

CONTEXT

Urban and environmental waters contain thousands of chemicals that can disrupt hormonal balance of living organisms and affect environmental health at low concentrations. A large number of studies have established that these micropollutants represent a hurdle in achieving a good ecological status of water bodies.

Water management is one of the World environmental priorities.

Sustainable water management requires new biotechnology based tools to provide comprehensive water diagnosis to authorities, scientists, end-users and stakeholders.

The aim of the BIOTTOPE project is to implement a new system, based on small biologic aquatic models, to assess water quality and the performance of wastewater treatment systems.



FrogBox®, automated tool to assess water quality on site by continuous biological monitoring.



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BIOTTOPE

LIFE11 ENV/FR742

**Biological tools to
Optimize Treatment Technologies
to remOve micro Pollutants and
Endocrine disrupters
2012 - 2014**

WITH THE CONTRIBUTION OF THE LIFE FINANCIAL
INSTRUMENT OF THE EUROPEAN UNION, GRANT
LIFE11 ENV/FR/742



PROJECT DESCRIPTION

BIOTTOPE project's objectives are to increase water quality by using a new treatment technology; and to develop an automated tool for monitoring raw and treated water directly on site based on the biological impact of the chemicals.

Small aquatic models, larvae of fish and amphibians, are well documented biosensors. Very early stages of amphibian and fish, just after hatching of the eggs, are very sensitive to micropollutants. In these aquatic sentinels, the physiological targets of endocrine disruptors are tagged by fluorescent biomarkers.

The deliverable of BIOTTOPE is to create a rating system that specifies water treatments and assesses the value of produced water to favor biodiversity.

ADMINISTRATIVE DATA

Project reference: LIFE11 ENV/FR/000742

Duration: 01-JUN-2012 to 31-DEC -2014

Total budget: 2,417,166.00 €

EU contribution: 1,193,583.00 €

Project location: Brussels Belgium and Ile de France, France.

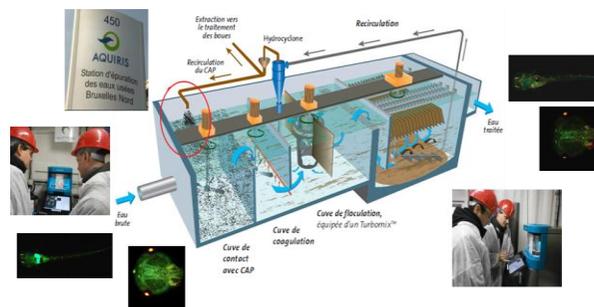
Beneficiaries:

- Veolia Recherche & Innovation (VERI)
- WatchFrog

TECHNICAL DESCRIPTION

A) Micropollutants removal

Evaluation of water treatment technology based on activated carbon adsorption and on a high speed settling step (Actiflo®Carb) to remove micro-pollutants such as Endocrine Disruptors Compounds.

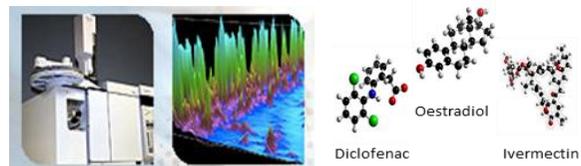


B) Water quality monitoring

B.1. Endocrine disruption assessment

Small aquatic biological models (tadpoles of the amphibian xenopus or fry of the medaka fish) are used for the detection of endocrine active molecules. These biological models harbor genetic markers which fluoresce in the presence of endocrine disruptors.

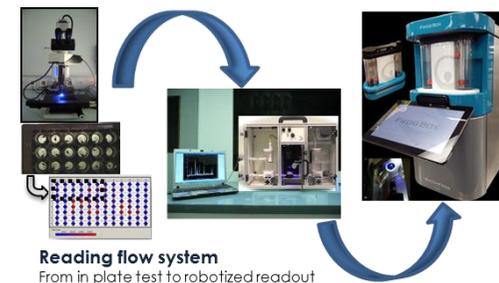
B.2. Micropollutants are analyzed with two chemical methods : comprehensive two-dimensional gas chromatography coupled to mass spectrometry (GCxGC TOF MS) and with LQT-Orbitrap high resolution mass spectrometer (LC-HRMS).



RESULTS & PERSPECTIVES

RESULTS

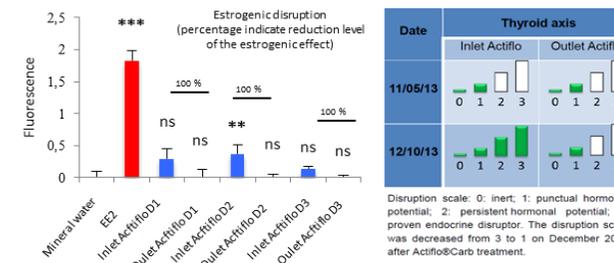
New automated on-line monitoring tool was developed. This device offers unique advantages as on site monitoring of the endocrine disruptive effect, easy to use for end-users and biological results are converted into a comprehensive scale of endocrine disruption.



Chemical analysis and the endocrine disruption assessment using biological small models shows the efficiency of the Actiflo®Carb technology for the removal of micropollutants.

Table 1. Removal rate of selected micropollutants by Actiflo®Carb

Compound		Removal (%)	Concentration before treatment (ng/l)
Diclofénaç	Pharmaceutical	66 ± 2	542 ± 300
Carbamazépine	Pharmaceutical	82 ± 1	417 ± 218
17α-Ethiniloestradiol	Synthetic estrogenic hormone	92	3,6
Oestrone	Natural estrogenic hormone	63	6,2
Sulfaméthoxazole	Antibiotic	60 ± 10	107 ± 80
Triclosan	Biocide - cosmetic product	>80 ± 10	265 ± 193
Diuron	Pesticide	>75 ± 10	94 ± 66
Oxadiazon	Pesticide	65 ± 10	43 ± 12
Monobutyltin cation	Industrial Priority pollutant	>97	624 ± 8
PCB 180	Industrial	>50	10



PERSPECTIVES: FrogBox™ will be available very soon.