An index for assessing urban soil health in Amsterdam

Amanda Matson, Erik van den Elsen, Kees Teuling, Hessel Woolderink, Gerard Korthals, Paul Romkens

SOILveR webinar; January 24, 2025

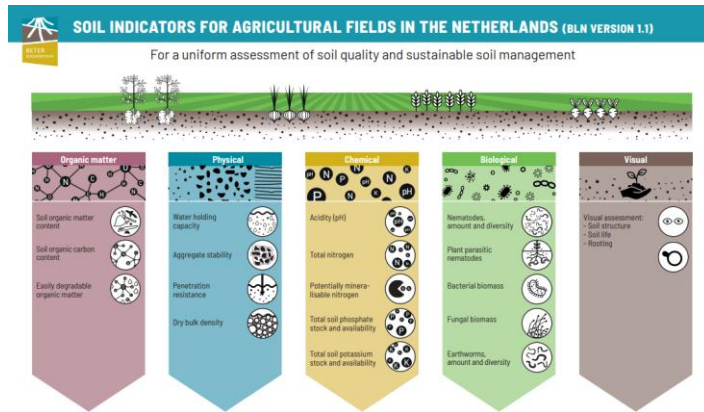# The Amsterdam starting framework

- **Six land uses**
  - Event terrain
  - City parks
  - Neighborhood greens
  - Gardens (with food)
  - Gardens (without food)
  - Sealed soils

- **Soil functions (ESS)**
  - Food production
  - Habitat
  - Water regulation
  - Filtering/buffering

- **Soil characteristics**
  - Fertility
  - Carrying capacity
  - Biodiversity
  - Infiltration/drainage

Contact: Amanda Matson (amanda.matson@wur.nl)

Developing the soil health index

Priorities

1. Identifying relevant and informative *urban* indicators

2. Balancing data quality/quantity with assessment costs

3. Recognizing and including existing user knowledge

4. Assessing need/potential for change

Contact: Amanda Matson (amanda.matson@wur.nl)

(1) Indicator selection

SOIL INDICATORS FOR AGRICULTURAL FIELDS IN THE NETHERLANDS (BLN VERSION 1.1)

For a uniform assessment of soil quality and sustainable soil management

BLN 1.1: https://edepot.wur.nl/550065

BGI Amsterdam indicatoren				
Nr	Indicator	Klassieke meetmethode	Snelle, goedkopere meetmethode (methode met * zijn geaccrediteerd)	Eenheid
Organische stof indicatoren				
1	Organische stofgehalte (OS)	Gloeiverlies 550 °C	NIRS*	%
Fysische indicatoren				
2	Textuur (of Korrelgrootteverdeling)	Pipetmethode	NIRS*	%
3	Indringingsweerstand	Penetrometer	niet beschikbaar	Mpa
4	Infiltratie capaciteit	Dubbele ring infiltrometer	METER Mini Disk Infiltrometer	mm m^{-2} u^{-1}
5	Porositeit	100CC ring methode	100CC ring methode	m^3 m^{-3}
6	Watervasthoudend vermogen	Zandbak/drukpan	Pedotransferfunctie: textuur + OS%	m^3 m^{-3}
7	Droge bulkdichtheid	100CC ring, massa na drogen 105 °C	Pedotransferfunctie: textuur + OS%	kg m^{-3}
Chemische indicatoren				
8	Zuurgraad (pH)	Extractie in CaCl$_2$	NIRS	-
9	Bodem Pb	Destructie Aqua Regia (Koningswater)	https://www.amsterdam.nl/wonen-leefomgeving/bodem/lood-grond/	mg kg-1 bodem
10	Standaardstoffenpakket	Extractie Aqua Regia (Koningswater	nvt	mg/kg bodem
11	Bodemvruchtbaarheid	-	-	-
12	EC (elektrische geleidbaarheid)	Soil saturated paste	-	dS/m
Biologische indicatoren[b]				
13	Aaltjes, aantallen	Microscopie	PCR (alleen specifieke soorten beschikbaar)	Aantal 100 g^{-1} droge grond
14	Aaltjes, plantenparasieten	Microscopie	PCR (alleen specifieke soorten beschikbaar)	Aantal 100 g^{-1} droge grond
15	Bacteriële biomassa	Microscopie	PLFA	µg PLFA g^{-1}
16	Schimmel biomassa	Microscopie	PLFA	µg PLFA g^{-1}
17	Wormen, aantallen	Mosterd extractie	n.b.	Biomassa (g)
Overige indicatoren				
18	Grondwaterniveau	Peilbuizen	https://www.waternet.nl/ons-water/grondwater/	cm
19	Landgebruik- of management historie	(Tabblad Landgebruik & Mgmt)		

■ Identifying relevant and informative *urban* indicators

- Including contaminants
- Less focus on productivity and more focus on physical indicators

Contact: Amanda Matson (amanda.matson@wur.nl)

WAGENINGEN
UNIVERSITY & RESEARCH

(2) Two-tier system based on land use/context

- Balancing data quality/quantity with assessment costs

T1
(Land use)

T2
(Context)

Contact: Amanda Matson (amanda.matson@wur.nl)

WAGENINGEN
UNIVERSITY & RESEARCH

(3) Context questions

- Recognizing and including existing user knowledge
  - Exisiting data, site observations/problems, specific interests/goals

Contact: Amanda Matson (amanda.matson@wur.nl)

Field sampling (not discussed)

- How to take samples

- Where to take samples

- How many samples to collect

- What lab tests (or do-it-yourself methods) to use

- Collected indicator data

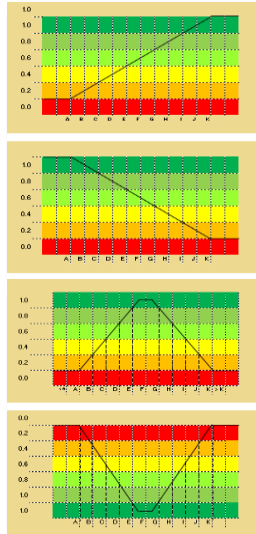# (4) Scoring and next steps

- Assessing the need/potential for change

Indicator data

Targets and thresholds (definition of 'good')

Scoring functions

Score per indicator

Options for improvement

Contact: Amanda Matson (amanda.matson@wur.nl)

Final outcome and next steps

Nr	Indicator	Data	Score
Organische stof indicatoren			
1	Organische stofgehalte (OS)	5.5	
Fysische indicatoren			
2	Textuur (Korrelgrootteverdeling)		
3	Indringingsweerstand	2.1	
4	Infiltratie capaciteit	32	
5	Porositeit	0.12	
Chemische indicatoren			
6	Zuurgraad (pH)	6.5	
7	Bodemvruchtbaarheid		
8	Verontreiniging		
Biologische indicatoren			
9	Aaltjes, aantallen	1754	
10	Aaltjes, plantenparasieten	103	
Overige indicatoren			
11	Grondwaterniveau	>1	
12	Landgebruik historie		

Guidelines

- Basic introduction (why this indicator)
- Measurement (where data comes from)
- Targets/thresholds (what is 'good')
- **Managment options (how to change)**
- How indicators relate to soil ecosystem services (SESS)

- Improvement options are indicator-based *not* context-based (link to SESS)

- Future steps:
  - Data collection and testing
  - Expanding area of relevance - much of the system will be widely applicable but currrently it is focused on Amsterdam

WAGENINGEN
UNIVERSITY & RESEARCH

Contact: Amanda Matson (amanda.matson@wur.nl)

Thank-you

Questions?

Contact: Amanda Matson (amanda.matson@wur.nl)