

New Technology and Approach for Early Warning of Harmful Algal Blooms (HABs) in the Bulgarian Black Sea

Nina Dzhembekova PhD

n.dzhembekova@io-bas.bg

Institute of Oceanology - BAS



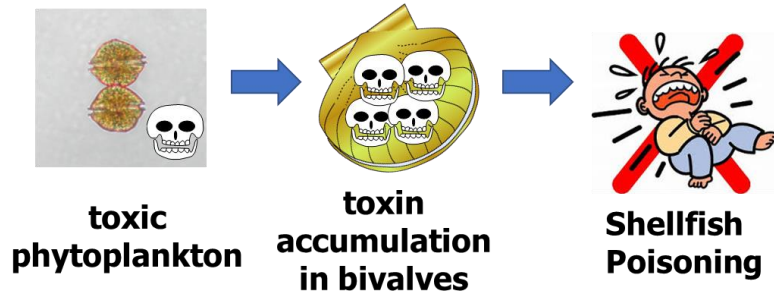
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HARMFUL ALGAL BLOOMS (HABs) - IMPACTS

HABs – EXCESSIVE GROW OF CERTAIN KINDS OF ALGAE IN WATER BODIES

Human Health

- Human illness & death



Ecosystems

- Low dissolved oxygen
- Reduced light penetration
- Food-web disruption
- Animal illness and death

Socio-economic

- Costs of medical treatment
- Aquacultures losses
- Recreation and tourism impacts
- Monitoring and management costs



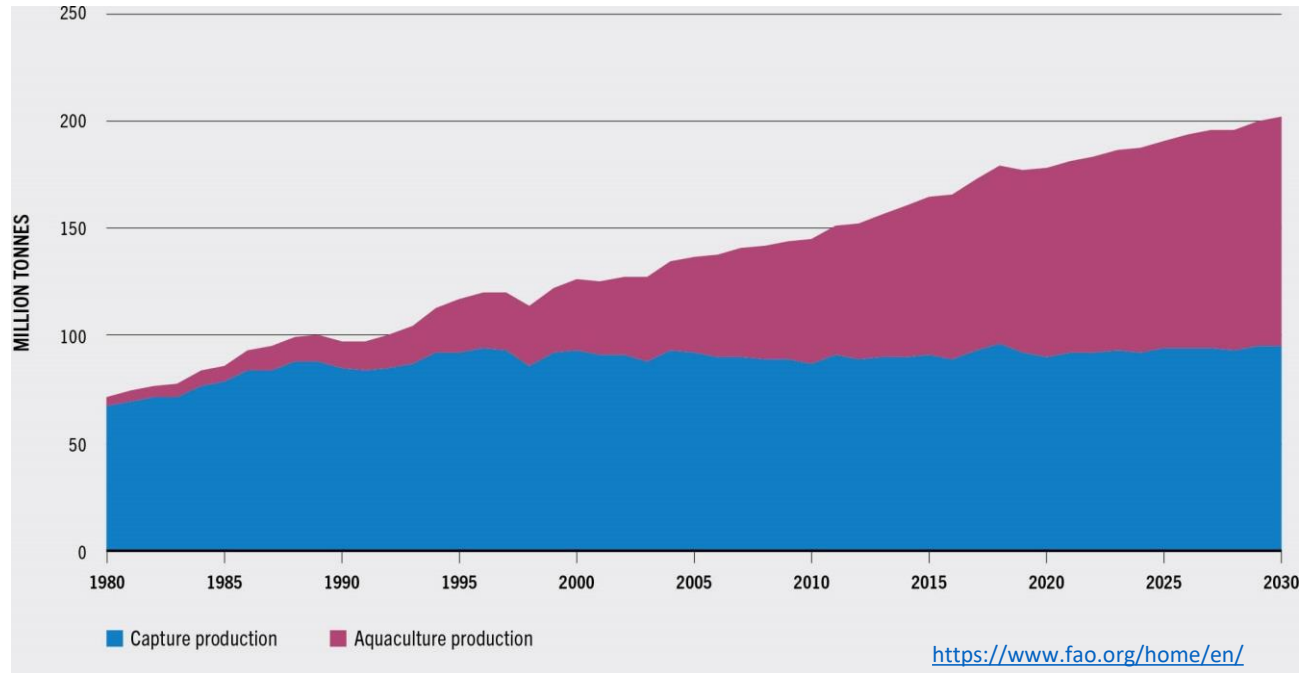
Photo: Rodriguez-Benito / ESA

<https://seos-project.eu/marinepollution/marinepollution-c03-p04.html>

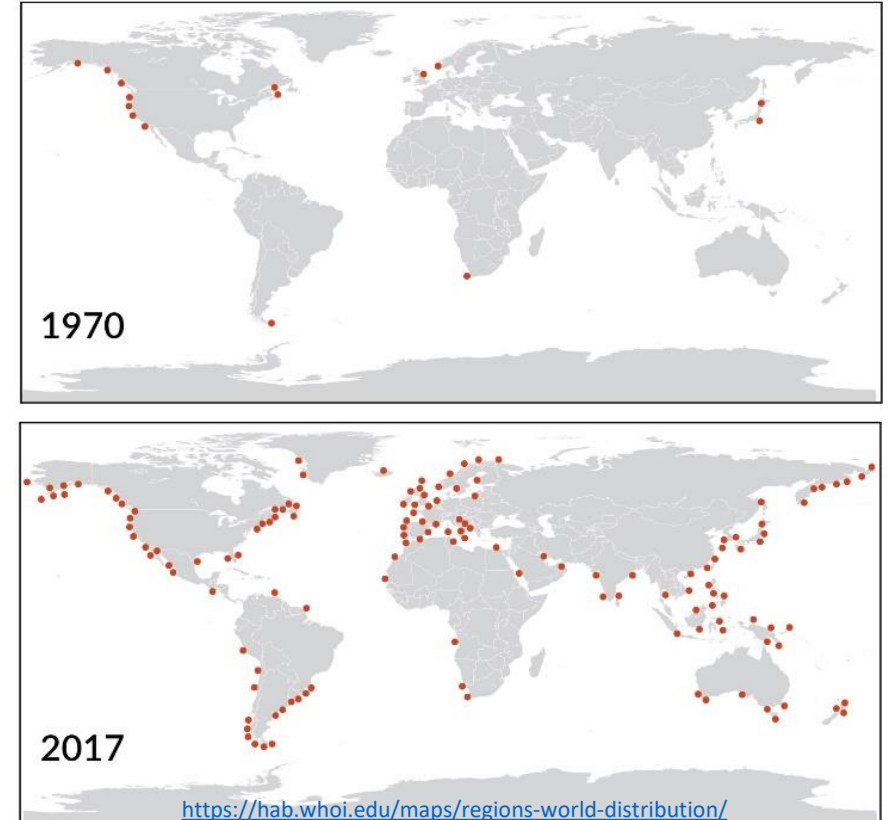


GLOBAL EXPANSION

World Capture Fisheries And Aquaculture Production 1980–2030



Harmful Algal Blooms – PSP related events



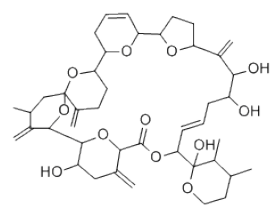
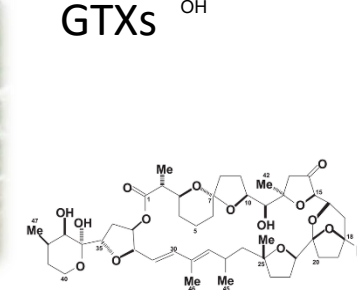
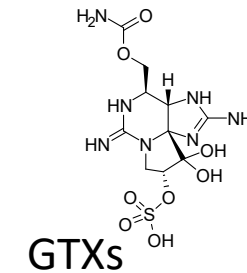
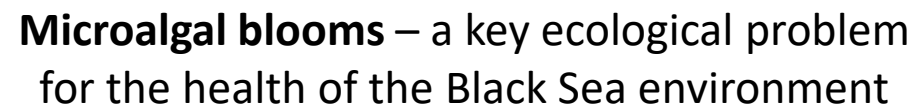
- Climate change, global warming
- Lack of detection and early warning capabilities
- Lack of bloom forecast capabilities
- Lack of bloom control strategies

Approaches to HAB management

- Prevention – nutrient control
- **Mitigation** – HAB monitoring programs
- Control



More than 30 potentially toxic species



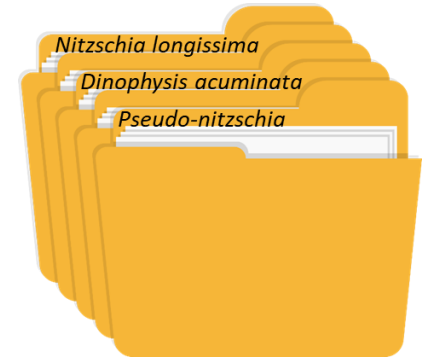
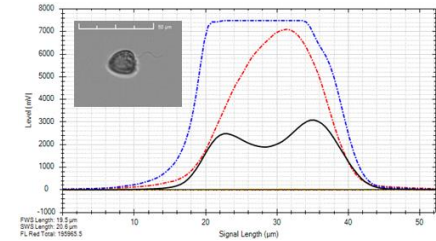
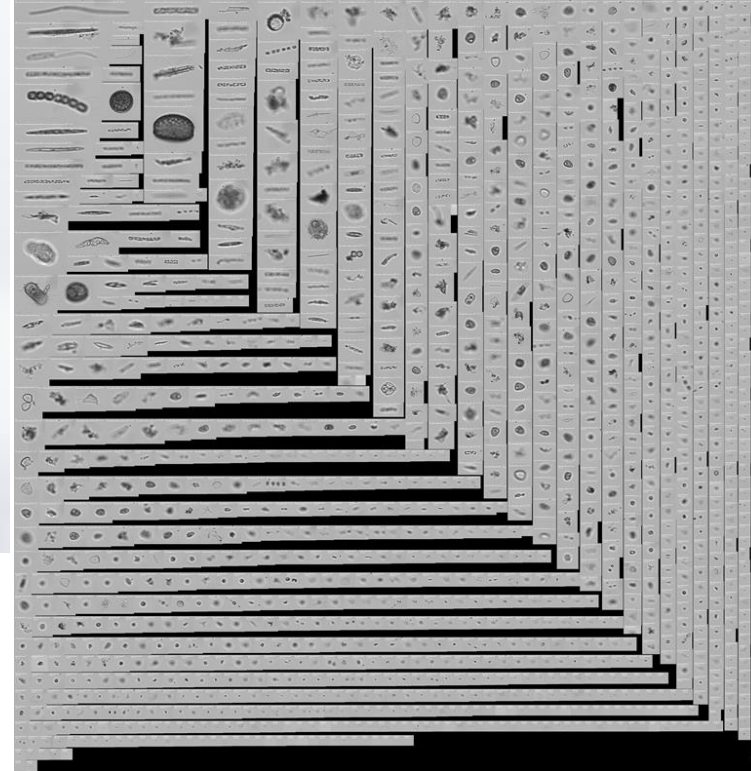
Various **phycotoxins** have been found

➤ **Mitigation – Development of a Regional Early Warning & Detection System for HABs**

Towards an Early Warning & Detection System for HABs in the Bulgarian Black Sea using *in situ* biosensors - CytoSense



CytoSense



- *in situ* measuring directly from a water body
- identify the algae by high resolution images and optical data
- real-time control of critical processes in surface waters
- early warning
- sensitive tracking of onset and decline of species
- dynamic monitoring of plankton diversity
- catch sudden and short events

REGIONAL BLACK SEA IMAGE REFERENCE LIBRARY

- ✓ More than 8000 photos were curated and included in the Black Sea image reference library
- ✓ More than 170 phytoplankton species are included in the library

THANK YOU!

STAY TUNED!

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