

PUBLIC AWARENESS ON HARMFUL ALGAL BLOOM (HAB) IN LAMPUNG BAY

Vishnu Aditya¹, Asep Koswara¹, Nurul Fitriya², Arief Rachman², Tumpak Sidabutar and Hikmah Thoha²

¹Community Preparedness, Indonesian Institute of Sciences
Jln. Raden Saleh No. 43, Jakarta Pusat 10330, Indonesia

²Research Center for Oceanography-Indonesian Institute of Sciences
Jln. Pasir Putih I, Jakarta Utara 14430, Indonesia
E-mail: adit_v07@yahoo.com

Received: February 2013

Accepted: June 2013

ABSTRACT

Harmful algal blooms (HABs) cause various problems, such as water quality degradation, fauna mass mortality and impairment of human health. Water quality monitoring in Lampung Bay has been conducted by Lampung Marine Aquaculture Office (BBL) of the Ministry of Marine Affairs and Fisheries since 1994. Occurrence of *Pyrodinium bahamense* var. *compressum* (Pbc), a causative organism of paralytic shellfish poisoning (PSP), has been recorded but threats caused by HABs have never been reported. A study aimed to know the level of public knowledge and awareness about HABs in Lampung Bay has been conducted. The components of group respondents consisted of local governments, academics and coastal communities. Awareness from each component was examined including general HAB knowledge, HAB impact to the community, HAB occurrence and local knowledge of HAB. Data of HAB knowledge were collected through questionnaire and focus group discussion. The result showed that 40.5% of respondents had knowledge of HABs phenomena and 51.3% respondents only know signs or indicators of HAB occurrence, while only 1.4% respondents had knowledge of local HAB occurrences. The direct impact of HABs to the community was not commonly known by the respondents. Only a few cases of poisoning after eating seafood were reported. It can be concluded that there was lack of public knowledge and awareness on HABs in Lampung Bay. Intensive public awareness programs about HABs should be conducted in order to reduce risk towards HABs in Lampung Bay.

Keywords: HABs, awareness, risk reduction, Lampung.

INTRODUCTION

Harmful algal blooms (HABs) are triggered by the increased abundance of phytoplankton. This blooms result in various problems, such as water quality degradation, marine fauna mass mortality and impairment of human health (Mitra and Flynn, 2006). Human illness and death are the primary impacts of HABs, but effects on other wildlife are also important. Some fish are killed due to HABs can be spectacular in volume, with millions of fish and millions of dollars lost to local economies (Glibert et al., 2005). In addition, HABs impact on aquaculture industries, and losses can be staggering as the impacted organisms are typically in confined areas and rapidly succumb to toxins

or to excessive accumulations of cells (Glibert et al., 2005).

In Indonesia, HAB has been acknowledged since 1980s. Adnan and Sutomo (1988) reported HAB occurring in Flores, Ujung Pandang and East Borneo. The same cases have also occurred in Lewotobi, Wulung Gitung, East Flores followed with fish mass mortality in 24 November 1983 (Adnan, 1984). Lampung Bay seems to be vulnerable to HAB impacts because a number of HAB species were found. *Pyrodinium bahamense* var. *compressum* (Pbc) is one of the most poisonous HAB species which often appears in Lampung Bay (Panggabean, 2006). Results of the water quality monitoring of Lampung Bay conducted by the Lampung Marine Aquaculture Office (BBL) of

the Ministry of Marine Affairs and Fisheries since 1994 have indicated that Pbc has been recorded in the plankton samples (Muawanah et al., 2004).

Although occurrences of the toxic phytoplankton are frequent, the people are not aware of threats caused by HABs due to limited knowledge about HABs and the impacts on their lives. Likewise knowledge of the local governments does not meet possible impacts on local economies, water quality, social culture and public health. This paper discussed public knowledge and awareness on HABs especially among people in Lampung Bay and thereby help in reduce the risk toward HABs.

MATERIAL AND METHODS

Fieldwork to collect data on public knowledge and awareness was conducted on 19–22 June 2012 in Hanura Village, Padang Cermin Sub District, Pesawaran District, Lampung.

Respondents consisted of, 1) local government represented by Marine Services of Pesawaran District and Lampung Marine Aquaculture Office, 2) Academics represented by Lampung University, Lampung Maritime High School and some schools in Hanura village, and 3) local coastal community represented by fishermen and mariculturist. There were several key questions within the questionnaires related to HAB as the natural phenomena, HAB occurrence, and its impacts on the community, and local knowledge on HABs. Focus Group Discussions were conducted to complement

the data obtained from the questionnaires in order to collect more and specific information from the participants. The Focus Group Discussion also designed HABs monitoring plan in each public component in order to create integration and coordination among local government, academics and local community.

RESULTS

Responds to distributed questionnaire were gathered from a total of all 74 respondents. It showed that 40.5% respondents had general knowledge on HAB phenomena, while 51.4% of respondents had acknowledged that marine water discoloration was a sign of HAB occurrence (Fig. 1). Only 31.1% of respondents had seen or heard the impacts of HAB to community specifically in marine fauna mass mortality. Local knowledge on HABs phenomena was not common to respondents with only 1.4% claiming to have specific traditional knowledge related to HAB phenomena.

Considering the general knowledge on HABs phenomena, the academic and government respondents showed much better understanding than local community. Similar condition occurred in the issues on HABs incident and that water discoloration as a sign of HABs (Fig. 2).

Questionnaire result on the knowledge and awareness of HAB impacts to the community in each component showed that 12% of local

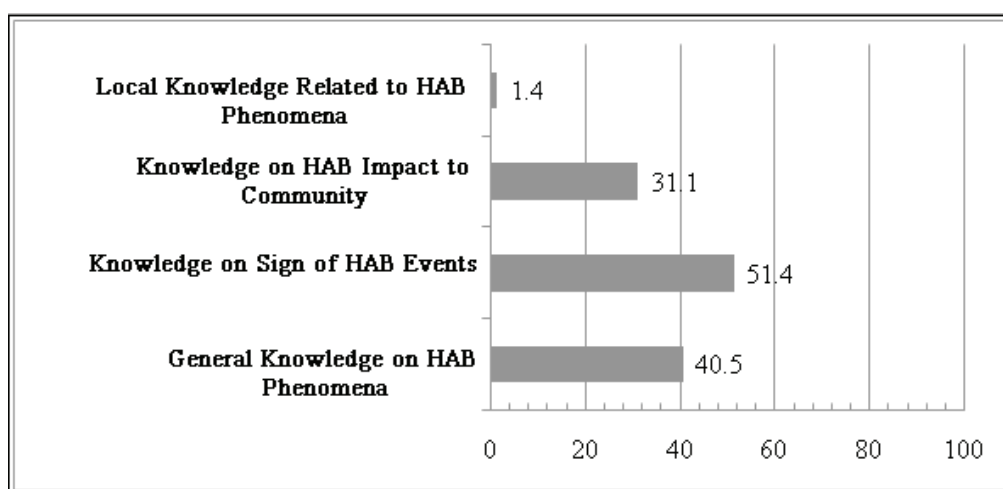


Figure 1. Questionnaire result on Knowledge and Awareness about HABs in Lampung Bay (%).

government respondents had seen or heard marine fauna mass mortality (Fig. 4). In the academics and community component, there were 6% and 5% of the respondents have seen or heard marine fauna mass mortality.

“Local knowledge on HABs phenomena” was only indicated by 2.9% of respondents in the community component. From Focus Group Discussion conducted within each component, it was difficult to get more information this issue. Even in Focus Group Discussion with academics and local government, there was no information on local culture related to HABs phenomena. The result of the Focus Group Discussion on the roles and activities that each component in the HAB monitoring before, during and after HAB take place were shown in Table 1. The plan was to create an integration and coordination between local government, academics and community.

DISCUSSION

Results of questionnaire survey showed that the local community component had the lowest level of knowledge on HAB phenomena (19.4%). This could be explained by the fact that HAB events in Lampung Bay were relatively rare compared to Hanura Bay, where unprecedented HAB events have impacted to the community.

Moreover, there was almost no information about local knowledge in Lampung Bay area related to HAB phenomena. The fact that only 2.9% of community component respondents having local knowledge on HAB phenomena indicates possible vulnerability of this coastal community because HABs was potentially occur in Lampung Bay as indicated by the presence of *Pyrodinium bahamense* var. *compressum* (Pbc) in the plankton samples collected since 1994 (Muawanah et al., 2004).

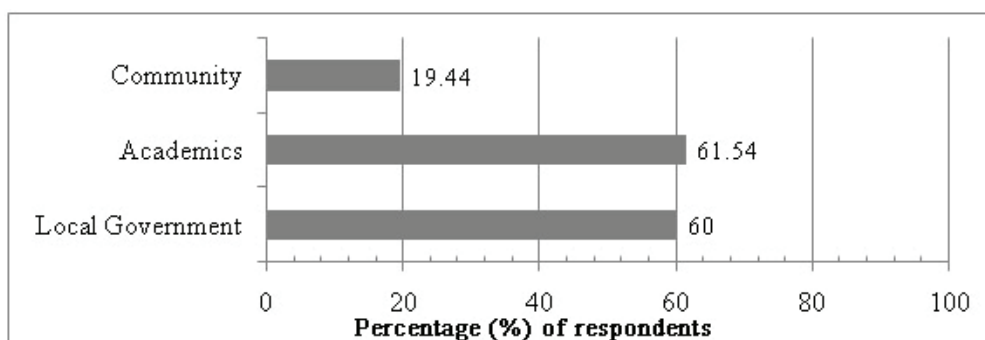


Figure 2. Knowledge on HAB phenomena in each component, indicated by percentages of respondents who have general knowledge on HABs phenomena.

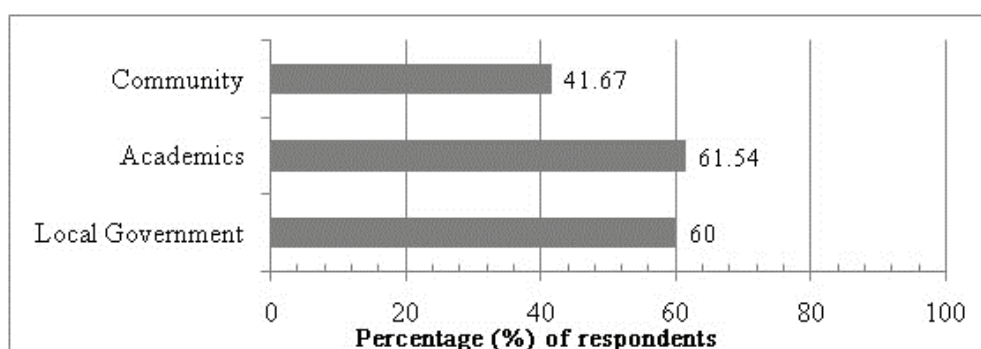


Figure 3. Awareness on HAB occurrence in each component indicated by percentages of respondents who have seen marine water discoloration as one of sign HABs occurrence.

Table 1. HABs monitoring plan in each public component

Local Government	Academics	Community
<ul style="list-style-type: none"> - Provide regulation to control environment pollution, including HABs - Setting up infrastructure to support HABs monitoring - Provide adequate funds for HABs monitoring implementation - Establish a special unit for monitoring HABs - Prepare media for rapid communication to disseminate information about HABs phenomena 	<ul style="list-style-type: none"> - Monitoring HABs with regular and sustained research - Disseminate the research results to the local government and public - Intensify discussions between government and public on the results of HABs monitoring - Integrate HABs materials into curriculum 	<ul style="list-style-type: none"> - Proactive in reporting important events that are suspected to relate to HABs phenomena - Participate in environmental pollution control - Create a log book every day for regular monitoring of water conditions - Establish groups of fishermen/community with HABs awareness - Participate in HABs monitoring in coastal villages

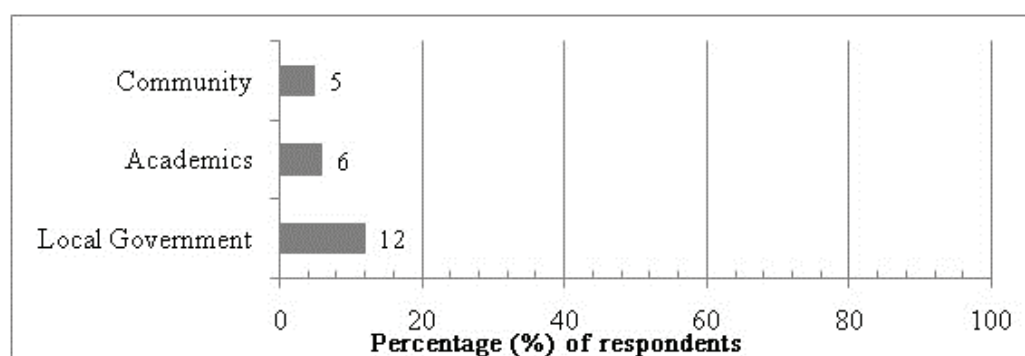


Figure 4. Knowledge and awareness of HABs impacts to the community in each component indicated by percentages of respondents who have seen or heard sudden marine fauna mass mortality.

Coastal community in Hanura village, on the other hand, had an experience of known signs of HABs occurrence such as marine water discoloration related to extreme weather change. Both of them can be used as indicators of HAB occurrence by fisherman as indicated by 41.7% respondents from the community component. This group of respondents, however, did not realize that their skills could become useful knowledge in HAB monitoring.

Level of knowledge in local government and academics about HABs phenomena was not much different and relatively high $> 60\%$ of the respondents. Easy access to HABs information, e.g., from HAB articles in literatures, newspaper, scientific journals, books, internet and other media may explained such results. Unfortunately, these

components were not able to disseminate their knowledge to the coastal community. There was no integration and coordination between local government, policy makers, academics and the local community in the coastal areas have been developed.

Regular interactions with the community on HAB should be conducted in Lampung Bay. It is an effort to increase public knowledge and awareness to bring HAB's risk reduction in Lampung Bay. Commitment from local government, academics and community themselves around Lampung Bay is needed because HAB management requires multi-sectoral and participatory activities in the community. There is also a need to use varied approaches including visual media. Hopefully, with more HAB information materials, the community

will understand HABs management and can make right decisions when HABs occur. Furthermore, their knowledge can be used for a sustainable coastal environment.

ACKNOWLEDGEMENT

The authors thank Dr. Zainal Arifin, Director of Research Center for Oceanography-LIPI: Irina Rafliana, Coordinator of Community Preparedness Program, Indonesian Institute of Sciences, A. Muawanah, Lampung Marine Aquaculture Office (BBL) of the Ministry of Marine Affairs and Fisheries. This research was funded by National Priority of Indonesian Development. This study was partly supported by a grant from The Japan Society for the Promotion of Science for the Asian CORE Program (Coastal Marine Science in Southeast Asia: COMSEA).

REFERENCES

- Adnan, Q and A.B. Sutomo. 1988. Case of tconsin shellfish in Balang Tiku – East Borneo. In: Panggabean, L.M.G. (ed), Natural toxins of microalgae. Oseana, 31: 1–12.
- Adnan, Q. 1984. Distribution of dinoflagellates at Jakarta Bay, Taman Jaya, Banten and Benoa Bay, Bali: A report of an incident of fish poisoning at Eastern Nusa Tenggara. In: Panggabean, L.M.G. (ed), Natural toxins of microalgae. Oseana, 31: 1–12.
- Glibert, P.M., D.M. Anderson, P. Gentien, E. Granéli and K.G. Sellner. 2005. The global, complex phenomena of Harmful Algal Blooms. *Oceanography*, 18: 136–147.
- Mitra, A. and K.J. Flynn. 2006. Promotion of harmful algal blooms by zooplankton predatory activity. *Biol. Lett.* 2: 194–197.
- Muawanah, A., A. Kartikasari and P. Hartono. 2004. Current status of HAB monitoring in Lampung Bay. In: Panggabean, L.M.G. (ed), Natural toxins of microalgae. Oseana, 31: 1–12.
- Panggabean, L.M.G. 2006. Natural toxins of microalgae. Oseana, 31: 1–12.