

● *Save for
Future*

Sustainability Policy and Strategies



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*CETSD
IIT Jodhpur*

Sustainable Development Efforts by IIT Jodhpur Through Use of Emerging Technologies

Overarching Goal:

Mobilize academic, fund generated, research and laboratory capabilities, student and personnel skill, and social scientific responsibility capacities of IIT Jodhpur to advance emerging technologies for knowledge preservation of adapted communities, adopt sustainable climate resilient systems, water conservation measures, natural resource management, and achieve net-zero greenhouse gas emissions by 2050.

Geographic Setting: Snapshot IIT Jodhpur students and administration have unique understanding of their relationship with the environment they live in. Here on the eastern edge of the Thar Desert, they know intimately the importance of co-existing communities and their adaptations while living with resilience to extreme heat, water management, soils and the flora and fauna. While IIT Jodhpur is young, IIT Jodhpur look with bold vision toward the sustainability. ([*IITJ-Indian Institute of Technology Jodhpur](#))

Evolution of the Sustainability Center

From 2019 IIT Jodhpur declared its commitment to making Western Rajasthan the most sustainable desert institution in India by setting up the Center for Emerging Technologies for Sustainable Development (CETSD). More can be read from [here](#).*

In the meantime, IIT Jodhpur outlines its climate action plan and also role of CETSD to affirm its resolve to put climate resilient technologies in the service of the location.

At the Center for Emerging Technologies for Sustainable Development (CETSD)

CETSD Action Strategy

The Climate Action Plan outlined here, puts forward the necessary steps to achieve this vision, charting the path to preserving adaptation knowledge of societies, its related technologies, carbon neutrality, climate resilient agriculture, zero waste, water and soil conservation to preserve Thar desert ecosystem. It is a data-driven strategy which follows a “DECLARE model” proposed by CETSD towards achieving the objectives of the plan.

- Develop a network with industries and NGO networks for knowledge sharing and working in partnerships for applying emerging technologies for achieving SDGs*
- Enable a strong internal structure and sustainability studies (technology, policy, social aspects, management, legal and financial) expertise base within the centre*
- Close connected with the other entities in IITJ, for actualizing the emerging technology work , along with strong capacity building, and undertake projects.*
- Link with government to enable applying emerging technologies for helping governmental to carry out its activities.*
- Actionable focus on small partnership viable funding with industry and NGO to put technologies on the ground within minimal time to put CETSD on the global map*
- Responsibility: scientific social responsibility aspects.*
- Engage: Students take concerted action for generating awareness amongst themselves by involve them through campus sustainability projects and academic projects.*

Role of CETSD Towards Climate Change Aspects of Thar Desert Region

CETSD will become a hub to greenhouse gas emissions inventory for baseline emission level study and track future course for the region.

The confluence of rapid population growth and the threat of uncertain climate environments pose challenges for the Thar Desert Region and its ecological sustainability.

- *CETSD coordinates interdisciplinary research and community outreach to improve soil and water conservation aspects.*
- *CETSD studies the cognitive processes by which artisans, scientists, farmers and individuals make decisions, apply sophisticated models of decision science to soil- water engineering problems related to this Thar desert ecosystem.*
- *Development of GIS-based decision-support tools that foster better long-term and more integrated decision making, use river flow, ecology, health and climate changes to define the dimensions of uncertainty observed in the region is one of the major objectives.*

IIT Jodhpur thus aims to promote and encourage innovative educational programs organized around climate change, emissions, natural resource use, water conservation, public health and decision making.

IIT Jodhpur's CETSD allows state personnel, national decision makers and scientists to collaborate on sustainable technologies and sustainability of technologies towards climate change solutions and societal development.

The Climate Change Conundrum and Solving the Micro or Regional Way

Even science and technology may not reduce significantly the uncertainty associated with climate change. The change of climate cycles leads to irregular droughts and floods in India including the nearby the Western Rajasthan region. The large increase in demography and better economic status of the society has increased the expanse and intensity of urban heat island towards the rural areas too.

In collaboration with district, state, and national researchers, CETSD will produce basic interdisciplinary research about climatic uncertainty, natural resource availability, waste management, emissions and human decision making.

Registrant of The Higher Education Sustainability Initiative (HESI)

Further IIT Jodhpur is designed as a living laboratory and interdisciplinary platform with following areas: 1. Ecosystem Science, 2. Sustainable Development 3. Geospatial Sciences, 4. Sustainability Auditing or accounting/ESG Financing/Risk Mitigation), 5. Public Health, 6. Human Ecology, 7. Sustainable Urban Planning 8. Natural Resource Management (including Net Zero goals), 9. Sustainability of Water

CETSD documents environment changes with the Campus Sustainability Projects. It should be equipped to be able to continuously respond to the ever-changing climate and unique emerging needs of the society. The effectiveness of the actions of IIT Jodhpur will be modelled in lines with Higher Education Sustainability Initiative, a global education network under the UN of which IIT Jodhpur is a registered member. We acknowledge the enormous support and assistance that affiliate faculty

across departments and core faculty of CETSD have put to writing this plan, with special thanks to the students, Office of Director and Office of Infrastructure Engineering at IIT Jodhpur.

Climate Actions in Sight of IIT Jodhpur,

- 1. Create a skilled and entrepreneurially developed underserved communities who had adapted to the livelihood through local available natural resource in the Thar Desert Region.*
- 2. To proactively avail community stakeholder participation, feedback and inputs on all major climate policy, actions and related budgetary initiatives.*
- 3. Lead by practice carbon capture, water conservation, waste management and use of clean and renewable energy use on campus as well as amongst its stakeholders and collaborators.*
- 4. Reduce campus based carbon emissions from buildings, transportation, and waste to negligible levels by 2050.*
- 5. Support increased energy efficiency, renewable energy and new electric vehicle transportation and related charging requirements within campus.*
- 6. Make sure that all new construction is being net-positive in both energy and materials by 2050.*
- 7. Implement activities and technologies that turn waste into resources.*
- 8. Support participatory activities, government schemes and local collaborations to enable good agriculture, ecology, public health and waste management in Western Rajasthan.*
- 9. Support green land use and development tools, prioritize people arriving by walking, biking, or using electric or solar vehicle transit, thereby reducing dependence on non-renewable fuel vehicles;*
- 10. Implementing the shaded corridors.*
- 11. To harvest water, monitor and digitize water grid within campus, enable and work with water positive organizations and empower them with water conserving technologies for societal implementation of water conservation practices.*
- 12. Create, maintain a local food system with healthy, affordable and culturally appropriate food for all Jodhpur residents.*
- 13. Significantly improve air quality and reduce mining activities on the existing remaining Aravalli ranges of the region.*



*Sustainability
Policy and Climate
Action Strategy
2021-2026*



Water Management

Aim: To conserve water through use of water efficient technologies, emerging climate resilient science and water management strategies.

Focus: Application of climate resilient water conservation technologies developed by IIT Jodhpur for the agrarian economy and societies of Western Rajasthan.

Key performance indicators on Campus

- Total individual building or infrastructure water consumption on campus
- Demographic water consumption per individual on campus
- Density of water saving technologies per individual
- Water use for landscape management: per unit area
- Basic volume of water available per animal or bird population for different seasons
- Water use projects enabling communities.

Key implementation strategies

- Extension of ongoing smart monitoring of water on campus
- Identifying time of water use, locations and landscape areas of potential water savings.
- Implement of technologies which are water efficient and positive water use projects.
- Installing water management measures, such as rainwater harvesting and sustainable irrigation systems.
- To establish community based water projects on the ground for hydro power generation.

Implemented Example Case Studies Through CETSD

1. Campus Sustainability Projects 2020-2021 can be accessed from [IITJ-Indian Institute of Technology Jodhpur](#)
2. Canal Based Hydro Power Operated Irrigation Project 2022-23 can be accessed from https://youtu.be/_yyyNnbboF8
3. As an example of implementation of water filter technology developed by IIT Jodhpur and used in different districts of Rajasthan, India. Some glimpses of the G filter in use at different locations are shown in Fig. 1 below.



Fig.1: G Filter a clay ceramic gravity based water filter for household water treatment

Non Renewable Energy and Carbon Foot Print

Aim: To use renewable source for energy production and practice it in a sustainable manner on the field.

Focus: Application of resource conserving technologies developed by IIT Jodhpur for reduction of non-renewable energy source use. IITJ aspires to be carbon neutral in all types of energy expenses by 2050.

Key performance indicators

1. Exhaust emission capture from diesel generators on Campus
2. To put at least one technology (in five years) in locations with flowing water potential to wean farmers away from diesel water pumping devices
3. To find the limiting value to carbon footprint per capita for an organization.
4. Carbon emissions from water and energy use respectively.
5. Number of carbon credits amassed by the campus or organization.

Key implementation strategies

1. Industrial collaboration for their exhaust emission capture
2. To serve farming communities with available running water potential across India to help them reduce their diesel costs
3. To do carbon foot print calculations for the organization and its infrastructure.
4. Use electricity consumption incentive program to incorporate competitiveness to reduce electricity use.
5. Dissemination of the knowledge of renewable energy through programs and scholarships.
6. To collaborate with organizations who are best in their run towards carbon neutrality.

Implemented Example Case Studies Through CETSD

1. Onsite capture and utilization of exhaust CO₂ for algae biomass production: The adaptability of micro algae to capture carbon dioxide was showcased. The algal growth can help in biofuel production. This was a project practiced on campus at IIT Jodhpur.
2. Hydropower use for Irrigation: The stored water potential was extracted using an undershot waterwheel as primer and a centrifugal pump was used to pump water to irrigate more than 100 acres of land in Lalitpur District in Uttar Pradesh. This is illustrated in IIT Jodhpur initiative to help farmers | Affordable and Sustainable Irrigation, https://youtu.be/_yyNnbboF8
3. Managing Carbon Foot Print of IITJ Campus: A six-month long study as a requirement towards the completion of B. Tech degree of two students was performed under the guidance for Prof Sudipta Das, Professor of Practice from FutureStation Advisors LLP and Office of Infrastructure at IIT Jodhpur. The report can be accessed here.
4. INTPART Project: "Collaborative Research Based Education for Optimized Performance of Wind Farms" is a major project running at the CETSD, IITJ.

Preservation of Flora and Fauna: Ecological Conservation

Aim: To preserve the wealth of biodiversity present on campus and in the region.

Focus: Application of visual and motion based sensing technologies as well as participatory citizen based app based approaches developed by IIT Jodhpur.

Key performance indicators on Campus

1. Statistics of the distinct species of animals and plants
2. Density of the location of habitats or nests of animals, and birds.
3. Temperature, humidity, wind speed and solar irradiance in the location under study.
4. Availability of food and water for the animal and plant biodiversity.

Key implementation strategizes

1. To undertake baseline survey of biodiversity within the region including the campus
2. To recommends removal of invasive species, plant local plants and improve afforestation with local species within the habitat
3. Creation of constructed wetland
4. Develop local produce and implement purchase of local foods and its sustenance.
5. To create a database with participatory awareness.

Implemented Example Case Studies Through CETSD

1. Biodiversity mapping project under the campus sustainability projects: development of Prakriti1.1 app
2. Saline Soil Reclamation and Water Conservation using Sub-surface Porous Vessel Technologies developed at IIT Jodhpur.

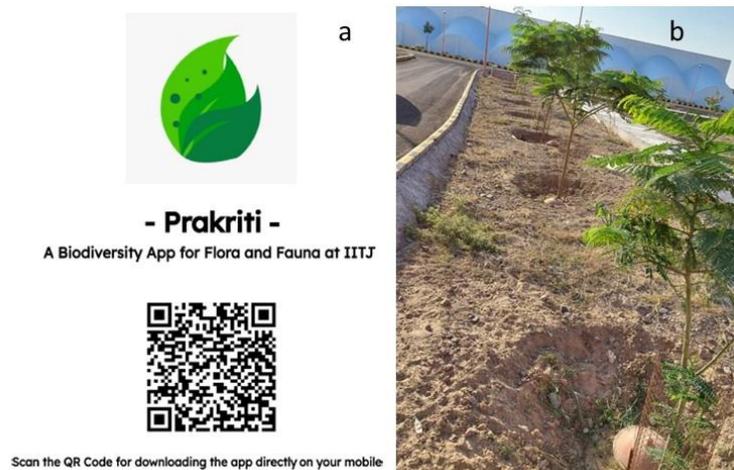


Fig. 2: a) Prakriti 1.1 app, a online Thar Desert bio-inventory platform b) the SSPV technology in front of Jodhpur club.

Waste Management

Aim: To manage waste using Rethink, Reuse, Refurbish, Rot, Recycle, Refuse, Redesign, Reduce and Recover strategies on Campus and at locations of intervention by IIT Jodhpur.

Focus: Application of indigenous, emerging smart waste management technologies as well as sustainable use and disposal strategies by IIT Jodhpur.

Key performance indicators on Campus

1. Statistics of the type of waste generated annually across the different infrastructures across the campus
2. Per capita solid waste production
3. Percent waste composted, recycles, reused, and recovered.
4. Amount of food wastage reduced on campus.
5. Amount of specific plastic and paper types recycled.

Key Implementation Strategies

1. Management strategy for source segregation of solid waste
2. Local design of campus waste management technologies
3. Adaptation of available indigenous technologies
4. Smart waste transport routing strategy
5. Reuse strategies for excavation or construction waste
6. Decontamination of soils using emerging technologies
7. Location suitability mapping for transient waste storage
8. Collaboration and tie-up with all regional stakeholders to enable regional waste management.

Implemented Example Case Studies Through CETSD

1. The Office of Students and Office of Infrastructure Engineering collaborated to put Khamba Composters across different locations as shown in Fig. 3 a and 3b.
2. The Office of Infrastructure Engineering also placed the mincing machines designed by Central Workshop Office Colleagues under the guidance of CETSD affiliate faculty. The machine is shown in Fig. 3 c below.



Fig. 3: a) Khamba Composter for organic wet waste in Girls Hostel b) Khamba Composters at Director's Bungalow c) Mincing Machine for tender coconut and hard horticulture waste simplification to fiber form.

Teaching Sustainability and Research

Aim: To undertake research that is related to sustainability of technologies and technologies towards sustainability which help in achieving the SDG at CETSD, IIT Jodhpur.

Focus: To provide faculty staff, students and society access to formal or informal research and learning opportunities to develop their knowledge, hands-on skills and understanding relating to sustainability through CETSD.

Key performance indicators on Campus

1. Programs available to all stakeholder to improve their sustainability education
2. Number of students enrolled in the individual programs of sustainability and technology
3. Projects which train of aspects of sustainability and natural resource management
4. Dedicated staff members related to sustainability projects
5. Dedicated core and affiliate faculty to teach concepts of sustainability in different inter-disciplinary areas of sciences, engineering and technology.

Key Implementation Strategies

1. **Student Enrolment:** More students are enrolled in PG programs on PhD and MS (Research) on Sustainability and Technology at CETSD
2. **Sustainability and Livelihood Projects:** To vie for governmental and non-governmental opportunities which can bring livelihood and knowledge dissemination program to the neighbouring societies.
3. To create new MDP or certification program which can disseminate about sustainability to government, non-government and society continuing education aspirants.

Implemented Example Case Studies Through CETSD

1. Rolling advertisement for PhD in Sustainability and Technology at CETSD from 2022.
2. MS (Research) in Sustainability and Technology for self-financing students from 2023.
3. STI hub (2023-26) for dissemination of appropriate technologies developed at IIT Jodhpur to communities across different parts of Thar Desert.

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