

# ASSESSMENT OF WATER QUALITY OF HOLY RIVER KSHIPRA AT RUDRA SAGAR

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**ABSTRACT:** The studies were conducted to grasp the various parameters of Physico-chemical of waste material that was disposed off within the stream and every outer pond of Ujjain town. During this paper, a water sample was collected altogether the three season of the year (summer, monsoon and winter). Physico-chemical parameters particularly pH, turbidity, TS, TDS, TSS, CaH, MgH, Cl, SO<sub>4</sub>, NO<sub>3</sub>, BOD, COD were analyzed victimization the quality technique and therefore the reason behind the pollution. The result indicates that the water is unsuitable for each domestic and industrial use.

**KEY WORDS:** Ecosystem, Aquatic, Environmentalist, Macrophytic diversity, perennial pond, Rudra Sagar.pH, dissolve oxygen (DO), biochemical oxygen demand (BOD), turbidity, TS (total solid),TDS (total solid),TSS (total suspended solids),Ca H (calcium hardness), Mg H(Magnesium hardness).

**INTRODUCTION:** Water is an inadequate and valuable resource for the endurance of human race. Semi synthetic activities modify the morphology of the areas the watercourse regimes inflicting problems with pollution. quick industrial enterprise for property development is inflicting major concern to the pollution of surface water as a result of most of the industries sewerage are putting off their waste in to the stream while not creating any source of treatment and violating the provisions for traditional laid-out of an equivalency. Pollution of watercourse bodies has become a significant and international draw back that's turning into necessary in developing nations of the earth as a result of inadequacy or non-existence of surface water quality protection measures and sanitation. Lagoons, rivers and streams are sinks for wastes. Wastes unite most often discharged into receiving water bodies with less or no connection with their assimilatory capacities. This in result makes pollution of water bodies a worldwide issue that has no respect for national or international boundaries. The pollution is increasing owing to monumental increase in and of itself the offered water in varied surface sources ought to be preserved.

Rudra Sagar is located in the middle of town however nowadays it is reborn into sewerage water (Nalla). The waste that flows once getting used for domestic, industrial and alternative functions is discharge into it. Water contains sewerage becomes the main component of Nalla, whereas another constituent, and embody organic waste and chemical. Sewerage discharge is one in all the issues which is conferred. Sewerage discharges are a significant component of pollution, causative to oxygen demand and nutrient loading of the water bodies. The waste matter may well be a combination of waste product water, agricultural evacuation, industrial waste effluents and hospitals facilities; it's usual that the waste matter from domestic origin contains pathogens, suspended solids, and other organic and inorganic pollutants. Industries, on other hand, manufacture helpful product however at an equivalent time generate waste products.

**STUDY AREA:** Ujjain is an ancient city situated on the eastern bank of the Kshipra River in the Malwa region of central India. The city is today part of the state of Madhya Pradesh. The site for the present study was Rudra Sagar which is positioned behind the Mahakaleshwar the prominent temple and in front of the Harsiddhi temple in Ujjain. Its three sides are surrounded by the road. The depth of the pond is approximately 5 to 6 meter and the area is about 7 hectare. It is a perennial water body. Rudra Sagar is one of the ancient sapt sagar having historical and spiritual significance.

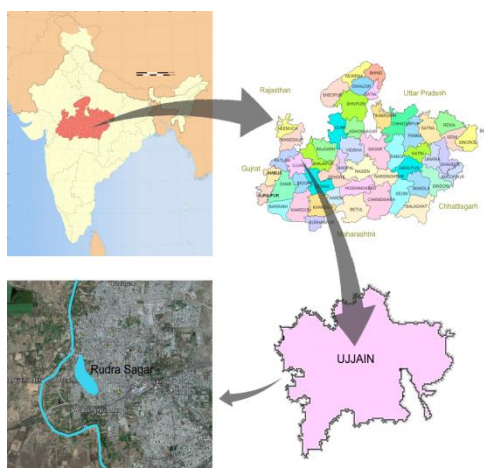


Figure 1: Location of Ujjain

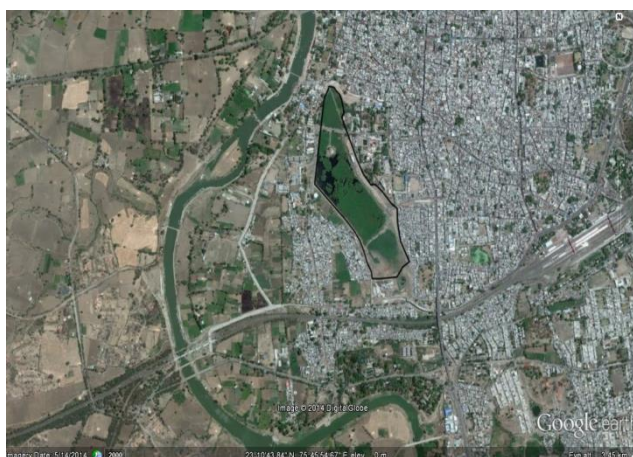
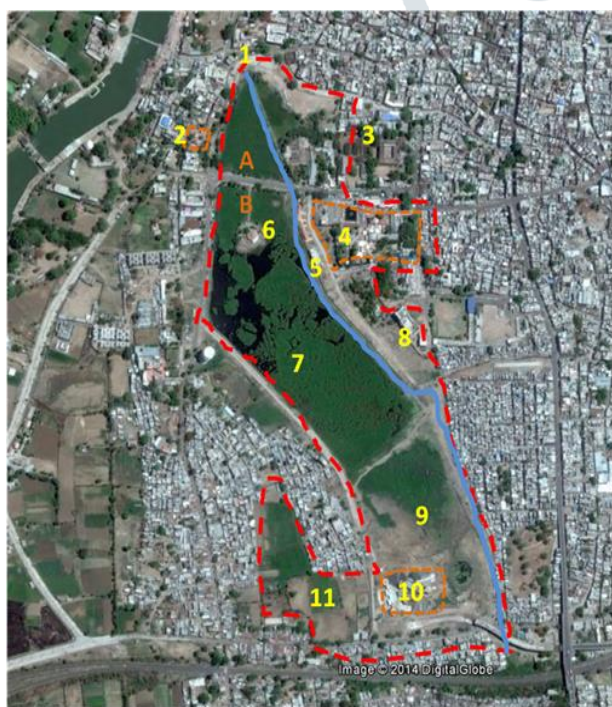


Figure 2: Rudra Sagar Google Map

**METHODOLOGY:** By means of the case study and by sampling Municipal waste water product and also the lake water sample is collected regarding 40-50 cm below the surface, to avoid the gathering of surface impurities, oils etc. Before sampling, 2-3L polyethylene bottles were rinsed with 0.1N chromic acid, then washed double the time with distilled water. A separate sample was collected in a bottle to calculate the Dissolve oxygen (DO).

**PARAMETERS:** Subsequently 15 water parameters were analyzed: Temperature, pH, Turbidity, Total solids Total dissolved solids, Total suspended solids, Total hardness, Calcium Hardness, Magnesium hardness, Nitrate, Sulphate, Chloride, Dissolved oxygen, Biological oxygen demand, Chemical oxygen demand.



--- Mahakal van area  
--- Significant sacred site



Figure 4: The north part of Lake from the causeway (Point A)



Figure 5: The lake from the causeway, looking southeast towards the Mahakal Temple. This photograph shows the water surface partly clear after manual removal of water hyacinth growth. (Point B)

Figure 3: Rudra Sagar and surrounding

RUDRA SAGAR LANDSCAPE:

1. An open drain carrying effluent runs along the eastern side of the lake from the south and crosses it to the north, from where it empties into the river. It is unsightly and a source of noxious smells and pollution.
2. The Harsiddhi temple sits on the western side of the northern part of the lake.
3. Substantial remains of an ancient wall and mound.
4. The Mahakal temple complex sits on raised ground, overlooking the lake. The Shikara is visible from most parts of the lake.
5. Public spaces in the streets to the east of the temple complex are well used, but the land between the complex and the lake is just dusty waste ground.
6. Vikramaditya Teela on the island reached from the causeway.

7. Most of the water surface is covered in water hyacinth due to excess nutrients, caused by untreated effluent flowing into the lake. The very little water surface is visible.
8. Location of old earth terraces with probable ancient remains - to be preserved.
9. The southern part of the lake is now permanently dry, except during the monsoon, and used for grazing.
10. Dargah under large old relict Imli tree (Tamarindus indica).
11. Existing agricultural fields and grazing land, proposed for park, car parking and camping ground.

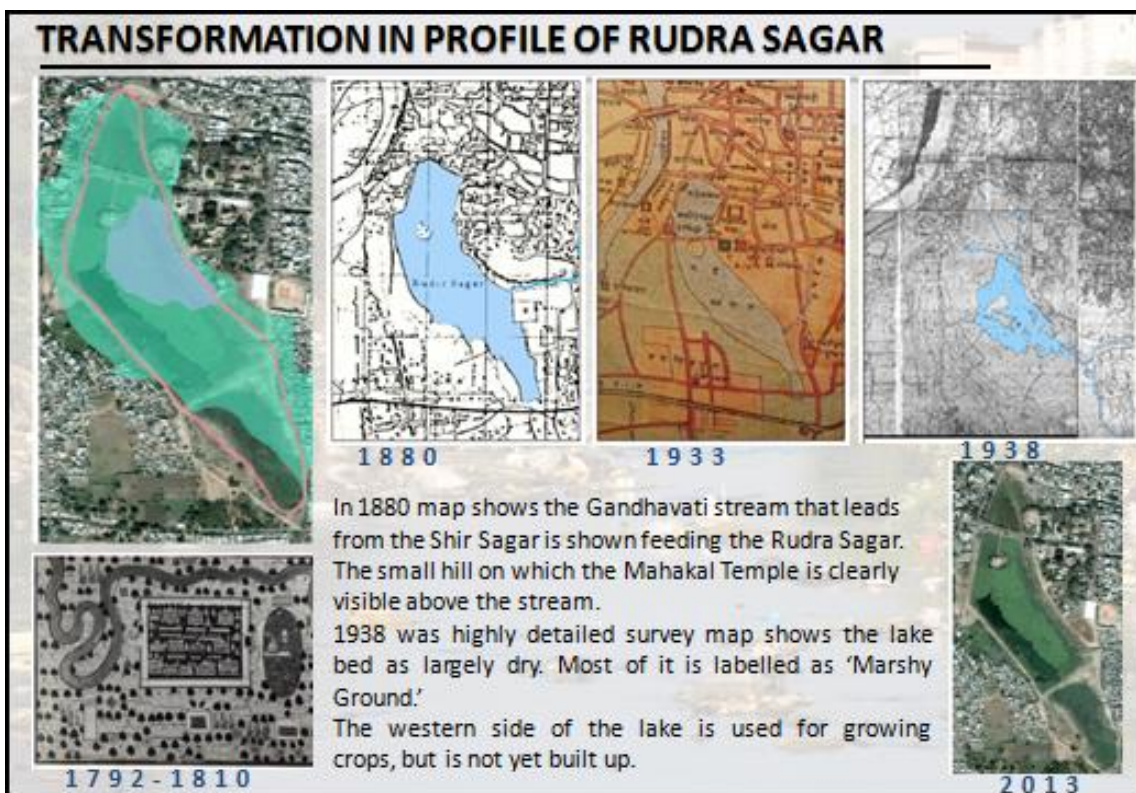


Figure 6: Transformation in profile of Rudra Sagar (Source: MP Ujjain Smart city Development Plan)

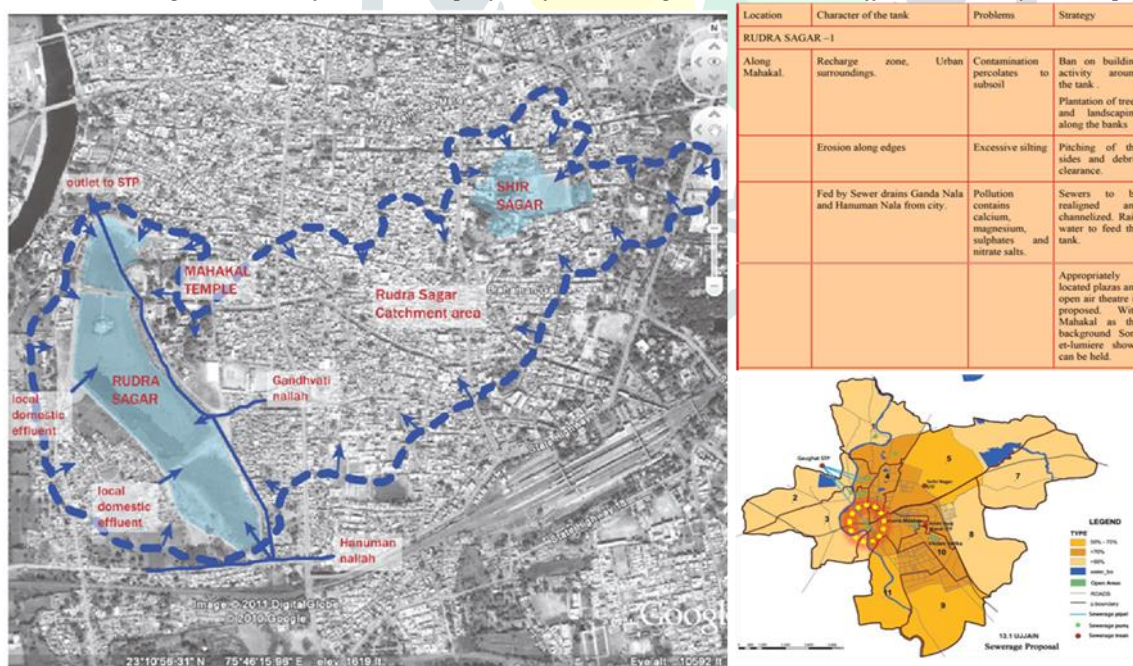


Figure 7: Existing catchment of Rudra Sagar (Source: MP Ujjain Development Town book 2021)

ISSUES RELATED TO RUDRA GAGAR

1. **Pollution:** Large scale water pollution is the result of untreated effluent flowing from the urban areas around the lake. The Nallah running along the eastern side and across the northern lake carries effluent. It is a source of noxious smells, and when it overflows during the monsoon, adds to the pollution. There is also pollution on

a smaller scale caused by people. Casual littering results in large quantities of non-degradable plastic clogging up the lake and lakeside. Informal use of the site as a dump has produced mounds of building waste. Lastly, lack of adequate sanitation means that people living in the vicinity use the waste ground around the lake as an open-air toilet, fouling the land with excrement and causing a potential public health hazard

**Reason of pollution**

- a. Urban development surrounded by Rudra sagar
  - b. Urban development surrounded by Rudra sagar
  - c. Religious aspects around Rudra Sagar.
  - d. The macrophytes were ascertained in high frequency. This uncontrolled growth of aquatic weeds within a water body may be a sign of pollution and it shows that the lake is on the verge of eutrophication. Most of the species present within the waterbody are eutrophic tolerant species especially Elodea, Lemna. Eutrophication affects the chemical properties of the water. It results in the ascend growth of aquatic plants. Water quality conjointly has been affected because of dense macrophytic vegetation that coated nearly the entire surface of the water.
  - e. Impact of Dye Industrial Effluent on Physicochemical Characteristics: - Rudra Sagar is one of the sacred water which is being contaminated by effluents discharged from Bhairavgarh dye industries. The foremost common textile process unit consists of desiring, scouring, and bleaching, mercerizing and dyeing method.
2. **Land Degradation:** Unregulated grazing by animals and harvesting of trees and shrubs for fodder and firewood have denuded the land of its vegetation and left exposed soil. This soil has become pale in colour and dusty in texture. The soil is also probably hosted to harmful pathogenic bacteria, resulting from use of the site as a toilet. Without an attempt to reverse the decline in the quality of the soil and restore vegetation cover, the soil will degrade further.

PROCESS OF ANALYZING THE POLLUTION: Parameters designated for assessing the bathing water quality standing at vital ghats and in the river, the impact of phosphate on overall water quality is thus high. Presence of Phosphate indicates the utilization of fertilizers within the catchment of the river.

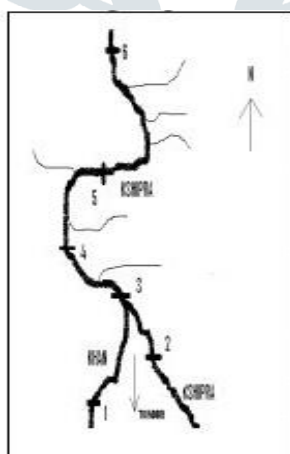


Figure 8: Water Sampling Map

Sample Station	1	2	3	4	5	6
Description	At Khan river (before confluence with Kshipra River)	At Kshipra river (before confluence with Khan River)	At Triveni Sangam	At Gaughat	At Rudra Sagar	At Siddhwat Ghat

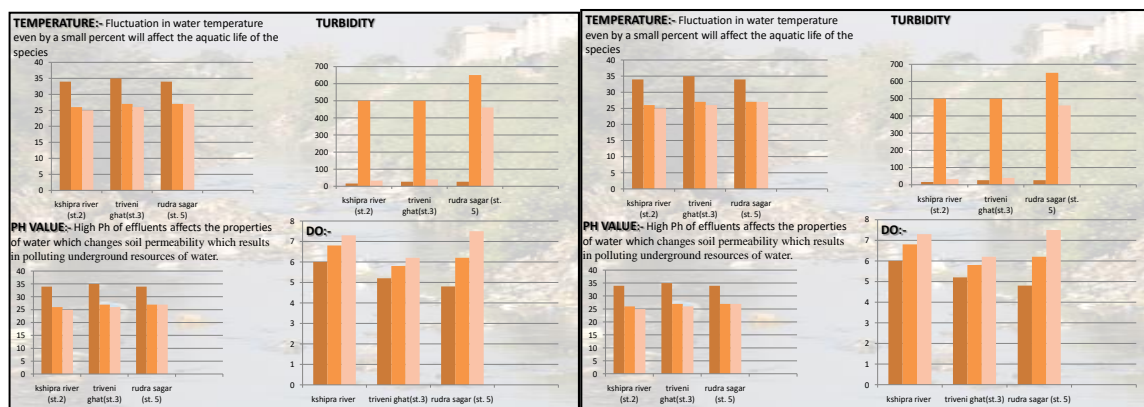


Figure 9: Result of water quality test (Source: www.iwrs.org.in, journal 2012)

CONCLUSION: WQI for kshipra river water in Rudra Sagar ranges between 36 and 49 representing their poor quality. The study additionally confirmed that Khan river entirely and drains to some extent is accountable for water quality deterioration in river Kshipra. The water is inappropriate even for bathing because of unacceptable amount of pH and DO present in it even BOD and FC values are extremely beyond the minimum acceptable limits. A serious action has to be taken for the preservation of the river and its stream.

# JETIR

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