

# IMPROVEMENT OF WATER QUALITY IN AN INLAND WATER BODY THROUGH LOW COST TECHNOLOGY – A CASE STUDY FROM INDIA

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## Abstract

Low-cost, environment friendly technology that uses locally available material and measures to control waste input can improve water quality in small water bodies. This paper explains the success story from a wetland region in south India. Climate change and anthropogenic impacts such as encroachment and release of untreated wastewater and solid wastes highly degraded the water quality, leading to water crisis. Monthly analysis of water sample from the sixteen locations for twelve months showed that presence of organic and inorganic pollutants are very high, water quality is much below safety limits and serious health hazards could be expected in near future. Hardness of water shows that water is totally unfit for human use. Amount of dissolved oxygen has become so low that organisms such as fish and frog disappeared from most of the region. Vector-borne and water-borne diseases affected thousands. Change in rainfall seasonality and failure in a development project affected natural flushing of water. Rainfall is becoming more seasonal, causing erosion and sedimentation and making parts of the wetland dry for a few months. However, experiments in the test plot with local technology using locally available material like charcoal and lime shell, and locally made cheap aerators prove that condition can be made better without much financial expense. Deepening and cleaning of the canal to enhance water circulation and erosion control using local plants made a lot of changes.

**Keywords:** water quality, inland canal, Kerala, low-cost technology, adaptation strategy

## Introduction

Though the inland water bodies play a crucial role in maintaining food and water securities and providing rural employment, environmental degradation pose a serious threat to many of them in the developing world, inviting serious shortage of reliable water and various health issues. However, water quality in many of them could be improved using low-cost, environment friendly and locally available technologies, if there is proper awareness and support from local people and local administration. Present study is an example of such a success story in a region surrounding an inland canal connected to a major river Meenachil and close to the Vembanad-Kol wetland in central Kerala in south India. More than ten thousand people living along the ten kilometre stretch of the canal depended on it for sanitary purposes, irrigation, transportation, fishing and duck farming. Wells near the canals once provided freshwater for domestic use, except during

non-rainy months because of salinity intrusion from the backwater area (Joseph, 2009). But, in recent decades, the canal became so polluted that people have to either travel for more than a kilometre to fetch water or to pay for it for home delivery, in a region that receives more than three times global mean rainfall. Public water supply is occasional and not reliable always. People still abstract the same water for non-cooking purpose, as there are no other alternative. Skin diseases affect those who directly use the water for bathing.

## Methods

A detailed survey and investigation on the issues related to water quality in the region were carried out. Information from local authorities, farmers and reports from various governmental and non-governmental agencies were used for this. Water samples from sixteen sites in the region were analysed for twelve months. Experiments to improve water quality using locally available low cost material were made, in addition to physical measures such as deepening and cleaning of the waterways to avoid stagnation of water. Programmes were organized to make awareness in local population on the importance of pollution control and water conservation.

## Results and Discussion

Survey shows that the canal is highly polluted from the direct outflow of domestic waste, effluent from the local industries, outflow of contaminated water from paddy fields, bathing of cattle, washing of vehicles etc. Vectors grow and spread fast in the water, inviting serious health issues. Diseases like Chikun Guinea, Japan Encephalitis, Dengue Fever, Diarrhoea and jaundice become common (Government of Kerala, 2008). The major project in the backwater where River Meenachil joins, to control flooding and salinity intrusion in paddy fields in the wetland area worsens the water quality in the canal, as natural flushing is obstructed. Major reason for the deterioration of water quality in the canal now is the stagnation of water.

Analysis of water sample from the sixteen locations along the canal shows that quality is much below safety limits and serious health hazards may be expected at any time. Amount of dissolved oxygen became so low that organisms such as fish and frog disappear from most of the region. Hardness of water becomes so high before the rainy season. High value of the chemical oxygen demand shows that the canal water is unsuitable for healthy aquatic life. The pH values are high during non-monsoon months. Total coliform values indicate that the water is moderately suitable for life existence during rainy season only. The water is subject to widespread eutrophication. Experiments in the test plot with local technology using locally available material like charcoal and lime shell, and locally made cheap aerators prove that condition can be made better without much financial expense. Deepening and cleaning of the canal to improve water

flow itself made a lot of changes. Awareness programme attracted local population. This has helped to change their way of life and they show care in disposing solid material into the canal. If the method adopted in the test plot is extended to the entire area, life in the surroundings can be brought back to earlier conditions. Climate change may affect the runoff in River Meenachil that in turn will affect the water level in the canal. More sediment input can be expected. Rainfall is becoming more seasonal and intense in the region (Nair, 2009). It may flood the region during monsoon. Lengthening gap in rainfall may further deteriorate the water quality in dry period. The proposed scheme of water diversion under national river linking project also may reduce the inflow of freshwater.

There should be a system for liquid waste treatment and a proper drainage system and collection facility for solid waste. Dredging of the canal and planting of local herbs for shore protection are important. Rooftop water harvesting can solve the shortage of reliable water, as the rainfall in the area is more than 300cm. This is to be done by the local government. But, there are new challenges like industrial development associated with economic expansion, rapid rise in population, filling of water bodies for real estate business etc that in turn may affect the water bodies. An adaptation strategy is required at the state level itself.

## Conclusions

Anthropogenic activities and changes in climate have large impact on water in the selected location. This may lead to serious socio-economic issues such as poverty in local population, migration to the nearby regions, conflict over resources and hiking price of water. However, proper adaptation measures, wise management, pollution control measures and adoption of low-cost water purification methods can help overcome the crisis without much investment.

## References

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