



Flanders  
State of the Art

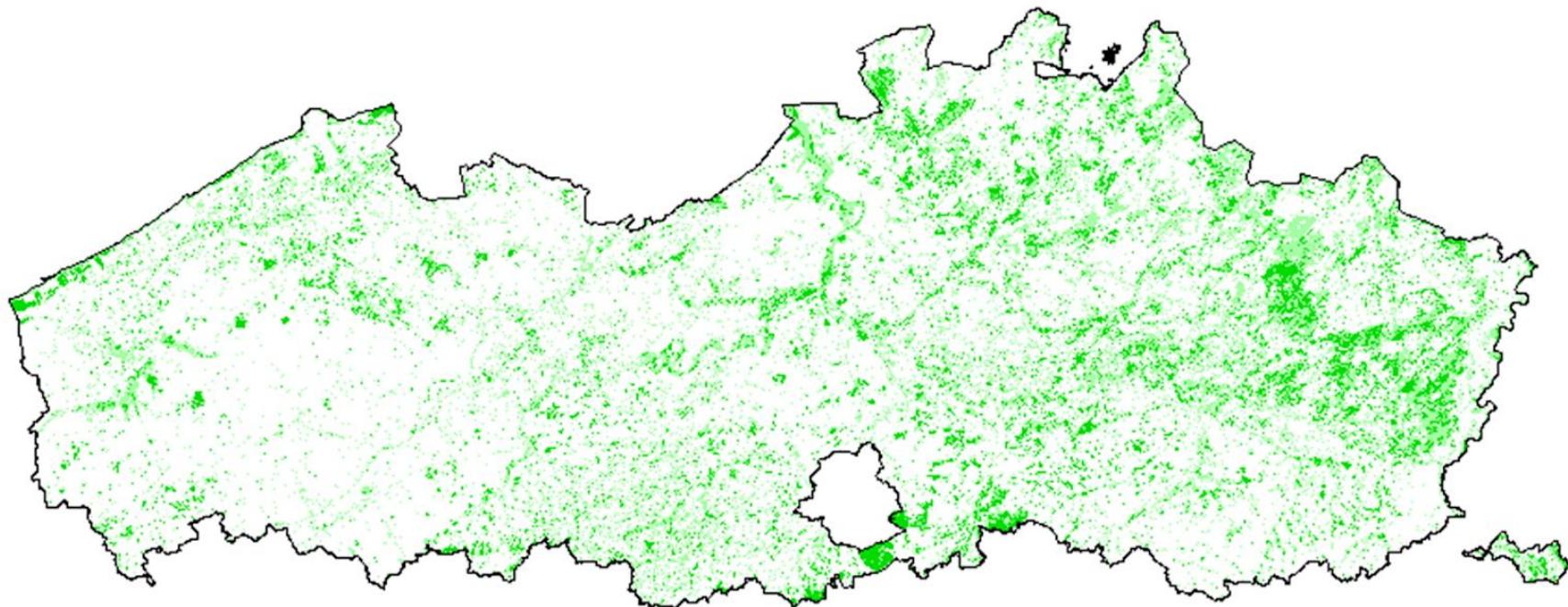
# Biological Valuation Map of Flanders

Oldschool fieldwork and innovative techniques

Toon Spanhove

RESEARCH INSTITUTE  
**NATURE AND FOREST**

# Biological Valuation Map (“BWK”)



- Biologisch minder waardevol
- Complex van biologisch minder waardevolle en waardevolle elementen
- Complex van biologisch minder waardevolle, waardevolle en zeer waardevolle elementen
- Complex van biologisch minder waardevolle en zeer waardevolle elementen
- Biologisch waardevol
- Complex van biologisch waardevolle en zeer waardevolle elementen
- Biologisch zeer waardevol

- Biologisch minder waardevol
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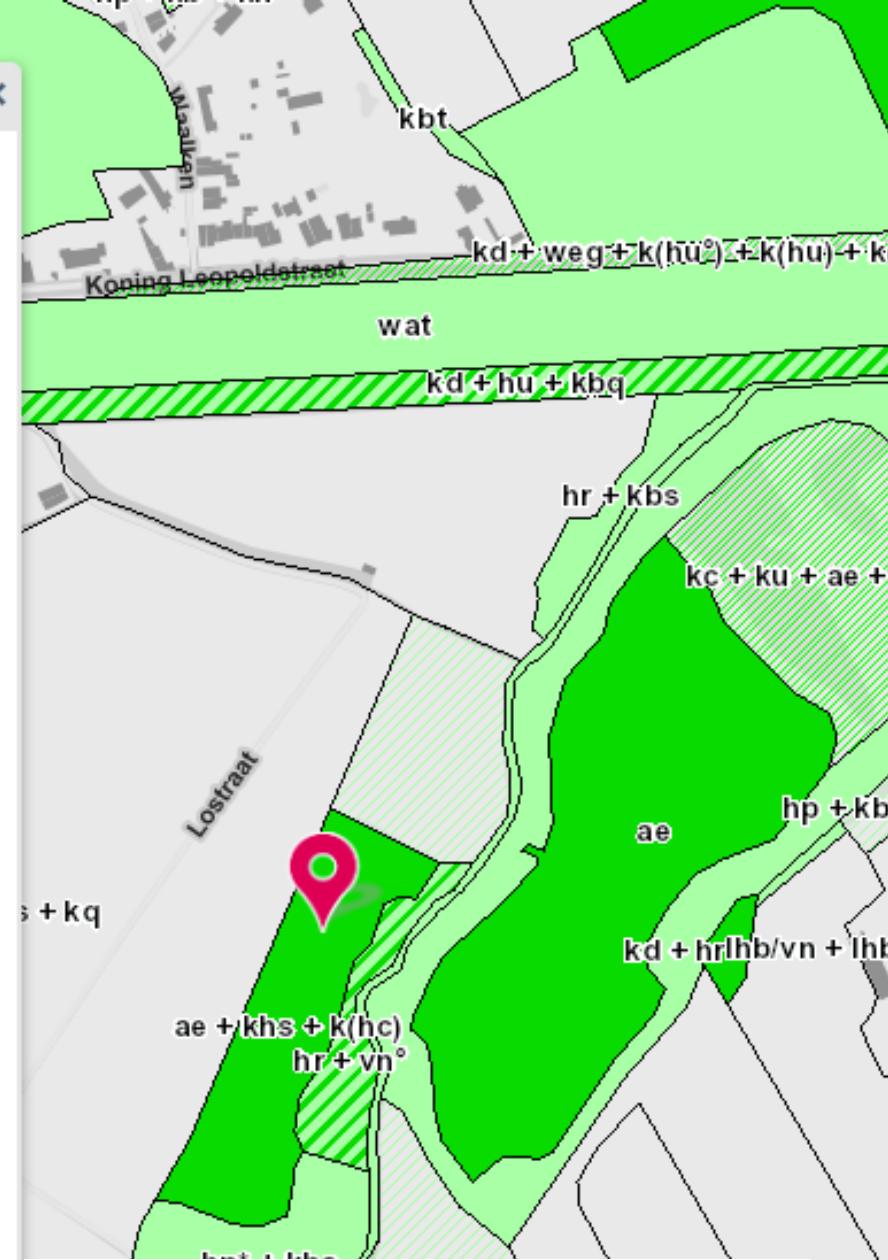


## Info

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### BWK 2 - Zones

Kenmerk	Waarde
Identificator	600980_v2014
Biologische waardering	biologisch zeer waardevol
Code biologische waardering	z
Karteringseenheid 1	eutroof water
Code karteringseenheid 1	ae
Karteringseenheid 2	houtkant met dominantie van wilg (Salix sp.)
Code karteringseenheid 2	khs
Karteringseenheid 3	bermen, perceelsranden, ... met dotterbloemgrasland
Code karteringseenheid 3	k(hc)
Karteringseenheid 4	geen
Karteringseenheid 5	geen
Karteringseenheid 6	geen
Karteringseenheid 7	geen
Karteringseenheid 8	geen
Relatie tussen de landbouw en de natuur	



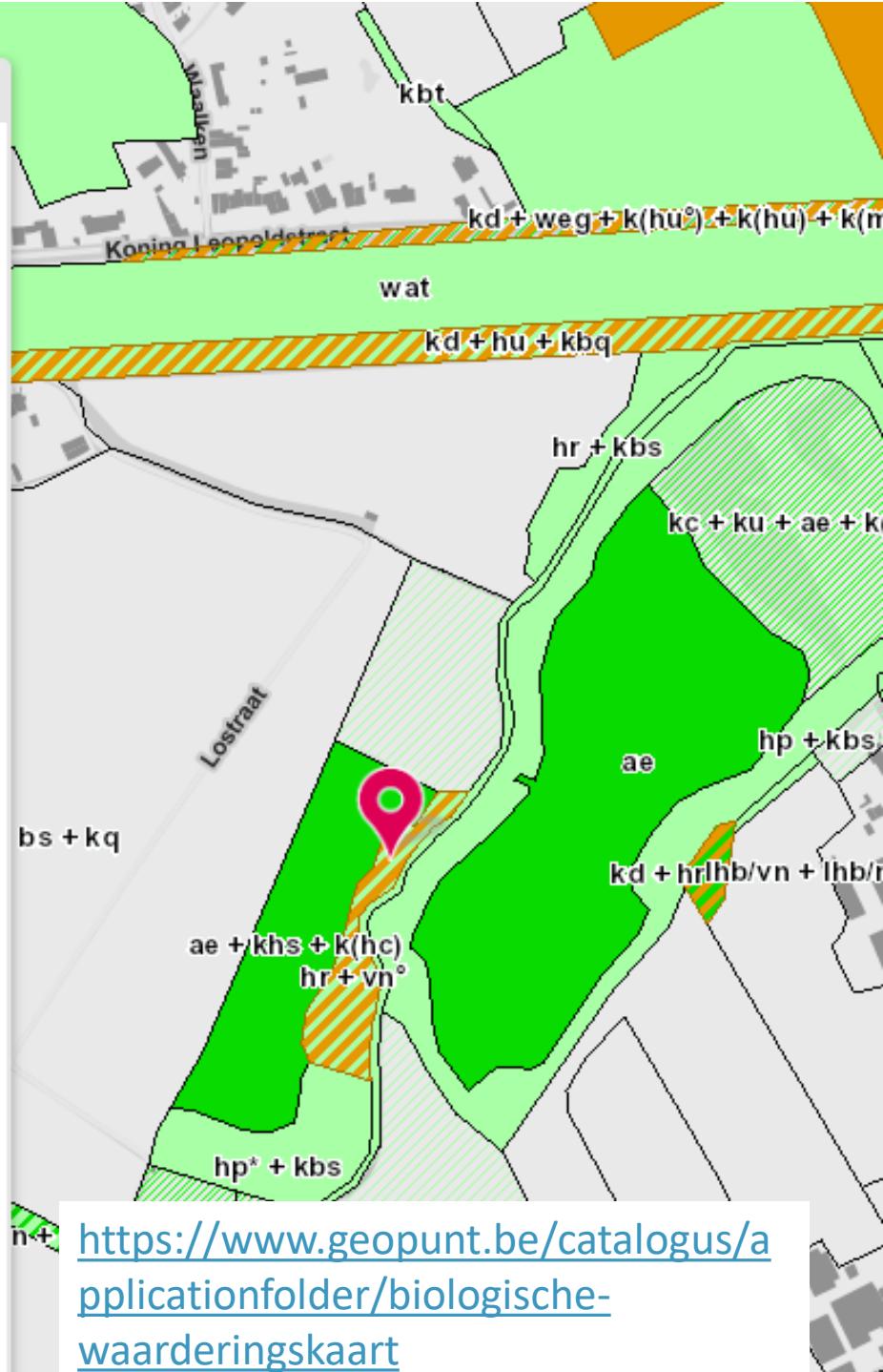
<https://www.geopunt.be/catalogus/applicationfolder/biologische-waarderingskaart>

## Info

&lt; terug

## BWK 2 - Habitat

Kenmerk	Waarde
Identificator	588170_v2014
Karteringseenheid 1	geen habitattype uit de Habitatrichtlijn
Code karteringseenheid 1	gh
Aandeel karteringseenheid 1 [%]	70
Karteringseenheid 2	Ruigte-elzenbos (Filipendulo-Alnetum)
Code karteringseenheid 2	91E0_vn
Aandeel karteringseenheid 2 [%]	30
Karteringseenheid 3	geen
Aandeel karteringseenheid 3 [%]	0
Karteringseenheid 4	geen
Aandeel karteringseenheid 4 [%]	0
Karteringseenheid 5	geen
Aandeel karteringseenheid 5 [%]	0
Herkomst habitat	manuele aanpassing van de automatische vertaling door karteerder

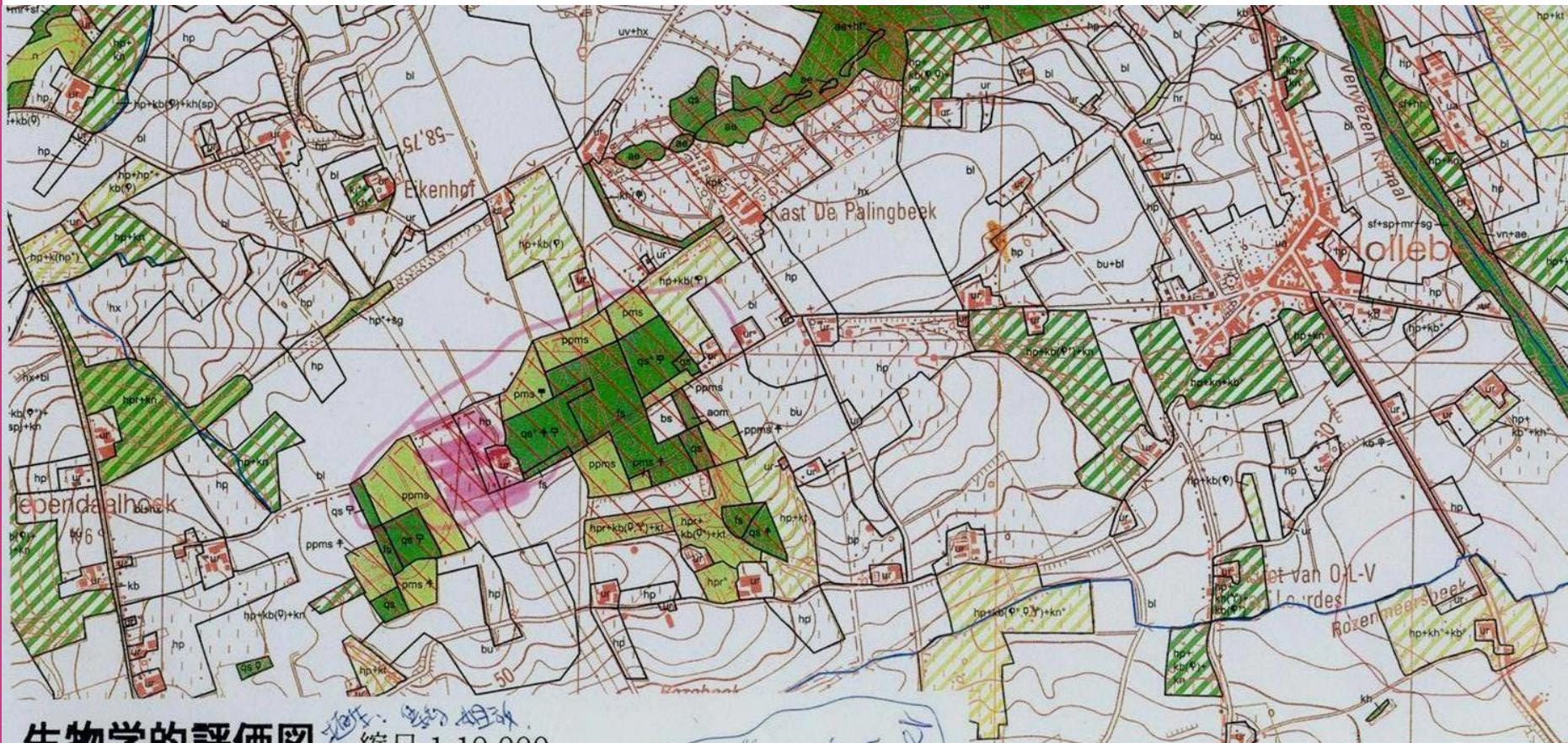


<https://www.geopunt.be/catalogus/applicationfolder/biologische-waarderingskaart>

# A fantastic product...

- ▶ Since 1978, 2 complete editions
- ▶ Wall – to – wall cover of Flanders
- ▶ Used in various applications
  - Biological valuation
  - Monitoring
  - Reporting o.a. under EU Habitat Directive
  - Nature management plans
  - Species management
  - Species distribution modelling
  - Ecosystem service modelling
  - Natural capital accounting
  - Spatial planning
  - Law enforcement

# A fantastic product...



生物学的評価図

縮尺 1:10,000

- |                |              |                |
|----------------|--------------|----------------|
| ①生物学的な価値が非常に高い | ②生物学的な価値がある  | ③生物学的な価値はあまりない |
| ③の要素と②の要素の複合   | ③の要素と①の要素の複合 | ②の要素と①の要素の複合   |

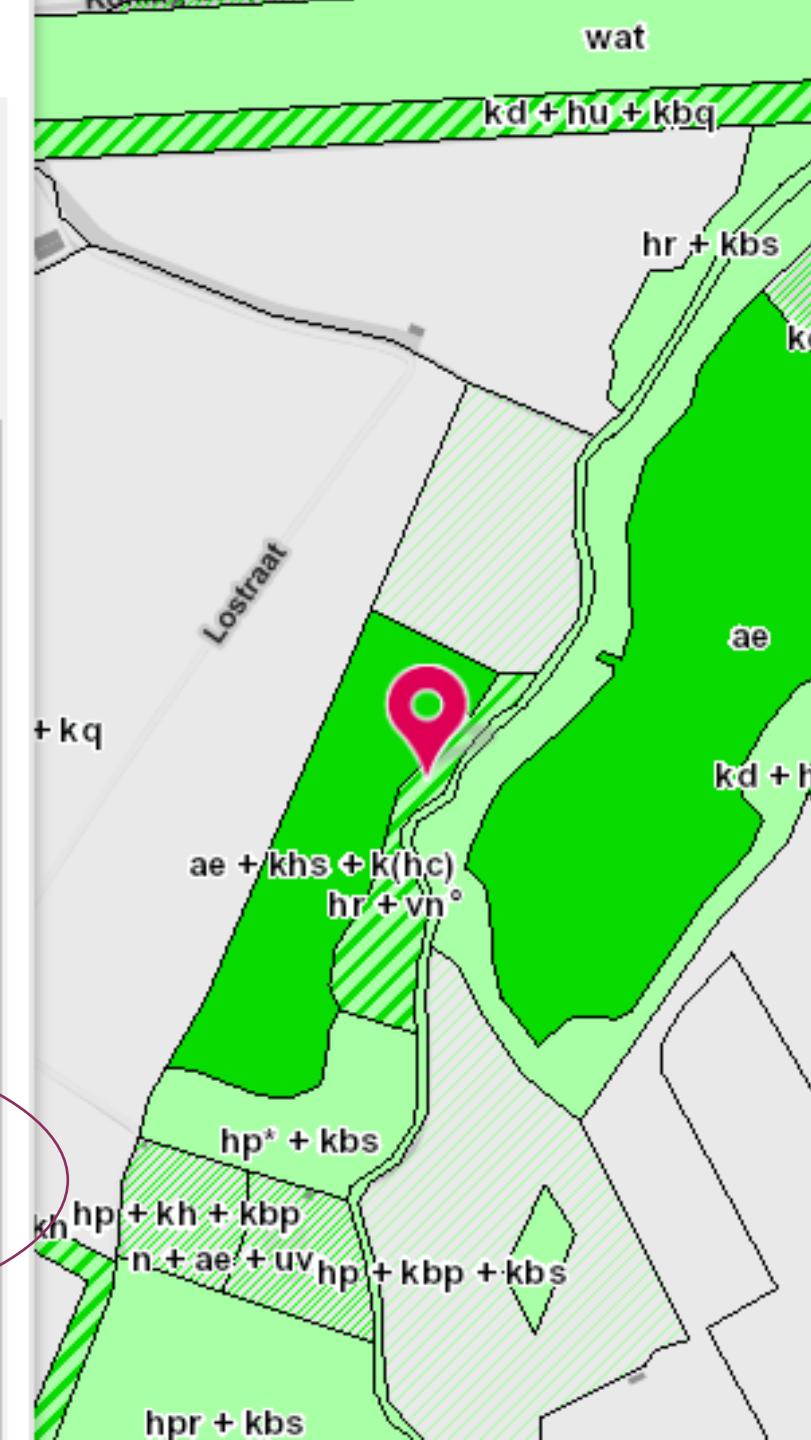
動物相上に際立った価値  
水路

Flemish experience  
inspiring the Japanese  
Ecological network

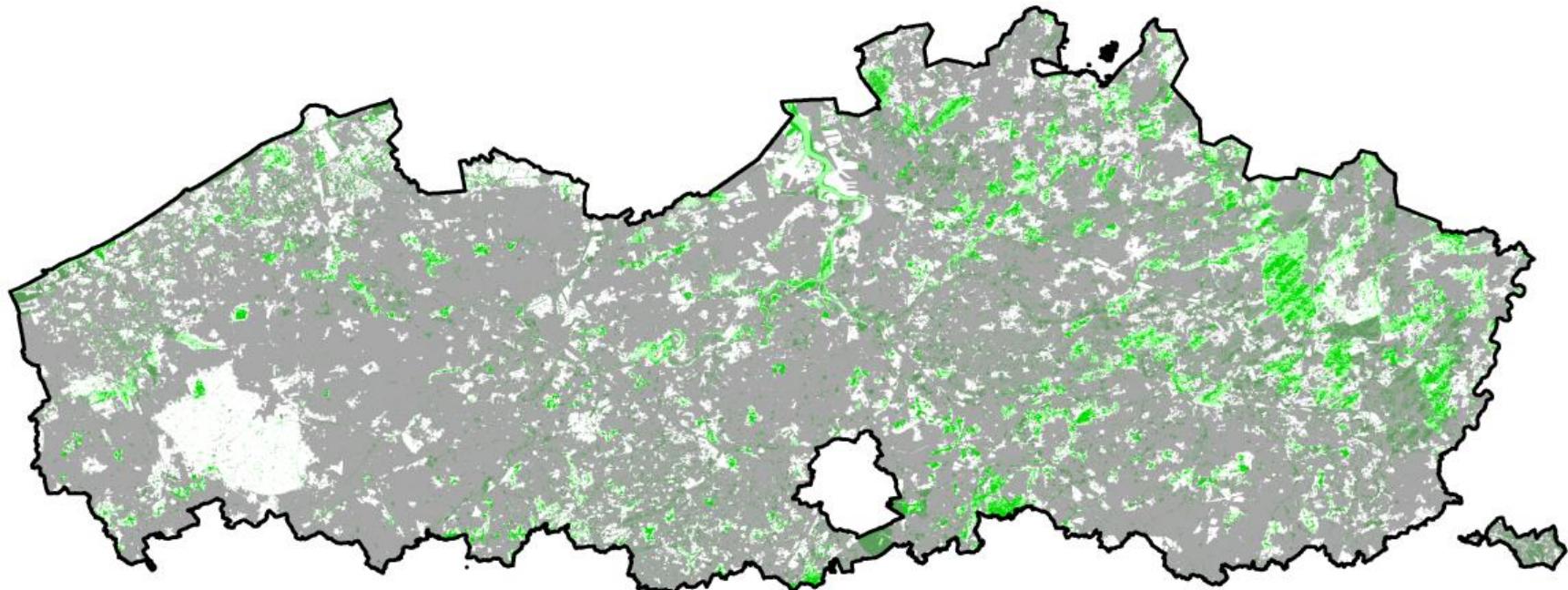
**A fantastic product...  
... with a major challenge.**



Kenmerk	Waarde
Code karteringseenheid 1	hr
Karteringseenheid 2	nitrofiel alluviaal elzenbos
Code karteringseenheid 2	vn-
Karteringseenheid 3	geen
Karteringseenheid 4	geen
Karteringseenheid 5	geen
Karteringseenheid 6	geen
Karteringseenheid 7	geen
Karteringseenheid 8	geen
Relatie tussen de karteringseenheden 1	
Relatie tussen de karteringseenheden 2	
Relatie tussen de karteringseenheden 3	
Herkomst	terreinbezoek door kartererder tijdens april 2001
Code herkomst	014
Bijkomende informatie	
Label Biologische waardering	hr + vn°



# 71 % older then 12 year



# A fantastic product... ... with a major challenge.

- ▶ How to keep the map up-to-date,  
guaranteeing the high quality standards  
without burden of costly fieldwork

?

# A fantastic product... ... with a major challenge.

- ▶ How to keep the map up-to-date,  
guaranteeing the high quality standards  
without burden of costly fieldwork



Pillar I: Oldschool field mapping

Pillar II: Integrate existing and forthcoming dataset

# Pillar I: Oldschool field mapping

- ▶ Field mapping of Natura 2000 areas and habitats
  - 7 field mappers + 1 GIS-assistant to update the map....  
.....every 12 to 18 year for resp. open habitats and forests
  - Oldschool, but with refined methodology for better repeatability



# Pillar II: Integrate existing and forthcoming dataset

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- ▶ 1. Indicator species
  - Waarnemingen.be
  - Focus on plant indicator species

# Pillar II: Integrate existing and forthcoming dataset

## ► 1. Indicator species



# Pillar II: Integrate existing and forthcoming dataset

## ► 1. Indicator species

- Waarnemingen.be with millions of observations
  - Focus on plant indicator species
  - Especially usefull in old / quick-and-dirty mapping
- 
- Potential pathway to citizen science.
    - observations approved by admin
    - especially valuable in combination with abundance of plant species
    - conditional questions? “*Have you also seen X, Y or Z?*”

# Pillar II: Integrate existing and forthcoming dataset

## ► 2. Integrate other GIS layers

e.g. agricultural GIS data (“landbouwgebruikspercelen”)



2016

2017

2018

2019

2020



- Akker - b.
- Hoogstamboomgaard
- Laagstamfruit - kl
- Permanent grasland - hp
- Serre - ur
- Tijdelijk grasland - hx
- Wijngaard - kl

# Pillar II: Integrate existing and forthcoming dataset

## ► 2. Integrate other GIS layers

→ Most relevant GIS layers

→ Agricultural datasets

→ Basiskaart Vlaanderen / GRB (urban and industrial areas)

→ DEM (e.g. high nature value grasslands)

→ Open street map

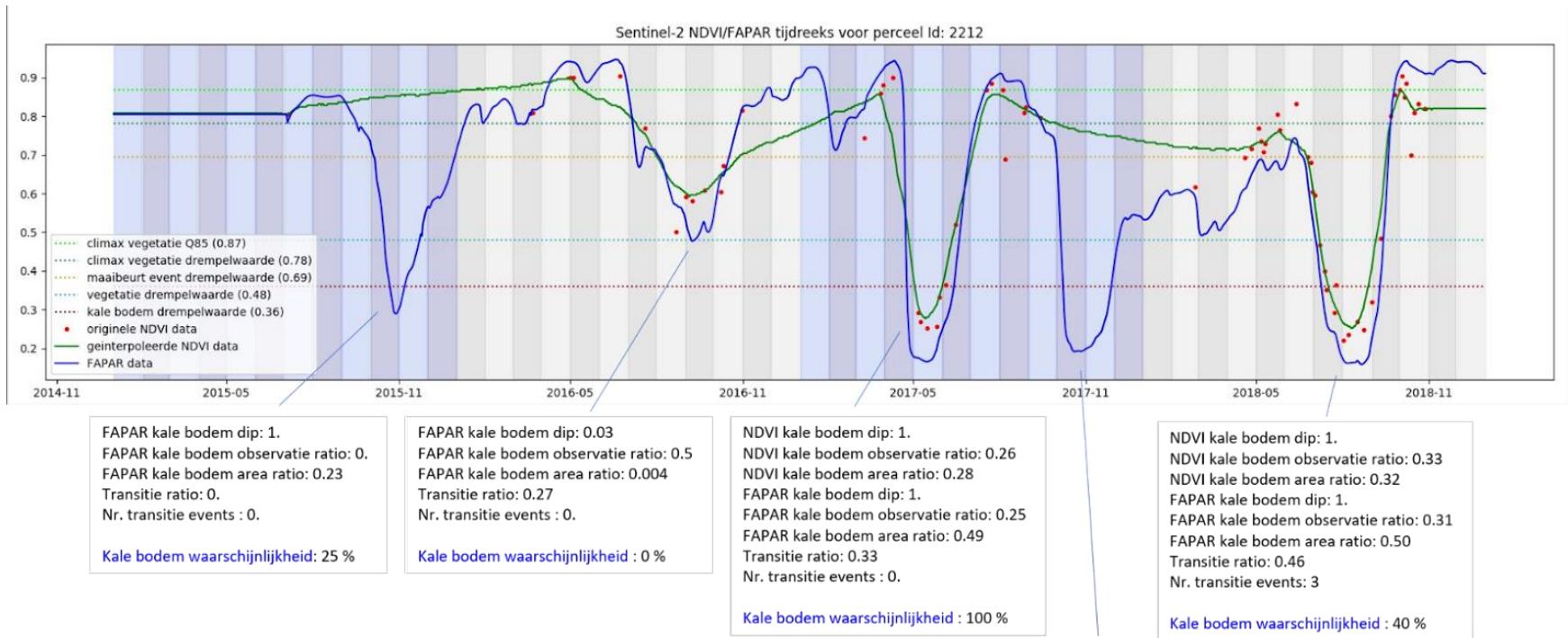
→ Lifewatch vegetation map

→ Easy to detect and highlight errors in the BVM,  
but challenging to perform a fully automated procedure  
- how to deal with errors in GIS data?  
- many slivers when overlaying layers  
-> edge evaluation methods = work in progress

# Pillar II: Integrate existing and forthcoming dataset

## ► 3. Remote sensing techniques

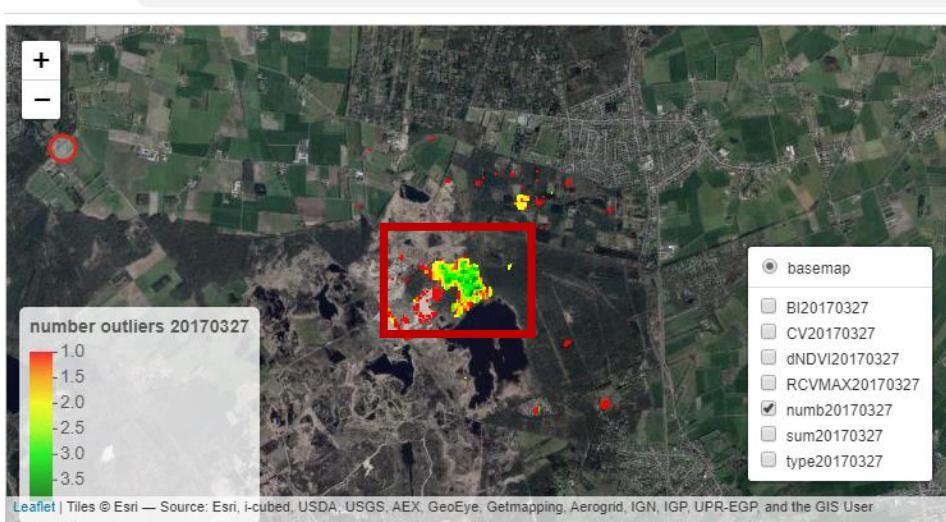
→ Detection of ploughing events in high nature value grasslands  
(analysis of time series from Sentinel 2) (work VITO)



# Pillar II: Integrate existing and forthcoming dataset

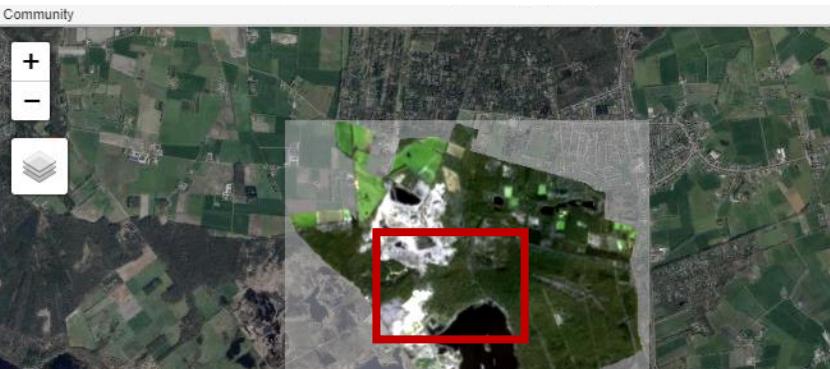
## ► 3. Remote sensing techniques

→ Change detection based on Sentinel-II time series (thesis  
KUL - Myrte Matthijs)



## Multi-Index Integrated Change Analysis (MIICA)

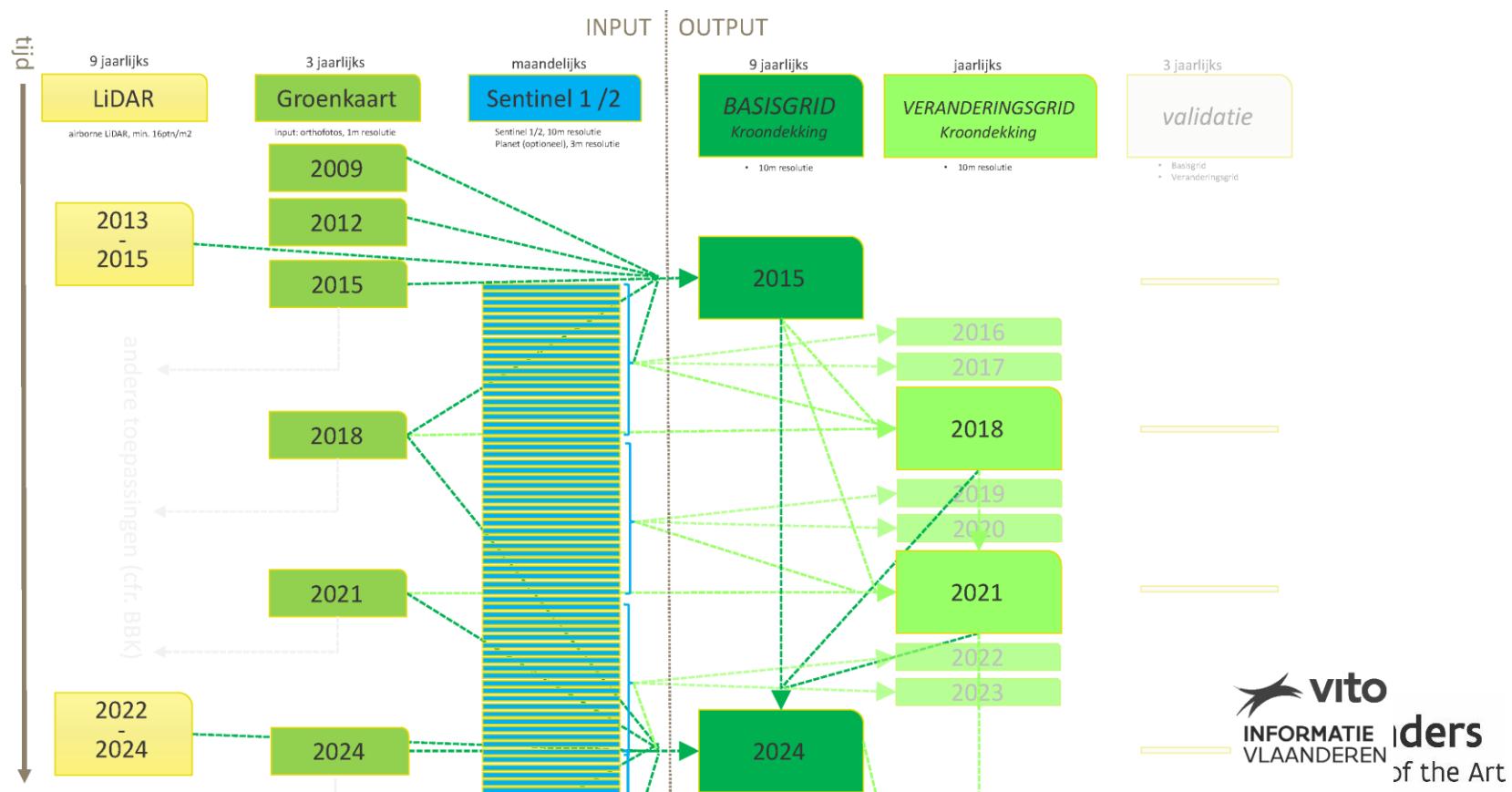
- Bi-temporal change detection (2015-2016, 2017-2018)
- 4 spectral indices
- Different periods in the year



# Pillar II: Integrate existing and forthcoming dataset

## ► 3. Remote sensing techniques

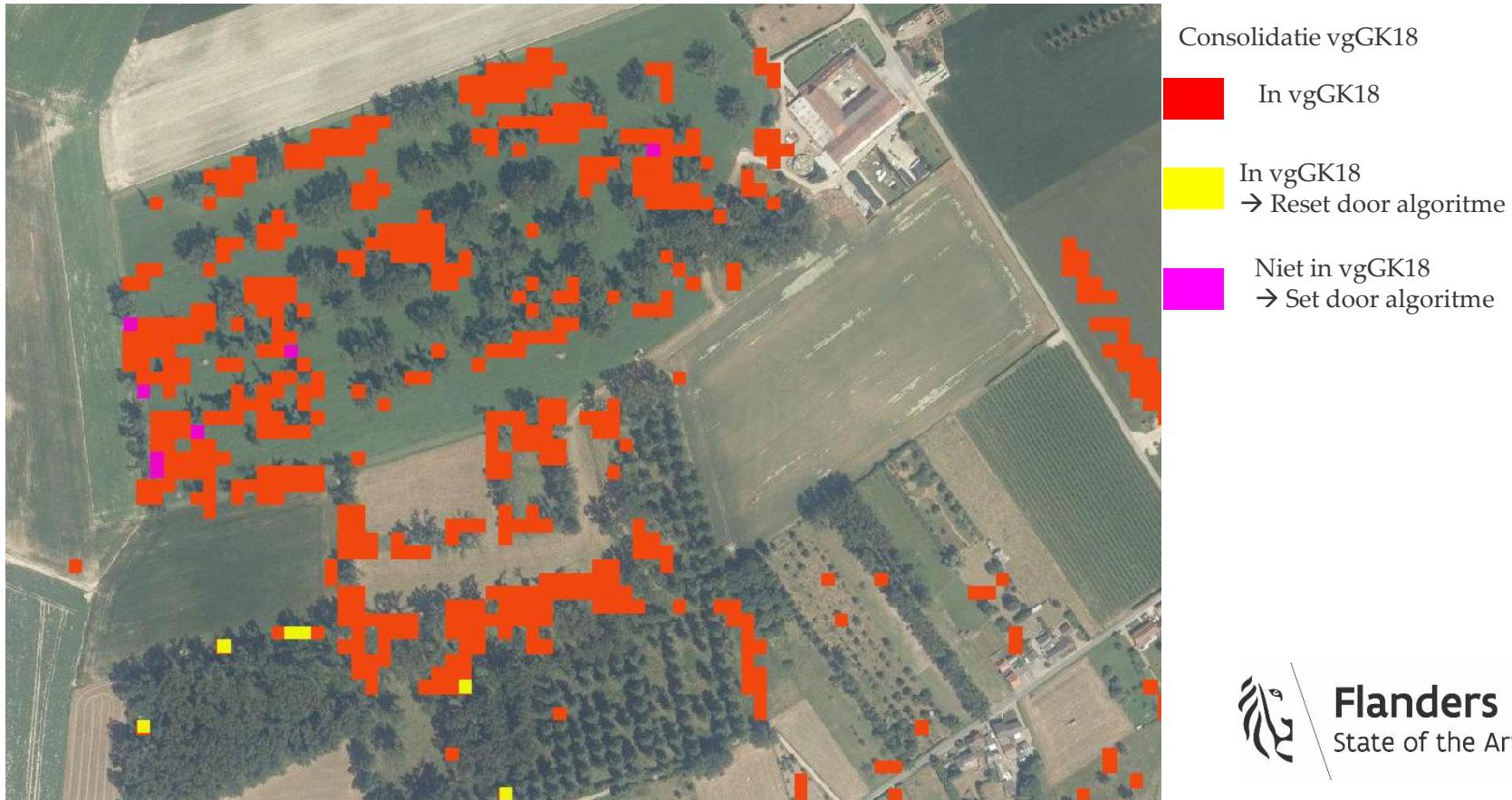
→ Disappearance of trees based on Lidar, Groenkaart and Sentinel 1 & 2 (work VITO & Digitaal Vlaanderen)



# Pillar II: Integrate existing and forthcoming dataset

## ► 3. Remote sensing techniques

→ Disappearance of trees based on Lidar, Groenkaart and Sentinel 1 & 2 (work VITO & Digitaal Vlaanderen)



# Pillar II: Integrate existing and forthcoming dataset

## ► 3. Remote sensing techniques

- Highlight changes
- Fast
  - × Possibility for biennial BVM updates
  - × Even nearly-realtime applications
- Rapid technological advances in AI & image recognition
  
- Often pixel based
- Accuracy OK?
  - × Is overall accuracy of 90% good enough?
  - × Minor vs major errors

# Summary: the future of BVM

= up-to-date & high quality map

## Pillar I: Oldschool field mapping

## Pillar II: Integrate existing and forthcoming dataset

- ▶ 1. Indicator species & citizen science
- ▶ 2. Integrate other GIS layers
- ▶ 3. Remote sensing techniques

- Other ideas?
- Work in progress
- Cooperation welcome!

→ Thank you for your attention

