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**Sixteenth Session of the IOC-FAO Intergovernmental Panel**

**on Harmful Algal Blooms**

Rome, 27-29 March 2023

**INFORMATION ON HABP DEVELOPMENTS IN THE INTERSESSIONAL PERIOD**

Where reference is made to Information documents these can be found at

https://hab.ioc-unesco.org/under Documents, IPHAB-XVI

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PROGRAMME DEVELOPMENT

1. Staffing

1.1 Staffing of the Programme Office

The IOC Secretariat has one permanent staff assigned to the HAB Programme. H. Enevoldsen is located at the decentralized Programme Office at the IOC Science and Communication Centre on Harmful Algae at University of Copenhagen (UCPH), Denmark. As of November 2020, Ms. Yun Sun has been seconded (JPO programme) by China to the IOC HAB Programme for a period of two years. The secondment was subsequently extended with 1 year until October 2023. Administrative support is provided by Ms. Simonetta Secco located at IOC Headquarters, Paris. The IOC Secretariat is inviting for staff support through the Junior Professional Officer Programme (JPO), or loan of staff to the HAB programme.

1.2 HAB Science and Communication Centres

The establishment of HAB Programme activity centres was proposed at the Twenty-fifth Session of the IOC Executive Council (Paris 10-18 March 1992) and the idea was further elaborated at the First Session of IPHAB (23-25 June 1992). At the Seventeenth Session of the IOC Assembly (Paris, 25 February-11 March, 1993), Denmark and Spain offered to host and establish Science and Communication Centres on Harmful Algae. The main purpose of the Centres is to provide the framework for systematic assistance in training and capacity building to developing countries with respect to harmful algae.

The IOC Science and Communication Centre on Harmful Algae in Copenhagen, Denmark, opened in May 1995. The Centre is a decentralized programme Office for the IOC HAB Programme and as support office for GEOHAB (jointly with the SCOR secretariat) and is staffed by Mr. Henrik Enevoldsen, Head of Centre, and Associate Professor Dr. Jacob Larsen. The Centre is hosted by, and located at, the Department of Biology with Professor Ø. Moestrup and Prof. Per Juel-Hansen as the focal points at the UCPH. Activities are centred on capacity building in identification of harmful algae and associated services. The partnership in the Copenhagen Centre was expanded through a formal memorandum of understanding with the Danish Natural History Museum (SNM) in April 2013 to allow for SNM staff to assist in capacity development activities and to develop joint projects to implement IOC HAB programme. The Centre operates on funds sought through UCPH and IOC and thus combines funds from IOC budget with project funds held at UCPH.

2. Regional groups and workshops

2.1 IOC Working Group on Harmful Algal Blooms in South America (COI-FANSA)

The FANSA group met in 1994 in Montevideo (Uruguay) and subsequently in Mar del Plata, Argentina (1995), Punta Arenas, Chile (1997), Rio Grande, Brazil (2000), Montevideo, Uruguay (2001), Guayaquil, Ecuador (2003), Lima, Peru (2006) Mar del Plata, Argentina (2008), Chile (2011). FANSA has since worked by correspondence and through ad hoc meetings. FANSA will present its plan for 2024-2025.

2.2 IOC Working Group on Harmful Algal Blooms in the Caribbean (COI-ANCA)

The main objective of ANCA is to improve the understanding of harmful algal blooms (HABs) in the Caribbean region and adjacent areas and the ability of national authorities to manage the impacts. ANCA works to increase international cooperation, taking advantage of the existing knowledge in the region, to train researchers in countries where HABs knowledge is less advanced. To examine the advances of the group and to plan future activities, ANCA has organized workshops in Cuba 1998, Costa Rica 2002, Venezuela 2003, Colombia 2007, Mexico 2013, the Dominican Republic 2016, Panamá 2018.During the 2021-2023 intersessional period, the IOCARIBE-ANCA working group achieved the goals proposed in March 2021 during the VIII ANCA-virtual workshop: 1) Increased visibility among the different social stakeholders in the Caribbean region; 2) Identify and characterise the microalgae responsible for the intoxications (PSP, DSP, ASP, NSP, Ciguatera), as well as the toxins vector species in the Caribbean and adjacent areas; Strengthening of research on epiphytic toxic dinoflagellates; 3) Progress in initiatives on HAB early warning systems. Since there are not focal points in all the Caribbean countries, work continues to add more members to the current group. ANCA will present its plan for 2024-2025.

See Document IOC-FAO/IPHAB-XVI/Inf.6.

2.3 IOC/WESTPAC HAB

Harmful Algal Blooms in the Western Pacific (IOC/WESTPAC-HAB) is a regional group and a network for HAB researchers to mitigate negative impacts caused by HABs, with the following long-term objectives:

• Understanding biological and chemical nature, population dynamics and environmental effects of harmful algae and their bioactive products;

• Prevention of ill consequences caused by HABs, through providing scientific knowledge useful for establishment of reliable cost- and load-effective management systems including monitoring and research.

WESTPAC-HAB has carried out various HAB related activities contributing to member states and international communities, such as assistances in identification of causative species of newly emerged HAB events, assistances in capacity building (HAB training course), sharing regional information of targeted HAB species (workshop and publication), and sharing knowledge of regional HAB records with international communities (publications).

IOC/WESTPAC/HAB will present its plan for 2024-2025.

See Document IOC-FAO/IPHAB-XVI/Inf.7.

2.4 IOC Working Group on Harmful Algal Blooms in North Africa (HANA)

The First IOC/HANA Workshop was held in Casablanca, Morocco, 2007, the Second in Alexandria in 2010, and the third in Casablanca, Morocco, 2011. HANA has since worked by correspondence until its Fourth Meeting which was held on-line 15-16 March 2021. a meeting with Chair, Vice-Chair and countries coordinators (Egypt, Tunisia and Morocco) hosted by Faculty of Science, Alexandria University, was held virtually on 3 June 2021. During this meeting an action plan for future activities has been made in order to implement the workshop recommendations in March.

IOC/HANA will present its plan for 2024-2025. See Document IOC-FAO/IPHAB-XVI/Inf.9.

EDUCATIONAL ELEMENTS

3. INFORMATION NETWORK

3.1 HARMFUL ALGAE NEWS - an IOC newsletter on harmful algae and algal blooms

HAN is published 2-3 times a year. In the intersessional period, issues No. 67-71 of Harmful Algae News have been published and No. 72 is in press. As from issue 45 2012 HAN is an e-newsletter. An IOC list of subscribers is used for dissemination in addition to list servers of ISSHA and 'ALGAE-L@LISTSERV.HEANET.IE'. The e-distribution is estimated to reach a total of no less than 2500 recipients.

Drs. Beatriz Reguera and Eileen Bresnan act as the Eds-in-chiefs supported by a team of regional Editors; Caribbean: Ernesto Mancera; Atlantic Europe: Maud Lemoine; Mediterranean Sea: Adriana Zingone; India: K.B. Padmakumar; Western Pacific: Chu Pin Leaw; North Africa: Hamid Taleb; North America: Patricia Tester; South America: Patricio Díaz and Luiz Mafra; and South Pacific: Mireille Chinain and Lesley Rhodes. HAN is produced by the IOC Centre in Copenhagen with the assistance of Leif Bolding. HAN also serves as newsletter for the International Society for the Study of Harmful Algae (ISSHA). Subscriptions and back issues are available at <https://hab.ioc-unesco.org/>. All issues since 1992 are merged into one PDF file and converted into a searchable format on-line. To help the user get a quick glimpse of an issue and help authors cite their contributions, full Table of Content and [DOI assignment](https://oceanexpert.org/document/29829) have been done for each issue from Issue 1 to Issue 67. From Issue 68 onwards, Table of Content and DOI are shown on the front and back cover respectively.

3.2 IOC HAB Internet Sites

The main IOC HAB site at <http://hab.ioc-unesco.org> and the GlobalHAB site [www.globalhab.info](http://www.globalhab.info) are maintained by the IOC HAB Centre with technical back-up by the IOC IODE Programme Office in Oostende, Belgium. The GlobalHAB site is co-edited by the Chair of the GlobalHAB SSC. The IOC HAB includes pages for regional groups. WESTPAC/HAB has a separate website at <https://ioc-westpac.org/>. All IOC main websites were rejuvenated 2021/22.

3.3 Harmful Algal Information System (HAIS) and the Global HAB Status Report

Following the lead of the International Panel for Climate Change (IPCC) consensus reporting mechanism, and to complement the World Ocean Assessment, the need has been expressed for a Global HAB Status Report compiling an overview of Harmful Algal Bloom events and their societal impacts; providing a worldwide appraisal of the occurrence of toxin-producing microalgae; aimed towards the long term goal of assessing the status and probability of change in HAB frequencies, intensities, and range resulting from environmental changes at the local and global scale.

Previous IPHAB Sessions endorsed the development of an integrated Harmful Algal Information System (HAIS) in cooperation with the IOC International Ocean Data Information and Exchange Programme (IODE). The Harmful Algal Information System, HAIS, consist of access to information on current use of taxonomic names of harmful algae, on harmful algal events, on information on biogeography of harmful algal species, a HAB expert directory and during 2021/22 of a database on algal toxins.

The IOC Taxonomic Reference List of Toxic Microalgae provides a reference for the use of names and information on each species of toxic microalgae. It is a special section of the World Register of Marine Organisms (WoRMS).

The HAIS data portal with species occurrence and event data [too be launched shortly] builds on two data sources i) The HAEDAT is a meta database containing records of harmful algal events, and ii) The biogeography of harmful algal species, HABMAP within OBIS.

Finally the International Directory of Experts In Harmful Algae and Their Effects on Fisheries and Public Health is a specialized section of the IOC OceanExpert directory.

HAIS: [http://hais.ioc-unesco.org](https://eur02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fhais.ioc-unesco.org%2F&data=04%7C01%7Ch.enevoldsen%40bio.ku.dk%7Ce111445231244b97df3108d8d991d0ad%7Ca3927f91cda14696af898c9f1ceffa91%7C0%7C0%7C637498567611157963%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=X2%2BCJlXGPRnGoUHaDP6hNh6GRBx5P2C14aBvE9g7dhg%3D&reserved=0)

IPHAB-XI decided through Decision IPHAB-XI.2 to develop a Global HAB Status Report (GHSR). The GHSR will to a large extent build on HAIS, the HAEDAT and HABMAP (OBIS) data. This initiative is implemented with the financial support of the Government of Flanders through the IOC International Oceanographic Data Exchange Programme (IODE) and the components the joint IODE-IPHAB Harmful Algae Event Data Base (HAEDAT) and the Ocean Biogeographic Information System (OBIS), in partnership with ICES, PICES and IAEA and the International Society for the Study of Harmful Algae (ISSHA).

A network of data editors was established and a data compilation template for HAB species has been developed for data to be entered into OBIS. This format is distributed to the editors network and the global literature review on HAB species occurrences is completed for now. Three regional one workshops have been held cooperation with IAEA Regional HAB projects in the Asia Pacific region, the Caribbean and for Africa. These regional workshops have significantly increased the number of countries contributing data. A centralized training workshop for data editors was held September 2017.

IPHAB-IX requested that the regional networks and groups 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 data to HAIS HAEDAT.

ANCA has progressed through the above-mentioned data workshop jointly with IAEA on data compilation and contribution to HAEDAT and OBIS. FANSA and HANA have included it in their Terms of Reference and have to start upload reports starting from 2000. WESTPAC/HAB has not included it in its ToR. However, certain WESTPAC countries have via regional IAEA projects started sharing data in HAEDAT for 2015-2016. The PICES HAB Section is yearly submitting HAEDAT reports and has taken action to complete data submission of all PICES countries starting from 2000. ICES contribute data annually via the ICES-IOC Working Group on Harmful Algal Bloom Dynamics (WGHABD).

OBIS focuses on the global distribution of HAB species “toxic to humans and fish” as covered by the IOC-UNESCO Taxonomic Reference list of Harmful MicroAlgae, while HAEDAT has a broader scope of all HAB events that adversely impact on human society whether by high biomass (clogging of fishing nets, beach closures), aquaculture fish kills, or seafood toxin events leading to shellfish farm closures, human poisonings or even human deaths. OBIS HAB species occurrence data are never complete and new data sets are continuously added to OBIS, but extensive literature data has been added.

As of 15/3/2023 HAEDAT compromises 13012 records (by 1/3/2021 it was 9268 records), however these are unevenly distributed around the globe. South American, African records are largely missing, while the most comprehensive data sets derive from the East and West Coast of North America, Northern and Southern Europe, Mediterranean and Asia. Smaller data sets are building up in Australia/New Zealand, the Pacific and Caribbean.

All nominated country/region Task Team members, and representatives of the regional groups ANCA, FANSA, HANA, WESTPAC/HAB, PICES etc. are urged to continue to contribute to data compilation, notably for areas that are currently poorly covered.

Quality assurance of data to guarantee uniform reporting standards is an ongoing major challenge.

HAIS provides the basis for the Global HAB Status Report the first edition of which was launched June 2021, <https://hab.ioc-unesco.org/the-harmful-algal-information-system-hais/> .The GHSR consist of:

1. The HAIS Data Portal

2. A special issue of the Elsevier journal *Harmful Algae* with regional reviews and partly open access

3. A paper in *Nature Communications*

4. An IOC synthesis publication

A report of the Task Team and revised draft Terms of Reference is available as Document IOC-FAO/IPHAB-XVI/Inf.11.

3.4 IOC co-sponsorship of ISSHA International Conferences on Harmful Algae

The HAB Programme has for three decades cosponsored the ISSHA International Conferences on Harmful Algae. However, as it is no longer policy of the IOC to sponsor conferences directly financially and since ICHA18 in 2018 IOC is an institutional co-sponsor of the ISSHA ICHA. Harmful Algae News continues to have an issue dedicated to a summary of the Conference. Proceedings will be published as a publication of the International Society for the Study of Harmful algae (ISSHA).

3.5 Provision of literature

The provision of HAB related literature to scientist in developing countries has been taken care of by the IOC HAB Centre in Copenhagen and through WESTPAC/HAB. As most of the titles list below are now available on-line via the IOC web site, the Centres have experienced requests for hard copies to have ceased and the hard copies are today primarily offered to IOC HAB participants in on-line or hands-on training courses. The book grants offered include the titles listed below.

- ‘Inventory of toxic and harmful microalgae of the world Ocean / Inventaire des micro-algues toxiques et nuisibles de l'océan mondial, Nicolas Chomérat, Philipp Hess, Elisabeth Nézan and Patrick Lassus, 2016. ISSHA and IOC of UNESCO, IOC Manuals and Guides No. 69.

- IOC-IAEA Guide for Designing and Implementing a Plan to Monitor Toxin-Producing Microalgae, IOC Manuals & Guides no 59. <http://unesdoc.unesco.org/images/0021/002145/214510e.pdf>

-GEOHAB: HABs in eutrophic systems. Glibert, P. (ed.). IOC and SCOR, Paris and Baltimore, 2006

-Manual on aquatic cyanobacteria. A photo guide and a synopsis of their toxicology. Cronberg, G. & Annadotter, H.. (Eds.), ISSHA and IOC of UNESCO, Copenhagen, 2006

-GEOHAB: GEOHAB Core Research Project: HABs in Upwelling Systems. Pitcher, G. et al. (eds.). SCOR and IOC, Baltimore and Paris, 2005

-Harmful Algal Management and Mitigation. Hall, S. et al, APEC, 2004

-Manual on Harmful Marine Microalgae, Hallegreaff, G. et al. (eds.), UNESCO Publishing 2003 and 2004

-Red tides. Okaichi, T. (eds.), Ocean Sciences Research (OSR). Terra Scientific Publishing Company & Kluwer Academic Publisher. Japan, 2003

-Molluscan Shellfish Safety, Villalba A. et al(eds.), Consellería de Pesca e Asuntos Marítimos da Xunta de Galicia and IOC of UNESCO, 2003

-GEOHAB. Global Ecology and Oceanography of Harmful Algal Blooms, Implementation Plan. P. Glibert and G. Pitcher (eds.) SCOR and IOC, 2003

-Proceedings of the Ninth International Conference on Harmful Algae Blooms, G. Hallegraeff *et al.*  (eds.), UNESCO, 2002

-LIFEHAB – Life history of microalgal species causing harmful blooms. Garcés, E. et al. (Eds.), Environment and Sustainable Development Programme, European Communities, 2002.

-Floraciones Algales Nocivas en el Cono Sur Americano, E.A. Sar *et al.* (eds.), 2002.

*-*Monitoring and Management Strategies for Harmful Algal Blooms in Coastal Waters, D. M. Anderson *et a* (eds.) , APEC Report # 201-MR-01.1, APEC Programme and IOC of UNESCO, Technical Series No. 59, Paris, France ,2001

-GEOHAB. Global Ecology and Oceanography of Harmful Algal Blooms, Science Plan. P. Glibert and G. Pitcher (eds.) SCOR and IOC, 2001

-Potentially Harmful Microalgae of the Western Indian Ocean. A Guide based on a preliminary survey. IOC Manuals and Guides No. 41, IOC of UNESCO 2001.

-Technical Guide for Modern Dinoflagellate Cyst Study, Matsuoka, K., and Fukuyo, Y. WESTPAC-HAB/WESTPAC-IOC, 2000

-Algae, Graham, L.E., Wilcox, L.W. Prentice Hall, Upper Saddle River, NJ, 2000

-Toxic Cyanobacteria in Water, Chorus, I., and Bartram, J., WHO, 1999

-Los dinoflagelados del Atlántico Sudoccidental. Balech, E., Ministerio de Agricultura Pesca y Alimentación, Madrid, 1998

-Proceedings of the Seventh International Conference on Toxic Phytoplankton, Yasumoto, T. et al. (eds.), IOC of UNESCO, 1996

-Proceedings of the Eighth International Conference on Harmful Algae, Reguera, B. et al. (eds.), Xunta de Galicia and IOC of UNESCO, 1998

-Biology, Epidemiology and Management of *Pyrodinium* Red Tides. Hallegraeff, G. M. et al. (eds.),. ICLARM Conf. Proc. 21,1989

-The Genus *Alexandrium* Halim, E. Balech, Sherkin Island Marine Station, Cork, Ireland, 1995

- Identifying Marine Phytoplankton, C. Tomas et al. (eds.), Academic Press, USA, 1997

-The Biology of Dinoflagellates, F.J.R. Taylor (ed.), Blackwell Scientific Publications, Oxford, 1987

-Physiological Ecology of Harmful Algal Blooms, D. Anderson et al. (eds.), NATO ASI Series, Springer-Verlag, Bermuda,1998

-Algal Toxins in Seafood and Drinking Water, I.Falconer (ed.), Academic Press, London,1993

-Phytoplankton Pigments in Oceanography, S.W. Jeffrey et al. (eds.), UNESCO Publishing, Paris, 1997

-Proceedings of the First International Congress on Toxic Cyanobacteria, Ø. Moestrup et al. (eds.), 1996

3.6 Manuals and Guides

Two new manuals and guides were published 2021-2023:

GlobalHAB. 2021. Guidelines for the Study of Climate Change Effects on HABs.Paris, UNESCO-IOC/SCOR. M. Wells et al. (eds.) (IOC Manuals and Guides no 88). Editorial Board: Wells, M.L., Burford, M., Kremp, A., Montresor, M. and Pitcher, G.C.

and

IOCCG (2021). Observation of Harmful Algal Blooms with Ocean Colour Radiometry. Bernard, S., Kudela,R., Robertson Lain, L. and Pitcher, G.C. (eds.), IOCCG Report Series, No. 20, International Ocean Colour Coordinating Group, Dartmouth, Canada.

4. TRAINING

4.1 HAB Training and Capacity Building Programme

The HAB Training and Capacity Enhancement Programme was originally adopted by IPHAB-VI as composed of 4 main modules on species identification, toxin chemistry and toxicology, design of monitoring, and management. A total of approx. 1850 people were trained, 40 through individual training stays at the IOC-Sciences and Communication Centres and the remainder participating in the +140 courses organized around the world. The gender ratio of all the trainees is in the range 40% males and 60% females.

The International Phytoplankton Intercomparison (IPI), the Marine Phytoplankton Enumeration and Identification Quality Assurance, has operated in its present form and setup since 2016 as a collaboration between the Marine Institute Ireland and the IOC through its Science and Communication Centre on Harmful Algae at the University of Copenhagen, Denmark. IPI is an international partnership to provide enumeration and identification quality assurance in marine phytoplankton.

The IPI has a board consisting of representatives of the partners. These members can invite additional partners to be represented on the board. For the period 2021-2024 the IPI will move to be hosted by the University of Las Palmas Gran Canaria.

At present, the main parameters measured under the IPI exercise are the composition and abundance of marine phytoplankton in preserved marine water samples through the analysis of prepared materials preserved in lugol’s iodine. The IPI scheme consist of three main areas. The analysis of samples by laboratories and statistical analysis of their results. A phytoplankton taxonomy exam created in the OceanTeacher website, run by OTGA (Ocean Teache Global Academy) and a 3 day Phytoplankton workshop in Denmark run by Jacob Larsen and Rafael Salas and with the collaboration of the University of Copenhagen.

We are studying the possibility of including Biovolume measurements to the IPI scheme as we already measure abundance and composition of Phytoplankton and also because it is a better indicator of Phytoplankton primary productivity (excluding pico- and nano- measurements) and a better measurement than cell density as a proxy for carbon content in the Oceans. The addition of this measurement would be in accordance with the objectives of the MSFD (Marine Strategy Framework Directive) and Water Framework Directive (WFD) rules. The water quality EN documents EN14996, Water quality - Guidance on assuring the quality of biological and ecological assessments in the aquatic environment and EN 15204, Water quality - Guidance standard for the routine analysis of phytoplankton abundance and composition using inverted microscopy (Utermöhl technique) do not include how to estimate biovolume in water. That’s why the CEN/TC 230 (WP7) draft guidance document was developed in 2014; a European standard on the estimation of algal biovolume as a development and improvement of standards in support of the WFD.

It describes a general procedure for the determination or estimation of biovolume of marine and freshwater phytoplankton taxa using the inverted microscopy (Utermöhl technique). The determination of phytoplankton abundance and composition according to EN 15204 is a precondition for the calculation of the biovolume of a phytoplankton samples.

**Courses and training implemented 2021-2023 by IOC or by IOC for or with partners:**

4.1.1 IOC Training Course and Identification Qualification in Harmful Marine Microalgae, IOC Science and Communication Centre on Harmful Algae Copenhagen, University of Copenhagen, Denmark, E-learning Sept-Nov 2021, followed by practical course October 2022.

4.1.2 HAB Course for Namibian and South African participants, distance learning 2 July – 8 August, 14 participants.

4.1.3 HAB Course at the National Marine Information and Research Centre (NatMIRC), Swakopmund, Namibia, 15-23 August 2022, 14 participants, in conjunction with the distance-learning course 4.2.2. Organized by the Trade Forward Southern Africa Programme financed by the UK Government.

4.1.4 International Phytoplankton Intercalibration (IPI): University of Las Palmas Gran Canaria – IOC; sample analyses, taxonomic quiz on OceanTeacher, 31 July – 30 Sept 2021, intercalibration report and workshop, January 2022 (the 2020 Workshop postponed due to Covid.19).

4.1.5 The Ciguawatch Initiative. Distance learning. Pacific Island States, July 2022 – April 2023, 32 participants from Fiji, Samoa and Tonga. This training consists of 4 modules focusing on identification of benthic dinoflagellates, each module included a 2-3 hours on-line session. The course was supported financially by FAO and organized in collaboration with Institute Louis Malardé in Tahiti.

4.1.6 IOC Science and Communication Centre on Harmful Algae, 16-27 October, 14 participants from Europe and Australia. The course was a follow-up practical course for participants in the on-courses in 2020-21 organized during the pandemic. This course finished with a 3-hour exam in practical species identification qualifying for the IOC Certificate of Proficiency in Identification of Harmful Algae.

4.1.7 HAB Course at the National Marine Information and Research Centre (NatMIRC), Swakopmund, Namibia, 30 January – 10 February 2023, 14 participants from NatMIRC and University of Namibia, financed by the Ministry of Fisheries and Marine Resources, Namibia.

4.2 Planned courses

4.2.1 IOC Training Course and Identification Qualification in Harmful Marine Microalgae, IOC Science and Communication Centre on Harmful Algae Copenhagen, University of Copenhagen, Denmark, E-learning Sept-Nov 2023, followed by practical course.

4.2.2 IOC Training Course and Identification Qualification in Harmful Marine Microalgae, IOC Science and Communication Centre on Harmful Algae Copenhagen, University of Copenhagen, Denmark, E-learning Sept-Nov 2024, followed by practical course.

4.2.3 International Phytoplankton Intercalibration (IPI): University of Las Palmas Gran Canaria – IOC; sample analyses, taxonomic quiz on OceanTeacher, intercalibration report and workshop, from January to December 2023.

4.2.4 International Phytoplankton Intercalibration (IPI): University of Las Palmas Gran Canaria – IOC; sample analyses, taxonomic quiz on OceanTeacher, intercalibration report and workshop, from January to December 2024.

4.2.5 Advanced Phytoplankton Course 13, Stazione Zoologica Anton Dohrn, Italy, 2024, t.b.c..

SCIENTIFIC ELEMENTS

5. ECOLOGY AND OCEANOGRAPHY

5.1 ICES-IOC Working Group on the Dynamics of Harmful Algal Blooms- WGHABD

The WGHABD (Chair: Dave Clarke, Ireland) met 14-17 June 2022 at CEFAS, Weymouth, UK. ICES WG’s no longer produce reports annually and the latest report is available as Document IOC-FAO/IPHAB-XVI/Inf.4. WGHABD will meet 20-23 March 2023 in Naples, Italy.

The main joint activities are HAEDAT and review of scientific issue relevant to GlobalHAB. IPHAB can formulate tasks / terms of reference for WGHABD.

5.2 IOC-SCOR International Science Programme - GlobalHAB

In response to Decision IPHAB-XII.1. "HABs in a Changing World: A Global Approach to HAB Research to Meet Societal Needs, GlobalHAB", the new programme GlobalHAB was launched in January 2016. The *GlobalHAB* *Science and Implementation Plan* was developed by the GlobalHAB Scientific Steering Committee (SSC) incorporating the suggestions of the international community at the 17th International Conference on Harmful Algae (ICHA) and the evaluation of 11 external reviewers. The Plan is available at the GlobalHAB webpage (www.globalhab.info). The GlobalHAB SSC held monthly virtual meetings and a face to face in the intersessional period. The face to face meeting was held 14-15 May, 2022, in the city of Glasgow,UK where the SSC celebrated its first in person meeting after the Covid19 pandemics. The meeting was held immediately after the Workshop on Modelling and Prediction [Workshop](http://www.globalhab.info/activity/142-modelling-and-prediction-of-harmful-algal-blooms) held at the University of Strathclyde on May 9-13, 2022, co-sponsored by IOC-SCOR [GlobalHAB](http://globalhab.info/), [EuroMarine](http://euromarinenetwork.eu/) European Research Network, NOAA's [National Centers for Coastal Ocean Science (NCCOS)](https://coastalscience.noaa.gov/) and the U.S. [Integrated Ocean Observing System (IOOS)](http://ioos.noaa.gov/). A detailed report on activities and outcome 2021-2023 and activities planned for 2024-2025, is available in document IOC-FAO/IPHAB-XVI/Inf.17.

5.3 ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors

IPHAB-III adopted Recommendation IPHAB-III.3 on a Working Group on Transfer of Phytoplankton by Ballast of Ships. In response to this recommendation a Joint ICES-IOC-IMO Study Group on Ballast Water and Sediments was established. The ICES/IOC/IMO Study Group on Ballast Water and Sediments [SGBWS] was later renamed the "ICES/IOC/IMO Study Group on Ballast and Other Ship Vectors [SGBOSV] and is now the ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors (WGBOSV).

WGBOSV met remotely in 2021 with Lisa Drake Rutherford as Chair; and remotely in 2022 with Okko Outinen (Finland) as Chair. A face-to-face meeting with Okko Outinen was held in Athens, Greece 8 - 10 March, 202, with an overlapping session with ICES WGITMO.

WGBOSV reports are available at <http://www.ices.dk/community/groups/Pages/WGBOSV.aspx> and as Document IOC-FAO/IPHAB-XVI/Inf.5.

5.4 Ciguatera, A Plan for Improved Research and Management

At IPHAB-XI it was recommended to develop a strategy for better understanding of and management of Ciguatera and to seek multi-UN agency involvement. Decision IPHAB-XIV.4. decided the continuation of an IPHAB Task Team on Task Team on a Global Inter-Agency Ciguatera Strategy for Improved Research and Management. The Task Team report is available as Document IOC-FAO/IPHAB-XVI/Inf.12.

6. TAXONOMY AND GENETICS

6.1 IPHAB Task Team on Algal Taxonomy

The Task Team was established through Resolution IPHAB-II.1. The Terms of Reference were updated by IPHAB-III to XIV. Chair is Nina Lundholm (Denmark). The core activity of the Task Team is the continued development and maintenance of the IOC Taxonomic Reference List, which is part of the World Register of Marine Species (WORMS) at <http://www.marinespecies.org/hab/index.php>. The Task Team met face-to-face for a workshop on 18-19 November 2021 in Copenhagen, Denmark to discuss the future of the list; discuss how to improve the list (addition of new types of entries, links, etc); practical arrangements working on the list and bringing it up-to-date, as well as to elect a new chairman.

The work on the Reference List has continued, name changes have been inserted where necessary, additional species have been added, illustrations have been added. The procedure for name changes is presently, that name changes are first sent to and agreed with the editor of AlgaeBase. Once agreement has been reached and the changes have been made in AlgaeBase, the same changes are made in the Reference List.

The Task Team report is available as Document IOC-FAO/IPHAB-XVI/Inf.15.

7. TOXICOLOGY AND TOXIN CHEMISTRY

7.1 IPHAB Task Team on Biotoxin Monitoring, Management and Regulations

The Terms of reference for the Task Team are given in Decision IPHAB-XIV.6. Chair is Dr. P. Hess (France). The Progress Report is submitted to IPHAB-XVI. Document IOC-FAO/IPHAB-XVI/Inf.14.

OPERATIONAL ELEMENTS

8. MONITORING & MANAGEMENT

8.1 IPHAB Task Team on Harmful Algae and Desalination of Seawater

At IPHAB-XIV, the decision was made (through Decision IPHAB-XIV.5) to continue the Task Team on HABs and Desalination of Seawater, chaired by Dr Donald M. Anderson. The Terms of Reference for the Task Team were to:

1. Assess and explore the feasibility of a joint FAO-IOC food safety risk assessment (or what available data allow) for toxins in drinking water coming from desalination plants;

2. In coordination with the IPHAB Task Team on Early Warning Systems for HABs, explore opportunities to work with the desalination industry and its academic partners to communicate and implement capabilities for HAB early warning systems through scientific presentations, workshops or other activities;

3. In 6 months develop a succinct list of challenges, objectives and actions with respect to the Task Team topic that will address the UN Decade of Ocean Science for Sustainable Development objectives and challenges and to present these at an IPHAB intersessional on-line consultation September 2021 with a view to formulate an IPHAB strategic framework for UN Decade initiatives;

The Task Team report is available as Document IOC-FAO/IPHAB-XVI/Inf.13.

8.2 IPHAB Task Team on Fish Killing Microalgae and Ecosystem Effects

The initial Terms of Reference for the Task Team are given in Decision IPHAB-XIV.8. Chair is Allan Cembella (Germany). At IPHAB-XV, Decision IPHAB-XV.5 endorsed the continuation of the Task Team on Harmful Algae and Fish Kills with modified mandate and terms of reference as the Task Team on Fish Killing Microalgae and Ecosystem Effects (FKMEE), co-chaired by Prof Dr Allan Cembella (Germany) and Dr Kazumi Wakita (IOC/WESTPAC-HAB), with members L. Guzmán (Chile), P. Hess (France), B. Karlson (Sweden), P.T. Lim (Malaysia, GlobalHAB-SSC), C. McKenzie (Canada), L.-J. Naustvoll (Norway), M. Wells (PICES), and A. Yñiguez (Philippines). The Task Team has been supplemented by international advisors and experts E. García-Mendoza (Mexico), G. Hallegraeff (Australia), H. Hégaret (France), M. Iwataki (Japan) and J. Mardones (Chile).

The issue is of global concern, which is reflected in the agendas of several strong international research groups. For example, an ICES working group efforts to quantify the cases of fish-killing algae in the North Atlantic area and to document deficiencies in the understanding of the processes controlling the occurrence of fish-killing and the factors that cause fish mortality. This study concludes that the presence of fish-killing algae, through the production of toxins, is a serious problem regionally and globally and that therefore there is need for a detailed assessment of the extent of the problem and the main gaps in our knowledge.

The Task Team report is available as Document IOC-FAO/IPHAB-XVI/Inf.16.

APPENDICE I.

**RESOURCES DIRECTLY AVAILABLE TO THE IOC FOR DEVELOPMENT AND IMPLEMENTATIONOF THE IOC HARMFUL ALGAL BLOOM PROGRAMME**

This is not an actual account (for this see documentation available for the IOC Assembly June 2023).

**2022-2023**

|  |  |
| --- | --- |
| IOC-UNESCO REGULAR PROGRAMMEIOC HAB Programme Regular Budget 2022-2023 1 IOC Staff + support staff | US Dollars57.700 |
| EXTRA-BUDGETARY CONTRIBUTIONS TO THE IOC:Norway (NORADs) (for HAB EWS Namibia and Morocco) 2021-22P.R. China , Junior Professional Officer | 88.000103.746 |
| SPONSORSHIP OF ACTIVITIES AND FUNDS ADMINISTERED AT THE SCIENCE AND COMMUNICATION CENTRES:Denmark:-University of Copenhagen: IOC Science and Communication Centre on Harmful Algae, Copenhagen, staff, operation and activities, 2022-2023. | 218.000 |

**GlobalHAB Funds 2018-2022**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Income (in USD) | 2018 | 2019 | 2020 | 2021 | 2022 |  2023 |
| SCOR/NSF Carry-over from previous year | 85.938 | 61.329 | 33.000\* | 33.000 | 51.454\*\* | 4.810\*\*\* |
| SCOR new funds from NSF | 13.333 | 0 | 0 | 0 | 0 | 0 |
| SCOR total | 99.271 | 61.329 | 33.000 | 33.000 | 51.454 | 4.810 |
| NOAA’s NCCOS CRP via the US National HAB Office to the University of Copenhagen | - | - | - | 50.000 | 50.000 | 3.297\*\*\*\* |
| IOC Regular Programme | 10.000 | 10.000 | 5.000 | 10.000 | 0,00 | To be decided |
| Grand Total | 109.271 | 71.329 | 38.000 | 93.000 | 101.454 | 8.108 |

|  |
| --- |
| \* No expenditure due to COVID-19 |
| \*\* Balance on Nov 13, 2022 |
| \*\*\* Balance on March 2023, after covering activities in 2022 (Modelling Workshop, Observation Mini-Symposium, SSC meeting) and 2023 (PICES/Control Workshop) |
| \*\*\*\* Balance on March 18, 2023 after covering activities in 2022 (Modelling Workshop, Observation Mini-Symposium, SSC meeting) and allocated for 2023 (Sargassum consultancy, qPCR Workshop, SSPM Climate Change) |
| Balance on March 18, 2023 (USD 8.109) could be used for the meeting of the new SSC. |

APPENDICE II.

**IMPLEMENTATION OF IPHAB-XV RESOLUTIONS AND RECOMMENDATIONS**

|  |  |  |
| --- | --- | --- |
| Code | Title | Implementation |
| Decision IPHAB-XV.1 | Regional HAB Programme Development  | Partly implemented as only some regional groups met 2022-23 and progressed on HAEDAT. See Document IOC/IPHAB-XVI/Inf.2 |
| Decision IPHAB- XV.2 | Task Team on the Early Detection, Warning and Forecasting of Harmful Algal Events | Implemented / under implementation, see Document IOC/IPHAB-XVI/Inf.2 |
| Decision IPHAB- XV.3 | Task Team on the development of the Harmful Algal Information System (HAIS) and the Global HAB Status Report (GHSR). | Implemented see Document IOC-FAO/IPHAB-XVI/Inf.2 |
| Decision IPHAB- XV.4 | Task Team on a Global Inter-Agency Ciguatera Strategy for Improved Research and Management  | Implemented / under implementation see Document IOC-FAO/IPHAB-XVI/Inf.14 |
| Decision IPHAB- XV.5 | Task Team on Harmful Algae and Desalination of Seawater | Not implemented, see Document IOC-FAO/IPHAB-XV/Inf.2 |
| Decision IPHAB- XV.6 | Task Team on Biotoxin Monitoring, Management and Regulations | Partly implemented. See Document IOC-FAO/IPHAB-XV/Inf.?? |
| Decision IPHAB- XV.7 | Task Team on Algal Taxonomy | Partly implemented, See Document IOC-FAO/IPHAB-XV/Inf.?? |
| Decision IPHAB- XV.8 | Task Team on Fish Killing Microalgae and Ecosystem Effects | Not implemented, see Document IOC-FAO/IPHAB-XV/Inf.2 |
| Recommendation IPHAB- XV.1 | HABP Workplan 2022-2023 | Implemented within the available resources |
| Recommandation IPHAB- XV.2HABP Publications | Operation of the IOC Intergovernmental Panel on Harmful Algal Blooms | Implemented |