



GlobalHAB - the International SCOR-IOC Science Programme on Harmful Algal Blooms

Programme Activities 2016

The GlobalHAB programme was launched in January 2016. The GlobalHAB Scientific Steering Committee (SSC) held its first meeting at the Scottish Association for Ocean Sciences (SAMS) in Oban (Scotland, UK) on March 8-10, 2016.

The SSC is constituted by Elisa Berdalet (Chair, Spain), Neil Banas (UK), Michele Burford (Australia), Chris Gobler (USA), Bengt Karlson (Sweden), Raphael Kudela (USA), Po Teen Lim (Malaysia), Lincoln Mackenzie (New Zealand), Marina Montresor (Italy), and Kedong Yin (China). The SSC includes liaisons from the International Council for the Exploration of the Sea (ICES) Working Group on Harmful Algal Bloom Dynamics (WGHABD), the IOC International Panel on Harmful Algal Blooms (IPHAB), the North Pacific Marine Science Organization (PICES) HAB Section, and International Society for the Study of Harmful Algae (ISSHA), the GOOS Biology and Ecosystems Panel and representatives of the sponsoring organizations, Henrik Enevoldsen from IOC and Ed Urban from SCOR.

The main objective of the Oban meeting was to design the general plan of the program over the next decade and map out specific activities for the next three years. In particular, the meeting focused on the definition of the Mission and Goals of GlobalHAB, the elaboration of a Science and Implementation plan, identify approaches for collaboration with other international entities, and addressing logistic and structural questions of the program. The main outcomes of the meeting are summarized below.

1. GlobalHAB Goal and Mission statements

GlobalHAB is a cutting edge scientific programme on HABs.

GOAL

To improve understanding, prediction, management and mitigation of HABs in aquatic ecosystems.

MISSION

GlobalHAB will

- ✓ *address the science and societal challenges of HABs, including the environmental, human health and economic impacts, in a rapidly changing world,*
- ✓ *consolidate linkages with broader scientific fields and other regional and international initiatives relevant to HABs,*
- ✓ *foster the development and adoption of advanced technologies,*
- ✓ *promote training, capacity building and communication of HAB research to society, and*
- ✓ *serve as a liaison between the scientific community, stakeholders and policy makers, informing science-based decision-making.*

2. Science and Implementation Plans

The Scientific Plan (SP) of GlobalHAB follows the legacy of the former GEOHAB program, but will incorporate new themes. It will be augmented by a new Implementation Plan (IP) for the coming 10 years. The international scientific community at the GEOHAB Open Science Meeting (OSM) in Paris, April 2013, recommended this approach.

During the meeting in Oban, the GlobalHAB SSC members analyzed the Programme Elements that structured GEOHAB to identify the relevant aspects still valid for GlobalHAB, as well as the new themes identified at the OSM. Before the meeting, several documents were developed by the GlobalHAB SSC members in order to facilitate the meeting discussions.

It was decided to carry forward the 5 GEOHAB Program Elements (Biodiversity and Biogeography; Eutrophication; Adaptive Strategies; Comparative Approach; Modeling, Observation and Prediction) and to define new Program Elements. Based on the GEOHAB SP, the addendum will be more synthetic and will probably be merged with the new Implementation Plan in a single 20-25-page document.

New draft documents were produced that will assist in the elaboration of the SP and IP, to be finished in June 2016. Each document included the following:

- a brief introduction about the importance of the topic,
- the overall and specific objectives,
- potential implementation activities with different time horizons,
- outcomes for the scientific community and policy makers, and
- funding opportunities.

A summary of the draft documents for the new themes follows next, with indication of the names of the SSC members and liaisons that are leading on development of the documents.

a.- HABs and Fish Farming (led by Lincoln McKenzie and Keith Davidson)

The overall objective is to determine the potential effects of nutrients, shifting nutrient ratios, and/or organic matter from aquaculture in promoting HABs in different regions.

Implementation activities will include a comprehensive review workshop and position paper to identify the gaps in knowledge on this issue, and to define further research strategies.

b. CyanoHABs (cHABs) and Freshwater HABs (led by Michele Burford, Bengt Karlson and Chris Gobler)

The overall objective is to take a global perspective in advancing the science and management of freshwater and cyanobacterial HABs in benthic and pelagic habitats.

Implementation activities will include the development of a user-friendly electronic manual on mitigation strategies for freshwater cHABs across the world; an Open Science Meeting on cross-cutting issues and challenges for cHABs in marine, freshwater and brackish systems; and targeted workshops on emerging species and toxins, and methodological challenges.

c. Climate Change and HABs (led by Raphe Kudela, Neil Banas, Kedong Yin and Chris Gobler)

The overall objective is to understand global patterns in HAB responses to common drivers (thermal windows, stratification, nutrients, changing levels of CO₂).

Implementation activities will include identification of super-sites for time-series observations of HABs and related oceanographic parameters to track the potential impact of climate change on HABs, in coordination with GOOS.

d. Human Health (led by Elisa Berdalet, Marina Montresor and Gires Usup)

The overall objective is to minimise the risk of HAB impacts on human and ecosystem health, exploring traditional and new toxin exposure risks.

Implementation activities will include a regional workshop or forum bringing together HAB and medical specialists to identify the main needs and tools to jointly address this objective.

e. Toxins (led by Po Teen Lim, Chris Gobler and Gires Usup)

A fundamental overall objective will be characterization of the genetic and environmental basis for toxin production and determination of the mode of

action of selected toxins. An overall applied objective will be the development, evaluation and regulatory validation of toxin analyses.

Implementation activities will include a workshop to summarize the state-of-the-art and to identify further experiments about the mode of action of fish-killing events, and an inter-laboratory validation study on mass spectrometry methods of (e.g. PSP-toxin analysis).

f. Benthic HABs (Elisa Berdalet, Gires Usup)

The overall objective is to improve the knowledge on the ecology, physiology, toxin transfer mechanisms through marine food webs, and to obtain fundamental parameters for modeling BHAB dynamics, with a special interest on climate change scenarios.

Implementation activities will include a training workshop on methods for sampling BHABs organisms, intercomparison exercises focused on new analytical techniques for ciguatoxins, palytoxins and analogues, and an open science meeting on BHABs.

g. Economy (Keith Davidson, Michele Burford, Vera Trainer)

The overall objective is to develop tools and criteria for the comprehensive understanding of the economic impacts of HABs.

Implementation activities will include an interdisciplinary workshop targeted to (re)evaluate the economic impacts in key regions affected by HABs.

2. Collaboration with other international bodies

Several ToRs specify the essential link of GlobalHAB with other international entities that have HABs among their scientific research interests (Figure 1). At the first GlobalHAB SSC meeting, some of these entities were already represented by their liaisons that indicated possible collaborations, such as:

IPHAB (Gires Usup) – IPHAB identifies needs related to HABs and addresses IOC high-level objectives (e.g., the development of a Global HAB Status Report, a UN interagency strategy on ciguatera for improved research and management). Support to GlobalHAB from IPHAB could include training workshops (e.g., on taxonomy), interaction with member states and regional grouping on HAB issues, technical support through IPHAB Task Teams on Toxins and economic costs of HABs, and encouragement of countries to support their scientists to engage in GlobalHAB activities. The IOC liaison also includes links to IOC regional programmes such as IOC/WESTPAC/HAB (represented by Po Teen Lim) which could contribute to GlobalHAB, for instance, by creating outreach materials and sending regional experts to GlobalHAB-related meetings.

PICES (represented by Vera Trainer) has a Section on Ecology of Harmful Algal Blooms in the North Pacific. PICES could collaborate with GlobalHAB in future studies, through the alignment of PICES work with certain GlobalHAB objectives, providing ex officio status for GlobalHAB representatives on PICES Expert Groups that organize special meetings, workshops, and symposia, etc.

ISSHA (represented by Vera Trainer) – At the ICHA-16 conference in Brazil, co-sponsored by ISSHA, GlobalHAB will have a booth, an abstract about the program and a Town Hall session **to facilitate the engagement of the international community on the implementation of GlobalHAB, essential for the success of GlobalHAB.**

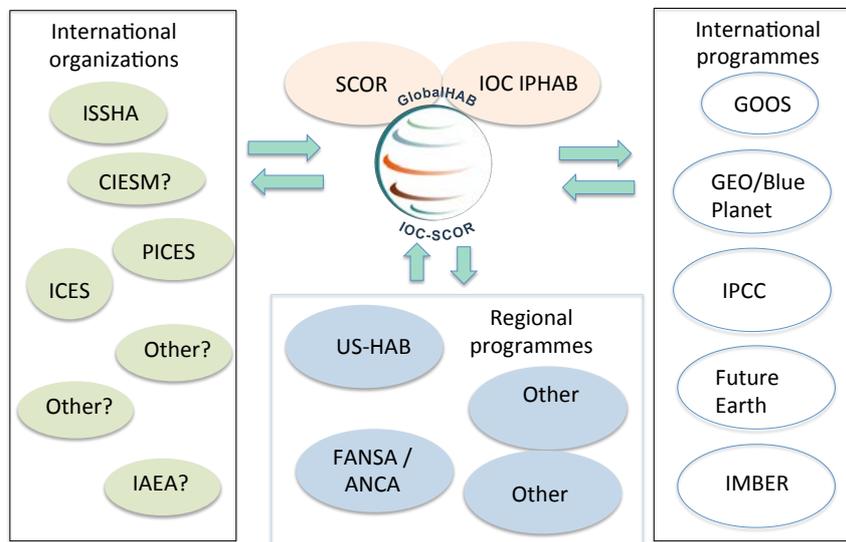


Figure 1. Links of GlobalHAB with other international entities that include HABs in their ToRs or objectives.

ICES (represented by Eileen Bresnan) - The ICES/IOC WG on Harmful Algal Bloom Dynamics (WGHABD), which concerns the ecology of HAB species within the ICES area, was pivotal in the development of GEOHAB. The new ToRs of the WGHABD in 2017 will incorporate “GlobalHAB” as a new descriptor. Furthermore, GlobalHAB could co-sponsor a 2017 workshop on novel methods for HABs species detection.

GOOS Biology and Ecosystems Panel (represented by Raphael Kudela) has identified HABs as an Essential Ocean Variable (EOV). GlobalHAB could help develop this EOV and the GOOS webpages can raise the visibility of GlobalHAB.

EuroGOOS (represented by Bengt Karlson) – Traditionally focused on physical oceanography processes, the incorporation of FerryBox systems may facilitate research on HABs. EuroGOOS also supported the proposal for UK funding of a GlobalHAB IPO.

IOCCG (represented by Raphe Kudela) – The joint working group between GEOHAB and IOCCG (now finishing a monograph) can continue with GlobalHAB.

GEO/Blue Planet (represented by Raphe Kudela) – The relationship with GEO/Blue Planet and GlobalHAB will be fostered.

IAEA (presented by Gires Usup) – IAEA developed a receptor-binding assay method for PSP and is now focusing on ciguatera (CTX detection method). IAEA participates in monitoring (sampling devices), provides support for lab equipment, is producing reference materials, and is incorporating epidemiology on the Pacific Island Countries and Territories (PICTs). All these aspects are relevant for the implementation of GlobalHAB objectives.

4. Other logistic and structural aspects

Other agreements concerned the general design of the logo (Figure 2), the webpage, revision of the Endorsement procedure, dissemination of the meeting in Harmful Algal News #53, future meetings, etc.



Figure 2. Draft of the GlobalHAB logo. To be refined.

5. GEOHAB Synthesis Products

At the official end of GEOHAB, some synthesis products were still in progress and GlobalHAB has taken responsibility to see them completed. These products include the following:

- A special issue to be published in *Oceanography* magazine (The Oceanographic Society), Volume 30, March 2017. [Deadline for submission: June 30, 2016]
Title: *International Cooperation in Harmful Algal Blooms Science*
Guest Editors: Raphael Kudela, Henrik Enevoldsen and Ed Urban
- A monograph on the application of Ocean Colour satellite techniques for the study of HABs is planned for publication in the *IOCCG Report* series. This book is the result of the collaboration between GEOHAB and the International Ocean Color Coordination Group (IOCCG), with Steward Bernard, Raphael Kudela and

Grant Picher as editors. The document will be structured on several representative case studies of HABs.

- A book published by Elsevier, under their *Ecological Studies* series.

Editors: Pat Glibert, Elisa Berdalet, Michele Burford, Grant Pitcher and Mingjiang Zhou.

Expected date of publication: End of 2016.

Chapters (expected): 25 (aprox)