EXECUTIVE SUMMARY

The Eleventh Session of the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB) was held at UNESCO Headquarters, Paris, from 28 to 30 April 2013.

The Panel reviewed the actions completed during the intersessional period and noted that significant progress had been made and that the Resolutions and Recommendations of the Tenth Session had been followed up to large extent. The major achievements reported include: (i) developments within GEOHAB including the launch of the GEOHAB Research Plan for the Core Research Project in Benthic Systems and the development of a revised international coordinated research plan for HABs; (ii) development of the regional activities within ANCA, FANSA, HANA and WESTPAC-HAB; (iii) the implementation of more than ten training courses and training-through-research projects; (iv) results from the ICES-IOC WGHABD and ICES-IOC-IMO WGBOSV; (v) the continued development of the integrated IPHAB-IODE Harmful Algae Information System (vi) the continued publication of the IOC Harmful Algae News; (vii) and the IOC co-sponsorship of international HAB conferences.


The Recommendations concern (i) a decadal plan for international coordinated research on HAB, (ii) an increased coordinated international focus on Ciguatera, (iii) a summary of the Decisions and planned intersessional activities into a Work Plan and budget for the IOC HAB Programme 2014-2015, and (iv) the continuation of the IPHAB and time of the next Session. Dr. R. Magnien (USA) was re-elected as Chair and Dr. Gires Usup (Malaysia) was re-elected as Vice-Chair.
## ADOPTED DECISIONS AND RECOMMENDATIONS

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Decision IPHAB-XI.1

SCIENTIFIC SYMPOSIUM ON HARMFUL ALGAE AND GLOBAL CLIMATE CHANGE

The Intergovernmental Panel on Harmful Algal Blooms;

Recalling High Level Objective 2 of the IOC Medium Term Strategy for 2008–2013; Mitigation of the impacts and adaptation to climate change and variability and in particular the decision therein to increase the understanding of the impacts of climate change and variability on marine ecosystems and their living resources,

Recalling the IPCC 2007 report that identified the likely intensification of problems associated with eutrophication and stress on coastal marine ecosystems,

Noting the influence of decadal scale climate variation on the occurrence of HABs and related events,

Noting that climate change may have effects on ocean temperature, circulation, stratification, acidification and nutrient delivery modes and may lead to the geographical spreading of species and an increase in the seasonal occurrence of some HAB species,

Recognizing that the effects of climate change on the occurrences of HABs in coastal waters are complex because of the additional influence of human pressures such as fisheries and nutrient enrichment,

Recognizing that new HAB appearances already are occurring in parts of the world that are consistent with climate change drivers, and that these and new events require environmental risk assessment strategies and/or frameworks,

Recognizing the importance of coordination among existing and new HAB monitoring programmes, analyses of time-series data on HABs and related events, and recognizing that gaps in scientific understanding constrain how projected climate change may influence HAB events,

Recognizing the ongoing activities on Ocean Acidification and Climate Change in relation to HAB by the IAEA,

Noting the conclusions and recommendations of the Joint PICES/ICES/IOC/GEOHAB Workshop on Harmful Algal Blooms in a Changing World (WKHABCW Expert Group), 18–22 March 2013,

Endorses that the WKHABCW Expert Group convene an open scientific symposium on harmful algal blooms and climate change in 2014–2015 to:

a. provide examples of locations and events where climate change may be affecting HABs and their impacts;

b. identify and promote research on critical topics/aspects of the broader field of HAB research to advance our knowledge of the impacts of climate change on the global scale;

c. attract and retain new expertise from other scientific disciplines;

d. evaluate the use of new technologies for the collection and analysis of long term data on appropriate parameters;
e. develop the HAB component of global climate observing systems;

f. foster framework activities to facilitate identifying and responding to climate change-driven effects on HABs, including risk assessment with associated probabilities and uncertainties;

g. develop best practice recommendations for research and monitoring to fill critical knowledge gaps;

Invites the SCOR Working Group 137 on Patterns of Phytoplankton Dynamics in Coastal Ecosystems: Comparative Analysis of Time Series Observation, and PICES Working Group 27 on North Pacific Climate Variability and Change, the ICES/PICES Strategic Initiation on Climate Change Impacts on Marine Ecosystem, and representation from the GEO Blue Planet and GOOS to contribute advice and resources to help implement the objectives above;

Notes that the outcome of the open scientific symposium will provide a significant contribution to the development of a new international research agenda on HABs;

Decides that the steering committee for an open scientific symposium on harmful algal blooms and climate change will be co-chaired by a representative of the PICES HAB Section, the Chair of the IOC-ICES WGHABD, and the Chair of the GEOHAB SSC and other members to be identified in consultation with the IPHAB Chair and the Secretariats of the sponsoring organizations;

Requests the ICES/IOC WGHABD review and advises on the progress of the preparations for the open science meeting on Harmful Algal Blooms and Climate Change.

Decision IPHAB-XI.2

DEVELOPMENT OF A GLOBAL HAB STATUS REPORT

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Recalling Resolution IPHAB-IX.2 on the ‘Development of the Harmful Algal Information System’ as a joint IPHAB-IODE activity,

Recognizing the benefits to policy administrators, managers of regulatory monitoring programmes and scientists of a series of syntheses of high quality information and future scenarios on the biogeography of harmful species and occurrence of harmful algal events including their economic and societal impacts,

Noting the recommendation by the IOC-SCOR GEOHAB Synthesis Open Science Meeting for the development of a Global HAB Report, to mirror as well as assist with International Panel on Climate Change (IPCC) reporting,

Noting that the current and developing global assessments relevant to HABs such as the United Nations World Ocean Assessment, the UNEP Global Environmental Outlook and the next Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) global assessment on biodiversity and ecosystem services, to be launched in 2018, do not or will not in detail provide a global status of HAB events and the causative species,

Acknowledging the value of the data and information products already developed by the IOC or by IOC and partners within the Harmful Algal Information System (HAIS) and that
these serve as the best available for a global HAB status report provided data series are completed.

**Reiterates** the request of IPHAB-IX for Member States and the IOC regional HAB groups and networks ANCA FANSA, HANA, and WESTPAC/HAB, and their respective IOC sub-commissions and regional committees, to include as a permanent Term of Reference the collation and submission of harmful algal event summary data to HAEDAT;

**Noting** that IOC/IODE’s Ocean Biogeographic Information System (OBIS) provides the world’s largest open access data base on the diversity, distribution and abundance of marine species, including harmful algae, and that OBIS will contribute to HAIS through HABMAP, and, if systematically complemented with data on HAB species, it provides a strong potential as a basis for a main component of a global HAB status,

**Reiterates** the invitation of IPHAB-IX for IOC National Committees to identify the appropriate institution, and IODE National Oceanographic Data Centres (NODCs) or OBIS nodes, not contributing so far, to participate in the Harmful Algae Information System, in particular HAEDAT;

**Decides** to establish a Task Team on the development of a periodic Global Harmful Algal Bloom Status Report to:

(i) develop an outline of and then initiate a Global Harmful Algal Bloom Status Report to:
   a) provide a global status and overview of HAB events and their societal impacts;
   b) provide a global overview of the occurrence of toxin producing microalgae;
   c) assess the status and probability of change in HAB frequencies, intensities, and range expansions resulting from global change;

(ii) recommend a review mechanism;

(iii) recommend on a periodicity and a regular process for preparation of a Global Harmful Algal Bloom Report;

(iv) recommend on a dissemination and communication strategy for a Global Harmful Algal Bloom Report;

(v) assist in identifying the resources required to develop the Report;

(vi) present an assessment of data and a draft Report to IPHAB-XII.

**Decides** also to invite the following to participate in the Task Team; the Chair of the IPHAB Task Team on Biotoxins, The Chair of the IPHAB Task team on Taxonomy, representatives of the regional IOC groups ANCA, FANSA, HANA and WESTPAC/HAB, the ICES-IOC WGHABD, the PICES HAB Section, the Chair IODE GE-BICH, a representative of IOC/IODE/OBIS, WoRMS, IAEA/EL, and ISSHA, Ifremer/Nantes, France. The Task Team may be expanded as required to fulfill the Terms of Reference;

**Notes** that the task team will continue its work until otherwise decided by the Panel, and that it will work by correspondence and/or meet upon request by the IOC Secretariat, and provide a progress report for the intersessional period to the chair IPHAB and IODE prior to IPHAB-XII and IODE-XIII.
Decision IPHAB-XI.3

HARMFUL ALGAE AND DESALINATION OF SEAWATER

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Noting that more than 150 countries worldwide operate desalination plants to produce drinking water from seawater and that many of these countries are IOC Member States,

Recognizing that desalination capacity is forecast to grow rapidly in the coming years as demand for fresh water grows,

Noting that in recent years, HABs have caused serious impacts at desalination plants [e.g. the cessation of operations due to clogging of filters, fouling of surfaces, damage to reverse osmosis membranes, taste and odour problems] and the concern that HAB-derived toxins could be present in the freshwater produced,

Noting that standard desalination methods remove the vast majority of algal toxins, but there is the potential for small amounts to be retained in the treated water, representing a potential threat to human health through chronic exposure,

Noting that research on this topic is limited and that the detailed guidance being requested by stakeholders in Member States is difficult to provide,

Recognizing that there is a growing risk to public health, plant operations and interruptions in drinking water supplies, there is therefore considerable value in assembling information on gaps in scientific understanding and engineering challenges and in seeking a consensus on methodologies to reduce risks,

Recalling Resolution IPHAB-X.4 to organize a meeting on “Impacts and management of toxic and harmful algal blooms (HABs) at desalination plants and related seawater facilities”,

Recognizing that Oman has generously agreed to be the host for the conference with some financial support, but that additional funds will be needed to support a conference of this scale,

Notes that a proposed project has the potential to provide funding from the United States Agency for International Development (USAID) to the Middle East Desalination Research Center (MEDRC) that will support the production and distribution of a Manual of Operations to guide desalination plant operators during HAB events, thereby meeting one of the goals of this Decision;

Decides to organize a meeting on impacts and management of toxic and harmful algal blooms (HABs) at desalination plants and related seawater facilities to be convened in Muscat, Oman, before the end of 2014 (if possible) to:

(i) Review the state of knowledge on the impact of HABs on desalination plants and other facilities that utilize large volumes of seawater in commercial or industrial applications;

(ii) Explore the engineering and operational strategies that are used, or could be used to mitigate the impacts of HABs and other planktonic threats to these types of facilities;

(iii) Produce a manual of operations containing information on HABs and their impacts and a series of recommendations on plant design and operations in areas potentially impacted by HABs;
(iv) Explore the potential risk for human health from chronic exposure to HAB toxins in drinking water, with due attention to approaches used to remove cyanobacterial toxins in freshwater from drinking water reservoirs;

(v) Produce a report summarizing the conference and its findings and recommendations including research priorities to fill knowledge gaps and to inform policy decisions in this subject area;

Invites WHO, IAEA, and ROPME to be participants in the organization of the conference;

Decides also that the Organizing Committee will be chaired by D. Anderson (USA), with assistance from A. Al-Thukair (Saudi Arabia), H. Al Hamsi (Oman), P. Hess (France), M. Wells (USA), G. Hallegraeff (Australia), R. Kudela (USA), S. McCarthy (MEDRC, Oman), N. Nada (Saudi Arabia), D. Furukawa (Australia), T. Pankratz (Singapore), S.H. Kim (Rep. of Korea), with other members to be invited in consultation with the Chair IPHAB and the Secretariat;

Encourages Member States to assist in providing funding for the conference;

Notes that the Organizing Committee is established until the event has been completed and a report published; that it will work by correspondence and/or meet on an opportunistic basis, and provide a report to the Chair IPHAB prior to IPHAB-XII.

Decision IPHAB-XI.4

REGIONAL HAB PROGRAMME DEVELOPMENT

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Recalling the priority of implementing and maintaining IOC programmes at the regional level;

Noting with appreciation the reports of the regional HAB activities within FANSA, HANA and IOC/WESTPAC-HAB;

Acknowledging that Regional HAB Groups and Networks enhance collaboration on scientific and technical matters in support of Member State management and mitigation of harmful algal blooms and help to represent Member State priorities at IPHAB;

Acknowledging that some Regional HAB Groups and Networks already undertake research, capacity building and outreach activities;

Decides that the terms of reference of regional IOC Regional HAB Groups and Networks will include:

(i) collating data on regional HAB events for inclusion into HAEDAT and for incorporation into the envisioned Global HAB Status Report;

(ii) prioritizing HAB research, management issues and capacity development to be addressed regionally and potentially globally through engagement of other Member States at IPHAB;

(iii) exploring means to facilitate inter-regional cooperation in training activities where expertise and resources can be shared;
(iv) establishing selection criteria for participants in training courses so that the effort is sustainable and effective;
(v) exploring the possibility of establishing regional reference laboratory(ies) for biotoxins and taxonomy
(vi) requesting Member States to evaluate the socio-economic impacts of HABs;
(vii) developing and enhancing expertise for monitoring purposes;
(viii) continuing the practice of open invitation to IOC Member States to participate in IOC HAB regional groups and for each group to elect a chair at two-year intervals;
(ix) reporting of (i)-(viii) to IPHAB every second year;

Notes that these standard ToRs for regional HAB groups are subject to regional subsidiary decisions where relevant;

Endorses the proposed activities and priorities of FANSA, HANA and WESTPAC-HAB for 2014-2015 subject to availability of funding;

Supports the establishment of new Regional HAB Groups or Networks where there is a request for this;

Requests that the Chairs of regional IOC projects and groups maintain contact with IPHAB Chair and Vice-Chair and the Executive Secretariat of IPHAB and coordinate activities;

Urges Member State institutions to contribute resources to help implement the activities and priorities of the Regional HAB Groups and Networks.

Decision IPHAB-XI.5

TASK TEAM ON BIOOTOXIN MONITORING, MANAGEMENT AND REGULATIONS

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Recalling Resolution IPHAB-X.2 on the IPHAB Task Team on Biotoxin Monitoring, Management and Regulations,

Acknowledging that biotoxins from harmful algae pose a serious threat to human health, the seafood industry and the socio-economic wellbeing of coastal communities,

Acknowledging the work of various groups which address the scientific aspects of methodologies and legislation with regards to the contamination of seafood with HAB-derived toxins, and that each group generates valuable scientific information that may be used to recommend regional or national policies. Some of the working groups have operated on an ad hoc basis [FAO/IOC/WHO expert consultation 2004/5; ECVAM/DG Sanco workshop 2005; EFSA risk evaluations 2006 – 2010] while others are standing working groups, in particular those for methodological development or policies [e.g. Asia Pacific Economic Cooperation (APEC), US-ISSC, EU National Reference Laboratories, CEN, AOAC, FAO-WHO Codex Committee on Fish and Fisheries Products],

Noting that there is a continued potential to improve the coordination and exchange of information among these groups,
Noting that new biotoxins from harmful algae and routes of exposure are being discovered, and that known toxins are emerging in areas where not previously reported, bringing to light heretofore unknown risks,

Noting that new and improved methodologies for detecting and monitoring the occurrence of HAB toxins in seawater and seafood tissue have recently been validated for some groups (STX, OA, AZA, YTX, PTX and DA) and are being developed for a number of toxin groups (CTX, Palytoxins, cyclic imines etc.),

Recalling that the activities of IPHAB contribute to minimising the effect of HABs on sustainable safe seafood supply, human health, international trade and economic wellbeing,

Decides to continue the Task Team on Biotoxin Monitoring Management and Regulation with the following Terms of Reference:

(i) Establish and maintain regular contact with FAO, WHO, and other regulatory bodies;
(ii) Establish and maintain regular contact with leading scientists and scientific organisations to ensure that the latest and most robust science is available to the Task Team in discharging its responsibilities;
(iii) Intensify contributions and advise to the development of the components of the Harmful Algal Information System (HAIS) regarding the unambiguous identification of toxic species/strains and the toxins they produce, the use of toxin names and the inclusion of background data on toxins;
(iv) Include cyanobacterial toxins in the listing of algal toxins and related information;
(v) Review the existing databases on biotoxin monitoring, management and regulation (e.g. MONDAT) and explore whether updating is possible or whether this should be included in the database in development on the toxins linked to toxic organisms;
(vi) Approach WHO to co-sponsor a meeting on impacts and management of toxic and harmful algal blooms (HABs) at desalination plants (see Decision IPHAB-XI.3) and related seawater facilities, advise working group on fish killing algae on aspects of toxinology and to take note of the need to address the increasing toxic threat from a number of toxin groups, including CTXs and palytoxins;
(vii) Participate in the organisation of training workshops for toxin detection, monitoring and management;
(viii) Recommend to IPHAB-XII on revised priorities for research, capacity development and engagement with regulatory bodies to address the most pressing issues and threats posed by HAB toxins in the marine environment;
(ix) Report to IPHAB XII on international activities in marine biotoxin monitoring management and regulation during the inter-sessional period;

Encourages relevant organizations to invite the IPHAB Task Team to participate as observer at the principal meetings of their respective groups to facilitate international compatibility of applied methodology and legislation with respect to HAB toxins;

Decides that the Task Team will be chaired by P. Hess (France), and include Bob Dickey, (USA); Ana Gago (EURL/Univ. Vigo, Spain); Raphe Kudela (UCSC, USA); Christopher O. Miles (NVI, Norway); Toshiyuki Suzuki (JFRL, Japan); Hamid Taleb (INRH, Morocco); Mark Wells (PICES), and members selected by the Chair of IPHAB and the Secretariat as required to fulfil the terms of reference and to ensure geographical coverage and expertise to cover the cyanotoxin area;
Invites FAO, IAEA, WHO to be members of the Task Team;

Notes that the Task Team is established until otherwise decided by the Panel and that it will work by correspondence and/or meets on an opportunistic basis, and provide a progress reports for the inter-sessional period to the Chair IPHAB prior to IPHAB-XII.

Decision IPHAB-XI.6

TASK TEAM ON ALGAL TAXONOMY

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Recognizing the pivotal role of taxonomy in scientific research, monitoring and management activities in the HAB programme,

Acknowledging that there are publications available on the taxonomy and identification of harmful algae, including those published by UNESCO/IOC,

Acknowledging the progress made by the Task Team in publishing and updating the IOC Taxonomic Reference List of Harmful Marine Microalgae as an integrated element of the World Register of Marine Organisms and the IOC/IODE Harmful Algal Information System (HAIS),

Recalling the frequent change of taxonomic status of many harmful algae and the identification of new harmful species require continuous updating of the Reference List,

Noting that frequent taxonomic changes must be considered and incorporated into the work of ecologists, toxicologists, and those undertaking regulatory monitoring,

Recalling the decisions of the previous sessions of the Panel regarding the Task Team on Algal Taxonomy,

Decides, with reference to the HAB Programme Plan, objective 6.2.2, ii (Annex V), to continue the Task Team on Algal Taxonomy with the following terms of reference:

(i) verify the Reference List and suggest modifications to it;
(ii) invite the scientific community to contribute to keeping the list updated;
(iii) include toxic cyanobacteria, including freshwater cyanobacteria;
(iv) include information on cysts;
(v) aim at including references to selected validated sequences in GenBank;
(vi) work in coordination with the Task Team on Biotoxins Monitoring, Management and Regulations to prepare a summary of data [e.g. number of species known to produce each toxin, current taxonomic problems];
(vii) interact in the development of the Harmful Algal Information System;
(viii) suggest themes for round-table discussions and other activities at the International Conference on Harmful Algae (ICHA); give presentation(s) at each ICHA conference, detailing recent changes in the taxonomy of harmful algal species;
(ix) identify editors within or outside the Task Team who will be responsible for validating, completing and updating the Reference List, including illustrations showing diagnostic features of each species, and reference or links to such illustrations;

(x) organize a meeting with editors, AlgaeBase, WoRMS and Chair of the Task Team on Biotoxins Monitoring, Management and Regulations, to address problems of classification and other problems associated with the list;

(xi) convene the editors prior to each ICHA conference to discuss and update the list;

**Decides** that the Task Team will comprise Ø. Moestrup (Denmark) Chair, M. Iwataki (Japan), K. Matsuoka (Japan), N. Lundholm (Denmark), A. Zingone (Italy), L.N Nguyen (Vietnam). The Task Team may be expanded as required to fulfil the Terms of Reference;

**Notes** that the Task Team will continue its work until otherwise decided by the Panel, and that it will work by correspondence and/or meet on an opportunistic basis, and provide a progress report to the Chair IPHAB prior to IPHAB-XII.

**Decision IPHAB-XI.7**

**TASK TEAM ON HARMFUL ALGAE AND FISHKILLS**

The IOC Intergovernmental Panel on Harmful Algal Blooms,

**Recalling** the IOC co-sponsored ‘International Workshop on Fish-killing Marine Algae’ held in Oslo, Norway, April 2011,

**Noting:**
- that there is increasing concern about the impact of ichthyotoxic algal blooms on society, economic interests, sustainability and security of seafood, living resources, and fisheries and aquaculture in particular,
- the likelihood that algal biotoxins are not the sole reason for algae-related fish kills, but that there may also be other less specific mechanisms,
- the limited utility and lack of standardization of current fish or cell-based bioassay methods for assessing ichthyotoxicity,
- that while these events are categorized as “fish-killing” there may be impacts on other components of coastal marine ecosystems,
- that the broader issue comprises three components: a) the ecology, oceanography and bloom dynamics of fish-killing algae as they relate to fish mortality events, b) the aetiology and specific mechanisms of fish mortality, and c) the management and mitigation of fish killing algal events,

**Recognizing** that there has been little discussion of fish-killing algae outside the aquaculture industry sector and insufficient awareness of this issue within the scientific community,

**Noting** that the ICES-IOC Working Group on Harmful Algal Bloom Dynamics will complete its Terms of Reference on fish-killing algae at its 2014 meeting,

**Decides**, with reference to the HAB Programme Plan, objective 6.3.1, ii, to continue the IPHAB Task Team on Harmful Algae and Fish Kills with the following revised terms of reference:
(i) prepare an overview of the scale of the issue and priorities, including a literature review publication, and report to IPHAB-XII with a view to develop a community-scale project;

(ii) support the organization of a joint ICES/IOC/PICES international scientific and technical workshop to better define global understanding and operational approaches to the broad issues listed in item (i);

Decides also that the Task Team will be composed by A. Cembella (Germany) (Co-chair), R. Gowen (United Kingdom) (Co-chair), P. Hess (France), G. Hallegraeff (Australia), R. Azanza (Philippines), Y. Fukuyo (Japan), and C. Trick (PICES). The Task Team may be expanded as required to fulfil the Terms of Reference;

Notes that the Task Team will continue its work until otherwise decided by the Panel and that it will work by correspondence and/or meet on an opportunistic basis, and provide a progress report to the Chair IPHAB prior to IPHAB-XII.

Recommendation IPHAB-XI.1

HABS IN A CHANGING WORLD: A NEW GLOBAL APPROACH TO HAB RESEARCH TO MEET SOCIETAL NEEDS

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Referring to the joint SCOR-IOC international science programme on the Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) as established through IOC Resolution EC-XXXI.1, and the associated GEOHAB Science Plan and associated Implementation Plans,

Referring to IPHAB Resolution IPHAB-X.3 which anticipated that IPHAB would recommend that GEOHAB continue beyond 2013 pending discussions and decisions at its XI Session and that SCOR should be invited to continue as co-sponsor,

Referring to Resolution XXVI-11 of the Twenty-seventh Session of the IOC Assembly recognizing that the need for continued global coordination and regional cooperation on HAB research can be expected to remain at the same level or increase, and the invitation to the Scientific Committee on Oceanic Research (SCOR) to take active part in the process to systematically assess the need for, and potential focus of, a continued global harmful algal bloom research programme,

Noting the conclusions and recommendations of the GEOHAB Synthesis Open Science Meeting, 24–26 April, 2013,

Noting that GEOHAB provided a unique ability to address underlying scientific questions and concerns related to harmful algae and their science-based management,

Noting the achievements and ongoing activities of GEOHAB detailed in the GEOHAB report series and the contributions made to the scientific literature,

Noting that GEOHAB provided an interface between IOC and other international coordinating organizations for science such as SCOR, IOCCG, ICES, PICES, and GEO,
Noting that the GEOHAB Science Plan has been assessed by the GEOHAB Synthesis Open Science Meeting and found to continue to provide a basis for international coordinated research on HABs,

Noting that within the joint framework of IOC and SCOR, GEOHAB is expected to synthesize and conclude its activities by the end of 2013,

Recognizing that to fully realise the benefits of the accumulated investments in GEOHAB and to address new priorities identified by the IOC in collaboration with SCOR, it is necessary to extend a limited number of targeted research and framework activities within the GEOHAB Terms of Reference beyond the end 2013,

Recognizing also that the Draft IOC Medium Term Strategy for 2014–2021 is moving from global environmental change research to global sustainability research, and that this change will require significant transformations in research processes, including adaptation of institutional arrangements to promote a new era of inter- and trans-disciplinary research aimed at understanding social-environmental process dynamics,

Noting that this research should provide relevant knowledge outputs and innovation that will meet societal needs,

Recommends that a new international research programme be formed on the foundations of the GEOHAB Science Plan, focusing on understanding HABs in the context of global sustainability, with a working name of GlobalHAB;

Further recommends the establishment of a GlobalHAB Scientific Steering Committee in consultation with partner organizations and in accordance with the draft Terms of Reference attached to this Recommendation as Annex I, including;

(i) To draft an Addendum to the GEOHAB Science Plan, extending the scope to include human and ecosystem health, and socio-economic impacts of HABs to enhance sustainable management of the oceans and coastal zone;

(ii) To identify specific targeted research and framework activities within GEOHAB for continuation beyond 2013 as part of GlobalHAB;

(iii) To develop an Implementation Plan that describes a decadal research programme focused on HABs in a Changing World;

Reiterates the invitation to SCOR to cosponsor the Scientific Steering Committee and invites other international scientific coordinating bodies to support GlobalHAB activities;

Urges Member States and their institutions to provide advice and resources to help implement GlobalHAB objectives.

Annex 1

The Scientific Steering Committee of the GlobalHAB Programme will:

1. Develop the Addendum to the GEOHAB Science Plan and a GlobalHAB Implementation Plan based on the recommendations of the GEOHAB Synthesis Open Science Meeting April 2013 and present the draft plan to IPHAB-XII.

2. Coordinate and manage GlobalHAB Research Projects (RPs) in accordance with the amended GEOHAB Science Plan and the GlobalHAB Implementation Plan.

3. Review progress of RPs, identify gaps in knowledge, and initiate new RPs in priority research areas.
4. Foster framework activities to facilitate implementation of GlobalHAB, including dissemination and information tools.

5. Establish appropriate data management activities, such as the SCOR-MBLWHOI-IOC/IODE DOI repository, to ensure access to, sharing of, and preservation of GlobalHAB data, taking into account the data policies of the sponsors, and taking into account ongoing data management activities of other IPHAB Task Teams.

6. Promote comparative and interdisciplinary research on harmful algal blooms by providing coordination and communication services to national and regional research groups, encouraging explicit affiliation with GlobalHAB via an endorsement process.

7. Coordinate, as appropriate, with IOC regional activities ANCA, FANSA, WESTPAC/HAB, and HANA.

8. Collaborate, as appropriate, with other intergovernmental organizations and their subgroups (e.g., IAEA, ICES, PICES, NOWPAP), as well as related research projects (e.g., LOICZ, IMBER), observational systems such as the Global Ocean Observing System and its regional alliances, and initiatives on risks and opportunities of global environmental change and for supporting transformation towards global sustainability.

9. Report regularly to SCOR (if SCOR accepts co-sponsorship) and the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB), and the international HAB research community on the state of planning and accomplishments of GlobalHAB, through annual reports and, as appropriate, the GlobalHAB Web site, Harmful Algae News, special sessions at scientific meetings, and other venues.

10. Interact with agency sponsors to stimulate the support of GlobalHAB implementation through various mechanisms (e.g., direct support of GlobalHAB initiatives and integration of the GlobalHAB approach in national programs).

**Acronyms**

ANCA = IOC HAB working group for Central America and Caribbean Sea
FANSA = IOC HAB working group for South America
HANA = IOC HAB working group for North Africa
GLOBEC = Global Ocean Ecosystem Dynamics project
IAEA = International Atomic Energy Agency
ICES = International Council for the Exploration of the Seas
IMBER = Integrated Marine Biogeochemistry and Ecosystem Research project
IOC = Intergovernmental Oceanographic Commission
IODE: International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission
LOICZ = Land-Ocean Interactions in the Coastal Zone project
MBLWHOI = Marine Biological Laboratory/Woods Hole Oceanographic Institution
NOWPAP = UNEP Northwest Pacific Action Plan
PICES = North Pacific Marine Sciences Organization
SCOR = Scientific Committee on Oceanic Research
WESTPAC/HAB = HAB Project of the IOC Sub-Commission for the Western Pacific
Recommendation IPHAB-XI.2

CIGUATERA, A PLAN FOR IMPROVED RESEARCH AND MANAGEMENT

Noting extensive human suffering from benthic microalgae *Gambierdiscus* induced Ciguatera Fish Poisoning (CFP); 1 in every 4 persons in the Oceania region, half that number in the Caribbean; and significant social and economic impacts, especially in tropical, small island developing States,

Noting the emergence of Ciguatera events in non-tropical areas,

Noting the potential global increase in CFP and other seafood poisoning due to climate change, coastal developments and globalised seafood trade,

Acknowledging that some Member States, regional groups, e.g. IOC/WESTPAC, and international organizations, e.g. IAEA, have on-going CFP projects,

Noting the significant global social and economic consequences of unrecognised, under reported and unchecked increases of CFP,

Noting the absence of CFP toxin standards and validated detection methods,

Noting with satisfaction the continuation of the BHAB Research Project initiated under IOC-SCOR GEOHAB focusing on the ecology of causative organisms (e.g. *Gambierdiscus*, *Ostreopsis*),

Referring to Decision IPHAB-XI.5 to include CFP and focus on toxin detection as a high priority in the Terms of Reference of the IPHAB Task Team on Biotoxin Monitoring, Management and Regulations,

Urges that the relevant Member State agencies to develop the capacity to monitor for Ciguatera-causing organisms, toxins, contaminated seafood and the epidemiology to reduce the risk associated with benthic HABs;

Recommends that the IOC and its Member States make the CODEX Committee for Fish and Fishery Products and its member countries aware that IPHAB prioritizes efforts on Ciguatera;

Recommends to the World Health Organization to assess if there is a basis for classifying CFP as a neglected tropical disease;

Recommends assessing the establishment of a coordinated IOC-FAO-WHO effort on CFP to combine the capabilities of those agencies and that of ecologists, toxin chemists and medical researchers to:

1. Develop a coordinated Ciguatera strategy
2. Improve organism detection and sampling strategies
3. Improve toxin detection
4. Improve epidemiological data collection, reporting and assessments.
Recommendation IPHAB-XI.3

HARMFUL ALGAL BLOOM PROGRAMME WORKPLAN FOR 2014–2015

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Referring to the deliberations of its Eleventh Session and the priorities identified prior to the session by ANCA, FANSA, and HANA;

Endorses the implementation of the workplan for the IOC Harmful Algal Bloom Programme as presented in Annex 1 to this Recommendation within the resources available;

Urges Members of the Panel and the IOC Secretariat to help identify the required resources.

Recommendation IPHAB-XI.4

OPERATION OF THE IOC INTERGOVERNMENTAL PANEL ON HARMFUL ALGAL BLOOMS

The IOC Intergovernmental Panel on Harmful Algal Blooms,

Recommends that the IOC Intergovernmental Panel on Harmful Algal Blooms continue until otherwise decided by the IOC. The Terms of Reference should remain unchanged.
**Annex 1 to Recommendation IPHAB-XI.3**

IOC HAB PROGRAMME WORKPLAN for 2014–2015  
(Main activities and funding identified as of 1 May 2013 only)  
SCC HA = IOC Science and Communication Centres on Harmful Algae; HQ = IOC-UNESCO Headquarters Paris

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| IOC SCC HA & HAB Programme Office  
Incl. the activities and services in this workplan implemented by the Centre and required to justify a decentralised PO. | IOC/H.Enevoldsen | Global | Copenhag en | 2014-2015 | 0 | Denmark in kind and individual projects | 0 | IPHAB-XI |
| **PUBLICATIONS** | | | | | | | |
| Manuals & Guides: “An Inventory of Toxic and Harmful Microalgae of the World Ocean” | IOC and co-publishers | Global | HQ / SCC HA | 2014-2015 | 0 | 0 | 20 | IPHAB-XI |
| Harmful Algae News | T. Wyatt (Spain), Editor | Global | HQ / SCC HA | 2014-20513 | 0 | 5 in kind | 5 | IPHAB-XI |
| GEOHAB Synthesis Report | R. Kudela (USA) | Global | HQ with SCOR | 2014 | 0 | 5 | 5 | IPHAB-XI |
| First Global HAB Status Report Draft and Assessment of Data | To be identified | Global | HQ / SCC | 2015 | 0 | 0 | 25 | IPHAB-XI |
| **COSPONSORSHIP OF CONFERENCES** | | | | | | | |
| XVIth ICHA | ISSHA | Develop. Country. | New Zealand | 2014 | 0 | 0 | 10 | IPHAB-XI |
|-----------|--------------------------|-----------------------|--------|------|---------------------|-----------------------------|----------------------|
| TRAVEL    |                          |                       |        |      |                     |                             |                      |
| IOC Staff | H. Enevoldsen            | -                     | Yearly | 2 x 3| 2 x 5               | 2 x 5                       | IPHAB-XI              |
| Chair IPHAB Travel | R. Magnien (USA) | -                     | Yearly | 2 x 2| 0                  | 2 x 2                       | IPHAB-XI |
| SCIENTIFIC ELEMENTS | | | | | | | |
| GlobalHAB SSC | IOC and invited cosponsors | Global | - | - | 2 x 20K (incl publication) | 0 | 2 x 100 | IPHAB-XI and cosponsors |
| ICES/IOC/IMO WGBOSV | S. Bailey (Canada) | Global | Yearly | 0 | 0 | 4 | IPHAB-XI |
| International Workshop on HABs and desalination | D. Anderson | Global | Oman | 2014 | 5 | 0 | 75 | IPHAB-X and IPHAB-X |
| REGIONAL GROUPS | | | | | | | |
| Regional Working Group on Harmful Algal Blooms in South America (IOC FANSA) | L. Proenca (Brazil) | S-America | Brasil | 2014/15 | 0 | 0 | 10 | IPHAB-XI |
| Regional Working Group on Harmful Algal Blooms in the Caribbean (IOC ANCA) | To be decided | Caribbean | To be decided | 2014/15 | 0 | 0 | 10 | IOCARIBRE and IPHAB-IX |
|------------------------------------------------------------------------|------------------------------|----------------------|----------------|-------------|---------------------|-----------------------------|---------------------|
| Regional HAB Project in the Western Pacific: WESTPAC-HAB               | To be decided                | WESTPAC              | To be decided  | 2014/15     | 0                   | 0                          | 10                  | WESTPAC-10          |
| Regional Working Group on Harmful Algal Blooms in North Africa (IOC HANA) | H.Taleb (Moroco)             | North Africa         | To be decided  | 2013        | 0                   | 0                          | 10                  | IPHAB-XI            |
| **CAPACITY ENHANCEMENT**                                              |                              |                      |                |             |                     |                             |                     |
| IOC Training Course on Identification and Qualification in Harmful Marine Microalgae | IOC SCC HA CPH               | Global, Develop. Country | University of Copenhagen, Denmark | 2014 and 2015 | 0                   | Danish partners and cost recovery. Grants sought | 2 x 10 If travel grants are to be provided to trainees | IPHAB-XI       |
| IOC-University of Copenhagen-University of Rhode Island International PhD Course on Ecology of Marine Phytoplankton, | IOC SCC HA CPH               | Global               | University of Copenhagen, Denmark | spring 2014 | 0                   | 10                          | 15                  | IPHAB-XI            |
| IOC Training Course on Qualitative and Quantitative Determination of Algal Toxins | To be identified             | Global               | To be decided  | 2014/15     | 0                   | sought                     | 20                  | IPHAB-XI            |
| Regional Training Course on Taxonomy and Ecology of Harmful           | To be decided                | HANA                 | To be decided  | 2014/15     | 0                   | 0                          | 15                  | IPHAB-XI            |
|-----------|------------------------|-----------------------|--------|-------|---------------------|-----------------------------|---------------------|
| Marine Microalgae (E-learning) | | | | | | | |
| The 3rd IOC/WESTPAC-TMO training workshop on Technical protocol for screening of Cigutoxin related substances. | IOC/WESTPAC | WESTPAC | Japan | 2013/14 | 0 0 15 | IOC/WESTPAC | |
| Local training courses: | | | | | | | |
| 2. Training course for collection, quantification, identification of phytoplankton | | | | | | | |
| Regional Training Course on HAB species identification | To be decided | FANSA | To be decided | 2014/15 | 0 0 15 | IPHAB-X | |
| Regional Training Course on HAB Monitoring | To be decided | ANCA | To be decided | 2014/15 | 0 0 15 | IPHAB-X | |
| Reestablishment of the ANCA-FANSA portal Algas Nocivas | Portal Editors | ANCA/NSA | IOC Server | 2011-2012 | 0 0 5 | IPHAB-X | |
| **Grand Total funding to be identified** | | | | | | | 687 |

Requested funding (2014–2015): US$ 70,000 from IOC Regular Programme (draft 37 C/5)
Identified funding (2014–2015): US$ 30,000 from expected extra-budgetary resources
US$ ~690,000 to be identified from extra-budgetary resources for full implementation.