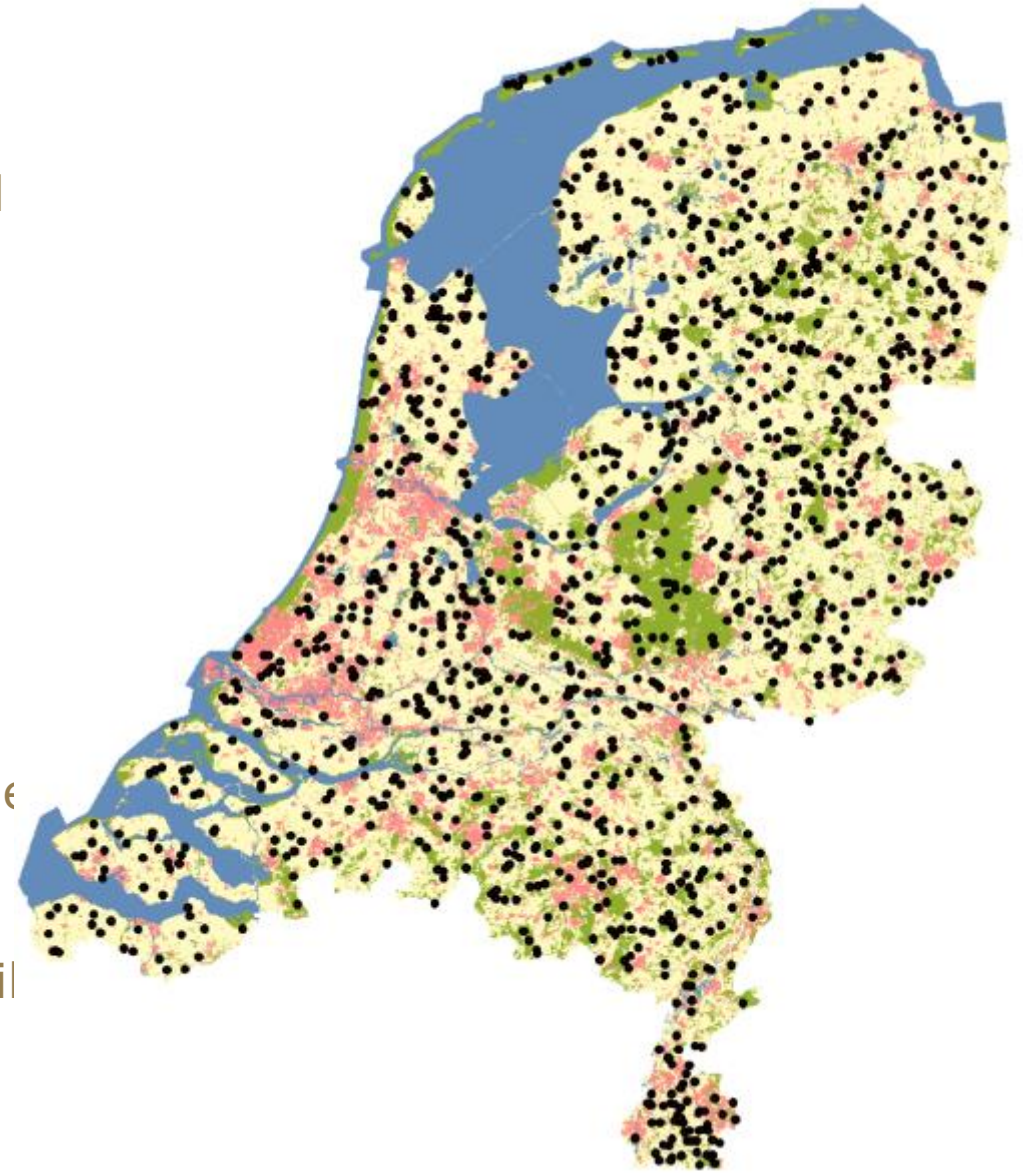
Questions to answer:

- Do EU and national monitoring objectives align?
- At what level of detail (in space and time) do we want soil monitoring information?
- Which monitoring systems can we/do we want to combine (BLN (CC-NL), NBI, BOBI, urban/provincial, others)?
- Does the result provide the information needed to take action?
- How will data flow and become available?

# LSK locations: 1998

The ‘Landelijke Steekproef Kaarteenheden’ (LSK) started in 1988, to describe the map units and determine the accuracy of the soil map of the Netherlands (1:50.000).

- 1392 locations
- Stratified random sampling: metrics
- 96 strata determined based on soil type and groundwater depth regimes
- Achieved a good geographical, soil and hydrological typology across the country
- Sampled according to horizons, multiple depths, range of soil properties, pedotransfer functions for bulk density
- Used for LULUCF reporting (remodelled to LULUCF soil classes and land use types)



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# LSK 1998 repeated in 2018: CC-NL

- Revisited LSK points
- Used LUCAS sampling protocol but:
  - replaced spade with auger
  - added penetrologger
  - bulk density with auger (unreliable also due to extremely dry summer)
- Layer sampling instead of horizons (0-30, 30-100 cm)
- Aim is to:
  - Determine SOC stock differences in 20 years
  - Aim to characterise soils of NL (N, CN etc):
  - Baseline measurement for monitoring in the future
- Multiple soil parameters (SOM, SOC, TOC, TIC, texture, pH, Ntot, Stot, fractions of C)
- Dutch soil monitoring (method and results) is largely comparable with Belgium and Denmark

# BLN 2.0

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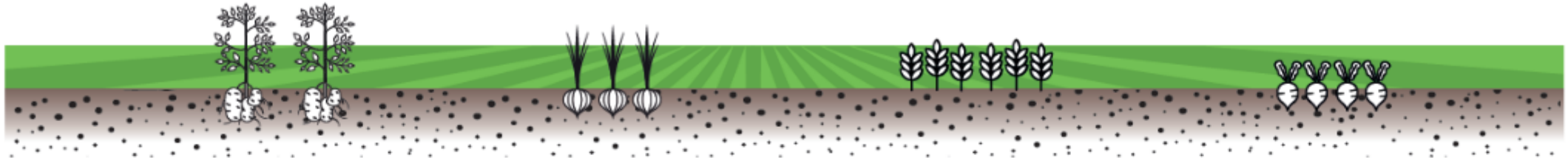
# BODEMINDICATOREN VOOR LANDBOUWGRONDEN IN NEDERLAND (BLN VERSIE 1.1)

Voor uniforme bodemkwaliteitsbeoordeling en duurzaam beheer



## Organische stof

- Organische stofgehalte
- Organische koolstofgehalte
- Afbreekbare fractie organische stof

## Fysisch

- Watervasthoudend vermogen
- Aggregaatstabiliteit
- Indringingsweerstand
- Droge bulkdichtheid

## Chemisch

- Zuurgraad pH
- Stikstof totaal
- Potentieel mineraliseerbare stikstof
- Fosfaatvoorraad en -beschikbaarheid
- Kalivoorraad en -beschikbaarheid

## Biologisch

- Aaltjes, aantallen en diversiteit
- Plantparasitaire aaltjes
- Bacteriële biomassa
- Schimmelbiomassa
- Regenwormen, aantallen en diversiteit

## Visueel

Visuele beoordeling
- Bodemstructuur
- Bodemleven
- Beworteling

**MET METING VAN BODEMKWALITEIT GERICHT WERKEN AAN VERSTERKEN BODEMFUNCTIES**

**PRODUCTIE • WATERREGULATIE • KOOLSTOFOPSLAG • RECYCLING NUTRIËNTEN • BIODIVERSITEIT**

# Integraliteit van belang

**Bodembeheer**

- Bouwplan & groenbemesters
- Bemesting & organische stofvoorziening
- Grondbewerking
- Gewasbescherming
- Waterbeheer
- …

**Bodemgezondheid**

- Fysisch
- Chemisch
- Biologisch

**Ecosysteemdiensten**

- Primaire productie
- Waterregulatie & zelfreinigend vermogen
- Koolstofvastlegging & klimaatregulatie
- Bodembiodiversiteit & habitatvoorziening
- Faciliteren van de nutriëntenkringloop

# Van BLN 1.1 en Open Bodemindex naar BLN 2.0

Integrale set Bodemmetingen met beschikbare streefwaarden en referentiewaarden

Vooral Ecosysteemdienst Productie

Integraal beoordelingskader van bodemkwaliteit

Complete set meten duur en tijdrovend

**BLN, versie 1.0/1.1**
*Bodemindicatoren voor Landbouwgronden in Nederland*

OPEN BODEMINDEX

Eenvoudig te bepalen met grondmonster

**BLN, versie 2.0**
*Bodemindicatoren voor Landbouwgronden in Nederland*

Meerdere ecosysteemdiensten, BLN-metingen met beoordelingkader OBI, haalbaar en betaalbaar

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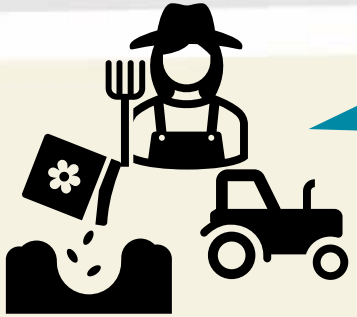
# Bodemgezondheid en bodembeheer

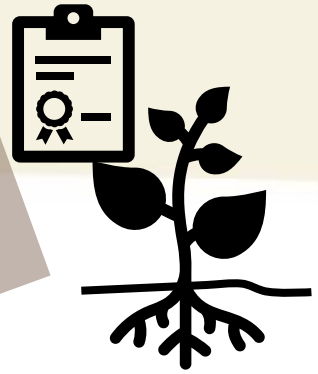
Beoordeling van bodemgezondheid

| Bodembeheer | Bodemkwaliteit: Goed | Bodemkwaliteit: Slecht |
|---|---|---|
| Goed | | |
| Slecht | | |



Doel: duurzaam bodembeheer

**Maatwerkadvies per perceel/bedrijf**
Bodemkwaliteitsplan &
Bedrijfs-bodemwaterplan



Doel: integrale bodemkwaliteit

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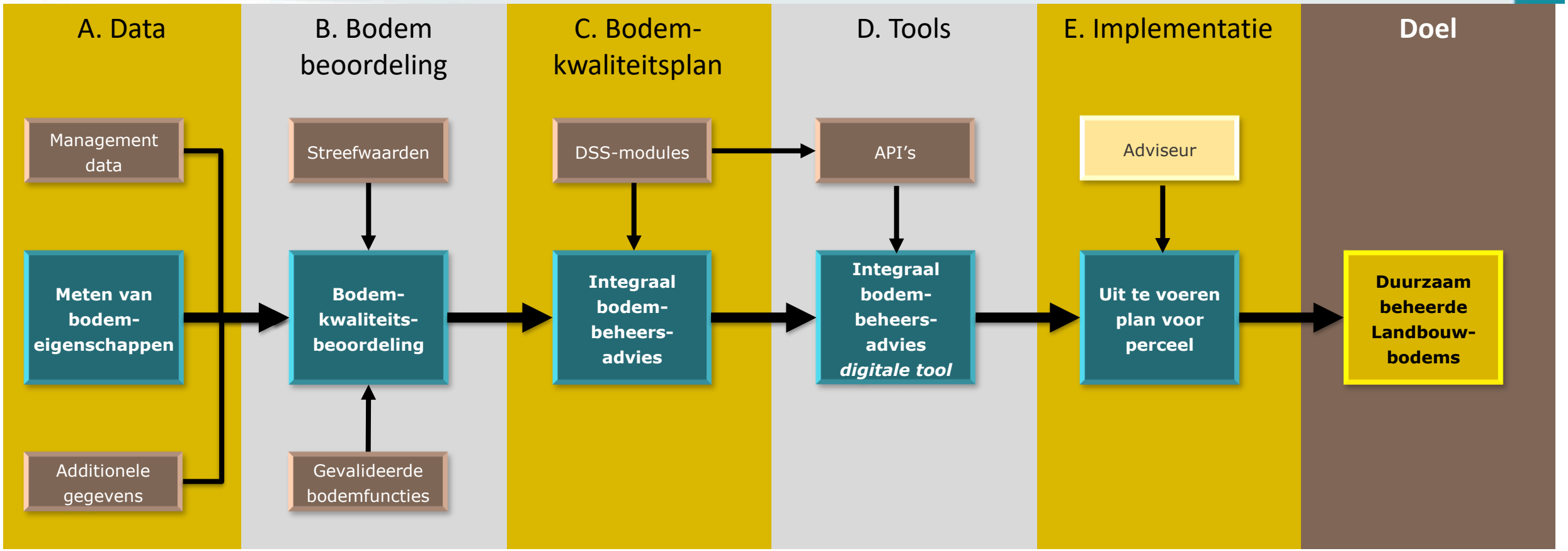
# Soil quality assessments to stimulate sustainable agricultural management

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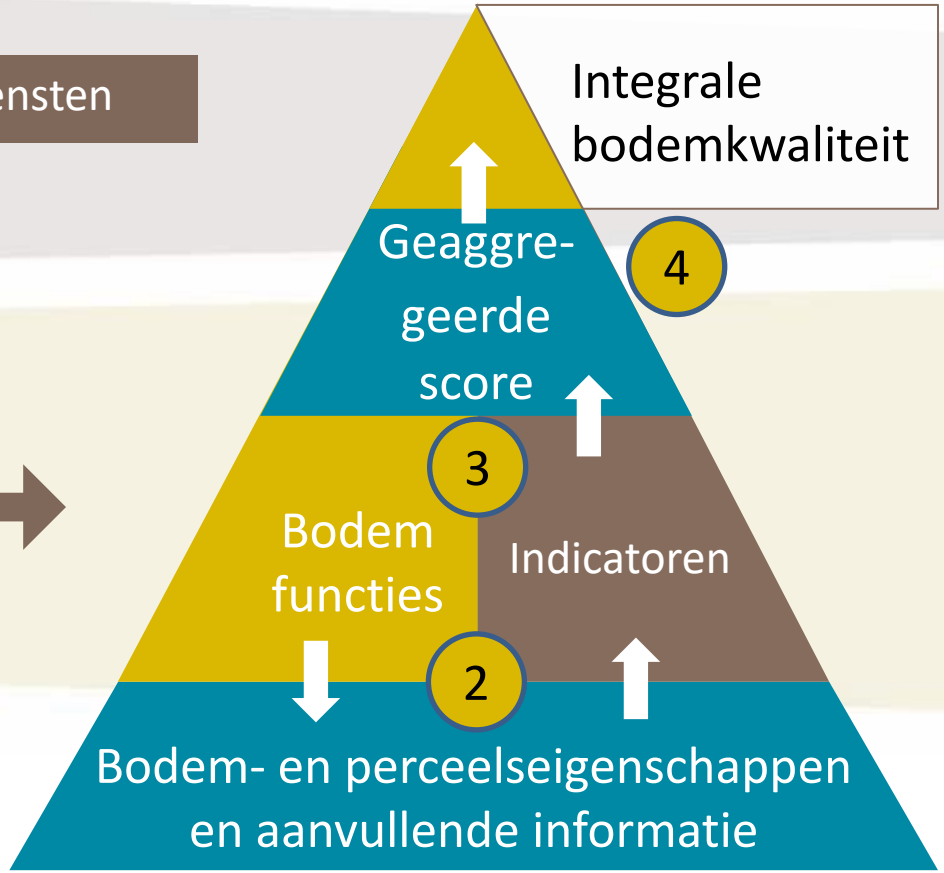
# Methodiek bodembeoordeling

1

Ecosysteemdiensten




Advies

Integrale kwaliteitsscore

Kwaliteitsscore per Ecosysteemdienst

Inzicht in wat de bodem levert

De metingen

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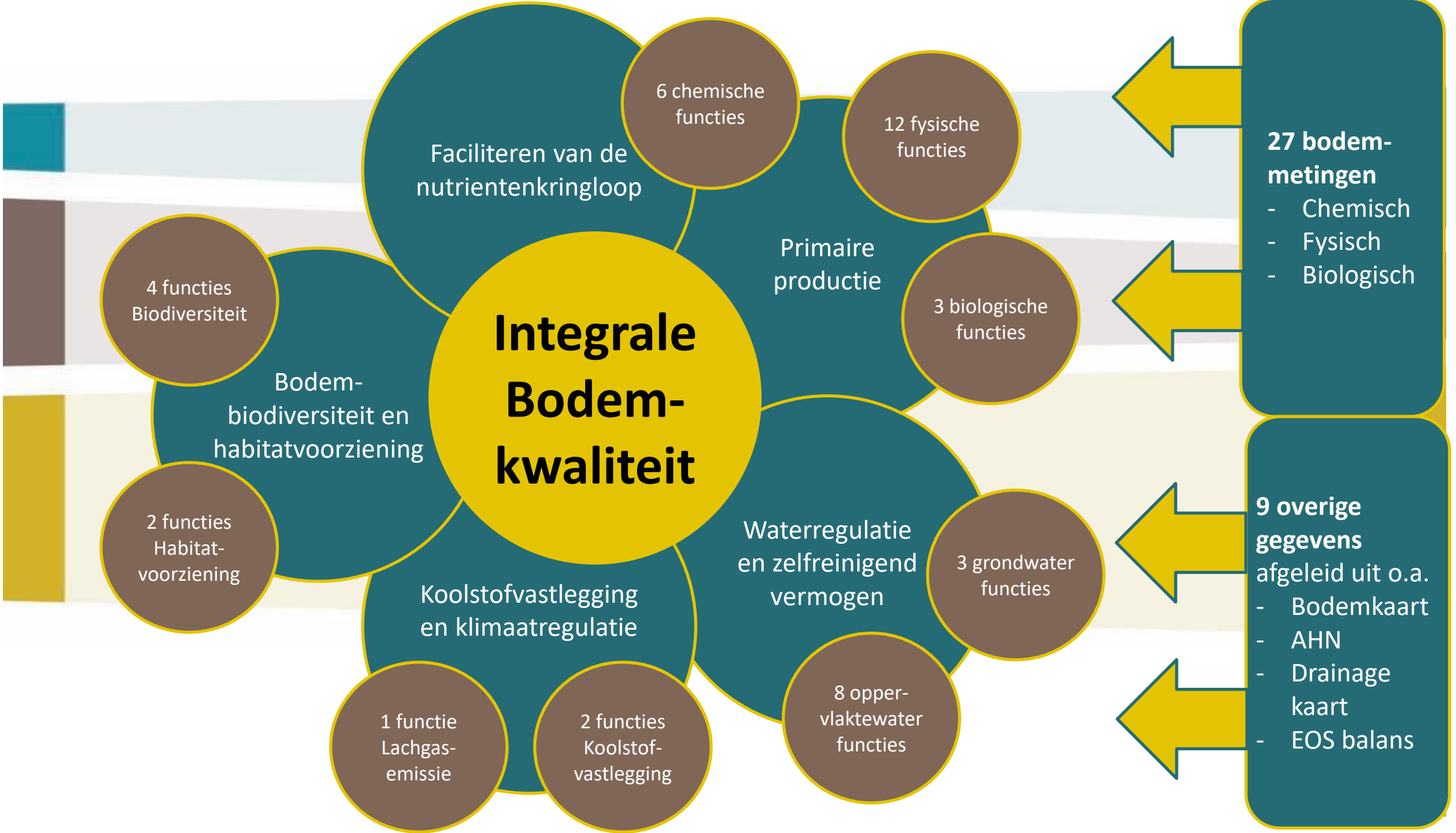
Ros et al. (2022) Beschikbaar via: https://pubs.acs.org/doi/10.1021/acs.est.2c04516


Integrale Bodem-kwaliteit
Faciliteren van de nutrientenkringloop
6 chemische functies
Primaire productie
12 fysische functies
3 biologische functies
Bodem-biodiversiteit en habitatvoorziening
4 functies Biodiversiteit
2 functies Habitat-voorziening
Koolstofvastlegging en klimaatregulatie
1 functie Lachgas-emissie
2 functies Koolstof-vastlegging
Waterregulatie en zelfreinigend vermogen
3 grondwater functies
8 opper-vlaktewater functies
27 bodem-metingen
- Chemisch
- Fysisch
- Biologisch
9 overige gegevens
afgeleid uit o.a.
- Bodemkaart
- AHN
- Drainage kaart
- EOS balans

# Bodemfuncties, indicatoren en metingen

Gevalideerde bodemfuncties vasgesteld in wetenschappelijk onderzoek

Streefwaarden voor niet landbouwfuncties beperkt beschikbaar

Additionele gegevens

Management

Landgebruik

Bodem water lucht

Schaal


Routinematige goede, goedkope en snelle metingen

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# Stand van zaken

- Bodembeoordelingsframework is beschikbaar
- Volgende stappen
  - Toepasbaar maken en toetsen in de praktijk
    - Op percelen en bedrijven
    - Landelijk en regionaal
  - Doorontwikkeling bodemfuncties, vaststellen streefwaarden
  - Koppelen aan maatregelen
  - Internationale afstemming

→ PPS BLN2 ingediend

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# Vragen en discussie monitoringssystemen

# Sustainable soil management

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# Sustainable soil management practices

- Beschouwd als noodzakelijk onderdeel in wetgeving om doelen te halen
- Gekoppeld aan bijdrage van de bodem aan diverse ecosysteemdiensten
- Zorgt voor nieuwe regelgeving waaraan boeren moeten voldoen
- Op basis van bodemdata, en knelpunten in de bodemgezondheid
- Principes voor sustainable soil management vastgelegd, flexibel toe te passen
- Uitgangspunt commissie: kosten van sustainable soil management vaak lager dan economische baten en altijd lager dan milieubaten
- Complementair aan bestaande EU wetgeving
  - Koppeling met andere wetgeving
  - Stimuleren van sustainable soil management met nationale en EU-funding en private sector
  - Cruciale rol voor de CAP en Soil Mission living labs en lighthouses in implementatie van sustainable soil management practices

# Definities sustainable soil management (practices)

Sustainable soil management: soil management practices that maintain or enhance the ecosystem services provided by the soil without impairing the functions enabling those services, or being detrimental to other properties of the environment

Soil management practices: mean practices that impact the physical, chemical or biological qualities of a soil

# Wat moeten lidstaten doen?

Binnen 4 jaar

1. Sustainable soil management practices definieren en maatregelen die vermeden zouden moeten worden
   - In lijn met andere regelgeving, programma's doelen en wetenschappelijke kennis
   - Open inclusief en effectief proces, participatie van stakeholders
2. Gemakkelijke toegang organiseren tot onpartijding en onafhankelijke advies, training en capacity building
3. Stimuleren bewustwording
4. Stimuleren onderzoek
   - incl. implementatie van holistische bodembeheers concepten
5. Beschikbare financieringsopties en implementatie activiteiten in kaart brengen
6. Beoordelen van de effectiviteit van de genomen maatregelen: monitoring

# Land take

- Land take = de omzetting van (semi-)natuurlijk land in kunstmatig land
- Doel: Beperken van het verlies van de capaciteit van de bodem om meerdere ecosysteemdiensten te leveren
  - Doel ook voorkomen van Soil Sealing
- Wat wordt gevraagd aan landen
  - Het monitoren van land take
  - Het beperken van land take
  - Aanwijzen van gebieden waar verlies van functies wordt bepekrt
  - Negatieve gevolgen zoveel mogelijk te beperken
  - Verlies van capaciteit zoveel mogelijk te compenseren
- Land take is vaak ook verlies van vruchtbare landbouwgrond

# Sustainable soil management principes in de directive *annex III*

1. Geen kale grond
2. Minimale verstoring
3. Vermijd toepassen of vrijkomen schadelijke stoffen
4. Pas machinegebruik aan op de draagkracht van de bodem
5. Bemest naar behoefte met circulaire organische meststoffen
6. Beregen naar behoefte zonder bodemdegradatie
7. Creëer en onderhoud landschapselementen
8. Gebruik passende rassen en gewassen
9. Houd grondwaterstand hoog in veengronden
10. Gebruik diversiteit en gewasrotatie
11. Beweid vee zonder bodemdegradatie
12. Neem de juiste maatregelen om bodemkwaliteit te verbeteren bij knelpunten

# Wat vindt de wetenschap?

- Belangrijke punten
  - Context specifiek
  - Naast selectie van juiste maatregelen ook juiste toepassing
- Mix van acties nodig → opgenomen in directive

- Aanbevelingen
  1. Koppel maatregelen aan de principes van de directive
  2. Creeer een database met mogelijke maatregelen
     - Met informatie over effectiviteit en toepasbaarheid
     - Contextspecifiek
  3. Maak verplichtingen voor landgebruiker duidelijker maak deze bindend
  4. Stel realistische doelen met tussenstappen
     - Om 100% gezonde bodems in 2050 te bereiken

# Betekenis voor Nederland

- We werken hier al aan
  - o.a. Nationaal Programma Landbouw Bodems, kennisprogramma DAW en in onderzoek
- Veel vrijheid binnen de regels om het zelf in te vullen
  - Noodzakelijk want duurzaam bodembeheer is maatwerk
- Eerste overzicht van maatregelen voor duurzaam bodembeheer in de landbouw in NL beschikbaar
  - Kan verder verfijnd en uitgewerkt worden
  - Voor ander landgebruik (stedelijk gebied, bos en natuur) nodig
- Monitoring van toepassing van duurzaam bodembeheer ontbreekt nog
- Doen we voldoende aan?
  - Advies, training, capacity building
  - Bewustwording
  - Land take

# Vragen en discussie soil management practices

EJP SOIL
European Joint Programme

# Wrap up

1. Wat vinden we van de Soil Monitoring Directive?
   - Wat zijn goede punten?
   - Wat zijn aandachtspunten?
2. Waar zou beleid nog over na moeten denken in Nederland?
3. Welke wetenschappelijke onderbouwing is aanvullend nodig?
   - Binnen EJP SOIL
   - In vervolg op EJP SOIL (2.0), Roadmap EJP SOIL
   - Daarnaast
   - In Nederlands onderzoek

Questions to answer:

- Do EU and national monitoring objectives align?
- At what level of detail (in space and time) do we want soil monitoring information?
- Which monitoring systems can we/do we want to co mbine (BLN (CC-NL), NBI, BOBI, urban/provincial, others)?
- Does the result provide the information needed to take action?
- How will data flow and become available?

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