Ecotoxicology and risk quantification

Synopsis

Impact of pollutants. Bioavailability, bioaccumulation, biomagnification and toxicity. Degradation and metabolisation of micropollutants. Global change and oceans. Biodeterioration.

Aims

- To develop critical thinking to study the biological impact and biodegradability of pollutants in the sea

Objectives

At the end of the Unit, you should:

1. Understand the threats of chemical pollution to the marine environment, how to assess them and how then can be combated
2. Develop a critical spirit via the study of a fact of topicality, its presentation via the scientific media and its bases.
3. Perceive the complexity of the interactions which affect the microbial world and the opportunities it offers to fight against chemical pollution.

Key Skills Acquired

At the end of the Unit, you should be able to:

1. critically review studies on the impact of pollutants in marine organisms
2. make an oral presentation of a scientific result.
3. identify opportunities offered by marine microbes, to combat against chemical pollution.

Programme

1. Introduction to marine ecotoxicology. How to measure the impact of pollutants. Impact on individuals, populations and ecosystems. Classification of pollutants. Trace metals in marine environment. Organic pollutants in marine environment. Degradation and metabolisation of the micropollutants. Global changes and oceans. Case study: Sea of Aral.
2. Modes of biodegradation of “natural” organic molecules in the marine environment. Mathematical models to describe the activity of the microorganisms in “natural” conditions.
3. Modes of biodegradation of “introduced” organic molecules in the marine environment: domestic (detergent) and industrial (aromatic cycles and halogenous molecules) effluents; hydrocarbons; and plastics.

4. Biodeterioration. Case studies: cement, concrete and metallic structures.

Learning & Teaching (35 hr Th; 15 hr Pr)

- Lectures
- Seminar (oral) prepared by each student and requiring a library search. The set of themes will be imposed by the teacher.
- Practical work combining one day at sea within the framework of a fishing campaign and the corresponding analyses in the laboratory: written report.

Teaching Staff

K Das (Coord.)

Semester: 1

Timetable slot To be advised

ECTS: 6

Level: Optional

Bibliography

- Syllabus and collection of copies of all transparencies used distributed at the beginning of the course.
- The biodegradation part of the course was published by the Presses de L'Institut Océanographique à Paris.

Assessment

- Oral presentation on ecotoxicology (15%)
- Written work on ecotoxicology (15%) within the framework of a seminar
- Training course (20%): Practical work will approach a set of issues of mercury contamination in several species of fish and invertebrates of the North Sea. One day of sampling in the North Sea is envisaged on board R.V. Belgium. The mercury concentrations and the isotopic composition of carbon and nitrogen will be used to connect the trophic ecology of these species, to the level of mercury contamination.
- Oral examination with open book on biodegradation (50%).

Course Evaluation

By completion of University Unit Evaluation Questionnaire by students, annual assessment by Unit Co-ordinator. A full external review by the ULiège Academic Quality & Standards Committee.