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

**on Harmful Algal Blooms**

Rome, 27-29 March 2023

Item 4.7.4 of the Provisional Agenda

**REPORT OF THE IPHAB TASK TEAM ON HARMFUL ALGAE AND DESALINATION OF SEAWATER**

At IPHAB-XV, the decision was made (through Decision Decision IPHAB- XV.5) to continue the Task Team on HABs and Desalination of Seawater, chaired by Dr Donald M. Anderson.

The manual “Harmful Algal Blooms (HABs) and Desalination: A Guide to Impacts, Monitoring, and Management” was published in 2017 to help the desalination industry tackle an issue that represents a potential threat both to human health and to the distribution of desalinated water on which an increasing number of arid countries rely for their fresh water needs. The IPHAB Task Team has continued to promote dissemination of *Manual* throughout the world.  This includes hard copies and downloaded PDF versions.  Several articles in newsletters have been published on the Manual, and more are anticipated.

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;

During the intersession, no progress was made on TOR # 1 – initiating a joint FAO-IOC food safety risk assessment. This is in part because a chapter in the manual described above covers this topic in detail, and in part because there has not been a request from the desalination industry for something newer and more official. The relevant chapter is: Soltani, A., Hess, P., Dixon, M.B., Boerlage, S., Anderson, D.M., Newcombe, G., House, J., Ho, L., Baker, P., and Burch, M. World Health Organization (WHO) and international guidelines for toxin control, harmful algal bloom (HAB) management, and response planning. In: *Harmful algal blooms (HABs) and desalination: A guide to impacts, monitoring and management.* Anderson, D.M., Boerlage, S F. E., and M. Dixon (Eds.)*.*Paris, Intergovernmental Oceanographic Commission of UNESCO 2017. (IOC Manuals and Guides No.78. Discussions on this TOR are continuing within the Task Team, which will also seek input from the Panel during IPHAB XVI.

For TOR # 2, the Task Team is in contact with the EWS task team, but no specific actions can be reported at this time. It is possible that the EWS pilot projects can include some activities connected with desalination plants in the selected countries.

For TOR # 3, the Task Team Chair worked with Team members in the formulation of a document listing challenges, a future vision, and specific actions related to HABs and desalination. These were communicated at a meeting of all IPHAB Task Team chairs in Helsingor Denmark in April 2022, where they were incorporated into a common document that would form the basis for a submission to the UN Decade of Ocean Science for Sustainable Development. The Desalination Task Team contribution is appended below.

The future of the Desalination Task Team should be discussed at IPHAB XVI. Many IOC member states have an interest in the topic given increasing water scarcity globally, but new activities need to be formulated to justify the continuation of the Task Team going forward.

**UN Decade contribution from the Task Team on Harmful Algae and Desalination of Seawater**

**Challenges**

* Access to safe drinking water is a major concern as the world’s population increases, and climate change is expected to increase the frequency, duration, and severity of droughts. It is estimated that 40% of the global population faces severe water scarcity today, and this figure could reach 60% by 2025.
* Desalination processes have been used for decades to provide drinking water in arid regions, and in many areas, they form the primary, if not the sole source of drinking water. Desalination is now also expanding to semi-arid regions as a solution during increasingly more frequent drought episodes. Desalination is also critical in small island States facing shortages of fresh water.
* There are now more than 16 000 desalination plants, and since 2018, more than 400 new desalination projects have been contracted worldwide. Ensuring the safety and operation of desalinated drinking water is therefore critical.
* Many desalination plants are in areas where HABs are episodic phenomena. Indeed, in recent years, HABs have caused sustained and significant impacts at desalination plants [e.g. the cessation of operations due to clogging of filters, fouling of surfaces and membranes, taste and odor problems] and there is also concern that HAB-derived toxins could be present in the freshwater produced.
* The problems caused by HABs at desalination plants are expected to increase in the future as desalination capacity continues to grow worldwide, as will the extent and diversity of HAB problems due to global warming, coastal development, eutrophication, and other forcings.
* Desalination plant discharges can lead to ecosystem disruption, and potentially to more HABs.
* At present, many desalination operators and managers are not well informed about the nature of HABs and the technologies that are available to detect, characterize, and manage them. There is a need to assemble information on gaps in scientific understanding and engineering challenges and to provide guidance on methodologies to reduce risks.
* Establishing guidelines for desalination remain challenging given the absence of toxin data from desalinated drinking water, and the limited numbers of studies exploring toxin removal by desalination processes
* Most risk assessments for HAB toxins focus on acute exposures, whereas chronic, low-level exposures are more likely with desalinated water.

**The Decadal Vision**

**Where would we like to be in 10 years?**

* A desalination community (designers, operators, managers, users) that is informed about the real and perceived threats from HABs to desalination processes and that has strong communication and collaborative links to HAB scientists and managers as well as an understanding of the technologies that can help in HAB management.
* A HAB community assisting in the development and testing of engineering approaches to HAB control and mitigation.
* New technologies and capabilities for HAB cell and toxin detection, quantification, forecasting, and mitigation installed and in operational use at many desalination plants.
* A completed risk assessment covering both acute and chronic exposures for HAB toxins in desalinated water, with international guidelines established.

**Actions**

1. One or several demonstration projects on the use of HAB toxin and cell detection technologies in desalination plant operation
2. Educate the desalination industry on HAB dynamics, toxins, etc. through enhanced communications and outreach on HABs in general, and HAB monitoring and management in specific
   1. Convene special sessions on HABs at a major desalination conference, with financial support for HAB scientists, who typically do not attend those meetings
   2. Update and publish review on HAB risks in desalination
3. Improve knowledge on the risks associated with biotoxins in desalinated drinking water
4. Foster the incorporation of new HAB technologies for toxin and cell detection and analysis into desalination plant operations

**Stakeholders**

* More than 150 countries who currently use desalination
* The desalination industry (design engineers, operators, managers, etc.)
* WHO, FAO; regional and national health agencies and departments