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# Review Paper-II on Study and Design of Mini Dam on Adan River near Bori Gosavi Village

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***Abstract:*** ***Mini dams offer a lifeline to communities during the dry season. The paper discusses issues related to Flood condition, the paper explores, the development, operation, and management of mini dam on Adan River. the main goal of this project to protect the bori gosavi from flood and gives potable amount of water as per future demand. Flood condition is more severe in Bori gosavi because of its location placed on the bank Adan River and in summer season, they are facing the problem of water scarcity due to their adverse planning of storing water. the one of the solution on this problem is to throw back the river water and store the water by constructing mini dam on Adan river away from few kilo-meters of bori gosavi.Dam play's an important role in the provision of many kind of benefits such as drinking and irrigation, water supply, small hydro power generation, fishing and so on this will increase the agricultural growth of farmers by providing sufficient amount of water.This dam will help to villagers to increase the agricultural protection and the safety unconfined flood condition.***

***Keywords: Dam's, Bori Gosavi, Adan River, Mini Dam, Flood, Bank.***

## I. INTRODUCTION

Atypical small storage dam would conceptually include an earth embankment and an earth cut overflow spillway channel. A small project may also include a separate operating spillway and/or a gated outlet structure through the embankment.

The valley is crossed by an earth embankment, which holds the stored water. The earth cut overflow spillway channel, which has an inlet elevation at or marginally above full supply level (FSL) and allows for the passage of major flood events, generally serves as a source of material for the embankment.

The operating spillway (typically made of concrete, rock, steel, or wood) allows watershed base flow and relatively frequent minor flood events to pass through.

In some cases, a separate structure for the operating spillway is not required or warranted, and the earth channel around the embankment discharges all excess flows to the downstream valley.

## II. LITERATURE REVIEW

1) *Wurbs (1987):* Performed numerous scenarios and concluded that the most uncertain aspect of dam breach flood wave modelling is breach simulation. He also mentioned that as reservoir size changes, so does the importance of various parameters. He determined that in the case of large reservoirs, peak discharge occurs when the breach reaches its maximum width and depth, making it critical to accurately predict breach geometry. However, in the case of small reservoirs, peak discharge occurs prior to the development of a breach, so the breach formation rate is regarded as a critical parameter in these cases.
2) *Singh and Scarlatos (1988):* 52 case studies were examined and documentation was made about the characteristics of breach geometry and time of failure tendencies. They concluded that the ratio of top breach width to dam height was significantly skewed and discovered that the ratio of top and bottom breach widths ranged from 1.06 to 1.74, with an average of 1.29 and a standard deviation of 0.18. In most cases, the breach's side slopes were inclined at 10-15o from vertical. They also discovered that the majority of failures occurred within 3 hours, with 50% occurring within 1.5 hours.
3) *Labadie (2004):* Dams and reservoirs are constructed to control these phenomena and to serve a variety of purposes, including water supply, irrigation, hydropower generation, and others. It is possible to observe high conflict and competition among reservoir purposes, particularly during critical conditions.
4) *Higgins and Brock (1999):* One of the most significant challenges confronting decision makers and planners in making effective use of available water resources is the operation of the dam reservoir. As a result, more research should be conducted to improve the durability and operating efficiency of a dam reservoir system in order to maximise the system's beneficial uses.

 

5) *Ahmadi (2014), Ashofteh (2015):* Optimization algorithms are useful tools for addressing reservoir operation issues and improving water resource management and planning. Several optimization models for dam reservoir system operation have been used in previous studies. There are two types of optimization algorithms: conventional (traditional) methods and evolutionary methods.
6) *Wehrens (2000):* The traditional approach can be used to find the best solution for the maximum and minimum unconstrained values of continuous functions.
7) *Fayaed (2013):* Evaporation losses in reservoirs are also a major issue in the operation of the dam and reservoir system. Predicting the amount of surface water losses is an important part of developing a dependable operational policy. To know the amount of water available in the dam reservoir for each period, an effective modern model for predicting reservoir evaporation is required.
8) *Xiong 2011:* Conducted dam break study using HEC-RAS numerical method on 100 ft high and 1.3 mile length compressive flood control foster Joseph Sayers dam located across Susquehanna river based on available geometry data for three scenarios such as "no dam break," "dam break," and "without dam" he advocated that the dam break is complicated and compressive process and actual failure mechanics are very hard to understand, neither physical model nor emperical method could full According to the findings of this study, dam breaks caused by piping increase the time period of highwater surface elevation, which increases the duration of risk. Dam break, on the other hand, does not increase the maximum water flow downstream.
9) *Asnaashari et Al (2014):* Using the HEC-RAS numerical model in conjunction with GIS tools, we created two hypothetical dam breach studies on Pinaus Lake Dam near Vernon and Cold Spring Creek Dam in Fairmont, Canada. The study was carried out to estimate the dam break outflow hydrograph, route the dam break hydrograph through the downstream river reach and floodplain, and calculate the inundation water depth and time. Maps were plotted for the worst case scenario to show the largest area that could be inundated, and incremental consequence analysis were carried out to assess hazard and dam classification.
10) *Von Thun and Gillette (1990):* To develop guidelines for estimating breach side slopes, mid-height breach width, and time to failure They proposed that breach side slopes be assumed to be 1:1, with the exception of dams with very wide cohesive cores, where slopes of 1:2 or 1:3 (H: V) may be more appropriate.
11) *Y. Xu and L. M. Zhang, M. ASCE (2009):* compiled data from 182 earth and rockfill dam failure cases, half of which were large dams with heights greater than 15 metres. To develop empirical relationships between five breaching parameters (breach depth, breach top width, average breach width, peak outflow rate, and failure time) and five dam and reservoir control variables (dam height, reservoir shape coefficient, dam type, failure mode, and dam erodibility), a multiparameter nonlinear regression model was developed. Each control variable's relative importance was assessed. Dam erodibility was discovered to be the most important factor influencing all five breaching parameters.
12) *L Y Sidek et al (2011):* A study was carried out to specifically model the dam beak of Saddle Dam A in Keniyr reservoir He ran dam break modelling for two different scenarios. Maximum flood (PMF) and clear day scenarios are both possible. They used the Froehlich and Macdonald-Langridge-Monopolis (MDLM) predictor equations to forecast dam breach parameters. The Danish Hydraulics Institute (DHI) developed the MIKE 11 -1D hydrodynamic model, which was used to simulate peak flows for both scenarios.
13) *Rasif Razach (2014):* ArcGIS was used to extract geometric data for the Neyyar reservoir from a digital elevation model for use in the HEC RAS (Hydraulic Engineer-ing Center's River Analysis System) model. As input, additional flow data was included. The output of the HEC RAS model was then exported to ArcGIS to create flood plain maps. Dam Break Analysis of Thenmala Dam in Kerala State, India was studied by Anila C. George and B. T. Nair (2015). The final analysis was performed using the BOSS DAMBRK software to determine the extent of inundation, travel time, and velocity of downstream progressing water. They obtained downstream river cross sections using ASTER digital elevation maps.
14) *Jaromir Riha (August 2019):* (Benefits and Drawbacks of a Small Embankment Dam) There are over 20,000 small dams in the Czech Republic, and several million are estimated to exist throughout Europe. They were built to provide significant societal benefits such as flood mitigation, sediment and water pollution reduction, and fishing and recreation opportunities. The advantages and disadvantages of small dams in the Czech Republic are classified and discussed. The small dam has positive effects such as reduced peak flow downstream of the dam and improved water quality in the stream below the dam. Sediment transport is reduced.
15) *Ana cristina souza da silva, cristiano AL Mei Da neves (2011):* The semi-arid northeastern region of Brazil has a distinct natural character that has historically necessitated several scientific and political efforts to improve the living conditions of the people who live there. For several reasons, the most appropriate use of water resources has been the subject of extensive research.

During the dry season, the small dam serves as one of the semi-arid population's primary sources of water. The findings are concerning on both a physical and social level. With such abundant water resources, a small dam with significant water storage volumes could be properly utilised for this purpose. As a result, the state should make greater efforts to ensure that this water source is used properly.

16) *Imtiaz Ali Bhatti, Nabi Bux Bhatti (January 2018):* A dam is a barrier or structure that impounds water and holds it back for later use. As a result, it plays an important role in providing a reserve stock of water for rural communities in outlying areas. The study was carried out to determine the socioeconomic impact, which was analysed using descriptive statistics and the t-paired sample test in SPPS software. Most of the world's countries are currently dealing with a water supply problem that does not meet human demand in terms of either quality or quantity. This problem can be an-alyzed using a t-paired sample and a socioeconomic survey, which yielded a summary of the parameter obtained using the t-paired sample and revealed significant variation.
17) *Chow, V.T (1959):* Mc Grow-Hill Book Company, New York, "Open Channel Hydraulics."
18) *Mac Donald and Langridge-Monopolis (1984)*

$$Ver = 0.0261(Vwhw)$$
$$Tt=0.0179Ver0.364$$

Where, Ver = volume of the material eroded from the embankment (cubic meter) Vw = volume of water that passes through the breach (cubic meter) hw = depth of water above the bottom of the breach (meter) tf = failure time

19) *Ernest Nti Acheampong Nicholas Ozor and Ephraim Sekyi-Annan (2014):* (Small dam development and its impact on livelihoods: Case studies from northern Ghana) During the dry season, small dams provide a lifeline to rural communities in northern Ghana. Following significant State interventions and donor agency investments in the development and management of small dams in Ghana, the paper discusses issues related to water use, socioeconomic significance, and sustainability of small dams. The paper investigates the political, economic, and social realities that shape the development, operation, and management of small dams through the lenses of political economy narrative. Using a multiple indicator approach, evidence from sixteen small dams examined revealed overall satisfactory to highly satisfactory performance indices for small dams. Economic returns from irrigation provide incentives to improve performance but take into account only a limited number of performance dynamics.
20) *N. Janardhana Raju, T. V. K. Reddy, P. Munirathnam (2005):* (A case study of the Swarnamukhi River basin in Southern India using subsurface dams to harvest rainwater) In many parts of India, declining water level trends and well yields, deterioration of groundwater quality, and drying up of shale wells are common. This is primarily due to the recurrence of drought years, excessive groundwater exploitation, an increase in the number of groundwater structures, and an explosion in population. Water conservation is required in this subcontinent on rainy days. India receives the majority of its rainfall in just 100 hours per year, mostly during the monsoon season. If this water is not captured and stored, the rest of the year becomes precarious, resulting in water scarcity. The primary goal of building sub-surface dams in the Swarnamukhi River basin was to capture base flow infiltrating into sandy alluvium as waste to the sea, thereby increasing groundwater potential for meeting future water demands. An analysis of hydrographs of piezometers from four subsurface dams monitored between October 2001 and December 2002 reveals an average rise of 1.44 m in the post-monsoon period and 1.80 m in the pre-monsoon period after the subsurface dams were built. Furthermore, during the pre-monsoon month of June, much before the construction of subsurface dams in October 2001, the water level fluctuated in the range of 3.1-10 m, as opposed to 0.4 to 3.1 m during the period following the construction. As a result, the design of rainwater harvesting structures necessitates extensive scientific research to determine the best locations for subsurface dams.

## III. CONCLUSION

*A.* After studying these reviews, we concluded that the study and design of a mini dam on the Adan River near Bori Gosavi Village, we are assuming that this dam protects the Bori Gosavi from flooding and provides potable water as needed in the future.
*B.* After reading all of the review papers, we discovered that in order to complete this project, we must construct a Mini Dam / Small Dam on the Adan River near Bori Gosavi Village.
*C.* There will be numerous benefits for surrounding villages and farmers if this project is completed.
*D.* We anticipate that this project will assist homeowners in increasing agricultural protection and the safety of unconfined flood conditions.

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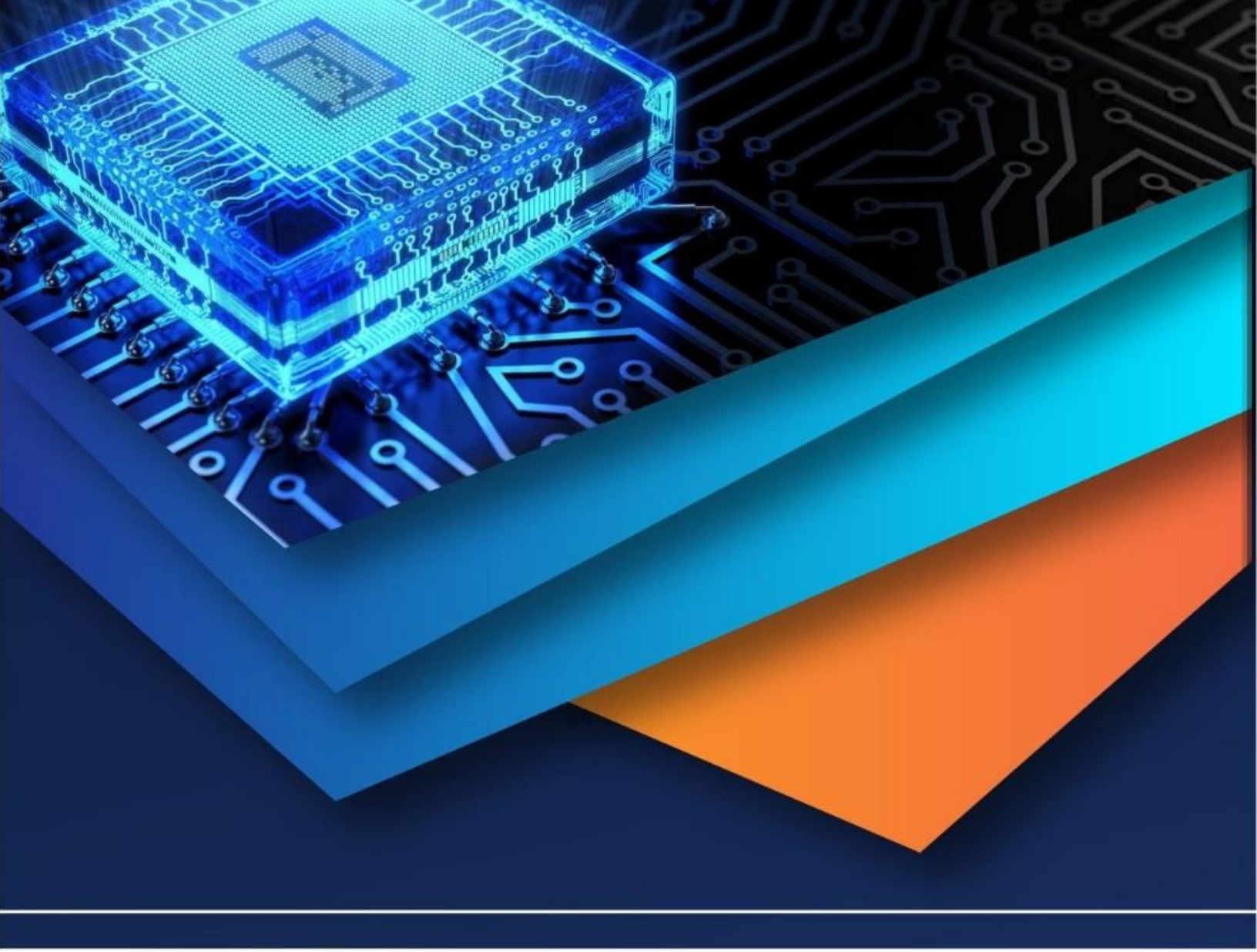

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