

STUDY OF BIOINDICATORS FOR THE ENVIRONMENTAL POLLUTION

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The study deals with the assessment of environmental indicators relevant to the quality of life which can be monitored and easily measured. Bioindicators is new generation indicator which is other than the core indicators (subsets) developed and used by the OECD for issues such as toxic contamination, land and soil resources, and urban environmental quality. Indicators can also provide a framework for collecting and reporting information within nations and for reporting national data to such international bodies as the United Nations Commission on Sustainable Development. A bioindicator is a living organism that gives us an indication of the health of an ecosystem which include biological processes, species, or communities and can be plants, animals or microorganisms. Each organic entity inside a biological system provides an indication regarding the health of its surroundings. They are also a method of monitoring the negative impacts that industrial activity has on the environment. This information helps develop strategies that will prevent or lower such effects and make industry more sustainable. The role of bioindicators in sustainable development will help ensure that industry leaves the smallest footprint possible on the environment.

Keywords: Bio indicators, OECD- Organization for Economic Co-operation and Development

I.INTRODUCTION

Biological processes within an individual belongs to animals, plants or microorganisms can act as bioindicators. Bioindicators include biological processes, species, or communities and are used to assess the quality of the environment and how it changes over time. Bioindicator species effectively indicate the condition of the environment because of their moderate tolerance to environmental variability. Changes in the population levels, physiological processes and behavioral modifications of such organisms are used to detect changes in the environmental health. Environment renders indicator species sensitive to its alterations, whereas detection of ecosystem by assessing an efficient incentive of a single population is believed to be more useful and cheaper (Spellerberg, 2005). Shortterm stress conditions or long-term events predict future situations and alterations by identifying the variations in indicator species (Cairns and Pratt,1993).Bioindicator is given to a living entity or group of organisms that shows the information, either based on the environment or a constituent of it (Wilkomirski, 2013).

II. WHAT ARE BIOINDICATORS

Naturally occurring Bioindicators are used to assess the health of the environment and are also an important tool for detecting changes in the environment, either positive or negative, and their subsequent effects on human society. There are a certain factors which govern the presence of Bioindicators in environment such as transmission of light, water, temperature, and suspended solids. Through the application of Bioindicators we can predict the natural state of a certain region or the level/degree of contamination (Khatri N and Tyagi S, 2015). Biological factors may indicate better the environmental balance through the biotic indexes, derived from the observation of bioindicator species. The advantages associated with using Bioindicators are as follows:

1. Biological impacts can be determined.
2. To monitor synergetic and antagonistic impacts of various pollutants on a creature.
3. Early stage diagnosis as well as harmful effects of toxins to plants, as well as human beings, can be monitored.
4. Can be easily counted, due to their prevalence (Trishala K, *et al* 2016).

III. TYPES OF BIOINDICATORS

Bioindicators can be plants, animals or microorganisms:

- If toxins are present, certain plants may not be able to grow in the area affected.
- Monitoring population numbers of animals may indicate damage to the ecosystem in which they live.
- Algae blooms are often used to indicate large increases of nitrates and phosphates in lakes and rivers.

The presence or absence of some specific plants or other vegetation provides ample information about environmental health. Lichens generally found on the trunks of trees and rocks are composed of algae and fungi both. They react to ecological changes in forests, including changes in the structure of the forest, air quality, and climate. Environmental stress can be indicated by the disappearance of lichen in forests, as caused by changes such as increases in the level of sulfur dioxide (SO₂), pollutants of sulfur and nitrogen (N₂) (Walsh, 1978; Peterson, 1986; Gerhardt, 2002; Holt & Miller, 2010; Khatri & Tyagi S, 2015). *Wolffia globosa* is an important tool for showing cadmium sensitivity and also used for indicating cadmium contamination. Changes in the diversity of species of phytoplankton, including *Euglena clastica*, *Phacus tortus*, and *Trachelon anas*, indicate the pollution of marine ecosystems (Mitchell and Stapp, 1992; Phillips and Rainbow, 1993; Jain *et al* 2010). Hasselbach *et al* (2005) used the moss *Hylocomium splendens* as an environmental indicator of heavy metals in the remote tundra ecosystem of northwestern Alaska. Animal indicators also help in detecting the amount of toxins present in the tissues of animals (Joanna, 2006; Khatri and Tyagi S, 2015). Invertebrates can

also be Bioindicators; aquatic invertebrates tend to be bottom feeders (also known as Benthos or macro invertebrates), living near the bottom of water bodies. Zooplanktons like *Alona guttata*, *Mesocyclops edax*, *Cyclops*, *Aheyella* are zone-based indicators of pollution. Invertebrates can also be Bioindicators; aquatic invertebrates tend to be bottom feeders (also known as Benthos or macro invertebrates), living near the bottom of water bodies. These types of bioindicators may be particularly powerful indicators of watershed health

Bacterium *Vogesella indigofera* which reacts to heavy metals quantitatively. *Euglena gracilis* is a motile freshwater photosynthetic flagellate. Although *Euglena* is rather tolerant to acidity, it responds rapidly and sensitively to environmental stresses such as heavy metals or inorganic and organic compounds

Most frogs require suitable habitat in both the terrestrial and aquatic environments, and have permeable skin that can easily absorb toxic chemicals. There is a relation between aquatic organisms and pollution as aquatic organisms are considered to be the indices of pollution (Kolkwitz and Marrson, 1908).

IV BENEFITS OF BIOINDICATORS

1. Bioindicators are biological assessment to monitor environmental pollution by their biological impacts on pollutants.
2. Bioindicators have the potential to indicate the toxicity or harmful impact of any pollutants when physical or chemical methods are not applicable.
3. A single species can be used as an indicator of any pollutants. No need to monitor whole community for biomonitoring.
4. Economically viable alternative when compared with other specialized measuring systems.
5. It directly monitor human health by maintaining link between the quality of human life and environment.

V. CONCLUSION AND DISCUSSION

Bioindicators play a key role between environment and pollution which indicates the current status of environmental condition. The presence and absence of indicators provides a information regarding the type and quantity of pollutants causing the degradation of environment. The benefits of bioindicators is that it uses a single species of any plant, animal or microorganism to make a conclusion regarding the increase level of any pollutants. Thus bioindicators monitors human health .The conclusion can be drawn that the bioindicators is dynamic tool for the assessment of the pollutants level and its toxicity degrading the ecosystem by the presence of different biotic factors present in the environment.

VI. REFERENCES

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