



**European Cooperation
in Science and Technology
- COST -**

Brussels, 8 December 2011

Secretariat

COST 4165/11

MEMORANDUM OF UNDERSTANDING

Subject : Memorandum of Understanding for the implementation of a European Concerted Research Action designated as COST Action ES1105: Cyanobacterial blooms and toxins in water resources: Occurrence, impacts and management.

Delegations will find attached the Memorandum of Understanding for COST Action as approved by the COST Committee of Senior Officials (CSO) at its 183rd meeting on 30 November 2011.

MEMORANDUM OF UNDERSTANDING
For the implementation of a European Concerted Research Action designated as
COST Action ES1105
CYANOBACTERIAL BLOOMS AND TOXINS IN WATER RESOURCES:
OCCURRENCE, IMPACTS AND MANAGEMENT.

The Parties to this Memorandum of Understanding, declaring their common intention to participate in the concerted Action referred to above and described in the technical Annex to the Memorandum, have reached the following understanding:

1. The Action will be carried out in accordance with the provisions of document COST 4154/11 “Rules and Procedures for Implementing COST Actions”, or in any new document amending or replacing it, the contents of which the Parties are fully aware of.
2. The main objective of the Action is to to increase, disseminate and harmonize capabilities across Europe for the risk management of cyanobacteria and cyanotoxins in water bodies by establishing strong and synergistic links between academia, authorities, industry and citizens.
3. The economic dimension of the activities carried out under the Action has been estimated, on the basis of information available during the planning of the Action, at EUR 92 million in 2011 prices.
4. The Memorandum of Understanding will take effect on being accepted by at least five Parties.
5. The Memorandum of Understanding will remain in force for a period of 4 years, calculated from the date of the first meeting of the Management Committee, unless the duration of the Action is modified according to the provisions of Chapter V of the document referred to in Point 1 above.

A. ABSTRACT AND KEYWORDS

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 COST 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 arrival of this Action is timely because new challenges in the field have appeared recently including emerging toxins and cyanobacterial species hitherto unknown in Europe, leading to the preparation of new legislation and regulations in some European countries. Over 40 partners (scientists, other professionals and companies), from 23 European countries, are expected to participate in this Action. The coordination – networking tools provided by COST are the most suitable medium to achieve the Action's goals.

Keywords: cyanobacteria, cyanotoxins, public health protection, risk management, awareness

B. BACKGROUND

B.1 General background

Cyanobacteria (CB) are global phototrophic microbes occurring in fresh-, brackish and saline waters. Under favorable conditions, CB multiply rapidly forming blooms and mats. A lot of CB species and strains are toxigenic, i.e. able to produce a diverse range of potent cyanotoxins. Toxic CB blooms can be especially detrimental to human and animal health, to aquatic habitats and to the human economy.

An initial situation assessment exercise (CYANONET- UNESCO, 1995) demonstrated that cyanobacterial and cyanotoxin production occurs in water bodies throughout Europe. These include high resource and amenity waters, drinking water sources, waters used for livestock watering, fisheries, agriculture, recreation, tourism and as wildlife and conservation reserves. It is widely forecast that toxigenic cyanobacterial populations will increase due to climate change, demographic changes or the appearance of new invasive CB species and their cyanotoxins in European waters. Cyanotoxin health hazards and economic impacts require wider recognition, understanding and the transfer of control strategies throughout Europe. Whilst successfully engaging in primary and applied research, previous EU projects have not focused on widening awareness, spreading relevant technical competence, or sharing CB- and cyanotoxin risk management experience. This COST Action is the next logical step to maximize benefits across Europe from the knowledge base and expertise already generated in the cyanobacterial/cyanotoxin Framework Programme (FP) projects and other transboundary programmes, to enhance capabilities across Europe, address current and future problems, coordinate research efforts and disseminate skills.

B.2 Current state of knowledge

State of the art research and existing management capabilities in Europe on CB have benefitted from input from the pure and applied life sciences, the human and animal health sectors, water engineers, economists and planners. Highlights include the development of advanced techniques for cyanotoxin analysis, elucidation of cyanotoxin modes of action, ecological studies on CB production and management techniques to reduce CB mass development, and cyanotoxin removal during drinking water treatment. These advances have been greatly aided by successful EU FP-funded projects over the past 10-15 years involving laboratories in small numbers of EU Member States. The potent, hepatotoxic peptide toxins (microcystins) occur annually in most countries and this cyanotoxin family is considered a major concern in the European context. Microcystins have been identified as undisputed health hazards by the World Health Organization (WHO). Emerging cyanotoxins are also of concern in Europe; e.g. cylindrospermopsin (CYN) which was viewed as limited to subtropical waters but has been recently found in several European countries. Surprising genera and species may be found to be involved in CYN production in Europe as research continues. It has been postulated that such emerging toxins could be related to invasive cyanobacterial species that are colonizing European waters.

European freshwaters also contain potent cyanobacterial neurotoxins, e.g. saxitoxins and anatoxin-a. Further neurotoxins are emerging and examples of cyanobacterial toxicities, including tumour-promoting and estrogenic effects, which cannot be assigned to any known cyanotoxins, are being reported.

Recent research results have also demonstrated a definite relationship, at global scale, between temperature and the dominance of cyanobacteria in water bodies. Under the most likely global change scenario temperatures will rise in different magnitude at different European regions, promoting exacerbated cyanobacterial blooms in Europe.

Advanced methods have already been developed in the labs of the Action partners to detect, identify and quantitate cyanobacteria and cyanotoxins. Techniques including liquid chromatography – mass spectrometry (LC-MS) have solved problems of cyanotoxin detection and identification at very low concentrations. Rapid low-tech immuno-methods, for on-site use, are also being developed in Europe, and merit dissemination, as kits, to increase capabilities in European regions without hi-tech resources. Research focus has also moved from traditional taxonomy (by microscopy) which can be difficult with cyanobacteria, to molecular biological techniques. Although ISO 20179:2005 introduced a standard method to determine microcystins, other methods for cyanobacteria-cyanotoxin analysis are not harmonized across Europe. There is currently a strong need for validation studies and interlaboratory comparisons leading to standardization. Early warning of toxigenic bloom formation is also being generated by some partners: with high potential for dissemination throughout Europe in this Action.

Multiple techniques (proactive and reactive) have already been used to control cyanobacterial blooms in Europe, with varying degrees of success. These experiences will be shared via this Action plus the dissemination of decision-making systems. Control measures, specifically characterized for cyanobacteria and cyanotoxin management, to be exchanged, will range from catchment and basin-scale to drinking water treatment methods including sorption, filtration and advanced oxidation processes.

B.3 Reasons for the Action

COST provides the most viable and immediate opportunity to disseminate the high degree of knowledge, technology and management skills, already available in selected European centres, to address the increasing cyanobacterial /cyanotoxins threat throughout the whole of Europe.

This Action will have a strong societal and economic impact throughout Europe. Protection of public health, of enterprises and investments, development of harmonized transnational approaches, improvement of public awareness and strengthening of the European capability to manage CB blooms both in the near future and beyond as they are expected to increase with climate change.

B.4 Complementarity with other research programmes

Highly successful EU FP projects have focused on cyanobacteria/cyanotoxins research e.g. TOXIC, PEPCY. The expertise arising will be disseminated via this Action. On-going projects e.g. “EULAKES”, “MAREX”, “CLEANWATER” (FP7) are expected to contribute to knowledge and will benefit this Action.

This Action will take advantage of the results of previous and on-going projects in a way that these are integrated and further used to add maximum value to researchers, end-users and stakeholders in the European context. Furthermore, it will coordinate efforts towards future research projects focused on research gaps and needs. Therefore, this COST Action will not be merely complementary to, but highly synergistic with the known and plausible future activities in this area.

C. OBJECTIVES AND BENEFITS

C.1 Aim

The main objective of the Action is to increase, disseminate and harmonize capabilities across Europe for the risk management of cyanobacteria and cyanotoxins in water bodies, by establishing strong and synergistic links between academia, authorities, industry and citizens.

The Action will compile and integrate experiences, identify research needs and gaps, focus on solutions and disseminate data, results and best management practices to end-users and stakeholders to protect public health, utilities, facilities and enterprises and hence contribute to European science, society and economy.

C.2 Objectives

Secondary objectives of this Action are:

1. To trigger the transfer of all the previous expertise on the topic to provide useful tools, regulations and awareness for the European citizens.
2. To diffuse knowledge and experience through Europe, especially to countries that were not in previous EU FP projects, or in which cyanobacteria problems have been only recently recognized, so that they do not have to "re-invent the wheel" .
3. To keep the European scientific community in the cutting edge of this interdisciplinary research by identifying research gaps and focusing research and efforts in order to achieve breakthrough results in the field.
4. To harmonize methodologies, practices and know-how across Europe.
5. To extend and increase recognition and awareness of the occurrence of cyanobacteria and cyanotoxins, and more widely to provide further management tools to counteract their production and adverse effects.
6. To support the involvement, training and activities of young researchers and managers in the field.
7. To design a European-wide, rolling Database on cyanobacterial blooms and cyanotoxin risk management. Data integration is essential since a number of studies and monitoring programmes are running in parallel in European countries but the data are not collected or compared at a European level to enable sharing of experience and identification of best practices.
8. To support decision making of end-users by further improving, testing and disseminating a decision support tool for the management of harmful cyanobacterial blooms.

9. To promote the different entities (academia, authorities, water responsables) keeping an open eye on the new hazards derived from new species and new cyanotoxins reaching our waterbodies.

C.3 How networking within the Action will yield the objectives?

The achievement of the above objectives requires inter-and multidisciplinary efforts. A strong and integrated consortium of Action has been developed and includes scientists and researchers with recognized expertise in analytical chemistry, molecular biology, aquatic/catchment ecology, toxicology and water engineering plus end-users and stakeholders (public authorities, water supply utilities, industry).

Networking activities given below will play a key role in accomplishing the Action's objectives:

- Discussions, exchange of data, ideas and proposals also through an open web-forum and formal questionnaires, in order to identify already available experience, assess present and future needs and prepare for the initial conference.
- An initial conference with thematic and cross-disciplinary sections to assess the current situation and establish targets and strategies to achieve the objectives.
- Cross-disciplinary workshops on scientific advances, awareness raising and risk-management for end-user groups.
- Meetings (also virtual – through web) for continuous exchange of ideas, experience, solutions.
- Training visits, as student and post-doc exchanges for the diffusion and harmonization of methods and techniques.
- Interlaboratory exercises and comparisons to evaluate and validate novel methods of cyanobacteria – cyanotoxin detection and identification. Distribution of reference materials to provide intercalibration.
- Organization of an Observatory to survey the new hazards related with cyanobacteria.
- Use of the Action's website to enhance communication and dissemination of outputs.
- A closing conference to present the results of the Action and to propose further collaborations.

C.4 Potential impact of the Action

The COST Action will enable new laboratories in European countries, without research expertise and practical experience in cyanobacterial bloom and toxin risk management, to benefit from others with this expertise. Mutual benefits will result for all participants, whereas novel ideas, approaches, needs and cases will be presented by countries that are now starting in the field. It is expected that the awareness-raising, training and technology transfer via networking will disseminate more than 15 years' worth of relevant research expertise and risk management experience, of currently limited geographical spread, to the whole of Europe. Specific impacts of the Action include:

- Public health protection through the transfer of knowledge and best-practices to end-users (public authorities, drinking water utilities, recreational water managers, fisheries and agriculture sectors).
- Protection of enterprises and investments (recreational waters, aquaculture, agriculture).
- Development of a transnational approach in the preparation of guidelines, standards and regulations for harmonized risk assessment and management.
- Development and dissemination of better, innovative monitoring tools (early warning; real-time; macro- and micro-scale).
- Development of novel proactive strategies and control measures for cyanobacterial blooms and cyanotoxins.
- Optimization of available research resources (man-hours, equipment, facilities) and funds and avoidance of duplicate work.
- Better use of the data for reasonable risk assessment and decision making.
- Improvement of public and authorities awareness and risk management capabilities on health issues related to cyanobacterial blooms.
- Extensive exchange of information and know-how that will foster increased scientific discovery and innovation at a European dimension.

C.5 Target groups/end users

The results of the Action will have a direct relevance and are targeted primarily to water companies and authorities, water resource engineers and managers, environmental and public health protection organizations, all of which are represented in the current consortium. The list of end-users and stakeholders extends to aquaculture- agriculture enterprises, recreational-sports facilities, environmental laboratories, nongovernmental organizations, policy makers, researchers and citizens. Having developed an extensive network of diverse experts and organizations, the Action will create links to all of the above interested parties to diffuse the results and achieve maximum impact.

D. SCIENTIFIC PROGRAMME

D.1 Scientific focus

This Action provides a structured plan, but flexible enough to permit future adjustments and inclusion of perspectives, activities and innovations not foreseen or realized during the preparation of the proposal. The framework of the Action will remain open to engage other researchers, end-users and stakeholders also from countries beyond those who have been anticipated to participate in the Action.

The most important research tasks to be coordinated by the Action are:

1. Research on the prevalence of harmful algal blooms in the European region that will extend beyond the already studied species and toxins.
2. Studies on the toxicological effects caused by harmful algal blooms and toxins that will broaden and deepen our understanding of the associated mechanisms on the molecular, cellular and organism level and also will address the effect of mixtures of toxins.
3. Research on ecosystem effects caused by harmful algal blooms and toxins with particular focus on fishery and aquaculture that deserve much more attention.
4. Development of methods for the detection, identification and monitoring of toxic cyanobacteria and cyanotoxins, that will extend from high resolution remote sensing to laboratory and waterside molecular methods.

5. Research on prevention and control measures, from integrated catchment management approaches to advanced water treatment processes.
6. Exploration of useful and/or positively bioactive compounds produced by cyanobacteria and microalgae (pharmaceuticals, nutraceuticals, pigments, cosmetics, research chemicals etc).
- 5 Overall risk and benefit assessment (are blooms and toxins only harmful?).
7. Needs for legislative action (if, when and where necessary).

Clearly, the Action cannot provide exhaustive answers to all research questions but rather aims to bring together an interdisciplinary consortium to address important issues and guide future work. The participating organizations will use their resources to carry out research while the Action will provide the necessary networking and communication mechanisms for coordination.

D.2 Scientific work plan methods and means

The work plan of this Action will comprise four working groups (WG), as shown in Figure 1:

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

WG2: Fate, impact and health effects.

WG3: Prevention and control measures.

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

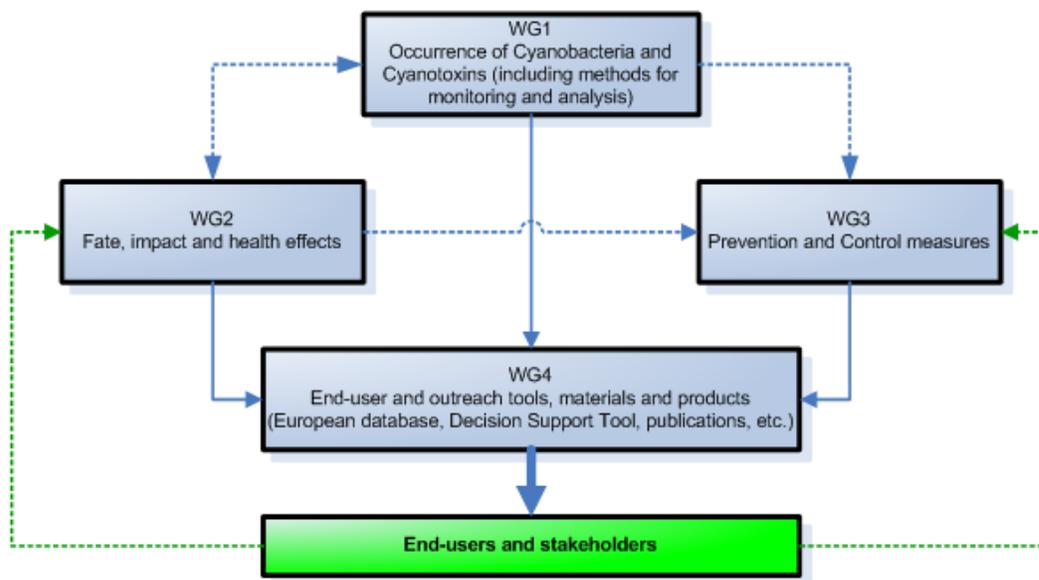


Figure 1: The Action's Working Groups (WGs). Dotted lines show the flow of information; solid lines show the flow of information, results and products.

The four WGs are interconnected and interrelated and there will be substantial flow of information and results from WG1-3 to WG4 which disseminates information, results, tools and materials to end-users and stakeholders. This integrated structure means that WGs are not isolated from each other and a mechanism of interaction and transfer of information and results is in place, which is realized by the Steering Committee (Section E). Furthermore, this structure allows for feedback from end-users and stakeholders to all WGs. Flexibility is also of paramount importance in such an interdisciplinary and dynamic field and the WGs will encourage participation and inputs from diverse institutions and parties.

The objectives, expected achievements and deliverables of the WGs currently are (but may not be limited to):

WG1: Occurrence and impacts of cyanobacteria and cyanotoxins (including methods of monitoring and analysis)

Aims of this WG are:

1. The spreading of knowledge and sharing of expertise in the identification, detection and analysis of cyanobacteria and cyanotoxins.
2. To gather all available data and experience and disseminate results relating to the presence of cyanobacterial mass populations and cyanotoxins in natural and controlled waters across Europe.

This WG will also identify gaps in knowledge and help to design new scientific programmes for the future.

Specific topics that will be addressed with the objective of progress beyond state of the art include:

- Training in development and validation of advanced analytical techniques for the detection and quantitative determination of cyanotoxins with emphasis on new-emerging cyanotoxins and especially targeting fast, specific, accurate and multi-toxin methods. Research will involve various analytical techniques (LC-MS, High Performance Liquid Chromatography-HPLC, Enzyme-Linked Immunosorbent Assays-ELISA, toxicity assays, sensors etc).
- Training in development and validation of molecular techniques (quantitative Polymerase Chain Reaction-qPCR, sandwich-hybridization assays, DNA chip assay) for the detection, counting and identification of cyanobacteria.
- Activities towards the standardization and harmonization of the methods used for the detection, counting and identification of cyanobacteria and cyanotoxins. Exchange of samples, evaluation of methods, validation requirements and criteria.
- Spreading awareness and experience in high resolution remote sensing for cyanobacterial blooms monitoring.

- Presence of toxic cyanobacteria, with emphasis on new - invasive cyanobacterial species, such as *Cylindrospermopsis raciborskii* and others. Study of their occurrence, genetic characterization, diversity, ecology and associated risks. The role of climate change on the prevalence of the cyanobacterial species will be further addressed.
- Emerging cyanotoxins in the European region. Research efforts will be focused on the prevalence of emerging cyanotoxins such as cylindrospermopsin or the extremely strong neurotoxins, PSTs (saxitoxin and analogues) as well as new toxins such as BMAA.
- Ecology and diversity of cyanobacteria and toxins, also in estuarine and transitional waters.

Achievements – Deliverables:

- A handbook of methods for the detection-determination of cyanobacteria and cyanotoxins as “Standard Operating Procedures”, complemented with validation data. The Handbook will be based and further expand and improve the one resulted from the FP5 TOXIC project. The Handbook is expected to set a starting point for the standardization of methods at a national, European (CEN) or international (ISO) level. It will also contribute to the Water Framework Directive’s (2000/60 EC) more effective application regarding the monitoring of cyanobacteria-cyanotoxins.
- A practical handbook for the validation requirements of methods, to support European laboratories that want to be accredited according to EN ISO 17025.
- Identification of the best-performing and cost-effective methods.
- Transfer of technical knowledge by training visits among partners.
- Articles and reviews in peer-reviewed scientific journals.
- Contributions to the book that will be created within the COST Action.
- Contributions to the conferences organized by the Management Committee (MC) with a focus to the transmission of knowledge to the young generation of scientists (by special sessions, for example).
- Substantial feed of information and results to all other WGs.

WG2: Fate, impact and health effects Aim of WG2 is the spreading of knowledge and sharing of expertise on the ecosystem and human health effects of cyanobacterial blooms and toxins. Specific topics that will be addressed include:

- Ecosystem effects caused by harmful algal blooms and toxins, also in estuarine and transitional waters (effects especially on fish, fishery and aquaculture that deserve much more attention).
- Adverse human health effects caused by harmful algal blooms and toxins (much is known on the molecular and cellular level but not on the organism level; also mixtures of agents need further attention).
- Potential exposure routes: drinking and recreational (both with European legislation), through the food web (not in legislation yet) as well as new routes of exposure, e.g. inhalation of aerosols during water sports.
- Possibilities for exploitation of the beneficial properties of cyanobacteria (sources of fine chemicals, renewable fuel, bioactive compounds, anti-tumour, antibacterial, anti-HIV properties etc).

Achievements – Deliverables:

- Articles and reviews in peer-reviewed scientific journals.
- Contributions to the book that will be created within the COST Action.
- Contributions to the conferences organized by the Management Committee (MC) with a focus to the transmission of knowledge to the young generation of scientists (by special sessions, for example).
- Substantial feed of information and results to all other WGs.
- Increase of awareness for public authorities and citizens.

WG3: Prevention and control measures.

Aim of WG3 is to guide research and dissemination activities in fields that range from predictive and catchment management approaches, via in-lake measures, to drinking water treatment methods for cyanobacterial and cyanotoxin removal/detoxification. Topics that will be addressed include:

- Integrated catchment management approaches.
- Nutrient reduction strategies and techniques, hydrophysical methods, chemical and biological remediation, based on the use of water bodies (lake, ponds etc. and rivers
- Water treatment methods such as **adsorption** (e.g. activated carbon), **membrane filtration** (Ultra, Nano-filtration, reverse osmosis), **chemical oxidation** (ClO₂, O₃ etc), **advanced oxidation processes** (e.g. photocatalytic, UV-H₂O₂).
- Evaluation of the cost-effectiveness of the above techniques taking into consideration human health and ecological issues.

Achievements – Deliverables:

- Handbook of “Best Practices” for prevention and control of toxic cyanobacterial blooms.
- Evaluation of cost-effectiveness, feasibility and scaling up prospects of control measures.
- Articles to journals, contributions to the book that will be created within the COST Action.
- Substantial input to the Decision Support Tool (WG4).

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

Aim of WG4 will be the development of end-user and outreach tools, materials and products for the dissemination of research results and the application of acquired knowledge. The main activities of WG4 will be:

- The development of a European Database that will include all related information about European research in the field (researchers, institutes, expertise, publications, methods, best practices), associated events (human and animal health incidents, economic and social effects closures and other interventions, increased water provision/treatment costs, effects on tourism, national events etc), management measures already applied, or in progress, and their evaluation, national risk management policies in use in Europe and in neighbouring states, including guidelines and legislation, methods etc.
- The further revision, improvement and dissemination of a Decision Support Tool (DST) for toxic cyanobacteria and cyanotoxins based on the Water Safety Plan (WSP) concept of WHO, which has been initially developed in a previous EU-Project. The WG will take actions to test the suitability of the DST and to translate it in the languages of the consortium.
- Development of factsheets, recognition guides, manuals for user- and professional groups (water industry, medical and veterinary communities, fisheries, sports associations, the general public).

Achievements – Deliverables:

- European Database for cyanobacteria-cyanotoxins.
- Testing, translation and dissemination of the Decision Support Tool (DST).
- Dissemination of knowledge to end-users and stakeholders.
- All information will be made available in a dedicated Action's website.

E. ORGANISATION

E.1 Coordination and organisation

The Action, which is planned for 4 years, will be supervised and coordinated by a Management Committee (MC) whose tasks and responsibilities will follow the “Rules and Procedures for Implementing COST Actions” (COST 4159/10). Four Working Groups (WGs) will be established for this Action (Section D) and the WG coordinators will be appointed by MC.

For the improvement of communications between MC and the WGs as well as to prepare MC meetings, workshops and conferences a Steering Group (SG) will be established, consisting of the Chair and Vice-Chair of the MC and the leaders of the WGs. The SG will also act as a Short-Term-Scientific Missions (STSM) Evaluation Committee.

The Milestones (M) and corresponding deliverables (D) to ensure attainment of the Action aims are:

M1– D1: Current situation assessment in Europe relating to the occurrence, analysis and control of cyanobacteria and cyanotoxins (WG 1-3) (month 12).

M2– D2: Recommendations for future European research programs and actions, first report (month 24), final report (D2) - month 48.

M3-D3: Handbook of cyanobacterial monitoring and cyanotoxins analysis – first internal version (M3) - (month 28), final version (D3) – (month 42).

M4- D4: Handbook of “Best Practices” for prevention and control - first internal version (M4)- (month 28), final version (D4)- (month 42).

M5-D5: Revised and expanded version of the Decision Support Tool; first internal English version (M5) - (month 28), final version (D5), (month 42).

M6-D6: European Database on cyanobacteria – cyanotoxins: first “beta” version (M6) – (month 28), final version (D5), (month 42).

M7-D7: Book of the Action, draft contents, authors, schedule (month 32), final version – (month 48).

The research will be carried and financed by the participants while COST will provide the necessary coordination.

Starting (Kick-off), Annual and Completion Meetings will be held with all WGs present at the same time, in at least four – five countries. The Completion Meetings will be open to all end-users. A conference held in Year 4 will widely disseminate results and set up a forum for discussion and recommendations for future research.

Workshops will be organized to diffuse knowledge and experience in “hot” research topics such as novel methods of cyanotoxin analysis, molecular methods to detect toxic cyanobacteria and remote sensing for early warning of blooms. Training visits and STSMs will be organized on different topics relevant to the Action, especially aimed to build abilities and aptitudes among early stage researchers and widen management capabilities throughout Europe.

An Action-specific website will be developed under the supervision of the SG. The website will serve as an open info-point for all stakeholders with a Members-only section for communication among participants (planning activities and events, presentations, forum, discussions and video-conference capabilities).

The results achieved during this Action will be presented in annual Progress Reports and in a Final Report according to rules set by document COST 4159/10.

E.2 Working Groups

The 4 WGs will be established as outlined in section D. Each WG will be lead by a Chair and Deputy Chair. The WG leaders will:

- Coordinate the activities within their WG to meet the objectives defined in the scientific program
- Stimulate and foster the set-up of joint research funded by members’ own institutions and grant awards (e.g. through use of short-term scientific missions).
- Plan the appropriate scientific meetings.
- Promote the co-authoring of scientific publications.
- Ensure the reporting of WG progress to the Action MC and Chair.
- Participate in MC meetings.

E.3 Liaison and interaction with other research programmes

The Action will liaise and interact with other projects such as “EULAKES” “MAREX” and “CLEANWATER” (FP7) by inviting representatives of these projects to the Action’s meetings and vice-versa. Joint meetings and sessions, e.g. in conferences, is another option. The Action will also interact with an international exchange project “MEAT-FP7” that will allow researchers in the field from New Zealand and Argentina to visit Europe within the next 4 years. Further opportunities for collaborations at an international level will be sought through the participants of non-COST countries. Collaborations will be sought proactively throughout the Action’s duration.

E.4 Gender balance and involvement of early-stage researchers

This COST Action will respect an appropriate gender balance in all its activities and the Management Committee will place this as a standard item on all its MC agendas. The Action will also be committed to considerably involve early-stage researchers. This item will also be placed as a standard item on all MC agendas.

The majority of researchers and experts already involved in this Action are women, many of them internationally recognized as leaders or experts in their field. Regardless of this, the MC will continuously monitor recruitments to ensure that the participation in the MC, WGs, SG and the involvement in activities related to the Action overall will respect an appropriate gender balance during the Action’s programme.

Care is be taken to actively promote the participation of early-stage researchers in all activities. The Chair and Vice-Chair of the MC will be the contact points for gender balance and early stage researchers involvement issues.

F. TIMETABLE

The duration of the Action will be 4 years. The timescale of Activities, Milestones (M), Deliverables (D) and Reports is presented in the following table.

Half Years	1	2	3	4	5	6	7	8
Milestones		M1		M2	M3-6	M7		
Deliverables		D1		D2			D3-6	D7
WGMeetings	*	*	*	*	*	*	*	*
WGReports		*		*		*		*
STSMs		*	*	*	*	*	*	
Reports to DC		*		*		*		*
Final Report								*

G. ECONOMIC DIMENSION

The following COST countries have actively participated in the preparation of the Action or otherwise indicated their interest: AT, BE, BG, CH, CZ, DE, EE, EL, ES, FI, FR, IE, IT, LV, NL, NO, PL, RS, SE, SI, SK, TR, UK. On the basis of national estimates, the economic dimension of the activities to be carried out under the Action has been estimated at 92 Million € for the total duration of the Action. This estimate is valid under the assumption that all the countries mentioned above but no other countries will participate in the Action. Any departure from this will change the total cost accordingly.

H. DISSEMINATION PLAN

H.1 Who?

This Action provides an ideal vehicle to extend and increase recognition and awareness of the occurrence of cyanobacteria and their toxins, and to make key management tools more widely available throughout Europe to counteract the adverse effects of cyanobacterial mass growths and cyanotoxins. These objectives will be realized by disseminating the results to the following target audiences and end-users:

- Researchers, especially young ones, from diverse disciplines, as analytical chemists, (molecular) biologists, ecologists, toxicologists, water engineers.
- The drinking water industry, especially scientists and managers involved in water quality control.
- Recreational water facilities managers.
- Aquaculture – agriculture enterprise managers.
- Environmental laboratories both public and private.
- Equipment and materials designers and manufacturers
- Public health and clinical professionals, water district authorities and organizations.
- Standardization bodies (national, CEN, ISO) and national laboratory accreditation bodies.
- Environmental – public health policy makers at national or European level.
- Nongovernmental organizations active in environmental public awareness.
- Regional and national watersports organisations.
- The general public.

Several of the above end-users and stakeholders are already participating in the network. Others have been contacted and have expressed interest to follow the progress of the programme and will be involved to maximize benefits.

H.2 What?

Practical materials to rapidly and effectively inform and educate end-user groups throughout Europe of the causes, recognition, impacts and control of cyanobacterial blooms and cyanotoxins are viewed as key products of the Action. Excellent examples and experience in producing the necessary guides and handbooks already exist at local and national level among proposed COST partners. Dissemination and enablement for end-user product generation will be extended throughout Europe, with reference to both shared and specific regional/national characteristics and needs. The Action will apply the following dissemination methods:

- A Europe-wide rolling database which will be an extension of the 2005 UNESCO CYANONET database will be developed and will contain a “Who’s Who” of researchers, organizations, companies involved in this field, with extended profiles, expertise, publications, projects, collaborations and contact details etc. Links to national risk management policies in use in Europe and in neighbouring states - including guidelines and legislation-, will be included. The database will also include harmonized methods for the analysis and detection of cyanobacteria and cyanotoxins resulting from WG2 and “best practices” for prevention and control arising from WG3. All of the above information will be interlinked (keywords) so that it can be presented by country, method, type of organization, expertise, etc in a searchable engine. To contain a forum for posting questions, enquires, news, announcements, discussions etc. The database will be for members-only in the initial phase but it will be open for the public when it has been well established. The database will be updated by members.
- A handbook of methods for the detection-determination of cyanobacteria and cyanotoxins as described in Section D, available also online, with link to the Action’s website.
- A handbook of “Best Practices” for prevention and control of toxic cyanobacterial blooms, available also online, with link to the Action’s website.
- A revised and expanded version of the Decision Support Tool (EU PEPSY project, FP6), translated into national languages and available online via link to the database.

- An Action-specific website that will link to the database and other materials and will contain updated information, presentations, frequently asked questions, announcements of events etc. Also an open forum for questions and discussions.
- Articles and review papers in peer-reviewed journals.
- Training visits, meetings, workshops and conferences organized by MC.

H.3 How?

The scientific community will be reached mostly through meetings, workshops conferences, publications and the Action's website. The database and website will be used to disseminate information and outputs to all end-user groups and stakeholders, as summarized in H1.

Furthermore, direct contacts will be needed to interact with policy makers, governmental and international organizations and to recommend future European research programs and actions. The strong network of internationally recognized experts that is already in place makes such connections possible. It is emphasized that the dissemination strategy and implementation will be both proactive and responsive, remain flexible and throughout the project to include innovative ideas, actions and campaigns that will further increase awareness on the field. Action participants will be encouraged to facilitate the dissemination of findings through their own national and local networks.