cases, it leads to hypoxia of water-bodies, further leading to formation of dead-zones where water can no longer support life.

- **Impact over humans:**
  - The human illnesses caused by HABs are rare but it can be debilitating or fatal. For example, eating seafood contaminated by toxins from algae called *Alexandrium* can lead to paralytic shellfish poisoning, which can cause paralysis and even death.
  - Fish and tourism industries are also affected by the HABs.
  - Consumption of aquatic resources from the regions of HAB may result in accumulation of toxic wastes in the human body through biological processes such as Bio-accumulation and Biomagnification.

Indian scientists have found that the HABs in Indian seas have increased by more than 15% in the last 12 years. To manage the HABs, there is a dire need to reduce the use of pesticides and fertilizers in farming and bring strict laws for treatment of industrial discharge and urban wastes.

9. Discuss the challenges that lie in harnessing the potential of hydroelectricity in North-East India. (150 words) 10

Approach:

- Briefly discuss the potential of harnessing hydroelectricity in North-East India.
- State the factors that hinder development in this aspect.
- Conclude accordingly.

Answer:

India's North-Eastern states with their mountainous topography and perennial streams, together account for almost **40 percent of the total hydropower potential of the country**. However, despite the potential, there are several challenges that hinder the harnessing of hydroelectricity in North-East India, which include:

- **Geological Issues**: Most of the North-East region **is seismically active with frequent earthquake occurrences**. This is compounded by lack of proper historical cataloguing of earthquakes, poor knowledge of ground motion post-earthquake, and the variation of spectral acceleration, which can lead to incorrect assessments. Slope failure has also been the causes of delay for the ongoing hydroelectricity projects.
- **Cost issues:** According to **the Standing Committee on Energy's report**, the **average cost for new power plants** is around Rs. 8 crore/MW for coal-based ones while it is Rs. 10 crore/MW for hydroelectric ones. Thus, from an initial-cost perspective, hydropower projects are less lucrative for developers.
- **Issues related to environmental clearance:** Delays in environmental and forest clearances is one of the major reasons for apprehensions and entry barriers. For instance, **three types of clearances are mandatory from three different wings of the Ministry of Environment and Forest**, i.e. environmental clearance from the Expert Appraisal Committee, forest clearance from the Forest Advisory Committee, and wildlife clearance from the National Board of Wildlife (NBWL). Further, the EIA conducted for several North-Eastern hydropower projects has been deemed to be inadequate.
- **Trans-boundary river management:** In most North-East states, the majority of the projects are being built on **basins that are shared between India and Bangladesh.** The projects developed by India (the upstream country) creates panic concerning water scarcity and ecological distress in the lower riparian Bangladesh, e.g. the hydroelectric projects on river Teesta, the proposed **Tipaimukh hydroelectric project on river Barak** etc.
- **Connectivity issues:** The region is characterised by **remoteness, hilly terrain, poor connectivity**, lack of adequate transport facilities, inadequate infrastructure etc. which hinder the ongoing projects.
- **Opposition by local communities:** Hydroelectricity projects are often opposed by local residents as they end up facing **issues related to land acquisition, rehabilitation and resettlement**. This also sometimes fuels agitation and escalates into court cases, thereby delaying projects.