IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 3, March 2024

DOI: 10.17148/IARJSET.2024.11307

A SURVEY ON WATER CONSERVATION DATABASE

Dhanush C[1], Girish B H[2], Thousif J[3], Yuvraj M Kumawat[4], Roopa K Murthy[5]

Student, Artificial Intelligence and Machine Learning, K S Institute of Technology, Bengaluru, India[1-4].

Professor, Artificial Intelligence and Machine Learning, K S Institute of Technology, Bengaluru, India[5].

Abstract: This explores innovative and integrated strategies for water conservation in urban settings. The study addresses the escalating challenges of water scarcity and outlines a comprehensive framework encompassing technological, policy, and behavioural interventions. Through a multidisciplinary approach, the paper aims to provide practical insights and solutions to foster sustainable water management practices, emphasizing the crucial role of technology and community engagement in achieving long-term water conservation goals.

Keywords: water conservation, urban settings, innovative strategies, water scarcity, comprehensive framework, sustainable water management practices.

I. INTRODUCTION

Water conservation is a critical endeavour in addressing the growing challenges of water scarcity, particularly in urban environments. As demand for water intensifies and climate change exacerbates scarcity issues, the need for innovative solutions becomes paramount. This introduction explores the significance of water conservation, highlighting the escalating challenges and the importance of adopting integrated strategies. The discussion encompasses the essential components of a comprehensive framework, including technological advancements, policy measures, and behavioural interventions. Through a multidisciplinary lens, the aim is to shed light on practical insights that can guide sustainable water management practices, emphasizing the pivotal roles played by technology and community engagement in achieving long-term conservation goals.

IMPORTANCE OF WATER CONSERVATION DATABASE:

A water conservation database is crucial for tracking and managing water resources. It helps monitor usage patterns, identify areas of excessive consumption, and implement effective conservation strategies. Additionally, such databases contribute to informed decision-making, sustainable water management, and addressing environmental concerns, ensuring a more resilient and efficient water supply for the future.

II. LITERATURE REVIEW

SL NO	YEAR OF PUBLICATION	PROJECT TITLE	DESCRIPTION
1	2023 [1]	Data-Driven Soil Water Content Estimation at Multiple Depths Using SFCW GPR.	This paper presents a cost-effective solution for estimating Soil Water Content (SWC) at various root-zone depths using Ground Penetrating Radar (GPR) and Machine Learning (ML) conducted at Worcester Polytechnic Institute, the study emphasizes the importance of accurate SWC prediction for efficient irrigation in industrial farming, impacting water conservation and soil quality. Traditional methods are invasive and costly. However, the proposed approach utilizes Signal Processing and ML on a dataset of 51 real field measurements, achieving a remarkable mean absolute percentage error as low as 6% across four root-zone depths.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 3, March 2024

DOI: 10.17148/IARJSET.2024.11307

			The study focuses on the 0.4 to 2.0 GHz frequency range, analysing frequencies crucial for root-zone SWC characterization. [1].
2	2022 [2]	Internet of Things and Cloud based water conservation and monitoring system.	Water, essential for all life, faces a crisis in India where over half the population, 600 million people, grapple with acute shortages. Despite extensive research on conservation, there's a dearth of effective water utilization plans. The proposed water conservation and tracking system employs Cloud and Internet of Things, utilizing ultrasonic and water-level sensors connected to NodeMCU. Real-time data, including vessel levels and individual consumption, is uploaded to a database, accessible via a self-designed web app. This cost-effective solution provides alerts and recommendations, aiding users in planning more efficient water utilization in the face of a critical shortage[2].
3	2021 [3]	Water Conservation Control by using Internet of Things Smart Meter	Rapid urbanization accompanying increased employment has led to a surge in city populations, triggering water crises globally. Diminishing groundwater levels are a major concern. A proposed smart solution involves an Internet of Things enabled water meter. This meter, tracking liters consumed, sets a threshold; surpassing it results in supply control for the day. Consumers can access consumption data through an Android app or a cloud server, offering an efficient approach to tackle water scarcity in modernized cities. [3].
4	2020 [4]	Interactive Contents with 360-Degree Panorama Virtual Reality for Soil and Water Conservation Outdoor Classroom.	The paper introduces an innovative Virtual Reality 360-degree panorama application system for education in soil and water conservation. It employs interactive VR videos based on outdoor classroom facilities, adhering to the cognitive theory of multimedia learning. The accompanying Android app, utilizing VR technology, facilitates user-video interactions. Learners download the app, insert their smartphones into affordable VR helmets, and engage in immersive 3D VR experiences. Notably, learners can trigger interactions, such as video selection and answering questions, by shaking their VR helmets. Experimental results indicate enhanced interaction compared to non-system scenarios, with interaction data stored in the cloud for future analysis. The system also supports flipped classroom strategies during visits to outdoor classrooms. [4].
5	2019 [5]	Application of Internet of the Things for the Water Conservation and Entrepreneurship in the Rural Area.	The concept of smart villages is gaining global popularity as a response to the digital revolution. While urban areas benefit from internet connectivity, rural regions lag behind in modern amenities. Smart villages leverage internet and digitization to enhance rural life in areas like education, healthcare, energy conservation, and sanitation. This paper focuses on addressing water crises and unemployment in Indian rural regions through Internet of Things, aiming to uplift living standards and foster entrepreneurship in these areas [5].

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 3, March 2024

DOI: 10.17148/IARJSET.2024.11307

6	2018 [6]	Tethys: Collecting Sensor Data without Infrastructure or Trust.	The significance of meticulous resource monitoring in institutional contexts for establishing conservation goals is emphasised in this research. It presents a wireless water flow sensor that uses energy harvesting to obtain over infrastructural constraints and collect data for unique fixtures. The study carried out in undergraduate residence halls demonstrates Tethys's ability to identify significant shower usage patterns, such as a statistically significant correlation among shorter mean shower lengths and water conservation symbols, indicating possible directions for future research in water conservation tactics [6].
7	2017[7]	Saving water with water level detection in a smart home bathtub using ultrasonic sensor and Fuzzy logic.	Although everyone on Earth depends on water, there are problems with its wasteful use. Inadvertent carelessness, such as failing to turn off faucets, might result in floods and annoy nearby residents. Preservation becomes important in areas where supplies of water are scarce. The purpose of this project is to reduce water waste by implementing an automated device-based water-saving technology. The suggested solution uses the Arduino Uno, an ultrasonic sensor, and a fuzzy logic algorithm to determine the water level[7].
8	2016 [8]	Incorporating persuasion into a decision support system: The case of the water user classification function.	This study aims persuasion into decision support system. It focuses on domestic water use while emphasising the importance of autonomic feedback systems in regulating household resource consumption. It presents the Water User Classification (WUC) feature in a Decision Support System (DSS) that encourages water conservation by drawing on social conventions and individual values. The WUC function provides customers with a water user identity through assessing data on environmental values, regular water usage, and appliance efficiency. Users may be given personalised water-saving recommendations along with a suggestion to revaluate their habits if this identity contradicts with a self-defined "green" identity [8].
9	2015 [9]	Water conservation using smart multi-user centralized mixing systems.	This paper highlights the critical importance of water conservation due to increasing demand surpassing natural replenishment rates. It introduces a smart centralized water mixing system designed to efficiently provide users with water at a consistent temperature and flow rate. By employing sensors, controllers, and integrating Wireless Sensor Network technology, the proposed system aims to eliminate wasteful practices, improve service quality, and contribute to significant water and energy conservation compared to conventional systems [9].

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 3, March 2024

DOI: 10.17148/IARJSET.2024.11307

10	2014[10]	Soil and water conservation projects and national food safety: A panel difference-in-differences estimation based on Heilongjiang province.	This study assesses the economic efficiency of soil and water conservation projects using a dataset spanning 66 counties from 2002 to 2010. Employing a difference-in-differences estimation method, the research reveals that such investments contribute over 11.2% to total gain of production, with a positive impact lasting beyond a year. However, discontinuity in these projects may yield negative results. To safeguard national food security, the study advocates for the sustained and increased financial investment in soil and water conservation initiatives[10].
11	2013 [11]	A study into the implementation of Water Conservation/Water Demand Management in Gauteng municipalities.	In South Africa, where water scarcity is a pressing issue, municipalities in urban areas face challenges in providing sufficient and high-quality water. Non-revenue water (NRW) averages 37% in municipalities, with demand surpassing supply in Gauteng. This study focused on Water Conservation/Water Demand Management (WC/WDM) strategies' effectiveness in reducing NRW and the potential integration of smart meter technology. While municipalities have policies in place, the study found limited success, emphasizing the ongoing importance of addressing water challenges and potential future adoption of smart metering technologies [11].
12	2012 [12]	Discussion on Soil and Water Conservation Activities Hydrological Effects Simulation in the Loess Plate.	The Loess Plateau is a vital water slurceand sediment producer for the Yellow River, grapples with water crises and severe soil erosion, accelerating environmental degradation. Soil and Water Conservation Activities (SWCA) have been implemented for nearly three decades, impacting the hydrological cycle by enhancing infiltration and reducing overland runoff. This research emphasizes the importance of studying SWCA hydrological effects to forecast long-term changes in the Yellow River hydrology and sediment dynamics, advocating for enhanced consideration of flow resistance factors in distributed hydrological models for accurate simulation [12] .
13	2011 [13]	The Analysis of Water Use and Water Conservation in Papermaking Industry.	The papermaking industry relies heavily on water for various processes, including pulping, washing, and paper formation. However, this high water consumption poses environmental challenges such as pollution and resource depletion. To address these issues, water conservation strategies such as recycling, reuse, and implementing efficient technologies are crucial. By adopting sustainable water management practices, the papermaking industry can reduce its environmental footprint while ensuring long-term viability [13].
14	2010[14]	Analysis of Industrial Water Conservation Potential.	The study uses a water volume balance model to compute a number of metrics, including the rate of recycling, reuse, water waste, fresh water consumption coefficient, recycling ratio, and rate of repeated use. According to the evaluation, these businesses may be able to reduce their industrial water demand by 20% in the future through putting technological advancements and water conservation management into place. In order to enhance water sustainability in the manufacturing industry, the research highlights the significance of taking pre-emptive actions[14].

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 3, March 2024

DOI: 10.17148/IARJSET.2024.11307

15	2009[15]	Rainwater Resources Utilization of Soil Conversation and Benefit Analysis in the Western Mountains of HENAN Province.	As a result, several initiatives to save soil-water while employing rainfall resources have been launched. Models for waterways, small alpine springs, and slopes affected by rainfall are among these programmes' offerings. These engineering have developed into an advanced technological system over time. Based on studies and investigations, the report evaluates the advantages of various programmes. It also describes the direction that development and research efforts in this field of study will take moving forward, highlighting the continuous attempts to address issues with soil erosion and water resource constraints in the area[15].

III. CONCLUSION

Water conservation provides a comprehensive view of the immediacy and complexities of tackling water scarcity. The report sheds light on the multidimensional nature of water conservation by delving deeply into various approaches and technologies. It promotes a comprehensive approach that incorporates technical breakthroughs, policy interventions, and community engagement.

The statement emphasises the significance of proactive steps in order to mitigate the hovering water crisis, such as sustainable practices, efficient water usage, and increased public awareness. By combining these critical features, the report presents a useful path for stakeholders to negotiate the complex issues of water conservation in a fast changing world.

REFERENCES

[1]. V. Filardi et al., “Data-Driven Soil Water Content Estimation at Multiple Depths Using SFCW GPR,” 2023 IEEE International Opportunity Research Scholars Symposium (ORSS), Atlanta, GA, USA, 2023, pp. 86-90,doi:10.1109/ORSS58323.2023.10161940.

[2]. A. Katal, S. Singhania, R. Sharma, S. Agarwal and S. Jain, “IoT and Cloud based water conservation and monitoring system,” 2022 2nd Asian Conference on Innovation in Technology (ASIANCON), Ravet, India, 2022, pp. 1-6, doi: 10.1109/ASIANCON55314.2022.9909162.

[3]. L. S. P. SairamNadipalli, D. Sai Akhil, A. A. Kumar and N. Ganesh, “Water Conservation Control by using IoT Smart Meter,” 2021 5th International Conference on Computing Methodologies and Communication (ICCMC), Erode, India, 2021, pp. 448-452, doi: 10.1109/ICCMC51019.2021.9418251.

[4]. H. -H. Tsai et al., “Interactive Contents with 360-Degree Panorama Virtual Reality for Soil and Water Conservation Outdoor Classroom,” 2020 International Symposium on Educational Technology (ISET), Bangkok, Thailand, 2020, pp. 78- 82, doi: 10.1109/ISET49818.2020.00026.

[5]. A. Joshi, I. Dandekar, N. Hargude, A. P. Shrotri and A. R. Dandekar, “Application of Internet of the Things(Internet of Things) for the Water Conservation and Entrepreneurship in the Rural Area,” 2019 IEEE Pune Section International Conference (PuneCon), Pune, India, 2019, pp. 1-4, doi: 10.1109/PuneCon46936.2019.9105807.

[6]. H. Chiang, J. Hong, K. Kiningham, L. Riliskis, P. Levis and M. Horowitz, “Tethys: Collecting Sensor Data without Infrastracture or Trust,” 2018 IEEE/ACM Third International Conference on Internet-of-Things Design and Implementation (IoTDI), Orlando, FL, USA, 2018, pp. 249-254, doi: 10.1109/IoTDI.2018.00032.

[7] T. Mantoro and W. Istiono, “Saving water with water level detection in a smart home bathtub using ultrasonic sensor and Fuzzy logic,” 2017 Second International Conference on Informatics and Computing (ICIC), Jayapura, Indonesia, 2017, pp. 1-5, doi: 10.1109/IAC.2017.8280602.

[8]] O. A. Masia and L. Erasmus, “A study into the implementation of Water Conservation/Water Demand Management in Gauteng municipalities,” 2013 Proceedings of PICMET ’13: Technology Management in the IT-Driven Services (PICMET), San Jose, CA, USA, 2013, pp. 2660-2673.

[9] M. Faizuddin, J. H. AlSadah and Y. E. Osais, “Water conservation using smart multi-user centralized mixing systems,” 2015 SAI Intelligent Systems Conference (IntelliSys), London, UK, 2015, pp. 362-370, doi: 10.1109/IntelliSys.2015.7361168.

[10] Y. -l. Wu, “Soil and water conservation projects and national food safety: A panel difference- in-differences estimation based on Heilongjiang province,” 2014 International Conference on Management Science & Engineering 21th Annual Conference Proceedings, Helsinki, Finland, 2014, pp. 2034-2041, doi: 10.1109/ICMSE.2014.6930486.

DOI: 10.17148/IARJSET.2024.11307

[11]] K. Perren, L. Yang, J. He, S. -H. Yang and Y. Shan, "Incorporating persuasion into a decision support system: The case of the water user classification function," 2016 22nd International Conference on Automation and Computing (ICAC), Colchester, UK, 2016, pp. 429-434, doi: 10.1109/IConAC.2016.7604957.

[12] Z. Shengtang, C. Peng and L. Miaomiao, "Discussion on Soil and Water Conservation Activities Hydrological Effects Simulation in the Loess Plateau," 2012 International Conference on Computer Distributed Control and Intelligent Environmental Monitoring, Zhangjiajie, China, 2012, pp. 241-244, doi: 10.1109/CDCIEM.2012.63

[13] J. Wang and Y. Zhang, "The Analysis of Water Use and Water Conservation in Papermaking Industry," 2011 International Conference on Computer Distributed Control and Intelligent Environmental Monitoring, Changsha, China, 2011, pp. 2281-2288, doi: 10.1109/CDCIEM.2011.357

[14] L. Lu, C. Liang, C. Gang and G. Pin, "Analysis of Industrial Water Conservation Potential," 2010 4th International Conference on Bioinformatics and Biomedical Engineering, Chengdu, China, 2010, pp. 1-4, doi: 10.1109/ICBBE.2010.5515486.

[15] G. -z. Wang and Y. -d. Mei, "Rainwater Resources Utilization of Soil Conversation and Benefit Analysis in the Western Mountains of HENAN Province," 2009 International Conference on Management and Service Science, Beijing, China, 2009, pp. 1-4, doi: 10.1109/ICMSS.2009.5303805.