

# BBLOOMS 2

## Cyanobacterial blooms : toxicity, diversity, modelling and management

### DURATION OF THE PROJECT

Phase 1: 15/12/2006 – 31/01/2009  
Phase 2: 01/02/2009 – 31/01/2011

### BUDGET

1.081.253 €

### KEYWORDS

Cyanobacteria blooms, diversity, toxicity, modelling, prediction, management

### CONTEXT

Cyanobacterial blooms, mass developments of cyanobacteria floating at the surface of waterbodies, have become a recurrent and increasingly important phenomenon in freshwaters worldwide over the last decades. The formation of such blooms in surface waters is highly linked to water eutrophication. These nuisance blooms represent m Cyanobacteria blooms, diversity, toxicity, modelling, prediction, management ajor potential hazards for human and animal health and interfere in various negative ways with the sustainable use of surface waters for e.g. drinking water treatment, recreation, irrigation, fisheries.

Between 25 and 70% of the blooms are toxic. The cyanotoxins are mainly released in the water during collapse of the blooms. The ingestion or contact with water containing cyanobacterial cells or toxins can cause health damage to man and domestic and wild animals.

### Methodology

From a scientific point of view, the research program will focus on:

- measurement of the major toxins present in the blooms and water samples by analytical methods specific and sensitive,
- collection of physical, chemical, biological and meteorological data on a few reference waterbodies plagued by toxic cyanobacterial blooms,
- identification and study of the toxigenic cyanobacteria present in the Belgian samples based on molecular tools on samples and strains, allowing the study of genetic diversity, and of factors regulating toxicity,
- development and test of management scenarios for control or mitigation of cyanobacterial blooms in a reservoir using integrated watershed models,
- development of a statistical predictive model for a series of urban ponds.

### PROJECT DESCRIPTION

#### Objectives

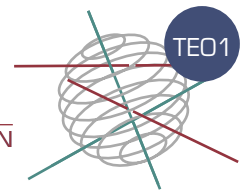
The surface waters in Belgium are also plagued by cyanobacterial blooms, particularly in summer and autumn. Eighty percent of the blooms contained taxa with the genetic potential to synthesise microcystins, and the presence of these toxins in the algal biomass was shown for 40% of the analysed bloomsamples.

This four-year proposal aims to deepen the knowledge of the cyanobacterial blooms in Belgium, improve the modelling for prediction and early-warning, develop operational monitoring structures and tools, and propose strategies to reduce the impact.

### INTERACTIONS BETWEEN THE DIFFERENT PARTNERS

Building of BLOOMNET will principally be carried out by FUNDP in collaboration with UGent and VUB. Sampling will be collected by UGent on 2 lakes in Flanders, VUB on a pond in Brussel and FUNDP on a lake in Wallonia; environmental conditions (water quality, meteorological data, zooplankton) will be analysed simultaneously. ULg and UGent will carry out genetic and molecular approaches to detect cyanobacteria toxicity. Determination of toxin contents will be done by HPLC (FUNDP) and with specific methods by University of Dundee and two members from the user com-





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mittee (Museum of Paris and Federal Environmental Agency of Berlin). A deterministic watershed simulation model will be developed by the Center for Environmental Study and Modelling (ULg) with different management scenarios, in collaboration with FUNDP.

### EXPECTED RESULTS

From science policy point of view, BBLOOMS2 will:

- implement a network of samplers based on existing monitoring programmes of surface waters or on

collaboration with health authorities or environmental organisations (BLOOMNET),

- transfer the knowledge about methods of monitoring and analysis of blooms that we will develop to the water/health authorities and environmental organisations by hands-on courses in our laboratories and field sites,
- reinforce communication with authorities and increase public awareness,
- contribute to future guidelines and risk assessment procedures and improve monitoring and management.

### PARTNERS - ACTIVITIES

The URBO (FUNDP) develops researches to improve the understanding of functioning of aquatic ecosystems including the relationships between environmental factors and biocenoses, with results applicable to surface water management.

The PAE (UGent) has a long-standing expertise in several protist groups, in particular diatoms. Ecophysiological, molecular and genetic studies of laboratory cultures, and microcosmos experiments complement field-based approaches.

The APNA (VUB) has a main focus on ecology of macrophyte dominated ecosystems and on the genetic diversity of plant populations.

The CIP (ULg) has built experience with molecular techniques and the construction of clone libraries to study the molecular diversity of cyanobacteria in environmental samples.

### CONTACT INFORMATION

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For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting <http://www.belspo.be/fedra> or <http://www.belspo.be/ssd>

