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NATIONAL HIGHER EDUCATION MISSION

KNOW HARMFUL ALGAL BLOOMS SAVE LIVES

In association with

DEPARTMENT OF FISHERIES

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

CMFRI

The Kerala State Council for Science, Technology and Environment (KSCSTE) was established by the Government of Kerala in 2002 in a bid to encourage and promote science and technology education. As an autonomous body, the KSCSTE has been providing financial support to educational institutions and eligible students to undertake various projects. As a part of this, under the aegis of Maharaja's College, Ernakulam, institutes such as CMFRI, Government Fisheries Department, CUSAT, KUFOS, and Nattakom Government College is organising a project named, **'KNOW HARMFUL ALGAL BLOOMS, SAVE LIVES',** where they take awareness classes on Algal Blooms for people residing in the coastal regions and in various other educational institutions.

The phenomenon of algal blooms has been reported from ancient times. It has even found mention in the Old Testament which described the 'river turning red with floating dead fish, making the water unportable for the people.' The first report of algal blooms along the Kerala Coast was by the scientist Hornel in 1908. Algal blooms were commonly known as 'RED TIDE'. This was due to rapid increase in number of microscopic plankton that led to the change of colour.

In 1986, the International Council for Exploration of Seas gave a scientific definition for algal blooms as "those, which are noticeable, particularly to general public, directly or indirectly through their effects such as visible discoloration of the water, foam production, fish or invertebrate mortality or

toxicity to humans." Various organisations around the world such as Scientific Committee for Oceanic Research (SCOR), European Union (EU), Asia-Pacific Economic Cooperative Programme (APEC), Geo-HAB, and COR-HAB, are working on HAB.

Around 300 species of algae are known to produce blooms, of which 60-80 species are known to produce toxins. They release metabolites (Biotoxins) during various stages of their lifecycle, which affect the growth of other organisms. They also cause the reduction of dissolved oxygen, nutrients and penetration of sunlight into the water column. They cause accumulation of toxins in filter feeding shell-fishes like clams, and oysters, leading to symptoms like vomiting, diarrhoea, chest pain, loss of appetite, dizziness and breathlessness when consumed by humans. Increased toxicity could lead to memory loss as well. The primary reasons for formation of algal blooms is availability of adequate sunlight and excessive amounts of nutrients like Nitrogen and Phosphorus. To an extent, natural processes like waves, currents and human encroachment also aid in algal bloom formation.

Algal blooms are classified into 4 types based on their effect on other organisms. They are, those which cause discolouration of water; those non-toxic to humans but harmful for aquatic organisms; those which affect humans and other organisms through air-borne toxins; and those which are toxic to humans through consumption of affected fish.

In India, around 39 algal species are known to cause blooms. 110 algal blooms have been reported from Indian waters. Blue-green alga *Trichodesmium erythraeum*, red or green *Noctiluca scintillans* are the most commonly occurring bloom causing species. 75% of algal blooms are caused by Dinoflagellate species. Of these 40 species produce toxins. Consumption of bloom affected fish cause 6 types of illnesses in humans. They are, Paralytic Shellfish Poisoning (PSP), Diarrhetic Shellfish Poisoning (DSP), Neurotoxic Shellfish Poisoning (NSP), Ciguatera Fish Poisoning, Amnesic Shellfish Poisoning (ASP), and Azaspiracid Poisoning (ASP).

Algal blooms are more prevalent in the western coast of India than its eastern coast. Around 32 different types of algae have been reported from the western coast. The Malabar coast of Kerala has reported the maximum number of algal blooms, followed by Mangalore and Goa. Algal blooms are mostly reported during the months of March-May and September-October. Of these, diatom blooms are observed during May, August and November, while dinoflagellate blooms are reported during September-October. 33 blooms have been reported from the eastern coast, caused by diatoms, dinoflagellates, and cyanobacteria. Most of the blooms are caused by diatoms. *Asterionellopsis, Trichodesmium & Noctiluca* are the species that most frequently implicated with causing algal blooms.

Algal bloom was the cause of death of 3 people and hospitalisation of 85 others in Tamil Nadu in 1981. In 1985 at

Poovar (near Vizhinjam) in Kerala, algal bloom led to the death of 5 children and hospitalisation of 300 people. In 2004, mass fish mortality was reported from the coasts along Thiruvananthapuram and Kollam districts, which however did not cause any human casualities.

Some species of algae that were previously unreported from Indian waters have caused algal blooms along the coast of Kerala. These species are prevalent in colder waters and may have been transported to our coasts through shipping. In ships, water collected from one region is disposed off in other regions. This is called Ballast Water. Introduction of new algal species by this method is called bio-invasion. The formation of cysts by dinoflagellates, which can withstand adverse environmental conditions, can lead to algal blooms when ideal conditions arise. These are more dangerous and are capable of being more toxic.

Toxic algal blooms are all caused by microscopic algae which measure between 20-200 µm. Apart from these, there are larger algae that get stuck to propellors of ship and other fishing equipments. However, these are not harmful and have useful purposes like production of therapeutic agents, and are thus cultivated.

Algal blooms can be controlled and prevented only through proper awareness amongst people. Overuse of chemical fertilisers and pollution have lead to increased frequency of algal blooms. Use of chemical fertilisers have grave effects on other organisms. Spreading awareness is the most ideal option to reduce the use of chemical fertilisers.

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