BeNeKempen

Harmonisation of exposure and risk assessment models for the BeNeKempen project

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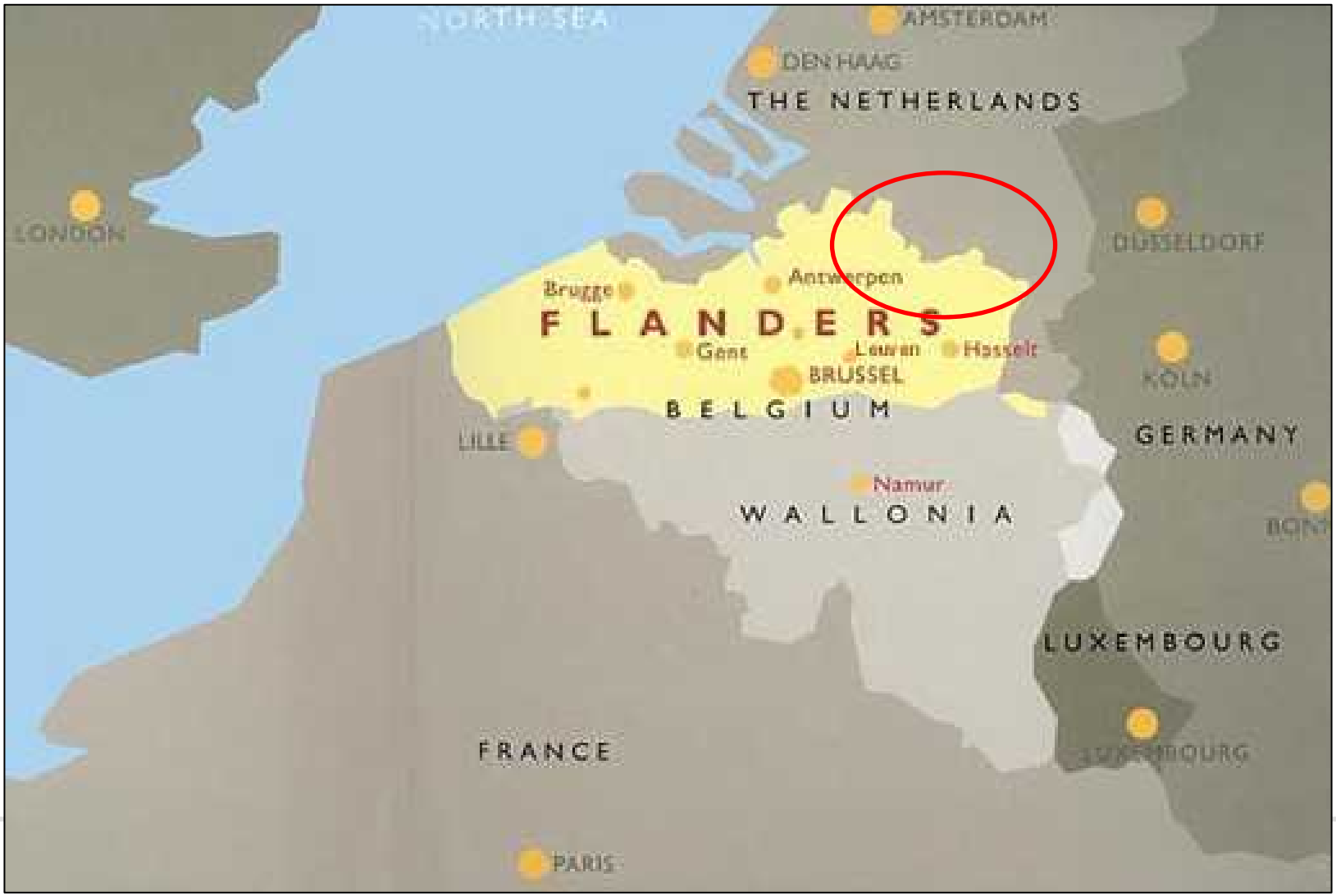
Content :

1. The BeNeKempen project
2. Approach to harmonization
3. Examples
4. Conclusions

1. The BeNeKempen project

BeNeKempen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1. The BeNeKempen project (1/5)

- The NO part of Belgium and the SE part of the Netherlands (Campine area)
- End 19th century - 1970's: non-ferrous industries:

  emissions, discharges of waste water, use of ashes for pavement of roads

  → diffuse soil contamination

  → contamination of sediments, groundwater and surface water

1. The BeNeKempen project (2/5)

Similar problems at both sides of the border:

- human health and ecological risks;
- hindrance of different activities: e.g. roadworks on roads paved with ashes, dredging of rivers, ...

➔ BeNeKempen project

Partners: OVAM
ABdK

with financial support EU INTERREG III

1. The BeNeKempen project (3/5)

Objective of the BeNeKempen project:

to develop and implement cross-border strategies to solve problems related to the heavy metal contamination and to reduce risks

1. The BeNeKempen project (4/5)

One aspect:

to assess and manage human health risks

But:

different guidelines and methodologies for risk assessment in the two countries

→ different conclusions for the same contamination with regard to risks

Difficult to explain!

1. The BeNeKempen project (5/5)

One of the aims of the project:

to develop a common methodology for risk assessment for soil contamination in the Campine area

by harmonizing regional (Flanders) and national (The Netherlands) methodologies

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2. Approach to harmonization (1/4)

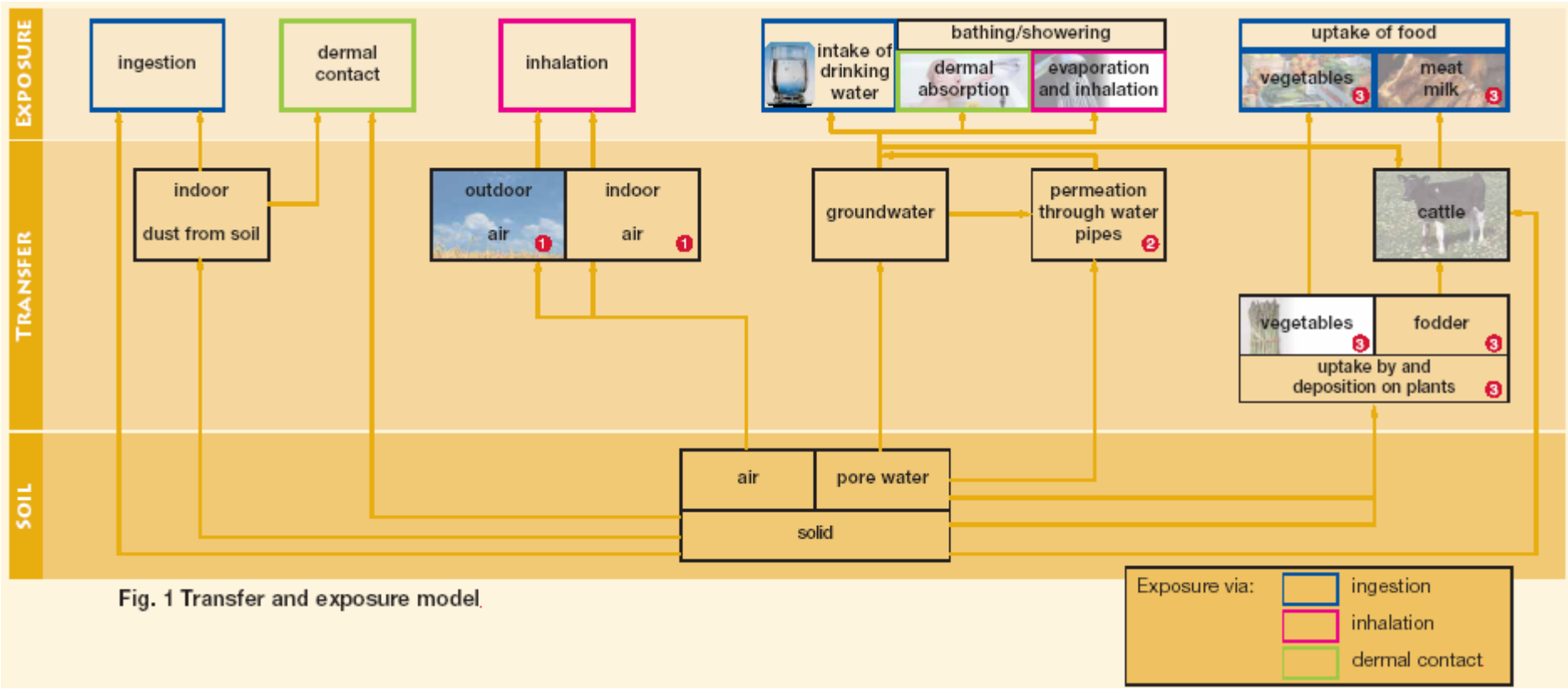

Fig. 1 Transfer and exposure model

2. Approach to harmonization (2/4)

Standard-computing models:

to calculate transfer of contaminants and exposure dosis, and assess risks

→ in Flanders: Vlier-humaan

→ in the Netherlands: CSOIL

similar basis, but many input parameters differ

2. Approach to harmonization (3/4)

Selection of relevant aspects:

- contaminants: Cd, Pb, As
- land use scenarios:
  - vegetable garden
  - residences with garden
  - residences without garden
  - recreation
- exposure routes:
  - ingestion of soil and dust
  - inhalation of soil and dust
  - consumption of vegetables
  - consumption of drinking water

2. Approach to harmonization (4/4)

Inventory of differences:

description of algorithms and parameters in Vlier-humaan and CSOIL

analysis

Discussion leading to consensus:

- straightforward
- more research
- policy decisions

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3. Examples (1/7)

- Uptake by plants
- Soil ingestion rates
- Background exposure (air and food)

3. Examples (2/7)

Uptake by plants:

Vlier-humaan and CSOIL:

$$C_{plant} = BCF * C_{soil}$$

Analysis:

BCF's ~ soil characteristics

~ plant species

e.g. Cd, carrots (Flanders):

$$\log BCF = 0.54 - 0.12 * \text{pH-KCl} - 0.75 * \log C_{soil}$$

3. Examples (3/7)

Uptake by plants:

Harmonization:

grouping of data from the Netherlands and Flanders

e.g. Cd, carrots:

$$\log BCF = 0.43 - 0.12 * \text{pH-KCl} - 0.51 * \log C_{soil}$$

3. Examples (4/7)

Soil ingestion rates:

CSOIL: no distinction inside/outside

Vlier-humaan: distinction inside/outside

mg/dag	children	adults
CSOIL		
residential	150	50
recreation	30	10
Vlier-humaan		
residential	50	20
recreation	100	50

3. Examples (5/7)

Soil ingestion rates:

Analysis: uncertain, few experimental data
literature research

Harmonization:

common values for amount/day

mg/dag	children	adults
Harmonization		
residential	100	50
recreation	130	50

3. Examples (5/7)

Soil ingestion rates:

Harmonization:

preliminary results

more research data needed:

- intake inside / outside
- concentration of metals in soil taken in
- land use type: urban / rural
- validation e.g. biomonitoring

3. Examples (6/7)

Background exposure (air and food):

CSOIL: no
Vlier-humaan: yes

Analysis:

different viewpoints:

with background: protection of people, whole environment is considered

without background: only soil pollution is considered

3. Examples (7/7)

Background exposure (air and food):

Harmonization: stepwise approach → clarify importance

with background exposure

without background exposure

e.g. critical values for residences with garden

mg/kg ds	with BG	without BG
As	63	154
Cd	42	63
Pb	560	612

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4. Conclusions (1/2)

- harmonization of methodologies is possible by introducing most recent developments
- research needs are indicated, research is ongoing, methodology will be adapted
- policy decisions → different options were calculated in order to clarify

4. Conclusions (2/2)

- need for harmonisation of methodologies for risk assessment on a larger scale

Thank you for your attention