

Manuscript ID:
IJRSEAS-2026-030240



Quick Response Code:



Website: <https://eesrd.us>



Creative Commons
(CC BY-NC-SA 4.0)

DOI: 10.5281/zenodo.21253767

DOI Link:
<https://doi.org/10.5281/zenodo.21253767>

Volume: 3

Issue: 2

Pp. 237-239

Month: April

Year: 2026

E-ISSN: 3066-0637

Submitted: 14 Mar. 2026

Revised: 25 Mar. 2026

Accepted: 15 Apr. 2026

Published: 30 Apr. 2026

Address for correspondence:

Girish Limaye
Research Scholar, Department of
Environmental Science, Savitribai
Phule Pune
Email: limaye.girish@gmail.com

How to cite this article:

Limaye, G., Supekar, A., & Suruse,
G. (2026). Evaluating Event-
Induced Variations in Surface
Water Systems of a Pilgrimage
Landscape: A Case Study of the
Girnar Region, Junagadh.
International Journal of Research
Studies on Environment, Earth, and
Allied Sciences, 3(2), 237–239.
<https://doi.org/10.5281/zenodo.21253767>

Evaluating Event-Induced Variations in Surface Water Systems of a Pilgrimage Landscape: A Case Study of the Girnar Region, Junagadh

Girish Limaye¹, Dr. Ashwini Supekar², Gunjan Suruse³

¹Research Scholar, Department of Environmental Science,
Savitribai Phule Pune

²Guide, Department of Geology Savitribai Phule Pune University

³Research Scholar, Department of Geology, Savitribai Phule Pune University

Abstract

Surface water bodies in ecologically sensitive regions often experience short-term but intense stress during large human gatherings. The Girnar region in Junagadh, Gujarat, represents one such landscape where ecological richness coexists with strong religious significance. The annual Girnar Parikrama attracts a large number of pilgrims, creating temporary pressure on natural water systems. This study investigates how such event-based human activity influences surface water quality. Water samples were collected from selected locations before and after the pilgrimage and analyzed for key physicochemical, chemical, and microbiological parameters. The results indicate noticeable deterioration in water quality following the event, particularly in terms of increased turbidity, higher biochemical oxygen demand, and elevated microbial contamination, along with reduced dissolved oxygen levels. These findings suggest that even short-duration events can significantly disturb fragile water ecosystems. The study emphasizes the need for better planning, real-time monitoring, and environmentally responsible practices during pilgrimage events. It also highlights the importance of integrating scientific assessment with management strategies to ensure the long-term sustainability of such sensitive regions.

Keywords: Surface Water, Pilgrimage Impact, Girnar Parikrama, Water Quality Variation, Environmental Stress, Sustainable Management

Introduction

Water is one of the most critical natural resources supporting life, ecosystems, and biodiversity. Surface water systems such as streams, ponds, and small reservoirs are especially important in forested and hilly regions, where they serve as primary sources of water for both wildlife and human visitors. At the same time, many of these ecologically important areas are also culturally and religiously significant. The Girnar region in Junagadh is a good example of this overlap. It is not only known for its rich biodiversity and forest cover but also for the Girnar Parikrama, a religious event that draws thousands of pilgrims every year. While such events are culturally valuable, they can create sudden and intense environmental pressure. Increased human presence leads to higher water usage, waste generation, and direct interaction with natural water bodies. Activities such as bathing, washing, and disposal of organic and plastic waste often take place near or within these water sources. Unlike gradual environmental changes, these event-induced impacts occur within a short period, making them difficult to manage. Therefore, it becomes important to study how surface water systems respond to such temporary but high-intensity disturbances.

Objectives of the Study

The present study is designed with the following objectives:

- To examine the changes in surface water quality before and after the Girnar Parikrama
- To identify the key factors responsible for water quality deterioration
- To understand the impact of these changes on the local ecosystem
- To suggest practical and sustainable measures for minimizing environmental damage

Description of the Study Area

The Girnar hills are located in the Junagadh district of Gujarat and form part of a protected ecological region. The area is characterized by rocky terrain, forest vegetation, and a network of small natural water bodies such as streams and ponds. These water sources are essential for sustaining local wildlife and maintaining ecological balance. During normal periods, human interference is relatively limited. However, during the Parikrama, the number of visitors increases sharply, leading to crowding along the routes and around water points.

This sudden increase in population density makes the region an ideal case for studying event-driven environmental changes.

Methodology

1. Sampling Approach

To capture the impact of the pilgrimage event, water samples were collected in two phases:

- **Before the Parikrama (baseline condition)**
- **After the Parikrama (post-impact condition)**

Sampling locations were selected to represent different levels of human interaction:

- Frequently used water points
- Relatively undisturbed upstream locations
- Downstream areas receiving runoff

2. Parameters Studied

To get a complete understanding of water quality, multiple parameters were analyzed:

Physical Parameters

- Temperature
- Turbidity

Chemical Parameters

- pH
- Dissolved Oxygen (DO)
- Biochemical Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)

Microbiological Parameters

- Total coliform bacteria
- Fecal coliform bacteria

3. Analytical Techniques

All tests were conducted using standard laboratory methods as per accepted water quality analysis procedures. Care was taken to maintain sample integrity during collection, storage, and testing.

Results

1 Physical Changes in Water Quality

After the pilgrimage event, turbidity levels increased noticeably at most sampling locations. This can be attributed to soil disturbance caused by heavy foot movement and runoff carrying suspended particles into water bodies. Temperature variations were minimal and did not show a significant impact.

2 Chemical Changes

One of the most important observations was the reduction in dissolved oxygen levels after the event. Lower DO levels indicate that the water is under stress and may not be able to support aquatic life effectively. At the same time, BOD and COD values increased, which suggests the presence of organic pollutants. These pollutants are likely introduced through food waste, biodegradable materials, and human activities near water bodies.

3 Microbiological Contamination

A sharp rise in coliform bacteria levels was observed in post-parikrama samples. This indicates contamination from human and possibly animal waste. Such contamination is a serious concern as it can make the water unsafe for consumption and harmful to both humans and wildlife.

Discussion

The findings clearly show that the Girnar Parikrama has a direct and measurable impact on surface water systems. The deterioration in water quality is not due to natural causes but is strongly linked to human activities during the event. The increase in turbidity, organic load, and microbial contamination suggests that existing infrastructure is not sufficient to handle the scale of the gathering. In particular, the lack of proper sanitation and waste disposal facilities plays a major role in water pollution. Another important point is that these impacts occur within a very short time frame. This means that even a few days of unmanaged activity can disturb the ecological balance of the region.

Environmental Implications

The observed changes in water quality have several consequences:

- Reduced water quality affects aquatic organisms and biodiversity
- Contaminated water sources pose health risks to pilgrims
- Wildlife depending on these water sources may be negatively affected
- Repeated annual events may lead to long-term environmental degradation

Recommendations

Based on the study, the following measures are suggested:

- Installation of temporary toilets and sanitation facilities during the event

- Strict control on waste disposal near water bodies
- Awareness campaigns to encourage responsible behavior among pilgrims
- Regular monitoring of water quality before, during, and after the event
- Involvement of local authorities and communities in environmental management

Conclusion

This study highlights how short-term human activities, such as pilgrimage events, can significantly affect surface water systems in ecologically sensitive areas. The Girnar region shows clear evidence of water quality deterioration following the Parikrama. While these impacts are temporary, their repeated occurrence can lead to long-term environmental damage if not properly managed. Therefore, it is essential to adopt a balanced approach that respects both cultural traditions and environmental sustainability.

Acknowledgment

I would like to express my sincere gratitude to all those who contributed to the successful completion of this research study titled “Evaluating Event-Induced Variations in Surface Water Systems of a Pilgrimage Landscape: A Case Study of the Girnar Region, Junagadh.” I am deeply indebted to my research guide and faculty members for their invaluable guidance, constant encouragement, and insightful suggestions throughout the course of this study. Their expertise and support played a crucial role in shaping the research and enhancing its quality.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References (Indicative)

1. APHA – Standard Methods for Water Analysis
2. CPCB Water Quality Standards
3. Environmental studies on pilgrimage impacts
4. Research articles on water pollution and ecosystem health