

Red tide is the name given to blooms or population explosions of certain tiny planktonic organisms, usually in coastal waters. The organisms become so dense that the water becomes discolored, taking on a brown, red, yellow or green hue. Large areas of the sea, perhaps hundreds or thousands of square kilometers, can be affected by the phenomenon. The Red Sea takes its name from a harmless red tide that frequently appears there. The organism which is responsible is known as sea sawdust (*Trichodesmium* or *Oscillatoria*), red tides of which are widespread throughout oceanic waters of the Indo-Pacific Region also.

Unfortunately, most other red tides in this region have not been so harmless. The oldest records of harmful blooms are from Australia, where newspaper reports of "rivers of blood" brought public awareness to seasonal red tides which caused massive fish kills in Sydney Harbour in the 1890s.

Further north, the deaths of three children and hospitalization of 20 other inhabitants of a village near Port Moresby, Papua New Guinea in 1972, heralded the discovery of a new deadly red tide organism, the dinoflagellate *Pyrodinium bahamense* var. *compressa*, and a new problem for the region—paralytic shellfish poisoning (PSP).

Paralytic shellfish poisoning is the result of eating bivalve shellfish (oysters, mussels, cockles, etc.) that have been harvested during or soon after red tides in the shellfish grounds. Symptoms are

Red Tide - A Growing Problem in the Indo-Pacific Region

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tingling around the lips and face; sometimes nausea, vomiting and diarrhea; weakness, incoordination; in severe cases paralysis of muscles and vocal cords; death usually within 12 hours due to respiratory failure; no antidote known. Illnesses and deaths from eating intestines of plankton-eating fish have also been reported.

Investigations showed that *Pyrodinium* red tides had probably been around Papua New Guinea for many years. In the Trobriand Islands there for instance, villagers knew not to harvest shellfish at times when the water became luminescent at night in the turbid lagoon near Losuia. *Pyrodinium* exhibits night-time luminescence.

In 1976, the first recorded PSP outbreak along the Brunei-Sabah coast of Borneo took place. There were seven deaths and over 200 illnesses. *Pyrodinium* red tides, which lasted several months, were responsible. Red tides appeared again in 1980, with two deaths from PSP, while in 1983-1984, 11 PSP deaths were reported.

The Philippines experienced its first recorded *Pyrodinium* red tides from June to August 1983, resulting in at least 21 deaths and nearly 200 hospitaliza-



At the SEAFDEC/IDRC shellfish toxicity workshop, Singapore, Sept. 1984. L to R: Drs. Veravat Hongskul and Hooi Kok Kuang, SEAFDEC; Masateru Anraku, Japan; Alan White, Canada.

tions from PSP. It was a national catastrophe, since the red tides occurred in a prime shellfish growing area.

In November 1983, four deaths and nearly 200 illnesses from PSP were reported from Indonesia for the first time. *Pyrodinium* was the suspected cause.

Pyrodinium is responsible for chronic toxicity of shellfish in Palau, while fish kills (due to oxygen depletion of the water) that occur in Guam and Tuvalu, and PSP cases in the Fiji and Solomon Islands, may also be *Pyrodinium* caused.

India has had recent PSP outbreaks, while in New Zealand a different dinoflagellate, *Dinophysis*, may have caused a build up of diarrhetic shellfish poisoning (DSP) detected in mussels.

It was also a different red tide organism that caused Thailand's first known PSP death in 1983 in a river close to the Gulf of Thailand.

In Hong Kong red tides are increasing at an alarming rate.

These scattered but seemingly connected phenomena prompted a regional red tide workshop in Sydney in June and a shellfish toxicity workshop in Singapore in September 1984.

They will be discussed in a global context in 8-12 June 1985, when the Third International Conference on Toxic Dinoflagellates will be held in New Brunswick, Canada. It is not coincidence that the conference site is at the head of the Bay of Fundy, a large water area in which the magnitude and impact of red tides have been increasing over the past 12 years.

For more information on the coming International Conference, contact Dr. A.W. White, St. Andrews Biological Station, Dept. Fisheries and Oceans, St. Andrews, New Brunswick, Canada E06 2X0.

Recorded sites of Indo-Pacific red tides and paralytic shellfish poisonings. Numbers and dates in boxes refer to number of deaths/illnesses, and time of first reported incidents.

