Recent Harmful Algal blooms (HABs) Events in Indonesia

By
Hikmah Thoha
Research Center for Oceanography, Indonesian Institute of Science
Indonesia

WESTPAC Workshop on the Development of a Research Strategy for Harmful Algal Blooms
“What We Know, and What We Do Not Know on HABs”
19-21 December 2016
Institute of Oceanography, Nha Trang, Vietnam
1. Recent HABs event in Indonesia: 1990 – 2015
2. Difficulties and Scientific subject needed on Facing the HABs Problem in Indonesia
3. Scientific activities
4. Expectation to WESTPAC-HAB and TMO project
### Recent HABs Event in Indonesia: 1990 – 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Causative species</th>
<th>Groups</th>
<th>Type of HAB</th>
<th>Location</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td><em>Trichodesmium erythraeum</em></td>
<td>Cyanobacteria</td>
<td>Red tide</td>
<td>Jawa Sea</td>
<td>-</td>
</tr>
<tr>
<td>1992</td>
<td><em>Gymnodinium sp./ Gonyaulax sp.</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Manokwari, Papua</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td><em>Gonyaulax sp.</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Jakarta bay</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td><em>Noctiluca scintillans</em></td>
<td>Dinoflagellate</td>
<td>Red tide</td>
<td>Jakarta bay</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td><em>Pyrodinium bahamense var. compressum</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Kao Bay, Halmahera</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td><em>Pyrodinium bahamense var. compressum</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Ambon Bay</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td><em>Noctiluca scintillans</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Ambon Bay</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td><em>Trichodesmium bahamense var. compressum</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Ambon Bay</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td><em>Chaetoceros sp.</em></td>
<td>Diatoms</td>
<td></td>
<td>Ambon Bay</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td><em>Alexandrium affine</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Ambon Bay</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td><em>Gonyaulax spinifera</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>West Sumatera</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td><em>Trichodesmium thiebautii</em></td>
<td>Cyanobacteria</td>
<td></td>
<td>Jakarta bay</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td><em>Chaetoceros spp</em></td>
<td>Diatoms</td>
<td></td>
<td>Ambon Bay</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td><em>Pyrodinium bahamense var. compressum</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Lampung Bay</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td><em>Pyrodinium bahamense var. compressum</em></td>
<td>Dinoflagellates</td>
<td>Toxin production</td>
<td>Ambon Bay</td>
<td>Health problem</td>
</tr>
<tr>
<td>2012</td>
<td><em>Chaetoceros spp.</em></td>
<td>Diatoms</td>
<td>Bloom</td>
<td>Ambon Bay</td>
<td>Oxygen depletion, fish kills</td>
</tr>
<tr>
<td>2012</td>
<td><em>Nitzschia spp.</em></td>
<td>Diatoms</td>
<td>Bloom</td>
<td>Ambon Bay</td>
<td>Oxygen depletion, fish kills</td>
</tr>
<tr>
<td>2012</td>
<td>Other diatoms</td>
<td>Diatoms</td>
<td>Bloom</td>
<td>Ambon Bay</td>
<td>Oxygen depletion, fish kills</td>
</tr>
<tr>
<td>2012</td>
<td><em>Cochlodinium polykrikoides</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Lampung Bay</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td><em>Cochlodinium polykrikoides</em></td>
<td>Dinoflagellates</td>
<td>Red tide</td>
<td>Lampung Bay</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Red tide</td>
<td>Ai Island, Banda</td>
<td>Oxygen depletion, fish kills</td>
</tr>
<tr>
<td>2015</td>
<td><em>Coscinodiscus spp.</em></td>
<td>Diatoms</td>
<td>Bloom</td>
<td>Jakarta Bay</td>
<td>Oxygen depletion, fish kills</td>
</tr>
<tr>
<td>2015</td>
<td><em>Alexandrium spp.</em></td>
<td>Dinoflagellates</td>
<td>Bloom</td>
<td>Jakarta Bay</td>
<td>Oxygen depletion, fish kills</td>
</tr>
</tbody>
</table>
Recent HABs Event in Indonesia: 1990 – 2015

Fish kills in Jakarta Bay (Nov 2015) caused by Coscinodiscus spp. & Alexandrium spp.

Fish kills in Lampung Bay (2012) caused by Cochlodinium polykrikoides

Fish kills in Ambon Bay (2012) caused by Pyrodinium bahamense var. compressum

Difficulties on facing the HABs problem in Indonesia

- Late response, no early warning system, limited fund to perform monitoring activities of the development of the HABs species in the bay
- Lack of laboratory equipment, difficulty in culturing the HABs species, lack of expertise of taxonomists.
- No routine shellfish toxicity monitoring activities.

Scientific subject necessary to solve the problem

- HABs causative species monitoring activities in time frame to specify and predict the HABs occurrence in specific condition
- Cysts beds study to map the distribution of bloom initiation area
- Culture and shellfish toxicity study to see the development and toxicity of the HABs species
Scientific Activities

Year 2013 – 2015, study:

Diversity of the phytoplankton and cyst responsible of Harmful Algal Blooms (HABs) in Indonesia with a special focus on the species Alexandrium sp., Cochlodinium polykrikoides and Pyrodinium bahamense var. compressum

Publications:


Scientific Activities

Year 2013 – 2015, study:

Diversity of the phytoplankton and cyst responsible of Harmful Algal Blooms (HABs) in Indonesia with a special focus on the species Alexandrium sp., Cochlodinium polykrikoides and Pyrodinium bahamense var. compressum

Next Publications:

- Resting cysts distribution and genetic characterization of the harmful dinoflagellate Cochlodinium polykrikoides Margalef (Gymnodiniales, Dinophyceae) in recent sediments from Lampung Bay (Sumatra, Indonesia), submitted for Oral Presentation by Mariana D Bayu in the 10th WESTPAC International Scientific Conference (April 2017), Qindao, China. Applying Travel Support & Young Scientist Travel Grant.

Scientific Activities

Year 2016, study:

The expansion of toxic dinoflagellate *Alexandrium pacificum/tamarense* and *Cochlodinium polykrikoides* from Asia to the Mediterranean Sea.

**Oksto Ridho Sianturi** Fellowship Granted for foreign researcher Ifremer
Training activities:
- Cysts extraction
- Sediment culture experiment
- Cysts culture experiment
- DNA Extraction
- Molecular identification of *Alexandrium* and *Cochlodinium*
Next Project (2017):

Study of Phytoplankton Diversity responsible of Harmful Algal Blooms (HABs) in Cirebon and Makassar Sea, Indonesia with a special focus on the species Alexandrium sp., Cochlodinium polykrikoides and Pyrodinium bahamense var. compressum
Indonesian Researcher who study on HABs:
- Sem Likumahua, M.Si (RCDS-LIPI): monitoring activities
- Muawanah (BPBBL): monitoring activities
- Untung Sugiharto, A.md (BATAN): Shellfish toxicity monitoring using RAB
- Sutanti, S.Pi & Novi Megawato, S.Pi (BATAN): Scanning Electron Microscope
3 Scientific Activities

Laboratory equipment availability:

- Inverted microscope (RCO-LIPI)
- Scanning Electron Microscope (BPPT)
- Memmert HPP 260 Culture Chamber (RCO-LIPI)
- Polymerase Chain Reaction (PCR) machine (RCO-LIPI).
More research collaboration between institutions and
Capacity building for young scientists (Training course)
THANK YOU