ENDIS-RISKS

ENDOCRINE DISRUPTION IN THE SCHELDT ESTUARY: DISTRIBUTION, EXPOSURE AND EFFECTS

Duration of the project: 01/02/2002 – 30/04/2006
Budget: € 1.314.000
Keywords: Endocrine Disruption, Scheldt Estuary, Distribution, Biomarkers, Mysid

CONTEXT

There is growing concern about the potential of various chemicals to produce changes in the functioning of the endocrine system of humans and animals. Known natural hormones as well as relatively unknown environmental pollutants seem to have the ability to potentially disrupt the endocrine system of man and animal in such a way that harmful effects on their development and reproduction can occur.
The first indications of possible effects of endocrine disrupting substances and the presence of these substances in the Scheldt estuary have recently been published. The industrial areas of Gent and Antwerp are to a large extent responsible for this pollution. Therefore, there is an obvious need to investigate the occurrence of endocrine disruption in the Scheldt estuary. In addition, a detailed knowledge of the distribution and long-term effects of these substances is needed in the framework of future-oriented policy measures at the national and European level.

PROJECT DESCRIPTION

Objectives
The major objectives within the project are:
- analyses of endocrine disrupters in water, suspended solids, sediment and biota (mysids, gobies);
- in vitro evaluation of the estrogenic and androgenic potency of samples of water, suspended solids and sediment;
- ecotoxicological and in situ evaluation of the effects on the resident mysid populations (short, intermediate and long-term);
- risk assessment of endocrine disrupters in the Scheldt estuary.

Methodology
The proposed project can be divided into four different research phases:

Phase I: Distribution of endocrine disrupting substances in the Scheldt estuary (chemical analyses, analyses on biota, in vitro analyses)

The Scheldt estuary will be sampled three times a year (spring, summer and winter) for the duration of the project. On each sampling date, sediment, water, suspended solid and biota (mysid shrimp and gobies) will be collected. An extended list of natural hormones and endocrine disrupting chemicals will be measured in these samples.

The different water, sediment and suspended solid extracts will be tested in vitro to assess their potential to bind with the (human) estrogen and androgen receptor. The results of these analyses will allow an identification of the estrogenic and androgenic potency in different environmental matrices of the Scheldt estuary.

Phase II: Evaluation of the exposure of biota from the Scheldt estuary to endocrine disrupting substances

Based on the results of the first sampling campaigns priority substances will be selected. These priority endocrine disrupting chemicals will be used in laboratory experiments with mysid shrimp to assess acute and chronic effects (Phase III).

Phase III: Ecotoxicological evaluation of the effects of endocrine disrupting substances occurring in the Scheldt estuary on resident mysid shrimp populations (laboratory and field studies)

Acute and chronic laboratory tests with mysid shrimps.
To evaluate the possible effects of the pollutants (retained in phase II) on mysid shrimp, acute and chronic test will be performed in the laboratory. Mysid shrimp will also be exposed in multi-generation experiments during two generations (until the first generation of juveniles produces juveniles again) to assess the effects of endocrine disrupters during prolonged exposure.

Population study of the native mysid shrimp in the Scheldt estuary.
The mysid shrimp population of the Scheldt estuary will be sampled and studied during one year. In this way, the present population dynamics can be compared with the available historical data and possible changes can be detected. In addition, a more in-depth field study on the possible endocrine disruption effects will be conducted based on the results of the laboratory toxicity experiments. Sensitive endpoints identified in the laboratory experiments will be validated in situ on the resident mysid shrimp population in the Scheldt estuary.

Phase IV: Risk assessment

In the last phase, the results of the previous phases will be incorporated into an integrated risk assessment for the Scheldt estuary with reference to endocrine disrupting substances. Moreover, an over-

all risk assessment for the Scheldt estuary will be conducted with these data in correlation with environmental concentrations of the tested endocrine disrupters. Recommendations for sustainable management and priority substances will be developed.

Expected results and/or products

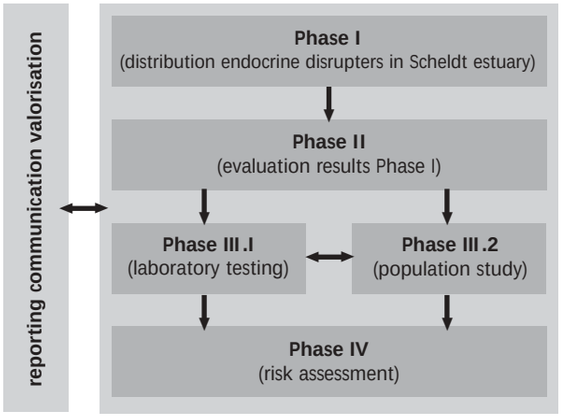
The results of this study on "endocrine disruption in the Scheldt estuary: distribution, exposure and effects" will be used at different levels and in different ways.

In order to ensure (rapid) dissemination and valorisation of the obtained results, the following actions will be undertaken:

- all results will be published in peer-reviewed journals;
- transfer (and discussion) of the obtained knowledge and insights to national and international representatives of policy making and policy supporting governmental services. This discussion will offer an essential contribution to the international contractual engagements of Belgium;
- diffusion of data and results through scientific databases;
- interactive communication forum during the project (project website);
- the results of the project will be brought together in a book, which will include the datasets on CD-rom and the main research results.

The diffusion and valorisation of the information as described above will be developed and maintained by the Flemish Institute for the Sea (VLIZ) (subcontracted) under supervision of the co-ordinator.

Overview of the interactions and different research phases in the ENDIS-RISKS project



PARTNERS

Activities

RUG-LMAE

The Laboratory of Environmental Toxicology and Aquatic Ecology belongs to the inter-faculty research group Endocrine Modulator Research Gent (EMRGent). This group investigates different aspects (environment and human) of endocrine disrupting substances. The recognised experience of the LMAE is in the field of ecotoxicology and risk assessment of endocrine disrupting substances and metals.

RUG-Marine Biology Section

This section is specialised in biological and ecological research in marine/estuarine ecosystems. This group has a long-standing and recognised expertise in the various research aspects of mysid shrimps in European estuaries, in particular the Scheldt estuary.

RUG-Laboratory of Chemical Analysis

This laboratory has an internationally recognised expertise, experience and technology for the identification, quantification and purification of endocrine disrupting chemicals (especially hormones).

MUMM

The Management Unit of the North Sea Mathematical Models has a crucial role in the preparation, performance and visualisation of the governmental policy concerning the marine environment. In addition, their laboratory is a recognised expertise centre for the analysis of micro-pollutants.

RIKZ

RIKZ has, in the Netherlands and in Europe, a central role in the research of endocrine disrupting substances in the marine environment. This institute recently performed (together with RIZA) the LOES-project (Research to the presence of estrogen-active substances in aquatic systems and wastewater in the Netherlands) and performs important policy supporting research on the Scheldt estuary.

CONTACT INFORMATION

website of the network: www.vliz.be/projects/endis

Co-ordinator

Colin Janssen
Universiteit Gent (RUG)
Laboratorium van Milieutoxicologie en Aquatische Ecologie (LMAE)
Jozef Plateaustraat 22
B-9000 Gent
Tel: +32 (0)9 264 37 75
Fax: +32 (0)9 264 37 66
colin.janssen@rug.ac.be
http://fltbwww.rug.ac.be/milieutoxicologie

Partners

Magda Vincx
Universiteit Gent (RUG)
Vakgroep Biologie – Sectie Mariene Biologie
Krijgslaan 281-S8
B-9000 Gent
Tel: +32 (0)9 264 52 10
Fax: +32 (0) 9 264 53 44
magda.vincx@rug.ac.be
http://allserv.rug.ac.be/~gdsmet/MarBiolwebsite/

Hubert De Brabander
Universiteit Gent (RUG)
Laboratorium van Chemische Analyse
Salisburylaan 133
B-920 Merelbeke
Tel: +32 (0)9 264 74 60
Fax: +32 (0)9 264 74 92
Hubert.Debrabander@rug.ac.be
http://allserv.rug.ac.be/~hdbraban/

Patrick Roose
Royal Belgian Institute of Natural Sciences (RBINS)
Management unit of the North Sea Mathematical Models (MUMM)
3de en 23ste Linieregimentsplein
B-8400 Oostende
Tel: +32 (0)59 24 20 54
Fax: +32 (0)59 70 49 35
P.Roose@mumm.ac.be
www.mumm.ac.be/

Dick Vethaak
Ministerie van Verkeer en Waterstaat – Directoraat-Generaal Rijswaterstaat
Rijksinstituut voor Kust en Zee (RIKZ)
Veldstation Jacobahaven
Jacobaweg 2
NL-4493 MX Kamperland
Tel: +31 (0)118 371 651
Fax: +31 (0)118 372 855
a.d.vethaak@rikz.rws.minvenw.nl
www.rikz.nl

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A publication of the PPS Science policy
Wetenschapsstraat 8 Rue de la Science - B - 1000 Brussels
TEL.: + 32 2 238 34 11 - FAX: + 32 2 230 59 12 - http://www.belspo.be
April 2003