14 SDG LIFE BELOW WATER

14.1 Research on life below water

LIST OF PUBLICATIONS

1. Engineering

Sr. no	Title	Authors	Affiliation	Journal & Volume	Year
1.	Development of static mixer for water treatment and investigation of effect of geometrical parameters on mixing effectiveness	Denny, Ashwin[a];Smart, D.,S. Robinson Kurissingal, Denny C.;Kumar, J.,Pradeep[b];Smart, Joses Jenish[d]	Department of Mechanical Engineering, KITS, Coimbatore	ARPN Journal of Engineering and Applied Sciences, Volume 17, Issue 3, Pages 262 - 272	February 2022
2.	Temporal Assessment of Sedimentation in Siruvani Reservoir Using Remote Sensing and GIS	Brema J.[a];Tamilarasan A.[b]	Department of Civil Engineering, KITS, Coimbatore	Geospatial Modeling for Environmental Management: Case Studies from South Asia, Pages 59 - 821 (Book chapter)	January 2022

2. Environmental science

Sr. no	Title	Authors	Affiliation	Journal & Volume	Year
1	Assessment of groundwater geochemistry using multivariate water quality index and potential health risk in industrial belt of central Odisha, India	Naik Manas Ranjan[a]; Mahanty Biswanath[b]; Sahoo Sunil Kumar[c]; Jha, Viveka Nand[c];	Department of Biotechnology, KITS, Coimbatore,	Environmental Pollution, Volume 303, 15 June 2022, Article number 119161	June, 2022
2	Potential of MOF-based novel adsorbents for the	Duarah, Prangan[c]; Haldar, Dibyajyoti[a];	Department of Biotechnology, KITS,	Advanced Materials for Sustainable Environmental	January 2022

	removal of aquatic pollutants	Purkait, Mihir Kumar[b]	Coimbatore (Book Chapter)	Remediation: Terrestrial and Aquatic Environments Pages 29 - 47 (Chapter 2)	
3	Exposure and health risk assessment of nitrate contamination in groundwater in Coimbatore and Tirupur districts in Tamil Nadu, South India	Pazhuparambil Jayarajan, S. K., & Kuriachan, L.,	Water Institute, KITS, Coimbatore	Environmental science and pollution research international, Vol 28, pages 10248–10261.	October 2021
4	Integration of sensors for dam water quality analysis – A prototype	Rose, Lina[a]; Mary, X. Anitha, Karthik C.[c]	Department of Biomedical Engineering, KITS, Coimbatore	Water Science and Technology, Open Access Volume 84, Issue 10-11, Pages 2842 - 2856	November 2021
5	Hydrologic flow regimes in humid tropics river basin	Chellaiah, Gajendran, Eazon, Daniel Biju	Department of Civil Engineering, KITS, Coimbatore	Water Science and Technology, Open Access Volume 84, Issue 10-11, Pages 3143 - 3154	November 2021
6	Urban stormwater harvesting for domestic water supply: A water evaluation and planning approach	Pravin S.S.; Gajendran C; Divya T.	KITS, Coimbatore, India	Water Science and Technology Open Access Volume 84, Issue 10-11, Pages 2871 - 2884	November 2021
7	Thermal modeling, characterization, and enviro-economic investigations on inclined felt sheet solar distiller for seawater desalination	Hilarydoss, Sharon[a].; Delhiraja, Krithika[b]; Reddy, Kalvala Srinivas[c]; Philip, Ligy[b]; Chand, Drupad[a]; Benny, Belmin[a]	Department of Mechanical Engineering, KITS, Coimbatore	Environmental Science and Pollution Research, Volume 28, Issue 45, Pages 63572 – 63588	December 2021
8	Nutrient chemistry and seasonal variation in the groundwater quality of a Riverine Island on the west coast of Kerala, India (Sustainable Water	Sajil Kumar P.J.[a].; Kokkat, Aswin[b]; Kurian P.K.[c]; James E.J.[b]	Water Institute, KITS, Coimbatore	Sustainable Water Resources Management Open Access Volume 7, Issue 6, Article number 105	December 2021

	Resources Management, (2020)				

14.2 Supporting Aquatic Ecosystems through Education

14.2.1 Fresh-water ecosystems (community outreach)

Community outreach program for Drinking water supply and Irrigation
In a commendable initiative, the Community Outreach Program by Prof. C. Mayilswami, Water Institute and Dr. Prawin Angel, Aerospace Engineering in collaboration with the Agriculture team, KITS, facilitated drinking water supply and drip irrigation for vegetables in Kaalimangalam (Ward no.11) and Pachinampathy villages of Alandurai Town Panchayat. This program, conducted on January 10, 2022, addresses critical issues related to water supply and agriculture in the community.

Drinking Water Supply: The program recognizes the pressing need for improved access to clean drinking water and install additional drinking water supply taps and a cement stone for washing clothes. This initiative aims to enhance the daily lives of residents by providing reliable access to safe drinking water and improved hygiene facilities.

Location of Pachinampathy village

Installation of pipe line

Drinking water supply

Drinking water tank construction and distribution

Kitchen garden piping layout | Drip irrigation

Irrigation Support: Another vital aspect of this program is the provision of irrigation support to the community garden. The Agriculture team's proposal involves providing essential resources for a kitchen garden benefiting 40 families such as grow bags with potting mix, banana and papaya suckers, various fruit plants, vegetable seeds, passion fruit plants, pandals, and labour charges for planting. Additionally, considering the water supply limitations, it is suggested that hand watering be employed for irrigation, and an existing submersible pump set in the second tube well may be utilized for watering coconut plants. This initiative aims to improve food security, agricultural diversity, and economic well-being of the local community.

Household Biogas Generation: The village community were trained to produce biogas and vermicompost in their houses. Biogas a renewable fuel produced when organic matter, such as food or animal waste, is broken down by microorganisms in the absence of oxygen, is an eco-friendly zero waste practice that creates awareness on sustainable environment among the villagers.

Trainings are also extended to the village women for making nutritional foods for leading a healthy lifestyle.

Household biogas plant | Vermicompost site

Training on food preservation

Treeplanting by Karunya Agri students

In conclusion, the Community Outreach Program is a laudable effort by Team Karunya to address pressing issues related to drinking water supply, disposal of waste, Vermicomposting, food preservation and storage in selected villages - Kaalimangalam and Pachinampathy. By providing essential resources and support, this program strives to enhance the overall quality of life and sustainability of the community, showcasing a commitment to social welfare and community development.

Community outreach team

14.3 Supporting aquatic ecosystems through action

14.3.3 Maintain ecosystems and their biodiversity (direct work)

A Mural Showcasing the Essence of Biodiversity on Campus

The mural depicts an event recorded in the world history when it rained forty days and forty nights upon earth. In the same day Noah entered into the ark with his family and beasts and fowl of every kind.

Karunya Aqua Museum

Mural painting work

The flood waters prevailed for forty days upon the earth, lifting the ark and the waters prevailed upon the earth on hundred and fifty days. All flesh died that moved upon the earth, both of fowl, and of cattle, and of beast, and of every creeping creatures and every man. Noah and his family were with him in the ark only remained alive.

14.4 Water Sensitive Waste Disposal

14.4.1 Water discharge guidelines and standards

KITS Effluent Treatment Plant

KITS has seamlessly integrated the Sewage Treatment Plants into its campus infrastructure, marking a commendable stride towards sustainable and responsible wastewater management. The facility plays a pivotal role in ensuring the institute's commitment to environmental stewardship and resource conservation. With a daily capacity to treat approximately 10 lakh litres of sewage and an additional 1.2 lakh litres of kitchen water, it not only fulfils the institution's water treatment needs but also sets a noteworthy example of how advanced sewage treatment can be effectively implemented within an educational institution.

Furthermore, the treated water, amounting to 4 lakh litres/day, is judiciously employed for irrigation and gardening within the campus. This utilization of reclaimed water not only serves as a sustainable alternative but also significantly reduces the institution's reliance on freshwater sources for landscaping and horticultural needs. By meticulously incorporating the Sewage Treatment Plant into its operations, the Institute demonstrates its commitment to environmental responsibility and the invaluable lessons it imparts to students on the importance of water management and treatment.

Display of treatment plant vision and cost of build details and Pump house facility

Air compressors and activated carbon tanks for de-odouring and clarification of treated water

14.4.2 Action plan to reducing plastic waste

R&D prototype of 2 TPD Rotary Kiln Gasification Pilot Plant for converting non-recyclable plastic waste into high quality syngas for generating steam has been installed at KITS, Coimbatore in collaboration with its industry partner, Techurja Inc., Bangalore and the institutional partner, Central Mechanical Engineering Research Institute, Durgapur. The project has come up with most economical solution for waste management and renewable energy. The purpose is to build a demonstration rotary kiln gasification plant that disposes 2 TPD of non-degradable waste to produce high calorific syngas, which will be used to produce steam. Since the quality of the syngas, specifically its calorific value is a key parameter that determines the efficiency and therefore the economics of the plant, it is considered as a major factor in deriving the objectives of the project.

Checking of Kiln chamber alignment

Steam Drum Installation and Feed Water Piping

Heat Recovery Boiler installation and integration with Combustion Chamber

14.5 Maintaining a local ecosystem

14.5.1 Minimizing alteration of aquatic ecosystems (plan)

Aquatic ecosystems perform numerous valuable environmental functions. They recycle nutrients, purify water, attenuate floods, augment and maintain streamflow, recharge ground water, and provide habitat for wildlife and recreation for people. Rapid population increases in many parts of the world led to the pollution of surface waters by fertilizers, insecticides, motor oil, toxic landfill leachates, and feedlot waste. At the same time that water pollution and releases of nutrient-laden municipal sewage effluents have increased, water consumption has also increased, thus reducing the flows available for the dilution of wastes.Therefore, since the loss and impairment of aquatic ecosystems is accompanied by loss and impairment of valuable environmental functions and amenities important to humans, and since restoration of aquatic ecosystems is possible, a large-scale aquatic ecosystem restoration program should be implemented to regain and protect the physical, chemical, and biological integrity of surface water such as

i. Correct non-point source pollution problems
ii. Arrest the decline of wildlife populations and
iii. restore all types of wildlife habitats with priority to endangered species habitat.

14.5.3 Programmes towards good aquatic stewardship practices

A good aquatic stewardship is defined as using water in a way that is socially equitable, environmentally sustainable and economically beneficial. This is achieved through a stakeholder inclusive process such as Water filtration systems help individuals practice good aquatic stewardship, be cognizant of water usage and make sure that all pipes and faucets are intact and secure ensures there is no passively lose and waste water.

14.5.4 Collaboration for shared aquatic ecosystems

i. Address emerging threats to food safety and access, as well as food and nutrition security in the Aquatic, through research that addresses how climate and environmental change is affecting the abundance, accessibility, and use of traditional foods and traditional ways of life.
ii.Provide research and technical support for water and sanitation infrastructure.
iii. Observe, understand, predict, and project Aquatic ecosystem change and its impacts on humans and the entire Earth system.
iv. Understand interactions between social, ecological, and physical Aquatic systems, particularly in the context of coastal, climate, and cryospheric change.
v. Improve multi-species and ecosystem approaches to predict climate change impacts on species distributions and on economically viable access to commercial and subsistence species in the next 50 years.

14.5.5 Watershed management strategy

People and the ecological integrity of aquatic systems rely on healthy watersheds. Environmental Protection Agency (WPA) employs a suite of programs to protect and improve water quality in the nation's watersheds—rivers, lakes, wetlands, and streams—as well as in our estuarine, coastal, and ocean waters. In partnership with states, territories, local governments, and tribes, EPA's core watershed programs help:

- Protect, restore, maintain, and improve water quality by financing wastewater treatment infrastructure
- Conduct monitoring and assessment
- Establish pollution reduction targets
- Update water quality standards
- Issue and enforce discharge permits and
- Implement programs to prevent or reduce non-point source pollution.