# Tackling Problems Of Waterlogging Occuring In Mysore Road (Kengeri) Due To Overflow Of Vrishabhavathi River

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**Abstract**

The main objective of this study is to solve one the major problems associated with the surrounding areas of Kengeri, where a constant overflow of stormwater from the stream of Vrishabhavathi River in the area of Mysore Road for a stretch of 100 metres. The area has also witnessed soil slippage which has caused the washing away of a part of Mysore Road, which is considered one of the most important and busiest roads of Bangalore. The study discusses reasons which constantly causes the overflow such as Inadequate space provided by stormwater drain, high level of contamination of flowing water and a smaller number of sewage treatment plants. The study proposes increase in number of STPs, identification of certain areas for detention ponds, searching of possibilities where large houses such as apartments can have a provision of STPs contributing for decentralization of STPs.

**Keywords** Vrishabhavathi, Mysore Road, overflow, stormwater drain, Detention ponds, sewage treatment plants.

## I. INTRODUCTION

Context- Bengaluru is one of the most fastest growing cities in India. The city has experienced growth exponentially from past few decades. The city has seen a never seen development from 1980s due to the introduction of main IT sectors in the city, result of which the city has experienced an IT boom, which again resulted in the migration of lakhs of people from other parts of the state/country to the city of Bengaluru. Hence, the city has experienced or is experiencing fast expansion which is again resulting in urbanization and conversion of small towns in outskirts to cities. On the negative side, due to the exponential growth and urbanization of the city, the natural resources existing in the city is being exploited, unscientific methods are being followed. Vrishabhavathi River- Vrishabhavathi river is a minor river, tributary of the Arkavathy, that flows through the southern part of the city of Bengaluru. Originates near Dakshina Mukha Nandi Teertha (Kaadu Malleshwara Temple) Near Malleswaram, flows through major areas like Nayandahalli, Rajarajeshwari Nagar and Kengeri, then culminates in a reservoir near Bidadi. Later it joins Arkavathy River near Kanakapura as a tributary.

In the present-day situation, the river is highly polluted due to various pollutants from industrial, agricultural, and domestic origins. Waterlogging- The stream of the river flows in parallel to the Bengaluru-Mysuru highway (NH 275) for a stretch of 500 metres, near the municipal corporation of Kengeri. During the time of rainy season, that stretch overflows on the highway which has become a reason for constant problems faced by the people in that area, commuters, and people who travel frequently by vehicles. The corporation has undertaken some measures to stop the problem, but the area is witnessing the same issue again from the past couple of years. This study aims to find the cause of the problem and come out with practical and possible solutions.

## II. STUDY AREA

Study is conducted in the site, near Kengeri town, Bengaluru (12.9201311, 77.4927360).

Fig. ii(a) Map of Karnataka


Fig. ii(a) Map of the site of study

## III. METHODOLOGY

In this study, a detailed case study of the site done including the topography. Existing data is collected and is analyzed, and inferences brought down. Examples of any such similar issues is identified, results are compared, and inferences recorded. Annual rainfall data is observed, effect caused is estimated, results recorded. Solutions for the issues faced identified and the inferences of case studies analysed. Different possible and practical methods are discussed and analysed, and a set of recommendations brought down to solve the existing issue.

## IV. METHODOLOGY

### IV (1). Topographic Analysis

Location: Mysore Road, Kengeri, Rajarajeshwari Nagar Zone, Bengaluru Urban, Karnataka, India. (12.89759, 77.46010 12.93336, 77.49914) Kengeri
is located in the outskirts of southwest of the city of Bengaluru.


Fig. iv(a) Topography of the stream

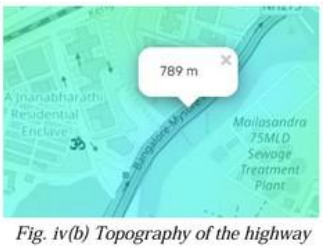


Fig. iv(b) Topography of the highway


780 - 795m elev 796 - 900m elev

- Maximum Elevation of Kengeri: 855 metres.
- Minimum Elevation of Kengeri: 765 metres.
- Average Elevation: 803 metres.

Highest point of elevation i.e., 855 metres is at the northern part of Kengeri. The site is located at an area which has one of the lowest points of elevation. Due to this, stormwater from throughout Kengeri gets accumulated near this area.
There is a difference of 2 metres in level between the NH 275 and Vrishabhavathi River.

### IV (2). Annual Rainfall Analysis

| | Precipitation in mm | Rainy Days |
|---|---|---|
| Jan | 4 | 1 |
| Feb | 7 | 1 |
| Mar | 16 | 2 |
| Apr | 45 | 5 |
| May | 131 | 11 |
| Jun | 126 | 14 |
| Jul | 134 | 15 |
| Aug | 137 | 15 |
| Sep | 125 | 12 |
| Oct | 147 | 13 |
| Nov | 65 | 7 |
| Dec | 23 | 3 |

Fig. iii Annual rainfall data (2021)

The city of Bengaluru is witnessing a greater number of rain days with high intensity as compared to the past decades.
This might be a matter of concern for the area as there could be increase in the number of cases of overflowing of the stream.

### IV (3). On-Site Analysis

A detailed case study has been done, data has been collected, and data analysis has been conducted on the site and few observations has been recorded as follows:

- The drainage system has been partially blocked by the debris due to the increase in contamination of the river.
- The road is not maintained properly as the condition continues to deteriorate.
- Level difference of the river and the highway (NH 275) recorded is 2 metres approx.
- Water drains given in the bunds has not been maintained properly.

## V. SOLUTIONS AND RECOMENDATIONS

**V (1). Case study on Sewage treatment plants** Sewage Treatment Plant is a facility whose main objective is to remove contamination, dirt, and harmful chemicals in the water to give out a purified stream of water which will be suitable for domestic use other than drinking and cooking purposes. There are various number of sewage water treatment facilities and processes like, centralized, de-centralized systems, urban runoff, etc. There are some components and processes involved in sewage treatment plants, they are: Inflow: The sewage treatment plant receives and processes wastewater from residences, businesses, industries, and other commercial establishments. Screening: To protect the downstream movement, large materials such as sticks, leaves, and trash are filtered out of the wastewater. Primary Treatment: During this phase, the wastewater is subjected to initial treatment, the solids in the water settle to the bottom of sizable tanks, where they solidify into sludge. A considerable percentage of the suspended particles are removed with the aid of this technique.

Secondary Treatment: After the basic primary treatment, the clarified water is treated biologically, which typically involves the use of bacteria and other biological agents to further break down organic contaminants. Tertiary Treatment: To further enhance the treated water's quality, tertiary treatment entails further steps. To achieve water quality standards, this could need extra filtering stages and disinfection techniques (such UV treatment or chlorination). Sludge Treatment: The sludge gathered in the settling tanks is subjected to anaerobic digestion, a biological process in which organic waste is broken down by microorganisms in the absence of oxygen. In the process, the amount of sludge is decreased, and biogas is produced. Before being disposed of or receiving additional treatment, the residual sludge is dewatered to lessen its volume. In the case of Vrishabhavathi River, there has been a lot of inflow of contaminated water from the sources from Industrial areas, Human wastes from residential areas, etc. There has been a necessity for the stoppage of contaminated water or regulation of inflow by decentralization of the system by increase in the number of Sewage water treatment Plants (STP) to bring down the quality of inflow of contaminated water.

### V (2). Case study on Detention Ponds

Stormwater runoff is managed and controlled through detention ponds, which are infrastructural components also referred to as stormwater detention basins or just retention ponds. They are frequently employed to lessen the effects of intense rain and the chance of flooding in urban and suburban settings.
During the time of intense precipitation, detention ponds help in managing stormwater flow and reduce the chance of downstream floods, before the stormwater being released into natural water bodies, stormwater is improved in quality by settling in the pond due to the slowing down of its flow, which also settles contaminants and debris. Design- The shape of a detention pond can vary according on the site and design specifications, and it can be rectangular, circular, or irregular.

Inlet and outlet elements in detention ponds play a very major role in the process as they manage the stormwater flow into and out of the pond, controlling the water level. In the event of severe weather, emergency spillways play a vital role in providing a way for extra water to securely escape the pond.
By temporarily storing extra rainfall during a storm, the pond lowers the risk of flooding downstream by delaying rapid flow. To simulate the natural flow of water and lessen the impact on places downstream, the stored water is released at a controlled rate.

The study has observed certain existing problems and issues in the site. Considering the data collected from the analysis IV (1), IV (2), IV (3) the study as identified few solutions and suggestions as follows:

**V (3). Identification of Detention Ponds**

There has been a constant increase in waterflow to the Vrishabhavathi River through various means. This study recommends identification of the place to provide a suitable area for detention ponds in the outskirts of Bengaluru, to contain the water level of the stream.

**V (4). Decentralization of Sewage Treatment Plants**

Sewage Treatment plants play a very important role in regulating inflow of stormwater. Decentralization of Sewage Treatment Plants and trying to implement of individual STPs in Residential Units/ apartments would contribute to regulation of the amount of inflow of the stream and decreasing of the water level of the stream of Vrishabhavathi River.

**V (5). Adequate Maintenance of the bunds**

According to the observations done in IV (3), the study has found out that water drains provided in tank bunds are not maintained properly, resulting in blockage in the pipes, which is in return causing the blockage of stormwater and preventing from reaching the streamline.
Hence, it is suggested for a proper and a timely maintenance of the concrete bunds.

**V (6). Regulation in the inflow of the water**

It has also been observed that there has been increase in the quantity of the inflow of the stormwater, these buildings include industries, residential buildings, and from commercial activities.
Hence, the concerned authorities are suggested to conduct a scrutiny of the industries and other buildings which release contaminated water in huge quantities.

**V (7). Efforts to increase the gap between the highway and the water stream.**

According to the observation done in the point 1V (1), it is found our that the level difference between the highway NH 275 and Vrishabhavathi River is 2 metres, which could cause increase in incidents of overflowing of the stormwater. It is required to increase the level difference between the stream and the national highway NH 275. It is advised to put in efforts to increase the level difference.

## VI. DISCUSSION

The study has conducted a detailed analysis of an existing issue of flooding in an area, which is one of the biggest issues faced in Urban areas. This study identifies and analyses major reasons for the cause of flooding and brings out certain measure and recommendations to bring down the problem of flooding. This study focusses on one of the major problems in that area, which is creating problems for the local civilians, commuters and people who travel frequently through the location of the issue.

## VII. CONCLUSION

The study has identified and analysed all the modes of available and practical solutions to solve the issue of flooding/overflowing of Vrishabhavathi stream. Hence, this study highly recommends all the solutions listed in points V (1), V (2), V (3), V (4), V (5), V (6) and V (7). This
is an issue which is seen in many parts of the city, state, and country.
Hence, all these measures could be applicable in all such situations. All the suggestions/ recommendations mentioned in the study aim to solve all the related issues regarding the flooding situation in a more sense of practicality and economic feasibility.
This study expects all the solutions recommended to be implemented by the concerned authorities and the problem of overflow to be solved immediately.

## VIII. REFERENCES


- Heavy metal contamination in soil under the application of polluted sewage water across Vrishabhavathi River. – ETP Jayadev- International Journal for Engineering Research. (Identifies reasons for the contamination of the water stream).
- Landuse and landcover study of Vrishabhavathi River Basin, Karnataka, India – S Shivanna, DR Vyshnavi, SB Brahmananda. (Studies the current land use and land cover of the water flow and surrounding areas).
- Identification of potential sites for detention ponds along the Vrishabhavathi River – PT Aravinda, HB Balakrishna, KC Jayaramu.
- Rainfall Analysis of Vrishbhavathi Valley in Bengaluru Region – HN Rajakumara, K Ganesha Raj.
- Detention pond design and land use planning for watershed management – LJ Harrell, SR Ranjithan.
- Effectiveness of Urban runoff detention pond – wetlands system – EH Martin
- Pollutant removal of stormwater dry detention pond – DW Stanley
- Single outlet detention-pond analysis and design – AO Akan.