DAYANADA SAGAR ACADEMY OF TECHNOLOGY AND MANAGEMENT
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CE, CSE, ECE, EEE, ISE, ME Courses Accredited by NBA, New Delhi, NAAC A+
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SYNOPSIS

PROJECT REFERENCE NO.	**46S_BE_5008**
TITLE OF THE PROJECT	PERFORMANCE EVALUVATION OF SOLAR DESALINATION PROTOTYPE FOR TREATING SEAWATER/BRACKIESH WATER.

NAME OF THE COLLEGE	DAYANANDA SAGAR ACADEMY OF TECHNOLOGY AND MANAGEMENT-560080
DEPARTMENT	CIVIL ENGINEERING DEPARTMENT

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❖ **KEYWORDS**: Solar desalination, Brackish water, Renewable energy, Solar-to-water conversion efficiency, Freshwater production rate.

❖ **INTRODUCTION:** India is facing a severe fresh water crisis due to human actions, driven by population growth and changing lifestyles. Competing users in agriculture, industry, and households are depleting the groundwater table, leading to scarcity. Water quality is deteriorating due to contamination from various sources. Disputes over water usage have become a prominent economic and political issue. The consequences include significant health problems, with approximately one million children dying annually from water-related illnesses, and around 45 million people affected by poor water quality. Solar desalination is a promising solution to the global water crisis, offering a sustainable and renewable way to produce freshwater. It eliminates the reliance on fossil fuels and reduces greenhouse gas emissions. The process can be achieved through thermal or membrane-based systems, powered by solar energy. By harnessing the sun's energy, saltwater is purified, and freshwater is produced,

addressing the growing need for clean water in regions with limited access. This study focuses on examining factors affecting the efficiency of solar stills, including design, materials, surface area, insulation, and other parameters. It proposes an innovative approach that combines interfacial solar evaporation for desalination and saline soil remediation. The use of solar-powered membrane distillation system for seawater desalination is explored as a sustainable solution. Experimental and theoretical evaluations are conducted to assess the system's efficiency in utilizing solar energy for freshwater production. The current status of solar desalination technology in India is discussed, highlighting its potential, challenges, and future prospects for addressing freshwater scarcity in coastal areas.

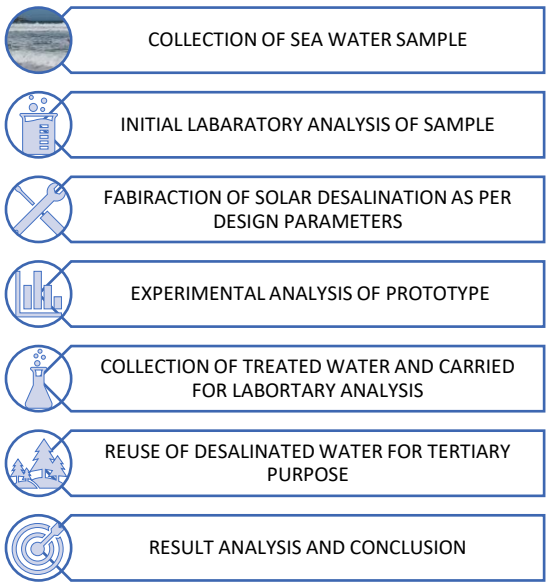
OBJECTIVES OF THE PROJECT

The primary goal of this project is to enhance the design of a simple solar desalination system for converting seawater into potable water, addressing the critical need for drinking water along coastal areas with large populations.

The specific objectives of the project include:

- Collecting and analysing the physio-chemical characteristics of seawater samples.
- Designing and studying an efficient prototype model of solar desalination for seawater treatment.
- Assessing the desalinator's effectiveness in removing salts and unwanted solids from the water.

METHODOLOGY



MATERIALS

1. **PVC wood**, an engineered wood made from wood fibers and plastic polymers, is a corrosion-resistant and durable material used in solar desalination models due to its resistance to seawater exposure.
2. **The 4mm glass** cover in solar desalination models retains heat, prevents heat loss, allows sunlight in, and is positioned at an 18-degree angle for water flow.
3. **Aluminium foil** serves multiple functions, including reflecting sunlight onto the desalination unit and enhancing heat absorption, leading to increased efficiency and performance of the system.
4. **Silicones**, polymers composed of siloxane, are versatile materials used in various applications such as sealants, adhesives, lubricants, insulation, and more.

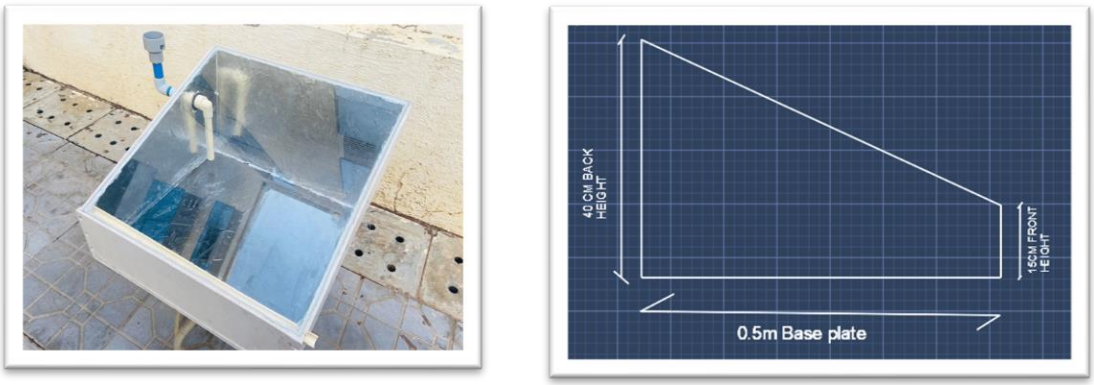


Figure No.1 Solar Desalintor protype model

RESULTS & CONCLUSION

Based on the findings of this study, it can be inferred that solar desalination demonstrates great potential as a technology for converting seawater into freshwater.

- The seawater sample was brought from Rameswaram and initial laboratory analysis were conducted on various parameters like Ca^{+2}, Mg^{+2}, total Hardness, BOD, turbidity, Cl^{-}, pH, and alkalinity to 420mg/l as $CaCO_3$, 26mg/l as $CaCO_3$, 446mg/l as $CaCO_3$, 0.62g/ml, 544mg/l as $CaCO_3$.

- By utilizing solar energy to evaporate seawater and subsequently condensing the vapor into freshwater, this method presents a **sustainable and economically** viable alternative to traditional desalination approaches.
- Yielding promising outcomes such as the removal of **Ca^{+2}, Mg^{+2}, total hardness, BOD, turbidity, Cl^-, pH, and alkalinity** to **23.19%, 76.26%, 67.72%, 54.83%, 36.61%** respectively acceptable levels.
- These models rely on renewable solar energy to power the desalination process, making them both **environmentally friendly and cost-efficient.** The performance of solar desalination prototype models is influenced by multiple factors, including the system's design, the type of solar energy collector employed, and the efficiency of the desalination process.

SCOPE FOR FUTURE WORK

- The present fabricated solar desalinator can be updated by using the solar panels instead of black paint coated surface and aluminum sheet.
- Sensors can be installed to monitor the efficiency of the solar desalinator at the inlet and outlet / collecting point as per the standards.
- Desalination process test can be analysed by varying different temperature and pH values to know the better efficiency in removing the pollutants and collected the treated water for tertiary purpose.