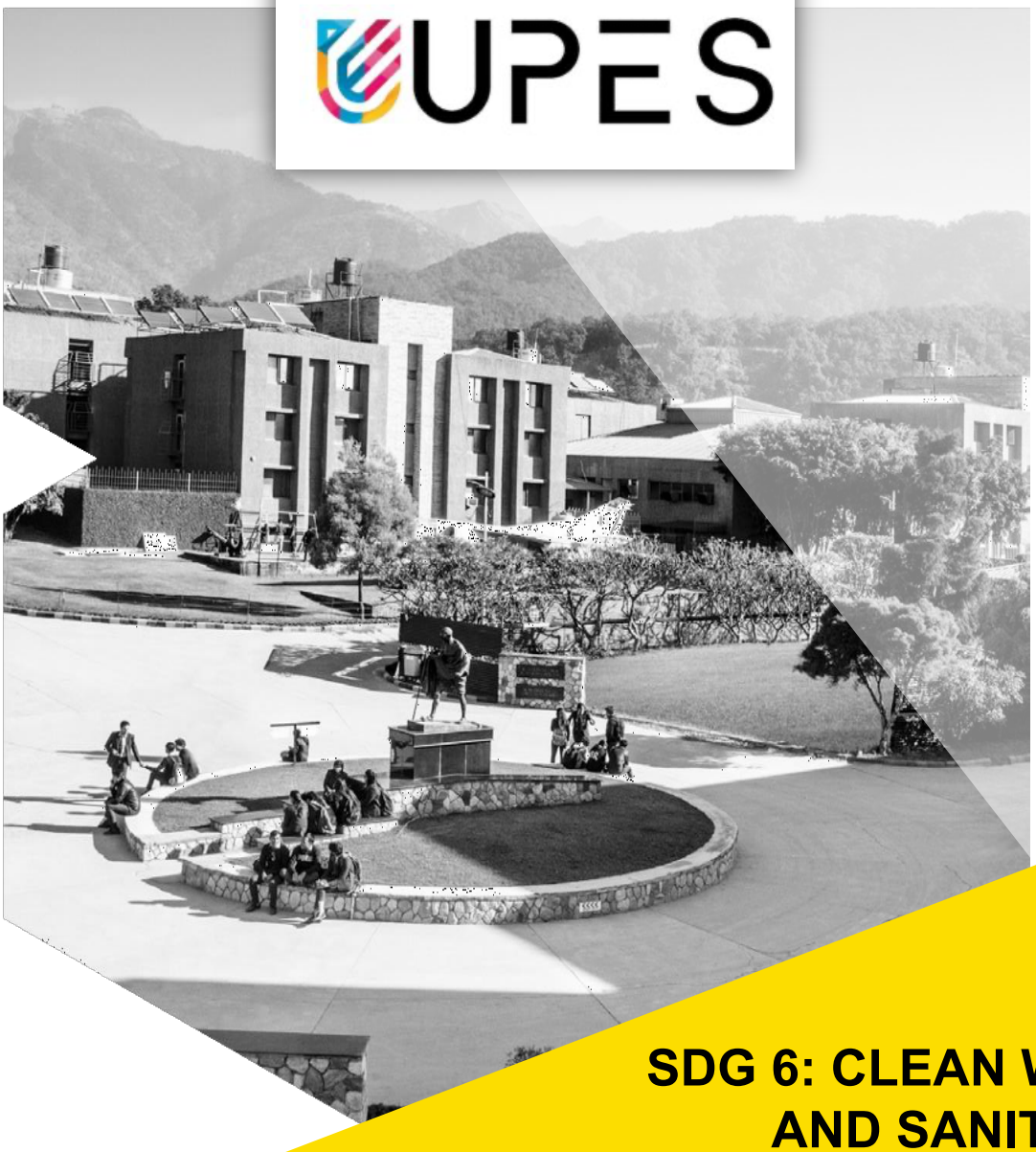
SUSTAINABLE DEVELOPMENT GOALS

UPES



SDG 6: CLEAN WATER AND SANITATION

2025

Table of Contents

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SDG 6: Clean Water and Sanitation – UPES Sustainability Report (2022–2025)

The University of Petroleum and Energy Studies (UPES) in India is committed to Sustainable Development Goal 6 (SDG 6), which focuses on clean water and sanitation for all by 2030 [1]. This report outlines UPES's initiatives and performance on SDG 6 from 2022 through 2025, aligned with Times Higher Education (THE) Impact Rankings indicators. It covers on-campus water usage efficiency, access to safe water and sanitation, community outreach, and contributions through research and education. All claims are supported with metrics and evidence from official reports and projects.

Water Usage, Efficiency, and Conservation on Campus

UPES has implemented comprehensive measures to conserve water and use it efficiently on campus:

Rainwater Harvesting & Efficient Fixtures

The university has an extensive rainwater harvesting (RWH) system. All RWH pits are equipped with flow meters to monitor and maximize groundwater recharge [1]. Alongside this, UPES integrates other water-saving technologies such as low-flow faucets and water-efficient appliances across its campus [2], significantly reducing daily water consumption at the source. These combined efforts have led to an estimated 89% reduction in dependency on external water sources through onsite rainwater capture and reuse [1].

Wastewater Recycling (Greywater Reuse)

UPES operates its own sewage treatment and water recycling facilities, making the campus a *"Zero Water Discharge"* site as per Central Ground Water Authority [3]. The campus's wastewater treatment plant has a capacity of **550 kiloliters per day (KLPD)**, allowing all sewage and greywater to be treated on-site. Treated water is reused for non-potable applications like campus landscaping and horticulture; for instance, **about 250 KL of recycled water** was used in the campus horticulture section recently [3]. By recycling and reusing water in this way, UPES minimizes fresh water intake and avoids any discharge of untreated effluent off campus. This closed-loop water system not only conserves water but also prevents pollution of local water bodies.

Monitoring and Leak Prevention

The university continuously monitors water consumption to detect leaks and improve efficiency. Water flow meters (installed on RWH structures and main supply lines) help track usage and recharge

volumes [1]. Facilities and maintenance teams conduct regular audits of water infrastructure to ensure that fixtures remain efficient and any anomalies in consumption are promptly addressed. This data-driven approach to water management ensures that conservation technologies yield measurable savings.

Innovative Water Efficiency Initiatives

In 2022, UPES eliminated all Reverse Osmosis (RO) drinking water systems on campus as a bold water-saving initiative. RO systems, while providing high-quality water, waste 3–4 liters of water for every liter purified. After conducting extensive water quality testing, the university determined that its source water was clean and potable without need for RO filtration [4]. Thus, UPES switched to direct supply (with appropriate basic filtration/UV treatment where necessary) for drinking water. **This change is saving an estimated 30 million liters of water per year** that would otherwise have been lost as RO reject waste [4]. It also aligns with expert recommendations to avoid RO when TDS (Total Dissolved Solids) levels are moderate and to use less wasteful treatment methods [5]. By removing unnecessary RO units, UPES not only conserves water but also preserves essential minerals in the drinking water, benefiting both sustainability and health.

Access to Safe Water and Sanitation on Campus

UPES ensures that all students, staff, and visitors have access to safe drinking water and hygienic sanitation facilities, with special attention to inclusivity and dignity for every user:

Clean Drinking Water Provision

Safe, potable drinking water is readily available throughout the UPES campuses. Water quality is regularly tested to meet national standards, and the findings have confirmed that campus water is fit for consumption without heavy filtration [4]. As noted above, the university's confidence in its water quality allowed the phase-out of RO filters, indicating that **100% of the campus population has access to clean drinking water** through on-site supply [4]. Dozens of water dispensers and hydration stations are stationed in academic buildings, hostels, and common areas, ensuring convenient access. By relying on potable source water (augmented by simple UV or chlorine disinfection as needed), UPES provides clean drinking water in a sustainable manner while avoiding water wastage.

Inclusive and Hygienic Sanitation Facilities

UPES maintains a robust infrastructure of restrooms and sanitation facilities that are clean, safe, and inclusive. All academic and residential buildings are equipped with adequate toilets segregated by gender, and these facilities are kept to high cleanliness standards through frequent cleaning and hygiene audits [2]. The university places special emphasis on dignified sanitation for women – providing feminine hygiene bins and privacy – and for all users in general by ensuring running water, soap, and proper waste disposal in every washroom. Importantly, accessible restrooms for people with disabilities are available on campus to uphold inclusivity [6]. Ramps, handrails, and wide-door layouts are provided so that wheelchair users and others with mobility impairments can use the

facilities comfortably [6]. These measures guarantee that *everyone*, regardless of gender or ability, has safe and equitable access to sanitation on campus. The overall campus environment is open-defecation free and aligns with the principles of India's Swachh Bharat (Clean India) mission. By maintaining hygienic toilets and clean drinking water, UPES protects the health and dignity of its community.

Community Access and Engagement Initiatives

UPES extends its water and sanitation initiatives beyond the campus gates, actively engaging with local communities and partnering with external organizations to support clean water access and improved sanitation in the region:

Outreach to Underserved Communities

The university conducts outreach programs in neighboring villages and underserved areas to improve access to clean water and sanitation for local residents. Faculty and students from UPES regularly organize workshops and demonstrations on topics such as building rainwater harvesting systems, water conservation in agriculture, and household water treatment methods [2]. These trainings equip villagers with practical skills to secure safe water – for example, by capturing rainwater or protecting local springs – and to practice good hygiene (like safe storage of drinking water and handwashing) [2]. UPES also engages school children and families in these communities through awareness campaigns on hygiene and sanitation, helping to instill long-term behavioral changes. By empowering local stakeholders with knowledge and low-cost technologies, the university helps rural areas become more water-secure and resilient against water scarcity and water-borne diseases.

Community Sanitation and "Clean India" Initiatives

Through Project Swachhata, UPES contributes directly to the national Clean India mission in its surrounding community. Student and staff volunteers carry out sustained cleanliness drives in adjoining villages and public areas near the campus [3]. This includes activities like cleaning community drinking water tanks, rejuvenating village wells, cleaning drains to prevent water stagnation, and maintaining public toilets or bathing areas where available. Such efforts improve the sanitary conditions of these areas, making safe water and sanitation more accessible to underserved populations. The project not only creates cleaner environments but also raises awareness among community members about the importance of sanitation and how to maintain facilities. UPES's adoption of nearby community spaces for regular cleaning and upkeep demonstrates a strong town-gown partnership benefiting public health and hygiene.

Partnerships with Government and NGOs

UPES frequently collaborates with government agencies, industry, and non-governmental organizations to amplify its impact on clean water and sanitation. A flagship example is the microalgae-based wastewater reclamation project led by UPES researchers, which is supported by the Department of Science & Technology (Government of India) and executed in partnership with a local environmental NGO, *Vikalp Nai Dishayen* [7]. This first-of-its-kind pilot plant uses algae to treat sewage water, producing clean water and valuable byproducts with *zero* waste generation [7]. The system,

built on campus, draws in sewage from a nearby municipal canal and purifies it using an algal pond and reactors, yielding clean water as well as bio-oil, biogas, and bio-fertilizer for reuse [7]. The collaboration exemplifies how UPES is developing scalable solutions that can be transferred to communities – the treated water can potentially be used for irrigation in surrounding areas, and the model could be replicated in small towns for cost-effective sewage treatment. Additionally, the university's *Himalayan Institute for Learning & Leadership (HILL)* fosters multi-stakeholder projects to solve water challenges in remote regions. One ongoing HILL project is designing a solar-powered water purification system for rural Himalayan communities lacking clean water infrastructure [8]. This initiative, in collaboration with international researchers, aims to use a solar concentrator to purify spring water by removing hardness and disinfecting it, providing villagers with clean drinking water powered by renewable energy [8]. Such projects illustrate UPES's commitment to leveraging partnerships and innovation to deliver clean water solutions beyond campus. Furthermore, through its Srijan Social Internship program, UPES has placed thousands of students with over 1,200 NGOs and community organizations across India [4]. Many of these internships focus on WASH (Water, Sanitation, and Hygiene) projects – for example, students have assisted in installing village hand-pumps, building toilets in rural schools, and conducting water quality testing drives. Over 5,000 student interns have contributed more than 200,000 human-hours to social impact projects through Srijan, significantly benefiting community development efforts [4]. By partnering with government schemes, NGOs, and industry sponsors, UPES ensures its expertise and resources meaningfully improve water and sanitation access for underserved populations.

Research, Education, and Policy Impact

UPES leverages its academic and research capabilities to drive innovation in water management and to influence broader policy and awareness around SDG 6:

Research and Innovation

Water-related research is a major thrust area at UPES, cutting across engineering, science, and policy disciplines. Faculty and students are actively engaged in projects on water purification technologies, wastewater treatment, and sustainable water resource management [2]. The university's researchers work closely with industry partners and government bodies to enhance the relevance and impact of these projects [2]. A standout research initiative during 2022–2025 is the microalgae-based wastewater reclamation plant mentioned earlier. Spearheaded by Dr. Bhawna Lamba of UPES, this project received a ₹73 lakh research grant and has achieved a Technology Readiness Level of 7 (operational prototype) [7]. It demonstrates an innovative method to treat sewage *while* generating biofuel and fertilizer, showcasing a sustainable model that could inform policy on wastewater reuse and circular economy. Another research effort focuses on water quality and public health: UPES scientists are conducting high-throughput monitoring of antibiotic-resistant bacteria in the rivers and wastewater of the Doon Valley [8]. This study, aligned with the One Health approach, is mapping hotspots of antimicrobial resistance in environmental water sources, providing data that can guide policymakers in addressing emerging water pollution and health threats. Additionally, through international collaborations (e.g., with French universities via HILL), UPES is exploring advanced filtration materials and nanotechnology for water treatment [8]. These research endeavors position UPES as a knowledge leader contributing practical solutions and evidence to shape water management policies at local and national levels.

Curriculum and Academic Programs

UPES integrates water and sustainability topics into its academic curriculum to educate future leaders in this domain. Relevant courses in environmental engineering, earth sciences, and public policy cover subjects such as water resource management, hydrology, water treatment technologies, and sanitation planning [2]. For instance, the School of Engineering's Sustainability Cluster (which encompasses Civil Engineering and Health, Safety & Environment Engineering) offers NBA-accredited programs where students learn about water supply systems, wastewater engineering, and water policy as part of their training [9] [2]. Students are encouraged to undertake projects and research dissertations on water-related challenges. In recent years, engineering students have developed prototypes like solar-powered water filters and IoT-based water quality sensors as capstone projects, reflecting UPES's hands-on approach to learning. Law and policy students have also engaged in studying water laws, rights, and governance as part of interdisciplinary electives. This academic focus ensures that graduates are sensitized and skilled to contribute to SDG 6 goals in their professional careers.

Public Awareness and Capacity-Building

Beyond formal curricula, UPES actively conducts campaigns and events to raise awareness about water conservation and hygiene both on campus and in the wider community. Regular workshops, seminars, and competitions are held to engage students and staff on topics like water-saving habits, water pollution, and innovation in the water sector [2]. Student-led clubs (such as an Environmental club or NSS units) organize "Save Water" drives and social media campaigns, and they mark occasions like World Water Day with interactive programs [2]. These activities have included campus-wide pledges to reduce water waste, poster exhibitions on global water issues, and hands-on training in building low-cost water filters for use in rural households. UPES has also hosted high-profile conferences that contribute to knowledge exchange on SDG 6. Notably, the annual International Sustainability Conference (HSFEA) hosted by UPES (as part of Sustainability Fair 3.0 in April 2025) featured dedicated sessions on wastewater treatment, water quality monitoring, and water-energy nexus solutions [9]. This conference brought together researchers, industry experts, and policymakers, providing a forum for discussing the latest advancements and aligning research with policy needs. By facilitating such dialogue, UPES helps influence policy and best practices beyond its campus. The university's experts frequently share insights with government initiatives – for example, UPES researchers have contributed to state efforts in developing a Water Quality Index for public water dispensers [10] and have provided technical advice on Uttarakhand's river rejuvenation projects. In summary, through continuous education, outreach, and thought leadership, UPES amplifies its impact on water and sanitation issues at regional, national, and global levels.

Metrics and Evidence of Impact (2022–2025)

The table below summarizes key metrics and evidence of UPES's performance on SDG 6, demonstrating concrete outcomes of its initiatives over the 2022–2025 period:

Table 1: Key SDG6 Metrics and Initiatives at UPES, 2022–2025

Metric / Initiative	Outcome / Value
Water recycling capacity (STP)	550 kiloliters per day – on-campus sewage treatment & recycling plant capacity [3].
Recycled water used (annual)	~250 kiloliters reused for campus horticulture and landscaping (recent year) [3].
Rainwater harvesting impact	~89% of total campus water demand met through rainwater recharge and reuse (estimated savings) [1].
Zero Water Discharge status	*Achieved.* No untreated wastewater leaves campus; certified by Central Ground Water Authority [3].
Potable water access (campus)	100% of students/staff have access to safe drinking water on site (campus water deemed potable without RO filtration) [4].
Water saved by efficiency measures	~30,000,000 liters per year saved by eliminating wasteful RO water purification systems [4].
Sanitation facilities coverage	100% campus population served by hygienic toilets (with dedicated male/female washrooms in all buildings) [2].
Inclusive sanitation access	Yes – wheelchair-accessible restrooms and accommodations available for persons with disabilities [6].
Community water/sanitation outreach	Multiple villages in Uttarakhand engaged with training workshops on rainwater harvesting, safe water use, and hygiene (ongoing annually) [2].
"Project Swachhata" community clean-ups	Regular clean-water and sanitation drives in adjoining community areas since 2022 (supports Swachh Bharat Mission) [3].
Student social internships (SDG projects)	5,000+ students contributed >200,000 hours on community development projects (many on WASH) via 1,230 NGO partnerships [4].
Notable water research projects	Microalgae-based wastewater reclamation plant (₹73 lakh DST-funded) – first of its kind prototype [7]; *Solar Water Purifier for Himalayas* – designing off-grid clean water system for rural communities [8].

Conclusion

Between 2022 and 2025, UPES has made significant strides in advancing SDG 6 through campus operations, academic programs, and community engagement. The university's efforts have resulted in measurably improved water efficiency on campus (nearly zero discharge and substantial water savings) and have provided tangible benefits to surrounding communities in terms of clean water access and sanitation awareness. By aligning its strategies with THE Impact Rankings indicators – from efficient resource use and inclusive facilities to research and outreach – UPES demonstrates a comprehensive and evidence-based commitment to clean water and sanitation. These initiatives not only support national priorities like the Jal Jeevan (water for all) and Swachh Bharat missions, but also position UPES as a role model in the higher education sector for water sustainability. Through ongoing innovation, partnerships, and education, UPES is contributing meaningfully to SDG 6 and helping build a future where safe water and sanitation are accessible to all [2].

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