Executive summary

GMP Translational Research Facility at IIT Bombay – A CSR Project of LTTS

The establishment of the 10X GMP Translational Research Facility at IIT Bombay, Partially supported through CSR funding from L&T Technology Services (LTTS), marks a significant leap in India's biomedical innovation ecosystem. As the first such GMP-compliant facility within an Indian academic institution, the lab plays a crucial role in bridging the longstanding gap between bench-level scientific discoveries and real-world clinical applications. In a country confronting rising chronic and lifestyle diseases, high dependence on imported APIs, and growing global demand for bio-innovations, this facility is strategically positioned to accelerate India's health technology capabilities. IIT Bombay's interdisciplinary strengths and long-standing track record in biosciences, biomaterials and nanotechnology make it an ideal institution to anchor this effort.

Key Features

- The 5,500 sq. ft. GMP facility, equipped with Class 10, Class 1,000 and Class 10,000 cleanrooms, enables IIT Bombay to conduct research requiring sterile, regulated environments for pre-clinical and clinical-scale manufacturing.
- It was designed to support projects operating at higher Technology Readiness Levels (TRL 3–6), which earlier faced challenges due to lack of in-house GMP infrastructure.
- Previously, researchers had to outsource to external labs, leading to high costs, delays, fragmented workflows and loss of commercial momentum.
- The new facility offers a streamlined pathway for projects in oncology, regenerative medicine, nanomedicine, tissue engineering and advanced drug delivery to progress toward TRL 8/9.
- It strengthens the transition toward regulatory submissions and human trials.
- The lab addresses critical academic, regulatory and industry needs, making the intervention highly relevant.
- LTTS provided support for the procurement of select equipment and supported Mechanical, Electrical, and Plumbing (MEP) work for the GMP Lab.

Field observations show significant progress. Construction is complete, key equipment is installed, and the facility has become operational. Two major projects—NanoDerma Heal (an advanced wound dressing) and a nanofibre mesh for urinary incontinence—are already being manufactured and tested in the lab. NanoDerma Heal has demonstrated strong preclinical results and received a patent in May 2025, while the nanofibre mesh has advanced far enough for regulatory preparation with the Drug Controller's office. The the mesh being produced in the lab shows high tensile strength and biocompatibility, signalling readiness for pilot-scale manufacturing.

Evaluation of Impact using REECSI Framework

This project was evaluated using the REESCI framework on five parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact.

Relevance

The Indian pharma sector relies heavily on imported APIs and excipients, underscoring the need for a domestic GMP facility to accelerate formulation and trial-readiness. Many promising innovations—such as the bioartificial pancreas—remain trapped in academic research due to delays in translation. A flexible, future-ready GMP lab enables timely development of diagnostics, therapeutics, implants and novel materials, ensuring products like advanced nanomembranes reach clinical trials, meet market needs and remain competitive in a rapidly evolving healthcare landscape.

Effectiveness

The GMP lab has accelerated effectiveness by equipping research teams with the infrastructure required for high-precision work such as electrospinning, sterile cell and vector processing, nanoparticle synthesis, freeze-drying, sterilization and bio-fabrication. High-end instruments such as the Beckman Coulter ultracentrifuge, tangential flow filtration systems, 3D bioprinter, Nano-spider electro-spinner, autoclaves, imaging systems and RLAFUV workstations enable diverse biomedical workflows.

Efficiency

The lab's 24×7 accessibility and interdisciplinary nature have strengthened IIT Bombay's innovation pipeline, allowing faculty and doctoral scholars to work across engineering, chemistry, biosciences and materials science. The development of robust SOPs (60% completed) and preparations for ISO 13485 certification indicate growing operational maturity, though staffing constraints and high annual maintenance costs (~₹1 crore) remain challenges.

"When this GMP lab was not conceived, studies usually stopped with publication of research papers. Project Investigators who were able to source funds outsourced the testing and development to private labs. This again was an inconsistent process because all labs were not equipped with the complete set of instrumentation to enable translation. Hence, it became a piece meal process where they depended on different labs for different steps. With a lot of potential studies already in TRL 4 and 5, we have accommodated as much as possible in this new translational research facility," explains Dr Prakriti.

Coherence

The facility aligns with national biotechnology priorities, Make in India, Atmanirbhar Bharat goals and global medical device regulations. It strengthens interdisciplinary collaboration, supports start-up incubation (e.g., the nano-fibre pelvic mesh project), and enables technology transfer. It also lays the foundation for expanding India's capacity to produce GMP-grade materials, vaccines, and medical devices, thereby enhancing public health resilience.

Sustainability

The facility's sustainability is supported by diversified funding efforts, careful budgeting, and the research teams' ability to mobilize additional resources when required. Sophisticated equipment is safeguarded through warranties and contingency-supported maintenance. Environmentally responsible practices—energy-efficient systems, water-saving devices, chemical waste reduction and ethical research standards—minimize impact and build public trust. Regular maintenance and monitoring strengthen operational resilience. As the lab advances toward international standards, external user access will generate revenue, ensuring long-term financial and functional sustainability.

Social impact

Social impact is already visible and projected to grow substantially. The lab elevates IIT Bombay's reputation as a leader in translational research, boosts NAAC ratings, improves student employability, and creates a skilled biomedical research workforce. It accelerates affordable healthcare solutions and introduces new therapeutic options that can dramatically improve patient outcomes—for example, resorbable nanomembranes that eliminate repeat surgeries, immunotherapies for leukaemia, drug delivery scaffolds and advanced wound dressings. The lab also contributes to public health preparedness by enabling faster production of diagnostics, antivirals and vaccines during health emergencies. In addition, the research ecosystem fosters entrepreneurship, encourages spin-off companies, and generates new employment opportunities in India's expanding biotech sector.

"This lab and its use will show students that research can actually be translated in reality. This will encourage more students to come forward," say Dr Prakriti and Dr Mamta.

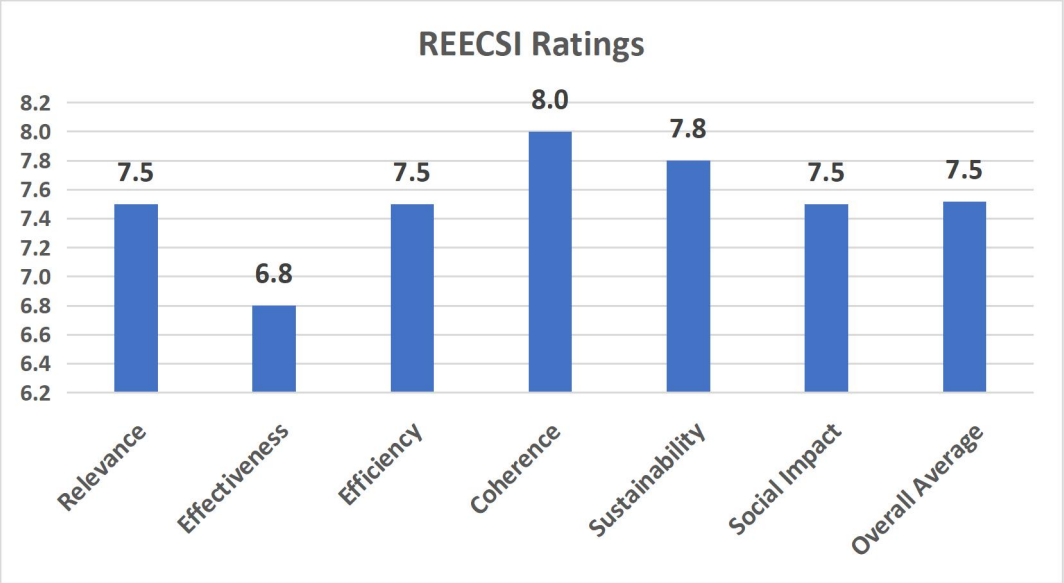
The GMP facility at IIT Bombay is a strategically significant intervention that strengthens India's biomedical innovation capacity. It provides a high-quality, regulated environment for translational research; accelerates lab-to-market pathways; enhances interdisciplinary collaboration; and positions India to reduce dependency on imported biomedical technologies.

The performance indicators of the program on six parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact – were rated by the SAN team on a

scale of 1 to 10 with ten being the highest based on the observations and the discussions with the stakeholders.

Indicators	Score	Average
RELEVANCE		
Encouraging Indian pharma sector	6	7.5
Bridging academic research and practical healthcare innovations	8	
Futuristic in the vision for Research and Development	8	
Developing products based on market needs	8	
EFFECTIVENESS		
Research Outcomes	7	6.8
Operational Effectiveness	6	
Collaboration and Partnerships	6	
Collaborative Inter Departmental Research	7	
Process Standardization and Quality Systems	7	
Equipment Utilization and Readiness	8	
EFFICIENCY		
Shared Resources	7	7.5
Lab space optimization	8	
Streamlined processes	8	
Publications and Patents	8	
Resource Utilization and Cost Management	7	
Feedback Mechanisms in place	7	
COHERENCE		
Alignment with Institutional Priorities	8	8
National Health and Biotech Alignment	9	
Integration with Research Ecosystem	7	
Regulatory and Quality Alignment	8	
SUSTAINABILITY		
Financial Strength	8	7.8
Research Practices	8	
Operational Resilience	8	
External Revenue Generation	7	
SOCIAL IMPACT		
Leap in translational research	7	7.5
Building Institutional Reputation	8	
Interdisciplinary Research	8	
Enhanced, Comprehensive Learning Experiences	7	
Enhancing research capabilities	8	
Research Workforce Development	7	
Promote interest in STEM	7	
Spin off for startups and new employment opportunities	8	
Affordable Healthcare	8	
Improving Public Health	8	
Improved health care outcomes	8	
Speeds Innovation	7	
Climate and health research	7	

Based on the indicators discussed above, the average REECSI score for the translational research facility is **7.5**, which indicates good preparation for high performance. The scoring for social impact is largely projected based on the consultations, observations and the scope of this facility. A subsequent review will give more clarity on these indicators.



Conclusion

LTTS's investment has enabled IIT Bombay to build infrastructure that will deliver long-term scientific, economic and social value. As the facility moves toward ISO certification, expands access to external users, scales up manufacturing, and strengthens its regulatory systems, it is poised to become a national hub for translational research and a catalyst for affordable, next-generation healthcare solutions.

Executive Summary

Metabolomics Research Facility, IIT Bombay - A CSR Project of LTTS

Established in 1958, IIT Bombay is one of India's premier institutions, renowned for rigorous academics, advanced research facilities, and interdisciplinary programs across undergraduate, postgraduate, and doctoral levels. The Bio systems Engineering Lab applies metabolomics and biotechnology to advance diagnostics, therapeutics, agriculture, and environmental science. Their work on engineering cyanobacteria for bio fuels led to studies on cellular metabolism and human blood metabolites, helping address metabolic disorders such as diabetes. The lab enables high-precision studies in bio process optimization, disease biomarker discovery, newborn screening, and recombinant protein production. Partially supported by CSR funding from L&T Technology Services (LTTS), the upgraded Metabolomics Research Facility strengthens India's biomedical research capacity, fosters scientific entrepreneurship, and accelerates the translation of discoveries into real-world applications.

Key Features

- Over 200 metabolites and 8 diabetes-related biomarkers have been identified.
- Facilitating improved understanding of complications, early diagnosis, and targeted treatment strategies.
- Equipped with state-of-the-art instruments such as Triple Quad LCMS and GCMS, enhancing sensitivity, precision, and throughput.
- Facilities include bioreactors, molecular biology, microbiology, bio analytics, and photobioreactor systems for diverse biotechnology applications.
- Integrates AI and data analytic for metabolomic modeling and interpretation
- Enables high-precision metabolic studies in bio process optimization, disease biomarker discovery, cyanobacterial engineering, and newborn screening.
- Drives sustainable practices, builds research capacity, provides affordable healthcare solutions, and fosters interdisciplinary learning and scientific entrepreneurship.

Field observations show notable progress at IIT Bombay's Metabolomics Lab. The facility is fully operational with advanced instruments supporting projects on biomarker discovery, cyanobacterial engineering, newborn screening, and AI-based bioprocess optimization. Research demonstrates faster analysis, improved diagnostics, and strong potential for sustainable bioenergy and healthcare innovation through metabolomics - driven solutions.

Evaluation of Impact using REECSI Framework

This project was evaluated using the REESCI framework on five parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact.

Relevance

India faces a significant burden of diseases, including diabetes, cardiovascular conditions, and cancer. IIT Bombay's metabolomics research offers valuable insights into metabolic changes, supporting disease diagnosis, prognosis, treatment, and clinical studies. The dedicated metabolomics facility enhances existing mass spectrometry capabilities, enabling comprehensive profiling of metabolites for applications in healthcare, biotechnology, agriculture, nutrition, and the environment. Through active participation in international conferences and hosting India's first global metabolomics symposium, the lab advances technological innovation, translational research, and global scientific collaborations.

Effectiveness

In the past two years, IIT Bombay's metabolomics facility analyzed over 1,000 samples, identifying 200+ metabolites and 8 diabetes-related biomarkers for early diagnosis and targeted treatment. Cyanobacteria are being engineered for biofuel production, while ongoing studies target kidney dysfunction and cervical cancer biomarkers. The 10-member team is trained on LCMS and GCMS, advancing projects to TRL 4. The lab promotes interdisciplinary research, Mass Spectrometry training, cross-departmental collaboration, and dissemination through publications, conferences, and patents, strengthening translational and industry-relevant outcomes.

"Lack of trained manpower to use these instruments effectively is a big challenge. Our research team is fully trained, and we also encourage and support other labs to use this facility. So far, seven labs at IIT Bombay have utilized this facility to add value to their studies," says Dr. Wangikar.

Efficiency

The lab operates 24/7 and is accessible to scholars from other labs, ensuring maximum utilization. Samples from multiple hospitals are processed under strict ethical and FDA-compliant protocols, with waste managed centrally. A dedicated three-member team uses AI tools for data cleaning and analysis, standardizing LCMS workflows. Over 1,000 samples were analyzed in 30 minutes each, with methods optimized to 12 minutes per sample, improving throughput, reducing costs, preserving sample integrity, and enhancing high-throughput and clinical applications.

Coherence

The lab's research aligns with India's national priorities in healthcare, biotechnology, and clean energy, supporting initiatives like biomarker discovery for diabetes and kidney disease and cyanobacterial carbon capture for sustainable technologies. Dr. Wangikar's team engages globally through collaborations and conferences, contributing to precision health, sustainable bioprocessing, and systems biology. Strong translational linkages bridge fundamental metabolomics research with clinical and industrial applications, enabling early diagnosis, precision medicine, and sustainable bio-manufacturing solutions.

Sustainability

The metabolomics facility contributes to emerging technologies like diabetes biomarker discovery and cyanobacterial bioenergy, supported by publications and patents. Strategic collaborations with hospitals, universities, IITs, and government agencies enhance research and funding opportunities. The facility is regularly upgraded with advanced instruments, software, and faster protocols, ensuring cutting-edge capabilities. Sustainable practices include careful sample handling, efficient instrument use, and proper waste management. Regular assessments, internal audits, and progress reviews promote transparency, continuous improvement, and long-term research sustainability.

> ***"Research projects that reach TRL 4 and above are usually sustainable. We have always focused on existing gaps in research and strive to innovate in technology to meet industry needs," says Mr. Ishaan.***

Social Impact

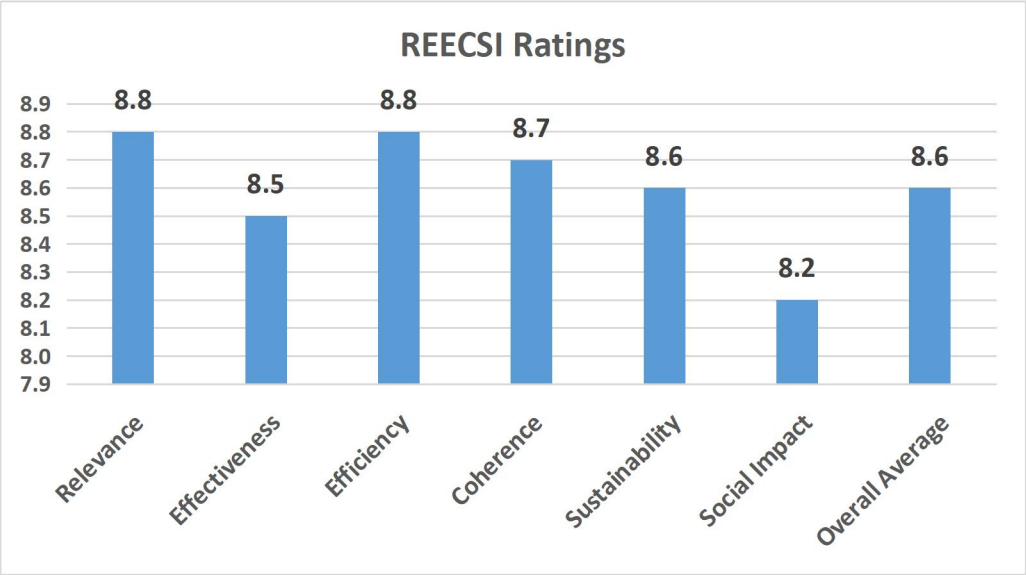
The metabolomics facility at IIT Bombay drives social impact through interdisciplinary research, advanced infrastructure, and research excellence. It offers high-quality education and training, fosters national and international collaborations, and promotes translational research in healthcare, agriculture, and the environment. The lab supports disease prevention, early diagnosis, personalized medicine, and improved healthcare access, including rural and underserved communities. By enabling technology transfer, innovation, and entrepreneurship, it translates metabolomics research into practical societal and bioeconomic benefits.

The metabolomics facility promotes social impact by converting research into practical solutions and commercial products via industry partnerships. It nurtures an innovation ecosystem that supports startups and entrepreneurial ventures in healthcare and bioenergy, facilitating societal benefits and the adoption of cutting-edge technologies.

The performance indicators of the program on six parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact – were rated by the SAN team on a scale of 1 to 10 with ten being the highest based on the observations and the discussions with the stakeholders.

Indicators	Score	Average
RELEVANCE		
Need for better understanding of diseases	9	8.8
Bridges the need for a dedicated metabolomics facility	9	
Research carried out	8	
Contributes to the larger goal of technological innovation	9	
Aligned with global developments in the field	9	
EFFECTIVENESS		
Results achieved in the past year	8	8.5
Encourages Interdisciplinary Research	9	
Promotion of MS Training and Research Opportunities	8	
Research Team	9	
EFFICIENCY		
Equipment Usage	9	8.8
Management of Samples	9	
Adherence to Protocols	9	
Data Analytics	9	
Research Productivity	8	
COHERENCE		
Alignment with Institutional and National Research Priorities	9	8.7
Global Research Integration	9	
Translational Linkages	8	
SUSTAINABILITY		
Contribution to Emerging Technologies	9	8.6
Strategic Collaborations	8	
Regular Upgradation of the Facility	8	
Sustainable Laboratory Practices	9	
Periodic Assessments and Evaluation	9	
SOCIAL IMPACT		
Interdisciplinary Research	9	8.2
Advanced Infrastructure	9	
Research Excellence	8	
High-Quality Education and Training	9	
Collaborative Networks	9	
Translational Research	9	
Innovation and Entrepreneurship	8	
Disease Prevention, Early Detection & Disease Management	8	
Personalized Medicine	7	
Healthcare Access	7	
Community Engagement	7	
Technology Transfer	8	
Innovation Ecosystem	8	

Based on the indicators discussed above, the average REECSI score for the metabolomics research facility is **8.6**, which indicates a strong performance.



Conclusion

Supported by LTTS, IIT Bombay's metabolomics facility has achieved notable progress in healthcare, diagnostics, and environmental research. With advanced instruments and a skilled research team, it enhances the institute's scientific reputation, drives interdisciplinary metabolomics studies, and promotes wider applications in clinical, industrial, and environmental domains across India.

Executive Summary

Ecological Restoration Project by Junglescapes Charitable Trust- A CSR Project of LTTS

Since 2008, Junglescapes Charitable Trust has been restoring severely degraded forest ecosystems in Karnataka through a science-based, community- participative approach, working under a formal MOU with the Karnataka Forest Department. India's first Certified Ecological Restoration Practitioner, the organization has restored over 1,400 hectares of forest through a structured 4–5-year ecological recovery cycle involving invasive species removal, native regeneration, and continuous monitoring. This work is focused in the Bandipur Tiger Reserve, a 874 sq. km landscape within the Nilgiri Biosphere Reserve and one of Asia's largest contiguous tropical forests. Bandipur lies within one of India's 52 designated elephant corridors, making it critical for wildlife connectivity between the Western and Eastern Ghats. Restoration here carries national and global significance, aligned with India's National Biodiversity Action Plan and the UN Decade on Ecosystem Restoration (2021–2030).

Key Features

- Provides sustainable employment to around 80 community members, supporting socioeconomic stability alongside ecological restoration.
- Installed low-smoke chulhas in 400 households and low-fuel water boilers in 1,500 homes, reducing firewood use, improving health, and conserving forests.
- Implements a structured 4–5-year restoration cycle to ensure habitat stability and self-sustaining forest regeneration.
- The "Barefoot Restorer" model offers skilled, year-round employment to forest-dependent and tribal communities, with strong women's participation.
- 34 native species were grown from seeds in nurseries and planted with Forest Department support.
- Innovative circular practices, such as bio-char production from invasive biomass, enhance soil fertility and reduce waste.
- Workforce grew from 5 to 80 community members, each working 22–24 days per month and earning ₹9,000–₹11,000 on average.
- Regular employment strengthens livelihoods, reduces migration, ensures stable household income, and boosts children's school attendance.

Field visits highlighted successful habitat restoration with strong community participation. Local workers, including women, were actively engaged in nursery development, planting native saplings, and removing invasive species. Continuous training and livelihood support enhanced their skills and income security. The restored areas showed improved vegetation cover, soil quality, and biodiversity, indicating tangible ecological recovery and socioeconomic impact.

Evaluation of Impact using REECSI Framework

This project was evaluated using the REESCI framework on five parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact.

Relevance

Bandipur's dry deciduous forests, designated as one of India's 52 critical elephant corridors, face an urgent need for ecological restoration due to severe invasion by species such as Lantana camara, Senna spectabilis and Eupatorium odoratum, which suppress native vegetation, fragment wildlife movement and reduce fodder availability. Although forest habitation has been prohibited since 1972, the continued presence of eight villages within the landscape adds social and management complexity, making sustained, community-linked restoration essential. Initiated in 2013, the Junglescapes programme responds to this need by undertaking long-term, scientifically validated invasive removal across contiguous forest plots, recognising that each plot requires four to five years for full recovery and therefore demands continuity of funding and monitoring.

Effectiveness

The LTTS-supported phase (2022–24), covering plots 13–15, was designed to create spatial continuity with previously restored areas, forming a larger biodiversity nucleus crucial for corridor functionality. By combining proven restoration techniques with livelihood engagement of local tribal communities the programme addresses both the ecological urgency of habitat recovery and the socio-economic realities of forest-dependent communities. The Junglescapes–LTTS partnership has delivered strong ecological and social outcomes in Bandipur. Over 150 hectares of degraded forest, including 75 hectares were restored, regenerating 252 native species, reducing invasive, and enhancing wildlife visibility. Assisted natural regeneration and invasive removal improved vegetation and habitat connectivity. The workforce grew from 5 to over 80, providing year-round, insured employment, gender inclusivity, stable incomes, reduced migration, and better school attendance, demonstrating long-term ecological–economic benefits, local ownership, and sustainable community development.

"Monsoon is the easiest time for us to uproot the Lantana… we are able to work throughout the year," says Uma Devi, worker.

Efficiency

Junglescapes Charitable Trust ensures cost and time efficiency by scheduling restoration during monsoon, when invasive removal is faster, with each worker restoring 0.5–0.7 hectares per month. Field labour accounts for 70–75% of expenditure, administrative overheads under 10%, and restoration costs ₹28,000–₹35,000 per hectare. LTTS contributions of ₹60.9 lakh (FY 2022–23) and ₹44.3 lakh (FY 2023–24) were fully utilized. The zero-waste approach, biochar production,

trained supervisors, joint monitoring, and safety measures ensure accountable and effective implementation.

Coherence

The Bandipur restoration initiative aligns closely with national and state forest conservation priorities, operating under a five-year MoU with the Karnataka Forest Department for technical guidance, site access, and coordinated monitoring. The project complements existing programmes, contributing to the UN Decade on Ecosystem Restoration, SDG 15 and 8, India's Green India Mission, the Karnataka SAPCC, and Schedule VII of the Companies Act. Its integrated approach links ecological restoration with social upliftment, livelihoods, and gender inclusion, ensuring long-term institutional and socio-ecological coherence.

Sustainability

Junglescapes ensures sustainability through strong community engagement, local ownership, and adaptive learning. The Barefoot Restorer programme equips youth and women with skills in ecological monitoring and invasive species management, while families help maintain restored areas. Sequential restoration cycles—including deweeding, enrichment, and monitoring—safeguard ecological gains. Fair wages, insurance, and attendance bonuses support financial and occupational stability, with over 85% of workers retained annually. Carbon sequestration potential further enables sustainable financing, making restoration socially inclusive, economically viable, and long-lasting.

> ***"Now the tribal communities have regular work… they are happy to stay in their homes," says Mahesh of Junglescapes.***

Social Impact

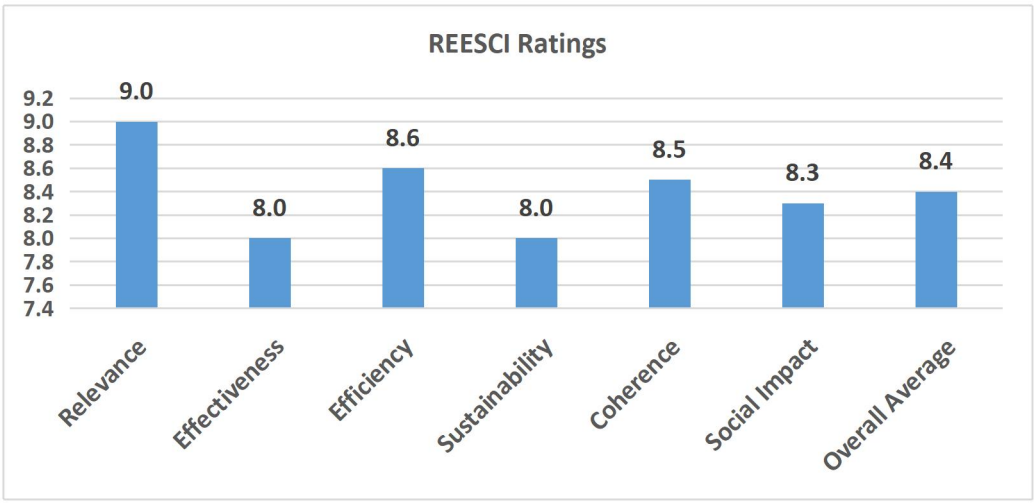
The Bandipur initiative has generated significant social benefits alongside ecological restoration. Trial plots show 100% sapling survival and 25–30% higher germination success, reducing surface evaporation, weed regrowth, and the need for follow-up cycles. Communities gain year-round employment, insurance, and energy security through 1,500 low-smoke water boilers. Nearly 50% of the workforce are women trained in seed management, fostering gender inclusion and leadership. Regular work has reduced migration, stabilized household incomes, and improved children's school attendance. The project builds pride, strengthens inter-community cooperation, and revives traditional ecological knowledge, linking livelihoods with sustainable forest stewardship and long-term community well-being.

The performance indicators of the program on six parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact – were rated by the SAN team on a scale of 1 to 10 with ten being the highest based on the observations and the discussions with the stakeholders.

Parameter	Indicator	Rating	Average
Relevance	Extent of degraded forest area and loss of native biodiversity in Bandipur.	9	9
	Presence and spread of invasive species affecting native ecology.	9	
	Frequency and severity of ecological disturbances such as forest fires, soil erosion, and habitat fragmentation.	9	
	Non-Availability of other programs enabling indigenous ecological knowledge in restoration efforts.	9	
	Forest-dependent households lacking stable, year-round income.	9	
	Community members seeking seasonal or migratory labour due to limited local livelihood options.	9	
	Demand from forest authorities for ecological restoration and climate-resilient development.	9	
Effectiveness	Restoration of identified plots through removal of invasive species and ecological restoration activities.	8	8
	Increase in native plant species and density of natural forest vegetation.	8	
	Rate of natural regeneration observed in restored plots.	8	
	Survival rate of planted saplings and native vegetation over time.	8	
	Increase in soil moisture and ground cover in restored plots.	8	
	Community members gaining sustained employment in restoration activities and improvement in household incomes.	8	
	Introduction of Biochar process as safe disposal of invasive weeds	8	
	Community members trained and applying ecological restoration and resource-management skills.	8	
	Aplication of biochar produced to degraded soils and improvement of sapling survival	8	

Parameter	Indicator	Rating	Average
Efficiency	Transparent and effective CSR fund utilisation	9	8.6
	Use of low-impact, eco-friendly restoration methods	9	
	Community groups independently manage restoration activities	8	
	Local seeds and materials used for restoration	9	
	Regular community monitoring and reporting mechanisms in place	8	
Sustainability	Long-term ecological recovery through natural processes	8	8
	Regular monitoring and removal of invasive regrowth	8	
	Ongoing collaboration with Forest Department supporting continuity	9	
	Continuous skill upgrading for community restoration teams	8	
	Local nursery/biochar unit ensure sustained native plant supply/growth	7	
Coherence	Strong multi-stakeholder collaboration across partners	9	8.5
	Creation of contiguous, invasive-free ecological corridors	8	
	Alignment with state forest and conservation priorities	9	
	Integrated ecological restoration with social inclusion and livelihoods	8	
Social Impact	Increased native biodiversity and wildlife presence	9	8.3
	Reduced forest fire risk through biomass removal	8	
	Improved human–wildlife coexistence	8	
	Enhanced women's participation in restoration activities	8	
	Strong community ownership in forest conservation	8	
	Demonstrated contribution to global SDG goals	9	
	Increased availability of native forage species	8	
	Improved year-round food resources for wildlife	8	

The Junglescapes project earned a REECSI score of **8.4**, highlighting its strong performance across ecological, economic, and social dimensions. The high score underscores the project's replicability, sustainability, and overall impact in promoting ecosystem recovery.



Conclusion

The Junglescapes initiative in Bandipur restores over 75 hectares of degraded dry deciduous forest by removing invasives, promoting native vegetation, improving soil and habitat health, and supporting wildlife movement along a critical elephant corridor. Over 80 tribal workers, nearly half women, gain skills, year-round income, and pride through the Barefoot Restorer model, reflecting LTTS's exemplary CSR leadership in ecosystem restoration.

Executive Summary
Neerotam Integrated Watershed Development - A CSR Project of LTTS

The Neerottam Integrated Watershed Development Project, implemented by the National Agro Foundation (NAF) with support from L&T Technology Services (LTTS), is a comprehensive rural development initiative across four villages in Chengalpattu district—Puthur, Thottikuppam, Poongunam, and Muthuvinayagapuram. The project tackled water scarcity, soil degradation, and livelihood challenges through integrated interventions in water resource development, agriculture, green cover enhancement, and capacity building. Infrastructure such as check dams, percolation ponds, and field bunds improved groundwater recharge and soil fertility.

Agroforestry plantations, sustainable farming practices, and SHG-led livelihood initiatives enhanced income and resilience. Participatory implementation ensured strong community ownership and institutional sustainability. The project demonstrated high efficiency, coherence, and social impact, boosting water availability, agricultural productivity, and women's empowerment while aligning with national programs and SDGs.

Key Features

- Benefited around 786 people in Tamil Nadu through groundwater recharge, soil erosion prevention, and sustainable water access.
- Beneficiaries reported increased rainwater retention, showing structures effectively hold water.
- Check dam successfully regulated water flow in canals and streams, ensuring steady supply.
- Benefited around 592 people through agricultural improvements, including threshing yards, fodder kits, and green manure bags.
- Planted over 24,000 agroforestry and horticultural trees, enhancing biodiversity and soil health.
- Training in animal care, agri-business, and SHG livelihoods promoted self-reliance and women's empowerment.
- Sintex drinking water tanks ensured regular access to drinking water for most respondents.
- Construction of toe wall and percolation pond in Poongunam village improved water availability and soil health.

Field observations, watershed and agricultural assessments, and focus group discussions reveal that the Neerotam Project substantially improved groundwater recharge, soil fertility, and cropping intensity. Farmers adopted organic practices, realized higher yields, and benefited from infrastructure like check dams and threshing yards. Women's SHGs accessed new livelihood opportunities, enhancing community participation and supporting long-term local sustainability.

Evaluation of Impact using REECSI Framework

This project was evaluated using the REESCI framework on five parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact.

Relevance

Before the Neerotam Project, the villages of Puthur, Thottikuppam, Poongunam, and Muthuvinayagapuram faced acute water scarcity, soil degradation, low agricultural productivity, limited livelihood options, and weak community capacity. Farmers struggled with poor yields and rising costs, while women had few income-generating opportunities. Environmental degradation reduced green cover and biodiversity. The project's integrated approach—through watershed management, sustainable farming, plantation drives, and community empowerment—effectively restored water security, improved soil fertility, enhanced livelihoods, and strengthened local capacity for sustainable, self-reliant development.

Effectiveness

The integrated watershed development initiatives enhanced water availability, groundwater recharge, and soil health across four villages. Interventions such as check dams, percolation ponds, field bunds, and village ponds supported irrigation, livestock, and domestic use. Sustainable farming, green manure, and seed banks improved crop yields, while 24,000+ trees boosted biodiversity and livelihoods. Capacity building and women's SHGs strengthened skills and income. Around 2,705 people benefited from training in LEAN farming, soil management, pest control, livestock rearing, and agri-business, leading to notable improvements in animal health and immunity.

> ***" I feel empowered to manage my livestock independently, and this support has improved my confidence, skills, and the overall quality of my livestock business, allowing me to provide better for my family." Bhavani, Puthu***

Efficiency

The project achieved significant outcomes within its planned timeframe and budget of ₹2.25 crore (Nov 2021–Mar 2024). A phased, participatory approach aligned activities with seasonal cycles, maximizing effectiveness. NAF's technical expertise, strong management, community involvement, and use of local resources ensured cost-efficiency and ownership. Integration of water conservation, agriculture, green cover, and livelihood interventions created a multiplier effect, delivering high-impact results, sustainable benefits, and excellent value for investment across the four villages.

Coherence

The initiative exhibits strong coherence through its integrated design and implementation, linking water resource development, agricultural improvement, green cover enhancement, and capacity building for mutually reinforcing outcomes. Institutional collaboration between LTTS and NAF combined strategic oversight with field-level execution. Participatory planning engaged local communities, SHGs, and farmer collectives, aligning interventions with real needs. The project also maintained policy and thematic coherence by aligning with national and state programs such as PMKSY, NMSA, and Tamil Nadu watershed initiatives.

Sustainability

The watershed interventions ensure long-term sustainability through durable water structures, improved groundwater levels, and enhanced soil fertility. Plantations of over 24,000 trees support biodiversity, carbon sequestration, and future income. Farmers adopted sustainable practices like LEAN farming and seed conservation, while women's SHGs gained livelihood opportunities, strengthening social and economic resilience. Strong community ownership, capacity building, and local governance mechanisms guarantee ongoing maintenance and management, ensuring ecological, agricultural, and financial benefits continue beyond project completion.

Social Impact

The project significantly improved quality of life, livelihoods, and social cohesion in the four villages. Year-round water access enhanced household well-being, reduced women's burden, and supported irrigation and livestock. Sustainable farming practices, agroforestry, and seed banks increased productivity, income, and food security. Women's SHGs gained economic empowerment and decision-making roles. Health, hygiene, and veterinary interventions, along with community participation, strengthened social capital, inclusion, and resilience, reducing migration and ensuring equitable, long-term benefits.

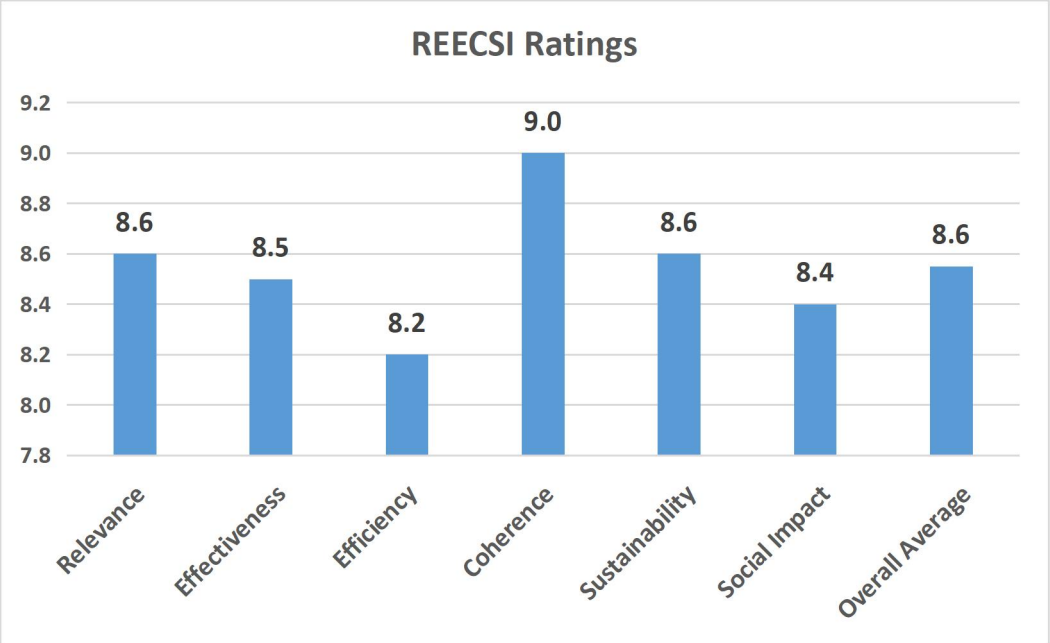
"Through the LTTS-NAF support received, I was able to start my own business, gain the confidence and skills to manage my livestock, increase my income, provide education for my children, and meet our daily household needs without worry." Ramya, Muthu Vinayagapuram

The performance indicators of the program on six parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact – were rated by the SAN team on a scale of 1 to 10 with ten being the highest based on the observations and the discussions with the stakeholders.

Indicators	Rating	Average
Relevance		
Alignment with community needs	9	**8.6**
Declining groundwater levels in the area	8	
Lack of opportunities for women	9	
Underutilisation of local resources	9	
Lack of awareness on sustainable agriculture practices	8	
Environmental degradation in the region	9	
Effectiveness		
Improvement in water availability	9	**8.5**
Adoption of sustainable agricultural practices	8	
Increase in crop yield and productivity	9	
Improved soil fertility	8	
Community participation in capacity-building activities	8	
Enabling women to start businesses	8	
Improvement in household income	9	
Satisfaction of community	9	
Efficiency		
Timely implementation of project activities	8	**8.2**
Optimal utilization of financial resources	8	
Cost-effectiveness of interventions	8	
Ratio of administrative to program expenses	8	
Adherence to planned timelines and budgets	8	
Coordination between community and NAF	9	
Coherence		
Alignment between project objectives, activities, and outcomes	9	**9**
Complementarity among different project components	9	
Consistency with national and state policy frameworks	9	
Contribution to cross-sectoral goals (water, agriculture, livelihood, environment)	9	
Alignment with SDGs	9	
Sustainability		
Continuity of project benefits after completion	9	**8.6**
Community ownership and maintenance of assets	9	
Strengthening of local institutions and governance mechanisms	9	
Adoption of sustainable agricultural and water management practices	9	
Long-term ecological impact (soil, water, vegetation)	9	
Financial viability of livelihood activities	7	
Replicability and scalability of project models in other regions	8	

Social Impact		
Protection of Natural Resources in the 4 villages	9	8.4
Enhanced Green cover and bio-diversity	9	
Increased soil fertility and productivity	9	
Improvement in quality of life and well-being of households	8	
Increased access to clean water and sanitation	9	
Enhanced livelihood opportunities and income levels	8	
Women's empowerment and participation in decision-making	8	
Increased awareness on Animal health and hygiene	8	
Increased community awareness on health, hygiene, and environment	8	
Strengthened social cohesion and collective action	8	
Reduction in migration due to improved local opportunities	8	
Inclusion of marginalized and vulnerable groups in development benefits	9	

The REESCI ratings indicate a well-designed, impactful, and highly positive watershed initiative. The overall score of **8.6** demonstrates that the project's design, activities, and outcomes are strongly aligned, effectively coordinated, and have successfully delivered significant environmental, social, and economic benefits.



Conclusion

The integrated watershed development initiative, implemented by the National Agro Foundation with LTTS support, has delivered lasting impact across four villages in Chengalpattu district. Water conservation structures improved groundwater and irrigation access, while sustainable farming and seed conservation enhanced soil fertility and crop productivity. Plantations strengthened biodiversity and long-term ecological benefits. Women's SHGs and livelihood support promoted financial stability and social inclusion. Strong community ownership, efficient execution, and alignment with national and global development goals make this a replicable model for climate-resilient rural development.

Executive Summary
Lake Restoration- A CSR Project of LTTS

The Chikka Kere (Gumma Reddy Lake) restoration project is implemented by United Way Bengaluru (UWB) with CSR support from L&T Technology Services (LTTS) in Bidarguppe Panchayat, Anekal Taluk, Bengaluru Urban district. The lake is located in a severely water-stressed region where surface water is heavily polluted and groundwater levels are declining. The project aims to improve water quality, restore the lake's ecological and hydrological functions, and strengthen community ownership for long-term sustainability. Construction of stormwater inlets, outer stormwater trenches and pipe culverts to divert and regulate inflows, bund strengthening to prevent erosion, and installation of fencing to avoid encroachment.

Implemented under UWB's "Wake the Lake" campaign, which has restored over 50 lakes since 2011, the project contributes to groundwater recharge, biodiversity revival, improved water access for farmers and villagers, climate resilience, and enhanced community stewardship of local water resources.

Key Features

- Planted 5,400 native saplings to restore lake edges and support birds and aquatic life.
- The project is part of United Way Bengaluru's "Wake the Lake" campaign, which has restored 50+ lakes since 2011.
- The lake is located in Anekal Taluk, a highly water-stressed area with polluted surface water and low groundwater levels.
- Bund strengthening and fencing were done to protect the lake from erosion and encroachment.
- Local communities were actively involved to ensure long-term care and ownership of the lake.
- Storm-water inlets, trenches, and pipe culverts were built to restore natural water flow and recharge.
- Seasonal water retention improved; previously dry within 2–3 months, the lake now holds water longer.
- Biodiversity improvement noted: sightings of butterflies (Common Cupid, Blue Tiger, etc.) and birds (Kingfisher, Green Bee-eater, etc.).

Field visits to Chikka Kere (Gumma Reddy Lake) highlighted steady progress in ecological restoration supported by strong community participation. Plantation of native saplings along the lake bund and shoreline was systematically implemented, with healthy establishment observed in restored areas. Bund strengthening, fencing, and stormwater management structures were functioning effectively, reducing erosion and protecting the lake. Improved water spread and recharge were visible after rainfall. Community volunteers and local stakeholders showed clear ownership, supported by regular coordination and monitoring. Overall, field observations indicate improved habitat conditions, better hydrological functioning, and growing social engagement, demonstrating the project's positive environmental and community impact.

Evaluation of Impact using REECSI Framework

This project was evaluated using the REESCI framework on five parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact.

Relevance

Bidaraguppe Chikke Lake, spanning 36 acres in Anekal, had remained dry for over 30 years due to rapid urbanization, industrial pollution, encroachment, clay mining, and waste dumping. Baseline hydrological and biodiversity studies revealed the lakebed's potential and identified invasive flora. Supported by LTTS, United Way successfully rejuvenated the lake, restoring environmental sustainability, ecological balance, and safeguarding local flora and fauna. The project was timely, necessary, and closely aligned with the region's social, economic, and environmental priorities.

Effectiveness

The LTTS–United Way Bidaraguppe Chikka Lake rejuvenation project restored water after decades, reaching up to 3 feet during rains, though retention remains seasonal. Desilting expanded the water area, 40 tonnes of plastic and 195 quintals of invasive species were removed, and aquatic life was reintroduced. Groundwater levels rose from 1,200–1,300 feet to 300 feet, converting 40% of rainfed land to irrigated. Plantation of 5,400 saplings improved biodiversity and carbon sequestration, while community engagement ensured long-term sustainability.

Shivanna, farmer – They have done a good job. There is good improvement of water in this area. We use the shallow lake bed for grazing our cattle on a daily basis. The farming cultural has drastically come down. Very few families are solely dependent on farming. Many of the family members prefer to go for jobs in factories and companies. Most of the families are into horticulture or vegetable farming.

Efficiency

United Way, with over a decade of experience restoring more than 30 lakes around Bengaluru, executed the Bidaraguppe Chikka Lake project with high operational efficiency. The scientifically guided approach included baseline and endline studies, phased implementation—survey and design, desilting, and biodiversity enhancement—and active community participation. Fertile desilted mud was distributed to farmers, while native flora and termite hills were preserved. Project funds were released in tranches and monitored via Earned Value methodology, ensuring timely execution, optimal resource utilization, and no budget overruns.

Coherence

The Bidaraguppe Chikka Lake restoration project demonstrates strong alignment with national and state initiatives, including the National Plan for Conservation of Aquatic Ecosystems, Jal Shakti Abhiyan, Atal Bhujal Yojana, Jalamrutha, Amrit Sarovar, Biodiversity Mission, and Swachh Bharat Mission. It promotes water conservation, groundwater recharge, pollution reduction, habitat restoration, and community participation. The project also advances key Sustainable Development Goals—SDG 6 (Clean Water), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land)—highlighting its environmental and social coherence.

Sustainability

The project was formally handed over to the village Panchayat in 2024, with community engagement embedded throughout its implementation. The Panchayat now oversees plantation maintenance, provides pathway lighting for safety, and enforces lake-use guidelines through visible signage. Educational murals in schools promote water conservation and cleanliness among children. Through these measures and United Way's active involvement in capacity building and awareness, the project has secured strong local ownership, ensuring the long-term sustainability and upkeep of the lake.

Social Impact

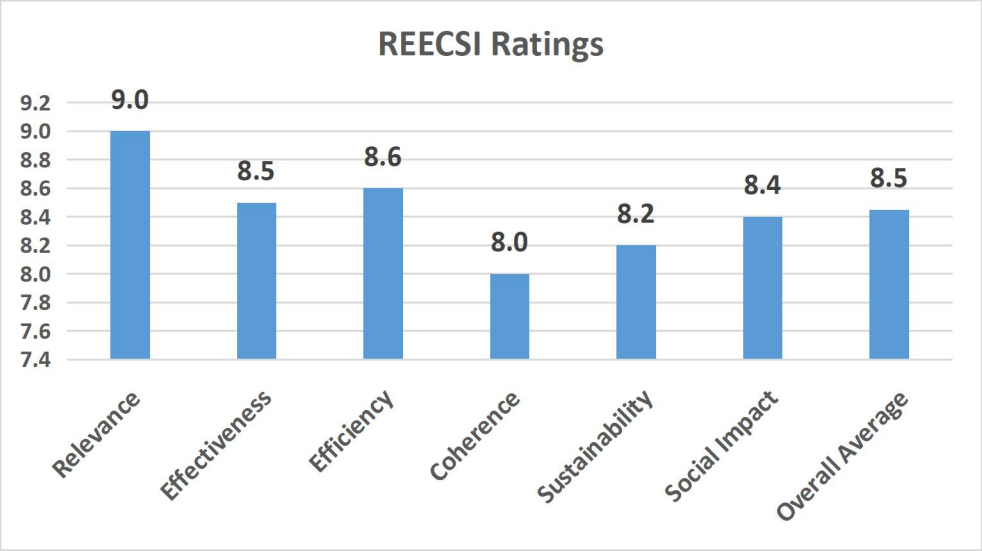
The rejuvenation of Bidaraguppe Chikka Lake conserved around 27.26 crore litres of water and raised groundwater levels by 5%, supporting agriculture and multi-cropping. Farmers' average income increased to Rs. 1,78,789 in FY 2022–23. The project enhanced carbon sequestration, biodiversity, and soil fertility, while reducing flood risks. Over 50 acres of farmland and 11,500 residents benefit from improved water availability. Community spaces, pathways, and wetlands support recreation, health, and livestock. The project's strategic design and execution ensured lasting social and ecological benefits.

The performance indicators of the program on six parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact – were rated by the SAN team on a scale of 1 to 10 with ten being the highest based on the observations and the discussions with the stakeholders.

Parameter	Indicator	Rating	Average
Relevance	Addresses regional water stress (groundwater, pollution, urbanization).	9	9
	Alignment with socio-economic and ecological context of the region	9	
	Baseline, hydrological, and biodiversity studies done	9	
	Project evolved based on stakeholder engagement.	9	
Effectiveness	Water retention in the lake after rejuvenation (depth, duration).	9	8.5
	Volume of silt removed and water area expanded.	8	
	Removal of invasive species and reintroduction of aquatic life.	8	
	Increase in groundwater level and irrigated land area.	8	
	Plantation of 5,400 saplings and CO_2 absorption potential.	9	
	Reduction in flooding and improved community awareness.	9	
Efficiency	Timely completion of project phases (study, implementation, biodiversity).	9	8.6
	Scientific methods used for desilting and waste removal.	8	
	Resource optimization—reuse of silt, preservation of native flora/fauna.	8	
	Community participation in execution and monitoring.	9	
	Cost efficiency—no budget escalation, use of Earned Value tracking.	9	
Coherence	Alignment with National Plan for Conservation of Aquatic Ecosystems, Jal Shakti Abhiyan, Jalamrutha, Amrit Sarovar, and Atal Bhujal Yojana.	8	8
	Integration with 4 SDGs	8	
	Coordination with Panchayat and lake committee structures.	8	
Sustainability	Formal handover to Panchayat and lake committee formation.	9	8.2
	Maintenance of plantation and infrastructure by community.	7	
	Visible behavioral change—cleanliness drives, signages, awareness murals.	9	
	Ecological continuity—native plant preservation, sedimentation pond.	8	
	Long-term local governance involvement ensuring project longevity.	8	
Social Impact	Water conserved: ~27.26 crore litres.	9	8.4

	Increase in groundwater recharge.	9	
	Increase in average income for farmers	7	
	Enhanced areas under improved irrigation and soil moisture.	8	
	Potential project for CO_2 sequestration	9	
	Improved biodiversity and community well-being.	9	
	Improved facilities for Community	8	

An overall REESCI score of **8.45** underscores the project's strong performance, showcasing its successful planning, execution, and measurable environmental and social outcomes.



Conclusion

The rejuvenation of Biradaguppe Chikka Lake by United Way, supported by LTTS, has successfully restored a vital freshwater resource in a rapidly urbanizing and encroached landscape. Implemented scientifically and systematically, the project improved water availability, biodiversity, soil fertility, and community spaces, delivering tangible benefits to both the local community and the surrounding ecosystem. With the lake now handed over to the Panchayat and community, its long-term sustainability depends on active local stewardship, engagement, and ongoing maintenance.

Executive Summary - Vanarai- A CSR project of LTTS

Vanarai has been engaged in integrated rural development in Maharashtra for several decades, tackling challenges such as water scarcity, declining soil fertility, limited livelihoods, and distress migration, with women disproportionately affected. In four villages of Ahmednagar and Jalna districts, early soil and water conservation efforts improved water availability, laying a foundation for agriculture and livelihood development. Building on this, L&T Technology Services (LTTS) partnered with Vanarai to implement an Integrated Village Development Project from June 2022 to May 2023.

The project adopted a holistic approach, integrating safe drinking water, agriculture and livestock support, livelihood diversification, women's empowerment through SHGs, and active Panchayat involvement. By addressing interconnected needs and strengthening local institutions, it aims to enhance living conditions, reduce seasonal vulnerabilities, and promote long-term resilience and self-reliance.

Key Features

- Implemented an integrated rural development approach addressing water, agriculture, livelihoods, livestock, sanitation, and nutrition to enhance socio-economic conditions.
- Improved agricultural productivity and resilience through watershed measures, soil testing, training, and 153 demonstration plots with 100% crop survival.
- Strengthened the livestock and dairy sector via vaccination of 400 animals, fodder support to 110 households, and farmer exposure visits.
- Three functional RO plants supplying clean water to around 5,000 people.
- Distributed of 1,920 mango saplings, and kitchen garden support (600 grow bags for 200 families).
- Economic empowerment through women-led enterprises like dal mills, food processing, and phenyl production.

Field visits highlighted strong community engagement across all project villages. Direct interactions with SHG members, farmers, Panchayat representatives, and Vanarai staff reflected inclusive participation and ownership. Focused discussions and interviews indicated improvements in water access, sanitation, agriculture, horticulture, and household nutrition, alongside strengthened governance and women-led enterprises. Observations confirmed systematic implementation, enhanced livelihoods, and visible socio-economic benefits, while challenges persisted in RO plant maintenance and market linkages, emphasizing areas for continued support and monitoring.

Evaluation of Impact using REECSI Framework

This project was evaluated using the REESCI framework on five parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability, and Social Impact.

Relevance

The project addressed the needs of 1,441 households (6,762 people) across Ahmednagar and Jalna districts by improving water access, agriculture, livelihoods, and women's empowerment. Three RO plants tackled health issues, while watershed measures, farm ponds, soil testing, and 1,920 fruit saplings enhanced agricultural resilience over 3,990 hectares. SHGs, a cattle feed factory, women's enterprises, kitchen gardens, and tool pools diversified livelihoods and reduced labor dependence. Panchayat involvement ensures alignment with local development plans, demonstrating strong relevance to both basic and aspirational community needs.

Effectiveness

The project demonstrated strong effectiveness across sectors with measurable outcomes. Three RO plants supplied over 1.3 lakh litres monthly to ~5,000 people, while 1,300 metres of drainage improved hygiene. Demonstration plots achieved 100% crop survival, and 1,920 fruit saplings recorded 70–75% survival. Livestock vaccination (400 animals, 110 families) and exposure visits (103 participants) enhanced cattle health. The cattle feed unit processed 500 bags below market price; SHG enterprises generated regular earnings, and mechanization reduced input costs by 10–12%, though phenyl-making pilots had limited market traction.

"I am Ramesh, a small farmer in Athwad. Earlier, we relied on borewell water, and my children often fell sick with stomach infections. Since the new RO water plant was installed, their health has improved a lot. The project also gave me mango saplings. Out of the 300 I planted, only 15 didn't survive. I now dream of selling mangoes along with onions in a few years. These interventions have made a big difference to both my family's health and my farm's future".

Efficiency

Efficiency across project interventions was generally positive. Community enterprises, including dal mills and SHG food units, operated with minimal overheads and strong ownership, while the producer company's cattle feed unit maintained competitive pricing despite liquidity constraints. The tool pool reduced per-acre cultivation costs, and RO plants were technically efficient but financially dependent on Panchayat subsidies. Project implementation was timely, with full budget utilization (₹1.29 crore) ,though seasonal inactivity (7–8 months) and political delays, such as the kurdai unit, reduced efficiency in some units.

Coherence

The project showed strong internal and external coherence through integrated water, agriculture, and livelihood interventions. RO wastewater reuse for phenyl production, cattle feed supporting the dairy economy, and dal milling aligned with local cropping patterns, while women's SHG enterprises and watershed measures enhanced income and agricultural resilience. Coordination between Vanarai, Panchayats, and agriculture and animal husbandry departments ensures alignment with state programmed. Coherence gaps included limited phenyl market linkages and overlapping investments, yet the initiative advanced SDGs 1, 2, 3, 5, and 6.

Sustainability

Sustainability outcomes were mixed but promising in core livelihoods and agriculture. Mango orchards offered stable income within three to five years and were replicated by non-beneficiaries. The cattle feed unit demonstrated long-term viability, and kitchen gardens ensured continued household nutrition. RO plants faced operation and maintenance challenges, and some SHG enterprises remained seasonal with limited capital. Positive signs included Panchayat co-funding, community cost-sharing, and proactive local leadership. Long-term sustainability depends on institutional capacity-building and continued Panchayat engagement.

Social Impact

The integrated project delivered multidimensional impact across health, livelihoods, agriculture, environment, and governance. Access to RO water and improved sanitation reduced disease incidence, while diversified livelihoods, mechanization, and SHG enterprises increased incomes, women's participation, and decision-making. Agricultural resilience improved through soil testing, crop diversification, and watershed works, enhancing food and nutrition security. Environmental gains included improved soil moisture and vegetation cover. Panchayats' co-funding and partial O&M strengthened local governance, collectively enhancing household wellbeing, ecological sustainability, and community resilience.

"I am the Sarpanch of Paregaon. Earlier, villagers often fell sick and struggled to get safe water. I decided to invest Panchayat funds in the RO water plant, even though the revenues wouldn't fully cover maintenance. We spent ₹1.4 lakh on the shed and ₹60,000 on filters. Even if we lose money, I believe people must have safe water. This project showed me how strong governance and prioritizing community welfare can build resilience and long-term benefits for the village".

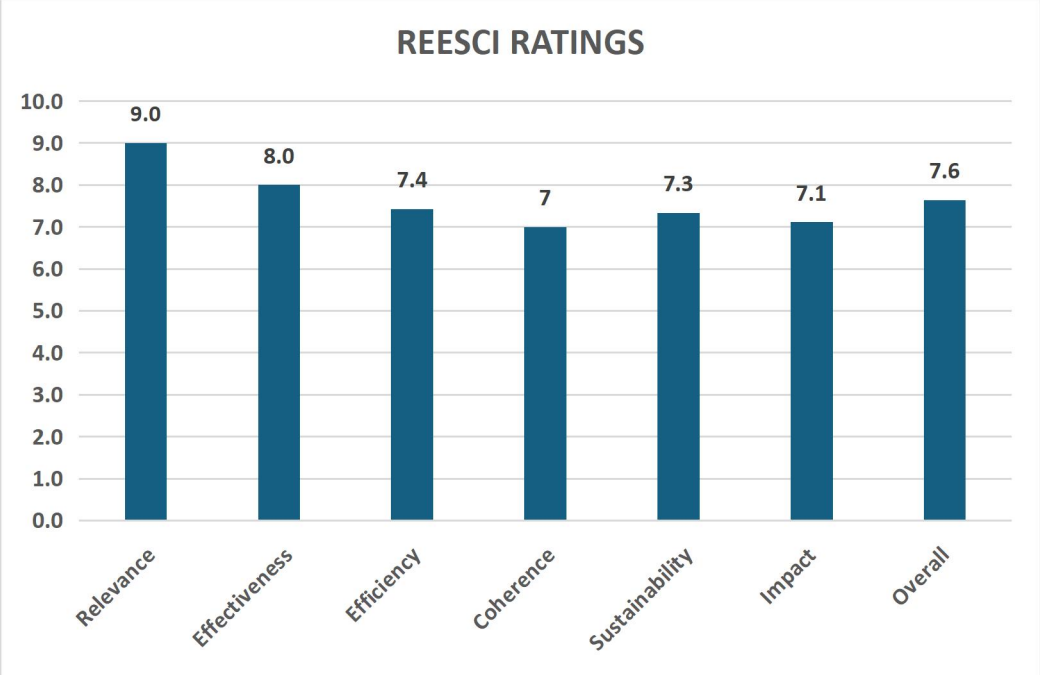
The performance indicators of the program on six parameters – Relevance, Effectiveness, Efficiency, Coherence, Sustainability and Social Impact – were rated by the SAN team on a scale of 1 to 10 with ten being the highest based on the observations and the discussions with the stakeholders

Criterion	Indicator	Ratings	Average
Relevance	Alignment of interventions with local livelihood and environmental needs	10	9.0
	Engagement of SHGs in livelihood activities	8	
	Extent to which RO systems address drought and health issues	9	
	Relevance of demonstration plots and exposure visits to local cropping patterns	9	
	Social inclusion of SC/ST and backward-class households	9	
	Alignment of project design with Panchayat and district development plans	8	
	Alignment of interventions with household needs	10	
Effectiveness	Availability and usage of safe water through RO plants	9	8.0
	RO plant functionality and downtime rate (days non-functional per month)	7	
	Functionality and maintenance of drainage lines in project villages	10	
	Improved crop productivity and soil fertility through demo plots and soil testing labs	8	
	Participation of farmers in exposure visits and adoption of improved practices	8	
	Livestock health improvement through vaccination and deworming	8	
	Income generation and viability of SHG and producer company enterprises	7	
	Effectiveness of tool pool services for small and marginal farmers	8	
	Health improvements due to clean drinking water and sanitation facilities	8	
	Survival and growth of mango orchards	8	
	Production and sales from cattle feed unit	7	

Criterion	Indicator	Ratings	Average
Efficiency	Cost-effectiveness of RO plant operations (pricing vs. maintenance cost)	7	7.4
	Resource utilization efficiency in SHG enterprises	6	
	Resource utilization efficiency in cattle feed enterprises	8	
	Timeliness and quality of implementation of infrastructure works (drainage, RO Plants)	8	
	Reduction in input costs due to tool pool and soil-based fertilizer advice	8	
	Community contribution or cost-sharing in project interventions	8	
	Efficiency of administrative and coordination mechanisms (Vanarai–Panchayat–LTTS)	7	
Coherence	Integration among agriculture, WASH, and livelihood interventions	8	7
	Collaboration between Panchayats, Vanarai, and line departments	7	
	Consistency between women's empowerment and livelihood diversification objectives	7	
	Reuse of wastewater from RO plants for productive purposes (phenyl, irrigation)	6	
	Convergence with government schemes (MGNREGA, NABARD, NRLM, etc.)	6	
	Linkages between livelihoods and agriculture	8	
Sustainability	Financial sustainability of RO plants and drainage infrastructure	6	7.3
	Institutional sustainability of SHGs and Producer Company (governance, reinvestment)	7	
	Replication of horticulture and kitchen garden models by non-beneficiaries	8	
	Continued use of learnings from demo plots and exposure visits	8	
	Adoption of improved animal husbandry practices post-project (vaccination, fodder cultivation)	8	
	Panchayat budget allocations for O&M of assets	7	

Criterion	Indicator	Ratings	Average
Impact	Reduction in seasonal migration due to diversified livelihoods	7	7.1
	Increase in women's income, mobility, and decision-making through SHGs	6	
	Improvement in household health due to RO water and sanitation access	9	
	Improved food and nutrition security through kitchen gardens and fodder promotion	8	
	Increase in farmer income through dal mills, food processing, and cattle feed production	7	
	Enhanced agricultural resilience through soil testing and horticulture	8	
	Strengthened Panchayat accountability and local governance	7	
	Employment opportunities through enterprises and services	5	
	Responsiveness and accountability of Panchayats	7	

The Vanarai project achieved an average REECSI score of **7.6**, reflecting strong performance with measurable improvements in water, agriculture, livelihoods, women's empowerment, health, and local governance.



Conclusion

The Vanarai–LTTS project achieved measurable outcomes across livelihoods, agriculture, WASH, livestock, and women's empowerment, improving incomes, food security, hygiene, and community resilience for nearly 6,762 beneficiaries. Enterprise initiatives strengthened market linkages and women's participation, while SHGs, producer companies, and Panchayats enhanced local governance. With scope for capacity building, market access, and convergence, the project serves as a replicable model of integrated rural development, demonstrating how collaborative partnerships can drive transformative, scalable, and sustainable change in rural India aligned with national priorities and SDGs.