

# Summary of National Report on HABs in Korea

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## 1. Introduction

Harmful Algal Blooms (HABs) by toxic and non-toxic micro algae have gained increasing attention over last three decades in Korea. Because harmful and toxin-producing micro algae have caused serious impact on aquaculture industry through mass mortality of culturing finfish and/or shellfish, and on human health through finfish or shellfish poisoning in Korea. Therefore, it is essential to have a common platform to develop the research, mitigation strategies and proper political proposals in the NOWPAP Region. The present report was compiled using existing data and information mainly from National Fisheries and Development Institute (NFRDI) responsible for HABs monitoring and mitigation in Korea.

## 2. Results and discussions

A total of 304 red tide events occurred by 31 micro algal species in the NOWPAP Region of Korea from 1999 to 2003. The top five major red tide causative species were *Cochlodinium polykrikoides*, *Prorocentrum minimum*, *Gymnodinium sanguineum*, *Heterosigma akashiwo*, *Prorocentrum micans* and *Skeletonema costatum*. The duration of red tide by dinoflagellates and/or diatoms was mostly less than 10 days except *Cochlodinium polykrikoides*, ranging 29-62 days. The highest peak season of red tide occurred in high water temperature season mainly from June to September. The majority of the events during the high water temperature season were attributed to the *Cochlodinium polykrikoides* blooms.

The practical field application of the mitigation techniques by yellow clay allowed fisheries damages to be sharply reduced from about 95 millions US dollars in 1995 to several millions thereafter. A few mitigation techniques against red tide have been developed by NFRDI or KORDI (Korean Oceanography Research and Development Institute) since 1996. Clay dispenser enabling wild yellow clay to crumble into fine size and subsequently dispensing into the HAB affected area and automatic HAB alarm system equipped with both chlorophyll and turbidity sensor have been developed to minimize fisheries damages when red tide occurs near aquaculture sites. Special device, Electrolytic Clay Dispenser (ECD) that electrolyzed seawater and clay dispenser combined each other, has been recently developed and is under propagation in Korea. The device is very useful in minimizing the quantity of clay used and enhancing the removal efficiency compared to the old style of clay dispenser.

NFRDI and fisheries extension service center are responsible for the monitoring around coastal area, while NMPA is in charge of aerial observance by helicopter. On the other hand, local government is responsible for the mitigation rather than monitoring when red tide occurs. 77 stations and additional 92 stations over the Korean coastal waters are regularly monitored from February to November by both NFRDI and fisheries extension service center, respectively. However, once harmful algal blooms occur, all the relevant agencies including NMPA conduct their daily HAB monitoring in which locality of HAB, cell density of causative organisms, water color, water temperature and salinity are described. All the collected data from field survey, meteorology and remote sensing by NOAA and MODIS are sent to HAB Emergency Center in NFRDI. HAB Emergency center analyze all the data and publish daily HAB news letter including HAB

information on the location map, prediction of strength and the direction of transportation. The HAB news letter is disseminated to fisherman and relevant organizations through fax, internet, ARS, SMS service and data-TV etc.

For the prevention from shellfish poisoning and to sustain safe supply of shellfish products such as oyster, mussel and clam, NFRDI in collaboration with fisheries extension center conducts regular monitoring on the shellfish culture farm mainly located in the South Sea. The monitoring of shellfish poisoning is conducted at least once a month for more than 100 stations from February to November in Korean coastal waters. However, monitoring frequency increased once a week when the toxin is detected in the meat or mid-gut gland of shellfish. NFRDI notifies fisherman not to harvest the shellfish when the level of PSP exceeds over 80 ug/100g meat. There was an announcement of banning for shellfish harvest from April 13 to May 16 and April 17 to June 19 in 2002 and 2003, respectively over the south eastern part of Korea due to PSP.

There is growing concerns to minimize fisheries damage by establishing early warning system from the initial stage and take emergent action against the blooms. Particularly, information on the bloom mechanism, transportation, eco-physiology and mitigation techniques for red tide causative species would be essential to countermeasure against the blooms. Thus, collaborative research program to get scientific knowledge and networking for the monitoring and prediction of HABs among NOWPAP member countries would be very beneficial in resolving the problems.

### 3. References

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