Assessing the Impact: Water Pollution and Its Physicochemical and Biological Effects on Pond Fish Culture

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Abstract- ***Pure water is the backbone of all the living organisms on this earth. Life can not be imagined without water. Science also believes that the first life originated in water. Water is as important for life as oxygen. we get water in around us in many forms like river , well, sea, pond ,lake etc. When unwanted substances introduced in water then water become impure and the pollutant like chemical, physical pesticides, insecticides, sewage, garbage and many more harmful substances mixed in the water, water become polluted. In this toxic environment no living organism will be able to survive. This toxic water is not only a threat to fishes, or other aquatic organisms but it is also considered as a global threat which means it is also influencing human life. In this review we are only discussing fresh water bodies and how pollution is affecting fresh water bodies and their environment. The aim of writing this review is to inform people about how by maintaining physical, biological and chemical parameters in fresh water bodies we can conserve aquatic organisms like fishes. This act can prove to be very beneficial for humans and will create a globally sustained world.***

Indexed Terms- ***Water Pollution, Fish Health, Contamination, Pollutants, Heavy Metals, Human Activities, Sustainable, Physical, Biological, Chemical Parameter, Insecticides, Pesticides, Pond Water Etc.***

I. INTRODUCTION

"Water is life." "Save water saves life" water is the most important natural resource for all living organisms. We can't imagine life without water even though life originated in water first. Chemical composition of water is two elements of hydrogen and one atom of oxygen. We can find water in liquid, solid and gas states. These colourless, odourless and tasteless liquid covers earth 70% of the surface. 2.3 % to total freshwater and the rest is salt water (Wetzel, 1983). About 60% of the human body is water. There are many sources of water around us like rivers, ponds, wells, etc. These freshwater are used in various human and living organisms activities like drinking , washing, gardening, cooking and so on. Water is polluted when unwanted waste, material like sewage, garbage, agricultural waste, domestic waste, industrial waste, chemical waste and very harmful unwanted substances enters into the water body.

Fish is an inexpensive source of protein and an important cash crop in many regions of the world and water is the physical support in which they carry out their life functions such as feeding, swimming, breeding, digestion and excretion (Bronmark and Hansson, 2005). Fishes are the one of the most important, beautiful, delicate, and conspicuous species on earth. They play a very vital role in maintaining the water ecosystem as they are primary and secondary consumers. Fish play a crucial role in ecosystems by helping them stay strong and balanced. They move around in the environment, providing important information, energy, nutrients, and genetic resources, which contribute to the overall health of the ecosystem. Freshwater fishes play a more dynamic role in ecosystems and give various benefits to the environment and human communities such as they are protein in rich food sources, pollution indicator, source of income and livelihood for many communities. Contributing to tourism and local economies. Freshwater fishes are important subjects for scientific study and educational purposes.

II. SOURCES OF WATER POLLUTION

There are many sources which are barriers to a healthy aquatic ecosystem. if we talk about pond ecosystems there are not only fish that survive but also zooplankton, phytoplankton, molluscan, and other life also found. Pond ecosystem health indicate the water quality of pond. Somebiological, physical and chemical sources are responsible for the water pollution and physico chemical parameter disbalance of water.

Human and developmental activities e.g. effluents from industries, irrigation activities, waste management problems, and also rise in urbanisation possessed some serious threats to the freshwater ecosystem (Zhu et al., 2018; Meijide et al., 2018; Kamboj et al., 2020).

III. BIOLOGICAL POLLUTION

Protozoa, algae, fungi, bacteria, and many more living organisms harm fishes and other pond organisms. Coliform bacteria andE. coli are important pathogens that cause infections in fish populations (Winfield and Gerdeaux, 2016).they are spread diseases and are responsible for dismanage water ecosystem.

IV. EUTROPHICATION

Eutrophication occurs when excessive nutrients such as nitrogen and phosphorus, cause an overabundance of algae and plants in water, leading to lower oxygen levels, more fish deaths, reduced water clarity, and biodiversity loss. Human activities like agriculture and sewage discharge majorly contribute to this process.

V. POTENTIAL OF HYDROGEN (PH)

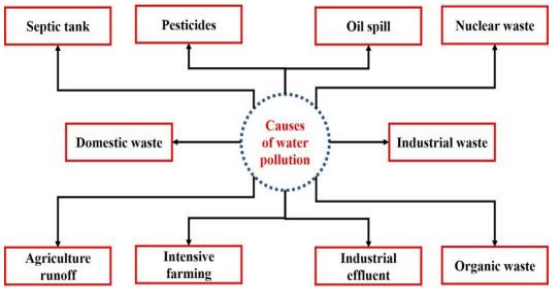
pH serves as an indicator of a water's acidity or alkalinity on a scale from 0 to 14. Neutral pH is 7, values below 7 indicate acidity, and those above 7 signify alkalinity. The pH of water plays a vital role in the well-being of fish and other aquatic organisms, influencing their physiological processes.

VI. ACIDIFICATION

When a pond or any water body gets more acidic through decreasing water pH its causes of acidification. The region of acidification is increasing acidic substances in water. Because of acidification, the health of the aquatic ecosystem gets unwell.

VII. CHEMICAL POLLUTION

When harmful chemical substances like pesticides, industrial chemical, fertiliser, metal, are introduced into the water body and harm to the ecosystem called chemical pollution. The heavy metals, specifically Pb, Cu, and Zn, are commonly acknowledged as having adverse effects on human health, aquatic life, and the overall environment. Elevated concentrations of these heavy metals are known to be deleterious, posing a significant risk to ecosystems by virtue of their bioaccumulation in organisms.



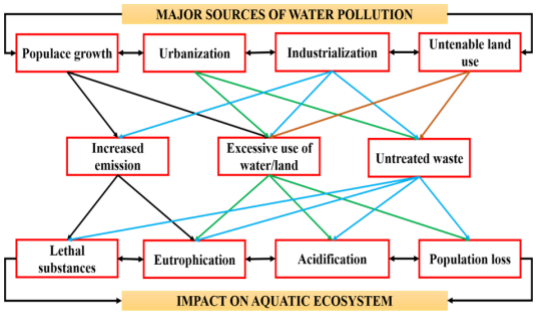
(Source: Malik et al. 2020)

VIII. EFFECT ON WATER LIFE

Water pollution can have significant and detrimental effects on fish. Here are some key impacts:

- Physical parameters: physical parameters like turbidity, temperature, colour, depth, and light all these physical parameters get disbalanced due to pollution. the results of parameter affecting all the ecosystem.
- Chemical parameters: such as pH, dissolved oxygen, co2, alkalinity, salinity, nitrate, phosphate, heavy metal all chemical parameters are affected and not only water bodies although human health gets down because of pollution.
- Biological effect: habitat degradation, oxygen depletion, physiological and behavioural changes, reproductive problems, and even death

in severe cases. bioaccumulation, diseases spread, food chain disruption all are the biological effects on fish population due to pollution of water.



(Source: Malik et al. 2020)

CONCLUSION

Fishes help to maintain Freshwater ecosystem stability. They contribute to nutrient cycling, regulate populations of other organisms, and influence the overall health and stability of freshwater environments .For the Healthy fish populations we can improve water quality ,which is a more important factor of water ecosystems, it helps in nutritional levels and maintenance of freshwater habitats. Maintaing the water quality of any water body is the main key point not only for the fish but also for all ecosystems including human beings. It is the duty of humans to use it for not only our own small benefit but We should ensure that the whole ecosystem is not destroyed. We should treat the chemical, biological and physical waste along with the increasing population of human beings and reuse it and all its parameters should be maintained in these derelict water bodies. We will have to develop a healthy ecosystem by maintaining it which will be beneficial for the entire living world.

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