

# Methodology to select contaminated sediments for prior remediation on a regional scale

## Case Flanders

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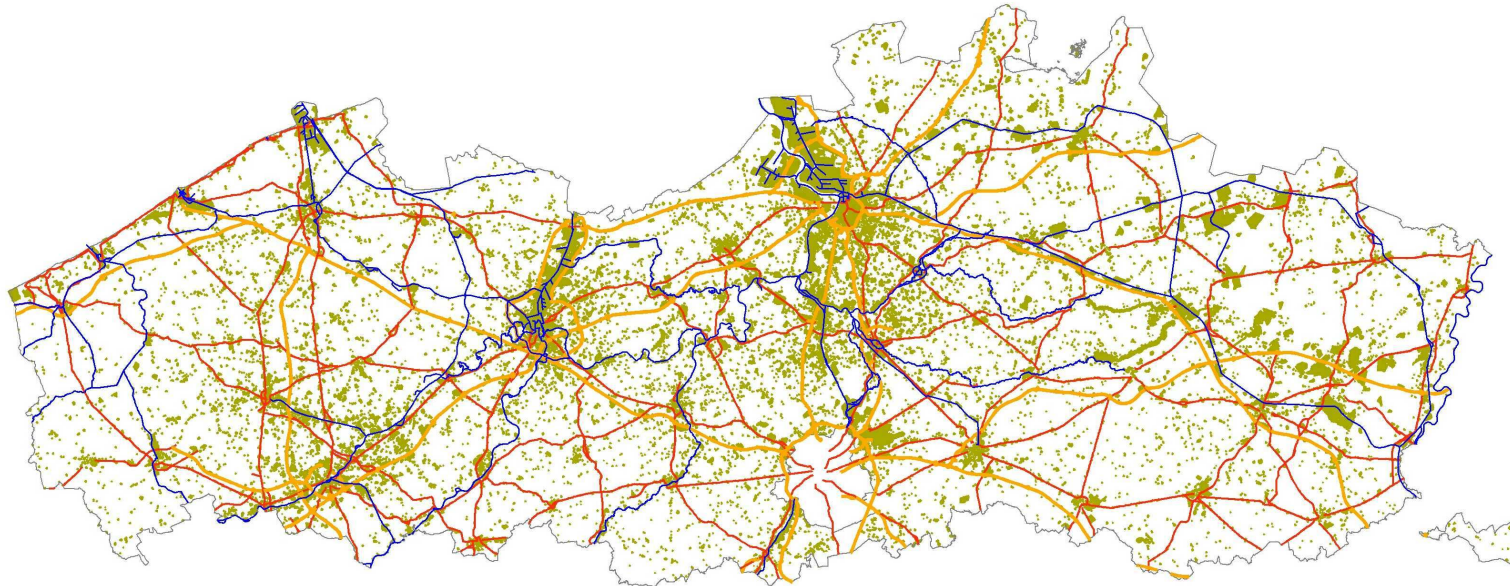
SEDNET 08.04.2011

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MORE BEAUTIFUL**



# Aims of the soil legislation in Flanders

- remediate historical soil contamination
- prevent and clean up new soil contamination
- soil certificate as information tool



- Locations where soil is investigated (>40.000 exploratory soil investigations)

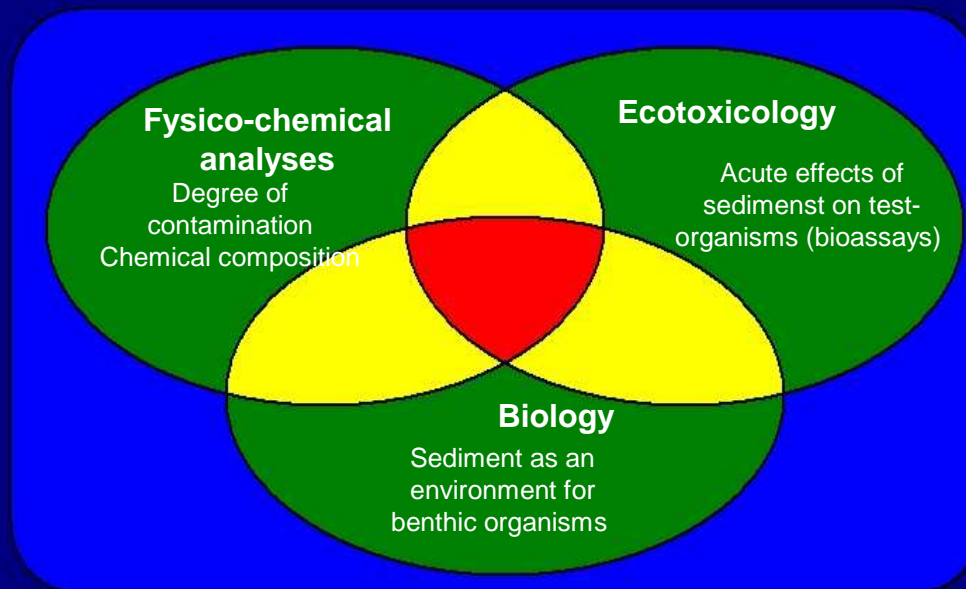
# Quality of sediments in surface waters Triad approach



## Fysico-chemical parameters:

Fractions,  
Organic matter,  
Mineral oil,  
Heavy metals,  
OCP's,  
PAH's,  
PCB's.

## Ecological quality of sediments TRIAD-concept



## Ecotoxicological parameters:

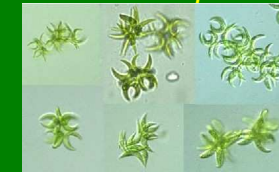
### Solid-phase test:

- *Hyalella azteca*



### Liquid-phase test:

- *Raphidocelis subcapitata*



### Liquid-phase test:

- *Thamnocephalus platyurus*



## Biological parameter:

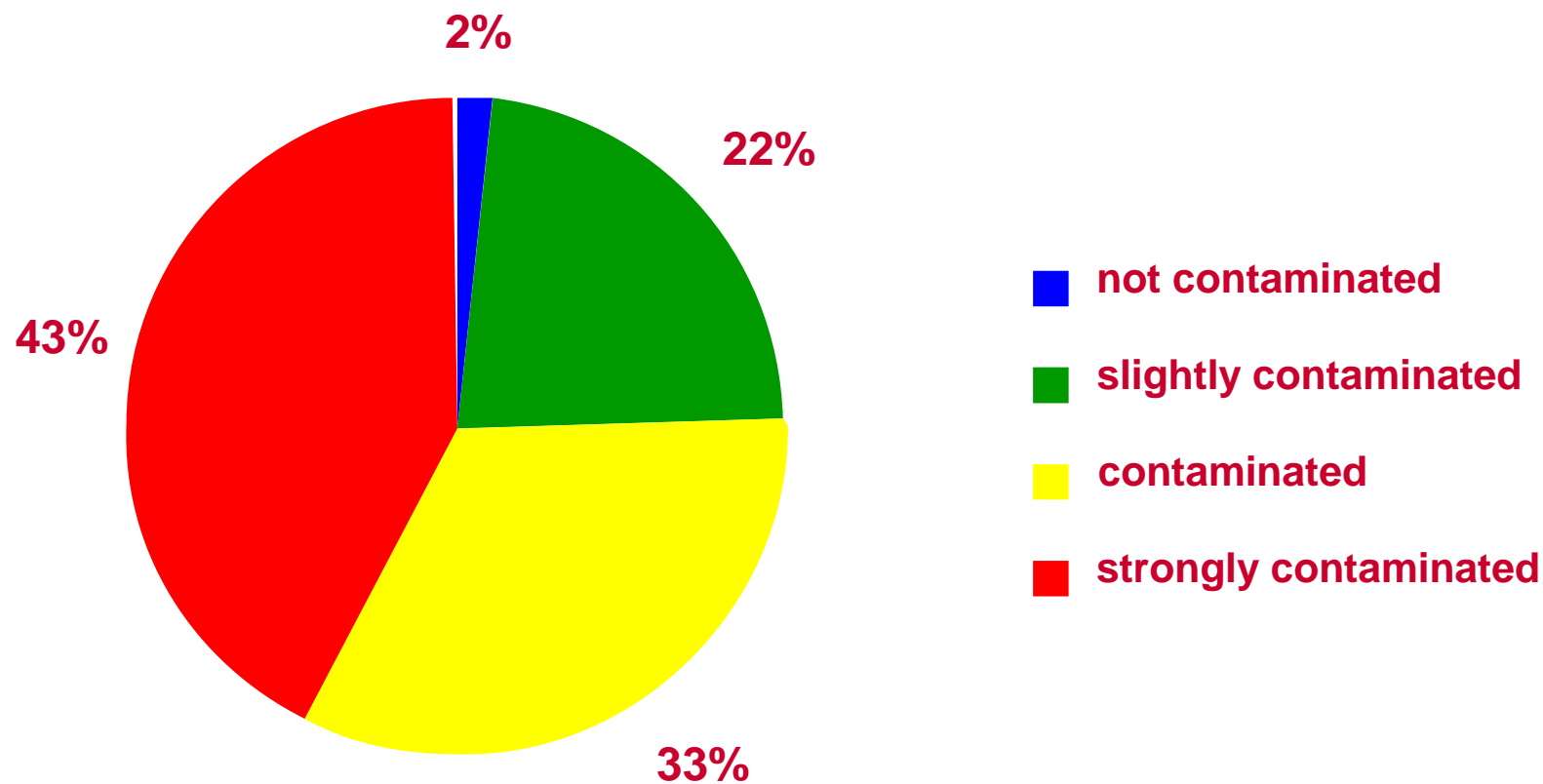
Benthic macro-invertebrates



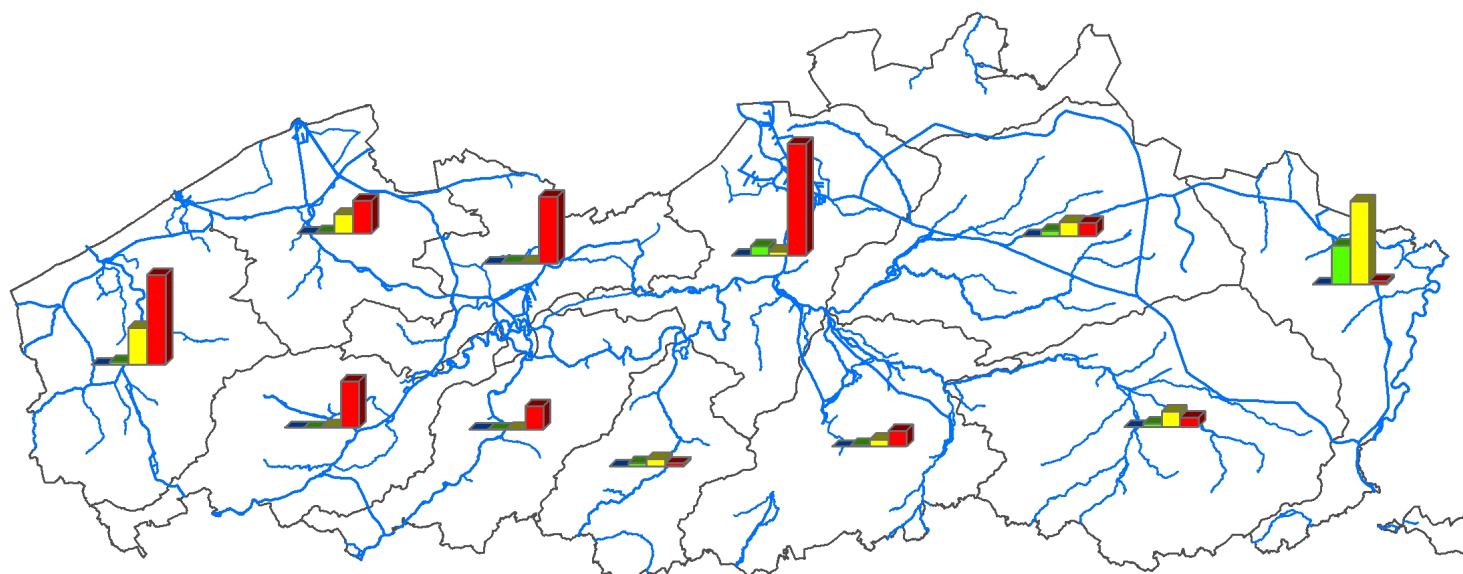
Biotic Sedimentindex (BSI): presence of indicator organisms and taxonomic diversity



# Quality of sediments in Flanders



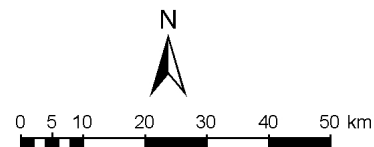
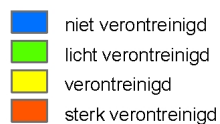
# Quality and quantity of sediments in Flanders - sub basin level



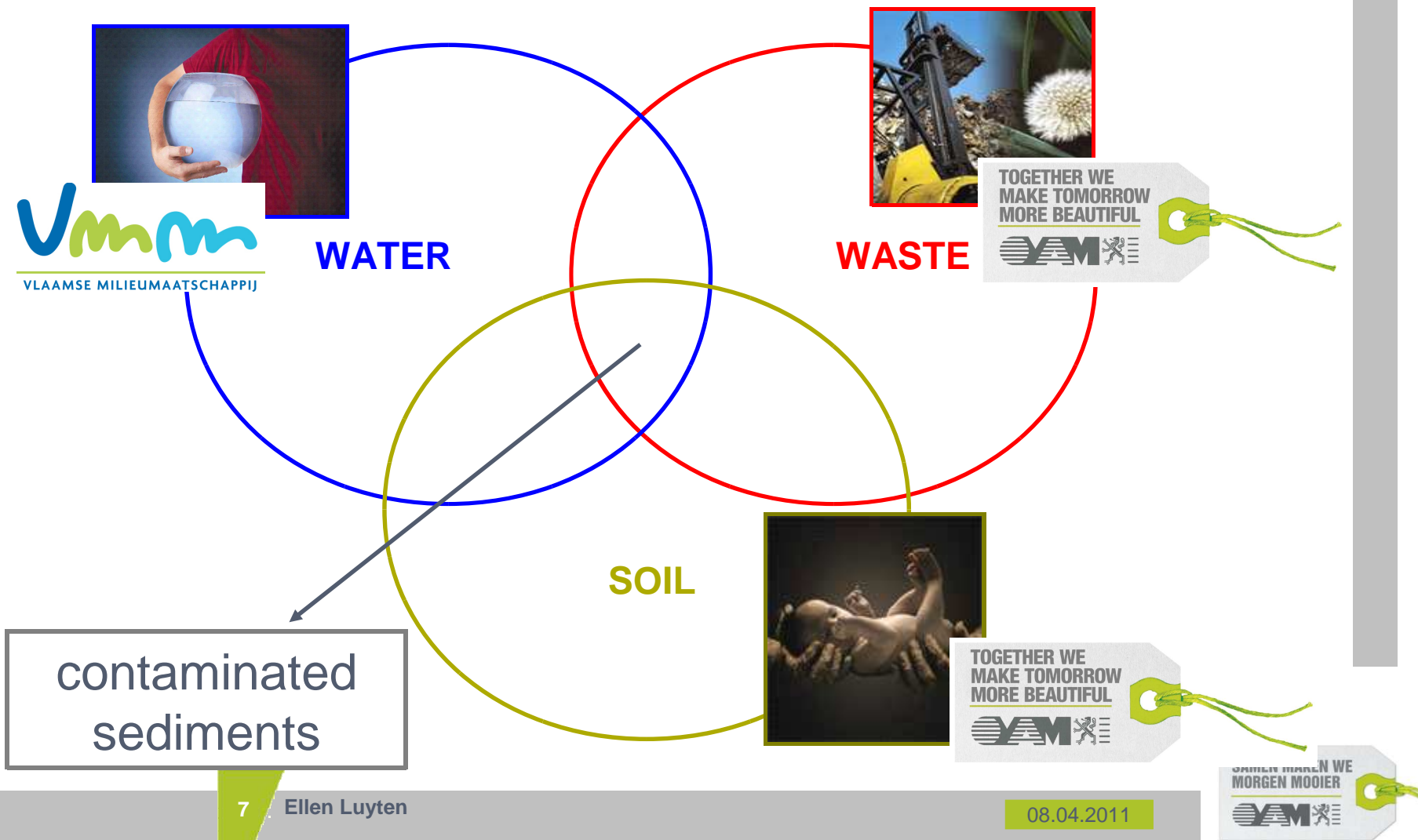
Geschatte hoeveelheid sediment per bekken



Waterbodemkwaliteit



# Contaminated sediments: interface of different policy frameworks



# Decree on soil remediation and soil protection

BMP 

Flemish government indicates **on regional scale** which contaminated sediments need to be investigated



Use of guideline for investigation of contaminated sediments



Severe contamination of sediments ?



Sediment remediation necessary



Remediation

**Need for methodology to set priorities**





# Contaminated sediments: interface of different policy frameworks



**CIW Coordination committee of integrated water policy**  
composed by

- Administrations and entities of the Flemish region
- Local water authorities
- Drinking water authorities
- Chairmanship and secretariat is assigned to VMM

**Structure of different CIW working groups**

- Platform for actors involved in water policy

## Methodology for setting priorities: 2 stages

- Stage 1: Decision Support System based on a multi-criteria analysis integrating all data

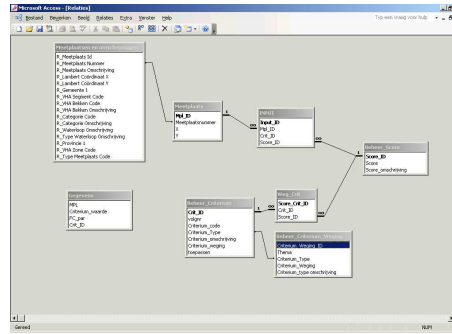
$$\left. \begin{array}{l} \sum_1^x (\hat{S} \times W_x) = SW_t \\ \sum_1^x W_x = W_t \end{array} \right\} SW_t \times W_t = EOP$$

- Stage 2: Expert judgement - evaluation of result

STAGE 1

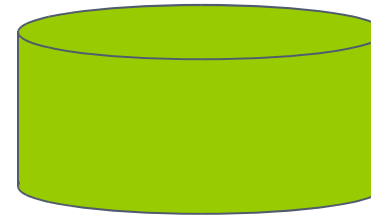
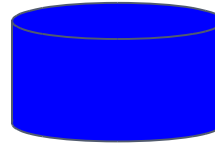


GIS-analysis



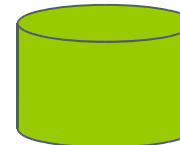
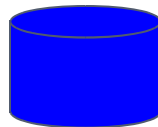
DSS\_PRIO

Set of theoretical priorities



STAGE 2

Set of priorities based on 'in practice'



Expert judgement

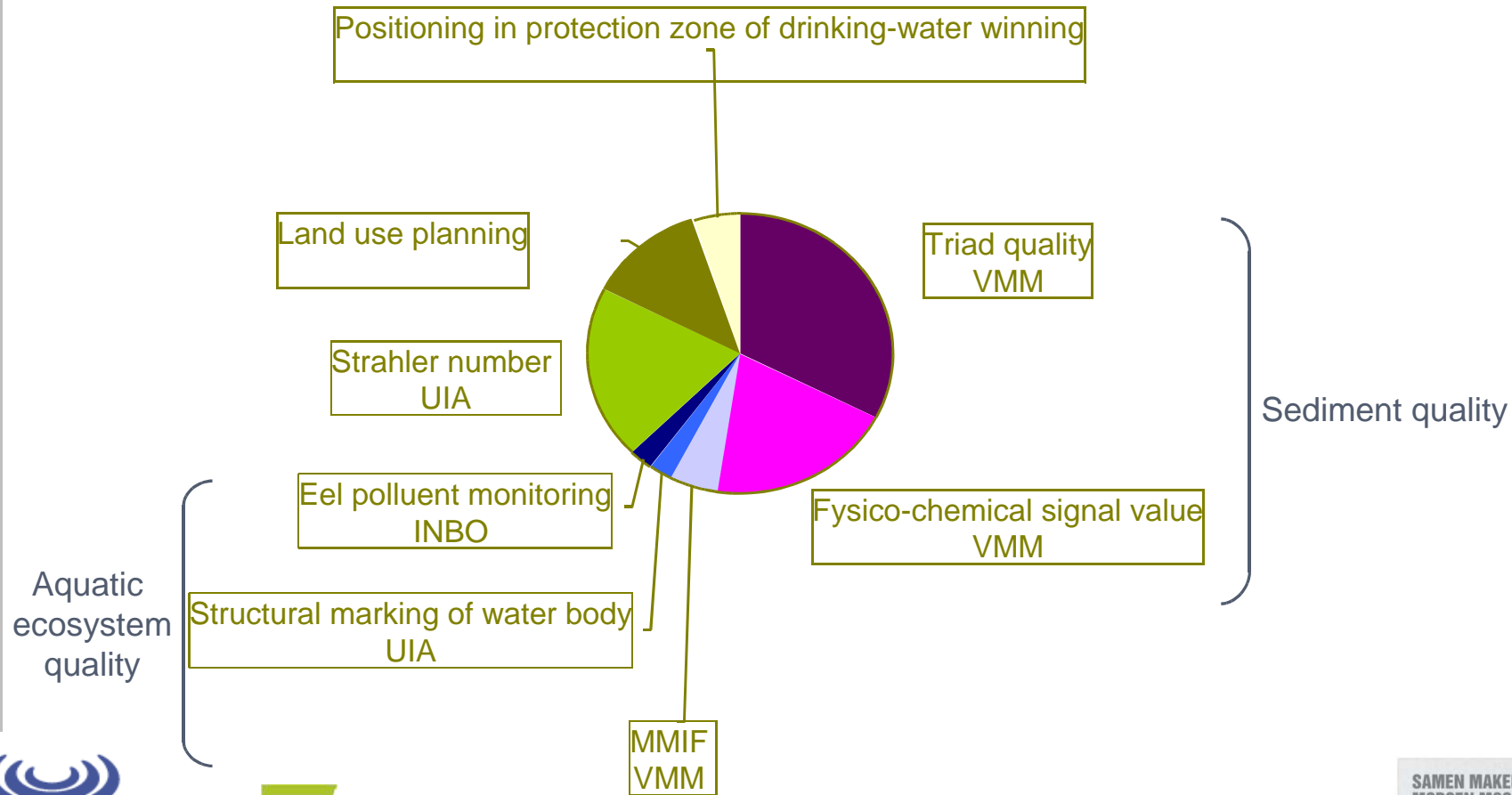


## STAGE 1: Criteria for Ecological Investigation Priority

3 quality standards for sustainability:

1. Quality of the sediment
  2. Quality of the aquatic ecosystem
  3. Criteria that enhance a succesful ecological recovery after remediation
- Assigning weights to the criteria, standardisation, imputation
  - Ecological Investigation Priority (EIP)

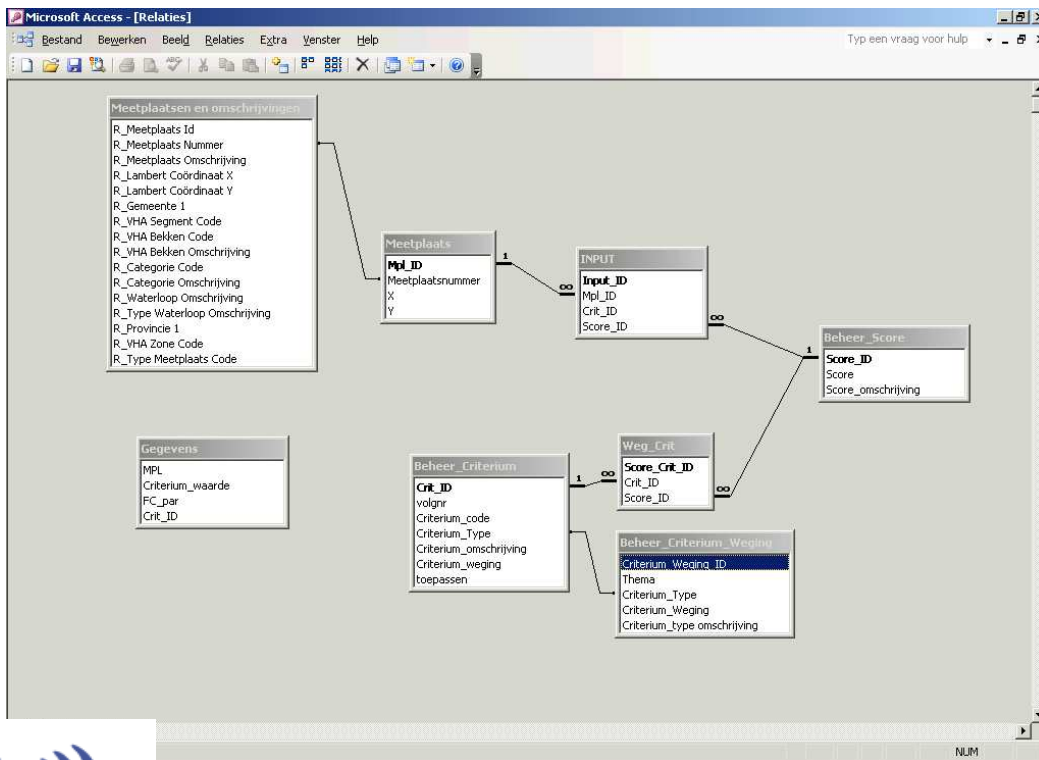
# STAGE 1: Criteria for Ecological Investigation Priority



# STAGE 1: DDS\_PRIO

## multi criteria analysis for setting theoretical priorities

- DDS\_PRIO: a relational database



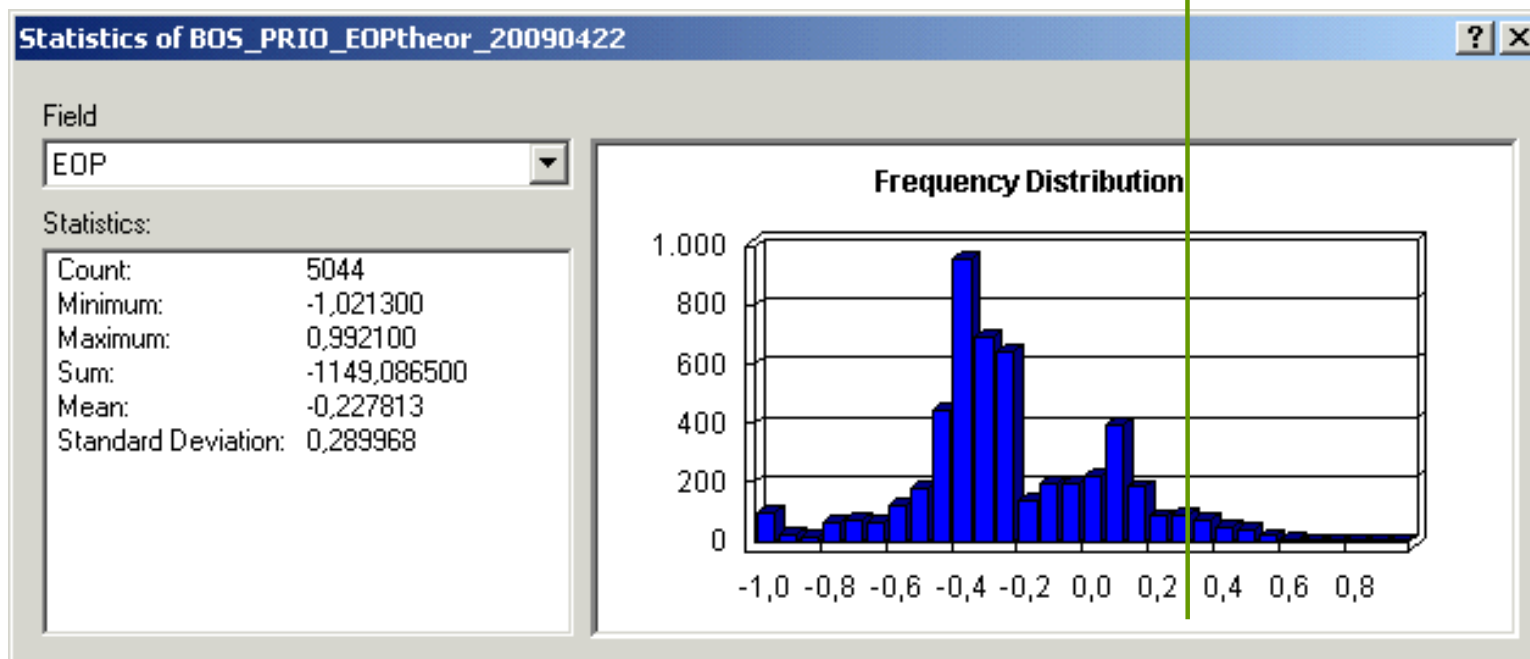
} **EIP**  
**Ecological investigation priority**

# STAGE 1: Results

EIP treshold value = +0,3

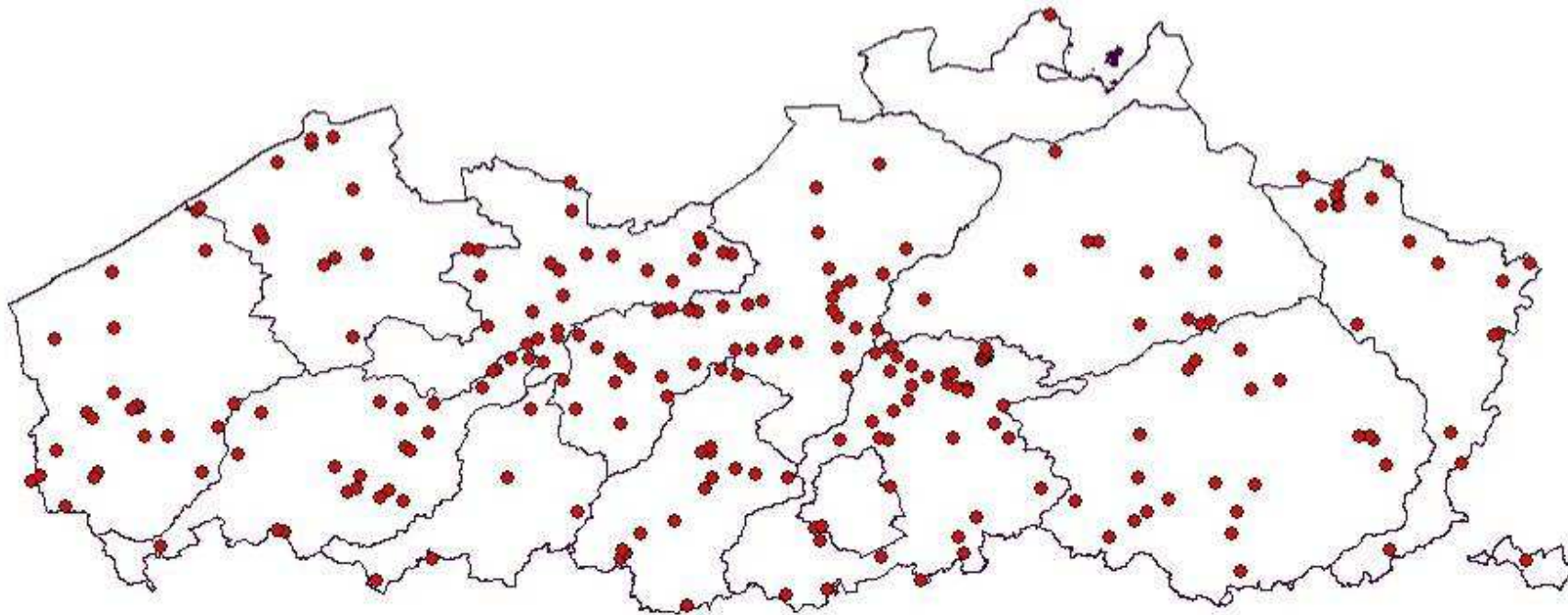
Low priority

High priority



# STAGE 1: Results

- EIP > 0,3

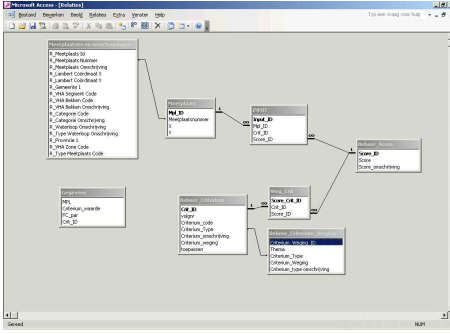




STAGE 1  
STAGE 2



GIS-analysis



DSS\_PRIO

Set of theoretical priorities



Expert judgement


Set of priorities based on 'in practice'



# STAGE 2: expert judgement consultation meetings

## Quality control of data

## Extra information

**BOS\_PRIO** Info fiche 

VHAG: 6551

Beheerder: Waterwegen en Zeekanaal NV - Afdeling Zeeschelde

VHAS: 6019406

**DIJLE**

EOP: **0,58**

Meetplaatsnr: E003174  
Gemeente: MECHELEN  
Categorie: BEV Bekken: BEV

**CRITERIA**

BBI: TKB:  
PKB: Hoogste norm overschrijding: 11428 keer de norm

Strahler orde: 6

Structuur: beek - kwaliteit: zwak


R	Parameter	Symbol	signal	Datum
PCB 138			11429	1.03/2004
PCB 153			6667	1.03/2004
PCB 180			10000	1.03/2004

RUIMTELIJKE INDELING (+ ligging in overstromingsgebied + ligging in drinkwaterbeschermingsgebied):

Natuur	Overstromingsgebied
Landbouw	Drinkwater + grondwater Beschermingsgebied
Wonen	
Recreatie	
Industrie	

Meetplaats met de lokale EOP de lokale tijdsde VHAS:

nummer	VHAS	Gemeente	EOP	TKB
E001572	6019406	MECHELEN	0,13	4
E001771	6019406	MECHELEN	-0,02	

**BOS\_PRIO** Expertenfiche 

VHAG: 6551

Beheerder: Waterwegen en Zeekanaal NV - Afdeling Zeeschelde

VHAS: 6019392

**DIJLE**

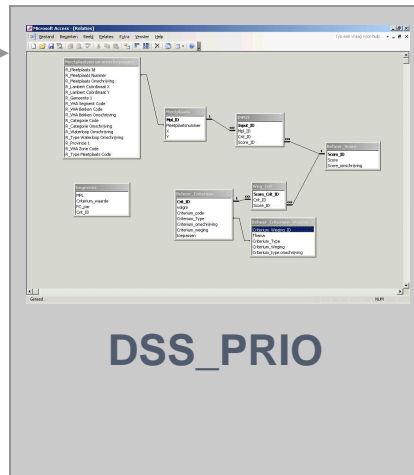
nummer:	E003176	Ja	Nee	weet niet	antwoorden en motivatie op open vragen in te vullen door betrokkenen
De meest recente analysesresultaten zijn niet meer actueel, er is sinds de meest recente analysesresultaten nog genuld		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wanneer? Door wie?
Er zijn andere relevante parameters		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Welke?
Een van de criteria uit het BOS_Prio model is niet meer relevant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Waarom?
- TKB		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Fysico-chemische signaalwaarden		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- BBI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Palingpolluentennet		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Structuur		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Strahlerorde		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- ruimtelijke indeling		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Ligging in drinkwater- en grondwater beschermingszones		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stroomopwaarts zijn er nog relevante lozingsbronnen of overstorten. Er zijn grensoverschrijdende vuilvrachten gekend.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Welke type lozing? Waar? Timing? Uitsluitend?
Er zijn verontreinigde oevers		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Waar? Uitsluitend?
het traject ligt in verontreinigde erosiegevoelige gebied en er is constante sedimenttoevoer naar de waterloop		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Waarom? Timing? Uitsluitend?
Er is geen reële kans op herstel		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Waarom? Timing? Uitsluitend?
er is kans op grondwatervervuiling		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wat is de specifieke situatie? Uitsluitend?
Er is een belangrijke beleidsopdracht, een gekende opportuniteit of een gepland project dat relevant is in het kader van deze onderzoeksprioritering		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Welke? Timing?
Er bestaat een onderzoekstrigger, van een andere aard dan een zuivere ecologische aard		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Welke? Timing?
Bijkomende stellingen - eventueel nog aan te vullen		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Mogelijke aanbevelingen:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## STAGE 2: expert judgement consultation meetings (2)

- extra relevant information from expert:
  - known upstream discharge points
  - water course is imbedded in an area sensitive to erosion
  - contaminated river banks
  - no real chance of ecological recovery
  - other opportunities exist to start investigation and remediation of the water course

# STAGE 2: Results

Sediment Monitoring Network - VMM > 5000



Set of theoretical priorities

Info-sheets

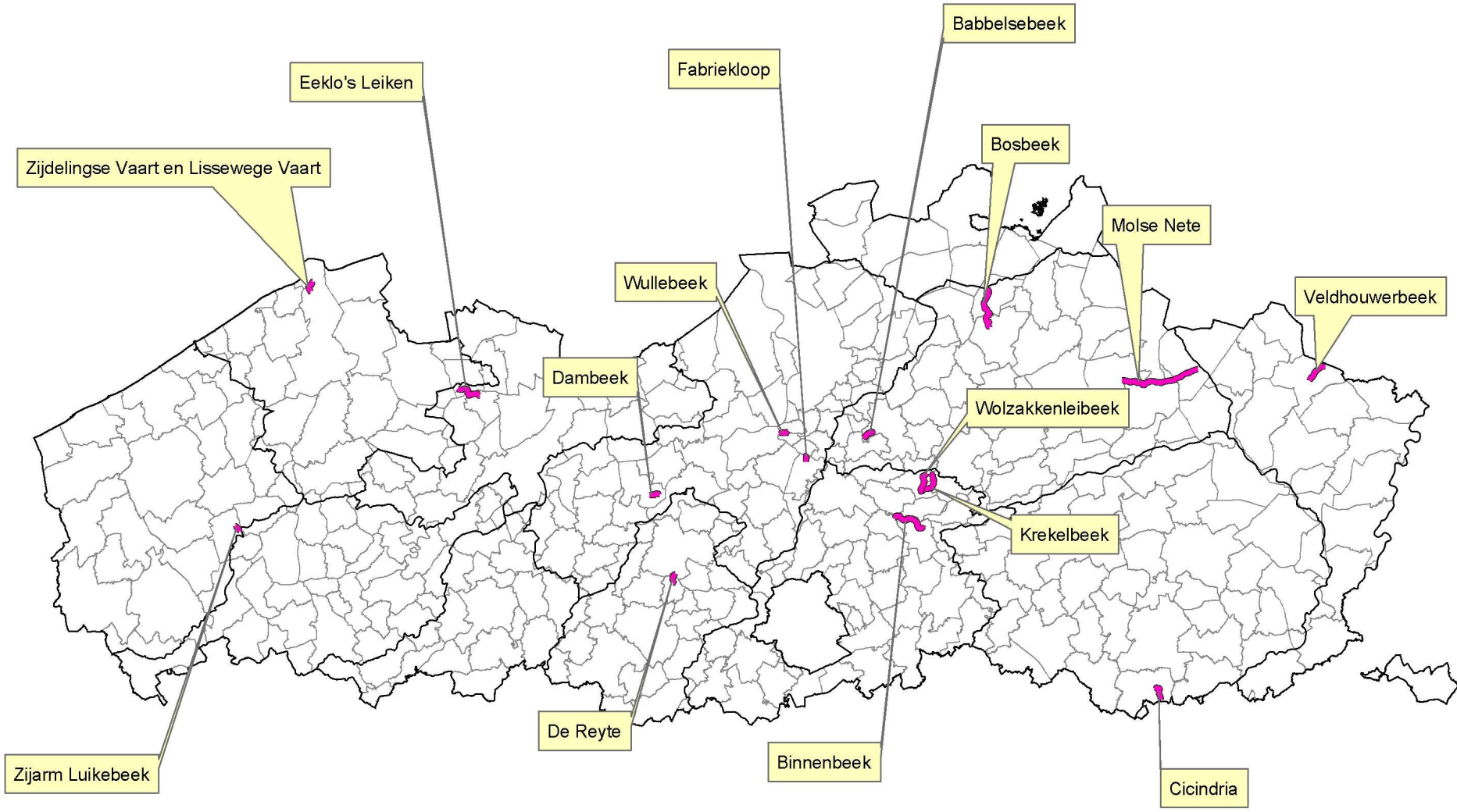
EXPERT JUDGEMENT

Insert  
discard  
adjust  
extra info

Set of priorities based on "in practice"

Final consultation and consensus

Priorities set on regional scale



# Acknowledgements

- CIW working group: Astrid Van Vosselen
- CIW secretariat: Jeroen Schelkens
- VMM: Ward De Cooman
- OVAM: Tim Caers, Jiska Verhulst



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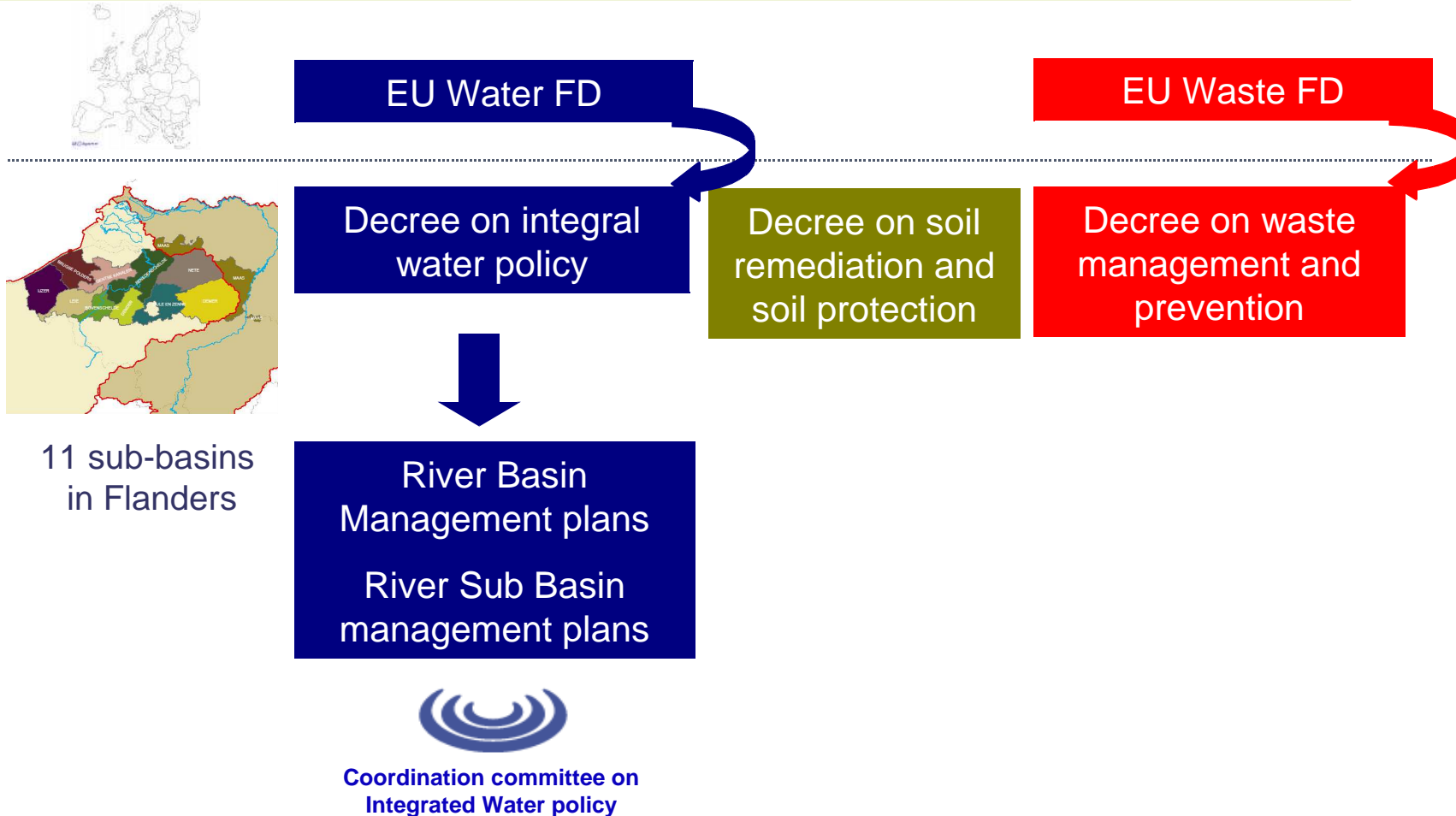


[www.ovam.be](http://www.ovam.be)  
[info@ovam.be](mailto:info@ovam.be)

T: 015 284 284  
F: 015 203 275

Public Waste Agency  
of Flanders  
Stationsstraat 110  
B-2800 Mechelen

# Contaminated sediments: interface of different policy frameworks (2)



11 sub-basins  
in Flanders

