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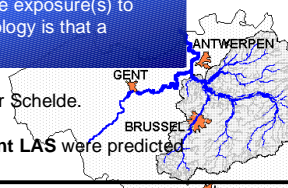
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Objectives

The **objective** is to develop a methodology allowing to more accurately estimate and refine the **risk of adverse effects** occurring to organisms or ecological systems due to possible exposure(s) to substances. An important element in this methodology is that a confidence interval will be calculated for this risk.

Case study:

- The Rupel is a tributary to the river Schelde.
- catchment area = 6.700 km²
- spatial risk patterns of the **anionic surfactant LAS** were predicted



Risk assessment is based on the comparison of

- a Predicted Environmental Concentration (PEC) = Exposure Analysis
- with a Predicted No Effect Concentration (NOEC) = Effects Analysis

Probabilistic Risk Assessment takes into account the variability and uncertainty, inherent to the environment.

Variability:

- represents inherent heterogeneity or diversity
- is not reducible through further measurements

However, variability can be refined by geo-referencing the risk assessment.

Uncertainty:

- represents ignorance or measurement error
- can partly be reduced through further research.

Probabilistic Exposure Analysis (PEC)

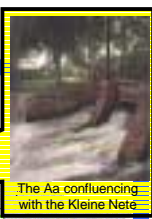
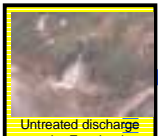
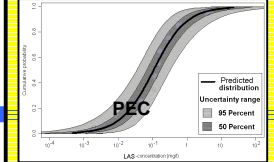
Spatial concentration patterns of the anionic surfactant LAS were predicted for the Rupel basin using the **GREAT-ER** software. Results show that:

- wastewater treatment plants have a significant though local improvement

on LAS-concentrations in the rivers

- the Rupel basin is a **very heterogeneous area** with unpolluted and heavily polluted areas

River concentration time-distribution (in winter low, in summer high PEC's)



Validation of the GREAT-ER predictions in the Rupel show that Boron measurements are within 50-150% of the model predictions.

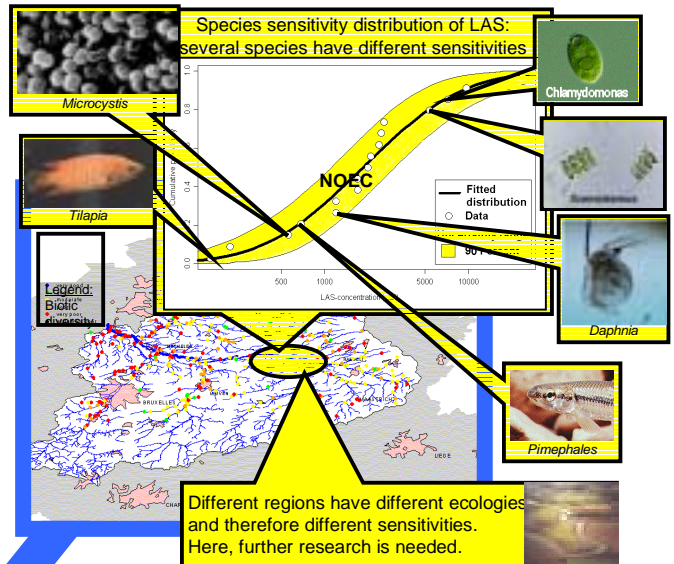
LAS-removal in waste water treatment plants is high (98-99.9%)



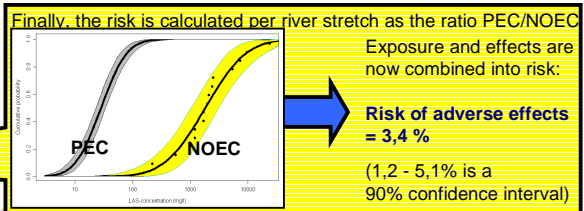
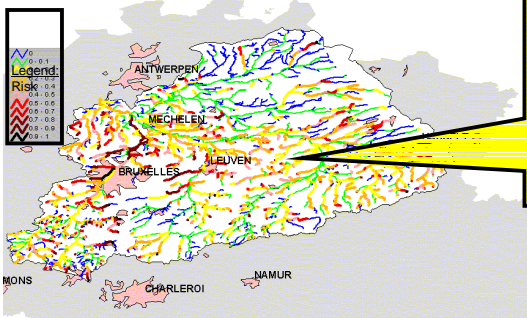
Probabilistic Effect Analysis (NOEC)

The predicted no effect concentration is determined based on NOEC toxicity data (NOEC = No Observable Effect Concentration) testing the sensitivity of an organism towards a chemical. Various species sensitivities towards a chemical can be captured in a variability distribution, called **Species Sensitivity Distribution**.

Species sensitivity distribution of LAS: several species have different sensitivities



Preliminary Geo-referenced Probabilistic Risk Assessment



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TAKE HOME MESSAGE

- Geo-referenced Probabilistic Risk Assessment is a refined, accurate tool for predicting adverse effects
- The Rupel basin is a very heterogeneous catchment with regions at low risk and regions with potential risk
- Further research is needed on geo-referenced effect analysis