AMITY UNIVERSITY GURUGRAM

REPORT ON
SUSTAINABLE DEVELOPMENT GOAL

SDG 6
Year 2022-2023

CONTENTS

PREAMBLE

Sustainable Development Goal 6 aims to ensure the availability and sustainable management of water and sanitation for everyone. Access to clean water and sanitation is vital for both human health and the health of the planet. This goal addresses not only drinking water, sanitation, and hygiene but also the overall quality and sustainability of global water resources. Improvements in these areas are crucial for advancing other development objectives, such as nutrition, education, health, and gender equality. SDG 6 is interconnected with other goals; for instance, safe water and sanitation are essential for good health (SDG 3). By managing water sustainably, we can enhance food and energy production (SDGs 6 and 7) and foster decent work and economic growth (SDG 8). Additionally, we can preserve water ecosystems and their biodiversity (SDG 14) while acting on climate change (SDG 13).

At Amity University Haryana, we contribute to clean water and sanitation by raising awareness through education, conducting research, implementing water conservation policies, and recycling and reusing wastewater on campus.

TEACHING AND LEARNINGS

Programs focused on Sustainable Development Goal 6, which highlights the importance of clean water and sanitation, are crucial at Amity University, just as they are in any educational institution. The university has a vital role in educating students, faculty, and staff about the significance of clean water and sanitation. By offering relevant courses, seminars, and workshops, Amity can raise awareness of the global water crisis and the need for access to clean water and sanitation facilities.

Amity University can also support research projects related to SDG 6, helping to develop new technologies and solutions for improving water quality, sanitation systems, and water resource management. Additionally, the university provides training programs for students and professionals in the water and sanitation field, fostering a skilled workforce to tackle related challenges.

Leading by example, Amity University can implement sustainable water management practices on campus, which include minimizing water waste, promoting recycling, and ensuring proper sanitation facilities for all. The university can engage with local communities to address water and sanitation issues, offering initiatives such as clean water access, sanitation facilities, and hygiene education to underserved populations.

By incorporating SDG 6 into its curriculum and institutional policies, Amity University can contribute to a comprehensive approach to sustainable development, ensuring that students understand the interconnectedness of various SDGs and the foundational role that clean water and sanitation play in broader developmental goals. By highlighting the importance of SDG 6, Amity University can inspire a sense of responsibility towards the global community and the environment.

Table 1: Programes offered at Amity University Haryana

Programes	School/Institute
B.Sc. (Hons) - Earth Sciences	ASEES
M.Sc. – Environmental Sciences & Management	
B.Tech (Civil Engineering)	ASET
M.Tech (Civil Engineering)	
Bachelor of Planning	ASAP
Master of Planning (Urban and Regional)	
Bachelor of Architecture	

RESEARCH AND COLLABORATIONS

Research is vital for advancing progress toward Sustainable Development Goal 6 (SDG 6), which aims to ensure clean water and sanitation for all. At Amity University Haryana, we are committed to conducting research that equips policymakers, governments, and organizations with the essential information and data needed to make informed decisions regarding water and sanitation management. This research helps identify gaps, assess needs, and formulate evidence-based strategies and policies to achieve the goal. Our faculty members are actively engaged in innovative research related to water purification and conservation. Some of the research topics are as follows:

- A Study of Water Management in Built Environment in Rural Part of Western Maharashtra
- Analysis and the Causes of Impacts of Water Pollution of River Rispana: A Critical Study
- Groundwater and Contemporary Issues

Some of the high impact research publications are listed below:

- Yadav, Durga & Dutta, J.. (2023). A systematic review on recent development of chitosan/alginate-based polyelectrolyte complexes for wastewater treatment. International Journal of Environmental Science and Technology. 21. 10.1007/s13762-023-05244-6.
- Pawariya, Varun & De, Soumik & Dutta, Joydeep. (2023). Synthesis and characterization of a new developed modified-chitosan Schiff base with improved antibacterial properties for the removal of Bismarck Brown R and Eosin Y dyes from wastewater. Carbohydrate Polymer Technologies and Applications. 6. 100352. 10.1016/j.carpta.2023.100352.
- Gupta, Asmita & Kumar, Madan & Sharma, Radha & Tripathi, Ritu & Kumar, Vivek & Thakur, Indu. (2023). Screening and characterization of bioflocculant isolated from thermotolerant Bacillus sp. ISTVK1 and its application in wastewater treatment. Environmental Technology & Innovation. 30. 103135. 10.1016/j.eti.2023.103135.
- Katoch, Gaurav et al. "Sol-gel auto-combustion developed Nd and Dy co-doped Mg nanoferrites for photocatalytic water treatment, electrocatalytic water splitting and biological applications." Journal of Water Process Engineering (2023): n. pag.
- Yadav, Nisha & Shiva, Shivani & Patyal, Preeti & Kumar, Arun & Singh, Ajai & Singh, Balvinder & Pandit, Bidhan & Ahmed, Jahangeer & Rao, Gyandshwar. (2023). Highly stable and uniform colloidal silver quantum dots stabilized with (N,S,O) donor ligand: Selective sensing of Hg(II)/Cu(II) and I− ions and reduction of nitro-aromatics in water. Journal of Molecular Liquids. 121531. 10.1016/j.molliq.2023.121531.
- S., K., D. N., T. A., G. V., S. S., H. S., T. P. & R. Kumar "Nano Ca–Mg–Zn ferrites as tuneable photocatalyst for UV light-induced degradation of rhodamine B dye and antimicrobial behavior for water purification." Ceramics International (2022).
- Sharma, K., Vaya, D., Prasad, G. et al. Photocatalytic process for oily wastewater treatment: a review. Int. J. Environ. Sci. Technol. 20, 4615–4634 (2023).
- Singh, Rajat & Mehra, Rahul & Walia, Ankita & Gupta, Simmy & Chawla, Prince & Kumar, Harish & Thakur, Atul & Kaushik, Ravinder & Kumar, Naveen. (2021). Colorimetric sensing approaches based on silver nanoparticles aggregation for determination of toxic metal ions in water sample: a review. International Journal of Environmental Analytical Chemistry. 10.1080/03067319.2021.1873315.
- Joshi, Rajesh & Khan, Abul Amir & Pant, Naresh & Agnihotri, Vasudha & Verma, Kamlesh & Kumar, Prem. (2023). Geochemical characteristics and suspended sediments dynamics in the meltwater from the Gangotri Glacier, Garhwal Himalaya, India. Environmental Earth Sciences. 82. 150. 10.1007/s12665-023-10802-9.
- Joshi, R., Khan, A.A., Pant, N.C. et al. Geochemical characteristics and suspended sediments dynamics in the meltwater from the Gangotri Glacier, Garhwal Himalaya, India. Environ Earth Sci 82, 150 (2023).

- Singh, R., Kumar, N., Mehra, R. et al. Colorimetric assay for visual determination of imidacloprid in water and fruit samples using asparagine modified gold nanoparticles. J IRAN CHEM SOC 19, 599–607 (2022).
- Sharma, K., Vaya, D., Prasad, G. et al. Photocatalytic process for oily wastewater treatment: a review. Int. J. Environ. Sci. Technol. 20, 4615–4634 (2023).
- Punia, P., Bharti, M.K., Dhar, R., Thakur, P. and Thakur, A. (2022), Recent Advances in Detection and Removal of Heavy Metals from Contaminated Water. CBEN, 9: 351-369.
- Bhatia, S., Al-Harrasi, A., Behl, T. et al. Unravelling the photoprotective effects of freshwater alga Nostoc commune Vaucher ex Bornet et Flahault against ultraviolet radiations. Environ Sci Pollut Res 29, 14380–14392 (2022).
- Thakur, A. & Punia, P. & Dhar, R. & Aggarwal, R.K. & Thakur, P.. (2022). Separation of cadmium and chromium heavy metals from industrial wastewater by using Ni-Zn nanoferrites. Advances in Nano Research. 12. 457-465. 10.12989/anr.2022.12.5.457.
- Dalal, Surjeet, Onyema, Edeh Michael, Romero, Carlos Andrés Tavera, Ndufeiya-Kumasi, Lauritta Chinazaekpere, Maryann, Didiugwu Chizoba, Nnedimkpa, Ajima Judith and Bhatia, Tarandeep Kaur. "Machine learning-based forecasting of potability of drinking water through adaptive boosting model" Open Chemistry, vol. 20, no. 1, 2022, pp. 816-828.
- Patel, Hemilkumar & Shaikh, Sofiya & Ray, Debes & Aswal, Vinod & Vaidya, Foram & Pathak, Chandramani & Varade, Dharmesh & Rahdar, Abbas & Sharma, Rakesh. (2022). Structural transitions in mixed Phosphatidylcholine/Pluronic micellar systems and their in vitro therapeutic evaluation for poorly water-soluble drug. Journal of Molecular Liquids. 364. 120003. 10.1016/j.molliq.2022.120003.

The scholarly contributions of AUH faculty members in edited volumes / books published

- "Photocatalytic Degradation of Drugs: A Sustainable Approach to Wastewater Treatment" in the book Handbook of Green and Sustainable Nanotechnology by Dr. Dipti Vaya.
- "Rare Earth Element-Based Functionalized Electrocatalysts for Overall Water Splitting Reactions" by Gurvinder S. Bumbrah, featured in the book Metal Nanocomposites for Energy and Environmental Applications.
- "The Role of Graphene Oxide-Based Nanocomposites in Arsenic Purification from Groundwater" by Debasree Ghosh, Sujata Kumari, and Sudip Majumder, in Advances in Nanocomposite Materials for Environmental and Energy Harvesting Applications.
- "Chemical and Isotopic Variability of Bhagirathi River Water (Upper Ganga), Uttarakhand, India" by Abul A. Khan, Naresh C. Pant, Rajesh Joshi, and Panuganti C.S. Devara, in Ecological Significance of River Ecosystems: Challenges and Management Strategies.

GOVERNANCE & MANDATES

Amity University Haryana has put in place a comprehensive set of preventive measures to combat water pollution and safeguard its water system, contributing to a clean and sustainable environment. These practices include:

Regular Cleaning
Consistent cleaning of overhead water tanks and coolers to prevent contaminants from accumulating.

Proper Maintenance
Ensuring that all water tank covers are securely closed and latched to keep pollutants out.

Minimized Chemical Use
Limiting the use of chemicals for cleaning tanks to help preserve water quality.

Public Guidance
Advising locals against pouring fat and grease down drains and recommending the use of phosphate-free detergents and dish cleaners to reduce harmful substances in wastewater.

Medical Waste Management
Ensuring safe disposal of medical waste to prevent contamination.

Toilet Usage Awareness
Informing residents not to flush non-biodegradable or harmful items to protect the sewage system.

Organic Farming
Promoting organic farming practices and avoiding pesticides and herbicides to minimize chemical introduction into the environment.

Effluent Treatment
Directing all effluents, including waste from kitchens, laundry, and labs to an Effluent Treatment Plant (ETP) for proper management and treatment.

Wastewater Recycling
Recycling all wastewater through sewage and effluent treatment plants, accompanied by regular quality testing to ensure safety.

Quality Testing
Conducting daily in-house testing of RO-treated water quality and periodic external assessments to maintain safe drinking water.

Pipeline Integrity
Using CPVC pipelines to prevent bacterial growth and regularly inspecting water pipelines to avoid leaks and damage.

Community Engagement
Running awareness campaigns, seminars, workshops, and street plays to promote a pollution-free campus and educate the community on prevention measures.

These initiatives collectively reflect a strong commitment to water quality and environmental sustainability at Amity University Haryana, essential for ensuring the health and well-being of both the campus and the surrounding environment.

UNIVERSITY INFRASTRUCTURE

Amity University Haryana utilizes underground bore wells to source all the water needed for domestic and drinking purposes on campus. Recycled water is employed for irrigation, gardening, cooling towers in chiller plants, and civil construction projects. Here's an overview of the campus water consumption and

Water Source

The university primarily depends on underground bore wells to supply water for domestic and drinking needs. Around 2.5 Lac litres extracted from ground through Borewell Pumps. This water is stored in six underground tanks, each holding 50,000 liters.

Fig 1: The RO process in action: transforming ground water into potable water

Recycled Water

In addition to bore well water, recycled water is used for flushing, gardening, cooling towers, and construction projects, helping to reduce reliance on fresh groundwater.

Table 3: Maximizing Treated Water: AUH's Utilization Strategies

STP Treated Water is being utilized as under:	
Flushing in Hostel Blocks	Approx 4 Lac Litres per day
Flushing in Academic Blocks	
Flushing in Faculty Flats	
For gardening including Sprinkler System	1.5 – 2 Lac Litres per day
For AC Chiller Plant Tower (from April to Oct)	1 Lac litres Per day
Excess water during Nov to March (when AC Chiller Plant is not in operation)	0.5 lac litres per day

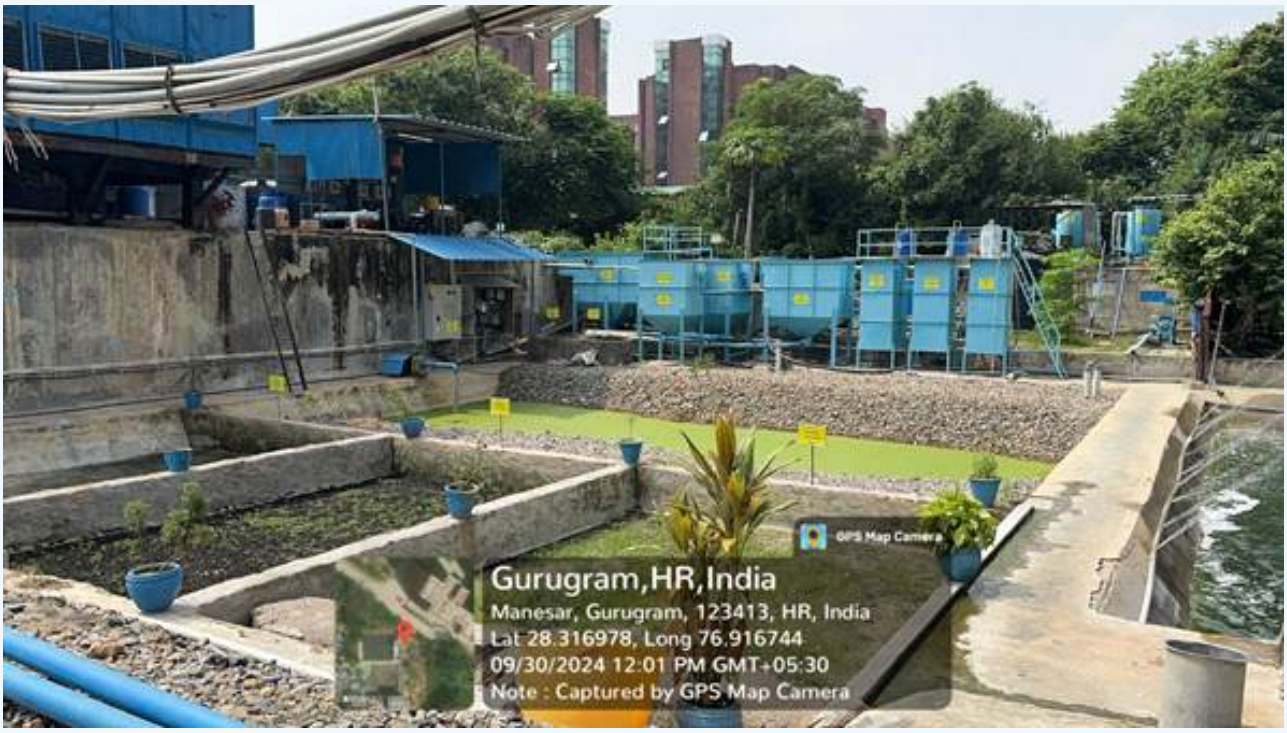

Fig 2: Key components of our wastewater treatment system

Fig 3: Efficient processes in action at the treatment plant at AUH

Water Usage

The university uses approximately 250,000 liters of water daily, mainly sourced from bore wells for drinking and domestic purposes, along with 700,000 liters of treated water for flushing and gardening.

Fig 4: Ensuring access to clean and safe drinking water for all

Overhead Tanks

The campus overhead tanks are equipped with sensors that monitor water levels and automatically refill them from the bore wells when levels are low, ensuring a continuous and reliable water supply for the university's 4,653 residents, including staff, faculty, housekeepers, and students.

Efficient water management is critical, especially in regions dependent on groundwater for daily needs. Monitoring water usage, promoting recycling, and installing water meters are essential steps toward responsible conservation and management of water resources.

Types of Wastewaters & its Treatment

Amity University is dedicated to establishing a sustainable water consumption system. Utilizing sewage treatment plants (STPs) and effluent treatment plants (ETPs) to process wastewater reflects a responsible and environmentally friendly approach.

Types of Wastewaters

Drainage Water: This typically refers to wastewater from sinks, showers, and other sources that do not contain hazardous chemicals.

Effluent Water from Laboratories, Laundries, and Cafeterias: This type of wastewater may have higher levels of contaminants and chemicals due to its origin.

Wastewater Treatment

Sewage Treatment Plants (STPs): These facilities are designed to treat sewage and other types of wastewaters, typically originating from residential and industrial sources. In this context, they are likely utilized to process drainage water and potentially other wastewater streams.

Fig 5: Overview of the state-of-the-art sewerage treatment facility at AUH

Effluent Treatment Plants (ETPs): ETPs are specifically designed to treat industrial effluents, which may contain various pollutants and chemicals. In this instance, ETPs are employed to treat wastewater from laboratories, laundries, and cafeterias.

Table 3: Maximizing Treatment Potential at AUH: STP and ETP Plant Capacities

Capacity of STP/ETP Plants for Treating Water	
There are 2 STP Plants in the Campus as under:-	
• Capacity of STP Plant No.1	4.5 Lacs litres per day
• Capacity of ST P Plant No 2	4.5 Lacs litres per day
Total:	9 Lacs litres per day
• Capacity of ETP Plant0.5 Lac litres per day	
• Kitchen 0.3 Lac litres per day • Laundry 0.2 Lac litres per day	

Note: On routine full working day flow of treated water from STP Plant 1 and 2 is 7 to7.5 Lac litres, monitored by meter reading on daily basis and summarized monthly.

Fig 6: Maintaining optimal pressure for maximum efficiency

Water Reuse

The water treated by the STPs and ETPs is reused in various applications, including horticulture, agricultural irrigation, and toilet flushing. This sustainable practice helps decrease the demand for fresh water and reduces environmental impact.

Capacity: The combined daily capacity of the STP is 900,000 liters (or 900 cubic meters), while the ETP has a daily capacity of 50,000 liters (or 50 cubic meters).

These i0nitiatives not only encourage water conservation but also help reduce the campus's environmental footprint. Ongoing monitoring and maintenance of these systems are essential to ensure their effectiveness and long-term sustainability.

EVENTS AND SOCIAL OUTREACH

Amity University Haryana utilizes underground bore wells to source all the water needed for domestic and drinking purposes on campus. Recycled water is employed for irrigation, gardening, cooling towers in chiller plants, and civil construction projects. Here's an overview of the campus water consumption and

Advanced Materials for Water Remediation (Seminar)

Students learnt and Understood about the Advanced materials that are used in Water Remediation and how it is tested. There are many ways and materials to clean water. Students discovered that how there are many ways for Water remediation

Water The Elixir Of Life: Save It (webinar)

This webinar is in the spirit of the UN Water Day and aimed at increasing water eco literacy of all sections of the society whatever be the literacy levels and age of the audiences. Though water is the lifeline of humanity our water resources are getting under avoidable stress due to wastage and pollution. Water issues have a wide spectrum: scientific, social, management and emotional. Accelerating, understanding and human sensitivity towards water conservation, sharing, and caring through constant dialogue is the target of the water day interactions. The main focus of the webinar is "Water scarcity and water resource management".

World Environment Day 2022 (Only One Earth) (Webinar)

There is a need for consistent efforts by the entire mankind to save the planet. Even, a small amount of effort by every individual could lead to mark a huge difference to save the mother nature. On this World Environment Day students realized how every individual could put in small efforts, to make huge differences to save earth.

Sustainable Development Goal 6 (SDG 6) focuses on ensuring availability and sustainable management of water and sanitation for all by 2030. It aims to provide universal access to safe drinking water and adequate sanitation, improve water quality, protect ecosystems, and promote integrated water resource management. Achieving this goal is vital for health, economic growth, and environmental sustainability

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