

Factsheet-3

Visual Indicators of Water Body Health Status

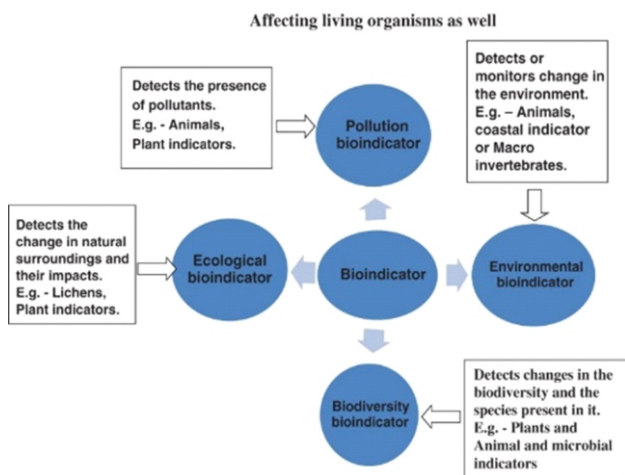
Visual Indicators of Water Body Health Status

A natural waterbody is a complex living ecosystem in which biotic and abiotic physical and chemical entities coexist. Living organisms such as plants, planktons, animals, and microbes act as Bioindicators that can be utilized to screen the health of the natural ecosystem.

Types of bioindicators

Different bioindicators point to different types of problems in water quality.

Figure 1. Sub-types of Bioindicators.



When does a living lake die?

Life is where water is. So, in its natural state, a waterbody is a living entity. It is a hub of life with a self-supporting ecosystem of flora and fauna thriving in and around it. However, increasingly, waterbodies are diseased, dying or dead. A waterbody dies when its water dries up. In most cases, however, it dies because of Eutrophication. Bacterial decomposers encouraged by dead algal matter, further deplete the levels of oxygen. As a result, eutrophication can quickly remove much of the oxygen from a lake, leading to an anoxic — and lethal — underwater environment. The lake dies.

The addition of excessive amount of nutrients such as nitrogen and phosphorous to water bodies which promotes excessive growth of plants in a water body is called Eutrophication. The canopy of plants, the heavy decomposition load and lack of light in the water, reduces oxygen levels and ultimately makes life impossible in the water.

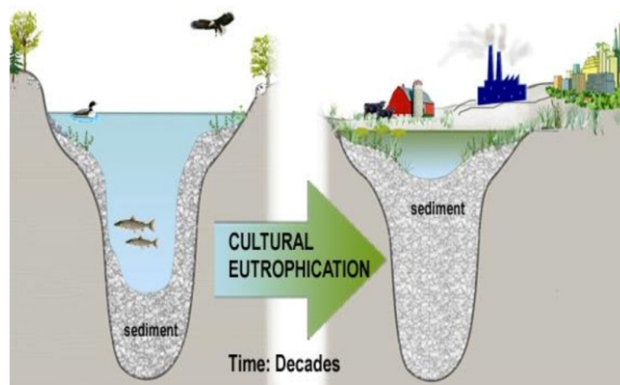


Figure 5. Cultural Eutrophication (Creeklife (Articles for the Environment), 2015)

Timely intervention can save a Waterbody

Waterbodies have amazing regenerative properties. By watching for symptoms that show that the waterbody ecology is under stress, and analysing them, we can diagnose the root cause of that stress. Once we know the cause, we can take steps to remove it and thereby restore health to the waterbody.

How to use visual cues (including bio-indicators) to diagnose waterbody problems?

Even as laypersons, with no access to water quality testing chemicals or facilities, we can make a fairly accurate diagnosis of the waterbody's health status using visual cues including bio-indicators. Let's look at some visual cues that you could use.

Algae free water that has some colour

If a waterbody seems to be mostly algae free but has a distinct colour when you fill up some in a glass, it could indicate dangerously high concentration of some minerals.

Red and brown colours are due to iron which could have flowed into the waterbody from nearby mining or metal processing areas.

Black colour, brown or yellow could be because of manganese, iron or organic matter. The darker it is, the greater the concentration. Manganese would make the water smell oily and have a metallic taste. Organic matter will make the water smell like sewage. Dark Brown colour could be because of tannic acid which is lethal for fish.

Interestingly, totally transparent water, could also indicate a dead waterbody. It indicates the absence of nutrients, presence of heavy metals or acidic base (pH less than 5.5).

Algae

Algal growth in a waterbody indicates the presence of nutrients and eutrophication. If water is clear and algae are sparse, it indicates the lake is healthy and low quantity of nutrients coming in (Oligotrophy). If water remains clear in the summer and monsoon but has algae in the other months, then it means that the nutrient load is higher though not fatal for the lake (Mesotrophy). At this stage, if you identify the source of contamination and control it, the lake will quickly bounce back.



Cyanophyta (Blue-green algae), a phytoplankton, is a powerful bioindicator which is known to indicate rapid eutrophication of water bodies via the creation of bloom formations



Colour of water because of algae

Algae can also give colour to the water and can give you important clues about the status of life in the pond.

Coloration	What it indicates	Waterbody health
Golden brown or reddish-brown colour with transparency between 25-35 cm	Caused by blooming of single cell algae as Euglena in cold weather. It means that the water is saline with high organic matter	Living with average health. Fish in the pond will be healthy and brilliant color
Light, pale or Bright Green color with transparency between 20 & 70 cm	Rich in phytoplankton like Chlorella, Chlamydomonas	Living pond, highly productive for fish
Dark Green or blackish green color	Occurs in high temperature when quick accumulation of organic waste happens. Has protozoa and germs.	Living but with deteriorating health. May have fish that stink
Foggy White Water color	Indicates dead algae, clay and bacteria because of bad quality water.	Poor health. Fish, if any, will be diseased Unproductive

Aquatic Plants



If, apart from algae, you also observe rootless, floating aquatic plants such as **Duckweed** (*Wolffia Globosa*) in the water, it means that the water is in eutrophic stage i.e., the polluting nutrients in it are high enough to sustain higher order plants that spread fast across the waterbody.

Duckweed are also excellent **bioindicators of heavy metals**. If the **leaves are turning yellow** it indicates high levels of **copper**. Cadmium contamination could be coming from coal or oil burning or incineration of municipal waste nearby.

Water Hyacinth (*Eichhornia crassipes*) – If you see most other aquatic plant species replaced with water hyacinth - a perennial, free-floating aquatic plant - it indicates **high level of nutrient contamination and possibly heavy metals**. Water hyacinth can completely cover lakes, outcompeting native aquatic species, reducing oxygen levels for fish, and creating ideal habitat for disease-carrying mosquitoes. It can completely kill a waterbody.

Lichens

Lichens generally found on the trunks of trees and rocks are composed of algae and fungi both. If you see lichens growing on the lake shoreline or partly submerged in the lake, it indicates that the pH of the water is above 5 i.e., it is near neutral or basic. It also indicates a low



nutrient content i.e.; the lake is clean. If you do not see lichen on the trees near your pond, it could mean that there is pollution coming in from coal burning, petroleum or metal processing industries nearby.

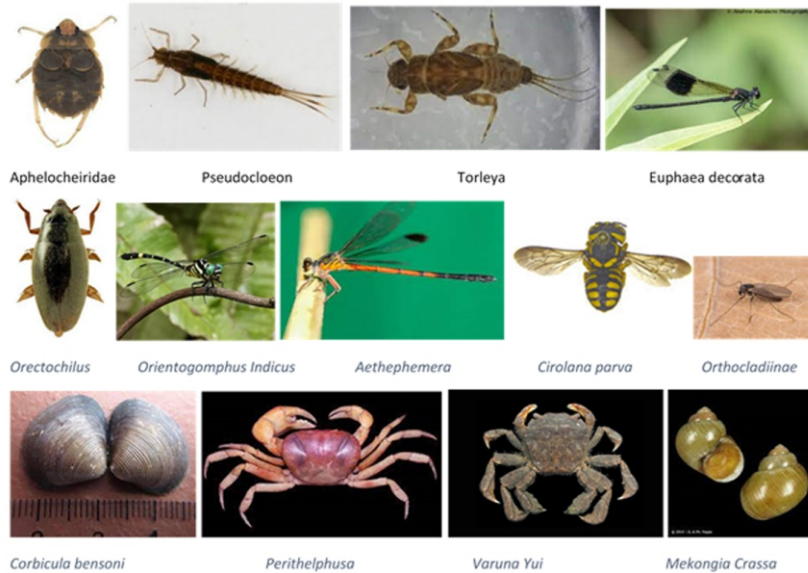
Frogs - Frogs are very sensitive to changes that take place in their freshwater and terrestrial habitats. This makes them important



Bioindicators of ecological quality and change. Frogs are particularly sensitive to chemical contamination. If you see a lot of frogs in your lake, it indicates a healthy environment. If you do not see any, it indicates chemical contamination.

Insects: These are excellent bioindicators because of their sensitivity to the ecological conditions around a waterbody. The presence of earthworms, nematodes, termites and ants in the waterbody shore is an indication of healthy ecosystem

If you see any of the species shown below in the waterbody, it indicates that the water quality is good with little or no pollution.



However, if you see the following insects, it indicates that moderate amount of pollution in the pond



The following are indicators of heavy pollution



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