EMBLAS TRAINING PROGRAMME
(PART I: MARINE CHEMISTRY)

Analysis of the training needs
(specifically for monitoring methods and QA/QC)
Draft Training Program
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This Training Programme preparation is part of the EMBLAS Project activities envisaged under its workpackage PA5.

General description of PA 5: Elaboration and implementation of a first training programme on monitoring methods and quality assurance adhering to ISO 17025 standard
According to the EMBLAS Inception Report:

- The trainings should be planned carefully and tailored to a specialist level. The trainings should ensure that there is a uniform approach to monitoring and an exchange of experience would facilitate this better than a standard training.

- Training could be targeted to the use of new equipment for monitoring. As very often data from different laboratories is not comparable, training should help solve problems related to harmonization of methods of sampling and processing.

- It will be necessary to also carry out inter-calibration and not only trainings. Trainings must comply with the monitoring program/s to be developed and contribute to quality performance.
According to the EMBLAS Inception Report:

- This Training Programme deals with the needs in capacity building so that to improve the performance of Black Sea laboratories in chemical monitoring and related QA/QC. The needs in biological monitoring will be attended in EMBLAS II. The MISIS Monitoring Programme “MSFD Guiding Improvements in the Black Sea Integrated Monitoring System” (http://www.misisproject.eu/, EC DG Env. Project MISIS: No. 07.020400/2012/616044/SUB/D2). has built the broader picture of capacity building needs in the Black Sea region, therein, EMBLAS elaborates on the details in the field of harmonization of chemical methods and preparations for introduction of new parameters and methods to better assess the Black Sea water, sediment and biota quality.
The EMBLAS Questionnaire\textsuperscript{1} responses were analysed, and the information provided showed limited capacities of most Laboratories to perform \textit{complex Black Sea monitoring} (including all media as required by BSIMAP). Commonly water quality monitoring is developed, whereas sediment and biota are not attended.

\textsuperscript{1} EMBLAS prepared special Questionnaires to collect information from relevant stakeholders for the preparation of the EMBLAS Diagnostic Report. This Report is the basis of all Project activities. It contains analysis of the BS monitoring status and of all numerous related issues to it (legal/policy frameworks, practical implementation, harmonization and training needs, infrastructure/vessels/equipment availability and needs, data management tools, assessments, etc.).
In **Georgia**: the Batumi laboratory of NEA performs complex hydrochemical observations, except for 2 mandatory parameters - total nitrogen and phosphorus. Pollution parameters sampling, conducted by NEA laboratories (Tbilisi, Kutaisi and Batumi), is taking place in rivers, but is not performed in the Black Sea.
Situation in individual States

List of parameters of seawater, analyzed by Russian Federation laboratories, includes hydrochemical and priority pollutants, and is sufficiently complete. But, sediments pollution and biota contamination are not studied.
Situation in individual States

- In **Ukraine**, almost all large marine Institutes (UkRSCES, IBSS, MHI, etc.) have the capacity to monitor standard hydrochemistry and pollution in water/sediments/biota. However, the routine national monitoring does not include sediments pollution and biota contamination in Crimean institutes. These are studied in projects only or under NASU Programmes or as part of Environmental Impact Assessments (related to Black Sea resources exploitation).
There are no regularly conducted trainings in the EMBLAS beneficiary countries, therefore training of young professionals is an issue for all organizations involved in Black Sea monitoring (lack of funding is the main reason for no regular trainings). The trainings which took place during the last 5 years in the region were organized in the frames of different international projects (see Chapter V in the EMBLAS Diagnostic Report) and they were mainly theoretical courses without particular practical exercises on spot.
So:

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Future actions:

In near future, when the revised BSIMAP is adopted, all national monitoring centers will be required to perform complex observations (hydrophysical and hydrochemical parameters in seawater, determination of priority pollutants in seawater, sediment and biota).
It is quite obvious that the laboratories responsible for the BSIMAP implementation need:

- Delegation by the National authorities of powers to conduct Regional monitoring (*sensu* Black Sea region, in the EEZ zone of each country), based on approved by the BSC program (e.g. revised BSIMAP);
- Available research vessel (at least one in each country), equipped with everything necessary for sampling of seawater, sediments and aquatic organisms, which would allow to properly trace the state of the Sea;
- Field and laboratory equipment - provision where necessary of modern chemical-analytical instruments;
- Consumables - regular purchase of sufficient number of required chemicals, glassware, ancillary equipment, standards, and reference materials;
- Capacity building which should include the following components:
  - Training - use of modern devices applying appropriate measurement procedures.
  - Training to comply with requirements for the competence of laboratories and their accreditation according to ISO 17025. This should include lessons in:
    - Organization of internal and external quality control.
    - Regular participation in intercalibration exercises (for instance those organized by various European Centres (MESL, Monaco or Quasimeme, Netherlands, etc.).
- Finally, all laboratories involved in BSIMAP shall be at least nationally accredited.
Marine laboratories participating in Black Sea monitoring should demonstrate that:

- samples are properly collected, analysed etc. using nationally or EU and internationally recognized procedures;
- such procedures are routinely checked in-house to demonstrate that measurements are remaining within acceptable limits of accuracy and precision;
- the ability of these laboratories to conduct these measurements has been confirmed by an independent and competent organization (national / EU accredited body).
Training Programme/Plan

- Taking into consideration the gaps in the current Black Sea monitoring, and in line with the needs of the national and regional monitoring programmes revision, priority trainings in chemical monitoring were identified as follows (as related also to harmonization needs and strengthening of QA/QC implementation):
Training Programme/Plan

**Standard hydrochemistry (water / sediments)**
- Sampling procedures of seawater, sediments and biota
- Nutrients, organic and total N and P\(^1\) in water
- Precision of pH measurements (proper acidification level evaluation) – use of modern techniques
- Organic carbon in water and sediments

\(^1\) Inorganic forms of N and P were the subject of harmonization under the BSC activities, and these analyses are part of regular intercalibrations (Quasimeme and IAEA).
Pollution (water)

- Trace metals (priority: Hg, Cu, Cd, Pb, Zn, As, Co, Cr, Ni)
- PAHs
- PCBs
- Pesticides
Training Programme/Plan

Pollution (sediment)

- Trace metals (Al, Hg, Cu, Cd, Pb, Zn, As, Co, Cr, Ni)
- Pesticides
- PCBs (total and ind.)
- PAHs
Pollution (biota)

- Trace metals (Hg, Cu, Cd, Pb)
- Pesticides (DDT and metabolites, Lindane)
- PCBs (total)
The Training Program include the following blocks for training:

- The requirements of ISO 17025
- Samples management
- Procedures documentation
- Analytical Procedures
- Method and data validation
- Method detection limit studies
- Supporting procedures
- Policy procedures
- Analytical standards inventory
- Proficiency documentation
- Training records
- Quality Manual
- Data management
The list of laboratories, participating in the training program implementation, shall first of all (but not exclusively) include the laboratories nominated as national centers in the framework of BSIMAP:

- NEA Fisheries and Black Sea Monitoring Centre, Batumi (Georgia);
- Laboratory "Specialized Centre on Hydrometeorology and Environment Monitoring of the Black and Azov Seas" (Sochi) and the Hydrometeorological Bureau of Tuapse (Russia);
- UkrSCES (Ukraine)
Invited participants in the Training Programme

- SIO-RAS, the Southern branch (Gelndzhik);
- Centre of Monitoring investigations of the Odessa National I.I. Mechnikov University (Odessa);
- Marine Hydrophysical Institute (Sevastopol);
- Institute of Biology of the Southern Seas (Sevastopol);
- Marine Branch of Ukrainian Hydrometeorological Institute (Sevastopol);
- Danube Hydrometeorological Observatory (Izmail);
- YugNIRO (Kerch);
- TSU + GAMMA Centre (Tbilisi)
The first training will be tentatively organised in the end of June 2014.
It will start from sampling in the Sea on hydrobiological station of Odessa National University and end with QA/QC lessons to be learned.
The training will include theoretical (1 day) and practical exercises (2 days).
The practical exercises will include sampling and analysis of seawater and sediments (Mussels - ?). Seawater samples will be analyzed for nutrients, total nitrogen and phosphorus. During water analysis quality control procedures will be specifically paid attention (control samples, matrix spike and testing standards).
During analysis of sediments (and biota?) all analytical procedures (storage, drying, extraction, fractionation, measurement) will be demonstrated.
All participants will also receive 2 samples of certified materials of Black Sea sediments for analysis in their laboratories:

1 - trace metals and 2 – priority organic pollutants.

Thus the training will be supplemented with consequent intercalibration exercise for sediments pollution.

Part of the theoretical training will be dedicated to also discuss the methods used and QC for these kind of analysis (metals and organics in sediments).
Thank you very much !!!