

Outline for the progress report on WESTPAC HAB Programme

Addressing emerging issues on Harmful Algal Blooms in the Western Pacific

1. Introduction and justification

Under the changing ocean environment with climate change, more frequent Harmful Algal Bloom (HAB) has been observed and its geographical coverage has been also expanded. The HABs cause health problems and fish kills, which are risks for human well-being and sustainable seafood provision to the society. Mitigation and management of the impact by HABs to the society is a common urgent issue of countries in the WESTPAC region to achieve sustainable development, especially to meet the target 14.2 of the SDGs Goal 14 on sustainably managing and protecting marine and coastal ecosystems to avoid significant adverse impacts by strengthening their resilience.

The HABs are natural phenomenon and cannot be stopped their occurrences. Therefore, holistic understanding and measures based on multidisciplinary and even transdisciplinary approaches are important to address problems caused by HABs. Based on this understanding, the program aims at promoting transdisciplinary HAB science under the UN Ocean Decade. Based on the strong natural science on HABs accumulated through long-time WESTPAC-HAB programme, transformative science would be promoted through effort of engaging various stakeholders to better address various problems caused by HABs. From the natural science side, understanding biology and ecology of phytoplankton and identification of causative species including morphology among others are the very basis to adequately address occurrences of HABs to choose necessary measures for mitigation. To early detect and issue warning to the society, novel techniques such as meta-barcoding and DNA analysis are expected to be utilized. From the social science side, to develop and maintain monitoring system to be effective, analysis of social system including administrative structure and relationships among stakeholders, i.e., national and local governments as management and monitoring bodies, fisheries including aquaculture industries as producers of shellfish and fish, and citizens as consumers are necessary.

2. Timeframe and objectives

Long-term objectives of WESTPAC-HAB program since its establishment in 1989:

- 1) Understanding of the biological and chemical nature, population dynamics and environmental effects of harmful algae and their bioactive products.
- 2) 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.

Specific time frame and objectives for this period:

Timeframe: 2021-2027

- 1) To coordinate the exchange of HABs information especially on emerging issues among the member states and all HABs-related organizations
- 2) To develop training modules and conduct capacity-building activities to improve our understanding of the ecology, physiology, and toxicity of HABs species

3. Major activities, outputs & outcomes over the last intersessional period (May 2021-April 2023)

[Major activities]

- 1) Two ~~Three~~ online SC meetings were conducted in Mar. and Sept. 2022.
- 2) Organized the seminar with the title "Fostering transformative HAB sciences for societal applications" at the UN Decade of Ocean Science for Sustainable Development Regional Kickoff Conference for the Western Pacific and Adjacent Areas shared with GlobalHAB and uploaded to its website.

- 3) Through correspondence with A. Cembella (Co-chair of Task Team), Incubator report on challenges and future works of WESTPAC-HAB program shared at Task Team on Fish Kill of IOC-IPHAB in Apr. 2022 (K. Wakita, Japan via correspondences)
- 4) Joined Task Team on Taxonomy of IOC-IPHAB in Nov. 2021 and Apr. 2022 (M. Iwataki, Japan)
- 5) Regional capacity building activities conducted:
 - (1) Incubator entitled “Fostering transformative HAB sciences for societal applications” conducted at the UN Decade of Ocean Science for Sustainable Development Regional Kickoff Conference for the Western Pacific and Adjacent Areas in Nov. 2021. (All SC members)
 - (2) Delivered a talk at the Asian Fisheries Society -Fish Health Section Webinar 2-pathogen free: Non infectious disease and disorders in Aquatic animals: HABs and Fishkills Jul. 2021. Invited speaker PT Lim (Malaysia)
 - (3) Invited to talk at the JAAM-JSPS-CREPSUM Online Forum “Deep Dive Into the Journey of Women in Ocean Science”, Oct. 2021. Invited speaker K. Wakita (Japan)
- 6) Species identification of newly occurred HAB species in this region, *Karenia selliformis* in Russia (2020) and Japan (2021), under collaboration of WESTPAC-HAB members. The species caused big fish kill in northern Japan became the biggest economic loss caused by HABs in Japan. Scientific findings provided to the public through interviews broadcasted on the TV news, websites (NHK world in English), and newspapers (M. Iwataki, Japan).
- 7) Biogeographical distribution of data on HABs species among SC members.

[Major outputs and outcomes]

- 1) The working plan of the WESTPAC HAB and the Incubator program were developed through discussion at the SC meetings.
- 2) Major outputs by regional capacity building activities:
 - (1) Incubator was organized with attendance of 77 participants from 9 WESTPAC member states. Challenges and future works of WESTPAC-HAB program identified.
 - (2) Capacity of participants on understanding fish killing mechanism and preventive measures enhanced.
 - (3) Young ocean scientists in WESTPAC countries were encouraged to promote ocean science through regional collaboration.
- 3) Knowledge and understanding of the public on the newly occurred HAB species in the region and its impact to the society raised. Iwataki et al. (2022) published and Orlova et al. (2022) reported newly occurred HAB species in this region.
- 4) Sakamoto et al. (2021) and Yñiguez et al. (2021) papers were published which summarize information of HAB occurrences in East and Southeast Asia using HAEDAT data. Iwataki, Yñiguez, and some members contributed to the paper of Hallegraeff et al. (2021), which summarize HAB occurrences in the world using HAEDAT data. Lum et al. (2021) was published with participation of co-authors from 10 WESTPAC countries which summarizes occurrences and distribution of *Chattonella* in the WESTPAC region.

4.A summary of key achievements since its establishment

- 1) Organized the seminar with the title “Fostering transformative HAB sciences for societal applications” at the UN Decade of Ocean Science for Sustainable Development Regional Kickoff Conference for the Western Pacific and Adjacent Areas.
- 2) A regional HAB session were convened in hybrid mode during the Xiamen Marine Environmental Science Symposium with contribution of more than 40 papers.
- 3) Two training events were organized physically in Brunei and Malaysia with the support of training material developed by IOC WESTPAC HAB.
- 4) Two meeting session with Department of Fisheries Malaysia were organized in Malaysia to update the recent development of HABs sciences and the needs to improvised HABs monitoring program.

- 5) Several novel and new records HABs species were discovered in this region through the joint collaborative effort (e.g. *Chattonella malayana*, *Heterocapsa borneoensis*, *H. iwatakii*, *H. limii*)

5. Self-assessment on implementation against objectives

- 6) Due to travel restriction imposed at different level regional, physical meeting among the SC members were not able to implemented during the period of reporting. WESTPAC HAB remained active nationally and regionally with the implementation of various activities.
- 7) Several online activities (e.g. SSC meeting) were organized to update and exchange of HABs information. Future HABs activities were also planned and finalized through email correspondence.
- 8) Two national training sessions with Department of Fisheries Malaysia were held in Malaysia and some training materials (Reference books) were provided from WESTPAC HAB.
- 9) A regional HAB session were convened during the Xiamen Marine Environmental Science Symposium (hybrid event) (XMAS-VI), from 9-13 January 2023, with contribution of more than 40 HABs papers involved more than 70 participants from this region.

6. Problems encountered and recommended actions

Problems encountered

- Data sharing were restricted due to data ownership issue by different member states
- Lack of data in database hampered the effort to understand long term changes of HABs events in all member states (especially due to climate changes)
- Limitation of international travels during the covid-19 pandemic

Actions to be considered by the 14th Intergovernmental Session

- Possible mechanisms for smooth data sharing among countries and research permission to be discussed
- Using available online meeting platform for meeting and information exchanges
- promote data submission to HAEDAT and OBIS by member states
- Hybrid course (hosted locally in selected lab with online lectures/instructors) will be used as an alternative to face-to-face regional training workshop

7. Objectives to be achieved, if applicable, over the next intersessional period (May 2023-April 2025)

- 10) Identify emerging societal and technical issues and needs on HABs among countries through conducting **steering committee (SC) meeting annually**
- 11) Exchange and sharing of up-to-date information on HABs sciences as well as disseminating information to other countries in the WESTPAC region
- 12) Constant communication with other HAB related international organizations such as GlobalHAB, IOC-FAO-IPHAB, PICES S-HAB, and etc.
- 13) Plan and conduct at least **one capacity building activity every year** in line with UN Decade of Ocean Science for Sustainable Development. Possible themes are: i) emerging issues on HABs in countries, ii) novel technique for early warning, iii) monitoring, mitigation and management, etc.
- 14) Provide technical assistances to address emerging HAB issues **upon request by countries**
- 15) Contributing to the UN Ocean Decade program/projects, such as Coast Predict and Marine Life 2030 through joining and providing input from the WESTPAC region **as opportunity arises**.

Restricted distribution

8. Planned activities for May 2023- April 2025

[provide, in tabular form, the action items that should be included in the work plan and budget]

Program					Funding Required		Remark
	Activities	Objectives	Expected outputs/outcomes	Date and place	IOC	Other sources (i.e., from national or international)	
Addressing emerging issues on Harmful Algal Blooms in the Western Pacific (WESTPAC-HAB)	1. Steering meeting	Update the status of HAB information in the region and identify emerging HABs issue to address	identified national/ regional HAB training courses, identified emerging HAB issues	2023 (in person in Hiroshima, Japan), 2024 (online), 2025 (online)	20,000 USD	10,000 USD (Univ. Tokyo, Univ. Malaya, Tokai Univ., etc.)	Steering meeting will be conducted in conjunction with ICHA 2023 in Hiroshima
	2. Strengthening collaboration with other HAB related networks (EASTHAB, GlobalHAB, IOCIPHAB, PICES S-HAB, etc.)	Join other HABs related meetings at least one time each by April 2025	Up-to-date information and cutting-edge technique and science on HABs shared among countries in the region; Emerging issues and needs on HABs of the countries in the WESTPAC region disseminated to other HAB related international societies.	2023-2025	No cost		
	3. Capacity building	One capacity building activity (online) every year conducted in line with UN Decade of Ocean Science for Sustainable Development. Possible themes are: i) emerging issues on	3 early-career ocean scientists in WESTPAC countries delivered presentations in the capacity building	2023-2025	No cost	In kind (Univ. Tokyo, Univ. Malaya, Univ. Philippines, etc.)	

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		HABs in countries, ii) novel technique for early warning, iii) monitoring, mitigation and management, etc.	activities by April 2025.				