

# **COST**

Domain Committee "ESSEM"

## **COST Action ES 1105**

**Start Date 11 April 2012**

*CYANOCOST - Cyanobacterial blooms and toxins in water resources: Occurrence, impacts and management.*

## **MONITORING PROGRESS REPORT**

***Reporting Period: from 11 April 2012 to 30 April 2013***

This Report is presented to the relevant Domain Committee.  
It contains three parts:

- I. Management Report prepared by the COST Office/Grant Holder***
- II. Scientific Report prepared by the Chair of the Management Committee of the Action***
- III. Previous versions of the Scientific Report; i.e., part II of past reporting periods***

The report is a "cumulative" report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

### **Executive summary (max.250 words):**

CYANOCOST (COST Action ES 1105) has completed its first year of operation. During this year the main objective was the initial situation assessment regarding toxic cyanobacteria in Europe. Working Groups were formed according to the MoU. The development of four publications on best practises for monitoring, analysis, prevention, control and treatment of cyanobacteria and cyanotoxins in water has been launched. Repositories and electronic forms for the collection of data to develop a pan-European database in the field have been designed. The Action's website has been developed and is now in operation. Seven STSMs were carried out, most of them by ESRs. The network has expanded with inclusion of seven additional countries. CYANOCOST has linked to NETLAKES and EULAKES. There were research proposals submitted and projects launched jointly by CYANOCOST members. Dissemination of CYANOCOST activities was further realized by a publication in "International Innovation" and by presentations in Conferences/Workshops.

## I. Management Report prepared by the COST Office/Grant Holder



### I.A. COST Action Fact Sheet

- **COST Action ES1105 - Cyanobacterial blooms and toxins in water resources: Occurrence, impacts and management**
- **Domain ESSEM**

- **Action details:**

**CSO Approval:** 01/12/2011

**End date:** 10/04/2016

**Entry into force:** 18/01/2012

**Extension:**

- **Objectives** (from DB as in About COST)

Toxigenic cyanobacteria are one of the main health risks associated with European water resources. They produce a wide range of potent toxins with adverse health effects on humans and animals exposed to them via drinking water, aquaculture and recreation. European research in the field has generated significant risk management capability, although this is regionally unbalanced. This action aims to transfer this knowledge and know-how to all European regions: widening awareness, spreading relevant technical competence, and sharing risk management expertise. The action aims to provide tools to end-users (public authorities, water utilities, aquaculture, tourism and recreation sectors) by pooling and coordinating expertise throughout Europe and to harmonize methods and practices across Europe, thereby protecting public health, enterprises and investments. This Action arrival is extremely timely because new challenges in the field have appeared recently including emerging toxins and cyanobacterial species hitherto unknown in Europe, plus the preparation of new legislation and regulations in some European countries. Over 40 partners (scientists, other professionals and companies), from 23 European countries, are participating in this action. The coordination and networking tools provided by COST are the most suitable and will be used to achieve the Actions goals.

- **Parties:** list of countries and date of acceptance

Austria (23/01/2012)	Greece (23/01/2012)	Poland (09/02/2012)
Belgium (06/02/2012)	Hungary (15/11/2012)	Portugal (10/05/2012)
Bulgaria (18/01/2012)	Iceland (date)	Romania (date)
Croatia (20/04/2012)	Ireland (09/02/2012)	Serbia (29/12/2011)
Cyprus (date)	Israel (14/01/2013)	Slovakia (23/03/2012)
Czech Rep. (08/08/2012)	Italy (01/02/2012)	Slovenia (05/01/2012)
Denmark (22/01/2013)	Latvia (date)	Spain (03/01/2012)
Estonia (18/04/2012)	Lithuania (20/03/2012)	Sweden (20/02/2012)
Finland (05/03/2012)	Luxembourg (date)	Switzerland (24/01/2012)
FYR of Macedonia (date)	Malta (date)	Turkey (23/03/2012)
France (10/02/2012)	Netherlands (28/02/2012)	United Kingdom (07/12/2011)
Germany (18/01/2012)	Norway (02/02/2012)	

- **Intentions to accept:**

Cyprus (30/4/2013)

- **Other participants:**

The United States Environmental Protection Agency, Cincinnati, USA.  
University of Cincinnati, Cincinnati, USA.

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• **Grant Holder Representative: Dr Anastasia Hiskia**, e-mail: [hiskia@chem.demokritos.gr](mailto:hiskia@chem.demokritos.gr)

• **Working Groups** (*list of WGs and names and affiliations of participants*)

*Important: Lists with WG members are not finalized. They will include additional WG members that have already expressed interest to be involved in CYANOCOST activities.*

### **WG1: Occurrence of cyanobacteria and cyanotoxins (including methods for monitoring and analysis)**

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## WG2: Fate, impact and health effects.

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### WG2 participants

WG2 participants are all MC members (see list below).

## WG3: Prevention and control measures.

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## WG4: End-user and outreach tools, materials and products.

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### WG4 participants

WG2 participants are all MC members (see list below).

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**I.B. Management Committee member list**

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### ***I.C. Overview activities and expenditure***



## 2012-2013 Budget

Total Action Budget: 145000 (167000 with FSAC max 15%)

Remaining Action Commitment: 5431.67

### Meetings

Meeting Type	Date		Place	Cost	Total
	From	To			
WG-MC meetings	2012-11-02	2012-11-04	Madrid, Spain	31198.43	31198.43
WG-MC meetings	2013-04-24	2013-04-26	Gdansk, Poland	58975 (estimation)	58975

### STSM

Beneficiary	Date		Place	Cost	Total
	From	To			
Samuel Cires	2012-08-23	2012-10-05	University of Helsinki, Helsinki(FI)	2300	2300
Vera Pavlova	2013-02-05	2013-02-22	Åbo Akademi University, Turku (FI)	2149	2149
Katharina Makower	2013-03-15	2013-05-15	University van Amsterdam, Amsterdam (NL)	1500	1500
Kristel Panksep	2013-02-01	2013-04-01	University of Helsinki, Helsinki(FI)	2500	2500
Anna Torunska	2013-04-01	2013-05-31	Univeristy of Helsinki,Helsinki(FI)	2484	2484
Shiva Shams	2013-03-25	2013-05-31	Univeristy of Helsinki,Helsinki(FI)	2350	2350
Veronika Ostermaier	2013-05-01	2013-06-01	Norwegian Institute for Water Research (NIVA),Oslo(NO),	850	850

STSMs total: 14133

### Workshops

Title	Date		Place	Cost	Total
	From	To			
Editorial Workshop in Cyanobacterial Monitoring and Cyanotoxin Analysis	2013-03-20	2013-03-21	Athens, Greece	28967.36	28967.36
Editorial Workshop in lake Prevention Measures	2013-04-15	2013-04-16	Geneva, Switzerland	344.54	344.54

### General Support Grants

Beneficiary	Date								Cost	Total
										<b>0</b>

### Schools

Title	Date	Place							Cost	Total
										<b>0</b>

### Dissemination

Title	Date	Place	Cost	Total
Development, hosting and		Rennes	3700	<b>3700</b>

updating of the action's website		University, France		
Editorial Article in the International Innovation Report presenting our COST Action	February 2013	Research Media Ltd, UK	2250	<b>2250</b>

**Others**


**Action Total : 139568.33**

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**II. Scientific Report** prepared by the Chair of the Management Committee of the Action, describing results achieved during the Action operation in this period, in no more than 3 pages (the report is “cumulative”). All items listed in Sections A, B, and C, below, must be addressed.

The main objective of CYANOCOST during its first year of operation was the “Initial Situation Assessment” in the field of cyanobacteria – cyanotoxins in Europe. To achieve this, an extensive network was developed that now encompasses 28 European countries plus USA with 78 nominated Management Committee (MC) and MC substitute members. Most of those nominated participants come from academia and research, health organizations, water institutes and utilities with diverse backgrounds, e.g. biology, ecology, limnology, environmental toxicology, analytical chemistry, molecular biology, water treatment. This core group has been constantly expanding with inclusion of experts from many countries and currently about 150 individuals have been involved in CYANOCOST activities.

Four Working Groups have been developed to plan and carry out work in order to realize the objectives of CYANOCOST: WG1 – occurrence of cyanobacteria and cyanotoxins, including methods for monitoring and analysis; WG2 – fates, impacts and effects of cyanobacteria and cyanotoxins; WG3 – prevention and control measures and WG4 – end-user and outreach tools, materials and products.

The main achievements of these WGs during the first year of operation are:

- The launching of four different publications (handbooks/special issues) that address the identification and harmonization of best practises in monitoring, analysis, prevention, control and treatment of cyanobacteria and cyanotoxins in water. These publications will be completed in the third year of the Action. The titles – editors are:
  1. Handbook of analysis of cyanobacteria and cyanotoxins (Meriluoto, Codd, Spoof).
  2. Handbook on molecular methods (Sivonen, Kurmayer, Wilmotte).
  3. In-lake prevention and control measures (Visser, Ibelings, Bormans).
  4. Drinking water treatment processes (Hiskia, Dionysiou, Antoniou, Kaloudis).
- The design of repositories and electronic forms for the collection of data to develop a pan-European database in the field (Blaha and others).
- The development of CYANOCOST website (Brient, Quesada): [www.cyanocost.com](http://www.cyanocost.com)
- The completion of seven STSMs (6 of which by ESRs).
- The expansion of the network, from 19 countries (kick-off) to 28 countries and the wide participation (total of about 150 individuals).
- The interlinking with other Actions (e.g. NETLAKES) and FP7 projects (e.g. EULAKES).
- The dissemination of CYANOCOST activities by a publication in “International Innovation” and by presentations in Conferences/Workshops.

### **II.A. Innovative networking**

As CYANOCOST is in its first year of operation where the main objective was the initial situation assessment, there are still no specific examples of innovative knowledge or scientific breakthroughs resulting from networking. It is expected, however, that such results will be achieved during the following years of operations, as partners are already forming groups and consortia for multidisciplinary collaboration.

The handbooks and special issues that contain best practices for cyanobacteria-cyanotoxins management are expected to have a strong socio-economic impact (e.g. human health, aquaculture, tourism) because they will improve the management of cyanobacteria and

cyanotoxins throughout Europe. These publications will be “open access” and they will be distributed to all stakeholders and interested parties.

Some examples of proposals/projects submitted or initiated in the framework of CYANOCOST during the first year of operation are:

1. Title: CYANOMED-Cyanobacteria and cyanotoxins in Mediterranean freshwater ecosystems: Risk assessment in a climate changing World  
Program: ENPI CBCMED  
CYANOCOST Partners from Spain (Quesada), Israel (Sukenik), Greece (Hiskia, Moustaka)  
Status: Proposal submitted.
2. Title: Lambda Water - Portable Optical Nanobiosensing Device for Multidetector of Cyanotoxins in Freshwater Samples  
Program: FP7-ICT-2013-10  
CYANOCOST Partners from Spain (Quesada), Greece (Hiskia),  
Status: Proposal submitted.
3. Title: Ecotoxicology of cyanobacterial toxins: emphasis on aeruginosins, nodularin and cylindrospermopsin  
Program: COST National Program (CH) – Embedded in CYANOCOST.  
CYANOCOST Partners: Karl Fent (Coordinator).  
Status: Proposal submitted, evaluation pending.
4. Title: Understanding and managing cyanobacterial blooms of the future: learning from past and present day dynamics  
Program: COST National Program (CH) – Embedded in CYANOCOST.  
CYANOCOST Partners: Bastian Ibelings (Coordinator).  
Status: Proposal submitted, evaluation pending.
5. Title: CYANOWATER - Cyanotoxins in Fresh Waters, Advances in Analysis, Occurrence and Treatment  
Program: ARISTEIA National Program (EL)  
CYANOCOST Partners: Anastasia Hiskia (Coordinator, NCSR Demokritos), Theodoris Triantis (NCSR D), Triantafyllos Kaloudis (NCSR D), Maria Moustaka (AUTH), Kostas Kormas (UTH), Dionysios Dionysiou (UC-USA).  
Status: Proposal submitted, funding granted, project started 1/1/2013.

## ***II.B. Inter-disciplinary networking***

Much of the work of CYANOCOST is cross-disciplinary. Members of WGs and authors of handbooks - special issues that are under development come from diverse disciplines such as biology, chemistry, ecology, toxicology, engineering. Already there is much interaction between those experts and we expect that as the work progresses maximum synergy will be achieved. Specific examples to show that inter-disciplinarity is beneficial for CYANOCOST are:

- The collaboration of biologists, ecologists, limnologists and analytical chemists to provide guidelines for the sampling of water containing cyanobacteria / cyanotoxins and the pre-treatment of samples with regards to the evaluation of results.
- The discussions between experts in microscopy and in molecular methods about the advantages and limitation of these alternative techniques for the identification of toxic cyanobacteria.
- The different view-points in the evaluation of prevention and control measures in the lake or during water treatment, with regards to their impacts in health, ecosystems and the environment.

This high-level of interdisciplinarity is expected to provide innovative scientific results in the following years. Regarding socio-economic impacts, it is foreseen that experts in environmental economics will be also needed to join the Action in order to contribute to the estimation of environmental and other costs that are associated with toxic cyanobacterial blooms.

## **II.C. New networking**

Seven countries joined CYANOCOST after the start of the Action (11 April 2012) and during the first year (until 30 April 2013):

*Estonia (18/04/2012), Croatia (20/04/2012), Portugal (10/05/2012), Czech Rep. (08/08/2012), Hungary (15/11/2012), Israel (14/01/2013), Denmark (22/01/2013).*

Cyprus has expressed intention to participate and MC approval is pending.

The total number of individuals already involved in CYANOCOST activities is about 150. About 55% are female and about 30% are ESRs.

A special 2-day workshop for ESRs was organized during the 3<sup>rd</sup> WG-MC meeting in Gdansk. In this workshop ESRs had the opportunity to discuss their ideas about possible collaborations and joint projects. They also presented posters with their work to all participants of the meeting (about 70 individuals).

Seven STSMs were completed during the 1<sup>st</sup> year, six of them (85%) were carried out by ESRs.

Currently, only USA participates as a non-COST country. The Environmental Protection Agency (EPA, Dr. de la Cruz) and the University of Cincinnati (Prof. Dionysiou) are representing USA. Dionysiou is actively involved in editing the "Drinking Water Treatment Processes" publication, as well as in organizing a workshop on cyanobacteria-cyanotoxins during the International Conference of Chemistry and the Environment, ICCE 2013. There is further interest by experts from Russia to join CYANOCOST and we expect to have their formal applications during the 2<sup>nd</sup> year.

Joint publications by CYANOCOST members, acknowledging CYANOCOST are:

- "Towards safe waters" – an interview article by the Steering Group of CYANOCOST, in International Innovation, Environment, April 2013, pages 85-87. Available on-line in: <http://www.research-europe.com/magazine/ENVIRONMENT/ENV17/index.html>
- Lara, Y., Lambion, A., Menzel, D., Codd, G.A. and Wilmotte, A. (2013). A cultivation-independent approach for the genetic and cyanotoxin characterization of colonial cyanobacteria. Aquatic Microbial Ecology (in the press).
- Štraser, A., Filipič, M., Gorenc, I. and Žegura, B. (2013). The influence of cylindrospermopsin on oxidative DNA damage and apoptosis induction in HepG2 cells. Chemosphere, accepted 12 March 2013, available on line.
- Štraser, A., Filipič, M., Novak, M. and Žegura, B., Cylindrospermopsin induced transcriptional responses in human hepatoma HepG2 cells, submitted to Toxicology in vitro (submitted at the end of December 2012).
- Štraser, A., Filipič, M., Novak, M. and Žegura, B., Double strand breaks and cell-cycle arrest induced by the cyanobacterial toxin cylindrospermopsin in HepG2 cells, submitted to Marine Drugs, Special Issue on »Compounds from Cyanobacteria« (submitted, April 2013).
- Kaloudis, T, Zervou, S., Tsimeli, K., Triantis, T.M., Fotiou, T., Hiskia, A. (2013). Determination of Microcystins and Nodularin (Cyanobacterial Toxins) in Water by LC-MS/MS. Monitoring of Lake Marathonas, a water reservoir of Athens, Greece. Journal of Hazardous Materials, submitted for publication.
- Fotiou, T., Triantis, T.M., Kaloudis, T., Pastrana-Martínez, L.M., Likodimos, V., Falaras, P., Silva, A.M.T., Hiskia, A. (2013). Photocatalytic Degradation of Cyanobacterial Metabolites in Water under UV-A and Solar Light using a Nanostructured Photocatalyst based on Reduced Graphene Oxide-TiO<sub>2</sub> Composite. Industrial & Engineering Chemistry Research, Special

Issue: "Recent Advances in Nanotechnology-based Water Purification Methods" (submitted for publication).

CYANOCOST was also presented in:

- The 15<sup>th</sup> International Conference on Harmful Algae in Changwon, Korea from the 29 October to 2 November 2012 (CYANOCOST Poster presented by Myriam Bormans).
- The EULAKES final meeting, Lake Garda, Italy, 30<sup>th</sup> May 2013 (presented by Jussi Meriluoto, Lisa Spoof)

## ***II.D. Self evaluation***

The main achievements and successes of CYANOCOST were discussed in Section II. We would like to add that a key point of CYANOCOST is the strength of this extensive network that is based on the good spirit of collaboration and inclusiveness. A good example for this is the handbook of analysis of cyanotoxins, where as many as 79 authors are involved and most chapters and SOPs are co-authored by groups that work together for the first time.

One thing that can be improved is the communication between members or groups of CYANOCOST. It would be helpful in the future if COST could provide on-line tools and platforms for communication, virtual meetings and exchange of data.

Regarding administration, we get excellent support from our COST officers and COST office and we find that e-COST system is very efficient. However, there are a lot of difficulties and lot of work for the Grant Holder to process payments, since national regulations have to be considered as well.

## ***III. Previous scientific report(s)***

This is the first report of CYANOCOST.