



# CETSD Newsletter

## Jan - March 2024



**CENTER FOR  
EMERGING TECHNOLOGIES  
FOR SUSTAINABLE DEVELOPMENT  
(CETSD)**

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## About CETSD

The Center for Emerging Technologies for Sustainable Development (CETSD) was established on 14 January 2020. CETSD aims for sustainable development towards a carbon-neutral, bio-based, self-sufficient economy through safer, green technologies. Research focuses on United Nations Sustainable Development Goals (UNSDGs), covering areas such as soil, air, and water decontamination, pollution control, environmental monitoring through sensors and IoT, resource recovery, carbon capture, waste management, climate-water-energy-food nexus, sustainable building design, green energy, climate change adaptation, public health, biodiversity, rural development, and smart agriculture.

**Vision** To be a partner in tapping the potential of emerging technologies for creating a sustainable and prosperous future India.

## Mission

- To provide a platform for non-governmental and governmental collaborators to work together to apply emerging technologies for finding and implementing solutions towards achieving SDGs.
- To help develop scientific temper societies to understand technologies that are sustainable or technologies that are using sustainability aspects.
- To innovate solutions towards challenges in location specific problems related to energy use, education, water management, infrastructure, traditional livelihood skills, and health.
- To perform applied research in areas such agriculture, environment, healthcare, waste management, pollution, livelihood, and rural development.

## Message from the Head

Welcome to the Center for Emerging Technologies on Sustainable Development at IIT Jodhpur. The center began in 2019 with a dedicated faculty team undertaking research and development in different thematic areas of Sustainability. We undertake research and development on cutting- edge/emerging technologies that address pressing sustainability challenges. We aim to integrate technological advancements with sustainable practices that balance economic growth, social equity, and environmental protection. We are exploring exciting projects in water treatment & management, renewable energy, sustainable agriculture, smart cities, climate resilience, indigenous skills, and resource-efficient systems. Our center aims to contribute meaningfully to the United Nations' Sustainable Development Goals (SDGs) through interdisciplinary research, collaborations, and stakeholder connections. CETSD is open to collaborative projects, thoughtful insights, and potential partnerships toward sustainable development.

# Scientific Achievements

## PROJECTS

- **STI (Science and Technology Innovation) Hub**, 265 Lakhs: 2023-2026; Funding agency: DST
  - Team: Prof. Anand Plappally (PI), Dr. Prasenjeet Tribhuvan, Prof. P. K. Tewari
- **Livelihood Business Incubator. Upajivanam**, 166 Lakhs: 2024-2029; Funding agency: MSME
  - Team: Prof. Anand Plappally (PI), Dr. Venkatesha Murty
- **NMR diffusometry and relaxometry approaches to evaluate molecular interaction and dynamics in nanosponges**, 64,02,264 INR: Feb. 2024-Feb. 2027; Funding Agency SERB CRG
  - PI: Prof. Samanwita Pal
- **Point-of-use and inline coliform sensors for smart water management. DDWS, JJM. R&D.**
  - Team: Prof. Meenu Chhabra, Dr. Saakshi Dhanekar, Prof. Kamaljit Rangra, Dr. Arpit Khandelwal, Dr. Raviraj Vankayala
- **To understand the molecular mechanisms of growth promotion by IFFCO nano urea in the model plant Arabidopsis thaliana**, 47 Lakhs: 2023-2024; Funding agency: IFFCO
  - Team: Dr. Ayan Sadhukhan (PI), Dr. Kirti Sankhala (Co-PI)
- **Hybrid organic-inorganic membranes with tunable pore sizes and physio-chemical properties for energy-efficient separation technologies**, 35 Lakhs: Jan 2023- Jan 2028
  - PI: Dr. Kirti Sankhala
- **Redesigning Urban Infrastructure for Sustainable Cities: A system of systems approach through Digital Twins**, 100 Lakhs: 2024-2026; Funding agency: IIT Jodhpur (Institute Project with School of AI and DS)
  - Team: Dr. Shreya Banerjee (Co-PI), Dr. Chandana N (Co-PI), Dr. Saran Adhar (Co-PI), Dr. Debasis Das (Co-PI), Dr. Trishikhi Roychoudhary (Co-PI), Dr. Vinod Vijay Kumar (Co-PI) Dr. Kirti Sankhala (Co-PI), Dr. Anugya Shukla (member)
- **Generative Causal AI Powered Digital Twin with Reinforcement Learning for Sustainable Urban Transformation-Phase 1**, 200 Lakhs: 2024-2025; Funding agency: MoE
  - Team: Dr. Shreya Banerjee (Co-PI), Dr. Chandana N (Co-PI), Dr. Saran Adhar (Co-PI), Dr. Debasis Das (Co-PI), Dr. Anugya Shukla (member)
- **Are we ready for the adverse effects of climate migration? A study on climate change-induced internal migration in India for 2040**, 5 Lakhs: 2023-2025; Funding agency: JP Narayan National Center of Excellence in Humanities, IIT Indore
  - PI: Dr. Anugya Shukla

- **Self-Healing Bacterial Concrete for Resilient Wastewater Infrastructure**, 25 Lakhs: 2023-2026; Funding agency: IITJodhpur
  - PI: Dr. Chandana N
- **Nanofiltration membranes for energy- efficient water treatment**, 25 Lakhs: Dec 2023 - Dec 2026; Funding agency: IITJodhpur
  - PI: Dr. Kirti Sankhala
- **Comprehensive Framework for Integrated Health Risk Assessment**, 25 Lakhs: 2024-27; Funding agency: IITJodhpur
  - PI: Dr. Rajyalakshmi Garaga
- **Inspection of Industrial units at Bhilwara through Rajasthan Pollution Control Board**, 0.48 Lakhs: 2024; Funding agency: Rajasthan State Pollution Control board
  - PI: Dr. Rajyalakshmi Garaga
- **UF Membrane Assisted Sorption Based Water Purification Systems in Rural 13 Village Schools of Jodhpur District, Rajasthan**, 40 Lakhs: 2021-2024; Funding agency: HEFA-CSR
  - PI: Prof. Anand Plappally
- **Unnat Bharat Abhiyan -Regional Coordinating Institute (UBA-RCI) IIT Jodhpur**, 10 Lakhs/year: 2019-2026; Funding agency: UBA
  - Team: Dr. Vivek Vijay (Regional Coordinator), Dr. Rajyalakshmi Garaga (PI)
- **GIS Survey Of Waqf Properties & Updation In An Online Waqf Assets Management System Of India (WAMSI)— For State of Rajasthan**, 110.62 Lakh: 2022-till date; Funding agency: Central WAQF board, Ministry of minorities
  - Team: Dr. Farhat Naz (PI) and Dr. Anand Plappally (Co-PI)

## RESEARCH PUBLICATIONS

1. Sharma, A., Nawkarkar, P., Kapase, V. U., Chhabra, M., & Kumar, S., Engineering of ketocarotenoid biosynthetic pathway in *Chlamydomonas reinhardtii* through exogenous gene expression. *Systems Microbiology and Biomanufacturing*, 2024, 4(3), 983-995.
2. Sharma, A., Mishra, A., & Chhabra, M., Rapid measurement of bacterial contamination in water: A catalase responsive-electrochemical sensor. *Heliyon*, 2024, 10(5).
3. Mishra, A., Khandelwal, A., Chhabra, M., & Lens, P. N., Algae-powered versatile microbial fuel cells for energy and resource recovery from different waste streams. In *Emerging Trends and Advances in Microbial Electrochemical Technologies 2024*, (pp. 627-646). Elsevier.
4. Mishra, A., & Chhabra, M. Co-culturing *Chlorella vulgaris* and *Cystobasidium oligophagum* JRC1 in the microbial fuel cell cathode for lipid biosynthesis. *Environmental Science and Pollution Research*, 2024, 31(46), 57338-57345.
5. Chandana, N., & Srinivas Rao. Integrated GIS-Based Approach for Sustainable Urban Solid Waste Management: A Case Study of Warangal City, India. *The Deccan Geographical Society of India (DGSI) XVIII International Conference on Urbanisation and Climate Change: Strategies for Sustainable Cities through Geospatial Technologies*, 5-7 March 2024.
6. Chaurasiya, S., Kumar, S., Lone, G. A., Kumar, A., Sankhala, K., Nazir, N., ... & Ikram, M, Influence of Gd and Ni doping on the structural, morphological, and magnetic properties of M- type calcium hexaferrite. *New Journal of Chemistry*, 2024, 48(12), 5144-5159.

7. Jangid, N., Marik, D., Verma, D., Dey, A., RS, S., Patel, D., Yadav, P., Sankhala, K., Sadhukhan, A, Effects of nano urea on growth and gene expression of Arabidopsis thalianain hydroponics; bioRxiv 2024.03.20.585664, 2024
8. Garaga R., Health risk Assessment from different sources to metals in PM10 and PM2.5 in the largest city of north-east India, Journal of hazardous, toxic, and radioactive waste, (ASCE), 2024: 28(2), 04024005
9. Ahmad, M., Prakash, C., Sharma, A., Dixit, A., Chhabra, M., & Plappally, A. K., Development and Performance Evaluation of a Portable Ceramic Water Filter with Exfoliated Graphite and Sawdust as an Additive. Water Conservation Science and Engineering, 2024, 9(2), 40
10. Ranjan, A., & Prakash P. (2023). Elderly Health in different States of India: learnings from 75th Round National Sample Survey, 2017-18. Journal of Health Management.
11. Dhiman V, Biswas S, Shekhawat RS, Sadhukhan A, Yadav P, In silico characterization of five novel disease-resistance proteins in Oryza sativa sp. japonica against bacterial leaf blight and rice blast diseases. 3 Biotech, 2024, 14(48) <https://doi.org/10.1007/s13205-023-03893-5>
12. F. Tehrani, M. Aggarwal, (2025), On extension of 2-copulas for information fusion, INFOR: Information Systems and Operational Research
13. Duhan, S., Adari, S. K., Kanwar, N., Gupta, S., Nighojkar, A. K., Ahmad, M., ... & Plappally, A. K., Suitability of clayey soils from Jalore and Jodhpur, Rajasthan, India for the production of 3-Litre ceramic water filters. Desalination and Water Treatment, 2024, 309, 210-219.
14. Bind, A., Dammala, P. K., & Rao, B. H., Geopolymer Based Crust for Mitigating Migration Of Sand Dunes In Thar Desert. AGU24, 2024.
15. Book Chapter: Sustainability and Health Informatics: A Systems Approach to Address the Climate Action Induced Global Challenge (Springer Nature Singapore) (Published)

## PATENTS

- Electrochemical potentiometric device for coliform; Indian Patent application number 202311016263; Aarti Sharma, Meenu Chhabra et al.
- Paper-based kit for the detection of catalase positive bacteria including coliforms; Indian Patent application number 202411002746; Jyoti Gautam, Meenu Chhabra et al.

## CONFERENCES

Garaga, R. (2024). Health risk from different sources to metals in PM 10 and PM 2.5 in the largest city of north-east India. THE American Geophysical Union. In AGU Fall Meeting Abstracts January 2024 Dec (Vol. 2023, pp. NG32B-0328).

## LAURELS

Prof. Meenu Chhabra: **Teaching Excellence Award, IIT Jodhpur 2024**

Dr. Rajyalakshmi Garaga: Team selected for **International Student Travel Grant by American Geophysical Union (AGU) 2023** and presented two conference papers

Dr. Rajyalakshmi Garaga: Selected from IIT Jodhpur as **Empanelled Auditor for Rajasthan State Pollution Control Board (RSPCB)** to inspect five industries at Bhilwara district, Rajasthan

Dr. Alok Ranjan: Invited to join the editorial board as an **Editorial Board Member of the BMC Health Services Research Journal** from the Springer Nature Publishing Group.



## EVENTS

### Delegation from American Institute of Indian Studies (AIIS):

CETSD hosted a delegation of scientists and educationists from American Universities. A Faculty group of **American Institute of Indian Studies (AIIS)** visited IIT Jodhpur, on 8th January 2024. The event was a confluence of ideas, expertise and collaborative spirit.



### World Water Day 22 March 2024:

IIT Jodhpur celebrated World Water Day by hosting an insightful seminar on Conservation of Traditional Water Bodies through Hydrogeo Tourism.

World Water Day, held on 22 March every year since 1993, is an annual United Nations Observance focusing on the importance of freshwater. The theme of World Water Day 2024 was 'Water for Peace'. In this context, a seminar was organized in hybrid mode to reflect on the importance of water conservation and traditional water conservation practices in the arid region of Rajasthan.

This seminar led by Dr. Shiv Singh Rathore talked about "Conservation of traditional water bodies through Hydrogeo Tourism". He explored how combining elements of hydrology and geology through tourism can raise awareness and promote sustainable practices for protecting our precious water resources.



## Indian Institute of Technology Jodhpur

Center for Emerging Technologies for Sustainable Development (CETSD)

*organized*

A seminar on World Water Day  
22nd March 2024

on

Conservation of traditional water bodies through Hydrogeo Tourism

by

Dr. Shiv Singh Rathore



## International Day of Zero waste 30 March 2024:

CETSD organized a webinar on "A Multidimensional Perspective on Waste Management in India" on the occasion of the International Day of Zero waste.

The International Day of Zero Waste, a significant event adopted by the United Nations General Assembly on December 14, 2022, is a crucial step towards a sustainable future. This event, held annually on March 30, 2024, serves as a platform for Member States, civil society, the private sector, academia, youth, etc., to engage in activities to raise awareness of national, regional, and local zero-waste initiatives and their contribution to sustainable development. The United Nations Environment Programme (UNEP) and the United Nations Human Settlements Programme (UN-Habitat) jointly facilitate the observance of International Day of Zero Waste.



Center For Emerging Technologies for Sustainable Development

Join us for a webinar on  
**The International Day Of Zero Waste**

**A Multidimensional Perspective on Waste Management in India**

**30 March 2024 | 10:00-12:15 IST**



**Professor Chandra Sekhar,**  
Director, IIIT Nuzvid



**Ananya Ghoshal**  
Development Professional



**Atun Roy Choudhury,**  
Sr. Manager- Technical,  
Cube Bio Energy Pvt. Ltd



**Priti Rao,**  
President BEAI,  
National President, WICCI

**Moderation:** Chandana N (Assistant professor CETSD)

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Designed and edited by: Dr. Kirti Sankhala