

# Parallel Ritual Canal System as a Planning Strategy to Address River Pollution and Safety Issues in Temple Precincts and Ghats

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**Abstract** - Rivers in India carry deep cultural and religious importance, especially in temple towns where activities like bathing, idol immersion, washing, and cremation often take place along riverbanks. These activities can lead to water pollution and create safety issues due to deep water, strong currents, and crowding during festivals. This research looks at how ritual activities affect river water quality and public safety in temple riverfront areas, focusing on Kaundanyapur, Maharashtra, as a case study. Site observations and a literature review identified key problems related to pollution, waste disposal, and unsafe bathing conditions. The study suggests a planning-based solution with a parallel ritual canal system that features shallow depth, controlled flow, and natural filtration methods. This system aims to separate ritual activities from the main river channel while allowing for religious practices and improving safety. It also discusses supporting infrastructure like designated washing platforms, immersion tanks, and ritual zoning. The proposed framework presents a sustainable and replicable approach to reduce ritual pollution and improve safety in temple towns throughout India.

**Key Words** - Riverfront planning, Ritual practices, River pollution, Temple precincts, Safety, Infrastructure strategies, Sustainable river management

## 1. INTRODUCTION

Rivers have always held an important place in Indian society, not only as sources of water but also as sacred and cultural spaces. From ancient times, rivers have been closely associated with religious beliefs, rituals, and daily practices. Riverbanks, especially near temples, function as active public spaces where people gather for bathing, prayers, festivals, and other ritual activities throughout the year.

With the increasing number of pilgrims and the intensity of religious events, riverfront areas in many temple towns are facing serious challenges. Activities such as ritual bathing, idol immersion, washing of clothes, disposal of offerings, and cremation practices directly affect river water quality. During festivals, overcrowding at ghats and uncontrolled access to the river increase both pollution levels and safety risks.

Deep water, strong currents, and the absence of organized infrastructure often lead to accidents and unsafe conditions for devotees.

While these practices are deeply rooted in tradition and belief, their environmental and safety impacts cannot be ignored. Completely restricting rituals is neither practical nor culturally acceptable. Therefore, there is a need to explore planning and infrastructure-based approaches that can manage ritual activities in a more controlled and sustainable manner. This research focuses on understanding ritual-induced river pollution and safety issues and explores design-oriented solutions that can protect the river while allowing religious practices to continue in a safe and respectful way.

## 2. Research Methodology

This research follows a qualitative and planning-based approach to study the impact of religious rituals on river pollution and safety in temple riverfront precincts. The study is based on literature review, case study analysis, and site observations.

Existing research papers, government reports, and studies related to river pollution, ritual practices, and riverfront development were reviewed to understand the nature of pollution and safety issues associated with religious activities. Case studies such as Manikarnika Ghat, Sabarmati Riverfront Development, and the Wardha River near Kaundanyapur were analyzed to examine ritual impacts and the effectiveness of planning and infrastructure-based interventions.

Site observations were used to understand ritual activities, crowd movement, ghat conditions, and safety concerns in temple riverfront areas. Based on the issues identified, a planning and design-oriented solution in the form of a parallel ritual canal system was proposed. The study aims to develop a conceptual and replicable planning framework rather than a detailed technical design.

## 3. Major Ritual Practices Affecting Riverfronts

- **Mundan Sanskar:** Disposal of hair into the river causes localized clogging and pollution near ghats, especially during peak ritual days.
- **Antim Sanskar (Cremation):** Immersion of ashes and partially burnt remains increases organic and chemical load in the river when proper facilities are not provided.
- **Asthi Visarjan:** Regular ash immersion without designated tanks leads to continuous water quality deterioration near temple ghats.

- **Tarpan:** Repeated offerings of water and flowers result in accumulation of organic waste along river edges.
- **Snan (Ritual Bathing):** Mass bathing during festivals causes overcrowding, safety risks, and contamination due to soaps, oils, and direct contact with river water.
- **Aarti and Daily Offerings:** Disposal of flowers, lamps, and incense into the river contributes to floating waste and visual pollution.
- **Idol Immersion:** Use of non-eco-friendly materials in idols significantly affects water quality and aquatic life.
- **Large Religious Gatherings:** Temporary events increase waste generation and stress on riverfront infrastructure, emphasizing the need for planned ritual zones.

#### 4. River Pollution in India

- Rivers in India are facing increasing pollution due to untreated sewage, industrial waste, and continuous human activities along riverbanks.
- Many river stretches near cities and pilgrimage towns are no longer suitable for drinking or bathing, as reported by agencies such as CPCB and NEERI.
- Religious activities like mass bathing, idol immersion, cremation rituals, and washing of clothes add localized pollution, especially near ghats.
- Smaller rivers flowing through temple towns are equally affected due to lack of planning and supporting infrastructure.
- The Wardha River near Kaundanyapur experiences increased pressure during festivals, highlighting the need for controlled ritual spaces and pollution-reducing interventions.

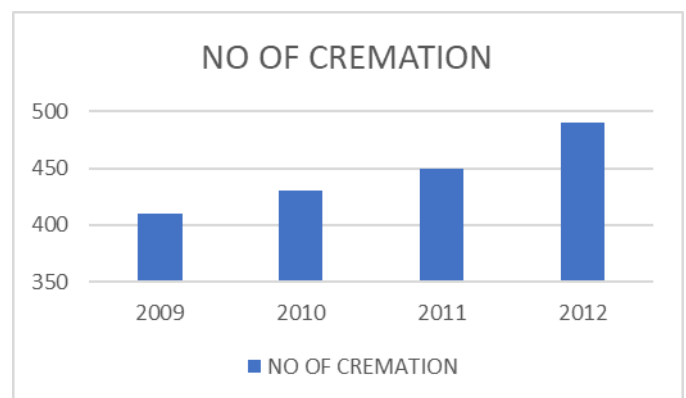
S. number	WQI range	Status
1	<50	Excellent water quality
2	50–100	Good water quality
3	100–150	Medium or average water quality
4	150–200	Poor water quality
5	200–300	Very poor water quality
6	>300	Water unsuitable for drinking/bathing or any other human use

#### 5. Impacts of Religious Rituals on Rivers: Case Studies

To contextualize the challenges at the Wardha River in Kaundanyapur, it is essential to examine established studies on ritual-induced pollution. Research by Raveendran and Geetha (n.d.) highlights how traditional practices can severely strain aquatic ecosystems when unsupported by proper infrastructure.

##### 5.1 Managing Cremation Rituals: Manikarnika Ghat, Varanasi:

Raveendran and Geetha (n.d.) note that the routine immersion of ashes at Manikarnika Ghat introduces dense concentrations of calcium phosphate, magnesium phosphate, and nitrogen compounds into the Ganges, which drastically elevates Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). However, the introduction of improved crematoria under the Ganga Action Plan (GAP) successfully reduced direct ash dumping. This proves that physical infrastructure can mitigate environmental damage without disrupting religious traditions.



Note:- Bar Diagrams Showing the Annual Variation in Number of Cremations at Manikarnika in 2012, 2011, 2010 and 2009 Year wise Data by Courtesy-Varanasi Nagar Nigam

##### 5.2 Sabarmati Riverfront Development, Ahmedabad

The Sabarmati Riverfront Development demonstrates how comprehensive urban design harmonizes religious activities with environmental preservation. By introducing designated step-lined ghats and organized ritual zones, the project segregated heavy human activity from vulnerable parts of the river. This allowed cultural traditions to continue while protecting the ecological baseline.

##### 5.3 Wardha River and Kaundanyapur Temple Precinct.

The Wardha River holds religious and cultural importance for the town of Kaundanyapur, where ritual bathing, daily

worship, festivals, and occasional cremation-related activities occur along the riverbanks. During religious events, increased footfall leads to direct interaction with the river, resulting in pollution from offerings, washing activities, and unmanaged waste. Additionally, the lack of defined ghats and safety infrastructure exposes devotees to risks from water depth and seasonal flow variations.

Unlike larger cities, smaller temple towns such as Kaundanyapur often lack organized riverfront planning and supporting infrastructure. This makes them vulnerable to gradual river degradation. The case of the Wardha River highlights the need for localized, low-impact planning solutions that are culturally sensitive and economically feasible.

### 6. Proposed Planning Solution: Parallel Ritual Canal System Integrated with Riverfront

The analysis of religious rituals and case studies clearly indicates that direct interaction between ritual activities and the main river channel is one of the primary causes of river pollution and safety hazards in temple towns. Activities such as ritual bathing, washing of clothes, offering of materials, and Idol immersion practices take place along unregulated river edges, leading to contamination of water and unsafe conditions for devotees. To address these issues without restricting religious practices, a planning-based solution that separates ritual activities from the main river flow is essential.

This research proposes the introduction of a parallel ritual canal system integrated with the riverfront as a sustainable and culturally sensitive solution. The canal functions as a controlled water body designed specifically for ritual use, running parallel to the river and connected to it through regulated inlets and outlets. By diverting ritual activities to this canal, direct pollution of the river can be significantly reduced while maintaining the sanctity and accessibility of water for devotees.

### 7. Design Principles of the Parallel Canal System

The proposed canal is designed with shallow water depth and slow flow velocity, making it safe for ritual bathing and daily use. Unlike the main river, which often has fluctuating water levels and strong currents, the canal allows controlled conditions throughout the year. Properly designed ghats with non-slip steps, handrails, and safety railings ensure secure access for all age groups. Clear zoning within the canal area separates activities such as ritual bathing, washing of clothes, and ceremonial offerings, preventing cross-contamination and overcrowding.

Dedicated platforms for washing clothes and performing daily rituals are provided along the canal, ensuring that soaps, oils, and waste materials do not directly enter the river. The canal is visually connected to the riverfront,

preserving the spiritual experience, while physically protecting the river from direct human impact.

### 7.1 Natural Filtration Methods in the Canal System

- **Constructed Wetlands :** Shallow planted zones using aquatic vegetation such as reeds, cattails, and local wetland plants help absorb nutrients, reduce organic pollutants, and improve water clarity.

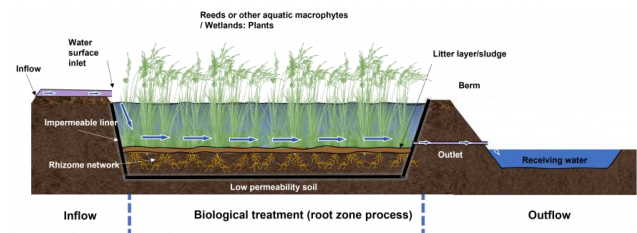


Fig -1: Constricted Wetland

- **Sand and Gravel Beds :** Layered sand and gravel filters trap suspended solids, hair, ash particles, and organic matter from ritual activities.
- **Bio-swaales and Vegetated Channels :** Sloped channels with grass and native plants slow down water flow and promote natural sedimentation and filtration
- **Settling Tanks:** Small sedimentation basins allow heavier particles like ash and ritual debris to settle before water moves into the filtration zones.

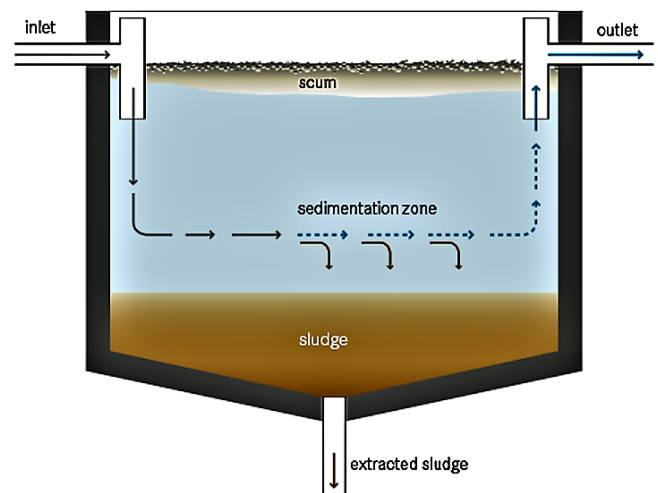


Fig -2: Settling Tank

Note:- These systems work together to reduce Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and suspended solids, improving the quality of water before it re-enters the river.

## 7.2 Artificial Filtration and Supporting Infrastructure

In addition to natural methods, **artificial filtration systems** can be incorporated to enhance efficiency during peak festival periods:

- **Screen Filters:** Installed at inlet points to capture floating waste such as flowers, cloth pieces, and ritual materials.
- **Oil and Grease Traps:** Used near washing zones to prevent oils and soaps from entering the filtration system.
- **Modular Treatment Units:** Compact treatment units can be introduced temporarily during festivals to handle increased load.
- **Controlled Outlets:** Treated water is released into the main river through regulated discharge points, ensuring minimum environmental impact.

These systems allow flexibility and scalability depending on seasonal usage.

## 8. Importance and Effectiveness of the Proposed System

The parallel ritual canal system addresses both pollution control and safety concerns, which are the major challenges identified in temple riverfronts. By shifting ritual activities away from the main river channel, the system prevents direct discharge of pollutants and reduces stress on river ecology. The shallow depth and controlled flow ensure safety for pilgrims, particularly during crowded festivals.

From a planning perspective, the canal allows clear organization of ritual spaces, improved crowd management, and easier maintenance. It also supports long-term sustainability by combining traditional practices with modern environmental planning principles. For towns like Kaundanyapur along the Wardha River, such a system offers a practical, low-impact, and culturally respectful solution that can be adapted to local conditions.

## 9. CONCLUSIONS

The proposed parallel canal system demonstrates that river pollution caused by religious rituals can be effectively managed through thoughtful planning and design rather than restrictions. By integrating safety-oriented ghats, zoned ritual spaces, and natural and artificial filtration systems, the solution protects river water quality while preserving religious and cultural practices. This approach provides a replicable model for sustainable riverfront development in Indian temple towns and directly responds to the challenges identified in the study.

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