

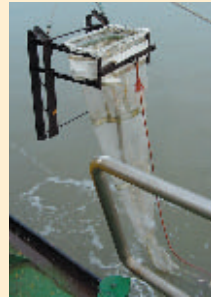
Estuaries belong to the most productive ecosystems in the marine environment. From an ecological point of view, the Scheldt estuary is one of the most important tidal river systems in Europe. It is an important passing, overwintering and feeding area for waterbirds and an important nursery for fish and shrimp.



ENDIS-RISKS is a four-year project carried out by a consortium of five Belgian partners and one Dutch partner. This project is financed within the framework of the "Second Plan for Scientific Support for a Policy of Sustainable Development" (SPSD-II) as a strategic scientific research.

The research project

The ENDIS-RISKS project aims to assess the distribution and the possible effects of endocrine disrupting substances in the Scheldt estuary. The effects of priority substances on biota, their physico-chemical distribution (speciation within the different compartments: sediment, water, suspended solids), their concentration in biota (mysid shrimp and gobies) and their geographic distribution will be assessed.



The valorisation of the ENDIS-RISKS project will result in a thorough, integrated and multi-disciplinary description of the current status of the Scheldt estuary in relation to the issue of endocrine disruption. This study will result in a fundamental, ecotoxicological risk assessment of endocrine disrupting substances in the Scheldt estuary.



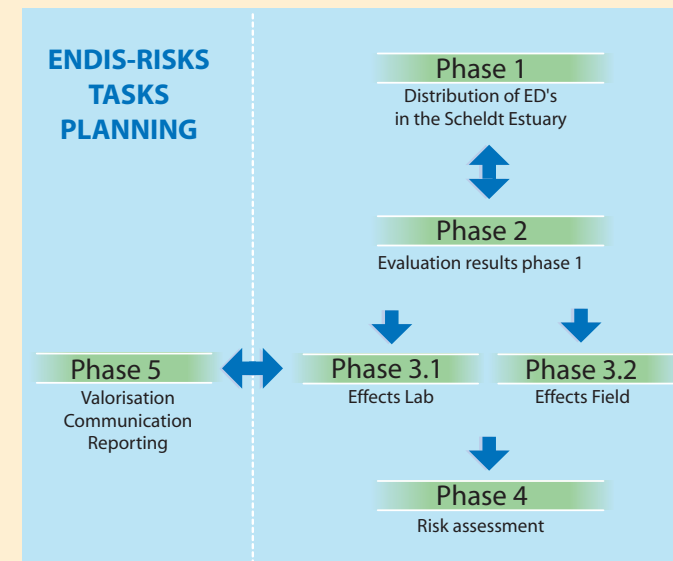
Study area

Unfortunately, the Scheldt estuary is also among the most polluted estuaries in the world. The observed effects in common terns, flounder and several gastropod species (see pictures previous page) from the Scheldt estuary have demonstrated the potential threat of environmental pollution on the resident wildlife. Recently, a comprehensive literature study (ED-NORTH project: targeted scientific action within SPSPD-I) demonstrated the urgent need for exposure and effect data of endocrine disruptors, relevant to the North Sea and its estuaries. The results of this project were compiled into a relational database which is publicly available through the ENDIS-RISKS website.

Objectives

- Analyses of endocrine disruptors in water, suspended solids, sediment and biota (mysids, gobies);
- In vitro* evaluation of the estrogenic and androgenic potential of samples of water, suspended solids and sediment;
- Ecotoxicological (laboratory and *in situ*) evaluation of the effects on the resident mysid populations (short, intermediate and long-term);
- Risk assessment of endocrine disruptors in the Scheldt estuary.

Planning



The ENDIS-RISKS project runs over a period of four years, from 1 Feb 2002 until 30 Apr 2006. It can be divided into five different phases. Four of these phases concern research activities, the fifth phase is a communication and valorisation phase.

Phase I

During the different ENDIS-RISKS campaigns, water, suspended solids, sediment and different biota (mysid shrimp and gobies) will be sampled and analysed for an extensive list of endocrine disruptors. In addition, *in vitro* analyses will allow an evaluation of the estrogenic and androgenic potency in sediment, water and suspended solids.

Phase II

The chemical and *in vitro* data of the first year campaigns will be integrated and evaluated in order to optimise the sampling strategy for the following campaigns.

Phase III

Mysid shrimp are chosen as target organisms. Recently, specific biomarkers were developed to study endocrine disruptive effects in these organisms. In addition, historic population data on the resident mysid population in the Scheldt estuary are available. As such, the new population data, generated within the ENDIS-RISKS project, will provide a way of evaluating potential population effects in mysids of the Scheldt estuary. Mysid shrimp will also be exposed in the laboratory to specific endocrine disruptors (these compounds will be selected on the base of the results of Phase II) to study their effects under controlled conditions. The laboratory and field studies will allow an integrated study of endocrine disruption in mysid shrimp.

Phase IV

The last research phase will compile all the data of the previous phases to perform a comprehensive risk assessment for endocrine disruptors in the Scheldt estuary.

Phase V

Throughout the project considerable effort will be directed towards the communication and valorisation of the results and data. The central point for these activities will be the ENDIS-RISKS website.



Samples will be taken with the RV Belgica (MUMM) or RV Zeeleeuw (VLIZ), three times a year for the duration of the project. Each year sampling campaigns will be performed during spring (April), summer (July/August) and winter (November-/December). These periods coincide with the three population peaks of the resident mysid population. The sampling locations were chosen in accordance with running national and international sampling programs and studies on the Scheldt estuary.

The compounds which will be analysed in the ENDIS-RISKS project were based on existing lists of priority substances (e.g. EU and OSPAR). Both natural hormones and numerous man-made chemicals will be analysed, such as phthalates, organotins, phenols, flame retardants, PCBs, dioxins, PAHs and pesticides.

Field study



Laboratory study



To evaluate the possible effects of the pollutants (retained in phase II) on mysid shrimp, acute and chronic tests will be performed in the laboratory under controlled conditions. Mysid shrimp will also be exposed in multi-generation experiments to assess the effects of endocrine disruptors during prolonged exposure. Different hormone-regulated endpoints (e.g. molting, vitellogenesis, specific protein expression, reproduction, growth, sexual differentiation, ...) will be monitored during these exposures.



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More project related info can be found on the ENDIS-RISKS website:
<http://www.vliz.be/projects/endis>



Endocrine disruption in the Scheldt Estuary: Distribution, exposure and effects



Endocrine disruption



The presence of persistent man-made chemicals in our environment is not a new problem. Since the 1960s, an increasing amount of environmental pollutants have been identified and their concentrations have been subject of continuous interest. 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. The issue of endocrine disruption presently attracts a lot of public interest and is subject to worldwide discussions between experts, regulators, academics and industry.

While associations between reproductive and developmental effects in wildlife and endocrine disruptors have been reported, the evidence for a causal link is weak or non-existing. This is especially true when considering effects on invertebrate species. Nevertheless, several indications exist that chemical pollutants could also act as endocrine disruptors in invertebrates. A well-known example is that of imposex/intersex in marine snails which is attributed to tributyltin (TBT) in anti-fouling ship paints.



Effects of endocrine disruptors in estuarine environments, where abiotic factors (e.g. salinity, temperature, dissolved oxygen, turbidity,..) have strong fluctuations, are expected to be greater than in purely marine 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 these organisms. Unfortunately, little is known on the exposure, effects and distribution of these chemicals in the estuarine environment.

Due to the high degree of complexity of the endocrine system of both vertebrates and invertebrates, a multi-disciplinary approach is needed to assess the possible impact of this threat.