



(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 6, June 2025

⊕ www.ijirset.com 🖂 ijirset@gmail.com 🖄 +91-9940572462 🕓 +91 63819 07438





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|

Study on Evaporation Control of Reservoirs: A Case Study of Katraj Lake

Shruti Shahaji Kangude¹, Prof. R. P. Gaikwad², Prof. Dr. R. R. Sorate²

Student, M.E. Dept. of Civil Engineering, Anantrao Pawar College of Engineering & Research, Parvati, Pune, India¹

Professor, Dept. of Civil Engineering, Anantrao Pawar College of Engineering & Research, Parvati, Pune, India²

ABSTRACT: The water is the most vital, primary, elementary and basic requirement of the human. Contribution of the water in the development of India is very much crucial and key role is always played by the water in socio-economic development of India. The water that is lost to the air from the surface of the pond is called evaporation. The amount of water lost by evaporation depends largely on local climate conditions. High air temperatures, low humidity, strong winds and sunshine will increase evaporation. Low air temperatures, high humidity, rainfall and cloud cover will decrease evaporation. Evaporation will also depend on the water surface area. The larger the pond, the more water will evaporate from its surface. As our country is agrarian country and the water is the prime need to increase the yield of agriculture product. This project revealed that the physical methods can reduce evaporation effectively without environmental consequences methods of Evaporation Control. For the effective method of Evaporation Control, katraj lake Reservoir will take for the analysis.

KEYWORDS: Evaporation, Reservoir, Evaporation Control, Temperatures, Vapour Pressure.

I. INTRODUCTION

Nowadays, the water has become a part of non-profit to profit organization, which engages various countries across the world with-holding sewage data for nearly all the countries and provides a better way of the water use and its management which can be useful for various routine activities. But due to a huge wastage of the water, the water is becoming one of the scarce resource day-by-day in the world and also in our country, India. The corporation and the farmers draw ground water which is less costly and easily available. Moreover, as and when they need the water, it can be drawn from the ground and thus groundwater levels have reduced, as the ground water level reduces, relatively the sea water level becomes higher so there is land ward hydraulic gradient which results into the flow of the seawater or the salty water stars approaching towards the ground which is called as the sea water intrusion into the ground and the amount of pollutants in the water is increasing rapidly, as per the report by the World Resource Institute. The report states that with more than half of India's total areas are facing high to extremely high stress; almost 60 core people are at very high risk of the surface-water supply disruptions.. [7]







www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|

II. SIGNIFICANCE AND OBJECTIVES

Significance:

The water is the most important element on earth that plays many vital roles in the life cycle of all living being. The importance of water and its optimum use are generally known and accepted practices. It is also very well known to save water in as much quantity possible has become the need of the hour. As our country is agrarian country and the water is the prime need to increase the yield of agriculture product. This project revealed that the physical methods can reduce evaporation effectively without environmental consequences methods of Evaporation Control.

Objectives

- To Study the Water Evaporation and water losses and factor affecting on Evaporation
- To study different types of method use for evaporation control and it's advantage and disadvantage
- To select effective method use for the Evaporation with fuzzy method
- To reduce the evaporation losses from the surface of a reservoir

III. METHODS TO REDUCE EVAPORATION

A number of approaches have either been applied or considered by Engineers and Scientists in their attempt to reduce evaporation losses from surface of water bodies. Since the basic meteorological factors affecting evaporation cannot be controlled under normal conditions, efforts have so far been restricted to managing the suppression or inhibition of evaporation from water surfaces by physical or chemical means. The methods generally used or being tried are broadly listed below:

- Wind breakers
- Covering the water surface
- Reduction of exposed water surface
- Underground storage of water
- Integrated operation of reservoirs
- Treatment with chemical water evapo retardants (wer).

The following is a classification of physical, chemical and biological methods of evaporation reduction from water surfaces.



Fig 3 Bubble Plume



Fig 4 Self - spreading mechanism





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|



Fig 5 Solar Panels on Canals

Fig 6 Wind Breakers

IV. QUESTIONNAIRE SURVEY

As a part of the present study titled "Study on Evaporation Control of Reservoirs: A Case Study of Katraj Lake," a structured questionnaire survey was conducted to gather primary data from individuals familiar with or impacted by the lake's water management system. The primary objective of the survey was to assess public awareness, perception, and opinion regarding the issue of water loss due to evaporation and potential methods to control it Total of 30 responses were collected from residents, environmental professionals, students, and other stakeholders in the Katraj area. The data obtained from this survey was analyzed to identify trends, insights, and community-driven recommendations that could support practical evaporation control measures.

The results of the questionnaire have been used to complement secondary data and strengthen the conclusions of the study.



RQ. 1 - Do you Know About Evaporation losses and its reasons?

Graph 1 responses on have Knowledge about Evaporation losses

A significant majority of respondents, 28 out of 30 (93.3%), reported that they are aware of evaporation losses and their causes, while only 2 respondents (6.7%) were not familiar with the concept.





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|

RQ. 2 - Which is the major Factor of Evaporation losses For Katraj Lake?



Graph 2 responses on major Factor of Evaporation losses

Among all factors, Temperature was identified as the major cause of evaporation losses in Katraj Lake by the largest number of respondents (30%).



RQ. 3 - Do you Know about Methods to Reduce Evaporation?

Graph 3 responses on Know about Methods

Out of 30 respondents, 21 individuals (70%) indicated that they are aware of methods to reduce evaporation, while 9 respondents (30%) were not familiar with such methods. This indicates a good level of awareness among the participants regarding evaporation control techniques.





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|

RQ. 4 - Which Method would u like to suggest for Katraj Lake project? Give ratings accordingly from 1 to 5 for each method



Graph 4 responses on Method suggest

Table 1 RII index for Method suggest for Katraj Lake Project

Method would u like to suggest for Katraj Lake Project							Relative Importance Index (RII)			
Sr No	Answer	1	2	3	4	5	ΣW	Α	Ν	RII
1	Bubble Plume	3	8	11	6	2	86	5	30	0.573
2	Self - spreading mechanism of WaterSavr	3	9	11	6	1	83	5	30	0.553
3	Solar Panels on Canals	5	7	6	8	4	89	5	30	0.593
4	Wind Breakers	5	4	9	5	7	95	5	30	0.633



Graph 5 RII index for Method suggest for Katraj Lake Project





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|

According to the respondents, Wind Breakers are considered the most preferred and practical solution for reducing evaporation at Katraj Lake, likely due to their simplicity, natural integration, and lower cost. Solar Panels on Canals also received strong support, likely for their dual benefits shading to reduce evaporation and clean energy generation. This analysis helps prioritize implementation strategies based on stakeholder perception and can be directly incorporated into your recommendation section of the thesis

V. CONCLUSION

- The present study focused on evaluating the causes of evaporation losses in reservoirs and exploring effective control methods, with Katraj Lake serving as a representative case study. Through a combination of literature review, field observations, and a structured questionnaire survey of 30 respondents, the research provided valuable insights into the level of awareness, perception, and preferences regarding various evaporation reduction techniques.
- Findings revealed that a majority of respondents (93.3%) were aware of evaporation losses and their causes, with temperature, surface characteristics, and wind velocity identified as key contributing factors. Among the several control methods evaluated such as Bubble Plume, WaterSavr, Solar Panels on Canals, and Wind Breakers the Relative Importance Index (RII) analysis showed that Wind Breakers (RII = 0.633) were the most preferred method, followed by Solar Panels (RII = 0.593).
- The study also highlighted that while awareness of common methods is high, there remains a knowledge gap regarding advanced or innovative techniques like WaterSavr and bubble plume systems. This underlines the need for targeted educational outreach and stakeholder engagement before implementing large-scale solutions.
- Overall, the study concludes that a combination of passive and active evaporation control methods, especially those that are cost-effective, environmentally friendly, and locally acceptable, should be prioritized. For Katraj Lake, the use of wind barriers and solar panel shading systems presents the most viable options, offering both technical and public support.

REFERENCES

- [1] Mostafa A. Benzaghta et. al. "Evaporation from reservoir and reduction methods: An overview and assessment study" international Engineering Convention May (2009)
- [2] Yara Waheeb Wessef et. al. "A Review of Evaporation Reduction Methods from Water Surfaces" E3S Web of Conferences 97, 05044 (2019)
- [3] Abdelmajeed, M. A. et. al. "Management of Evaporation Losses of Gasoline's Storage Tanks" research gate 2009
- [4] Qian-Qian Xia et. al. "Identifying Reservoirs and Estimating Evaporation Losses in a Large Arid Inland Basin in Northwestern China" MDPI 2022
- [5] Mrs. M. S. Joshi et. al. "Methods to Reduce Evaporation of Water from Reservoir" International Research Journal of Engineering and Technology July 2021
- [6] Azolla Fern et. al. "Control the Evaporation of Water in Lakes and Ponds" International Journal of Engineering Research & Technology 2018
- [7] Hany F. Abd-Elhamid et. al. "Reservoir Management by Reducing Evaporation Using Floating Photovoltaic System: A Case Study of Lake Nasser, Egypt" MDPI 2021.
- [8] Ahmad Danboos et. al. "Effect of Evaporation on the Haditha Reservoir on the Euphrates River in Iraq and Recommendations for Reducing Evaporation Losses" International Journal of Applied Engineering Research (2018)
- [9] Sanket S. Jadhav et. al. "Evaporation Control Technique in Open Reservoirs: An Overview and Assessment Study" IOSR Journal of Mechanical and Civil Engineering (2018)
- [10] Abrar Ali et. al. "Development of Thin Film Surface Coating for Reduction of Water Evaporation in Oman" research gate July 2016
- [11] Cluff, C. Brent et. al. "Evaporation Control for Increasing Water Supplies" Water Resources Research Center University of Arizona
- [12] Qian-Qian Xia et. al. "Identifying Reservoirs and Estimating Evaporation Losses in a Large Arid Inland Basin in Northwestern China" MDPI 2022





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 6, June 2025

|DOI: 10.15680/IJIRSET.2025.1406131|

- [13] Mrs. M. S. Joshi et. al. "Methods to Reduce Evaporation of Water from Reservoir" International Research Journal of Engineering and Technology July 2021
- [14] Azolla Fern et. al. "Control the Evaporation of Water in Lakes and Ponds" International Journal of Engineering Research & Technology 2018
- [15] Hany F. Abd-Elhamid et. al. "Reservoir Management by Reducing Evaporation Using Floating Photovoltaic System: A Case Study of Lake Nasser, Egypt" MDPI 2021.
- [16] Ahmad Danboos et. al. "Effect of Evaporation on the Haditha Reservoir on the Euphrates River in Iraq and Recommendations for Reducing Evaporation Losses" International Journal of Applied Engineering Research (2018)
- [17] Sanket S. Jadhav et. al. "Evaporation Control Technique in Open Reservoirs: An Overview and Assessment Study" IOSR Journal of Mechanical and Civil Engineering (2018)
- [18] Abrar Ali et. al. "Development of Thin Film Surface Coating for Reduction of Water Evaporation in Oman" research gate July 2016









INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY





www.ijirset.com