ENDIS-RISKS
Endocrine disruption in the Scheldt estuary

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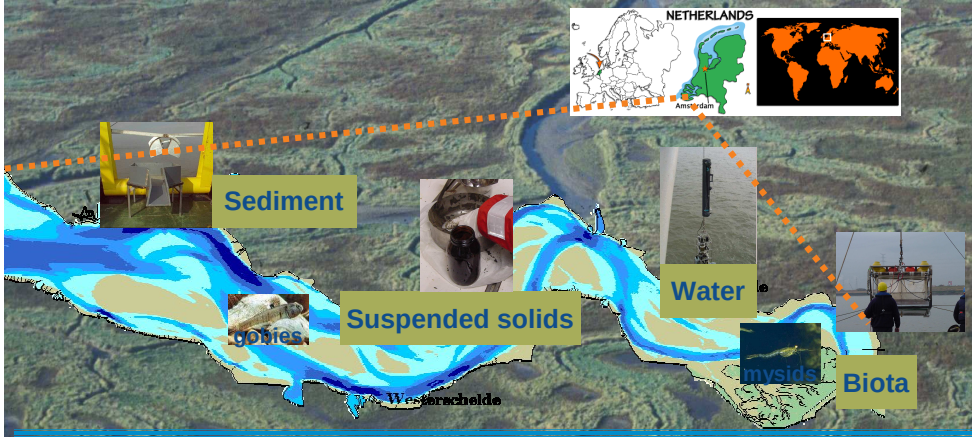
Background

During recent decades, reproductive and developmental problems in a wide range of wildlife species have been reported. These disruptions are ascribed to the influence of particular compounds, so called endocrine disruptors, on the hormone systems of exposed animals and their offspring. Effects of endocrine disruptors in estuarine environments, where animals are continuously exposed to strong fluctuations in their abiotic environment, are expected to be greater than in strictly marine or freshwater environments. As a consequence, hormone disruption in estuarine species by exposure to xenobiotics could potentially have a major impact on the growth, survival and reproduction of estuarine organisms. Unfortunately, little is known of the exposure, effects and distribution of endocrine disruptive chemicals in estuarine environments.

The Scheldt estuary

The Scheldt estuary is one of the most important tidal river systems in Europe. It is an important passing, overwintering and feeding area for waterbirds and nursery for fish and shrimp. Unfortunately, the Scheldt estuary is also among the most polluted estuaries in the world. Relatively few data are available on the distribution and effects of endocrine disruptors in this estuary.

Phase I. Distribution of endocrine disrupting substances in the Scheldt estuary



Chemicals analyzed in ENDIS-RISKS

- natural and synthetic hormones (17α-ethinylestradiol, 17β-oestradiol, oestrone)
- phtalates (butylbenzylphtalate, dibutylphtalate, diethylhexylphtalate)
- organotins (mono-, di-, tributyl and phenyltin)
- phenols (alkylphenols, alkylphenoxyethoxylates)
- polyaromates (flame retardants, PCBs, dioxins, furans)
- pesticides (β-HCH, DDT, dieldrin, hexachlorobenzeen, lindane, atrazine, chlordane, kepone, endosulfan, toxaphene, vinclozin)
- PAHs

Compound	Mysid[1]	Sediment[1]
Σ Organotins	1110-1370 ng g^{-1} dw	84-348 ng g^{-1} dw
Σ PBDEs	2095-3561 ng g^{-1} lw	262-1664 ng g^{-1} dw
HBCD	562-727 ng g^{-1} lw	14-71 ng g^{-1} dw
Σ NPE	430-1119 ng g^{-1} dw	1422 ng g^{-1} dw
NP	206-435 ng g^{-1} dw	1222 ng g^{-1} dw

[1]Verslycke T., Vethaak D., Arijs K. & Janssen C. 2003. *Environmental Science and Technology* (submitted)

Sampling strategy

- 7 sampling points
- 3 campaigns per year
- 4-year study (2002-2006)
- mysid population study
- chemical analysis
- *in vitro* estrogenicity and androgenicity

Phase II. Evaluation of the results of phase I

FIELD CONCENTRATIONS
(Phase I)

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EFFECT DATA
(literature, ED-North database)
http://www.vliz.be/projects/endis/EDNorth.php

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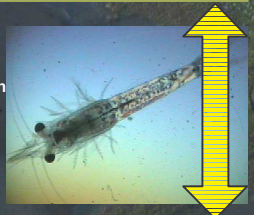
RETAIN IN PHASE III

Phase III. Ecotoxicological laboratory and field study

ACUTE/CHRONIC TESTING in the laboratory
mysid shrimp *Neomysis integer*

- energy metabolism
- (ecdy)steroid metabolism
- specific protein expression
- vitellogenesis
- DNA damage
- growth, molting
- reproductive endpoints



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BIOMARKER STUDIES in the field

Phase IV. Risk assessment

RESULTS OF PHASE I,II and III
(chemical data, toxicity testing, field study)

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PREDICTED NO EFFECT CONCENTRATIONS (PNECs)
(chemicals, ≠ environmental compartments)

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OVERALL RISK ASSESSMENT FOR SCHELDT ESTUARY

SUGGESTIONS FOR SUSTAINABLE DEVELOPMENT

Phase V. Valorisation, communication and reporting: http://www.vliz.be/projects/endis

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ENDIS-RISKS is financially supported by the Belgian Federal Science Policy Office

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