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1 - 3 November 2021

Harmful Algal Blooms

Impact on food safety and food security

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Harmful algal blooms

Concept

Phytoplankton blooms, micro-algal blooms, toxic algae, red tides, or harmful algae, are all terms for naturally occurring phenomena. About 300 hundred species of micro algae are reported at times to form mass occurrence, so called blooms. Nearly one fourth of these species are known to produce toxins. The scientific community refers to these events with a generic term, "Harmful Algal Bloom" (HAB), recognizing that, because a wide range of organisms is involved and some species have toxic effects at low cell densities, not all HABs are "algal" and not all occur as "bloom".

Ranging from microscopic, single-celled organisms to large seaweeds, algae are simple plants that form the base of food webs.

Under the certain conditions, algae may grow out of control.

Harmful algal blooms

Growth conditions

- Some algal species flourish when wind and water currents are favorable.
- Some algal species flourish due to over enrichment of waters, when nutrients (mainly phosphorus, nitrogen, and carbon) from land reach the sea
- Some HABs have also been reported after natural phenomena such us unusual high water temperatures, and extreme weather events such as hurricanes, floods, and drought.

Airborne HAB toxins may also cause breathing problems and, in some cases, trigger asthma attacks in susceptible individuals

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Some algal species can produce exudates that can cause damage to the delicate gill tissues of fish both wild and farmed. Aquaculture stocks (fish, molluscs and crustaceans) kept in holding units such as cages, pens, ropes, ponds are trapped and, thus, can suffer devastating mortalities, which could lead to economic and food losses, and eventually become a food security problem.

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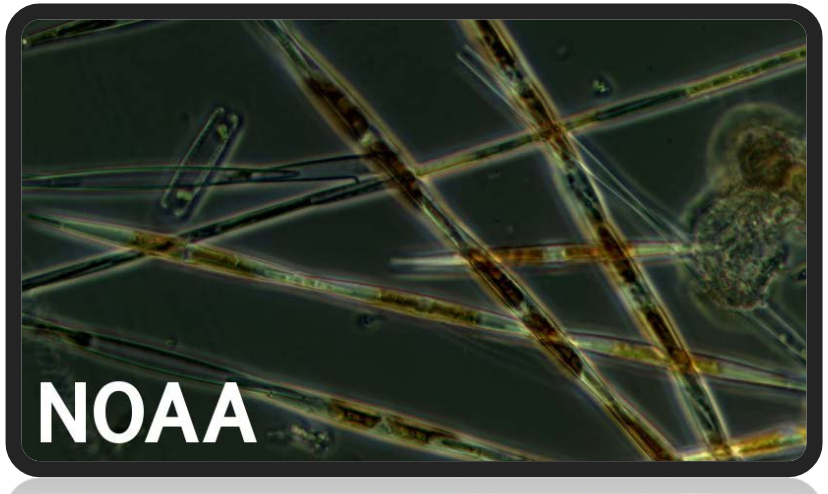
Harmful algal blooms

Toxic HABs

Of greatest concern to humans are algal species that produce potent neurotoxins that can find their way through shellfish and fish to human consumers, where they cause a variety of gastrointestinal and neurological illnesses (paralytic shellfish poisoning, amnesic shellfish poisoning, diarrhetic shellfish poisoning, neurotoxic shellfish poisoning, azaspiracid shellfish poisoning and ciguatera poisoning).

Worldwide, ciguatoxins are estimated to cause around 50 000 cases of ciguatera fish poisoning annually; neurological effects may last for weeks or even years and one percent of these cases are fatal (FAO/WHO, 2020).



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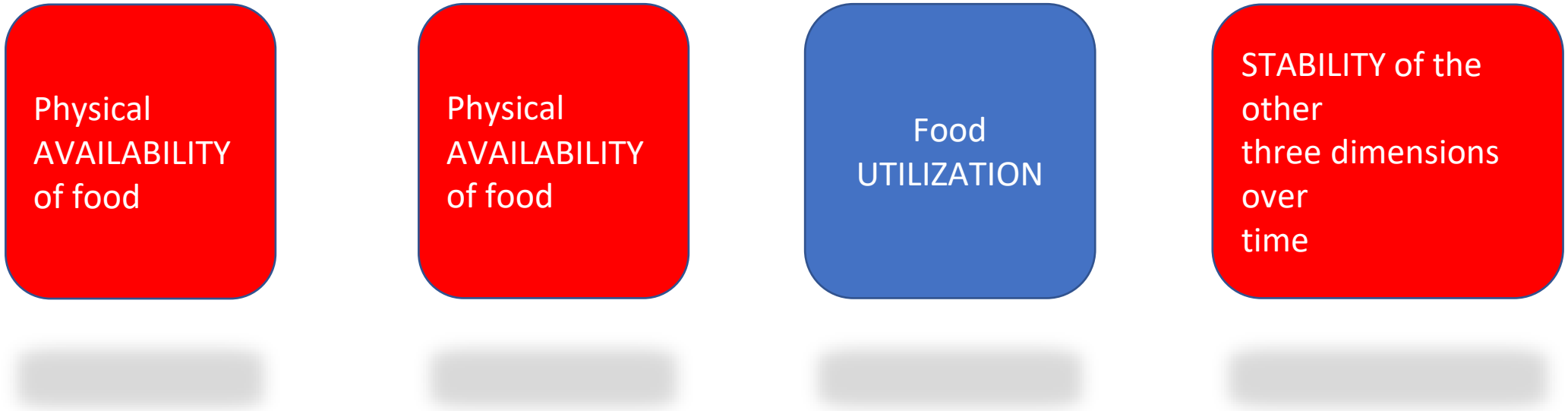
HABs impact on the food security pillars



- Availability due to mass mortalities (economic implications)
- Access due to bans to capture certain fish species that could be toxic (increases price of other commercial species)

TRANSITORY FOOD INSECURITY

Severity of food insecurity due to HABs

Will depend on:
the duration of the of the HAB;
the number of people affected;
impact on availability and access to fishery products and nutrition status.

This knowledge will determine the nature, extent and urgency of the assistance needed for affected population groups.

Globally, fish provided more than 3.3 billion people with 20 percent of their average per capita intake of animal proteins, reaching 50 percent or more in countries such as Bangladesh, Cambodia, the Gambia, Ghana, Indonesia, Sierra Leone, Sri Lanka and several small island developing States (SIDS)

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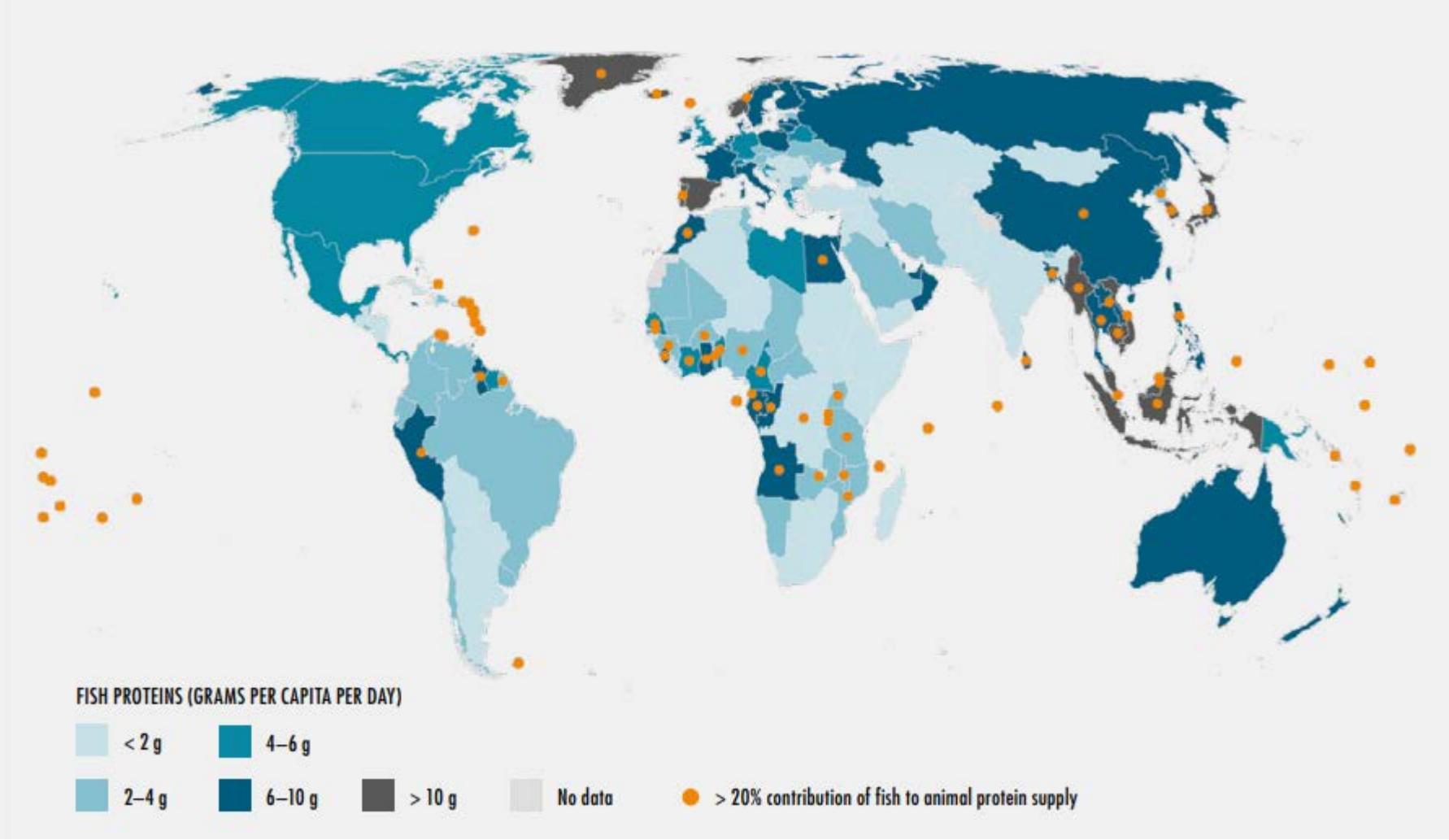
Contribution of fish to animal protein supply, average 2015–2017



Priorities countries for setting early warning systems and safety net programmes

Harmful algal blooms

Monitoring programmes

Important progress limiting adverse impacts of planktonic HABs has been achieved by implementing rigorous monitoring programs addressing harmful algae species in the aquatic environment, marine toxins in seafood, and associated human diseases. However many countries do not have the resources to establish monitoring programmes for HABs and marine biotoxins.

Harmful algal blooms – FAO's work

In 2015, FAO organized an interagency meeting with the World Health Organization (WHO), the International Atomic Energy Agency (IAEA) and UNESCO's Intergovernmental Oceanographic Commission (IOC) to discuss ciguatera fish poisoning as an increasing food safety threat.

During the meeting, a plan of action was defined and the need for international-level guidance was identified.
During the 11th Session of the Codex Committee on Contaminants in Foods (CCCF) in February 2017, as part of the plan of action, FAO made recommendations for consideration of work on ciguatera poisoning, which was endorsed.
The CCCF agreed to develop risk management guidelines and establish maximum levels (MLs) for ciguatoxins (CTXs).
To facilitate this work, FAO and WHO were asked to provide scientific advice to carry out a risk assessment of CTXs on which the MLs would be based and to review existing analytical methods for CTXs detection and quantification, with a view to recommend methods for routine analysis and surveillance.

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Harmful algal blooms – FAO's work

In November 2018, FAO and WHO organized an Expert Meeting on Ciguatera Poisoning.

An outcome from the meeting was a joint FAO/WHO Report that provided the necessary scientific advice to Codex Alimentarius, and also the material for the development of an e-learning Course on Monitoring and Preventing Ciguatera poisoning (https://elearning.fao.org/course/view.php?id=648).

https://doi.org/10.4060/ca8817en

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Harmful algal blooms – FAO's work

Over the last years, the participation of FAO in IPHAB and relevant expert meetings has resulted in the identification of a number of issues and areas that needed attention, such as:

- the need for guidance for marine biotoxins monitoring
- the need for a risk profile to define whether toxins present in water coming from desalinization plants are a threat to human health
- the need to develop guidance for the implementation of early warning systems for HABs

Early Warning Systems for Harmful Algal Blooms

Food and Agriculture Organization of the United Nations

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

IAEA International Atomic Energy Agency

Virtual Expert Meeting on

Early Warning Systems for Harmful Algal Blooms

27, 28, 29 October

Technical Guidance for the Development of Early Warning Systems for Marine Harmful Algal Bloom Events

Including BHABs, fish killing HABs, pelagic toxic HABs and cyano-HABs

Harmful algal blooms – FAO's work

A document that could guide competent authorities and relevant institutions involved in consumer protection or environmental monitoring to implement early warning systems for HABs present in their areas (marine and brackish waters), specifically for those affecting food safety or food security (BHABs, fish killing HABs, pelagic toxic HABs and cyanobacteria).

Important to note that not all countries and institutions can implement the same level of systems and this guidance is mainly for those that do not have systems in place.

- The draft document is being used for the pilot trials in Africa and Latin America
- The final document is likely to be published in 2022

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Toxin Assay Information

Species containing the toxin	Toxin type	Toxin details	Max. concentration	Assay type

Kit used:	**Type of kit used:**
Additional information:	
Economic losses:	USD800M salmon
Management decision:	Disposal of salmon mortality in offshore areas off Chiloe Island
Additional harmful effect information:	Social problems, protests in Chiloe Island

Created at 05:42 on 25 Aug 2017
Updated at 06:03 on 25 Aug 2017

Event occurred before in this location:	Yes (2009)
Individuals to contact:	Jorge I. Mardones

Nature of the event (all selected must be present):

- ☐ Water Discoloration
- ☐ High Phyto concentration
- ☐ Seafood toxins
- ☐ Mass mortalities
- ☐ Foam/Mucilage in the coast
- ☐ Other effect

Resources affected here (all selected must be present):

- ☐ Planktonic life
- ☐ Natural Fish
- ☐ Birds
- ☐ Benthic Life
- ☐ Aquaculture Fish
- ☐ Shellfish
- ☐ Aquatic Mammals
- ☐ Humans
- ☐ Seaweed
- ☐ Other

Associated syndrome (all selected must be present):

☐ Aerosolized toxins effects ☐ ASP ☐ AZP ☐ CFP (Ciguatera Fish Poisoning) ☐ CSP (Ciguatera Shellfish Poisoning) ☐ Cyanobacterial toxins effects ☐ DSP ☐ NSP ☐ OTHER ☐ PSP

Toxins involved (all must have been detected in the event):

Add row

Any | Any

http://haedat.iode.org/

Conclusions

- Global warming and associated changes in the oceans could affect HAB occurrences and toxicity as well, although forecasting the possible trends is still speculative.
- Effective HAB monitoring and research strategies can contribute to alleviate negative impacts on food safety and food security.
- Coordinated efforts by the scientific community, policy makers, and industry are the best approach to mitigate the impact of HABs (including emergency preparedness).
- Transparency is needed.

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THANK YOU

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