

Waste, Water, and Natural Resources Programme



At the **Waste, Water, and Natural Resources Programme** of TERI, our mission is to spearhead transformative solutions for sustainable resource management. We are setting a new standard for environmental stewardship by transforming the generation of carbon credits through nature-based solutions, unlocking nature's potential by valuing ecosystem services, and rehabilitating degraded lands. Using SDGs as way-posts, we develop innovative strategies for biodiversity conservation to strive for a harmonious coexistence between progress and nature. As both pioneers and providers of cutting-edge technologies, we are at the forefront of revolutionizing waste management, circular economy practices, wastewater reuse, and resource efficiency.



Tree Plantation on Farm Land

Our Key Areas

- » Strengthening climate mitigation strategies and rural livelihood through carbon finance projects
- » Sustainable management of forest ecosystems and conservation of biodiversity
- » Training and capacity building for carbon stock assessment of carbon pools in the forest and agricultural ecosystems, biodiversity assessment, valuation of ecosystem services, and development of carbon finance projects under nature-based solutions
- » Rehabilitation and reclamation of mine wastes and abandoned mines
- » Implementing health and nutrition related projects and outreach
- » Exploring circular economy and resource efficiency options to strengthen waste management not only in cities, but MSME industrial units as well
- » Investigating climate linkages of waste management and waste characterization, along with waste mapping to improve the on-ground situation
- » Performance assessment for waste generation and management processes, including impacts on vulnerable groups (informal sector)
- » Waste to energy issues, modelling greenhouse gas emissions from the waste sector, and institutional strengthening
- » Undertaking wastewater treatment and water reuse projects, from the concept stage to full scale implementation, through licensee partners

Sustainable Solutions

- We implement forestry and agroforestry-based carbon finance projects under REDD+ and ARR.

- We are offering solutions for abating land degradation, rehabilitating degraded areas, and ensuring optimal use of land resources.
- Our initiatives focus on improving the sustainable management of biodiversity and ecosystem services.
- We work towards the implementation of the Eco-City programme with Urban Local Body (ULB).
- We are working with cities for implementing source segregation of waste and training and capacity building leading to more effective utilization of dry and wet waste streams.
- We specialize in industrial waste utilization through value added products. This includes ceramic filters from bagasse ash, catalysts from red mud for hydrocarbon cracking, and volatile organic compounds and carbons from biomass residues.
- We have invented an advance oxidation-based technology (TADOX) pilot to treat the most difficult wastewater and are in the process of upscaling the same.

Thematic Domains

The programme consists of two broad divisions: **Land Resources** and **Environment and Waste Management**. Under these divisions, there are Core Areas that help us sharpen our focus on the different aspects of concern.

Land Resources

The Land Resources Division focuses on promoting sustainable forest and biodiversity management, providing solutions towards generating finance through carbon mechanisms for forests, and supporting the livelihood of forest-dependent communities. The Division operates through five areas: **Centre for Forest Management and Governance**,

Centre for Sustainable Land Management, Centre for Biodiversity and Ecosystem Services, Nutritional Security, and Sustainable Services Management.



IFS Training Workshop



Nursery for Tree Plantation

Centre for Forest Management and Governance (CFMG)

CFMG focuses on research and implementation in the areas of forest management, governance, and policy. The Area is involved in monitoring, evaluation, training, and capacity building in natural resource management and implementing ARR (afforestation, reforestation, and revegetation) based carbon finance projects. We have an expertise in the Forest Rights Act, 2006 and value chain-based research on non-timber forest produce (NTFPs).



Community Involvement in Biodiversity Conservation

Centre for Sustainable Land Management (CSLM)

CSLM tackles challenges in the area of land degradation, rehabilitation, and resettlement; mine reclamation; and training and capacity building on climate change, forestry, and policy support. We are also engaged in carbon finance projects on wetland ecosystems that generate carbon credits to farmers and forest dependent communities. Besides, the Area plays a pivotal role in addressing environmental challenges related to unsustainable land management practices.

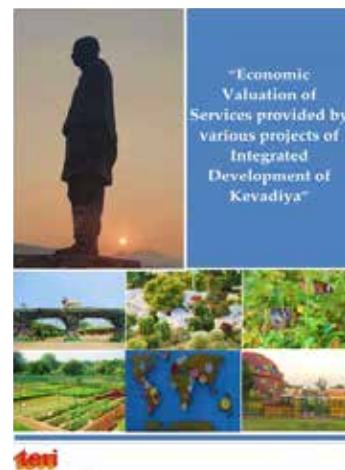


Rehabilitation of Red Mud

Centre for Biodiversity and Ecosystem Services (CBES)

CBES is primarily focused on assessment, monitoring, and evaluation of sustainable management of forest ecosystem and biodiversity conservation. We emphasize on mainstreaming biodiversity through enhanced community engagement and valuation of benefits from ecosystem services.

We develop effective strategies for environmental restoration and community development through REDD+ (reducing emission from deforestation and forest degradation) and ARR (afforestation, reforestation, and revegetation) based carbon finance projects. Our attention extends beyond traditional species or habitat conservation. We work to address the intricate web of policies, along with social and economic factors that underlie the most critical challenges associated with biodiversity loss and climate change.



Nutritional Security (NS)

This area is involved in implementing health and nutrition, environmental monitoring and reporting, waste management, and resource mapping-related projects. Along with these, the team is also engaged in conducting awareness and outreach sessions, such as 'Training of Trainers' workshops under the following themes:

- Jaltarang (World Wetlands Day–WWD)
- Water Conservation
- Urban Farming



Nutritious Khakra-making Workshop for Tribal Women

Sustainable Services Management (SSM)

SSM deals with applied research on land-use change and ecosystem services; biomass assessment; nature-based technology interventions in securing water quality and quantity; applications of renewable energy in NRM; monitoring, evaluation, and impact studies of development programmes; and watershed development project. The Area has successfully implemented both policy and development projects.



Study on Soil Hydrology and Floral Diversity

Environment and Waste Management

The Environment and Waste Management Division works on solid waste and wastewater management issues, assessment of resource efficient cleaner production (RECP) potential in micro, small, and medium scale industries (MSMEs), and solutions for holistic waste management and resource optimization.

The division operates through four areas, each having a uniquely dedicated focus: **Centre for Waste Management, Resource Efficient Technologies, NMCG-TERI Centre of Excellence on Water Reuse, and Bio-waste Technology Area.**

Centre for Waste Management (CWM)

Addressing the critical need that is waste management, CWM is creating technologies and solutions to minimize waste generation and convert waste into useful products. Its initiatives promote circular economy through resource efficient and cleaner production in industries, maximize resource recovery, and encourage recycling for landfill-free

cities. Waste streams addressed include municipal solid waste, e-waste, industrial waste, construction and demolition, liquid waste streams, as well as plastic waste and its linkages with marine pollution.



Bio-Methanation Plant at Madri Station, Udaipur

Resource Efficient Technologies (RET)

The RET Area is actively engaged in providing consulting and implementation support to small and medium enterprises (SMEs) based in Central and South Asia, on resource efficiency, circular economy, and sustainable consumption and production (SCP). Sectors such as metal finishing, metal products, engineering, dyes, and intermediates are covered under its activities. Currently, agri-food processing industries in Uzbekistan and Tajikistan; enterprises in tourism clusters along the Lakshadweep shorelines of the Maldives, Sri Lanka, and India; and enterprises along the plastic value chain in Sri Lanka are being targeted. The Area also works on industrial waste utilization through value added products.



SME Assessment in Uzbekistan

NMCG-TERI Centre of Excellence on Water Reuse (NTCoE)

The Centre of Excellence is a first-of-its-kind in the country that designs and fosters research and innovation for low-cost, effective, and integrated wastewater treatment technologies. These solutions can bridge the current treatment gaps, boost treatment efficiency, augment capacities, and provide safe treated water for reuse. This CoE has been established by the National Mission for Clean Ganga (NMCG); Department of Water Resources, River Development; and Ganga Rejuvenation, Ministry of Jal Shakti, Govt of India. The center contributes towards various national missions: Namami Gange, SBM, and Water Vision@2047, to name a few. Along with an interest in ZLD, circular economy, and water reuse, the center works towards developing R&D based policy interventions for emerging concerns like micro pollutants, micro plastics, persistent organic pollutants (PoPs), antimicrobial resistance (AMR), etc.



*Sewage Sample Treated at the TADOX Plant
Before & After*

Bio-waste Technology (BWT)

The BWT Area promotes sustainable bio-waste utilization in bio-methane production. The Area evaluates diverse bio-waste samples collected across the country—including

MSW, agricultural residue (such as paddy straw), industrial waste (such as press mud), and energy crops (such as Napier grass)—to test the bio-methane yield and identify the best suitable feedstock for biogas plants.

The area has a wealth of experience in bio-waste and biomass resource mapping, biogas technology research, and feasibility assessments. It primarily focuses on waste sample evaluation and techno-financial assessments of biogas and compressed biogas (CBG) projects to achieve efficient and viable plant planning and installation. Moreover, BWT is involved in capacity building, technical training of different stakeholders, and developing detailed project reports (DPRs) and detailed feasibility reports (DFR).

Accomplishments

» TADOX® (TERI Advanced Oxidation) technology won the **FICCI Water Award 2022**. It is based on advanced oxidation process for treatment of industrial and municipal wastewater, open drains, and landfill leachates, etc.



The FICCI Water Award 2022 for TADOX®

» We were honoured with the **Pathfinder Award 2021**, co-organized by IUCN and UNDP International, under the category 'Biodiversity Conservation'. This award has been bagged for a community conservation project in Nagaland,



Laboratory Testing for Bio-Methanation Potential



Money Distribution to the Farmers for Tree Plantations to Mitigate Climate Change

titled **'Strengthening Community Conservation in a Biodiversity Hotspot'**, in collaboration with other partners.

- » We have provided **livelihood support to over 2 lakh farmers and forest dependent communities** through carbon finance projects.
- » About 40 training workshops, sponsored by the Ministry of Environment, Forest, and Climate Change have been organized for the officers of Indian Forest Services since 1999.
- » We have bagged a project on sewage sludge co-digestion in Udaipur under Centre of Excellence Scheme of office of PSA, with CSR support from an industrial partner.

Way forward

Informed by the cutting-edge developments in technology and research, we aim to double-down our initiatives in our key areas:

- » Sustainable forest management and biodiversity conservation
- » Enhanced livelihood through carbon finance and mitigating climate change
- » Rehabilitation and restoration of degraded lands
- » Responsible management of solid waste and wastewater reuse to promote environmental sustainability
- » Resource efficiency, circular economy, and value-added utilization of waste

Igniting sustainability through empowering solutions for environment and natural resources—our trailblazing initiatives pave the way for a future where waste is minimized, resources are optimized, and sustainability thrives.

