

# Sedimentation Management at Jayakwadi Dam

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**Abstract-** River deltas are the major repositories of terrestrial sediment flux into the world's oceans.Reduction in riverine inputs into the deltas due to upstream damming might lead to a relative dominance of waves, tides and currents that are especially exacerbated by coastal subsidence and sea-level rise ultimately affecting the delta environment. Analysis of multi-date satellite imagery and maps covering the Godavari deltas along the east coast of India revealed a net erosion of 76 km<sup>2</sup> area along the entire 336-km-long twin delta coast during the past 43 years (1965–2008) with a progressively increasing rate from 1•39 km<sup>2</sup> yr<sup>-1</sup> between 1965 and 1990, to 2•32 km<sup>2</sup> yr<sup>-1</sup> during 1990–2000 and more or less sustained at 2•25 km<sup>2</sup> yr<sup>-1</sup> during 2000–2008. In the case of the Godavari delta, although the water discharge data do not show any major change, there was almost a three-fold reduction in its suspended sediment loads from 150•2 million tons during 1970–1979 to 57•2 million tons by 2000–2006. A comparison of data on annual sediment loads recorded along the Godavari Rivers showed consistently lower sediment quantities at the locations downstream of dams than at their upstream counterparts. Reports based on bathymetric surveys revealed considerable reduction in the storage capacities of reservoirs behind such dams. Apparently sediment retention at the dams is the main reason for the pronounced coastal erosion along the Godavari deltas during the past four decades, which is relevant to the hectic dam construction activity in these river basins. The dams are the main reason for the pronounced coastal erosion along the Godavari deltas during the past four decades, which is relevant to the hectic dam construction activity in these river basins.

**Keywords:** Sedimentation Results , Reservoir, Dam, Silting Effects, Solutions

## I. INTRODUCTION

Our case study is Jayakwadi dam which is an earthen dam located on Godavari river at the site of Jayakwadi village in Paithan taluka of Aurangabad district in Maharashtra, India. The harsh project is one of the largest irrigation projects in the Indian state of Maharashtra. It is a multipurpose project. The water is mainly used to irrigate agricultural land in the drought-prone Marathwada region of the state. It also provides water for drinking and industrial usage to nearby towns and

villages and to the municipalities and industrial areas of Aurangabad and Jalna districts. The surrounding area of the dam has a garden and a bird sanctuary. In the past we have built enormous construction projects keeping several safety measures in mind. The Jayakwadi reservoir is one such example. The need of study is to evaluate current sedimentation rate in dams. In this paper we shall find out the current condition of the dam. It is observed from some studies that the different storage zones of the Jayakwadi reservoir are silting up rapidly where reduced life storage is expected to be available around 100 MCM by the year of 2060-70. So, it is definitely required to evacuate the silt from the reservoir to increase its operation life. Now, it is a great question how it may be achieved. In this study we will be discussing some of the empirical methods we can use for silt calculation article guides, a stepwise walkthrough by Experts for writing a successful journal or a research paper starting from inception of ideas till their publications. Research papers are highly recognized in the scholar fraternity and form a core part of the PhD curriculum. Research scholars publish their research work in leading journals to complete their grades. In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal.

## II. OBJECTIVES OF THE STUDY

The following objectives will be fulfilled to achieve the aim:

1. Estimating the sedimentation rate in the reservoir
2. Perform case study analysis on the site
3. Determining the storage reduction due to sediment deposition since the dam became operational
4. Forecasting model of the phenomenon of silting lakes used for finding methods to prevent silting of reservoirs and desilting measures.
5. To suggest strategies that can be implemented to control dam siltation.
6. Estimating the sedimentation rate in the reservoir
7. Perform case study analysis on the site
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9. Forecasting model of the phenomenon of silting lakes used for finding methods to prevent silting of reservoirs and desilting measures.
10. To suggest strategies that can be implemented to control dam siltation.

### III. SCOPE OF THE STUDY

It is observed from the above studies that the different storage zones of the Jayakwadi

- a. Reservoir are silting up rapidly where reduced life storage is expected to be available around 100 MCM by the year of 2060-70,
- b. So, it is definitely required to evacuate the silt from the reservoir to increase its operation life
- c. Now, it is a great question how it may be achieved.
- d. This study recommends that on an experimental basis, silt evacuation process must be done to prevent sedimentation. Reservoir are silting up rapidly where reduced life storage is expected to be available around 100 MCM by the year of 2060-70,
- e. So, it is definitely required to evacuate the silt from the reservoir to increase its operation life
- f. Now, it is a great question how it may be achieved.
- g. This study recommends that on an experimental basis, silt evacuation process must be done to prevent sedimentation.

### IV. CASE STUDY ON JAYAKWADI DAM

Our case study is Jayakwadi dam which is an earthen dam located on Godavari river at the site of Jayakwadi village in Paithan taluka of Aurangabad district in Maharashtra, India. Located at geographically 19°29'8.7"N75°22'12"E. Our site is located at one of the fastest growing area in Maharashtra.



Figure 4.1: Photograph shows the close view of the Jaikwadi dam (Nathsagar Reservoir)

### DATA COLLECTION

The salient features of the Jayakwadi dam Project Planning are as given below.

1. Catchment Area : 21750 Sq.kms.
2. Gross Storage : 2909 Mm<sup>3</sup>
3. Live Storage : 2171 Mm<sup>3</sup>
4. Type of Dam : Earthen
5. Length of Dam : 10.20 km .
6. Maximum height of dam above River Bed : 37 meters
7. Area under submergence : 35000 Ha.
8. Life of dam :44 Years
9. Commencement of the Project:oct1965
10. Year of first impoundment: 1974
11. Year of commencement of Irrigation: 1976
12. The current life of the dam is 44 years.

### V. EXPERIMENTAL RESULT OF JAYAKWADI DAM

The data used for the last ten years shows a trend in sedimentation using different empirical formulas

- i. Khosla's equation The average sedimentation for last ten years is found out to be 0.79824 ha.m/100 sq Km/ year
- ii. Joglekar equation The average sedimentation for last ten years is found out to be 2.111986 ha.m/100 sq Km/ year
- iii. Varshny equation The average sedimentation for last ten years is found out to be 4.338161 ha.m/100 sq Km/ year
- iv. Froehlich formula The current sedimentation is found to be 2.6175 % loss/year

### VI. EFFECT OF SEDIMENTATION

1. As the above calculated sedimentation shows the sedimentation occurred in the 10 years and its gradually increasing rate may affect the life of the dam.
2. It has an adverse effect on the rehabilitation on the environment and the settlement of the project.
3. Also has an impact on the ground water. The quality and quantity of water changes.
4. Silt removal by any method is not economical.
5. Impacts on the floods.
6. The impact of reduced inflow of water towards the dam.
7. As the project is mainly built for irrigation purposes this may lead to scarcity of water for irrigation.

### VII. SOLUTION TO PREVENT SEDIMENTATION OF RESERVOIR

1. Reduce the sediment yield on the upstream side by reducing its production.
2. Control soil erosion and practice revegetation.

3. Sediment trapping above the reservoir for large dams by building check dams and farm ponds.
4. Channel erosion control can be done by gully stabilization.
5. Route Sediment can be used to bypass the sediment through sediment tunnels.
6. Mechanical Excavation can be used i.e dredging.
7. River flushing is one of the solutions for redistribution.



### VIII. CONCLUSION

To provide sustainable, economic, social and safe environment practices sedimentation analysis is essential. This can be achieved by calculating sedimentation over time. The rate of sedimentation should be controlled if found more has to be made preventive measures. Using different map This study set out to enhance understanding of dam siltation, sediment management and to test the feasibility of using Analytic methods in tracing sediment sources in two small sub-catchments in the farming areas between Paithan province of Aurangabad. If the sedimentation deposits are removed from time to time it is expected that the reservoir life can be expanded. The sediment yield should be removed in the

upstream side before entering the storage capacity of the reservoir. Practising various form of techniques can reduce the deposits in the live and storage zone. scarcity of water for irrigation

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