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Paris, 25 March 2023

English only

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

**on Harmful Algal Blooms**

Rome, 27-29 March 2023

Item 4.7.2 of the Provisional Agenda

**REPORT OF THE IPHAB TASK TEAM ON THE HARMFUL ALGAL INFORMATION SYSTEM (HAIS) AND THE GLOBAL HAB STATUS REPORT (GHSR)**

**The report is structured according to the decision IPHAB-XIV.3 taken in 2021, reproduced below:**

**Decides** to continue the series of Task Teams on HAIS and GHSR as an editorial advisory group for HAIS/GHSR with the following terms of reference:

1. Advise the IOC secretariat/IODE Project Office and HAIS partners on requirements for HAIS adjustments, quality control and web site edits;

During the process of generating the first GHSR (see following section) the requirement for multiple technical improvements in HAEDAT has been identified to facilitate proper data entry, extraction and quality control as well as improving recording criteria for HAB events. There is currently no funded technical support to implement any improvements to HAEDAT.

1. Advise and encourage regional groups and editors on data compilation and submission of HAB data to OBIS/HABMAP and HAEDAT;

There have been various initiatives to encourage data submission to HAEDAT during this session. IOC ANCA- IOCARIBE and HANA organized training courses for countries within their regions about data entry into HAIS. Data entry has also been discussed in other regional groups. Data entry has not been regionally consistent. This ToR will be carried over into the next session.

1. Review a user guide (drafted by the IOC secretariat) for data submission to HAEDAT;

A [HAEDAT USER GUIDE](https://oceanexpert.org/document/29378) was produced in Nov 2021 and reviewed by the Task Team.

1. Advise on and stimulate the use of HAIS data and data products and act proactively if GHSR/HAIS conclusions or data are misinterpreted or incorrectly referred to;

The Task Team have supported the IOC response to queries about the use of HAIS products. HAIS outputs have increased in visibility during the last session. There has been ~ 100% increase in the number of records of HAEDAT recorded in Google Scholar since 2020 when there were 15 records; in 2021 – 55, in 2022 – 45, in 2023 – 14 to date. HAEDAT has been referenced in publications focusing on desalination, early warning systems, remote sensing, coastal bloom increase, regional studies and a variety of book chapters. The HAIS dataset has also been used in multiple projects and government investigations during the session.

1. Advise and assist in the development of a webinar on the GHSR and HAIS;

The Task Team assisted with the IOC webinar on the GHSR and HAIS that was held on 15th June 2021. GHSR authors recorded [video summaries](https://hab.ioc-unesco.org/the-harmful-algal-information-system-hais/) which are available on you tube.

1. Compile and assess feedback on the first edition of the GHSR and its components with a view to ultimately advise on a second edition of the GHSR;

Feedback to the first edition of the GHSR was positive. There was media interest and it was reported in > 28 news outlets around the world. GHSR authors were invited to give radio/podcast interviews in forums with a variety of interests ranging from dedicated science to gardening. The GHSR synthesis article ([Hallegraeff et al., 2021](https://www.nature.com/articles/s43247-021-00178-8.pdf?origin=ppub)) has been accessed 17K times and cited >100 times since publication. The Harmful Algae special issue articles have been cited >600 times since publication.

The dedicated time and effort required to produce the report was also flagged as being a significant consideration when developing the second GHSR report. The ideal would be to have a dedicated funded officer who would be able to coordinate the generation of the next GHSR.

A number of significant technical issues with HAEDAT associated with data entry, extraction and quality control have been identified as needing improvement. The criteria for refinement of selected HAB events e.g. high biomass blooms also needs updating if HAB drivers such as eutrophication are to be included in the next GHSR. These have been identified as challenges for the next GHSR.

1. Engage with working groups, groups of experts within and outside IOC (including IOC IGMETS, IOC Trends-PO, ICES WGPME, the marine sites of the International network on Long Term Ecological Research (I-LTER), EMODNET-Biology, and ICES-IOC WGHABD), and individual scientists to identify time series of phytoplankton data including information on HAB species;

Members from these groups participate in Task Team HAIS &GHSR meetings.

1. Investigate with GlobalHAB possibilities of organizing initiatives (such as workshops, interactive data analysis, courses) on HAB time series analysis in the context of environmental variability;

The possibility of GlobalHAB organizing relevant workshops was discussed with the GlobalHAB chair. Such activities were suspended during covid and only restarted in 2022. This will be continue into the next session.

1. 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,

This Task Team represents a significant data source and thus has the potential to contribute to multiple challenges and actions across the UN Decade including those associated with food security, human health, climate change, eutrophication, ocean literacy and data accessibility.

**The significant issue facing this Task Team is the lack of resource**. HAIS, particularly HAEDAT needs financial support in order to remain a viable data source that can contribute to the objectives and challenges of the UN Decade. Without dedicated support, HAIS and particularly HAEDAT will struggle to remain a usable resource by the end of the UN Decade.

**PROGRESS DURING THE LAST SESSION**

**The First IOC Global HAB Status Report**

The First IOC Global HAB Status Report was launched on 8th June 2021. Datasets from the IOC-PICES-ICES [Harmful Algal Event Database](http://haedat.iode.org/index.php) (HAEDAT) and the biogeography of harmful species HABMAP within the IOC/IODE's [Ocean Biodiversity Information System](https://obis.org/) (OBIS) were primary data sources for the report. The GHSR comprised of a [special issue](https://www.sciencedirect.com/journal/harmful-algae/vol/102/suppl/C) of the journal Harmful Algae containing 12 regional articles describing HAB events and changes over time, [a synthesis article](https://www.nature.com/articles/s43247-021-00178-8.pdf?origin=ppub) investigating the perception of global increases in HAB events, a [summary](https://unesdoc.unesco.org/ark%3A/48223/pf0000378691) for policy makers, the [Harmful Algal Information System](https://data.hais.ioc-unesco.org/) data portal and a [press release](https://www.eurekalert.org/news-releases/498988). Publication details are at the end of this document. The release of the GHSR was reported in > 28 news outlets around the world and GHSR authors invited to give radio/podcast interviews. A webinar organized by the IOC was held to launch the GHSR on 15th June 2021. [Regional video summaries](https://hab.ioc-unesco.org/the-harmful-algal-information-system-hais/) from the GHSR are available to watch on You Tube.

The synthesis article (Hallegraeff et al, 2021) has been accessed 17K times since publication with 115 citations. Articles in the Harmful Algae special issue have been cited > 600 times. Google Scholar shows an increase in the references to HAEDAT outputs since the GHSR was launched (Figure 1). HAEDAT has been used in publications associated with desalination, early warning systems, remote sensing, coastal bloom increase, regional studies and a variety of book chapters. The dataset has also been used in various projects and government investigations.



**Figure 1: Increase in HAEDAT references in Google Scholar since 2000**

**The Second Global HAB Status Report**

 The TT has started initial discussions about the second GHSR which as well as reporting status and changes, is felt should also address HABs in relation to topics relevant to the UN Decade such as eutrophication (via SDG 14.1) or climate change. The available datasets to support this will be investigated in the next session.

The large amount of effort particularly for main authors (Hallegraeff, Zingone, Enevoldsen) of the first GHSR was acknowledged. The ideal for the second GHSR would be to have a dedicated officer to coordinate production.

**HAIS [HAEDAT/OBIS]**

The process of producing the first GHSR has revealed a number technical issues, particularly with the HAEDAT database. While the data and extraction in HAEDAT works well for shellfish toxins, particularly associated with closures of shellfish harvesting areas, other HAB event types are not captured appropriately and need to be further refinement. When recording Ciguatera events there is no capacity to record number of humans impacted and it is not easy to differentiate toxin detection in fish from human illness or management measures. With Cyanobacteria events the criteria to assign events differs between countries, it is not possible to distinguish between cyanotoxins or high biomass impact, in some countries freshwater events have been entered. High biomass blooms which is an important category when examining eutrophication impacts are poorly recorded as the only option is to record them as a high phytoplankton count. When these data are extracted you need to distinguish between a shellfish toxin species trigger level and high biomass event which requires a degree of expertise. It is not always clear if there is an impact associated with a high cell count record. In a the future HAEDAT will need to be standardized in relation to initiatives underway in the Task Teams on Taxonomy and Biotoxins. HAEDAT was supported by Gov of Flanders and this funding has stopped. Funding is required to address issues/modernise HAEDAT/HAIS before the production of the next GHSR.

**GHSR publications**

Synthesis paper

Hallegraeff, G.M., Anderson, D.M., Belin, C., Bottein, M.Y.D., Bresnan, E., Chinain, M., Enevoldsen, H., Iwataki, M., Karlson, B., McKenzie, C.H. and Sunesen, I., 2021. Perceived global increase in algal blooms is attributable to intensified monitoring and emerging bloom impacts. *Communications Earth & Environment*, *2*(1), p.117.

**Harmful Algae Special Issue**

Anderson, D.M., Fensin, E., Gobler, C.J., Hoeglund, A.E., Hubbard, K.A., Kulis, D.M., Landsberg, J.H., Lefebvre, K.A., Provoost, P., Richlen, M.L. and Smith, J.L., 2021. Marine harmful algal blooms (HABs) in the United States: History, current status and future trends. *Harmful Algae*, *102*, p.101975.

Belin, C., Soudant, D. and Amzil, Z., 2021. Three decades of data on phytoplankton and phycotoxins on the French coast: Lessons from REPHY and REPHYTOX. *Harmful Algae*, *102*, p.101733.

Bresnan, E., Arévalo, F., Belin, C., Branco, M.A., Cembella, A.D., Clarke, D., Correa, J., Davidson, K., Dhanji-Rapkova, M., Lozano, R.F. and Fernández-Tejedor, M., 2021. Diversity and regional distribution of harmful algal events along the Atlantic margin of Europe. *Harmful Algae*, *102*, p.101976.

Chinain M, Gatti CM, Darius HT, Quod JP, Tester PA. Ciguatera poisonings: A global review of occurrences and trends. Harmful Algae. 2021 Feb 1;102:101873.

Hallegraeff, G.M., Schweibold, L., Jaffrezic, E., Rhodes, L., MacKenzie, L., Hay, B. and Farrell, H., 2021. Overview of Australian and New Zealand harmful algal species occurrences and their societal impacts in the period 1985 to 2018, including a compilation of historic records. *Harmful Algae*, *102*, p.101848.

Karlson, B., Andersen, P., Arneborg, L., Cembella, A., Eikrem, W., John, U., West, J.J., Klemm, K., Kobos, J., Lehtinen, S. and Lundholm, N., 2021. Harmful algal blooms and their effects in coastal seas of Northern Europe. *Harmful Algae*, *102*, p.101989.

McKenzie, C.H., Bates, S.S., Martin, J.L., Haigh, N., Howland, K.L., Lewis, N.I., Locke, A., Peña, A., Poulin, M., Rochon, A. and Rourke, W.A., 2021. Three decades of Canadian marine harmful algal events: Phytoplankton and phycotoxins of concern to human and ecosystem health. *Harmful Algae*, *102*, p.101852.

Pitcher, G.C. and Louw, D.C., 2021. Harmful algal blooms of the Benguela eastern boundary upwelling system. *Harmful Algae*, *102*, p.101898.

Sakamoto, S., Lim, W.A., Lu, D., Dai, X., Orlova, T. and Iwataki, M., 2021. Harmful algal blooms and associated fisheries damage in East Asia: Current status and trends in China, Japan, Korea and Russia. *Harmful Algae*, *102*, p.101787.

Sunesen, I., Méndez, S.M., Mancera-Pineda, J.E., Bottein, M.Y.D. and Enevoldsen, H., 2021. The Latin America and Caribbean HAB status report based on OBIS and HAEDAT maps and databases. *Harmful Algae*, *102*, p.101920.

Yñiguez, A.T., Lim, P.T., Leaw, C.P., Jipanin, S.J., Iwataki, M., Benico, G. and Azanza, R.V., 2021. Over 30 years of HABs in the Philippines and Malaysia: What have we learned?. *Harmful Algae*, *102*, p.101776.

Zingone, A., Escalera, L., Aligizaki, K., Fernández-Tejedor, M., Ismael, A., Montresor, M., Mozetič, P., Taş, S. and Totti, C., 2021. Toxic marine microalgae and noxious blooms in the Mediterranean Sea: A contribution to the Global HAB Status Report. *Harmful Algae*, *102*, p.101843.