SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

SUSTAINABILITY REPORT

2021 - 2022

www.sathyabama.ac.in | Tamilnadu, India

Preamble

The words "sustainable development" and "sustainability" have become more well-known recently. In the past several decades, it has emerged as the subject of most of the discussions across the world. The most common definition of sustainable development, which is "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs," was developed in the Brundtland Commission report. The Sathyabama Institute of Science and Technology prioritises sustainability in all of its developmental initiatives. The Institution's dedication to attaining sustainable development is demonstrated by this Sustainability Report.

Stakeholders interested in our sustainability performance, such as students, faculty, staff, local businesses, and communities, are the target audience for this report. It displays the organisational strategy and dedication to sustainability**.** This report focuses on our sustainability initiatives for the period 2021 - 2022.

Message

Dr. MARIAZEENA JOHNSON

B.E., MBA., M.Phil., Ph.D.

Chancellor

Dr. MARIE JOHNSON

B.E., MBA., M.Phil., Ph.D.

President

We are very happy to publish the Institution's Sustainability Report, which provides a brief review of the work for the period 2021 - 2022.

Sustainable development has gained significant attention from administrators and leaders with the evolution of the Sustainable Development Goals and the Millennium Development Goals. Sathyabama Institute of Science and Technology has initiated many schemes towards achieving the Sustainable Development Goal. Sathyabama's strategic plan expresses the commitment to get involved in multidisciplinary research that can provide solutions to the problems faced by society and promote sustainable development.

Academic excellence, research towards meeting the national mission, and implementation of sustainability initiatives have enabled Sathyabama to be in the top 50 Universities in the rankings by the National Institutional Ranking Framework (NIRF), Government of India, for the seventh consecutive year.

The staff and students of our institution have understood their role in building a sustainable community, and they actively participate in all our initiatives contributing to sustainable development. In our continuous pursuit of excellence, we are very happy that we are able to make significant progress towards the Sustainable Development Goals.

Foreword

Sathyabama Institute of Science and Technology is one of the top higher educational Institutions worldwide that has made tremendous progress in terms of academics, research and innovation, internationalization, employability, and outreach. It is an inclusive institution dedicated to delivering high-quality education to everyone without any discrimination and aims to create a society where everyone has the right to a decent living.

Sustainable development prioritizes economic growth while giving appropriate consideration to environmental and social factors. A development can only be deemed genuine if it does not compromise the environment in any way. It is imperative that we all give up our unsustainable habits and begin contributing to the conservation of natural resources. Sathyabama adopts best and innovative practices to accomplish sustainable development.

Sathyabama's research and academic initiatives are aimed at achieving the sustainable development goals, which include ending hunger and poverty, fostering health and well-being, providing access to affordable and clean energy, fighting climate change, reducing economic inequality, advancing gender equality, and building sustainable communities. The core of the curriculum at our institution is built around sustainable development. Research at Sathyabama addresses the Sustainable Development Goals of Agenda 2030, and our Research Centres are working towards their achievement.

We are pleased to release this report, which highlights the initiatives our institution is taking to create a community that is secure, resilient and sustainable.

Dr. T. SASIPRABA
VICE CHANCELLOR

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A. ABOUT SATHYABAMA

Sathyabama Institute of Science and Technology is one of India's premier Academic and Research universities that offers multi-disciplinary academic programmes in various fields of Engineering, Science, Technology, law, Dental Science, Pharmacy, Nursing, and Management. It is established under Sec.3 of UGC Act, 1956 and is been Accredited with 'A' Grade by the National Accreditation and Assessment council in third cycle.

A.1 Vision of the Institution

Be a leading multidisciplinary University, producing world class talents to address global challenges

A. 2 Mission of the Institution

- To attain excellence in Education and Research through effective collaboration with Industries and other International/National organisations
- To consistently remain an attractive ecosystem for students and employees, a hub of innovation for researchers and an incubating platform for entrepreneurs
- To create an inclusive environment that caters to all forms of diversity
- To engage in outreach and community development activities, creating an impact on the society

A. 3 Rankings and Ratings

Sathyabama Institute of Science and Technology is consistently ranked among the top 50 Universities in India. It has been ranked in 43rd position among the Universities in India by National Institutional Ranking Framework (NIRF), Government of India for the year 2022. Sathyabama is ranked in1001-1200 position by QS World University Rankings, 2023 and it is one of the 41 Institutions in India ranked by QS. According to QS Asia University Rankings, 2022, Sathyabama is ranked in 301-350 rank. Assessing the performance of Sathyabama in the core criteria like Teaching, Research, Internationalization and employability, QS Stars has awarded Five Star ratings for the Institution in the year 2022. The Institution is ranked in 1201+ position by Times Higher Education World University Rankings 2022 and with respect to Times Higher Education Asia University Rankings, 2022 it is ranked in 501+ position. The Institution

is placed in 401+ rank in the world by Times Higher Education Young University Rankings, 2022 and ranked 501+ in the world by Times Higher Education Emerging Economies University Rankings, 2022. It is ranked in 401+ category in the Times Higher Education Subject Ranking for Engineering and Technology

Recognizing the contribution of Sathyabama towards Sustainable Development Goals of United Nation's Agenda 2030, Times Higher Education has ranked Sathyabama in good positions in the Times Higher Education Impact Rankings, 2022. It has been placed in 401-600 rank under Sustainable Development Goal 01 (No poverty), in 801-1000 rank under Sustainable Development Goal 03 (Good Health and Well Being), in 401-600 rank under Sustainable Development Goal 10 (Reduced Inequalities), in 201-300 rank under Sustainable Development Goal 13 (Climate Actions), in 87th Position under Sustainable Development Goal 14 (Life Below Water), in 101-200 rank under Sustainable Development Goal 15 (Life on Land), in 401-600 rank under Sustainable Development Goal 17 (Partnership for Goals) by Times Higher Education Impact Rankings, 2022. With regard to the Overall Times Higher Education Impact Rankings, 2022, Sathyabama is ranked in the 601-800 band.

At national level, Sathyabama Institute of Science and Technology has been ranked in top positions by various Agencies. India Today has ranked Sathyabama in 46th place among Best Engineering Colleges in India for the year 2022. According to Outlook ICARE Rankings 2022, the Institution is Ranked No. 11 among the Top 100 Private Engineering Colleges in India. Sathyabama is ranked in18th place among the Top Private Engineering Institutions in India and placed in 12th position among the Top Private Universities in India by Education World, 2022. Sathyabama is ranked in 6th position among the overall Top Engineering Institutions in India and ranked in 3rd place among the Top Private Engineering Institutions according to i3RC Times Top Engineering Institute Rankings 2022.

Schools/Department/Courses

There are 8 Schools namely**,**

- School of Computing,
- School of Electrical and Electronics,
- School of Mechanical Engineering,

- School of Bio and Chemical Engineering,
- School of Building and Environment,
- School of Management Studies,
- School of Science and Humanities
- School of Pharmacy
- School of Nursing
- School of Dental Science
- School of Law

B. SATHYABAMA'S SUSTAINABILITY APPROACH AND PERSPECTIVE

B.1 Teaching and Learning

Sustainability forms the core of teaching and the notion of sustainable development is instilled in the students. Students are educated about the sustainability issues and a sense of responsibility is created.

Sathyabama is committed to providing a quality education to students to develop them as responsible citizens who are concerned about their environment. We design our curriculum with adequate emphasis on environmental education. Subjects relating to sustainable development are included in the curriculum of all branches of studies, ensuring that all of our students are groomed as professionals who follow sustainability principles in their professional life.

B.2 Sustainability in the curriculum

To have sustainability principle inbuilt in the curriculum the following Courses are included in the curriculum of the University.

- Green computing for Computer science students
- Energy Engineering
- Environmental impact assessment
- Environment pollution control
- Disaster management
- Wind and solar energy
- Health informatics
- Environmental science and engineering
- Environmental biotechnology
- Biosafety, bioethics and IPR
- Water resources engineering
- Irrigation engineering
- Air and noise pollution
- Ground water engineering
- Solid waste management
- Energy and environmental management
- Environmental planning and design

B.3 Masters Programme Offered

A Masters Prograame on Sustainable Architecture is offered in the School of Built Environment.

C. RESEARCH AT SATHYABAMA

Sathyabama is one of India's premier Higher Education Institutions known for its research excellence. World-class research facilities are available at the Institution.

C. 1 Research Strategies

- Establishment of Research Centres in the frontier areas of Science and Technology
- Setting up Centres of Excellence in association with Government agencies
- Promoting research culture through seed funding
- Collaboration with Industries and Universities across the world to improve the research strength
- Strengthening research infrastructure
- Establishment of Centre for innovation and Technology Transfer to promote innovation and knowledge transfer
- Strengthen the Institution-Industry interaction through involvement in consultancy-based research projects.

Sathyabama promotes ground-breaking research and innovation in the thrust areas of science and technology to address global challenges related to social, economic, and environmental issues.

To promote research activities, Sathyabama instills a research culture and provides a research enabling environment

C.2 Measures

- Drafting a research policy to guide the research activities

- Making substantial investments to develop research infrastructure
- Providing Institutional seed fund to encourage innovation and research and facilitate conversion of ideas in to products
- Setting up IPR facilitation Cell to support and promote innovation and protect intellectual property
- Rewarding the researchers appropriately rewarded for their research accomplishments.
- Allocating a significant percentage (7%) in its annual budget for research to upgrade the research infrastructure and research facilities
- Constituting Research Committees to review the research and development activities of the Institution

Academic research is considered to be very important to offer solutions to the problems encountered by the Industries. Having understood the need for sharing knowledge between Industries and Universities, Sathyabama collaboratively work with many of the industries and the fruit of the synergistic effort are enjoyed by the Institution, Industry and Society.

C.3 Research Centres

The following are the Research Centres of Sathyabama that are carrying out research on almost all the major areas of science and Technology:

- Centre for Nanoscience and Nanotechnology
- Centre for Energy Research
- Centre for Ocean Research
- Centre for Space Technology
- The Centre for Bioresource Research and Development
- Centre for Earth and Atmosphere Science
- Centre for Remote Sensing and Geoinformatics
- Centre for Robotics and Automation
- Centre for Quality Assurance and Non-Destructive Evaluation
- Centre for Waste Management

- Centre for Laboratory Animal Research
- Centre for Climate Change Studies
- Centre for Drug discovery and development

C.4 Research focusing on Sustainable Development Goals

Research at Sathyabama addresses the Sustainable Development Goals of Agenda 2030, which requires the participation of individuals, institutions, countries and Governments in creating a better world free from poverty, hunger, health issues, inequalities, and providing access to quality education, access to clean water and sanitation, access to affordable and clean energy.

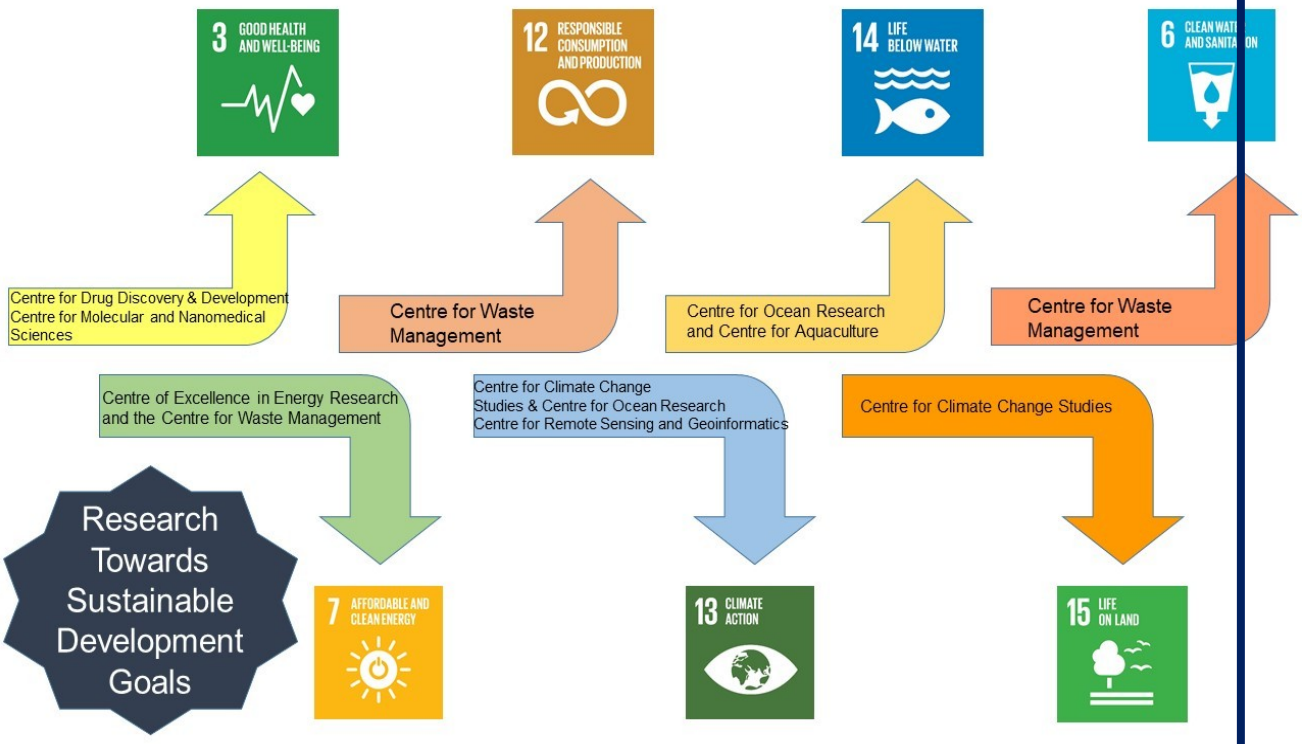
The Research Centres are focusing on the following SDGs:

- The Centre for Drug Discovery and Development and the Centre for Molecular and Nanomedical Sciences are working towards SDG-3 Good Health and Well-being. They are focusing on research to discover novel drugs to fight against life-threatening infectious diseases, including tuberculosis (TB), Acquired Immuno Deficiency syndrome (AIDS), Dengue and non-infectious diseases including, Alzheimer's disease, cancer and diabetes
- The Centre of Excellence for Energy Research and the Centre for Waste Management are involved in research projects and initiatives that address SDG 7- Affordable and Clean Energy. The MHRD-funded Center of Excellence in Energy Research is working to find sustainable solutions to the need for energy while minimising environmental impact and reducing carbon footprint
- The Centre for waste management is involved in finding alternative energy through biosources. It has come out with biodiesel from waste cooking oil and bio fertilizers from food waste. The Centre for Waste Management is working towards achieving SDG 12- Responsible Consumption and Production. The Centre carries out research in the

area of waste management and promotes the 3 R concepts Reduce, Reuse and Recycle to minimize waste generation. This Centre organizes programmes to create awareness about the consequences of consuming more and more products without considering the concepts of repair, reuse and recycling

- The Centre for Climate Change Studies and the Centre for Ocean Research are involved in research addressing SDG 13- Climate Action. The Centre monitors marine organisms associated with various ecosystems such as coral reefs, seagrass meadows, intertidal zones and mangrove ecosystem in selected coastal sites to study the impact of global climate change on aquatic ecosystems
- The Centre for Remote Sensing and Geoinformatics is involved in research facilitating resilience and adaptive capacity to climate-related hazards, disaster preparedness against floodrelated disasters, addressing SDG 13
- The Centre for Ocean Research and Centre for Aquaculture are working towards SDG 14- Life Below Water which addresses issues on conservation and sustainable use of oceans, seas and marine resources for sustainable development. Research in Mariculture, Marine Technology and Engineering, Marine Ecology, Marine Nanotechnology, Marine Biotechnology, and Marine Education are the focus areas of research of this Centre. The Centre is involved in research in areas including resilience and adaptive capacity to climate-related hazards, disaster preparedness against flood-related disasters through Remote Sensing and Geoinformatics
- The Centre for Climate Change Studies is working towards SDG 15 - Life on Land, which addresses issues related to the management of land and water resources and biodiversity conservation
- Marine Research Station- Apart from the Research Centres within the campus, Sathyabama Institute of Science and Technology has established a new Marine Research Station at Rameswaram to

encourage research on conservation of marine ecosystems, marine ecology and climate change. The research station is helpful in research related to coastal and marine biodiversity conservation and in understanding the impact of anthropogenic stressors on marine ecosystems



C.5 Publications and Patents

Our Institution's performance in terms of research publications is excellent. More publications are made in Scopus and Web of Science indexed journals and in high impact factor journals.

12000+ research papers are indexed in Scopus with a H index of 81 and 6000+ research papers are indexed in Web of Science with a H index of 71. The total No. of Publications for the current year is 2200 with a highest impact factor of 13.4. More than 300 Joint Publications have been made as an outcome of the joint research with International Research Organizations and Universities. Many faculty members have written Books, Monographs

and book chapters on various specialized subjects. Sathyabama is highly active in applied research with more than 500 patents filed, over 100 patents published, 115 patents including ten German patents were granted. 15 patents have been successfully converted into products this year.

C.6 Top 2% Most Influential Scientists

Our faculty members Dr.G.Murugadoss, Dr.T.Prem Jacob, Dr. S.Manigandan, Dr.K.Govindaraju and Dr.Jayaseelan.C are in the list of Top 2% Most Influential Scientists (Single Year) in 2023 in the Stanford Universty Survey.

Dr.G.Murugadoss, CNSNT Dr.T.Prem Jacob, CSE Dr. S.Manigandan, AERO

Dr.K.Govindaraju, COR

Dr.Jayaseelan.C, CLATR

D. SOCIETY AND COMMUNITY

D.1 Sustainable Community

Sathyabama Institute of Science and Technology is involved in community development initiatives that contribute positively to the development of sustainable community. It is playing a vital role in developing a sustainable community

- where the needs of everyone in the community are met and people feel safe, healthy and happy and the prosperity jointly enjoyed
- Where the needs are met while ensuring that adequate resources are available for future generations.
- where the environment is appreciated, protected and damage to the environment is minimised
- Where the employment opportunities are growing and working lives are more rewarding

It is working to achieve the following goals

- Clean air and water and nutritious food for everyone
- Protection of ecosystems and biological diversity
- Conservation of water, land, energy, reduction, reuse and recycling of waste.

To pursue these goals, the Institution:

- Use appropriate technology to minimize emissions and pollution
- Use of renewable energy
- Advocates green concepts like organic farming
- Minimize waste
- Avoid usage of plastics
- Advocate Plantation drive
- Advocates mass transportation
- Advocates the usage of bio-fuel and bio-fertilizers
- Promotes eco-conscious and eco-friendly initiatives

D.2 PARTICIPATION IN GOVERNMENT INITIATIVES

The Faculty members and the Research Scientists of Sathyabama are actively participating in Unnat Bharath Abhiyan, a Government of India's initiative to develop villages by providing technical solutions to their problems. Sathyabama has adopted 5 villages and helped them in solving some of their issues by providing technical solutions, which are purely the outcomes of the research.

D.3 ENVIRONMENT CONSCIOUSNESS INITIATIVES OF THE INSTITUTION FOR PROMOTING SUSTAINABLE DEVELOPMENT

D.3.1 Carbon Neutrality

Only the University buses are allowed inside the campus, which is the only mass transit system. No private vehicles of staff or students are allowed inside the campus, and hence the pollution is almost nil. More trees are scheduled to be planted in future through eco club and a separate land space is allotted to encourage farming.

D.3.2 Reduction of carbon footprint

At Sathyabama, all the possible actions that produce greenhouse gases are identified and monitored. Efforts are taken to reduce the usage of fossil fuel. One notable initiative is usage of bio-fuel for running some of the

Institution's buses. In fact, the bio-fuel is a research outcome of our Centre for Waste Management that adopts innovative technologies for developing cleaner and greener environment. Bio-fuel/bio-diesel is produced from the waste cooking oil generated from the institution's huge cooking facility. The vegetable waste generated after cooking is also effectively converted into bio fertilizer.

This Centre conducts several programmes to students and public to create awareness about waste segregation and management.

D.3.3 Water consumption

Students and staff of the Institution are instructed to use minimum water and avoid wastage of water. Water saving taps are fitted in rest rooms, wash basins and in student hostels.

D.3.4 Recycling of waste water

The Institution has a Sewage Treatment Plant that recycles the waste water. The contaminants are treated and reduced to safe level according to the standards of environment agency and removed. The purified water is used for flushing in toilets and watering the plants in the garden.
(https://www.sathyabama.ac.in/campus-life/stp-plant)

D.3.5 Transportation

Sathyabama advocates mass transportation to reduce carbon emissions and carbon foot print in the environment. The Institution has 200+ buses used for the commutation of staff and students to and from the Institution. It is compulsory for the students to use the Institution run buses. This environmental conscious initiative not only reduces the cost of transportation, but contributes to the reduction in air pollution to a very large extent.(https://www.sathyabama.ac.in/campus-life/transport-facility)

D.3.6 Reduction of food waste

The Institution has very big cooking facility that prepares food for around 12000 people. Effective measures are taken to minimize and avoid food waste. One Unique feature of Sathyabama is, anyone visiting the Institution can have food at the Institution's mess free of cost. Moreover, as a philanthropic act, the Institution provides food to hundreds of children, old people and destitute women living in the nearby community. This is one small CSR effort of the Institution to feed the hungry mouths.

D.3.7 Plastic Reduction

Usage of plastic is minimized in the campus. Drinking water coolers are installed at accessible places for students and staff. Usage of polythene covers, plastic water bottles and plastic cups are avoided. Reusable plastics are responsibly used and recycled.

D.3.8 Supplier evaluation

Responsible consumption-behaviour is promoted in the Institution. An item will be purchased only after ruling out the possibility of repair and reuse. Purchasing will be approved from a particular supplier, producer, manufacturer and distributor only if the green standards are satisfied by them.

D.3.9 Training for staff and students

Staff members and students of the Institution are given adequate training to learn and follow sustainable practices. All the initiatives of the Institution are successfully implemented with the active participation of the staff and students. Awareness programs, workshops, training programmes, seminars, rallies, and road shows are regularly organized to sensitize the students towards social issues.

The Community Development Club of the Institution is functioning with the objective of inculcating the spirit of service among students.

The Institution's ECO Club is dedicated to raising environmental awareness and protecting the environment. Students of this club regularly organise programmes relating to harmful activities that affect the environment and their effect on and prevention of the same.

Training programmes are provided to students to develop awareness on environmental issues and encourage responsible behaviour to adopt a sustainable way of life and create a sustainable community. The Institution has introduced Community Internships to students to increase students' social responsibility.

D.3.10 Food wastage

University is taking measurable initiatives towards reduction of the food and energy wastage in the campus. Planning and monitoring committee suggestions of the University are helping time and again for waste management; effective power supply management is one such example. Bio degradable and non-bio degradable wastes are segregated separately in the campus and bio degradable wastes are used as food for cattle and used as manure for the plants and trees. Non bio degradable wastes are disposed through the waste disposal adopted through Chennai Metropolitan garbage cleaning methods. Paperless University will be the game changer towards boosting up objective of the environmental friendly campus.

E. SUSTAINABLE DEVELOPMENT GOALS

In 2015, 193 Nations agreed with the United Nation that they can change the world for the better by eradicating poverty and hunger, promoting good health and quality education, promoting gender equality, promoting access to clean water and clean energy, taking actions to combat climate change, protecting life below water and life on land, Promoting peaceful and inclusive societies for sustainable development and strengthening the means of implementation and development through global partnerships for sustainable development.

SATHYABAMA'S CONTIBUTION TOWARDS SUSTAINABLE DEVELOPMENT GOALS

Sathyabama Institute of Science and Technology support the implementation of every SDG, through learning and teaching, research and organizational governance.

SDG 1- NO POVERTY

1.1 ADMISSION OF STUDENTS BELONGING TO LOWER INCOME GROUP WITH FULL SCHOLARSHIPS

Sathyabama aims at creating a society where all are employed and poverty is eradicated. Sathyabama believes that education is an instrument to remove poverty. Sathyabama has a reputation as one the big universities in India. It is a prestigious institute and the Placement cell of Sathyabama have never fallen short of their goals in placing the students who have passed out. A strong Alumni is one of our prides. Every year, we offer admissions to around 500 students, from very poor background, in various streams in our university including, Engineering, Arts, Science, Law and Management. While it is very difficult to select the actual needy, we have tied up with NGO's like Agar am, Maryam, Ability, etc., who help us find the truly deserving students from very low economic background.

The Institution not only provides the fee waiver to these students, but also provides food and on campus accommodation free of cost to enable them to complete their studies. Performance of the students receiving scholarships, are monitored and the students who need special attention are given the additional support. They are given all the support needed to develop them into qualified graduates with employability skills. These students earn their degree and get placed in prestigious organizations, taking their family and their society up as they grow.

Living in a hunger and poverty free society has been Sathyabama's dream. Our founder Chairman Dr. Col Jeppiaar, had made a mission of feeding anyone who visits the college and this tradition has been carried on till date.

1.2 IMPROVING THE LIVELIHOOD OF MARGINALISED COMMUNITY THROUGH VILLAGE ADOPTION INITIATIVE

Sathyabama's initiatives will always focus on finding solutions to the social, economic and environmental problems faced by the society. The Institution believes that villages are to be developed to develop the nation. Several activities are undertaken by the institution for livelihood enhancement from health, education and economic perspective.

Objective

- To improve the livelihood of the people of the beneficiary villages
- To help them generate income through alternate source
- To develop the selected villages through various measures
- To solve the day-to-day problems of the villages by providing technological solutions

Sathyabama has adopted 6 villages under Unnat Bharath Abhiyan, a Government of India's initiative and helping them in solving some of their day-to-day problems by providing technological solutions. Kumizhi, Venkatapuram, Aapur, Oteri, Thenmelpakkam and kalaiampoondi are the Six villages benefiting under this initiative.

The academicians and researchers of the institution have trained the people of Aadhanur, Eachampoondi and Periakottagam villages, belonging to SC community on Biodiesel production, Biochar production from Agro waste, Accelerated Biocompost production from vegetable market waste, Flyash brick making, hydroponics an alternate farming technology, through the recently established STI hub in Cuddalore, Kattumannarkoil taluk

People belonging to ST community from Peenjamandhai, pallambattu and Jarthamkollai Panchayats of Jawadhu Hills are provided training on millet cultivation, medicinal plant cultivation, and bee farming through the Agri Innovation Hub. The villagers are trained on making value added products from the millets. They are also provided technological assistance for digital

marketing. Skill development programmes on baking, tailoring, electrical work, laptop repair are conducted for the village youth. Computer literacy programmes are organised for the school children of these villages.

In addition, the institution gives educational support and employability to eligible candidates from the beneficiary villages. Frequent health camps and awareness Programmes are organized by the institution.

Impact

- The problems faced by the villages are solved through technological interventions.
- Increase in the income of farmers and women through the value addition of the agricultural produce- Through the training received on value added products from millets, the villagers belonging to Peenmandhai, Palambattua and jathankollai Panjayats have started earning by preparing and selling value added products
- Empowerment and social inclusion of underrepresented sections of the community
- Facilitate the achievement of SDGs

Start-ups Established

- "BiGlySo Pvt. Ltd" has been launched for the production of waste cooking oil derived biodiesel, Agro-waste derived enriched biochar, vegetable market waste based accelerated bio compost, industrial grade bio glycerine, waste cooking oil based detergent soaps, and bioglycerine based liquid soaps.
- "POOBAS Pvt. Ltd" has been established for sales of hydroponics based horticultural cultivation and consultation
- "Penteum Enterprises Pvt. Ltd functions with the objective to utilize fly ash for brick making.

- Poomanam was established by the Self help group women in these adopted villages where they make incense sticks from the flower waste.

1.3 WOMEN EMPOWERMENT

Realising that teaching a person to fish is better than to feed him, Women empowerment bureau of the Institution conducts several training programmes and vocational courses for women of these villages to financially empower them. It also works with some of the NGOs for the upliftment of the downtrodden by providing them training in a vocation and facilitating income generation. More than 1000 women are trained in mushroom cultivation, sea weed cultivation, ornamental fish culturing, solar lamp making, baking, tailoring, sanitary napkin making, house-keeping, beauty and wellness etc.

Training Programmes to Women

Training on Baking

Training on Solar Lamp Making

SDG 2 - ZERO HUNGER

Hunger and malnutrition impedes the human progress and pose a major challenge for achieving sustainable development. Research reveals nearly 800 million people live in extreme poverty across the world. To move towards a world where there is no poverty, the world community should jointly take efforts to improve the food system, practice sustainable agriculture, enhance socio-economic status of the people living in poverty, and develop rural economies.

Climate change is the main reason for the decline in food production and the consequent hunger and food security issues faced by the global community. In India food security is a major problem to be addressed in priority over other problems as India failed to achieve the Millennium Development Goal-1 with respect to eradication of poverty and hunger. The problems associated with Climate change, such as declining fertility of land, increasing water scarcity are to be addressed properly in order to increase the agriculture productivity. To end hunger and all forms of malnutrition and to ensure access to food to everyone, by 2030, requires the support of Educational Institutions. We believe higher educational Institutions like us can contribute to eradicate the problem of hunger and malnutrition through innovative research.

2.1 RESEARCH CONTRIBUTION

At Sathyabama, research on effective agricultural practices, organic farming and pest control are undertaken. The Centre for climate change studies is involved in research addressing the issues like maintenance of ecosystems and avoiding degradation of eco-systems, adaptation to climate change, water scarcity, ground water resources and irrigation. Centre for Remote Sensing and Geoinformatics is also involved in research that addresses the change in rainfall pattern, anthropogenic disaster monitoring and so on.

2.2 TRAINING PROGRAMMES

The Institution conduct

- Training programmes to students and outsiders in order to develop awareness on these issues and encourage responsible behaviour to combat human caused climate change and promote sustainable way of life.
- Training programmes to farmers on sustainable and resilient agricultural practices.
- Awareness programmes on food wastage and ways to avoid food wastage.

2.3 OUTREACH PROGRAMMES

Sathyabama has always had a social consciousness about the society we are in. The needy and poor are always helped, and many projects to empower them with employment has always been the mission. The students also do a lot of outreach activities in the schools and villages that we have adopted.

The Institution sponsors food to old age homes, homes for destitute women and Children's home in the nearby community as a small step towards eradication of hunger. Sathyabama's CSR arm has arrangement to donate food to the following orphanages and Homes. Christmas is a season of celebration and Sathyabama never fails to extend its arm to the orphanages

and Home for the aged, where special food and delicacies are served. Christmas Baskets are sent out in the hope to bring cheer and happiness.

2.4 FOOD DISTRIBUTION DURING NATURAL DISASTERS:

Other than giving food to orphanages and Homes, Sathyabama has never failed to rise to any occasion, during natural calamities in Chennai. The huge kitchen in Sathyabama that feeds more than 5000 people every day, three times a day, effortlessly starts cooking for the masses during any natural calamity. The students also volunteer and their active participation has always been Sathyabama's strength. The food that is cooked and packed by the efficient kitchen gets distributed effortlessly by the students.

2.5 WOMEN EMPOWERMENT AND ERADICATION OF HUNGER

Empowering women will alleviate poverty and eradicate hunger. The women in the rural areas have been taught many skills that could help them make a living and have a good quality of life.

Training on Tailoring

Training on Beauty and wellness

Training on Seaweed Cultivation

Initiatives on campus to avoid food waste

Zero food waste campaign

SDG 3 – GOOD HEALTH AND WELL-BEING

Sathyabama Institute of Science and Technology towards SDG3

Sathyabama Institute of Science and Technology is one of the premier institutions that constantly gives equal importance to both academics and research, with a focus on bringing more benefits to society by making technologies easier and more affordable. It offers professional courses in biotechnology, dental sciences, Microbiology, Medical Lab Technology, Clinical and Nutrition and Dietetics and Psychology. These departments were established to bring in trained professionals who will support the healthcare sector in improving its capabilities and benefiting society.

Sathyabama Institute of Science and Technology encourages various outreach activities, keeping in mind the health and wellbeing of the community. The aim of such activities is to reach a larger mass of the population, create awareness among them, and change their perceptions of hygiene and health. This will indirectly increase the quality of life. As the institute has several departments, they carry out activities such as commemorating the days of importance every year, which involves national and international speakers who are world-renowned doctors and clinicians, scientists from top institutes and industries, and spending some time with the young researchers and talking about the current challenges.

3.1 RESEARCH AND PUBLICATION

The Institute also supports various multi-disciplinary projects, which bring clinicians and scientists together on the same platform to sit and discuss

several challenging aspects. This had built a connection between the top hospitals in Chennai and Tamil Nadu, such as Deepam Hospitals and Kauvery Hospitals, to collaborate with the Sathyabama Institute of Science and Technology.

There is a separate research and development wing in Sathyabama, which focuses mainly on research activities. The Centre for Drug Discovery and Development is one of the main centres that conducts multiple national and international conferences, outreach activities, training programmes, and workshops. This is done in collaboration with other departments such as the School of Pharmacy, the School of Dental Sciences, Allied Health Science, and the School of Bio and Chemical Sciences.

The Centre for Drug Discovery and Development aligns its focus on the major challenging concerns to overcome infectious and non-infectious diseases. To understand disease biology, disease progression, epidemiology, drug discovery, and diagnostic development. The centre has received funding from the Indian Council of Medical Research (ICMR) for studying the different mutations of the envelope and membrane proteins of SARS-CoV-2 and its effect on the formation of VLPs. It has received funding from the Ministry of Education (MoE SPARC) for the identification of biomarkers for the rapid diagnosis of pulmonary tuberculosis by imaging technique.

Sathyabama SEED Innovation Fund

Sathyabama Institute of Science and Technology values young researchers and scientists who bring about novel ideas and products that will benefit the health and wellbeing of society. One such initiative by the institute is the SEED Innovation Fund, which provides funding to students and staff.

One of the scientists from the Centre for Drug Discovery and Development received the SEED Grant for the formulation of a polyherbal capsule for

reducing the viral load of respiratory disease (CoVID 19). The capsule was formulated by using metabolites extracted from plants.

Another SEED innovation grant was given to one of the scientists from the Biomedical Department for developing a smart digital pain level detector.

3.2 PUBLICATIONS

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
1.	Dr. Bethanney Janney J	School of Bio & Chemical	Associate Professor	Monitoring indoor air quality using smart integrated gas sensor module (IGSM) for improving health in COPD patients	Environmental Science &Pollution Research, Springer	https://doi.org/10.100 7/s11356-022-24117-y	5.8
2.	Dr. Saqib Hassan	School of Bio & Chemical	Assistant Professor	Water a major source of endocrine-disrupting chemicals: An overview on the occurrence, implications on human health and bioremediation strategies	Environment Al Research	https://doi.org/10.1016/j.envres.2023.116097	8.3

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
3.	Dr. Anima Nanda	School of Bio & Chemical	Professor and Dean-IQAC	Molecular Characterization of Extended Spectrum B-Lactamase Producing Escherichia Coli Isolated from Urine Samples.	Asian Journal of Pharmaceutics	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwj6raunptWAAxVnUGwGHYKUAyUQFnoECCkQAQ&url=https%3A%2F%2Fwww.asiapharmaceutics.info%2Findex.php%2Fajp%2Farticle%2Fdownload%2F4480%2F1419%2F10546&usg=AOvVaw306Ii4KkofCnAZsJmMTwf&opi=899784 49	0.4
4.	Dr. Anima Nanda	School of Bio & Chemical	Professor and Dean-IQAC	Mosquito Larvicidal Activity of ZnO Nanoparticles against Dengue Causing Vector Aedes Albopictus Using Leaf Extract of Lavandula Angustifolia	Journal of Nanostructures	https://jns.kashanu.ac.ir/article_112778.html#:~:text=In%20dose%20dependent%20manner%20from,confirmed%20the%20biosynthesis%20of%20ZnON	1.4

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
5.	Dr. Anima Nanda	School of Bio & Chemical	Professor and Dean-IQAC	Larvicidal activity of Artemisia absinthium extracts with special reference to inhibition of detoxifying enzymes in larvae of Aedes aegypti L	Journal of King Saud University–Science	https://doi.org/10.1016/j.jksus.2022.102248	3.8
6.	Dr. Anima Nanda	School of Bio & Chemical	Professor and Dean-IQAC	Biosynthesis of Zinc Oxide Nanoparticles from Allium sativum Extract: Characterization and Application	Bio-NanoScience	https://doi.org/10.100 7/s12668-022-01009-6	3
7.	D. Alex Anand	School of Bio & Chemical	Associate Professor	Differentially Expressed Cell Cycle Genes and STAT1/3-Driven Multiple Cancer Entanglement in Psoriasis, Coupled with Other Comorbidities	Cells	doi:10.3390/cells11233867	6
8.	Dr.S.Usha Nandhini	School of Bio & Chemical	Assistant professor	Isolation and bioactive potentials of Streptomyces from Tripura forest soil, North- east India.	Journal of Environmental Biology	DOI:http://doi.org/10.22438/jeb/43/6/MRN-1740	0.7

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
9.	Sathish Kumar R	Centre for AQUACULTURE	Assistant Professor (Research)	Statistical optimization of media components for antibiotic production in Streptomyces sp. CMSTAAHAL-3	Electronic Journal of Biotechnology	https://doi.org/10.1016/j.ejbt.2023.03.005	2.7
10.	Dr.T.Rajasekar	Centre for Drug Discovery and Development	Assistant Professor (Research)	Antibacterial wound dressing with hydrogel from chitosan and polyvinyl alcohol from the red cabbage extract loaded with silver nanoparticles	Green Processing and Synthesis	10.1515/gps-2023-0035	4.3
11.	Dr.T.Rajasekar	Centre for Drug Discovery and Development	Assistant Professor (Research)	Silver nanoparticles synthesized from the seaweed Sargassum polycystum and screening for their biological potential	Scientific Reports	10.1038/s41598-022-18379-2	4.6
12.	Dr.V.Gopikrishnan	Centre for Drug Discovery and Development	Scientist C	Exploration of fish gut-associated actinobacteria for its antifouling activity	Journal of basic Microbiology	10.1002/jobm.202300051	3.1

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
13.	K. Manigundan	Centre for Drug Discovery and Development	Assistant Professor (Research)	Microbe-enriched farm yard manure (MFYM) approach for the suppression of Ralstonia solanacearum Yabuuchi (Smith) inciting bacterial wilt disease in eggplant (Solanum melongena L.)	Plant and Soil	https://doi.org/10.1007/s11104-023-06119-y	4.9
14.	K. Manigundan	Centre for Drug Discovery and Development	Assistant Professor (Research)	Actinobacteria as a source of biofertilizer/biocontrol agents for bio-organic agriculture	Journal of Applied Microbiology	https://doi.org/10.1093/jambio/lxac047	4
15.	K. Manigundan	Centre for Drug Discovery and Development	Assistant Professor (Research)	Diversity of Antimicrobial Peptide Genes in Bacillus from the Andaman and Nicobar Islands: Untapped Island Microbial Diversity for Disease Management in Crop Plants	Current Microbiology	https://doi.org/10.1007/s00284-022-03086-y	2.6

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
16.	K. Manigundan	Centre for Drug Discovery and Development	Assistant Professor (Research)	A Novel Finding: 2,4-Di-tert-butylphenol from Streptomyces bacillaris ANS2 Effective Against Mycobacterium tuberculosis and Cancer Cell Lines	Applied Biochemistry and Biotechnology	https://doi.org/10.1007/s12010-023-04403-2	3
17.	Dr. M. V. Rajeswari	Centre for Aquaculture	Assistant Professor (Research)	Personal protective equipment (PPE) pollution driven by COVID- 19 pandemic in Marina Beach, the longest urban beach in Asia: Abundance, distribution, and analytical characterization	Marine pollution Bulletin	https://doi.org/10.1016/j.marpolbul.2022.114476	5.8
18.	Dr. Krupakar Parthasarathy	Centre for Drug Discovery and Development	Associate Professor (Research)	Susceptibility of SARS Coronavirus-2 infection in domestic and wild animals - A systematic review	3 Biotech	10.1007/s13205-022-03416-8	2.9
19.	Dr. M.Radhakrishnan	Centre for Drug Discovery and Development	Professor (Research)	Antibacterial and anti-HIV metabolites from marine Streptomyces albus MAB56 isolated from Andaman and Nicobar Islands, India	Applied Biochemistry and Biotechnology	https://doi.org/10.1007/s12010-023-04493-y	3

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
20.	Dr. M. Radhakrishnan	Centre for Drug Discovery and Development	Professor (Research)	In-vivo studies on Transitmycin, a potent Mycobacterium tuberculosis inhibitor.	PLOS ONE	https://doi.org/10.1371/journal.pone.0282454	3.7
21.	Dr. M. Radhakrishnan	Centre for Drug Discovery and Development	Professor (Research)	Biosynthesis, Characterization and Evaluation of Antimicrobial, Antioxidant and Antiproliferative Activities of Biogenic Silver Nanoparticles Using Streptomyces KBR3	Indian Journal of Pharmaceutical Science	10.36468/pharmaceutical-sciences.1064	0.5
22.	Dr. M. Radhakrishnan	Centre for Drug Discovery and Development	Professor (Research)	Production and characterization of glycolipid biosurfactant from Streptomyces enissocaesilis HRB1and its evaluation for biomedical and bioremediation applications	Journal of Surfactants and Detergents	https://doi.org/10.1002/jsde.12643	1.6
23.	Dr. M. Radhakrishnan	Centre for Drug Discovery and Development	Professor (Research)	Isolation, characterization and antimicrobial activity of endophytic actinobacteria strains from medicinal plants	Indian Journal of Pharmaceutical Science	10.36468/pharmaceutical-sciences.1009	0.5

S. No	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
24.	Dr.V.Vijaya Baskar	School of Electrical & Electronics	Professor	A Non-Invasive Blood Glucose Monitoring For Diabetics With Breath Biomarkers: An Ensemble-Of-Classifiers Model	Journal of Mechanics in Medicine and Biology	doi.org/10.1142/S0219519423500082	0.8
25.	Dr.E.Anna Devi	School of Electrical & Electronics	Associate Professor	Detection of cervix tumor using an intelligent system accompanied with PNN classification approach	Signal, Image and Video Processing	https://doi.org/10.1007/s11760-023-02616-w	2.3
26.	Dr.S.Nirmalraj	School of Electrical & Electronics	Associate Professor	Permutation feature importance- based fusion techniques for diabetes prediction	Soft Computing	https://doi.org/10.1007/s00500-023-08041-y	4.1
27.	Dr.M.Subramoniam	School of Electrical & Electronics	Professor	A Convolutional Neural Network for COVID-19 Diagnosis: An Analysis of Coronavirus Infections through Chest X-rays	Electronics(Swit zerland)	https://doi.org/10.3390/electronics11233975	2.9
28.	Dr.S.Lakshmi	School of Electrical & Electronics	Professor	An Efficient Hybrid Model for Acute Myeloid Leukaemia detection using Convolutional Bi-LSTM based Recurrent Neural Network	Computer Methods in Biomechanics &Biomedical Engineering: Imaging and Visualization	https://doi.org/10.1080/21681163.2022.2073912	1.6

3.3 PATENTS AND INNOVATIONS

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
1	German Patent	202022103681	System for detecting melanoma - XP	Sathyabama Institute of Science and Technology	Granted	01/07/2022	28/09/2022
2	German Patent	202022103682	Portable health care device	Sathyabama Institute of Science and Technology	Granted	01/07/2022	28/09/2022
3	German Patent	202022103667	System for the isolation and characterization of probiotic species for human and animal use	Sathyabama Institute of Science and Technology	Granted	01/07/2022	10/08/2022
4	German Patent	202022103721	System for the classification and expression of the outer membrane protein OMPL 1 from pathogenic Leptospira species and for the validation of an innovative diagnostic technique in human and canine samples	Sathyabama Institute of Science and Technology	Granted	05/07/2022	18/08/2022

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
5	German Patent	2020 2210 3697	System For the Production and Evaluation of Plant-Based Food Bars to Improve the Interactions Between the Gut Microbiome and The Brain	Chandini Lokkashri, Jerrine Joseph, Sathyabama Institute of Science and Technology, Thyagarajan Rajendiran	Granted	04/07/2022	15/09/2022
6	Product	2018 4102 2285	Development of ceramic coatings on dental abutments for better corrosion protection	Dr.Gobi Saravanan Kaliaraj	Granted	14/06/2018	13/02/2023 Patent No: 421 428
7	Product	2022 4103 6025	Sweat Based Glucose Monitoring With Inbuilt Drug Delivery System	Sathyabama Institute of Science and Technology - Krishnakumar S	Published	23/06/2022	01/07/2022
8	Product	2022 4103 6045	Smart Wearable Band for Patients Health Monitoring System	Sathyabama Institute of Science and Technology - A.Sivasangari, P.Ajitha, R.M.Gomathi, R.Subhashini, G.Mathivanan	Published	23/06/2022	01/07/2022

S.No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
9	Product	202241036046	Wearable Epilepsy Seizure Detection Device	Sathyabama Institute of Science and Technology - Dr.A.Sivasangari	Published	23/06/2022	01/07/2022
10	Product	202241037942	Transcutaneous Electrical Nerve Stimulator	Sathyabama Institute of Science and Technology - Dr.V.Sivachidambaranathan	Published	01/07/2022	08/07/2022
11	Product	202241036043	Micro-Electro-Mechanical System Based Wearable Sensors for Monitoring Gait of Elder People	Sathyabama Institute of Science and Technology - A.Sivasangari, T.Sasikala, V.NirmalRani, Jabez	Published	23/06/2022	01/07/2022
12	Product	202241029933	IoT Based Novel One Touch Wearable Smart Watch for Stress Prediction	1. Mary Sajin Sanju I 2. F.V. Jayasudha 3. Rexiline Sheeba 4. Dr. S. Lakshmi 5. Dr. M.R. Ebenezar Jebarani 6. Dr. P. Kavipriya	Published	25/05/2022	03/06/2022
13	Product	202241036004	Anti-Tremor Device for Parkinson's Disease Patients	Sathyabama Institute of Science and Technology - Dr. T. Sudhakar, Prakash Pandurangan	Published	23/06/2022	01/07/2022

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
14	Product	202241062995	AI Based Computer Vision Using ML Approaches to Predict and Diagnose Autism Disorders	1. Dr. P. Saravanan 2. Dr. Shraddha Chaudhary 3. Dr. Manmohan Singh 4. Dr. K. Sampath Kumar 5. Dr. T.R. Kalai Lakshmi 6. Dr. Sheshang Degadwala 7. Dr. R. Thiagarajan 8. Dr. R. Ramkumar	Published	4/11/2022	18/11/2022
15	Product	202221046050	A System for Diagnosis and classification of bone cancer using artificial intelligence	Dr. S.K. Lanjhiyana, Dr. Sweety Lanjhiyana, Purnima Rai, Dr. Zulfa Nooreen, Shubham Tripathi, Sonali Singh, Princee Kesarwani, B. Sathiyaprasad, Prof (Dr)Vivek Singh Kushwah, Dr. Sajal Kumar Jha, Dr. Deepak Sharma, Dr. Manish Jaimini	Published	12/08/2022	09/09/2022

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
16	Product	202241037150	The sentimental analysis based disease estimation and health risk prediction system	Mr.T.Venketbabu, Mr. Mohammad Owais, Rajrupa Metia, Pinaki Satpathy, Santanu Maity, Razia Sultana, Amit Bhattacharyya, Mr.J Logeshwaran, Dr. Harishchander Anandaram, Mr. Varusai Mohamed, Suman Paul, Avishek Das	Published	28/06/2022	08/07/2022
17	Product	202241043127	Design System of Healthcare Services Powered by IoT and Fog Computing for Smart Cities	Mr.Deependra Rastogi, Dr. Tanvi Gupta, Mr. Abhinav Raghav, Mr.Soumalya Ghosh, Dr. Ramarcha Kumar, Mr.B. Sathiyaprasad	Published	27/07/2022	05/08/2022
18	Product	202241046215	A Secure block-chain based Medical Internet of Things (MIoT) for Healthcare Data Management	Dr.Arulprakash.A, Mr.Deependra Rastogi, Mrs.Aanchal Vij, Mr.Sathiyaprasad, Mr.K. Babu, Mr. Tamilselvan.T	Published	12/08/2022	19/08/2022

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
19	Product	202241053438	Artificial Neural Network based system for predicting child mental stress	Dr. G. M. Karpura Dheepan, Dr. B. U. Anu Barathi, Mr. K. Babu, Mr. Amandeep Singh K, Mr. G. Muthugurunathan, Dr. S. Rajashree, Dr. M. Nafees Muneera, Dr. A. Jemshia Miriam, Mrs. Suja Cherukullapurath Mana, Dr. N. S.Usha	Published	19/09/2022	14/10/2022
20	Product	202241065775	Design System for Detecting Blood Leakage during Hemodialysis using Real-Time Internet of Medical Things	Ms.R.Asha, Dr. J. Jeslin Shanthamalar, Dr. Nancy Noella R S, Ms. Devipriya M, Ms. Lakshmi Priya S, Mrs. Nithya S, Ms.C.A.Daphine Desona Clemency, Mr. K.Babu, Mr. B. Sathiyaprasad, Dr. Sreeji. S	Published	16/11/2022	25/11/2022

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
21	Product	202241077461	Design Intelligent Human Activity Tracking and Monitoring System for eHealthcare using IoT	Mr.K.Babu, Ms.K. Neela, Ms.R.Asha, Dr.A.Deepa, Mrs.Parveen Akhther, Mr. Prasanth V.S, Ms.M Beula kutti, Ms.Reddy Selvam Mamatha, Mr. B. Sathiyaprasad, Dr. Sreeji. S	Published	31/12/2022	06/01/2023
22	Product	202321015802	Robust and Efficient Detection of Cancer Detection Using Machine Learning and Deep Learning Techniques	Dr. Namit Pathak, Dr. V. Kalaimani, Anusha P, Dr. Sanjogta Meshram, M Revathy Meenal, Dr. N. Mathan, Dr. M. John Paul, R Krishna Kumar, Dr. Palani A, Dr. Sankar. K	Published	09/03/2023	24/03/2023

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
23	Product	202341005248	Artificial Intelligence Healthcare Chat Box System	Dr. Vijay Arputharaj. J, Mr. Vijjapu Anuragh, Dr. M. P. Vaishnnave, Dr. Shubham Mahajan, Dr. Barjinder Kaur, Dr. R. Kanakaraj, Mr. Ranjithkumar R, Mr. Parashuram Shankar Vadar, Dr. Charu Gupta, Dr. Palak Girdhar, Dr. V. Kannan, Mr. J Logeshwaran	Published	26/01/2023	24/02/2023
24	Product	202341011576	AI Based Nanotechnology to Treat Blood Cancer Nodes	Mrs.K.Anita Davamani, Dr.N.Kavitha, Dr. Jebarani Evangeline S, Dr. K. Sangeetha, Ekta Shivhare, Dr.S.Prakash	Published	20/02/2023	17/03/2023
25	Product	202341032328	Method for Detection of Polycystic Ovary Syndrome Using Android App	Sathyabama Institute of Science and Technology	Published	08/05/2023	16/06/2023

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
26	Product	202341032347	Method for preparing natural sprinkling powder used for treating open wounds	Sathyabama Institute of Science and Technology	Published	08/05/2023	16/06/2023
27	Product	202341034738	Methods for performing antimicrobial wound healing gel using Fish Collagen	Sathyabama Institute of Science and Technology	Published	18/05/2023	23/06/2023
28	Product	202211070169	Bleeding recognition technique in wireless capsule endoscopy images using fuzzy logic and principal component analysis	Dr. Pawan Kumar, Dr. M. Thangaraj, B Ranjitha, Sakshi Taaresh Khanna, Dr. Neeraj Kumar Sharma, Dr. Ghanshyam Vatsa, Dr. C. Kavitha, Dr. S. Jackson, Ms. Eshwari Nagesh Mundas, Mr. Anupendra Singh, Ms. K. Leelarani, Ms. S. Shopika	Published	05/12/2022	30/12/2022

S. No	Patent Type	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published / Granted Date
29	Product	202241036880	An IoT Based Smart Baby Towel for Predicting Behviour and Care of Newborn	Dr.A.Jemshia Miriam, Dr.S.Raja shree, Dr. M. Nafees Muneera, Dr. V. Saranya, J. Karthika, M. Vanathi, B. Sandhiya, R. Vignesh, D. Deepa, S. Hemalatha	Published	28/06/2022	08/07/2022

3.4 DAYS OF IMPORTANCE RELATED TO HEALTH AND WELL BEING COMMEMORATED AT SATHYABAMA

3.4.1 World Aids Day

It is very essential in today's scenario to inculcate in young minds the seriousness of an ongoing disease or pandemic. Therefore, Sathyabama initiates every centre, school, or department to commemorate the days of importance, which will bring awareness among students, teachers, and the general public about the disease. The days of importance conducted at the Centre for Drug Discovery include World AIDS Day, World TB Day, World Cancer Day, and World Organ Donation Day.

The theme for World AIDS Day 2022 was "Equalize." WHO is calling on global leaders and citizens to boldly recognise and address the inequalities that are holding back progress in ending AIDS and to equalise access to essential HIV services, particularly for children and key populations and their partners. The focal point of this programme is to raise awareness among the younger generation, particularly among women, about the need to

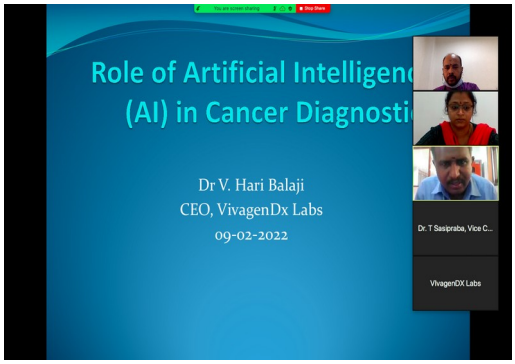
maintain one's own reproductive health and welfare. This action is being conducted with the UN's SDG-3 goals in mind, which aim for fair access to healthcare services for all men and women in order to attain universal health coverage.

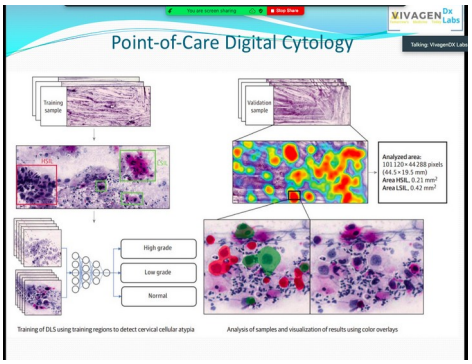
Every year at Sathyabama, we commemorate this day and inculcate awareness among our young and blooming doctors, scientists, and nurses from several departments. The Centre for Drug Discovery and Development plays a key role as we contribute to finding novel drugs and therapeutic medicines for the cure of several pathogenic infections. Our major focus is on HIV, HPV, dengue, TB, and SARS-CoV-2. Dr. Siddappa Byrareddy, Professor and Vice-Chair of the Research Department of Pharmacology and Neuroscience, University of Nebraska Medical Centre, Omaha, NE, USA, delivered a special lecture on “HIV/AIDS is curable”. Dr. Archana Ashwin, MD, Consultant, MGM Healthcare Chennai, has delivered a special lecture on HIV/AIDS and Monkeypox Viruses: Two Pandemics. Dr. C. Pravda, Professor and Head, Department of Oral Medicine and Radiology, Sathyabama University Dental College & Hospital, Chennai, HIV in oral health.

A total of 250 participants from dental, nursing, bioinformatics, and R&D fields attended. Both national and international speakers have raised awareness among the participants about the molecular mechanisms of HIV disease pathology and preventive strategies for HIV infection.

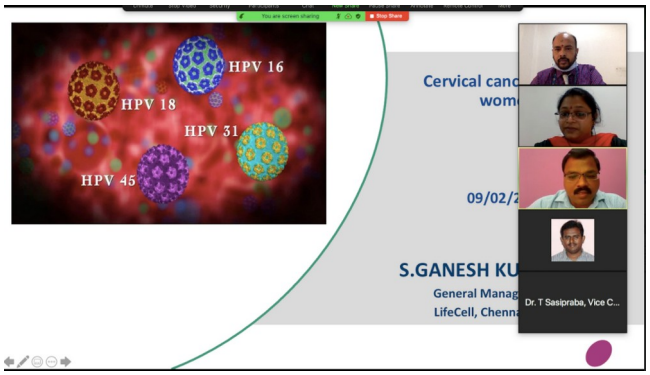
3.4.2 World Cancer Day

The Centre for Drug Discovery and development had organized a one-day webinar in commemoration of World Cancer Day on 9th February 2022. 131 participants had registered for the webinar. Students, teachers, and research scholars had registered for the event. Two scientific experts delivered talks on Cancer diagnostics and therapeutics. Dr. Haribalaji shared his views on the Role of Artificial Intelligence (AI) in Cancer diagnostics. He also gave an introduction to machine learning and data generation. Mr. Ganesh Kumar shared his experience on Human Papilloma Virus (HPV) and its association with Cervical Cancer.





Dr. Haribalaji (CEO, VivagenDx Labs) presenting on AI based Cancer Diagnostic



Mr. Ganesh Kumar presenting on HPV and its association with Cervical Cancer Diagnostics

3.4.3 World Organ Donation Day

The Centre for Drug Discovery Development, organized the Webinar programme on 13th August 2022, commemorating World Organ Donation Day. The two most renowned clinicians Prof. Dr. J. Amalorpavanathan, Member, State Planning Commission, Tamil Nadu, who contributed profoundly to the field of Transplantation and Dr. Supraja. K, Consultant, Respiratory Medicine, The Madras Medical Mission, Chennai, delivered their special lecture on organ transplantation. More than 80 participants including teaching faculties, clinicians and students from all over India

attended the webinar. Dr. J. Amalorpavanathan took the participants on a virtual journey from the myth to the present scenario of organ donation with his mind-storming speech. His speech enlightened the participants about organ transplantation and created awareness among the participants to wear helmets while driving, to save their lives by avoiding head injury during unfortunate accidents. Dr. Supraja gave insights on the lung transplantation scenario in India. Her talk highlighted the success story of lung transplantation in India during the COVID-19 pandemic which was a breakthrough in medical society. The challenges and the impact of COVID-19 on lung transplantation were discussed in detail. This webinar was an eye-opening session where the participants actively interacted with speakers and also inspired the participants to organ donation to save the lives of the needy.

3.4.4 World TB Day

Centre for Drug Discovery and Development commemorates World TB Day every year on 24 March. The main aim is to bring together scientists, students and researchers on a platform for an open discussion about the problems and challenges in the diagnosis of tuberculosis. Even today, there are increasing number of cases detected positive for TB. This webinar had two eminent scientists DR. RK Shandil who delivered a lecture on the Avenues and Challenges of TB Infection. The second guest lecture was given by Dr. Anil Jacob Purty who spoke about the disease and its drug resistance. This webinar was very useful and received a large number of participation from students, researchers and scientists.

3.4.5 World Leprosy Day

The School of Nursing, commemorates the world Leprosy Day every year in January. This is done to spread awareness in the community about the

disease. This year, students of Nursing joined hands and organized an outreach camp at Thiruporur Government Hospital to talk to outpatients about leprosy and the precautions to be taken while handling the patients.

3.4.6 World Breastfeeding Week

The School of Nursing organized a programme under the theme of World Breastfeeding Week. This was done to bring the focus on young lactating mothers and women who are pregnant. They were educated about the necessity of breastfeeding which will have a good impact on their health and wellbeing.

3.4.7 World Oral Health Day

The programme was celebrated from 21st to 25th March 2022 At Sathyabama Dental College & Hospital. Lectures were delivered on the Importance of Oral Health and the Role of Periodontists in it to BDS Students. A brief orientation to the subject of Periodontology along with the Importance of Oral and periodontal Health was given to 1st Year BDS Students.

3.4.8 International Day of People with Disabilities

This day is celebrated every year on December 3rd, to provide their rights and well-being - A person with disabilities at every level of society and development.

To commemorate this day, the Department of Public Health Dentistry, Sathyabama Dental College, conducted a paper bag workshop for the students of Montfort Community Development Society on December 2nd,

2022. There were around 40 students gathered there along with the staff of MCDS and Mrs Vijayalakshmi, the in-charge head, gave an introduction speech. Dr. Nadeem was called upon to give a speech to the students. Dr. Nadeem gave a speech based on the theme of the year 2022. “Transformative solution for inclusive development.” The interns were divided ourselves into 2 groups, 4 members each. One group interacted with the students and the other group decorated the room.

3.5 GENERAL HOSPITAL AND DENTAL HOSPITAL

The Institution has its own General Hospital and Dental Hospital that offers medical treatment to the nearby community at a very reasonable rate. Apart from the hospitals it also provides medical health professional courses in Dental, Pharmacy, and Nursing

The world has made significant progress but still faces significant challenges to achieving the 2030 targets for Good Health and well-being. Women

around the world lack access to sexual and reproductive health care, millions suffer from malnutrition, HIV/AIDS continues to afflict thousands daily, billions of people have no access to life-saving medicine, and we continue to create more waste that will impact the health of all.

Poor health impacts every dimension of human life: lowers access to education and economic opportunities and increases poverty. A cause of poverty, health is also impacted by poverty and Goal 3 is strongly connected to SDGs, such as Goal 1: No Poverty, Goal 2: Zero Hunger, Goal 5: Gender Equality, Goal 6: Clean Water & Sanitation, Goal 13: Climate Action, and Goal 16: Peace, Justice & Strong Institutions.

Sustainable Development Goal 3 seeks to ensure health and well-being for all, at every stage of life. The Goal addresses all major health priorities, including reproductive, maternal and child health; communicable, non-communicable and environmental diseases; universal health coverage; and access to all safe, effective, quality and affordable medicines and vaccines. It also calls for more research and development, increased health financing, and strengthened capacity of all countries in health risk reduction and management.

Studying disease epidemiology, and drug discovery by bio-prospecting natural resources from screening to identify potential anti-infective leads.

Understanding the disease burden and better understanding of the disease pathogenesis Monitoring factors that affect human health and well-being, like air quality and traffic Supporting health promotion and disease prevention, through the use of wearable monitoring devices

Enabling remote/rural healthcare and ensuring continuous support until the disease is completely eradicated. Overall, we can contribute to the prevention of people falling below the poverty line and help target specific support to those in need.

3.6 OUTREACH ACTIVITIES

Several Outreach activities are taken up by the dental college, school of Pharmacy and allied health science.

Patients reporting to the Dept of Periodontics OPD were also educated about the topic. CRRIs used Short Educational Videos – both sourced from the Net and Self-created to Educate patients on Oral Health in Special Scenarios. A sketching and e-poster competition was organized among BDS students on the topic “My Mouth, my Pride”.

CATCH THEM YOUNG!! - Patients reporting to the Dept of Pedodontics were asked to draw their ideas of “Happy Mouth” and give a short talk on what they felt was good Oral Health. BSc Nursing Students were also given a lecture on the Importance of Oral Health and the critical role played by Nursing Practitioners in promoting the same both at the Hospital and Community levels

Patient Education – by CRRIs Patient Education Videos by CRRIs

Lectures on Importance of Oral & Periodontal Health to Students

Sathyabama College of Nursing offers training in Nursing at the undergraduate level. The Institution is being approved by Government of Tamil Nadu, Indian Nursing Council and Tamil Nadu Nurses and Midwives Council. College started its first batch in the academic year 2019-20. The Institution provides training specially to develop skills in problem solving and critical thinking. The students will be updated with advanced technologies in patient care, comfort and safety even in disaster situations. The faculty and students of the Nursing are constantly engaged in research activities and motivated to publish their research findings in the peer-reviewed national and international journals, conferences and book chapters. Sathyabama Institute of Science and Technology places emphasize on co-curricular and extracurricular activities. These activities are student centric and primarily aim to supplement regular curricular activities. Its goal is to represent the student body in making the study experience as rewarding and enjoyable as possible.

The Outreach activities of the school include a Nutrition demonstration on pregnancy diet, a health talk on antenatal exercise, Antenatal Care and anemia and also organized role-play on personal hygiene to commemorate World Population Day on the theme “Towards a resilient future for all harnessing opportunities and ensuring rights and choices for all” at Palavakkam PHC.

In commemoration of World Aids Day, we at Sathyabama College of Nursing organized an outreach rally on the theme “EQUALIZE”. It is a wakeup call for all of us to focus on the practical solutions to alleviate inequality and put an end to life threatening disease ‘AIDS’. Mrs. Suganth, Staff Nurse & Mrs.Shanthi, Sector Health Nurse from Semmanchery primary health center hoist the green flag to start the outreach Rally.

Sathyabama college of Nursing in coordination with Sathyabama General Hospital organised a Diabetes week celebration commemorating the World Diabetes Day on the Theme: “Education to protect tomorrow”.

Awareness Camps Conducted by Dental Hospitals

The Department of Public Health Dentistry conducted a dental screening camp at Amma Appa Old Age Home, Mannivakkam.

Dental screening camp at Kirubai Old Age Home.

Dental screening camp was conducted by the Department of Public Health Dentistry in KARAM KODU THOZHA OLDAGE HOME, KANNAGI NAGAR with a major goal of creating dental awareness among the elderly people. Oral screening was done, oral hygiene instructions were given, oral hygiene aids were provided to them. Pamphlets were distributed to highlight

the importance of maintaining oral health. The people actively participated in both the dental screening and oral health education.

Dental screening camp was conducted by the Department of Public Health Dentistry in ALPHA NURSERY SCHOOL. Oral screening was done, oral hygiene instructions were given, oral hygiene aids were provided to them. Pamphlets were distributed to highlight the importance of maintaining oral health. The people actively participated in both the dental screening and oral health education

Department of Public Health Dentistry

Dental College and Hospital has conducted an oral screening camp with a Doctor and CRRI students at VASANTHAM OLD AGE HOME at Sithalapakkam.

Department of Public Health Dentistry from Sathyabama Dental College and Hospital has conducted an oral screening camp at Kalaivani trust Old age home.

3.7 NATIONAL AND INTERNATIONAL CONFERENCES

The Centre for Drug Discovery has undertaken multiple outreach activities and organised many national and international conferences related to SDG 3 Goals of Health and Wellbeing. One such activity is the Indo-Singapore International Conference, where eminent speakers shed light on current health issues such as endometriosis and tuberculosis. The conference was a two-day Indo-Singapore International Conclave on Translational Research in Healthcare, “Harnessing Next Gen AI-enabled Biotech Innovations for Sustainable Healthcare," which was supported by MHRD-SPARC, intending

to provide an excellent platform to nurture young minds towards emerging research in translational research and healthcare.

Dr. H Shakila delivering a talk on Vaccine Adjuvants

3.8 MEMORANDUM OF UNDERSTANDING (MOUS)

Dr. Swamy Mruthinti, Associate Dean and Professor, University of West Georgia, USA, visited our campus and addressed the students of the Department of Biotechnology, School of Bio & Chemical Engineering with his deliberation on "Diabetes- a risk factor for Inflammatory Diseases" on 8th July 2022. To develop academic and research cooperation, a Memorandum of Understanding (MOU) was also signed with University of West Georgia.

A Memorandam of Understanding (MoU) was signed between HUMCEN GLOBAL PVT LTD and Department of Biotechnology, School of Bio & Chemical engineering, Sathyabama Institute of Science and Technology.

Industry institution collaboration - GE - Sathyabama - Centre of excellence in healthcare - Centre of Excellence has been set up in association with GE Health care, Bangalore and Sathyabama, Chennai to develop knowledge and expertise in the domain of health science and troubleshooting of medical instruments for Biomedical Engineer

The Department of Biomedical Engineering, Sathyabama Institute of Science and Technology, has signed a Memorandum of Understanding (MoU) with ATHEENAPANDIAN PRIVATE LIMITED, Chennai, on September 15, 2022, recognising the importance of research and development in the areas of manufacturing biomedical equipment as well as industrial training for engineering and technology students. The academic and research collaboration shall encourage interactions between the engineers, faculty, and students of both organisations.

Centre for Drug Discovery and Development had signed a MOU with PREL'S BIOTECH INDIA PRIVATE LIMITED, CHENNAI, INDIA. This Collaboration will be beneficial in the area of industrially relevant microbial and enzymatic research with specific focus on reducing environmental

pollution which has a big impact on the health and wellbeing of the individual.

SDG 4 – QUALITY EDUCATION

The mission of Sathyabama Institute of Science and Technology is to provide quality education to the students and develop qualified manpower for the Nation. The Institution offers courses in Engineering, Science, Technology, Arts, Management, Dental, Nursing and Law and develops professionals.

One of the core values of the institution focuses on the on institutional social responsibility in education. Our Institution believes in Education for all. It takes pride in owning responsibility and commitment towards society by supporting the education of students from rural, economically backward communities, differently abled and acid attack victims with full Financial Assistance.

Students across India hailing from different states, speaking different languages study at Sathyabama. Students from neighbouring countries like Nepal, Srilanka and Myanmar study in the Institution. Students from low income Countries like Nigeria, Congo, and Cameroon visit our Institution for pursuing their research.

The Institution offers opportunity for free education to economically backward students. This promotes access to quality education to everyone as financial status is not a constraint. The desiring students from rural, economically backward section and first generation graduates are given 100% scholarship with free accommodation and food.

4.1 ADOPTION OF SCHOOLS

An educated society will always be a developed society. Schooling at primary and secondary level is very important and through good education poverty can be eradicated from the community. The Institution besides taking care of the tertiary or University level higher education of the needy and the downtrodden also takes care of primary and secondary level school education. It has adopted 21 Schools in the nearby community and provide all financial and infrastructure support to develop these Schools. Sathyabama also takes care of the salary of the Teachers of these adopted Schools.

Objective

To develop government schools into model schools, in terms of infrastructure, academic standards and holistic development of students

Challenges faced

- Lack of basic facilities: basic facilities like class rooms, toilets, drinking water facility and play grounds were not available in the schools. We had to fulfil these basic needs in priority over other needs and had to allocate more funds
- Very high student-teacher ratio: Less number of teachers taking care of more number of students. Our institution had to pay salaries for the additional teachers
- Inadequately motivated teachers: Due to the heavy work load the teachers lacked time and energy to perform well or motivate students. We had to encourage and motivate them
- High rates of student drop-out: Students had less interest to continue with the studies. Our Institution had to conduct several motivational programmes to teach them about the importance of education.

4.2 PROGRAMMES FOR THE ADOPTED SCHOOLS:

1.My Saturday University

Sathyabama has introduced Skill Development Courses at the University for the Government School Children under “My Saturday University” Programme The students of these schools use the Laboratories of the Institution on Saturdays so that they can learn new technologies and get equipped.

2. Science on Wheels-a mobile science laboratory

This is an initiative wherein basic physics and chemistry laboratory is set up in a bus which reaches out the school children, particularly the rural students

3.Educational and Awareness Programmes

Our students visit these schools regularly and conduct various educational and awareness programmes.

The students of Sathyabama also visit the schools, teach the students there, give them motivation and inspire them. When the school students visit the university they are given hands on training in computers and are really made to understand the importance of good education. Other than school and college students, Sathyabama aims at educating the adults in the rural areas and in the areas below poverty line with vocational courses to help them have a regular income.

Outcomes

- 21 schools were adopted and receive support from the institution. computers, Laptops, Speakers, Projectors, CCTV, Television sets, printers worth more than 2 crore rupees were provided to these schools so far.
- The Institution has spent more than 3 crore rupees towards facilities like class rooms, toilets and laboratories
- As a result of visiting the university on Saturdays students are inspired to study well and get opportunity to study free of cost in the university. Around 100 students from the adopted schools are given 100% scholarship to do higher studies at Sathyabama.

Training students and Adults from Adopted schools & villages

4.3 SKILL DEVELOPMENT CENTRE

Sathyabama Institute of Science and Technology has a dedicated Skill development Centre that conducts various value added skill development courses in association with National Skill Training Institute (NSTI), Ministry of Skill Development & Entrepreneurship (MSDE) with the objective of promoting entrepreneurship and improving the employability of the students.

The UGC has approved 10 courses/programmes under UGC NSQF (National Skills Qualifications Framework), at different levels for the students, with the aim of enhancing various skill components. The Institution offers Certificate, Diploma, PG Diploma, Advanced Diploma and Degree programmes in varied areas. These courses are offered with the objective of strengthening the students' competency level in the relevant areas. Students from other institutions and organizations also enrol in these skill development courses. Every initiative towards the re-skilling and up-skilling of students and faculty is carried out in order to meet the requirements of the industry and work in cutting edge technologies. The Institution offers certificate courses on Banking and Financial Services, Tally ACE Accounting Software, a course on Virtual reality and Augmented Reality, Instrumentation, Quality Control and Non- Destructive Testing technologies, a course on Media and Entertainment, Digital Film Making Techniques for Beginners, Construction Management, Diploma courses in "Hands on Experience in Remote Sensing and GIS" and "MEP Technology," a PG Diploma course in Computational Biology, an Advanced Diploma course in Robotics & Autonomous Machines, and a degree course in Translational Physiology and Public Health Nutrition.

Skill Development Programmes for the general public

The Skill development Centre organises and conducts various skill development and vocational education programmes to youths, who are school drop outs and rural women. These training programmes are conducted with the aim of teaching a vocation or skill to the under privileged people, so that they earn their livelihood. Women are trained in vocations like tailoring, baking, beauty and wellness, incense stick making, candle making, mushroom cultivation, sea weed cultivation and solar lamp making. Men are trained in electrical work, repairs and maintenance of home appliances, laptop servicing and plumbing. These people are also given technical and

financial support to start their own business and earn as independent entrepreneurs.

4.4 CENTRE FOR PROFESSIONAL AND CAREER ADVANCEMENT

Sathyabama Institute of Science and Technology has established a Centre for Professional and Career Advancement through which Online Certificate and Post Graduate Diploma courses are conducted. This centre works with the objective of providing a life-long learning platform for all aspiring learners in order to reskill or up skill their knowledge and become an industry-ready workforce through a systematic approach. This is an initiative to utilize the faculty expertise and the IT infrastructure available in the Institution to provide benefit to the learners across the globe by providing quality online education. This Centre is highly beneficial to students who are not able to continue with the formal college/university education as it provides Skill Based Vocational Courses and Technology Related Courses that expands the opportunities for employment.

4.5 GUIDANCE FOR HIGHER STUDIES

Sathyabama provides guidance to students for higher studies at top-notch academically and culturally affluent Universities. To prepare the students for higher studies, GRE, GMAT, TOEFL, IELTS, GATE, CAT training is offered by renowned Training Institutions. A separate and well equipped library is set up to provide study material for the students who are preparing for competitive examinations. Sathyabama's Centre for higher studies counsels and supports its students for their enrollment at Universities across the world.

4.6 JEPPIAAR IAS ACADEMY

Jeppiaar IAS Academy is one of the initiatives taken by the Institution with the objective to offer free coaching to students who aspire to become civil servants.

SDG 5 – GENDER EQUALITY

Sathyabama is an Institution that works consistently towards achieving gender equality which is one of the fundamental rights. It believes that achieving gender equality is essential for developing a sustainable community. The enrolment figures for various programmes of the Institution ensure the equal participation of girls in the education. Sathyabama, as an employer, practice positive discrimination towards employment of women. Women occupy most of the key positions in the Institution. Around 80% of the women are in top position and more than 70 % of the staff members are women. The Chancellor and the Vice Chancellor of the Institution are women.

In any committee or club or any forum, the equal representation of girls and women is a strictly followed norm at the Institution. The concept and the ideology of gender equality is deeply rooted in the core value of the Institution. Men and women have equal access to opportunities at
The Institution and equally participate in policy making and administration.

Sathyabama Institute of Science and Technology has always been an unbiased institution, merit is based on performance only. With 70 percent of the workforce being women, Sathyabama strives to set out the bias against women in developing countries like India, by tilting the scales a bit towards women. The existence to the "Women empowerment bureau' the "Anti-Discrimination Cell", 'Human rights cell', 'grievance cell' just goes to prove that the University has always been conscious in seeing that there is no discrimination based on gender.

Anbu Foundation the CSR arm of the University was started with the aim of giving free education for girls from poor families. It soon turned out that we had to also consider the boys as in some cases there is no equality when there is poverty. It is because of that, the ratio of girls to boys has been kept higher consciously.

5.1 WOMEN EMPOWERMENT BUREAU

The Aim of having the 'women empowerment bureau' and many other cells is just to be more mindful about having a balance way of dealing with Students. Staff and the society that we serve.

Sathyabama rightly believes that a society that has empowered women, and where equality exists, growth becomes inevitable.

The need for financial independence of women, especially in the economically weaker background is also emphasised and women are trained to become financially independent. Other major factor is the health. It has been found that in developing countries like India, the people who live below poverty line, especially the women tend to ignore, health and hygiene. Medical camps are held regularly in the college campus as well as in the villages and the schools that we adopted.

5.2 SEMINARS /WORKSHOPS/SENSITIZATION PROGRAMMES ON GENDER EQUITY AND EQUALITY

It has been a conscious endeavor and every occasion is used to bring awareness of gender equity. The women's day is an occasion used to send messages of gender equality.

All outreach activities, and out NSS and NCC cadets are a right mix of girls and boys. All activities are planned to include all the genders. It has been our strength that we not only preach, but also practice not only Gender equality, but equality to all of mankind, and that reflects in all the activities the University takes up for social causes.

The students participate in Gender equality seminars, webinar and many other programs, but are also made to have hands on experience while they visit villages and the schools that we adopt.

Gender sensitization programmes are held at the Institution to help students deal with gender
discrimination. These programmes also educate students about the ill effects of gender bias and other related social consequences. The Institution has a policy for promoting gender equality. In collaboration with the institution's Women's Empowerment Bureau, the departments regularly conduct programmes on gender discrimination, women empowerment, and women entrepreneurship.

5.3 MEASURES FOR THE PROMOTION OF GENDER EQUALITY

Sathyabama makes consistent efforts to promote gender equity and equality. It provides an enabling environment for female students and employees. The Institution has a Gender equity policy devised on the basic principles of respect and tolerance for everyone and facilitates gender equality. Women are encouraged to participate at all levels of the organization, including the highest levels of administration and management. Sathyabama treats everyone with respect and provides equal opportunities for growth and development.

Following are some of the measures taken to promote gender equity:

- Ensuring no discrimination in the hiring and promotion process. Sathyabama is proud to acknowledge its large pool of women employees currently serving in leadership roles as Heads of Departments, Deans, Directors, and Vice Chancellor
- Pay decisions are based on merit, performance, and grade, not gender

- Ensuring that there is no discrimination while accessing various facilities provided by the Institution
- Exclusive career counselling for female students has resulted in a significant increase in the number of girl students being offered job placements
- Conducting workshops on the prevention of sexual harassment to raise awareness among all students and staff, and to promote a safe and conducive atmosphere
- Sensitization programmes were conducted on issues related to gender equity and women's empowerment
- The Women's Empowerment Bureau organises training programmes, seminars, and workshops on gender equity for students
- The Institution's Women Empowerment Bureau has organised several programmes for female staff and students on cybercrime and crime defence mechanisms, inviting advocates and police department personnel
- Awareness programmes on the legal protections available to girls were organised for the students
- Female employees are provided maternity leave, child care leave and are also entitled to avail leave on the adoption of children
- There are a significant number of women cadets in the NCC unit
- Indoor and outdoor games for men and women, students, and staff were held on various occasions
- Internal Complaints Committee (ICC) is constituted in the Institution to deal with the complaints of sexual harassment of women staff and students. ICC works for the prevention of sexual harassment against girls by providing a support system for women employees and girls
- The daycare centre was established to support women with children and improve the work-life balance of women employees

- The Institution has installed CCTV cameras at key places in the campus for round-the-clock vigilance and to ensure the safety of women on campus
- Committees such as the Anti-Ragging Committee, Students Grievance Redressal Committee, and Internal Compliants Committee respond quickly to female students' grievances and ensure a decent and safe environment
- The Institution has female counsellors who provide counselling services to support the students with their psychological issues

5.4 GENDER RATIO AMONG SCHOLARSHIP STUDENTS

The following charts will explain the ratio of girls to boys in the scholarship scheme.

Academic Year	Boy	Girls
2021-2022	461	712
2020-2021	456	679
2019-2020	231	342
2018-2019	208	361
2017-2018	182	305

SDG6 - CLEAN WATER AND SANITATION

6.1 ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

Researches indicate that billions of people around the world do not have access to safe drinking water, sanitation and hygiene services. Thousands of people die due to diseases caused by unsafe water, sanitation and hygiene.

Sathyabama Institute of Science and Technology has taken substantial steps in meeting SDG 6(**Clean Water and Sanitation**) in terms of noteworthy research publications, innovations, capacity building programmes for students, faculties and through dissemination activities to the rural communities.

As per SDG 6.1 and 6.2, By 2030, achieve universal and equitable access to safe and affordable drinking water and access to adequate and equitable sanitation and hygiene for all. To achieve this goal several activities, innovative projects and awareness programmes were conducted**.**

Sensitization programmes are conducted for students and the public on clean water and sanitation. Series of Training programmes are conducted for young and dynamic student volunteers of NCC, NSS, Science club and Women Empowerment Cell in order to educate the rural school students and economically privileged communities to know the importance of sanitation - hygiene behavior and water use efficiency.

6.2 PROMINENT INITIATIVE TAKEN BY THE INSTITUTION

6.2.1 Rainwater Harvesting

Rainwater harvesting can be a simple solution to meet the daily water requirements and prevent the depletion of the normal groundwater level. Rainwater harvesting has the benefit of allowing excess or wasted water to be injected into the aquifer, replenishing the groundwater table. At Sathyabama rainwater harvesting facility is created, which helps in fulfilling the water requirements to a considerable level.

6.2.2 Establishment of Sewage Treatment Plant

In the state of industry collaboration laboratory facility, Sewage Treatment plant (STP) is established in the year 2019 in association with in-house Department of civil Engineering, Department of Chemical Engineering, Centre for Waste Management and Eco care Engineering Systems Pvt. Ltd to treat about 15 lakh liters of raw sewage water in a day which adopts Sequential Batch Reactor (SBR) process.

Specifications	**Details**
Freshwater requirement for campus per day	9 lakhs litres
Wastewater generated	7.5 lakhs litres
Source of Water for Treatment	Mess kitchen and hostel toilet water
Capacity of Water treatment	7 lakhs litres

facility per day	
Usage of treated water	Landscaping and gardening
Outcome	Reducing the freshwater consumption for secondary purposes

Sewage Treatment Plant at the Campus

The STP is equipped with Sensors for Automated control over the SBR design suggested and updated by the Industrial Experts. Further the STP is helpful in performing the case study experiments and research oriented activities. Periodical monitoring is also taking place in the regular interval. The treated water and sludge generated during the treatment process are well utilized for research purpose for characterizing and re usual of water and sludge.

6.2.3 Waste water management

On campus, a 1.5 MLD sewage treatment plant is being built for the proper treatment, disposal, and reuse of wastewater. The treated water is reused for gardening purposes and in toilets for flushing. The Institution has been making a great effort to decrease its water footprint by relying on recycled wastewater and water harvested during the rainy season.

6.2.4 Institution Water Audit

The Centre for Waste Management in association with WasmanPro Environmental Solutions LLP, Chennai dedicatedly involves itself in Environmental and Energy Audit for the Institution since 2018. As a part of it Water Audit is also pursued. Interviews held and Questionnaire responses collected from STP Head for waste water data covers an important aspect in the Water Audit. A walk through survey of the entire facility was conducted to identify defective fixtures and to spot water leakage/ wastage points. The walk-through survey and interacting with the staff and other concerned authorities were conducted a different intervals spanning between October 2021 and May 2022. Discussion was held with the administrative officers, pump operators, ETP/STP staff, housekeeping staff, kitchen employees, students, staffs on the various water usage done by them during the day and the related treatment aspects. Collection of records of water pumped to the overhead and underground tanks and average running hours of all pumps etc. was done to estimate actual supply and to quantify the total water intake by the Institute.The amount of water sent to water treatment unit and the quantity of water recycled and reused was also analyzed.Past records were also analyzed to get historic water usage data for baseline study purpose and to have a companion of past years and present years water footprint.Based on the findings, calculation was done on overall water usage in the campus and methods for reducing the water footprint were suggested.

The audit was conducted in various time periods spanning from October 2021 to May 2022 to get a clear picture of water consumption of the institute and the measures taken by it to reduce the wastage and decrease the water footprint.

The STP unit was also audited at several occasions to check its functionality the quality of treated water. It was found that the Institution has been using treated water from the STP for gardening and flushing which are one of the major water usage points in the educational Institution. Nearly 40 lpcd is

used for flushing in an educational Institution, this requirement is met by the treated water.

The fresh water take is used for purposes like drinking, cooking, cleaning, bathing, laboratory use etc. So the water footprint of the Sathyabama Institute of Technology is considerable less due to presence of an efficient water treatment unit and Rain water harvesting facility. So the intake water of 1191KLD per day seems adequate.

6.3 RESEARCH INITIATIVES LEADING TO PUBLICATION

By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

Research Publications which supports SDG 6 to improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

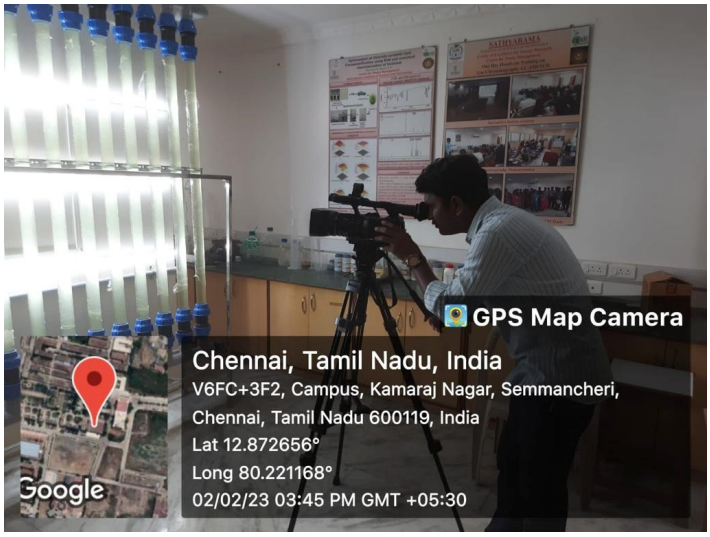
By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

Students were encouraged to undergo internships in the public water supply agencies to understand the water supply processes which is based on the needs and priorities which was evident.

6.3.1 Zero Waste Initiatives for Sustainability

A Pilot Scale Photobioreactor, an Algal Cultivation facility, has been established at the Centre for Waste Management, Centre of Excellence for Energy Research. This facility has been extensively used in investigating the various micro algal species for its potential in remediating waste waters and subsequently accumulate the inherent lipid content, so as to address the twin problems of wastewater treatment and enhance sustainable raw material availability for bioenergy production. The photobioreactor has been used in the remediation of biodiesel wash water (third cycle) for the growth of *Chlorella vulgaris, Chlorella variabilis, Nannochloropsis sp.* For induction of lipid, which can be extracted for biodiesel production.

Food Waste based Activated Carbon has been synthesized and evaluated for its efficiency in handling alkaline waters. The results have been promising and have ended up in development of an additional unit in the existing Pilot Scale Biodiesel Plant, wherein the waste water generated from the process will be treated in a Food Waste Activated Carbon Column and will be recycled for subsequent water requirement in the Biodiesel production process promoting Circular Economy.



6.4 RESEARCH PUBLICATIONS

At Sathyabama, many ongoing research addresses SDG 6 and the following are the publications with impact factor related to SDG 6:

S. NO	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
1.	Dr.S.Packialakshmi	School of Building & Environment	Associate professor	Assessing the Wastewater Pollutants Retaining for a Soil Aquifer Treatment using Batch Column Experiments	Civil Engineering journal	http://dx.doi.org/10.28991/CEJ-2022-08-07-011	4.1

2.	Dr.S.Packialakshmi	School of Building & Environment	Associate professor	An Analytical Study for Assessing Water Productivity in Pre and Post-Rehabilitation Period of Rural Tank System	Journal of Advances in Civil Engineering	https://doi.org/10.1155/2022/1119931	1.8
3.	B.Priyadharshini	School of Building & Environment	Assistant Professor	Adsorption of cadmium (Cd) and lead (Pb) using powdered activated carbon derived from Cocos Nucifera waste: A kinetics and equilibrium study for long-term sustainability	Sustainable Energy Technologies and Assessments	https://doi.org/10.1016/j.seta.2022.102709	8
4.	Priyadharshini b	School of Building & Environment	Assistant Professor	Evaluation of groundwater quality and heavy metal pollution index of the industrial area, Chennai	Physics and Chemistry of the Earth	https://doi.org/10.1016/j.pce.2022.103259	3.7
5.	Eshanthini P	School of Building & Environment	Assistant Professor	Identification of Groundwater Potential Zone in Poondi Micro-watershed, Thiruvallur, Tamil Nadu	Journal of the Geological Society of India	https://doi.org/10.1007/s12594-022-2099-6	1.3
6.	Dr. J. Premkumar	School of Bio & Chemical	Associate Professor	Effects of CuO/Al2O3/Water-WO3 nanomaterials on NETZERO energy/ emission-	Fuel	https://doi.org/10.1016/j.fuel.2023.127938	7.4

				based hydrogen generation			
7.	Dr.T.Sudhakar	School of Bio & Chemical	Assistant professor	Magnetic porous Ag2O/Chitin nanostructure adsorbent for eco- friendly effective disposing azo dyes	Environment Al Research	https://doi.org/10.1016/j.envres.2022.114824	8.3
8.	Dr.Jayshree Nellore	School of Bio & Chemical	Professor	Effects of Morpholino-mediated knockdown of the Angiotensin-converting enzyme 2 (ACE-2) on dopamine Neurogenesis and the Hypothalamic Pituitaryadrenal (HPA) Axis in Larval Zebrafish (Danio rerio)	Indian Journal of Biochemistry & Biophysics	DOI: 10.56042/ijbb.v60i5.477	1.4
9.	Dr.Y.Swarnalatha	School of Bio & Chemical	Professor	Biological Activity of Cyclic Peptide Extracted from Sphaeranthus amaranthoides Using De Novo Sequencing Strategy by Mass Spectrometry for Cancer	Biology	https://doi.org/10.3390/biology12030412	4.2
10.	Dr. P. Grace Kanmani Prince	School of Bio & Chemical	Associate Professor	Deep belief network Assisted quadratic logit boost classifier for brain tumor	Biomedical Signal Processing and Control	https://doi.org/10.1016/j.bspc.2022.104415	5.1

				detection using MR images			
11.	Dr.H.Jemmy christy	School of Bio & Chemical	Assistant Professor	Hydrogen-bonded keto-enol mechanized chalcone material for optical and antibiofilm applications	Journal of Molecular Structure	https://doi.org/10.1016/j.molstruc.2023.136109	3.8
12.	Dr.Prakash P	School of Bio & Chemical	Assistant Professor	Evaluation of the Toxic Effect of Bauhinia purpurea Mediated Synthesized Silver Nanoparticles against In-vitro & In-vivo Models	Toxics	https://doi.org/10.3390/toxics11010009	4.6
13.	Dr.Prakash P	School of Bio & Chemical	Assistant Professor	Cardio protective activity of Sargassum wightii on isoproterenol induced myocardial stress in rats	Indian Journal of Geo Marine Sciences	DOI:10.56042/ijms.v51i05.65572	0.5
14.	Dr.D.Prabu	School of Bio & Chemical	Associate Professor	A Review on Cassava Residues as Adsorbents for Removal of Organic and Inorganic Contaminants in Water and Wastewater	Journal of chemistry	https://doi.org/10.1155/2023/7891518	3
15.	Dr.V.Meenakshi	School of Electrical & Electronic	Associate Professor	Impact of the combined effect of seawater exposure with	Environmental Research	https://doi.org/10.1016/j.envres.2023.116300	8.431

		s		wastewater and Fe2O3 nano particles on Chlorella vulgaris microalgae growth lipid content,biochar, & bio-oil production			

6.5 INNOVATION WHICH ARE STRONGLY SUPPORTING SDG 6

S. No	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published Date	Granted Date
1	202241036037	A Deep Root Watering System	Sathyabama Institute of Science and Technology - Dr. S Jackson Durairaj and Dr Kunal Biswas	Published	23/06/2022	01/07/2022	
2	201641037331	Compact Sensor System For Train Compartment Wash Basin Water Recovery	Sathyabama University - Dr. S S .Dawn, Mr. Ankit Kumar, Mr. Akash Dutta, Dr. Poornapushpakala, Dr. S. Barani	Granted	01/11/2016	04/05/2018	09/05/2023 Patent No: 431354

S. No	Patent Number	Patent Title	Applicant Name	Current Status	Filed Date	Published Date	Granted Date
	202241036024	A Method for Producing Biosorbent to Remove Heavy Metals in the Water	Sathyabama Institute of Science and Technology - Dr D Prabavathy	Published	23/06/2022	01/07/2022	

6.6 CSR INITIATIVES RELATING TO SDG 6

Students of Sathyabama involved involved in Lake Cleaning

SDG 07 - AFFORDABLE CLEAN ENERGY

7.1. GLOBAL SCENARIO IN CLEAN ENERGY

Energy plays a vital role in the Sustainable Development Goals (SDG) from increasing access to electricity, to improving clean cooking fuels, from reducing wasteful energy subsidies to curbing deadly air pollution. One of these goals which is projected under SDG 7 aims to ensure access to affordable, reliable, sustainable and modern energy for all by the end of the next decade.

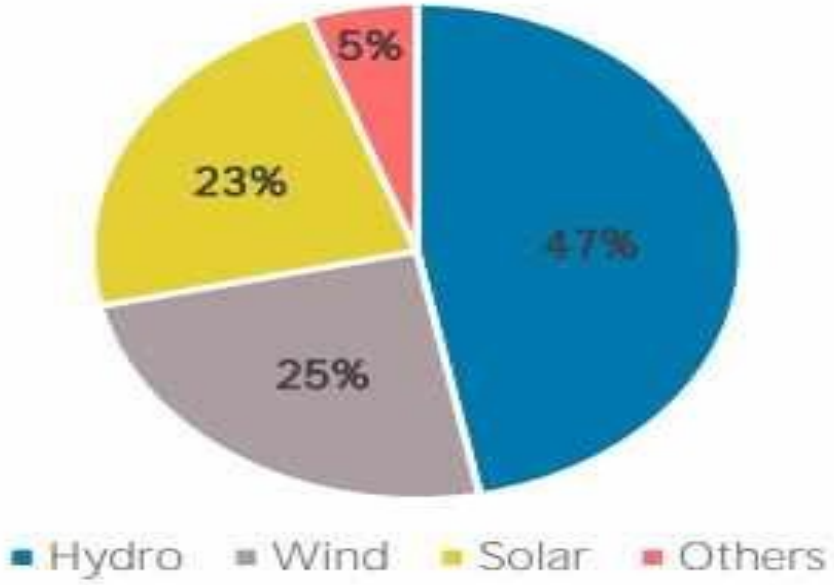
The important disadvantage present in the energy production from fossil fuels is the emission of about 60% of global greenhouse gas. While some 17% of energy consumption is now met with renewables, the Intergovernmental Panel on Climate Change warns that this needs to reach around 85% by 2050 to avoid the worst impacts of climate change. Over 50% of our global population lives in cities. They are also responsible for around 70% of global energy related emissions. They are on the frontline of both climate impacts and the transition to a sustainable future for all.

Greater investment and policy support for distributed renewable solutions including solar lanterns, household rooftop solar panels and mini-grids powered by wind, water or sun is the fastest, cleanest, and most affordable way of achieving energy access.

The renewable energy sources (RES) such as solar, wind and hydel have significant potential to contribute to the economic, social and environmental energy sustainability of the globe. They improve access to energy for most of

the population, they also reduce emissions of local and global pollutants and they may create local socioeconomic development opportunities.

According to the International Renewable Energy Agency(IRENA) report, Solar and wind energy continued to dominate renewable capacity expansion, jointly accounting for 90 per cent of all net renewable additions in 2019. In 2019 the global renewable generation capacity amounted to 2,537 GW where hydropower accounted for the largest share of the global total, with a capacity of 1,1190GW.



Wind and solar energy capacities were at 623 GW and 586 GW, respectively. Whereas, other renewables included 124 GW of bioenergy, 14 GW of geothermal plus, and 500 MW of marine energy. Asia accounted for 54 per cent of new capacity in 2019, increasing its renewable capacity by 95.5 GW to reach 1.12 TW which is about 40% of the global total. Asia continued to dominate global solar capacity expansion with 56 GW increase, about 60 % of the total in 2019, but this was lower than in 2018. China, India, Japan, Republic of Korea and Vietnam added most new capacity in 2019 as per IRENA report.

7.2. INDIA'S PERFORMANCE IN CLEAN ENERGY

Several millions of people in India do not have access to reliable, affordable electricity and they are often forced to use to kerosene, charcoal and diesel in order to fuel their lives and thus polluting our environment with large amount of greenhouse gases. Also, the utilization of centralized power production from fossil fuels and nuclear energy, grid distribution, and long-distance transmission pose great difficulty to provide clean electricity to far off villages and hilly areas.

India has made a commendable progress in the new and renewable energy production. India is very ambitious in its targets for promoting renewable energy. In India, renewable energy has started playing an increasingly important role in the augmentation of grid power, providing energy access, reducing the consumption of fossil fuels and helping India to pursue its low carbon development path.

India's renewable capacity installations reached 86 gigawatt (GW) at the end of the year 2019 with wind energy became the biggest contributor with 44 % share in the total renewable energy mix followed by solar with 39 % share. According to the **Ministry of New and Renewable Energy,** Government of India, stands now at 5th Global position for overall installed renewable energy capacity.

The renewable energy has a share of 23.39% in the total installed generation capacity (370GW) in the country up to February 2020. Especially in the last 5-6 years, the solar capacity has been increased from ~2.6 GW to more than 34 GW. Our Indian Government has reduced the solar tariff more than 75% to meet the energy demand. India also embarked upon in setting up world's largest renewable energy programme for ~17 GW till 2022.**Ministry of New & Renewable Energy (MNRE)** is the nodal agency at the central level for promotion of grid-connected and off-grid renewable energy in the country. Ministry's programmes are implemented in close coordination with State Nodal Agencies (SNAs) for renewable energy (RE).

Over the period, the SNAs have developed considerable knowledge and experience in planning and implementation of RE programmes. India is working towards achieving the goal of installing 175 GW of renewable power capacity by 2022 by setting a new target to increase the country's share of non-fossil-based installed electric capacity to 40 % by 2030. With a radical new approach, India is very confident to provide energy access to all people by 2030.

7.3. STATUS ON THE CLEAN ENERGY PROGRAMME AT OUR INSTITUTE:

7.3.1Establishment of Centre of Excellence for Energy

Recognising the importance of the clean energy as one of the primary sustainable development goals, **Sathyabama Institute of Science and Technology** has been focussing its R&D efforts in developing and demonstrating new energy materials and lab scale modules for the sustainable energy production and storage technologies such as solar photovoltaics, solid oxide fuel cells, super capacitors and photocatalysis. The institute has established "**The Centre of Excellence for Energy Research (CEER)** funded by the Ministry of Human Resource Development (MHRD), Govt. of India under the scheme of Centre of Excellence in the Frontier Areas of Science and Technology (FAST). It was inaugurated by His Excellency Dr. A. P. J. ABDUL KALAM, Former President of India on December 9th, 2014 in the august presence of Col. Dr. JEPPIAAR, Founder and Chancellor of the Sathyabama Institute of Science and Technology.

7.3.2 Aim and Objectives

programs. The Centre organizes workshops/conferences for students, researchers, academic staff, and scientists in India to further strengthen their expertise in the areas of energy research, to accelerate the India's human development index and to provide energy security.

The Centre is established in the International Research Centre (IRC) with facilities such as Raman Spectroscopy (Renishaw inVia Reflex Raman spectrometer), DEKTAK profilometer from (Bruker, USA), Potentiostat,-Galvanaostat with Impedance Analyser (Biologic, France), Hall Effect measurement system (Ecopia, South Korea), Raman Spectroscopy (Renishaw, United Kingdom), UV-Visible Spectroscopy (Jasco Analytical Instruments), 50L Biodiesel Pilot plant (Malnad Extraction Industries Bangalore, India), and Gas chromatography (YL Instrument South Korea). The major research laboratories established are Photovoltaics, Surface Physics, Energy Materials, Materials Chemistry, Materials Processing and Bio fuels.

7.3.3 Activities for the Promotion of Clean Energy

The Institute engages itself in several clean energy production and storage related projects in order to reduce the carbon emission. It renders the necessary support to cater to the needs of the Government bodies such as MHRD, ISRO etc. (please see Table 1). The scientists and research scholars are deeply involved in the development of heterojunction solar cells, perovskite based solar cells, intermediate temperature solid oxide fuel cell, oxide and nitride-based supercapacitors for energy production and storage. They have fabricated lab scale devices with advanced materials and have planned to upgrade the power capacity of the devices in future (please see the Table 2). Research is also in progress in the production of hydrogen using titanium oxide as photocatalyst for water splitting.

impact International Journals (Please refer the list of publications- Attachment 1). Because of the excellent contact through Faculty and Student Exchange Programme with reputed foreign institutes, our researchers have contributed significantly to update the clean energy programme and our Institute also has signed MoUs with Foreign Institutes who work on clean energy (Please see the attachment-3). Our Institute pays keen attention to organize Workshops, National and International Conferences on energy production and storage (Please see the attachment - In order to create awareness among research scholars, several Training/Orientation programmes were periodically conducted (Please see the photographs).

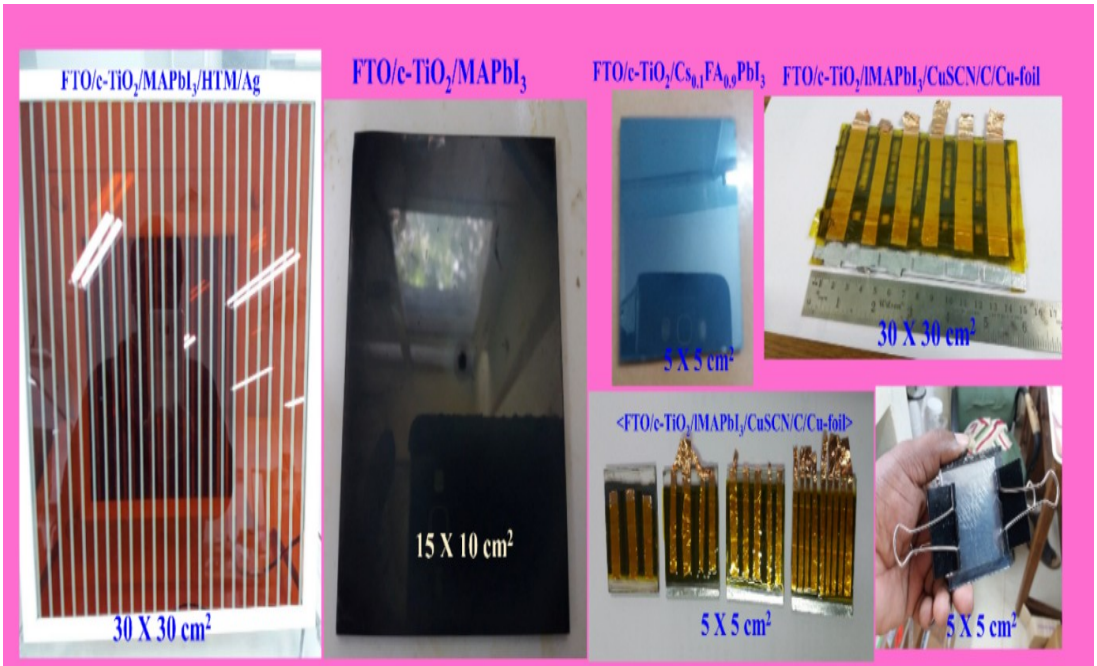
Support Materials

Table1: SANCTIONED PROJECTS

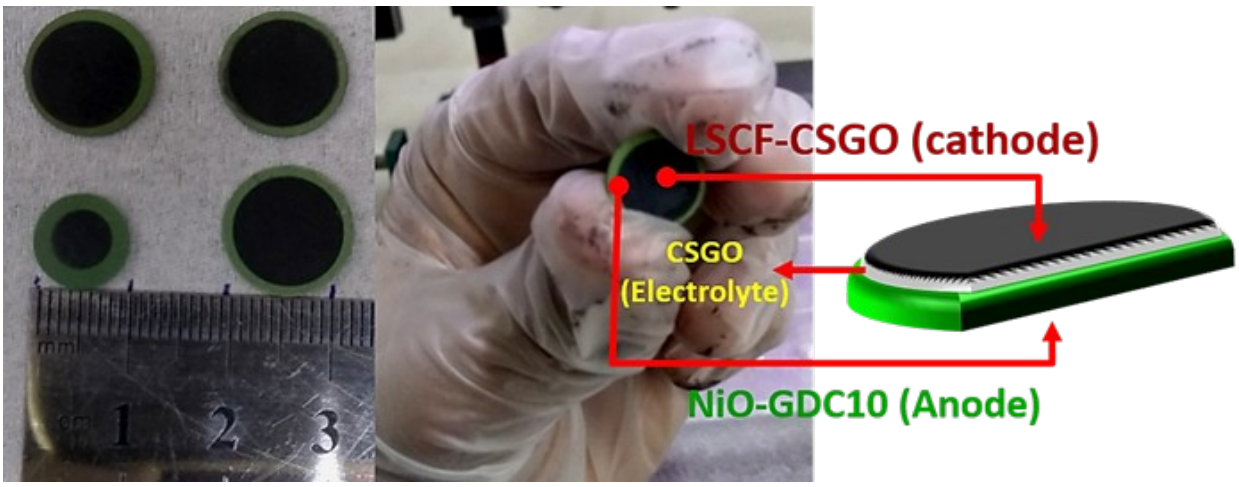
S. No.	Project title	Principal Investigator	Funding agency	Total fund (Rs.)	Duration & Status
1.	Development of Morphology-Controlled Transition Metal Sulfides Supported on Carbon-Based Materials as Advanced Electrodes for Supercapacitor Applications	Dr. J. Theerthagiri	ISRO	14,92,000	2019-2021 (Ongoing)
3.	Centre of Excellence for Energy Research (CEER)	Dr. T. Sasipraba Dr. P. Kuppusami, Dr. T.S. Shyju, Dr. S.S. Dawn	Ministry of Human Resource Development	2,50,00,000	2014-2018 extended till 2021

Table 2 Various Kinds of Devices Fabricated /Installed in Our Institute

Device	Power Output 2020	Power Output 2021
Heterojunction Oxide Solar Cells (Lab scale)	3 W	10 W
Thin Film Solar Cells (Lab scale)	10W	20W
Perovskite Solar Cells (Lab scale)	0.1W	5-10 W
Si based Solar Cell panels	10kW	50-100 kW
Ceria based SOFC	0.3W	1W



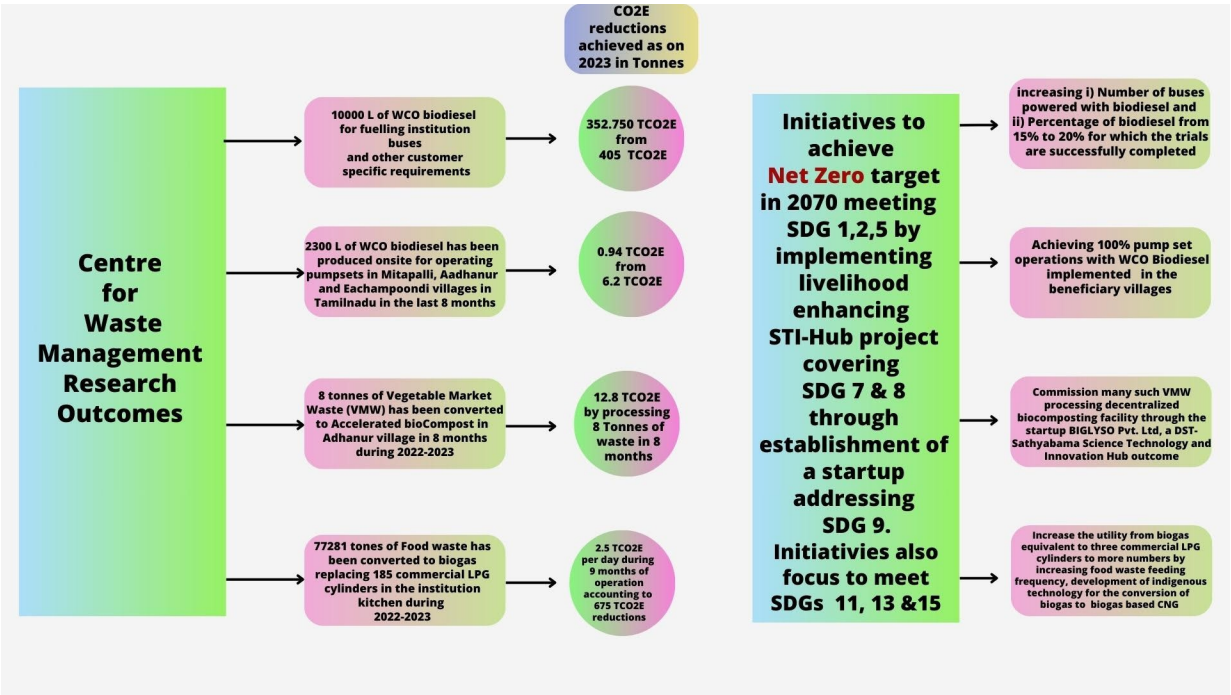
Developed Large-Area Perovskite Solar cells



7.3.4 Biofuel Research and Implementation of Technologies

Centre for Waste Management, Centre of Excellence for Energy Research (Bioenergy) has been involved in bioenergy/biofuel research since 2014 with waste as a substrate for energy production.

Climate Change remains a threat and Renewable energy sources including solar and wind energy have contributed to the global energy demand. While this energy gap is attempted to be filled, reduction of greenhouse gas emissions by the conversion of industry and urban waste to energy are simultaneously getting popularized to reach the Net Zero target by 2050 globally and by 2070 in India. In line with this the research pursued in the Centre for Waste Management completely focusses on diversion of organic waste (both liquid and solid) more specifically waste cooking oil to biodiesel; agro waste to biochar for nutrient supplementation; vegetable market waste for accelerated biocompost; food waste to biogas; ritual waste to incense sticks. These initiatives have contributed to circular economy and reduction of CO2E (Carbon dioxide emissions represented as Tonnes CO2E). The Centre has contributed in achieving CO2E reductions as detailed below through its research initiatives.



Waste Cooking Oil to Biodiesel: The Centre has successfully taken initiatives to translate the research into implementation as the team has set a Pilot Scale Biodiesel Production facility that can handle 100 L of waste cooking oil if operated in two batches per day for the production of second-generation biodiesel with high brake thermal efficiency and lower emissions. Through the Science Technology and Innovation Hub established at Kattumannarkoil C,D block, Cuddalore District, with the support of Department of Science and Technology, Government of India, Sathyabama Institute of Science and Technology has succeeded in taking the lab outcomes to the society for livelihood enhancement. A pilot plant for biodiesel production ha also been house at the project site and about 250 beneficiaries have been trained to produce biodiesel. They have been trained in source/raw material collection, production, refining, product quality assessment, sales and marketing by the investigating team of the institution.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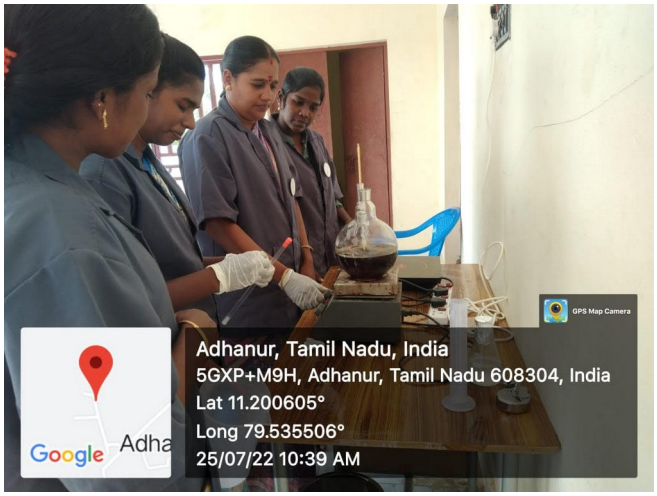
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The biodiesel produced in the institution premises is used regularly for operating five of the institution buses in blends with diesel on a regular basis, while the produced in the project site is sold for genset, pumpset and heavy vehicles' (lorries) fueling. Sathyabama is looking forward to integrate the source to enhance the biodiesel production rate.

Algal Oil to Biodiesel: Third generation sources are also proven as a sustainable raw material for the production of biodiesel. A team in the institution is extensively working on the algae cultivation and extraction facility for the separation of the lipid from the algal biomass for biodiesel production. A study has been demonstrated to prove the effective use of algae based biodiesel in colder conditions owing to its excellent cold flow properties, a technique which has been patented and published by the scientific team.

Agro-waste to Bioethanol: A team has studied different agro-wastes combinations for the cellulose improvement in the biomass adopting various

pretreatment techniques. Soon a Pilot Scale fermentation facility to produce bioethanol with membrane distillation technology for high purity bioethanol recovery will be established.

Agro-waste biochar for briquette applications: Not all agro waste are found suitable for bioethanol production. Agricultural waste is so heterogeneous and plentiful that they can be diverted for numerous applications. Hydrothermal Reactors have been set up to study the conversion rate of different biomass into biochar and subsequently valuated. On the basis of the calorific value of the char obtained developments are initiated in briquetting of the agro-waste based biochar as a replacement to solid fuels (coal) in specific energy/power sectors.

Food waste to Biogas: The institution has a 1 Tonne capacity anaerobic digestor that converts anaerobically the food waste generated into biogas. On an average about 500 to 700 kg of food waste converted daily and three commercial LPG cylinders are getting replaced. Sathyabama is looking for an expansion of this facility and the scientific team has been encouraged to involve committedly for the establishment of BioCNG in the institution.

7.4 ENERGY MANAGEMENT POLICY

The overall goal of the energy efficiency and clean energy policy is to stimulate energy efficiency programmes to promote sustainable development in the university premises.

The main objectives of the affordable and clean energy policy are to:

- Improve energy security by making the most of current local energy sources,
- Utilization of solar and wind hybrid system power (Roof-top) the laboratory thereby reducing dependence on conventional power.
- Use of solar lamps to light the walkways and common utility areas such as Playground, Street lights in the campus, Building corridors, etc., in the night time.
- Utilize energy resources effectively by implementing cutting-edge technologies.
- Develop high purity, homogeneous and nanoscale materials for several photo-electrochemical applications such as chemical/gas sensors, energy storage, tribological, oxidation and corrosion resistant, water-splitting and photodetector applications.

Establish a framework for the energy regulator to promote the supply of renewable energy

Encourage the efficient use of renewable energy, and assess the levels of energy performance.

Timer controlled devices (sensors) will be installed, in the classrooms, halls, administrative offices, restrooms, playground, street lights in the campus, building corridors, etc.,

Restriction of personal vehicle inside the campus enhancing reduction of carbon foot prints and to meet zero-carbon campus.

Use of battery-operated vehicles to commute inside the university premises

Provide guidelines for obtaining universal access to cost-effective energy.

- Conduct routine internal energy audits, energy management to find potentialfor energy conservation. Promote the faculty members as a certified energy audit.
- Encourage energy conservation awareness among diverse societal groups.
- Train the academics, non-teaching staff, students, and housekeeping staff to make the Institute a pioneer in energy conservation.

Increase the utilization of renewable energy with the installation of a grid-interactive solar photovoltaic system on campus.

Maintenance and replacement of other lights/lighting fixtures with LEDs on a regular basis

Encourage students to complete undergraduate and graduate-level projects on energy management, energy optimization techniques, and renewable energy harvesting to raise awareness of energy use and its cost. The Policy is reviewed on a regular basis.

7.5 PUBLICATIONS

Training Programmes Conducted

S. NO	Name of the Faculty, Department, Designation	Title of the Paper	Name of the Journal	DOI	I. F
1	Balasankar Karavadi, School of Bio & Chemical, Associate Professor	Enhanced waste cooking oil biodiesel with Al2O3 and MWCNT for CI engines	Fuel	https://doi.org/10.1016/j.fuel.2022.126429	7.4

S. NO	Name of the Faculty, Department, Designation	Title of the Paper	Name of the Journal	DOI	I. F
2	Dr. M. Karthikeyan, School of Bio & Chemical, Assistant professor	Synthesis and characterization of barium doped CaO heterogeneous nanocatalyst for the production of biodiesel from Catharanthus roseus seeds: Kinetics, optimization and performance evaluation	Environmental Research	https://doi.org/10.1016/j.envres.2023.115336	8.3
3	Sathish, School of Bio & Chemical, Associate Professor	Effective utilization of azolla filiculoides for biodiesel generation using graphene oxide nano catalyst derived from agro-waste	Fuel	https://doi.org/10.1016/j.fuel.2022.125412	8.035
4	Dr V Balamurugan, School of Electrical & Electronics, Associate Professor	Sustainable Multipath Routing for Improving Cross-Layer Performance in MANET Using an Energy Centric Tunicate Swarm Algorithm	sustainability- MDPI	https://doi.org/10.3390/su142113925	3.9
5	Dr N R Krishnamoorthy, School of Electrical & Electronics, Associate Professor	Machine learning algorithms for a diesel engine fuelled with biodiesel blends and hydrogen using LSTM networks	Fuel	https://doi.org/10.1016/j.fuel.2022.126292	8.035
6	Dr. N. Nirmala, Centre for Waste Management, Scientist – C	Technical insights of microalgae derived bio-diesel on its performance and emission characteristics, techno-economics and practicability huddles	Fuel	https://doi.org/10.1016/j.fuel.2023.128744	7.4

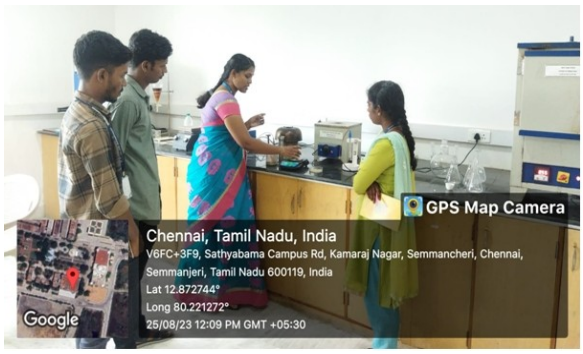
S. NO	Name of the Faculty, Department, Designation	Title of the Paper	Name of the Journal	DOI	I. F
7	Dr. N. Nirmala, Centre for Waste Management, Scientist - C	A review on biological biohydrogen production: Outlook on genetic strain enhancements, reactor model and techno-economics analysis	Science of the Total Environment	http://dx.doi.org/10.1016/j.scitotenv.2023.165143	9.8
8	Dr. J. Arun, Centre for Waste Management, Assistant professor (Research)	Processing of marine microalgae biomass via hydrothermal liquefaction for bio-oil production: study on algae cultivation, harvesting, and process parameters	Biomass conversion and biorefinery	https://doi.org/10.1007/s13399-022-03446-5	4
9	Dr. J. Arun, Centre for Waste Management, Assistant professor	Influence of biomass and nanoadditives in dark fermentation for enriched bio-hydrogen production: A detailed mechanistic review on pathway and commercialization challenges	Fuel	https://doi.org/10.1016/j.fuel.2022.125112	8.035
10	Dr. Dawn S S, Centre for Waste Management, Professor	Application of deep eutectic solvent in biodiesel reaction: RSM optimization, CI engine test, cost analysis and research dynamics	Fuel	https://doi.org/10.1016/j.fuel.2021.121933	8.035
11	Dr. N. Nirmala, Centre for Waste Management, Assistant Professor	Optimization OF Chlorella variabilis MK039712.1 lipid Transesterification using Response Surface Methodology and analytical characterization of biodiesel	Renewable Energy	https://doi.org/10.1016/j.renene.2021.07.123	8.634

S. NO	Name of the Faculty, Department, Designation	Title of the Paper	Name of the Journal	DOI	I. F
12	Dr. N. Nirmala, Centre for Waste Management, Assistant Professor	Structural and compositional evaluation of WasteCooking Oil – Algal Oil Biodiesel using FTIR and GC- FID for improved fuel properties”	World Review of Science, Technology and Sustainable Development	https://doi.org/10.1504/WRSTSD.2021.114686	

Training Programs for scholars, School Students and researchers

Orientation Programmes conducted for students and faculty

Centre of Excellence for Energy Research is involved in training and Capacity building and conducts series of training programmes in Biodiesel, Bioethanol and Biogas Production. In the last five years about 1000 students and 50 industry experts have been trained throught he various programmes conducted.



7.6 OUTREACH PROGRAMMES

Centre for Waste Management, Centre of Excellence for Energy Research jointly with Centre for Aquaculture Sathyabama Institute of Science and Technology organized "An Awareness Programme on "Popularization of Biodiesel for Fueling Fishing Boats" commemorating World Biofuel Day on 10th August 2022 at Tsunami Quarters Karikkattukuppam Muttukadu. Dr. M.V. Rajeswari, Assistant Professor (Research), Centre for Aquaculture co-ordinated the program. 25 fishermen returning after fishing enthusiastically participated the programme. Dr. Dawn S.S , Professor (Research) Centre for Waste Management, explained about the various initiatives of the centre. The importance of biofuel and its role in Climate resilience was explained.

Fishing boat fuel (Diesel) requirements per boat, frequency of fishing in a year and related information were gathered by the research team for further studies. The scheme of producing biodiesel from waste cooking oil and its benefits from environment, economy and efficiency points of view were explained. The participants were encouraged to fuel the boats with biodiesel in blends with diesel gradually from 1% - 10%. They showed keen interest and involvement in blending biodiesel with diesel and using the blends in their boats. The program ended with handing over of biodiesel to the fishermen as an encouragement to fuel their boats. The fuelling of the boats with biodiesel blends was announced and the participants eagerly welcomed the event planned to be convened on 17th August 2022.

Centre for Waste Management, Sathyabama Institute of Science and Technology organized a "Waste Cooking Oil Collection Drive " commemorate National Safety Day on 4th March 2022, elucidating Food Safety. The Scientific team started the drive from the institution campus and covered the Sozhinganallur and Medavakkam stretch covering about 5 kms. The team approached Ponnusamy Hotel, Salem R R Briyani, Hotel Ramanaa's and Sundari Restaurant. The team highlighted their focus on collecting the waste cooking oil that is generated during the frying operations in their restaurant. The health impacts posed by the Waste Cooking Oil reuse for frying and cooking were explained and how they will be playing a major role in prevention of health hazards by giving the used cooking oil to the centre for waste management who are in turn using it to produce biodiesel. The environmental hazards of throwing away the waste cooking oil into sewer lines and on landfills were also explained creating an awareness on both food and environmental safety by diverting the much-generated waste cooking oil for biodiesel production. The drive was completed with an agreement from the hotels and restaurants a major portion of their waste cooking oil to Centre for Waste Management, Sathyabama Institute of Science and Technology. As a consequence of the drive, the centre will be getting waste cooking oil from the restaurants apart from the volume of waste cooking oil it has been receiving from the institution's mess that caters to the food needs of about ten thousand inmates on an average daily. This initiative was taken up to create an additional awareness of how the waste

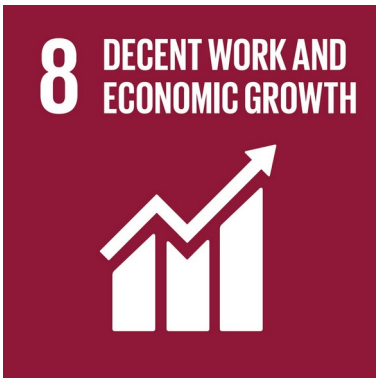
cooking oil can alternately generate revenue by selling it away to organizations which hold a Repurpose Used Cooking Oil (RUCO) certification, who in turn will convert into Biodiesel.

Energy Audit: The institution also is involved in periodic energy audit to assess the energy requirement and how the conventional energy source utility is. The replacements with alternate energy sources is also slowly expanding in the institution.

7.7 RESEARCH COLLABORATION

1. University of Hyogo, Japan – ***Perovskite Solar Cells.***

2. Indian Institute of Madras, Chennai, India - ***Storage applications***.
3. CSIR-Central Electrochemical Research Institute (CSIR-CECRI) - ***Sensor and Storage applications.***
4. Technological Development Unit (UDT), University of Concepcion, Coronel Industrial Park, Coronel, Chile - ***Water splitting applications.***
5. Institute of Natural Science and Mathematics, Ural Federal University, Yekaterinburg 620002, Russia - ***Development of new magnetic materials.***
6. King Saud University, Kingdom of Saudi Arabia – ***Photocatalytic Applications.***
7. National Dong Hwa University, Taiwan**- *Solid oxide Fuel Cells* te** against the developing research solutions and innovative technology• delivering behaviour change through instilling low-carbon values and habits in our students.



SDG 08 DECENT WORK AND ECONOMIC GROWTH

8.1 PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL

The University is committed to long-term goals that ensure creating, promoting and delivering opportunities that enhance the employability of suitable talent and students. Generating a sustainable pipeline of talent, providing access to the right tools and support for employees by giving individuals the platform to excel is critical to the long-term success of the university and its vital contribution to the community.

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all The full productive employment strategy is framed around developing and implementing simple and consistent processes and systems; supporting the evolution of the workforce, their engagement and wellbeing. The employment policies and practices are legally compliant and have enabled the University in retaining employees and sustaining its position as a fair employer since inception.

8.2 GRADUATE EMPLOYABILITY

The graduates of Sathyabama Institute of Science and Technology are sought after employees, as reflected in the University's ranking in NIRF (INDIA) and the QS Graduate Employability Rankings.

The University plays an important role in employment of graduates and job creation in India and across the world. Commercialization of the research findings of researchers has a high impact on the employment and entrepreneurial ventures of graduates whose growth and survival rates are above the national average.

8.3 STUDY PROGRAMMES

The robust Curriculum design of the University, accredited by National and International Agencies has promoted creation of responsible and ethical citizens. Global initiatives by the UN to promote Corporate Social Responsibility, Sustainable, Green Engineering and Management solutions are being meticulously disseminated through teaching-learning and research practices of the university. Periodic technology upgrades, innovation management and value added courses in the diverse disciplines have paved way for jobs which increase economic productivity.

Special focus on entrepreneurship, creativity and innovation is provided through Technology Business Incubators supported by the Department of Science and Technology (GOI) and Micro, Small and Medium Enterprises

(GOI). Approaches fostering mission-oriented, inclusive, social innovation and digitally enabled innovation for sustainable development and growth of formal MSMEs with access to financial services have been enthusiastically acknowledged by various stakeholders.

8.4 INFORMAL STUDENT EMPLOYMENT INITIATIVES

The "**Earn while you Learn Programme"** launched from 2010 to offer interesting and varied career opportunities for students during their study period is a sought after initiative as it provides opportunities for skill development and work experience. Conscious contribution to basic literacy and open access to existing scientific and technological information, flexible intellectual property rules that allow fair use of physical spaces, online tools with hands-on learning and open repositories of scientific and technological knowledge is being practiced to achieve full and productive employment and decent work for all women and men including young people by 2030.

8.5 INTEGRATION OF PERSONS WITH DISABILITIES

With increased attention to the principle of inclusive education for students with disabilities, systematic measures for the conditions in higher education have been incorporated. A transparent, fair and effective method of financing education through specific grants is in practice. Promoting and supporting integration of persons with disabilities through impartial standards regarding equal pay for work of equal value is the motto of the university.

8.6 EDUCATIONAL EQUITY AND COMMUNITY DEVELOPMENT

Shared accountability and coordinated services integration in education, health and livelihood promotion has led to joint development and welfare of the local community. Various skill Development and Capacity Building programmes for poverty alleviation, promotion of small businesses, financial security, health and hygiene, physical and psychological wellbeing, literacy and safety of individuals for both men and women are being provided for

economic inclusion and building up the local community and create assets and wealth for sustainability.

8.7 STRATEGY FOR ECONOMIC EMPOWERMENT

The series of reforms and enablers of the Government in the Economic package to make India Atmanirbhar and measures for relief and credit support to businesses, especially MSMEs to support Indian Economy's fight against COVID-19 have been followed to address rural and urban employment generation activities. The startups initiated at the university have been supported to contribute efficiently to the labour market with a distinct focus on inclusive and indiscriminative approach towards equity and sustainability.

SDG 09 INDUSTRYY INNOVATION AND INFRASTRUCTURE

Creativity and innovation are new drivers of every nation's economy. Innovations is important to an organization as much as Quality. In the NIRF Innovation Rankings 2023, the Institution is placed in the band 51–100 among all the Institutions in India. We have conducted seminar, workshop, conference on regular focused towards innovations, Intellectual Property rights (IPRs), Creativity, Product Design and Development, Design Thinking, System Thinking and Conceiving — Designing — Implementing — Operating – (CDIO).

9.1 PROGRAMMES ON INTELLECTUAL PROPERTY RIGHTS/DESIGN THINKING

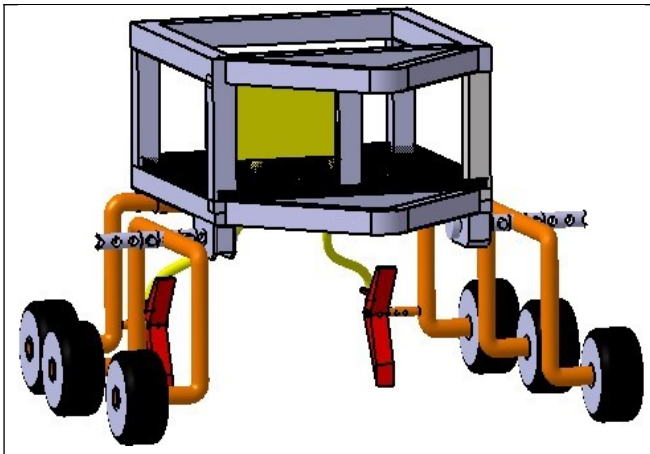
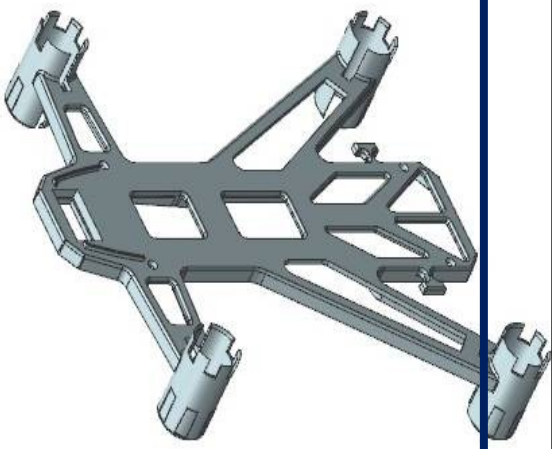

What is Intellectual Property (IP)?
SATHYABAMA


SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
www.sathyabama.ac.in
SATHYABAMA INSTITUTION INNOVATION COUNCIL
ORGANIZES
A WORKSHOP ON
DESIGN THINKING,CRITICAL THINKING AND INNOVATIVE DESIGN
Date: Feb 14, 2022
Time : 5.30P.M to 06.30P.M
RESOURCE PERSON
Registration link: t.ly/GOqB
Platform:ZOOM
FACULTY COORDINATORS
DR. A.SIVASANGARI
IIC INNOVATION COORDINATOR
MS.D.DEEPA
IIC MEMBER
Dr.Karthiya Banu,Ph.D
Founder & CEO
Inspire Softech Solutions
Chennai


DESIGN THINKING
Nybble – World's Cutest Open Source Robotic Kitten

Centre of Excellence for Collaborative Product Design and Development (CPDD)

The creation of real product is an important for commercializing technologies arising from R&D at technical institutions. For example, conversion of a Bolt & Nut from design into product requires 4-8 weeks. The master pattern can be selected only after testing the design of 34 patterns. That master pattern is used for production. Using Rapid prototyping we can select the master pattern in 4-8 hours. The Rapid prototyping requires construction of a mini plant. Institutions mostly lack of mini plant. Most of the Engineering Institutions have keeping Computer Aided Design Lab in different Location and Additive Manufacturing Laboratory (3 D Printer Lab) in different location. In this Situation, Design to Reality is very difficult. In Sathyabama Institute of Science and Technology, we are Integrated Computer Aided Design Lab and Additive Manufacturing Laboratory and developed new centre name as **Centre of Excellence for Collaborative Product Design and Development (CPDD).** Through this CPDD, we have developed more than fifty products in the year 2019. Sathyabama have more than 20 successful patent/non patent technology transfer.

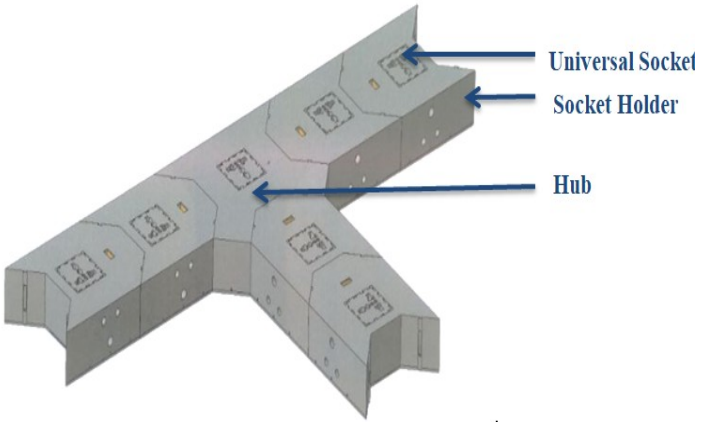
	
Multipurpose Agricultural Robot; Grant No: 317206-001, Grant Date: 26/04/2019	Base Plate for Unmanned Aerial Vehicle, Grant 316200-001, Grant Date: 29/03/2019
	
Vertical Axis Wind Turbine Using Gorlov and Savonius Blades for Water Pumping System; Grant No : 294063	Tube Muffler for Light Motor Vehicle; G No :304750

Sathyabama is one of the top Indian Industrial Design (Design Patents) grant institutions in India. A growing trend in Intellectual Property Rights with Design Patents grants and Patents Published in effect moving responsibility for innovations.

IPRs	2017	2018	2019
Grants	7	4	63
Published	25	14	XX

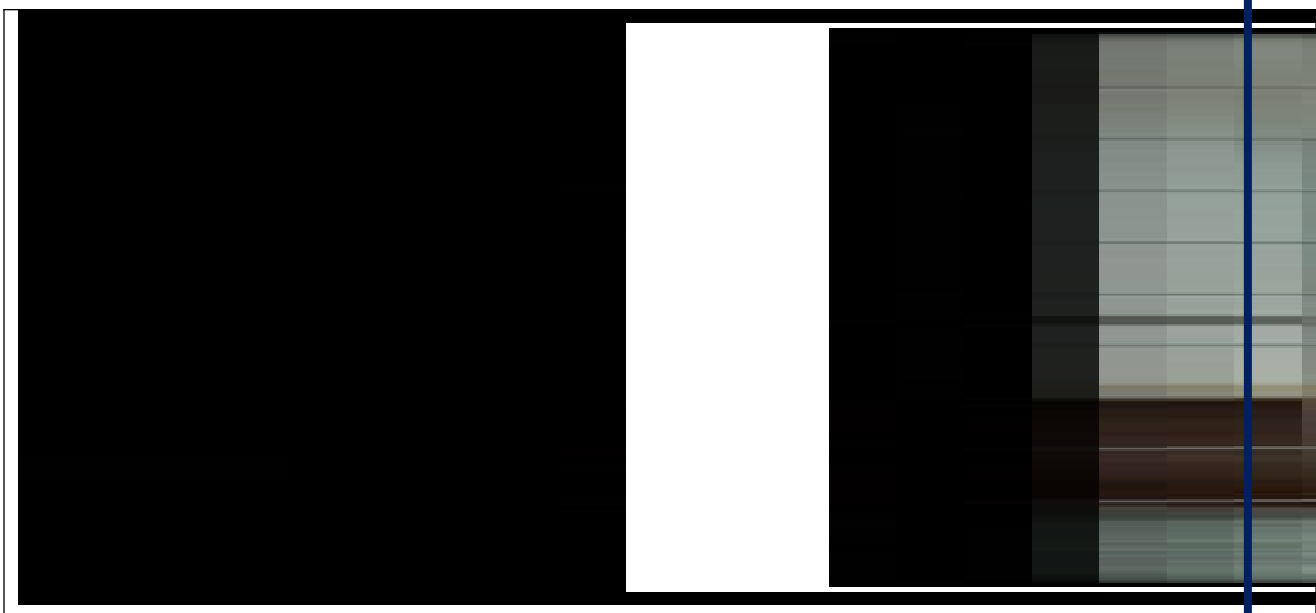
Product: Extension Power Cord

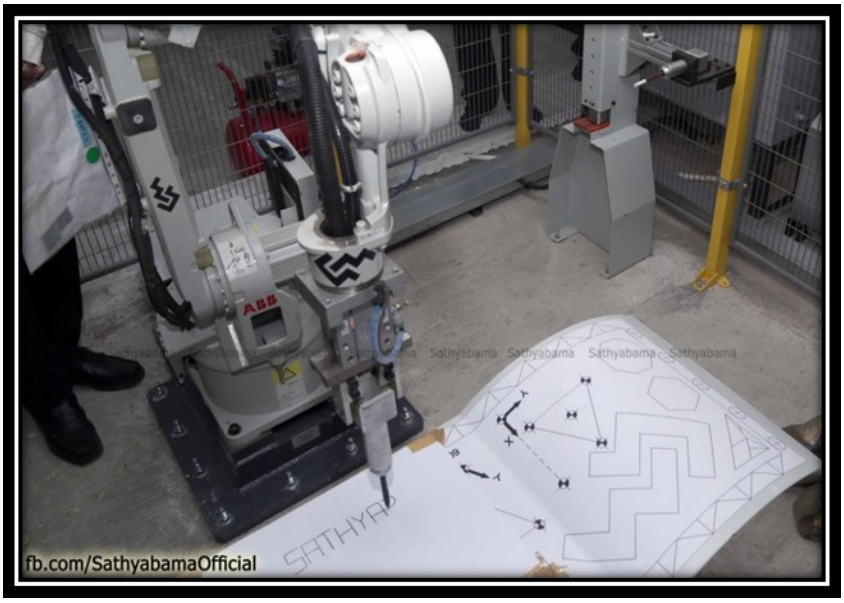
Technology Transfer: CADD Technologies School of Design Private Limited, Coimbatore



9.2 INFRASTRUCTURES FOR INNOVATIONS:

Sathyabama Institute of Science and Technology has ventured into yet another digital initiative "NEXTGEN Lab" to empower students in cutting-edge technology. Pre Incubation and Product Development aspects, Sathyabama developed NI LABVIEW Laboratory, Spectroscopic facilities, Data Science and Centre of Excellence for Robotics and Automation.





The Center of Excellence for Robotics and Automation was established in 2019 to cater the automation knowledge needs in the field of robotics and Artificial intelligence. This center has an exclusive Industrial robot of ABB IRB 1520 (6 axis) to perform operations, programming, and advanced control systems.

9.3 INDUSTRY INSTITUTE INTERACTION CELL:

The aim of our Industry Institute Interaction Cell (IIIC) is to strengthen the relationship between industry and our institute, which provides an excellent platform for both the students as well as the faculty members to be aware of industry expectations from the graduates. IIIC serves as a podium to showcase the best practices, latest technologies in industry stand point and their implementation.

Industry Institute Interaction Cell Meeting

9.4 EXECUTIVE DEVELOPMENT PROGRAM:

Sathyabama has well experienced Executive Development Program (EDP) for working professionals entitled with Quality Management, Production Planning, 5 S and Marketing.

INFRASTRUCTURE AND FACILITIES NEWLY ESTABLISHED

To provide avenues in the new research areas and a learning arena for academic advancements, we continue to develop and upgrade infrastructural facilities. Sathyabama Centre for Advanced Studies, a state-of-the-art facility with a total built up space of 2,40,000 Sq. ft is established. The Centre houses Artificial Intelligence Laboratory with Supercomputing facilities, DARE (Drone and Robotics Experimentarium) Lab consisting of Robotics Workstations, Swarm drones, Quadruped Robot, Humanoid Robot and autonomous rovers, Advanced Characterization facility with HRSTEM,

FESEM and XRD, Metaverse Studio with AR/VR kits, Makerspace with 3D printers, scanners and Replicators, Media Centre with state of the Art Studio and Centre for Innovation and Technology Transfer which will serve as an incubation cell for several student and faculty start-ups. An Innospace Fab Lab which serves as a One Stop Place for all Idea to Prototyping needs for Students and Startups has been established at Sathyabama Technology Business Incubator. The Center for Ocean Research has been identified by the Ministry of Earth Sciences to establish the Ocean Field Research Facility. Such a unique facility was inaugurated in the name of our founder chancellor, Col. Dr. Jeppiaar by the Hon'ble Secretary of the Ministry of Earth Sciences, Government of India, Dr. M. Ravichandran on 11th March 2022. The facility spans around 10,000 Sq. ft with Aquatic Animal Husbandry and Algal Culture Facility for the Marine Biotechnological Studies, which will augment the research in the area of biotechnology. The institution has also focused on energy conservation and has taken initiatives to change to green and renewable energy.

INNOVATION ECOSYSTEM

The Institution has a strong innovation ecosystem that has facilitated several startups. Start up Summits and Pitch decks were conducted to attract funds from the Angel Investors and Venture Capitalists. An agreement has been signed with Native lead foundation to support the Institution in the development of greater number of startups. 24 startup companies are under consideration for funding.

Awareness programme on Entrepreneurship, Innovation and Startups were organized for the students, faculties and research scholars to promote start up culture in the Institution. To encourage the students and faculties to develop their entrepreneurial interests, our management has provided 50 lakhs as seed fund this year. The innovative ideas are converted successfully into products and currently 22 products are ready for commercialization.

Sathyabama TBI supports startups across the country working in the areas of Blue Economy and sustainability. The TBI in association with DST-TIFAC has been identified as TIFAC TAP CENTRE for Academic partnership and Technological intervention towards expertise of faculty members on Engineering, Aquaculture and Plastic Cluster. Sathyabama TBI has supported 26 Student Innovations in 3 successive editions of Startup summits organized this year.

EXHIBITIONS/REGIONAL MEERT/HACKATHON

Sathyabama Institute of Science and Technology organized an Exhibition on Science and Technology from 27th to 29th July 2022 supported by National Council for Science and Technology Communication, Department of Science and Technology, Govt. of India. More than 1100 school students from 24 schools (Government and Private) participated in various events conducted in the exhibition.

Our Institution was recognised as a Nodal Centre to organise the Regional Meet of IICs, Innovation Cell, Ministry of Education, Govt. of India on 21st July, 2021.

Sathyabama was also one of the 75 Nodal Centres across India which hosted the fifth edition of Smart India Hackathon, supported by AICTE and MoE on 25th and 26th August 2022. 21 teams from across the country participated in the event.


SATHYABAMA
SATHYABAMA

SDG10 REDUCED INEQUALITIES

10.1 INTRODUCTION:

Sathyabama Institute of Science and Technology has always prided itself for its inclusive education. Students from all walks of life, religion, caste, creed and the differently abled too find Sathyabama inclusive. Even our employment policies have no discrimination based on the status of the applicant. The campus is very inclusive for all kinds of physical disabilities. From, ramps to interpreters and Brail books in the library, and the ever friendly attitude of the students and the staff makes inclusive education very easy. Sathyabama also prides in inclusion of high functioning Autistic students, who have benefitted by normal education in a regular college. The inclusion does not end with their academics. Sathyabama's placement Cell takes responsibility to place most of the differently able students in rewarding careers. In short their life is taken care of once they come to Sathyabama.

10.2 GOALS:

The main aim is to help differently abled students integrate with the society as a whole and not lose out on anything that the world has to offer.

- To reduce the inequities that arise due to mental or physical disabilities, social and cultural differences, class differences and overall any differentiation that exists because of inhuman practices.

- To help students from socially backward and downtrodden lives to create a future that is worth living. To uproot them from poverty and guide them to a more meaningful life.
- To guide children of parents who are disengaged from the society, like prisoners, to be made self-sufficient and have a positive way of looking at life
- To be a mentor and support system for students with physical disability to excel in any sport or activity that they are interested in.

10.3 SCHOLARSHIP FOR DISABLED STUDENTS:

Free education is offered to students from Ability foundation, an NGO that helps children with disabilities pursue education. Sathyabama offers 50 free seats every year to Ability foundation. The hearing impaired students have interpreters who are also recommended by Ability and Sathyabama recruits them to help the students. The visually impaired and the students in wheel chair are also given the attention required. Students with mild autism are also integrated well in the system because of the overall acceptance.

10.4 SCHOLARSHIP FOR MERITORIOUS STUDENTS FROM SOCIALLY AND FINANCIALLY POOR BACKGROUND:

Sathyabama supports students from very poor background finish their higher education and elevate their living standards. These students will be given

free education, free Hostel facilities and free transport. Some of the students who passed out and are well placed have made their Alma Mater proud by sponsoring students themselves. This compounding effect will make the ripples larger in our society and it brings immense pride to Sathyabama.

Deserving students from marginalised communities, economically weaker sections, children of destitute women, children of war widows, children of prison inmates and acid attack victims are given 100% scholarships to pursue higher education.

Students with excellent academic records are given merit scholarship.

Chancellor with Merit scholarship students

10.5 ARRANGEMENT WITH GLOBAL NETWORK EQUALITY: (PRISONERS WELFARE)

Sathyabama has an arrangement with the GNE (Global network Equality) who work with the prisoners and their children. Admissions are offered to them free of cost and these students are given special attention and care as they have had a traumatic childhood.

10.6 FACILITIES OFFERED

Sathyabama provides full support for Differently-abled students and strives to make life easier for them. They are also included in the sports and cultural activities. The acceptance of those students in the university by the faculty and students has had a positive effect on their self-esteem and they are also given enough training to face the world with pride. Sathyabama's placement cell also helps them find jobs as soon as they finish their graduation.

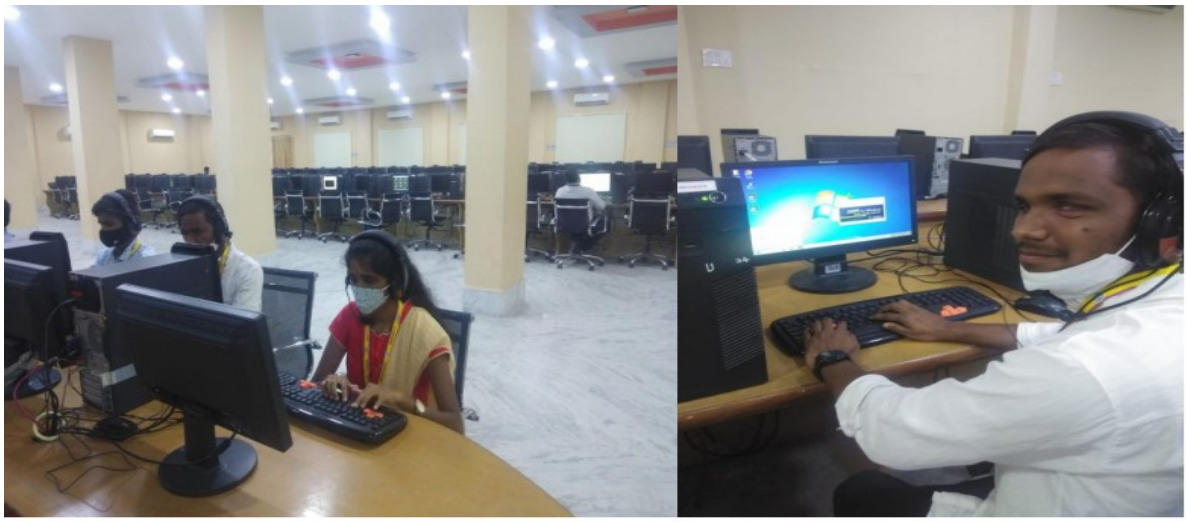
Almost all the buildings are equipped with facilities such as ramps, rails and special toilets to suit the special needs of differently-abled persons.

Ramp facility

10.6.1 Access to Library for Students with Special Needs

Sathyabama do not discriminate students with disabilities and ensures that they have equal access to Library resources. The students with disabilities are provided extra care and support to access the Library facilities. They are provided with remote access, extended reserve period and are given late fine

waiver. Books and other e content are sent by mail to these students. The library provides volunteer readers for the visually impaired students and Sign Language Interpreters' for Hearing impaired students. Visually impaired students can access the library with the help of JAWS software installed in all the systems in the



10.6.2 Grievance Cell:

Sathyabama has a Student's grievance cell which is a 5-member team. The students can approach the cell for any of their grievance and the matter will have to be resolved in 48 hours. The cell is opened on all days and students can approach them at any time during college hours. Regular meetings are held and the issues are discussed and they try finding ways to see that the grievances are minimized.

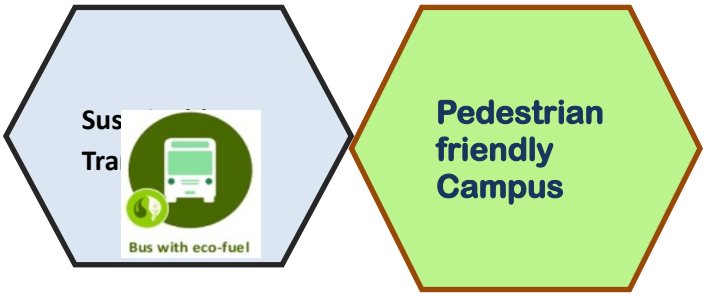
10.6.3 Placements for the Disabled:

Sathyabama's Placement cell has always tried and placed the students from the inequitable background in good organizations. They have signed an agreement with "youth for job foundation' which is a foundation that helps disabled students get good jobs. The endeavour does not end there. The placement cell has been conscious of the fact that these students has it rough when they go into the society and hence, special counselling is offered to

them and the organizations that recruit them are also given an orientation of how they could be Disability friendly organization. Students from socially weak background are given training in Soft skills.

SDG11 - SUSTAINABLE CITIES AND COMMUNITIES

11.1 LEADING BY EXAMPLE, WE PROVIDE A SUSTAINABLE CAMPUS



Sustainable Practices within the campus

1. All students and faculty members use sustainable transport means to commute to college, these are through buses that use Bio-diesel generated from waste oil collected from college kitchen
2. Pedestrian-friendly and pollution free campus with natural ecosystem of wetlands surrounding the campus, only battery-operated vehicles are mainly used inside the campus
3. Mass Tree plantation was conducted by college in the area Thiruvarrum and in the college by around 1000 students on 27th Jan 2019.
4. Water treatment plant has been established in the campus that is used for irrigating the landscape in the campus
5. Renewable resources are utilized in the campus like Solar energy for street lighting, charging points, solar heater for hostels.
6. Road traffic awareness program was conducted by students as a NSS activity on 2nd Feb and 9th Feb 2019 in Sholinganallur, Chennai.

11.2 CONTRIBUTION TO SUSTAINABLE DEVELOPMENT OF CITY

Engineer J. Vanjinathan, Assistant Professor in Department of Civil Engineering has been appointed for State Quality Monitor in TUFIDCO (Tamilnadu urban finance Infrastructure development and corporation). He was involved in the project appraisal in TUFIDCO (Tamilnadu urban finance Infrastructure development and corporation) for the following projects;

- Development of commercial complex at Thiruvallur theatre under Smart Cities Mission
- Redevelopment of new stand in Vellore City Municipal Corporation under Smart Cities Mission
- Convention center at Tamukkan ground Madurai smart city
- Bridge project at Alandurai Town Panchayats

School of Building and environment signed a MOU, with ITDP Institute of Transportation and development policy, Chennai, to collaborate in working towards planning Sustainable transportation in Chennai.

Our students worked for **Complete street project** and prepared proposals for pedestrian infrastructure in the influence area of schools in Mylapore and Saidapet areas in Chennai.

11.3 CENTRE OF EXCELLENCE IN URBAN CLIMATE AND BUILT ENVIRONMENT

- School of Building and environment, Department of Architecture has established Centre of Excellence in Urban Climate and built environment which possesses a well-equipped Climatology lab, with instruments like Thermal imagers, data loggers, outdoor data loggers and simulation software like IESVE, ENVIMET etc. , here simulation studies and research works on Sustainable practices topics like building materials, energy efficiency in the building, urban heat island, sustainable landscape planning are conducted and documented.
- Students underwent Internship and collaborated for the following Govt. proposal – Post occupancy evaluation for Zero peak energy design for India during the period.

11.4 SUSTAINABILITY AS AN INTEGRAL PART OF ACADEMIC LEARNING

The Academic learning has been developed with the intent to provide professionals and students with a springboard for invention, knowledge and understanding of the application of an integrated environmental approach in sustainable architecture design.

To equip the students with knowledge to respond to a changing world and environmental challenges for best performance in the Industry as Sustainable Architects, Green Auditors, and Green Building Professionals.

1. School of Architecture offers Post graduation program on sustainable architecture and Building Management. The Sustainable goals have been incorporated in the curriculum and students get exposure through various studies and live experiments conducted.
2. Students in Master program in Sustainable Architecture and Building Management can cater to sustainable city planning and design through their academic curriculum and studios which prepare them for sustainable design and construction, enhancement of building services, Intelligent building management systems
3. Professional Training conducted for Post-graduates and Under-graduate programs enable the students to get exposure by working with renowned Architects, Sustainable Architecture firms, Construction Industry.
4. Under Graduate program in Bachelor of Architecture has been structured to include subjects related to Sustainability like Sustainable Architecture, Energy efficient architecture, Vernacular Architecture, Landscape Architecture, Site planning Conservation.

SDG12 - RESPONSIBLE CONSUMPTION AND PRODUCTION

With the Centre for Waste Management playing a key role the School of Bio and Chemical Engineering, the School of Mechanical Engineering, the School of building and environment through their research objectives, projects, training programmes and other related activities have always promoted the use of services and products bringing a better quality of life while still pertaining to lesser utilization of natural resources and toxic materials. The institution functions with the focus of developing processes and products that give away lesser waste and pollutant emissions thus meeting the demand of Responsible consumption and production.

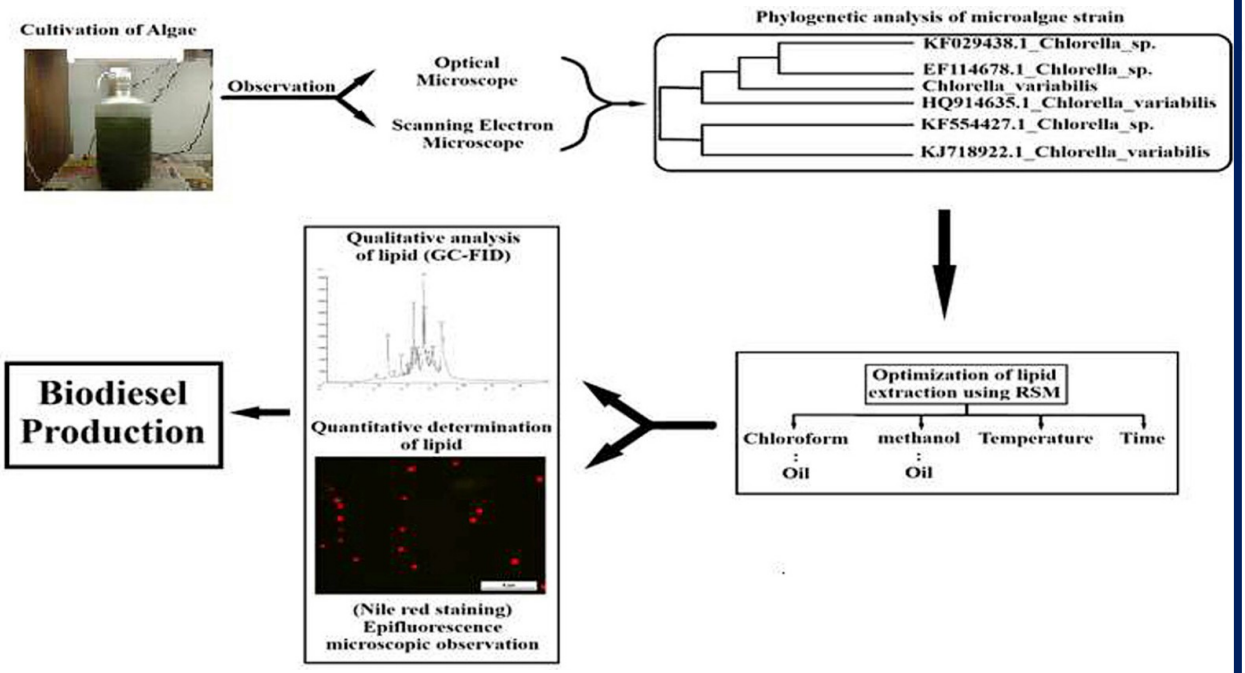
The holistic approach of Sustainable Consumption and Production is built around the following objectives:

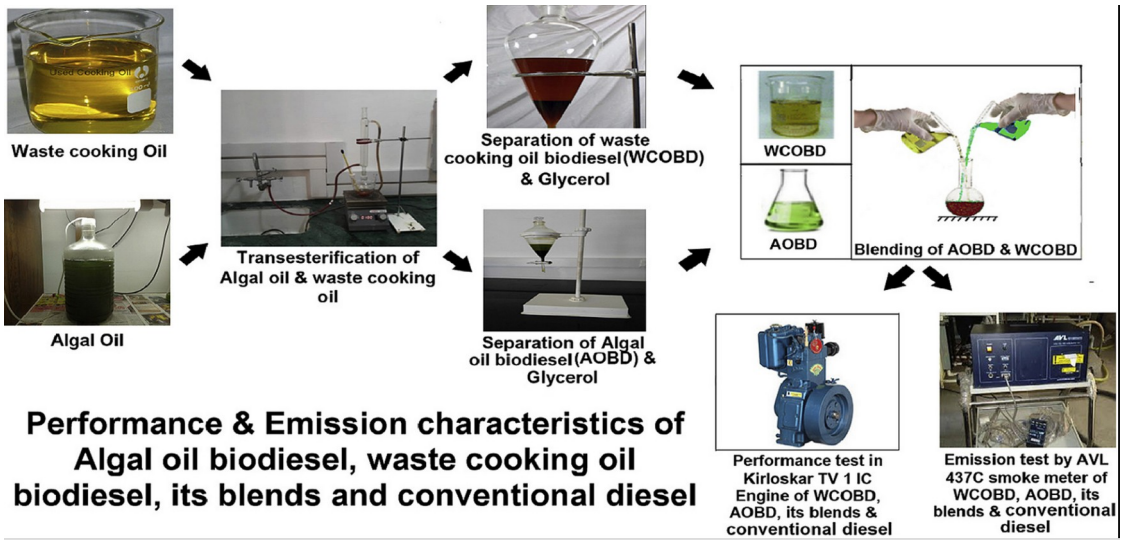
Decoupling environmental degradation from economic growth

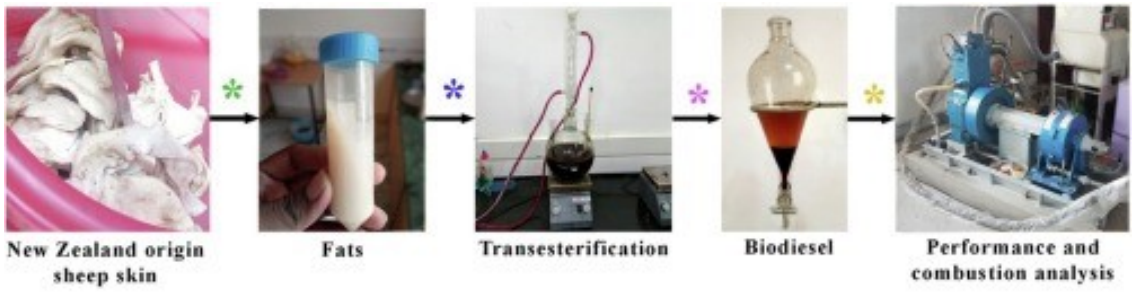
The Centre for Waste Management, a Centre of Excellence for Energy Research (Bioenergy) is working on projects related Waste to bioenergy Conversion technologies

Feasibility studies at the lab/bench/pilot scale for the production of biodiesel from various non-edible sources like jatropha/pongamia seeds; animal fat like beef tallow, Newzealand sheep skin; Microalgal lipids and Waste Cooking Oil of different origin. The studies have resulted in the preparation of Biodiesel from Waste Cooking Oil generated in the Sathyabama Institute of Science and Technology mess, which caters to the food need of about

10,000 inmates. This research measure not only has diverted the use of Waste Cooking Oil for fuel production but has also contributed indirectly to the reduction in usage of conventional petroleum crude (natural resource) for the production of diesel. A 50 litres pilot plant established in the Centre for Waste Management Laboratory produces on an average 90-96% yield catering to the need of five of the institution's buses to operate with 12% blend. The usage of the blends in the buses have proved successful, the laboratory, bench scale and pilot scale biodiesel produced to have better performance and lower emissions.




Waste cooking Oil
Algal Oil
Transesterification of Algal oil & waste cooking oil
Separation of waste cooking oil biodiesel(WCOBD) & Glycerol
Separation of Algal oil biodiesel(AOBD) & Glycerol
WCOBD
AOBD
Blending of AOBD & WCOBD
Performance & Emission characteristics of Algal oil biodiesel, waste cooking oil biodiesel, its blends and conventional diesel
Performance test in Kirloskar TV 1 IC Engine of WCOBD, AOBD, its blends & conventional diesel
Emission test by AVL 437C smoke meter of WCOBD, AOBD, its blends & conventional diesel


New Zealand origin sheep skin
Fats
Transesterification
Biodiesel
Performance and combustion analysis
- Extraction of fat from New Zeland origin sheep skin
- Processing of fat for transisterification
- Conversion of fat into biodiesel
- Biodiesel for engine testing

Calorific Value : 36,283 (kJ/kg) Diesel : 39,865 (kJ/kg)

Brief Report on Pilot Scale Bio-Diesel Production Plant	
Raw material Used	Mixed Waste Cooking Oil of FFA < 4 %
Operating time	1.5 hours
Temperature	60^{O} C
Methanol to Oil Molar ratio	4.5 : 1
Catalyst	0.5 weight %
Yield	98%

Project: "Formulation of Biopolymer from algal biomass as an alternate to Conventional Plastic" by Using Natural algae biomass". Algae are predicted to play an important role in tomorrow's bio economy. Microalgae flourish in municipal wastewater treatment ponds, where they perform a waste purifying function, but harvesting of the algal biomass is generally not practiced, and where it is the chemical flocculants used to remove the algal cells limit further uses of the algal biomass, even for bio fuels (e.g. anaerobic digestion for methane generation). Many research scholars concentrating for the production of bio fuel/bio mass by natural algae. But this project deals about formulation of Biopolymer from algal biomass as an alternate to Conventional Plastic from wasted algae biomass. Wasted algae bio-mass are our raw material for making an alternate conventional plastic. Through chemical synthesis process we are able to make alternate from raw materials. This project is totally new innovation in the area research and development of waste material as well as new composite materials and this could be definitely useful for common people because of low cost and eco-friendly.

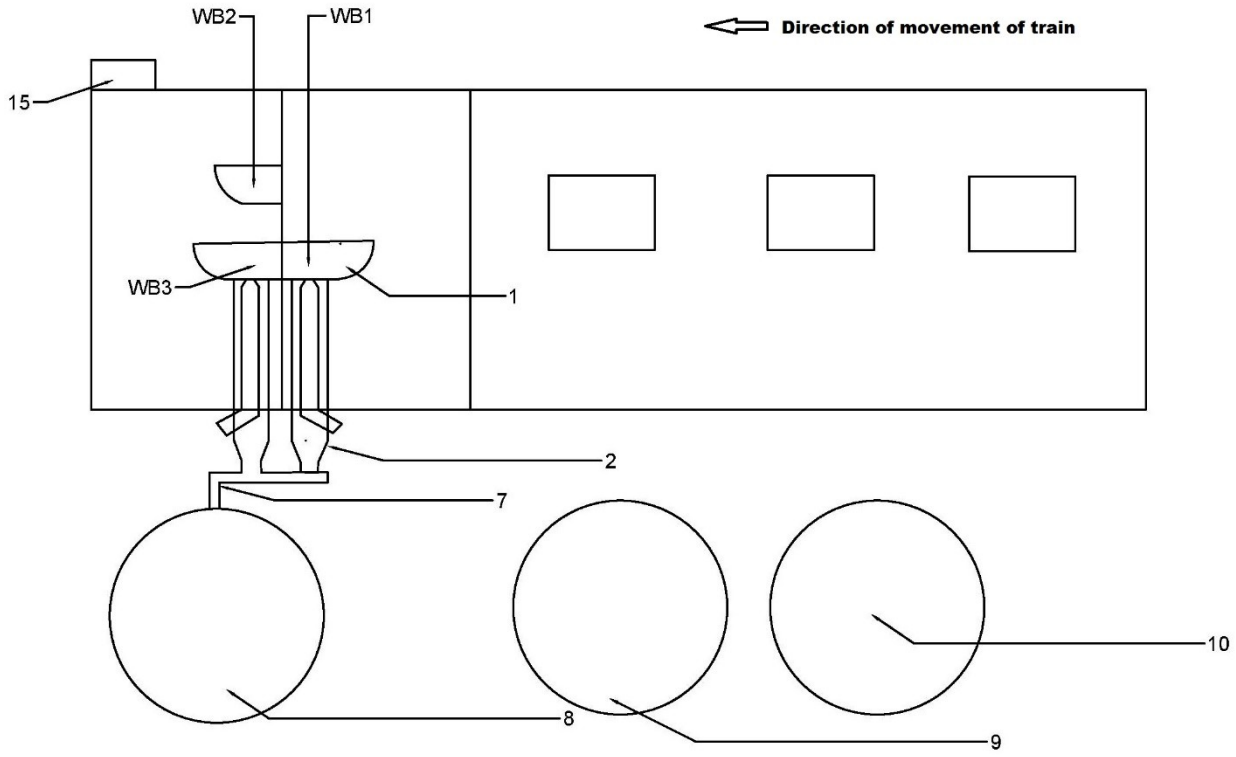
Automobile components made from algal reject

a) **Compact Sensor System for Train Compartment Washbasin Water Recovery 201641037331**

In this growing technical era, we are forgetting the elementary thing which supports the existence of human race that is WATER. Society faces a major problem in the form of "WATER SCARCITY ". But on the other hand we waste a huge volume of water every day at some places. One of such places is the Indian railway where lakhs and lakhs liters of water get wasted every day just after a single use. In India average number of passenger trains

running is 12617, which carry about 23 million passengers a day and 8.397 billion passengers annually. At an average 24 coaches are there in a long distance trains. Water is stored in the reservoirs at the time of departure of train (1800 litres/coach) and refilling of tanks is done after 250-450 km. But the water is not efficiently utilized. After a single use it gets wasted on railway tracks and it becomes unfit for further use. The thing is that the water which falls on the track is unable to penetrate even to the water table because of the highly compact concrete and stones which are used while constructing the tracks, so it becomes useless. Water from the wash basins are the major offender of waste water during travel.

In order to meet the demands of water for the growing population of our country we need to harvest this water from being wasted. To do so we can make certain changes in the construction of the water tanks and the wash basins of the trains of India. As per the proposed system the water tanks can be divided into three chambers both of them should be separated by the non-permeable flexible membrane which will also act as the divider between the water (used & fresh) in the tank. As the volume of fresh water decreases, the place to store the filtered used water increases, so in this way the same tank can be used for storing the freshwater as well as the used water. Water from the wash basin is passed through a filter. Purity of the water will be tested at filter outlet.

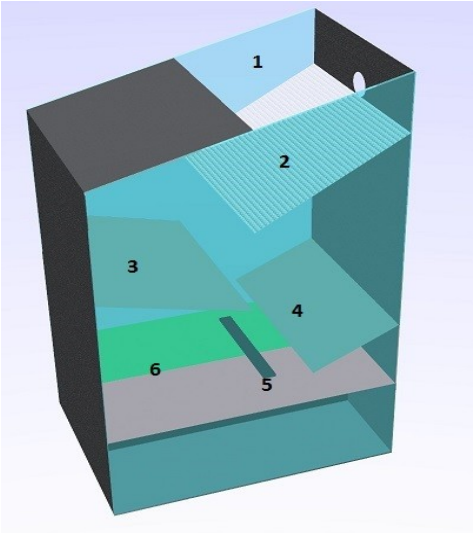


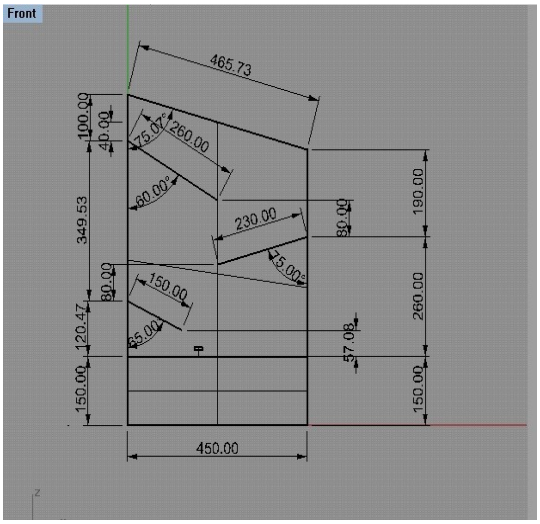
Scheme of Wash Basin Water treatment in Railway Compartment

b) Automatic Smart Segregator

About 0.1 million tonnes of waste is generated in India every day, which is approximately 36.5 million tonnes annually having composition of organic waste- 40-60%, plastic, paper, cardboard, metal, glass- 12-28% and other wastes 12-47%. 95% of the municipal waste collected is dumped on land with only 5% being composted as a result of which the landfill sites are growing drastically, so adverse that even airport authorities' permission is being requested to further extend the height of landfill sites. The researchers suggest for opting a different route of utilizing easily available efficient techniques such as waste-to-waste conversion techniques, recycling processes, bio-gas plant, but the only limitation is that these all demands raw segregated waste for their successful operation and once the organic waste is mixed with inorganic and hazardous waste it's almost impossible to achieve efficient segregation. Establishing segregation plants is limited by need to large area of land, high cost machinery, heavy power requirements, so other

way to look into the problem is to ensure source segregation right at the point of origin. We propose an automatic and smart concept of self-sorting thrash bin, which is capable enough to sort the waste into organic waste and recyclable waste.





Configuration of Automatic Smart Segregator

The Centre for Waste management take initiatives to develop sustainable management of resources and achieve resource efficiency along both production and consumption phases of the lifecycle.

Waste Cooking Oil to Detergent Soaps and Bioglycerol to Liquid Soap

Benefits: No lathering agent addition, removes dirt with less water requirement, Simple process, Suitable for being made with low investment through microenterprises, Potential income generating technology

Eco Friendly soap from used cooking oil and Liquid Soap from bioglycerol two projects funded by Unnat Bharat Abhiyan, Centre for Rural Development and Technology, Indian Institute of Technology, Delhi.

Organic pots from food waste and coco peat

Food waste **Cocopeat**

Mould

Mould and Mixing the ingredients **Filling into the mould**

Sun Drying **Dried pot** **Onsite training (pot making)**

A Technology Development for waste to organic pots- a replacement to sapling distributing polythene bags funded by Unnat Bharat Abhiyan, Centre for Rural Development and Technology, Indian Institute of Technology, Delhi.

Ritual Waste to Incense sticks

Recycle of **Ritual Waste Materials to Incense Sticks**- an Eco-friendly Approach for Rural Industrialization and Entrepreneurship Development, Sensitivity: Internal & Restricted funded by Unnat Bharat Abhiyan, Centre for Rural Development and Technology, Indian Institute of Technology, New Delhi

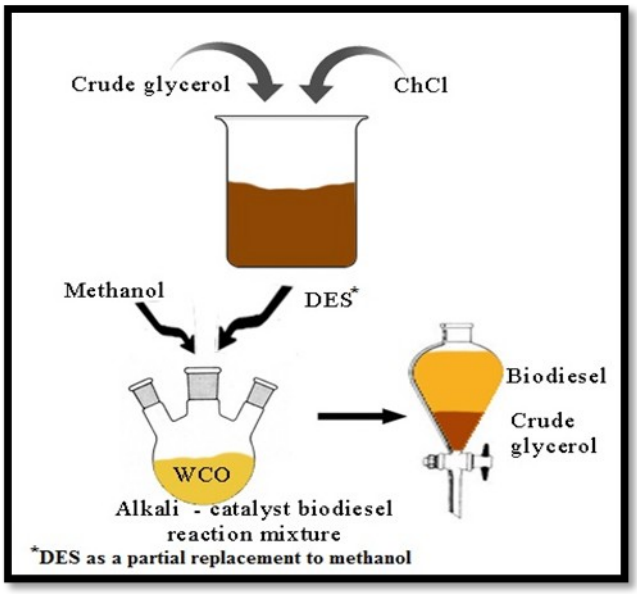
Training Self Help Group Women to make Incense sticks from Ritual Waste, Kumizhi Village

Outcome: Establishment of POOMANAM, Microenterprise establishment at Kumizhi


பூமணம்
அகர்பத்தி குறுந்தொழில் நிறுவனம்
அமைப்பு
கழிவு மேலாண்மை மையம்
சத்யபாமா
நிகர்நிலை பல்கலைக்கழகம்
இடம் : குமிழி, காஞ்சிபுரம், தமிழ்நாடு


பூ ம ண ம்
உ ண் மை யா ன பூ க் க ளி ன் சா ர ம்

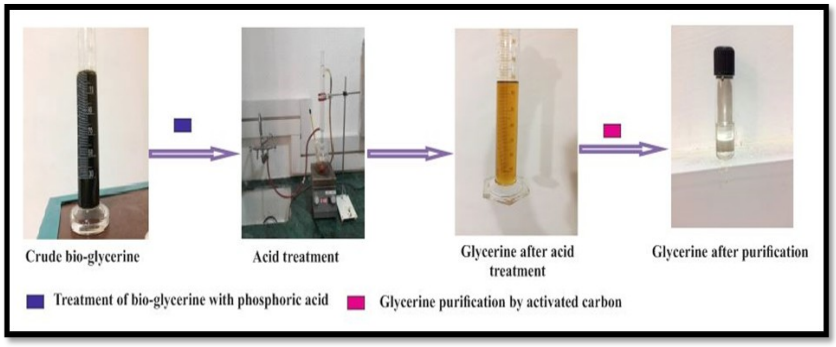
Green Solvent (Deep Eutectic Solvent-DES) Synthesis from bioglycerol recovered as a byproduct from Biodiesel production



Green Solvent Synthesis

The DES thus prepared is used as a partial replacement for Methanol in transesterification reactions for biodiesel synthesis and used to capture CO_2 reducing global warming thereby mitigating climate change.

Refined bioglycerol for heat transfer applications



A process was developed to treat crude glycerol obtained as a byproduct from transesterification reaction in the due course of producing biodiesel, which has good value as an industrial product of significant purity.

Activated Carbon from Food Waste

A technology has been developed to convert food waste to activated carbon which is potentially used in the treatment of biodiesel wash water thereby making the process a closed circuit one by providing a solution to recycle and reuse the water for washing of crude biodiesel.

Creation of new jobs and poverty eradication

The Centre has been instrumental in disseminating the processes, products and technologies pertaining to Sustainable Consumption and Production, thus being an eye-opener to the younger generation of a developing country like India to show case opportunities such as the creation of new markets, green and decent jobs as well as more efficient, welfare-generating natural resource management by conducting conferences, training programmes, workshops, awareness programmes, exhibitions etc.,

Societal outreach program

Centre for Waste Management, a Centre of Excellence for Energy Research (Bioenergy) continued to meet the centres' objectives recovering waste, recycling it using several waste valorization techniques and ending up in development of waste to value added materials for reuse, water treatment, manure, and energy applications. MHRD funded SPARC project was executed, ending up in development of protective coatings for biofuel transporting pipelines. The work was pursued in association with the Centre for Nanoscience and Nanotechnology. A patent was filed jointly. A monograph entitled "Polymetallic Coatings to Control Biofouling in Pipelines: Challenges and Potential" with the Scientific team of CWM contributing three chapters was also a remarkable publication from CRC Press, that came out as a project outcome.

A patent entitled "Automatic Smart Segregator "filed in December 2016 was granted during this academic year. A total of 18 Journal publications were made in this academic year with a cumulative impact of 121.05. The Centre's H-index is 12 and i-10 index is 21, The total citations of the Centre is 1127.

The Centre organized the 2nd International Conference on Waste Energy and Environment from 5-7th of September 2021. The conference was conducted in online mode, about 247delegates participated in the conference. A

proceeding with ISBN was published. Selected papers were published in high impact journals including Chemosphere, Biomass Conversion and Biorefinery, Applied Nanoscience. The team was consistently involved in conducting training and outreach Programmes. A total of 10 Hands on training Programmes utilizing Biodiesel Production and Characterization facilities, Gas Chromatography (GC-FID), Hydrothermal Reactor were conducted. The Scientific team conducted several outreach Programmes commemorating National and International Days of importance. In this line the Centre celebrated National Science Day on 28th February 2022; Zero Discrimination day on 1st March 2022; National Safety Day on 4th March 2022; Water Day on 22nd March 2022 and Earth Day on 22nd April 2022. The outreach programmes were conducted to create awareness among school children and the general public in line with Environmental Conservation and Protection. The Centre was also involved in conducting several consultancy services for undergraduates, postgraduates and research scholars and industries.

Adding feather to the cap the Centre jointly with Centre for Nanoscience and Nanotechnology and Department of Electronics and Communication was granted 2.36 Crore worth project entitled “Science Technology and Innovation Hub at Kattumannar Koil C D block, Cuddalore district for SC community". Three batches of 200 beneficiaries of Eachampoondi and Aadhanur villages have been trained in biodiesel, Flyash bricks and detergent soap making. Several other processes for development of other products involving waste as resources will be taught to the beneficiaries, who will also be trained in marketing, sales and for entrepreneurship for the next three years.

Start-ups Established

a) “BiGlySo Pvt. Ltd” has been launched for the production of waste cooking oil derived biodiesel, Agro-waste derived enriched biochar, vegetable market waste based accelerated bio compost, industrial

grade bio glycerine, waste cooking oil based detergent soaps, and bioglycerine based liquid soaps.

b) "POOBAS Pvt. Ltd" has been established for sales of hydroponics based horticultural cultivation and consultation

c) "Penteum Enterprises Pvt. Ltd functions with the objective to utilize fly ash for brick making.

d) Poomanam was established by the Self help group women in these adopted villages where they make incense sticks from the flower waste.

Sathyabama Institute of Science and Technology through the Centre for Waste Management will

Contribute to India's shift towards sustainable consumption and production

e) Achieve sustainable management and efficient use of natural resources by 2030 thereby having the expected Material footprint, material footprint per capita, and material footprint per GDP

f) Have a reduced Food Waste Index by translating food waste recycling technologies for fuel production and activated carbon synthesis, thereby diverting waste to useful product of higher value.

g) make the collaboration established with Vans Chemistry fruitful to handle E-Waste which is hazardous. The Institution will jointly develop a technology in handling the hazardous e-waste by translating the preliminary work done on recovery of Mercury from Compact Fluorescent Lamps part from establishing an E-Waste Collection hub.

h) will focus on establishing startups related to Waste Management and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment by 2030.

i) will substantially reduce waste generation through prevention, reduction, recycling and reuse within the institution and also develop strategies and protocols jointly with environmental management companies like Wasmanpro Solutions, Vans Chemistry,

Transenergitics etc., to reduce waste disposal, increase recycling rate by encouraging companies to adopt sustainable practices.

j) Promote public procurement practices that are sustainable, in accordance with national policies and priorities

k) involve in outreach activities, training programmes, workshops and conferences among different beneficiaries and stake holders including students, teachers, industry personnel and general public to render relevant information and awareness for sustainable development and lifestyles in harmony with nature

l) implement renewable and alternate energy technologies in large.

m) promote sustainable tourism in Chennai where the institution is located by implementing green concepts in terms of clean energy usage (biodiesel from Waste Cooking Oil), waste management in hotels (Biogas from food waste) promoting Installed renewable energy-generating capacity.

n) acquire subsidies for implementing sustainable consumption and production

The Centre for Waste Management, Sathyabama Institute of Science and Technology has

- Established practices of waste sorting, waste collection, recycling, concept of 'Circular Economy' and 'Resource Efficiency' in school and college/university curriculum
- Undertaken research on resource flows, life cycle analysis, secondary materials and provide capacity building and ventured into technical support for setting up MSMEs/start-ups in the waste sector
- Introduced short training courses on different aspects of resource efficiency such as resource efficient designs, recycling and waste reduction in all public administration, health, engineering, training and education programs

- Engaged in multi-disciplinary research and development, establishment and testing of developed frameworks and tools to address the implementation and challenges of resource efficiency

SDG 13 - CLIMATE ACTION

13.1 WHO WE ARE?

The Centre for Climate Change Studies (CCCS) was established in the year 2011 at International Research Centre (IRC) with the primary mandate of investigating the impact of predicted climate change on marine organisms associated to various ecosystems like coral reefs, sea grass meadows, seaweeds, intertidal zones and mangrove ecosystems etc. In addition, we are committed to achieve United Nation's Sustainable Development Goals (SDGs), mainly SDG 13 and SDG 14 that cover's Climate Action and Life Below Water by 2030.

At present, in the CCCS, the following activities are going-on: (i) Implications of climate change on natural life history traits of coral reef caridean shrimps; (ii) Response of micro-planktons to elevated temperature and decreased pH using multidisciplinary approach including proteomics, biochemical and physiological assays; (iii) Contribution of seaweeds towards sustainable future by playing a role in climate change mitigation and adaptation; (iv) Diversity and status of coral reef shrimps in Gulf of Mannar Biosphere Reserve, Tamil Nadu and Lakshadweep and (iv) Plant-insect interaction under climate change scenario. Besides, the Centre is also instrumental in spreading awareness about conservation of marine ecosystem to schools and teachers through citizen science program.

Researchers at CCCS have been actively working at Sathyabama Marine Research Station (SMRS), recently established at Rameswaram to encourage research on cutting-edge marine ecology and climate change to sustainably use, manage, and conserve natural ecosystems for the benefit of the coastal communities of Gulf of Mannar and Palk Bay regions.

13.2 RESEARCH AREAS

- Seaweed ecophysiology under climate change condition to ocean acidification
- Understanding the impact of ocean acidification on marine invertebrates
- Unraveling the thermal tolerant symbiodinium clade from the Scleractinian corals of Palk Bay

Under the SDG the Centre for Climate Change Studies (Marine Biology Lab) has been extensively understanding the impact of climate change on marine organisms under the physiological perspective.

We have been investigating how marine organisms, in particular tropical seaweeds, sea anemones and associated organisms respond to the predicted ocean acidification (pH 8.1 vs 7.7) and varying temperature (27, 30 and 33). The model experimental set up is shown in figure below. As response

variables, we measure growth, productivity, redox state, primary and secondary metabolites.

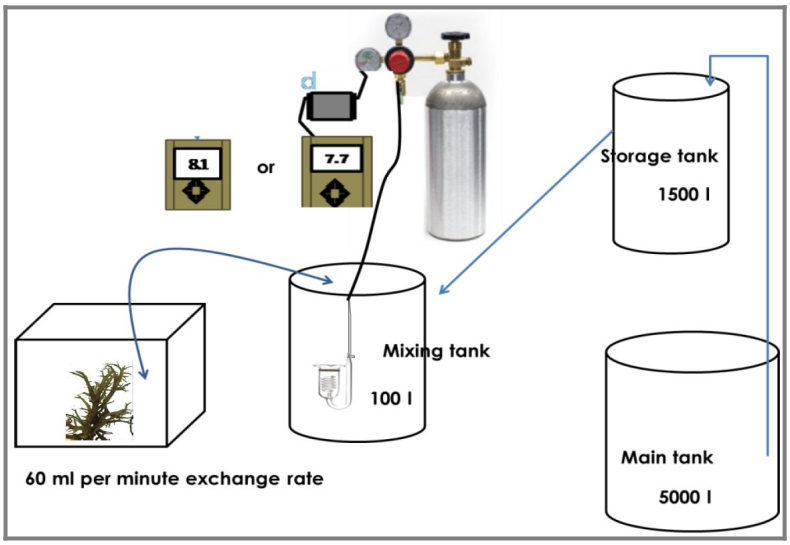


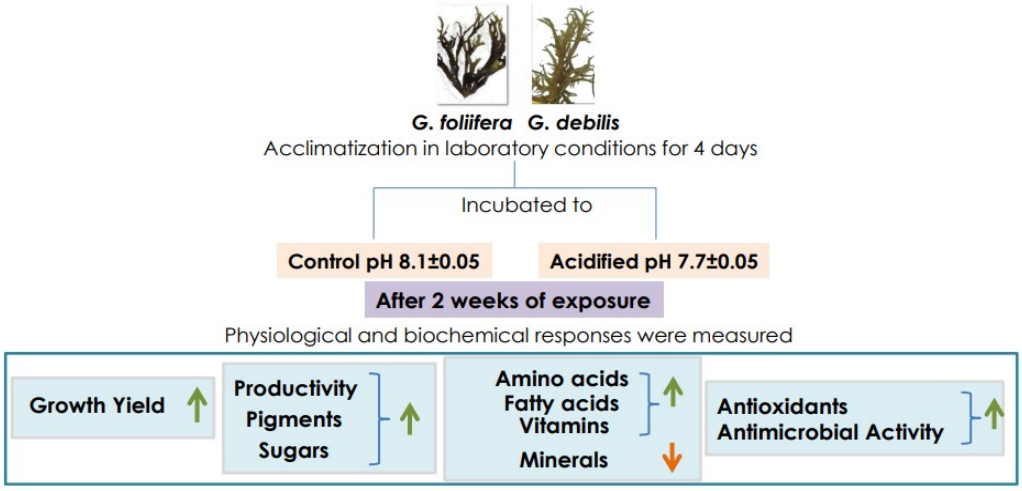
Fig. A model experimental set up for ocean acidification

Evaluation of growth, primary productivity, nutritional composition, redox state, and antimicrobial activity of red seaweeds Gracilaria debilis and Gracilaria foliifera under pCO2-induced seawater acidification

The genus Gracilaria is an economically important group of seaweeds as several species are utilized for various products such as agar, used in medicines, human diets, and poultry feed. Hence, it is imperative to understand their response to predicted ocean acidification conditions. In the present work, we have evaluated the response of Gracilaria foliifera and Gracilaria debilis to carbon dioxide (pCO2) induced seawater acidification (pH 7.7) for two weeks in a controlled laboratory conditions. As a response variable, we have measured growth, productivity, redox state, primary and secondary metabolites, and mineral compositions. We found a general increase in the daily growth rate, primary productivity, and tissue chemical composition (such as pigments, soluble and insoluble sugars, amino acids, and fatty acids), but a decrease in the mineral contents under the acidified condition. Under acidification, there was a decrease in malondialdehyde. However, there were no significant changes in the total antioxidant capacity

and a majority of enzymatic and non-enzymatic antioxidants, except for an increase in tocopherols, ascorbate and glutathione-s-transferase in G. foliifera. These results indicate that

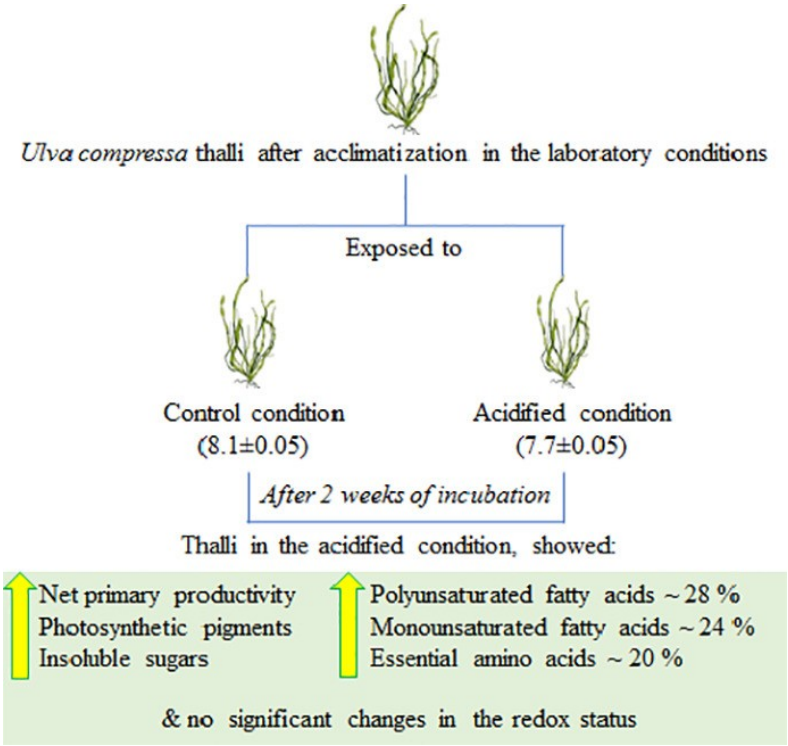
elevated pCO2 will benefit the growth of the studied species. No sign of oxidative stress markers indicating the acclimatory response of these seaweeds towards lowered pH conditions. Besides, we also found increased antimicrobial activities of acidified samples against several of the tested food pathogens. Based on these observations, we suggest that Gracilaria spp. will be benefited from the predicted future acidified ocean.



Influence of seawater acidification on biochemical composition and oxidative status of green algae Ulva compressa

The sequestration of elevated atmospheric CO2 levels in seawater results in increasing acidification of oceans and it is unclear what the consequences of this will be on seaweed ecophysiology and ecological services they provide in the coastal ecosystem. In the present study, we examined the physiological and biochemical response of intertidal green seaweed Ulva compressa to elevated pCO2 induced acidification. The green seaweed was exposed to control (pH 8.1) and acidified (pH 7.7) conditions for 2 weeks following which net primary productivity, pigment content, oxidative status and antioxidant enzymes, primary and secondary metabolites, and mineral

content were assessed. We observed an increase in primary productivity of the acidified samples, which was associated with increased levels of photosynthetic pigments. Consequently, primary metabolites levels were increased in the thalli grown under lowered pH conditions. There was also richness in various minerals and polyunsaturated fatty acids, indicating that the low pH elevated the nutritional quality of U. compressa. We found that low pH reduced malondialdehyde (MDA) content, suggesting reduced oxidative stress. Consistently we found reduced total antioxidant capacity and a general reduction in the majority of enzymatic and non-enzymatic antioxidants in the thalli grown under acidified conditions.



Seasonal Changes in the Biochemical Constituents of Green Seaweed Chaetomorpha antennina from Covelong, India

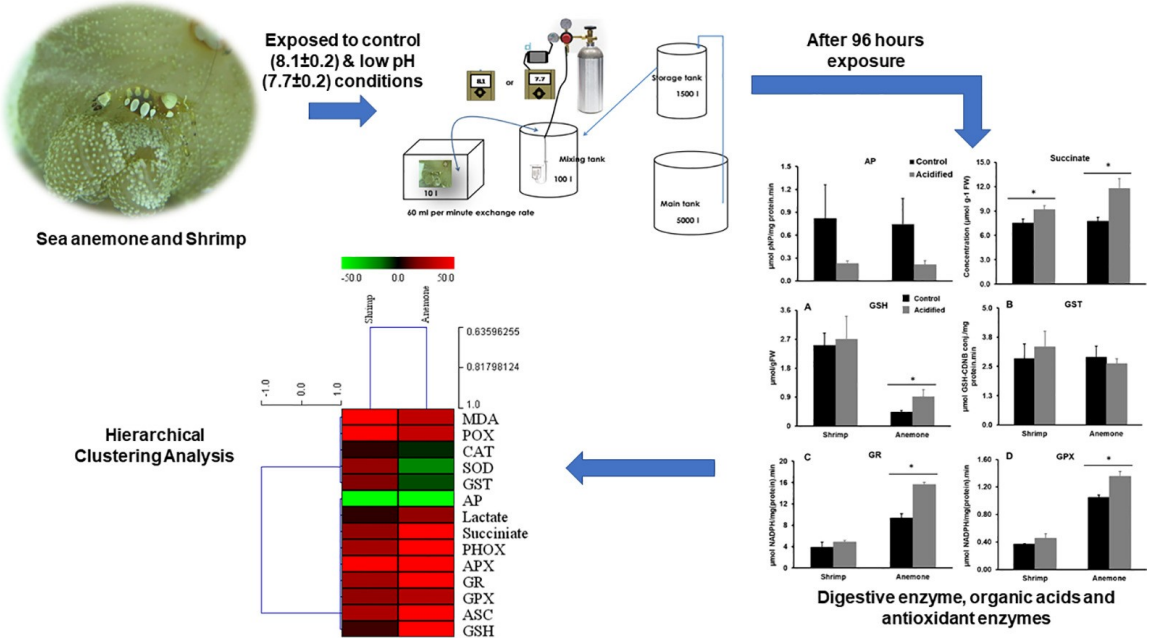
Seaweeds are well known for having a wealth of nutritional benefits and providing ecological support to associated fauna. Seasonality influences the biochemical characteristics, affecting their ecological and economic values. In the present study, we evaluated pigments, primary and secondary

metabolites, minerals, and antioxidant properties of green seaweed Chaetomorpha antennina growing on the intertidal rocks along the Covelong coast, India, in different seasons (from June 2019 to March 2020). Significant variations were found in the levels of antioxidants, minerals, and metabolites in different seasons, e.g., amino acid levels were the highest in post-monsoon and the lowest in summer. In monsoon, we found the highest concentration of fatty acids in the thalli. Lipid peroxidation and total antioxidant activity were at their maximum levels during post-monsoon, which indicated oxidative damage responses. No significant variations were found in the levels of photosynthetic pigments. The outcomes indeed suggested seasonal variations in the biochemical and nutrient profile of C. antennina. We suggest that the harvesting/collection of C. antennina for different nutrients and metabolites should be performed in the respective seasons.

Physiological responses of the symbiotic shrimp Ancylocaris brevicarpalis and its host sea anemone Stichodactyla haddoni to ocean acidification

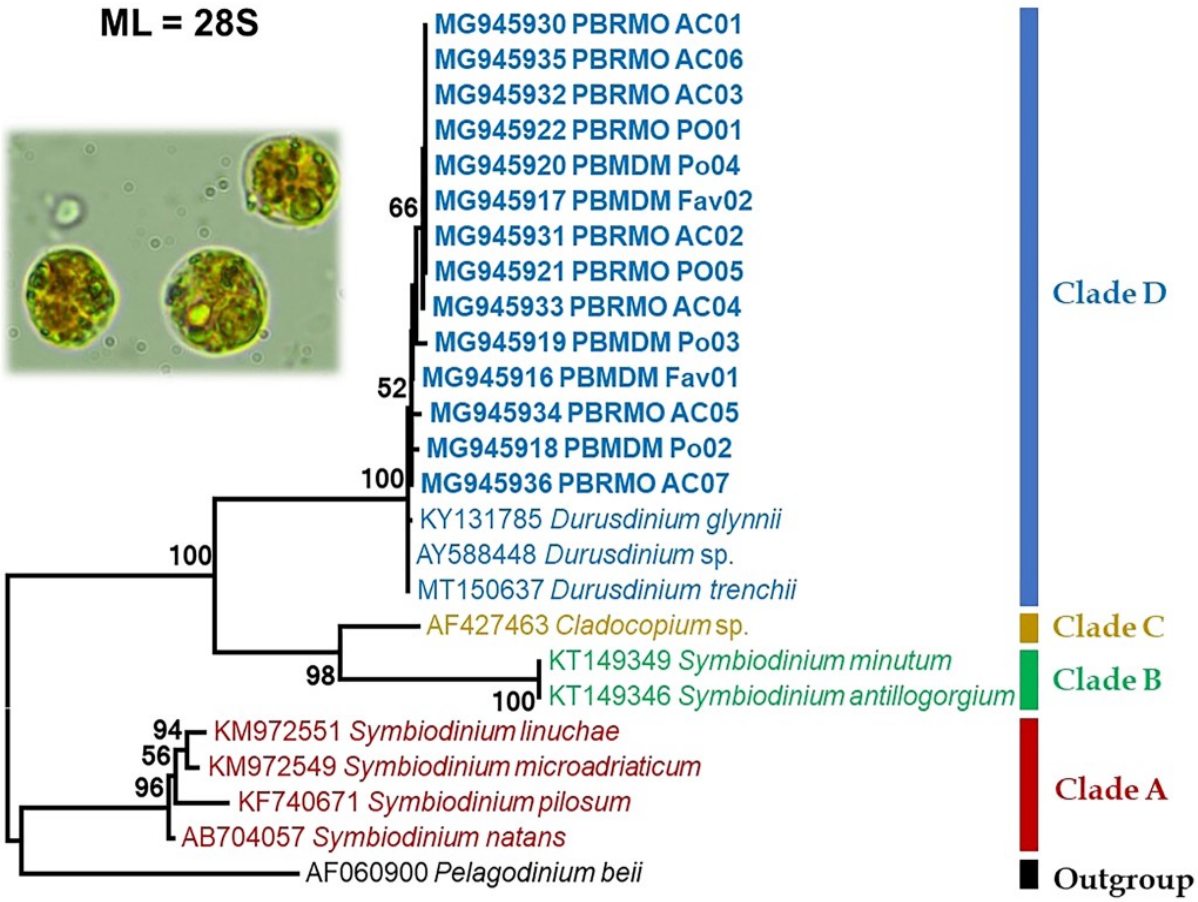
In this study, the physiology of symbiotic 'peacock-tail' shrimp Ancylocaris brevicarpalis and its host 'Haddon's carpet' sea anemone Stichodactyla haddoni were tested under lowered pH (7.7) and control (8.1) conditions. The biochemical responses such as digestive enzyme (AP), organic acids (lactate and succinate), oxidative damages (MDA), antioxidants metabolites/enzymes (ASC, GSH, SOD, CAT, APX, GPX, GR, POX, and PHOX), and detoxification enzyme (GST) were measured. The AP showed insignificantly reduced values in both the organisms in lowered pH conditions compared to control indicating the effect of abiotic stress. The hierarchical clustering analysis indicated low MDA in sea anemone can be explained by higher POX, APX, GR, ASC, and GSH levels compared to shrimps. However, the detoxification enzyme GST showed less activity in sea anemones compared to shrimps. The results suggest that A. brevicarpalis

and sea anemone S. haddoni may have deleterious effects when exposed to short-term acidification stress.



Probing the thermo tolerant endosymbiont genus Durusdinium (Clade D) in the scleractinian corals of Palk Bay, Southeast coast of India

The world's coral reef ecosystems are built by a symbiotic relationship between reef corals and the dinofagellates of the family Symbiodiniaceae. Climate change has already impacted the world's coral reef ecosystems. Some corals can survive in extreme environmental conditions through the acquisition of stress-tolerant endosymbionts. In the present study, the genetic diversity of endosymbionts of fourteen coral genera such as Porites (Five), Favia (Two), and Acropora (Seven) sampled from the reefs of Mandapam and Rameswaram, Palk Bay, Tamil Nadu, India was assessed by sequencing both large (LSU) and small subunit (SSU) gene fragments. The phylogenetic construction of LSU revealed the diversity of thermo tolerant Clade D that was monophyletic throughout various coral taxa. Comparison of thermo tolerant clade D with SST (>32 °C) has provided valid evidence for the presence of the endosymbiont Durusdinium sp. (Clade D) across different coral species in the Palk Bay.



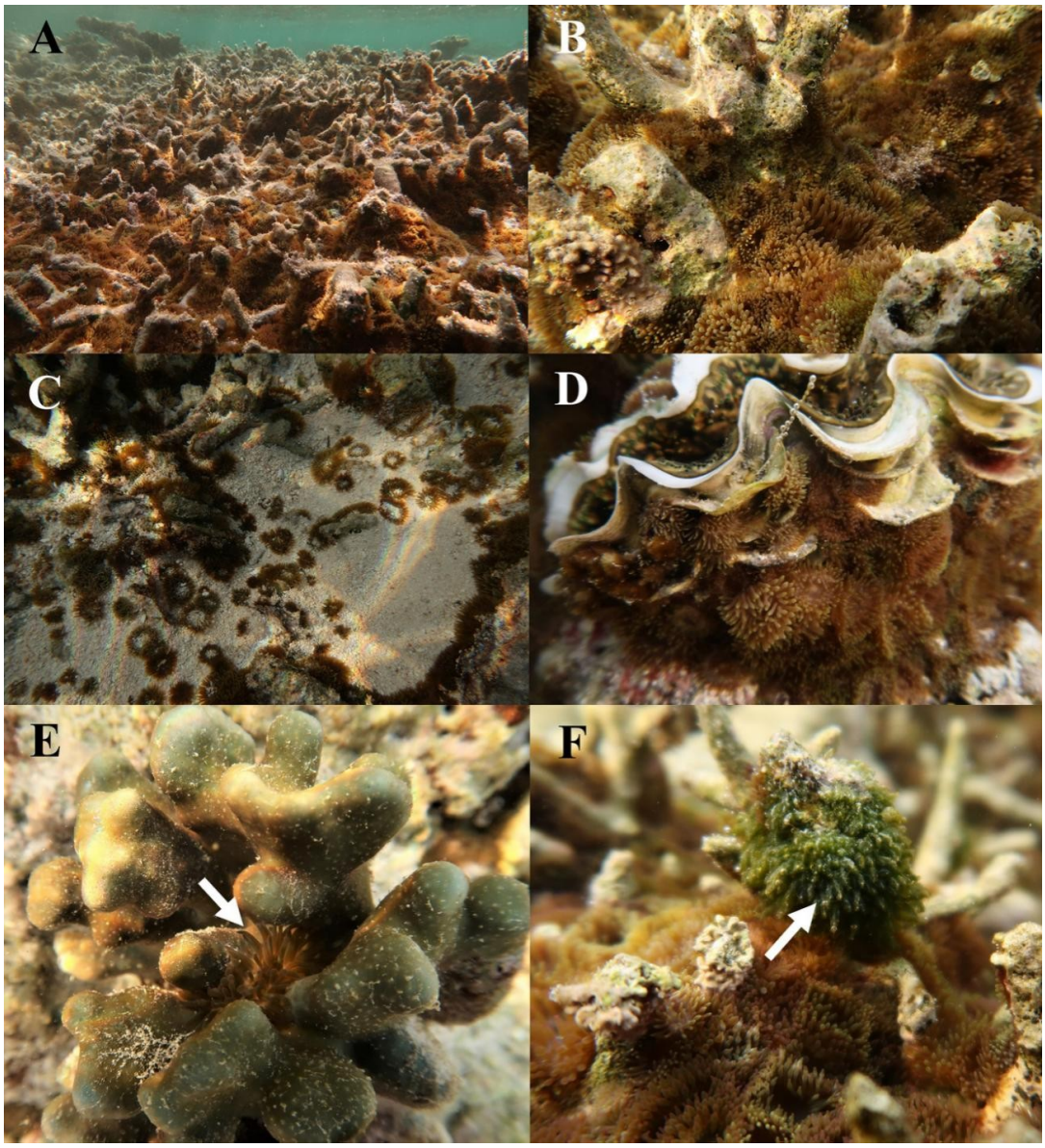
Sea anemone infestation on the coral reefs of Lakshadweep

Coral reefs have undergone a phase shift in several instances due to the dominance of soft corals, sea anemones or sponges. Such phase shifts could be triggered either by natural calamities or due to the anthropogenic disturbances that resulted in the reduction in coral cover and coral health

One such instance has been documented recently (February 2021), during an intertidal survey along the reef edges (lagoon side) of Agatti Island, Lakshadweep, India. The dead corals, shells of giant clams and some live corals were infested by corallimorph sea anemone (Figure 1). These are invasive and naturally thrive in man-made or environmentally disturbed coral reef habitats. They are considered as secondary colonizers that cover as a carpet the empty spaces of coral reefs. They are also resistant to pollutants

and could be a potential indicator for pollution studies. The present corallimorph sea anemone species was identified as Condylactis sp. due to its typical brown colour, short tentacles with pink-coloured tips and oral disk diameter of 0.5–4 cm with mouth turned upside down, which are characteristic features of corallimorph sea anemones. Like other sea anemones, the corallimorph sea anemones also possess zooxanthellae inside their

bodies to perform photosynthesis and provide nutrients to the host. The present infestation of corallimorph sea anemones in Lakshadweep is only observational and subsequent damage to the coral reefs needs to be examined.



13.3 OTHER RESEARCH AREAS RELATED TO SDG13

- Evaluating carbon sequestration potential of marine macrophytes and understanding photophysiology
- Understanding temporal variations in nutritional values of green seaweed Chaetomorpha antennina and their associated faunal communities.
- Deployment of underwater sensors to obtain real time data on seawater biogeochemistry

- Establishing Long Term Ecological Monitoring (LTEM) site at Palk Bay


Hannatech

13.4 CONVSERVATION AND OUTREACH

Scientists at the Centre for Climate Change Studies are active at disseminating information by organizing conservation outreach programs for the students, researchers and the general public.

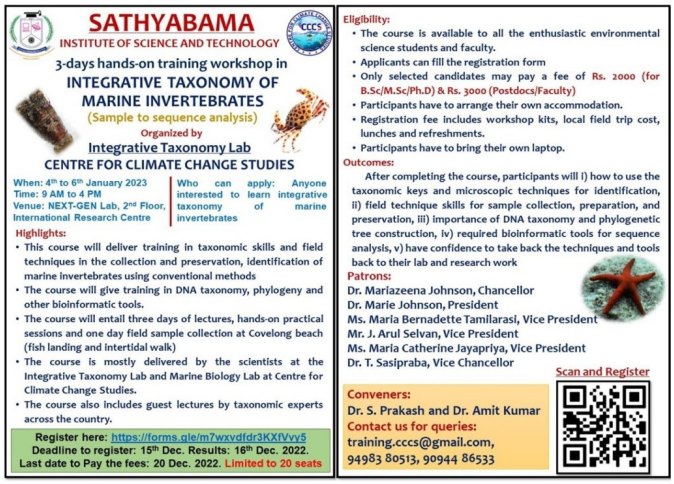
13.5 TEACHING AND LEARNING

We are committed to provide a high-quality education that enables our students to engage with sustainability challenges and to create indigenous solutions to the burning issues of climate change at the local, national and international levels. In support of this, we will encourage organizational

training inviting subject experts from different university/institutions towards sustainability-oriented change.

In addition, CCCS join hands with the Centre for Professional and Career Development at Sathyabama to provide curriculum innovation, research-led practice and staff training.

1. UG – Environmental Science and Engineering – SBTA1001
2. Certificate course in Marine Biology and Climate Change
3. Field course in Intertidal Ecology and Climate Change
4. Practical course in DNA Taxonomy and Phylogeny
5. Coordinating activities for the South Asian Regional Hub on Ocean Acidification


SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
3-days hands-on training workshop in
INTEGRATIVE TAXONOMY OF MARINE INVERTEBRATES
(Sample to sequence analysis)
Organized by
Integrative Taxonomy Lab
CENTRE FOR CLIMATE CHANGE STUDIES
When: 4th to 6th January 2023
Time: 9 AM to 4 PM
Venue: NEXT-GEN Lab, 2nd Floor, International Research Centre
Who can apply: Anyone interested to learn integrative taxonomy of marine invertebrates
Highlights:
• This course will deliver training in taxonomic skills and field techniques in the collection and preservation, identification of marine invertebrates using conventional methods
• The course will give training in DNA taxonomy, phylogeny and other bioinformatic tools.
• The course will entail three days of lectures, hands-on practical sessions and one day field sample collection at Covelong beach (fish landing and intertidal walk)
• The course is mostly delivered by the scientists at the Integrative Taxonomy Lab and Marine Biology Lab at Centre for Climate Change Studies.
• The course also includes guest lectures by taxonomic experts across the country.
Register here: https://forms.gle/m7wxvdfdr3KXfVvy5
Deadline to register: 15th Dec. Results: 16th Dec. 2022.
Last date to Pay the fees: 20 Dec. 2022. Limited to 20 seats
Eligibility:
• The course is available to all the enthusiastic environmental science students and faculty.
• Applicants can fill the registration form
• Only selected candidates may pay a fee of Rs. 2000 (for B.Sc/M.Sc/Ph.D) & Rs. 3000 (Postdocs/Faculty)
• Participants have to arrange their own accommodation.
• Registration fee includes workshop kits, local field trip cost, lunches and refreshments.
• Participants have to bring their own laptop.
Outcomes:
After completing the course, participants will i) how to use the taxonomic keys and microscopic techniques for identification, ii) field technique skills for sample collection, preparation, and preservation, iii) importance of DNA taxonomy and phylogenetic tree construction, iv) required bioinformatic tools for sequence analysis, v) have confidence to take back the techniques and tools back to their lab and research work
Patrons:
Dr. Mariazeena Johnson, Chancellor
Dr. Marie Johnson, President
Ms. Maria Bernadette Tamilarasi, Vice President
Mr. J. Arul Selvan, Vice President
Ms. Maria Catherine Jayapriya, Vice President
Dr. T. Sasipraba, Vice Chancellor
Scan and Register
Conveners:
Dr. S. Prakash and Dr. Amit Kumar
Contact us for queries:
training.cccs@gmail.com,
94983 80513, 90944 86533


GOA-ON
Global Ocean Acidification Observing Network
SAROA hub
WEBINAR series
SAROA
Ocean acidification in the northern Indian Ocean: Role of atmospheric pollutants
23 March 2023; 5 PM IST
Dr. VVSS Sarma
Chief Scientist and Scientist-In-Charge
CSIR-NIO Regional Centre, Visakhapatnam
Register here: https://forms.gle/FLRcxxcaV92qivTQ8
You will receive zoom link after registration


SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
U/S 3 STATUS BY UGC
Centre for Climate Change Studies
We cordially invite you all to join us on
WORLD WETLANDS DAY 2022
WETLANDS: THROUGH THE EYES OF A NATURE ENTHUSIAST
Invited speakers
Basil Peter
Nishand Venugopal
Date & Time:
02 Feb 2022 (Wednesday)
12 PM to 2 PM
Registration Link:
https://forms.gle/WWfWPCfUxvyHBgk2A
Only registered participants will get the ZOOM link
Chief patrons
Dr. Mariazeena Johnson, Chancellor
Dr. Marie Johnson, President
Mr. J. Arul Selvan, Vice President
Ms. Maria BernadatteTamilarasi, Vice President
Patron
Dr. T. Sasipraba, Vice Chancellor
Organizers:
Ms. Kunjulakshmi K
Dr. Amit Kumar
Dr. S. Prakash
Email
training.cccs@gmail.com
Profile of the invited speakers
A nature enthusiast, Nishand Venugopal quit his 15-year-old job as a producer in a leading English news channel to pursue his passion for nature and wildlife conservation. He's an avid nature photographer, writes poetry and prose that focus on nature and conservation, and uses his website (www.nishandphotoark.com/) and social media channels to encourage people to observe and conserve nature. His articles and poems have been featured on websites such as Lonely Conservationists, Science Next Door, The Paise Trail, Kate on Conservation, Spillwords, Conservation Optimism, East Mojo etc. He was selected as Saevus Wildlife magazine's Gallery Member of the Month for March 2020 and his interview was published in the magazine. Recently his blog got published in the book named 'The Secret Life of Conservationists' by Lonely Conservationists.
Nishand Venugopal
Wildlife & Nature Photographer, Peter Basil is a member of Cochin Natural History Society (CNHS). He serves as a resource person for Kerala Forest Department. He is instrumental in spreading awareness for nature conservation. He delivers frequent talks about Birds & conservation to schools & colleges, nature clubs in India and abroad. He is also a guest speaker in Lowa University, Chicago. He has conducted photo exhibitions "Whispers from Nature" at Durbar Hall for Kerala Forest Department, and in the High Court of Kerala. He has given interview to All India Radio on important days related to nature. His photos are published in leading newspapers, magazines such as The Hindu, Indian Express, Malayala Manorama & Mathrubhumi and in the books of reputed Naturalists.
Basil Peter

13.6 RESEARCH FUNDING

We are always grateful to your funding agencies who believe in our high-quality, cutting-edge research in the themes of marine ecology and climate change that embraces the real-world challenges to advance and translate knowledge and to drive innovation and enterprise. We are delivering research that helps to lead global change, providing evidence to underpin policy making and shape the way organizations operate, creating jobs and opportunity.

S. No	Name of PI	Title of the project	Amount (in Rs.)	Funding agency	Status
1.	Dr. Amit Kumar	Can seaweed provide refugia to associated communities under climate change conditions?	29,55,000	SERB- ECR, India	Completed
2.	Dr. S. Prakash	Evaluating the population and conservation status of endangered humphead wrasse in Gulf of Mannar, India	4,97,000	Wildlife Conservation Trust, India	Completed
3.	Dr. Thanga Suja	Adaptation of Nilaparvata lugens (Stahl) (brown planthopper) to resistant rice: Characterizing the role of salivary gland plasticity in insect virulence	60,79,476	SERB-CRG, India	Ongoing
4.	Dr.Thanga Suja	Agri Innovation Hub for Holistic Development of Scheduled Tribe Population in Anaicut Block\ in Jawadu Hills, Vellore District, TN	2.6 Crore	DST-STI Hub, India	Ongoing
5.	Ms. Shruthika Raut	Assessing diversity, population genetics and conservation status of Electric Rays along Bay of Bengal, India	Rs.6.0 lakhs	The Rufford Foundation, London	Ongoing
6.	Ms. K.Kunjulakshmi	Assessing the conservation priorities of freshwater ornamental shrimp (family Atyidae and Palaemonidae) from the central western ghats, India	Rs.5.82 Lakhs	The Rufford Foundation, London	Ongoing

13.7 PUBLICATIONS (RESEARCH ARTICLES)

1. Kumar A., Prakash, S. 2023. Mitochondrial Genome of “Spotted Numbfish” Narcine timlei (Bloch & Schneider, 1801) and Phylogenetic Relationships among Order Torpediniformes. Journal of Applied Ichthyology, Article ID 6829359.
2. Baeza, J.A., Prakash, S., Frolová, P. et al. 2023. Unweaving a hard taxonomic knot in coral reef dwellers: integrative systematics reveals two parallel cryptic species complexes in ‘marbled’ shrimps of the genus Saron Thallwitz 1891 (Caridea: Hippolytidae). Coral Reefs 42, 157–179, https://doi.org/10.1007/s00338-022-02317-9.
3. R. Gueron, A.O. Almeida, R. Aguilar, M.B. Ogburn, S. Prakash, J.A. Baeza. 2022. Delimiting species within the Lysmata vittata (Stimpson, 1860) (Decapoda: Lysmatidae) species complex in a world full of invaders. Zootaxa. 5150(2): 189-216.
4. S. Prakash, T. T. Ajith Kumar, Kuldeep, K. Lal. 2022. Corallimorph sea anemone infestation in the coral reefs of Lakshadweep archipelago, India. Current Science. 122 (9): 1090-1091.
5. S. Prakash, N. Marimuthu. 2022. First record of some crinoid and sponge associated crustacean decapods (Crustacea: Decapoda) from Lakshadweep Archipelago. Thalassas: An international Journal of Marine Sciences, 1-6 (published online).
6. S. Prakash, Amit Kumar, M.K. Okla, A. Ahmad, Z.K. Abbas, A. A. Al-Ghamdi, G. Beemster, H. AbdElgawad. 2022. Physiological responses of the symbiotic shrimp Ancylocaris brevicarpalis and its host sea anemone Stichodactyla haddoni to ocean acidification. Marine Pollution Bulletin, 175: 113287.
7. Aguilar, R., Prakash, S., Ogburn, M.B., Lohan, K.M., MacDonald, K.S., Driskell, A.C., Ahyong, S. T., Leray, M., McIlroy, S.E., Tuckey, T.D., Baeza, A.J. 2022. Unresolved taxonomy confounds invasive species identification: the Lysmata vittata Stimpson, 1860 (Decapoda: Caridea: Lysmatidae) species complex and recent introduction of

Lysmata vittata sensu stricto in the western Atlantic. Journal of Crustacean Biology, 2(1): 1-18.

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9. S. Raut, S. Prakash, Kumar, A. 2022. New distributional record of Pen shell Atrina hystrix (Hanley, 1858) from Chennai coast, India. The Nautilus, 136, 49-55.
10. Raut, S., Prakash, S., Vinuganesh, A., Kumar, A. 2022. A new species of the genus Protohyale Bousfield & Hendrycks, (Crustacea, Amphipoda, Hyalidae) from Covelong, Chennai, India. Zootaxa 5205 (6): 563–574, DOI: 10.11646/ZOOTAXA.5205.6.4.
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12. Vinuganesh, A., Kumar, A., S. Prakash, SM Korany, EA Alsherif, S. Selim, H. AbdElgawad. 2022. Evaluation of growth, primary productivity, nutritional composition, redox state, and antimicrobial activity of red seaweeds Gracilaria debilis and Gracilaria foliifera under pCO2-induced seawater acidification. Marine Pollution Bulletin, 185, Part A, 114296.
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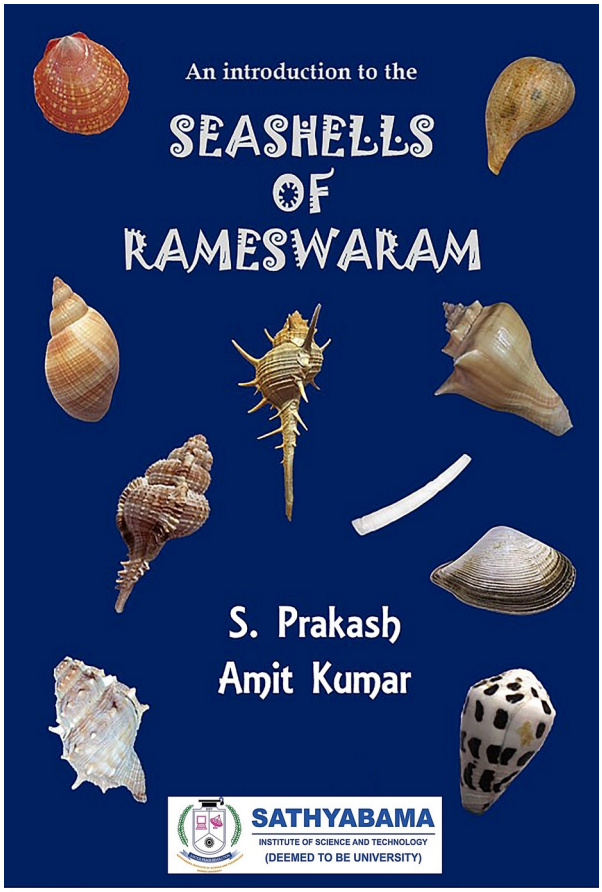
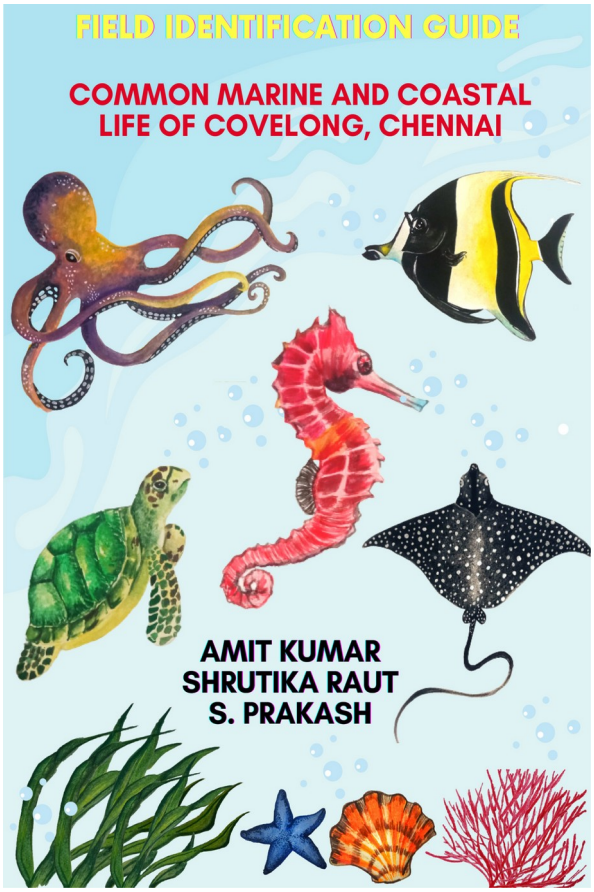
14. Arya, A., Kumar, A. 2022. Serum and plasma proteomics for high altitude related biomarker discovery. In High altitude sickness – solutions from genomics, proteomics, and antioxidant interventions (eds. N.K. Sharma and Arya, A). Springer nature Singapore.
15. M. Rajesh Kannan, R. Balakrishnan, M. Thillaichidambaram, S. Natesan, P. Gunasekaran, S. Prakash, C.M. Ramakritinan. 2023. Probing the thermo tolerant endosymbiont genus Durusdinium (Clade D) in the scleractinian corals of Palk Bay, Southeast coast of India. Biologia, 78: 255-264.

Books

1. Amit Kumar, Shruthika Raut and S. Prakash. 2022. Field Identification Guide to Common Marine and Coastal Life of Covelong, Chennai. Sathyabama Institute of Science and Technology, Chennai. 1-161 pp. ISBN 978-93-83409-76-1.
2. S. Prakash and Amit Kumar. 2021. An introduction to the seashells of Rameswaram. Sathyabama Institute of Science and Technology, Chennai. 85 pp. ISBN 978-93-83409-10


An introduction to the
SEASHELLS OF RAMESWARAM
S. Prakash
Amit Kumar
SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)


FIELD IDENTIFICATION GUIDE
COMMON MARINE AND COASTAL LIFE OF COVELONG, CHENNAI
AMIT KUMAR
SHRUTIKA RAUT
S. PRAKASH

13.8 INTERNATIONAL VISITS RELATED TO SDG 13

13.9 MoUs

With Neelithal Aquaponics, Mettupalayam - For aquaponics and hydroponics related work, feed testing, etc

SDG 14 - LIFE BELOW WATER

Oceans cover more than 70% of the planet and are a source of food and income for more than 10% of the world's population. Pollution and climate change continue to have a major impact on the ocean. Countries are working together to protect the marine environment from their effects and achieve United Nations Sustainable Development Goal (SDG) 14, which calls for conserving and sustainably using the oceans, seas and marine resources for sustainable development.

Sathyabama Institute of Science and Technology is focusing to conserve and sustainably use the oceans, seas and marine resources for sustainable development (SDG 14) though its premier research centres like Centre for Ocean Research, Centre for Climate Change Studies, Centre for Remote Sensing and Geoinformatics and Centre for Earth and Atmospheric Sciences. Centre for Ocean Research (COR) was established in 2007 as a joint initiative of National Institute of Ocean Technology (NIOT) Chennai and Sathyabama Institute of Science and Technology to encourage targeted sectors like reduce marine pollution; protect and restore ecosystems; reduce ocean acidification; sustainable fishing; conserve coastal and marine areas; end subsidies contributing to overfishing; increase the economic benefits from sustainable use of marine resources; increase scientific knowledge; research and technology for ocean health; support small scale fishers; and implement and enforce international sea law. The main role of the research centres are to facilitate a platform to the student communities from the Schools and Departments to utilize the high end instrumentation related to

ocean science and research as Ocean education is enhanced through scientific cooperation and knowledge at all levels, through the development of research capacity and through the transfer of marine technology.

14.1 INTEGRATIVE TAXONOMY LAB AT CENTRE FOR CLIMATE CHANGE STUDIES

Currently, we are working in three areas: Marine Biodiversity Assessment; Impact of climate change stressors on marine organisms and Marine Microbial Bioprospection.

In our laboratory, we take a multidisciplinary and integrative approach. We are not fixated on any particular technique but use all appropriate methods to answer our research questions - from microscopy to next-generation sequencing, from behavior to physiology.

14.1.1 Marine Biodiversity Assessment

We have been actively involved in the assessment of marine and coastal biodiversity of Covelong, Chennai and Gulf of Mannar & Palk Bay, Ramanathapuram, and Lakshadweep Islands by conducting regular fish landing visits, underwater benthic surveys by snorkeling and SCUBA diving. Several new records of marine invertebrates such as soft corals, shrimps, Amphipods and freshwater shrimps have been discovered.

Underwater images and study site along the Tamil Nadu coast and Lakshadweep Islands

Understanding cryptic species lineage and species boundaries

Delineating species boundaries correctly is crucial to the discovery of life's diversity because it determines whether or not different individual organisms are members of the same entity. The gap in communication between the different disciplines currently involved in delimiting species is an important and overlooked problem in the so-called 'taxonomy crisis'. To solve this problem, it is suggested that taxonomy become integrative, and this integration is seen as the real challenge for the future of taxonomy.

Therefore, in Integrative Taxonomy lab at CCCS we adapt a comprehensive framework to delimit and describe taxa by integrating information from different types of data and methodologies. It includes morphology (shape, size, coloration), genetics, population, ecology, behavior and biogeography.

New species discovery and Cryptic species complexes

Cleaning partner shrimp - Urocaridella degravei **sp. nov.**

Peppermint shrimp - Lysmata wurdemanni complex

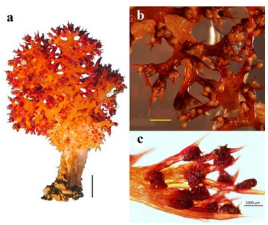
Peppermint shrimp - Lysmata vittata complex

Amphipod - Protohyalae covelongensis **sp. nov.**

Freshwater shrimp - Macrobrachium irwini **sp. nov.**

Marbled shrimp – Saron marmoratus and S. neglectus complex

Nemertean worm - Tetrastemma freyae **sp. nov.**



Soft coral - Dendronephthya johnsonii **sp. nov.**

14.1.2 Related Publications

1. Baeza, J.A., S. Prakash, P. Frolova, Z. Duris and A. Anker. 2023. Unweaving a hard taxonomic knot in coral reef dwellers: integrative systematics reveals two parallel cryptic species complexes in ‘marbled’ shrimps of the genus Saron Thallwitz 1891 (Caridea: Hippolytidae). Coral Reefs 42, 157-179.
2. Raut, S., Prakash, S., Amit Kumar. 2022. New distributional record of pen shell Atrina hystrix (Hanley, 1858) (Bivalvia: Pinnidae) from Chennai coast, India. The Nautilus, 136(3-4): 49-55.
3. Shruthika Raut, S. Prakash, Vinuganesh, A., Amit Kumar. 2022. A new species of the genus Protohyale Bousfield & Hendrycks, 2002 (Crustacea, Amphipoda, Hyalidae) from Covelong, Chennai, India. Zootaxa, 5205(6): 563-574.
4. K. Kunjulakshmi, M.A Santos, S. Prakash. 2022. Macrobrachium irwini sp. nov., a new species of freshwater shrimp from Western Ghats, India (Caridea: Palaemonidae). Zootaxa, 5194(3): 416-425.
5. R. Gueron, A.O. Almeida, R. Aguilar, M.B. Ogburn, S. Prakash, J.A. Baeza. 2022. Delimiting species within the Lysmata vittata (Stimpson, 1860) (Decapoda: Lysmatidae) species complex in a world full of invaders. Zootaxa. 5150(2): 189-216.

6. S. Prakash, N. Marimuthu. 2022. First record of some crinoid and sponge associated crustacean decapods (Crustacea: Decapoda) from Lakshadweep Archipelago. Thalassas: An international Journal of Marine Sciences, 1-6.
7. Aguilar, R., Prakash, S., Ogburn, M.B., Lohan, K.M., MacDonald, K.S., Driskell, A.C., Ahyong, S. T., Leray, M., McIlroy, S.E., Tuckey, T.D., Baeza, A.J. 2022. Unresolved taxonomy confounds invasive species identification: the Lysmata vittata Stimpson, 1860 (Decapoda: Caridea: Lysmatidae) species complex and recent introduction of Lysmata vittata sensu stricto in the western Atlantic. Journal of Crustacean Biology, 42(1): 1-18.
8. S. Balakrishnan, S. Prakash and P.C. Tudu. 2021. First record of a rare Axiid Shrimp Eutrichocheles modestus (Herbst, 1796) (Malacostraca: Decapoda: Axiidae) from Northwestern Bay of Bengal. Records of Zoological Survey of India, 121(1): 11-16.
9. Chernyshev, A. V., Polyakova, N. E., Vignesh, M. S., Jain, R. P., Prakash, S., Norenburg, J. L., Rajesh, R. P. 2020. A histology-free description of a new species of the genus Tetrastemma (Nemertea: Hoplonemertea: Monostilifera) from Hawaii and India. Zootaxa, 4808(2): 379-383.
10. Amit Kumar, D. Adhavan, Vinu Ganesh and S. Prakash. 2020. DNA barcoding revealed first record of 'fine-spotted' whipray Himantura tutul (Myliobatoidei: Dasyatidae) in the Indian coastal waters. Journal of Applied Ichthyology, 36: 515-518.
11. Prakash, S. and Amit Kumar. 2020. Varying color pattern, yet genetically similar: Pebble crab Seulocia vittata (Stimpson, 1858) (Brachyura: Leucosiidae) from the southeastern coast of India. Journal of Threatened Taxa, 12(5): 15612-15618.
12. Prakash, S. and N. Marimuthu. 2020. Notes on some crinoid associated decapod crustaceans (Crustacea: Decapoda) from Lakshadweep Archipelago, Central Indian Ocean. Zootaxa. 4776(1): 86-100.

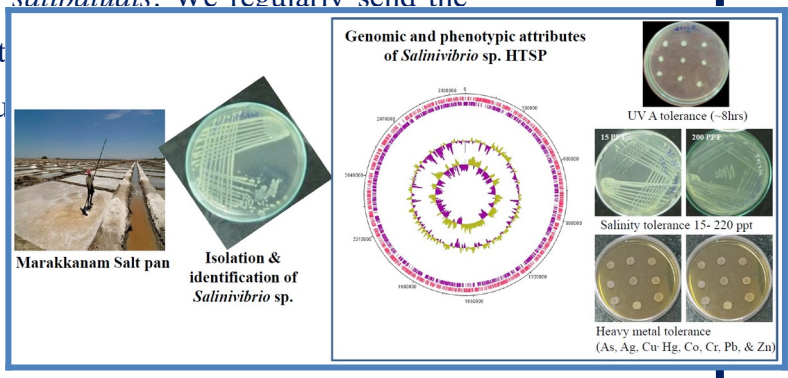
13. Prakash, S. and J. A. Baeza. 2018. A new species of shrimp of the genus Urocaridella Borradaile, 1915 (Decapoda: Caridea: Palaemonidae) from Papua New Guinea. Journal of Crustacean Biology, 38(2): 206-214.
14. Prakash, S. and J. A. Baeza. 2017. A new species of Lysmata Risso, 1816 (Caridea, Decapoda, Lysmatidae) from the Gulf of Mexico. Zootaxa, 4363(4): 576-582.

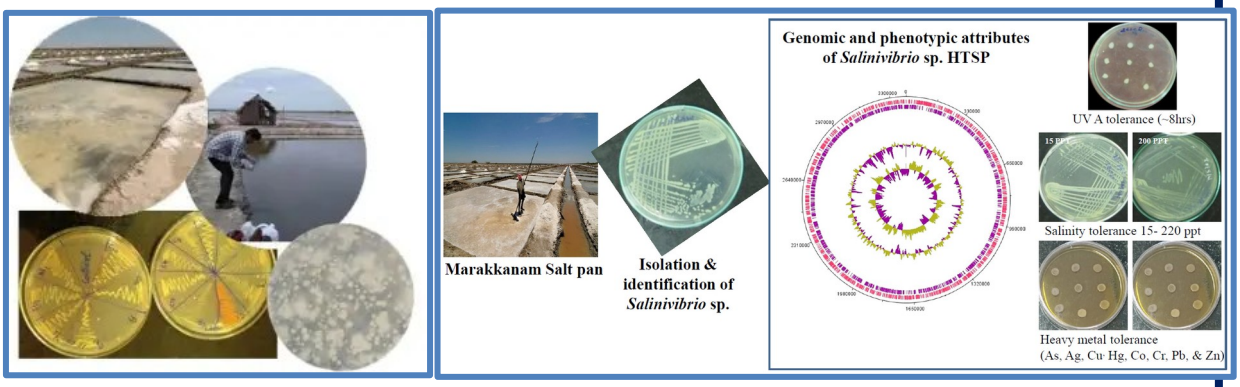
Books published related to SDG14

1. Amit Kumar, Shruthika Raut and S. Prakash. 2022. Field Identification Guide to Common Marine and Coastal Life of Covelong, Chennai. Sathyabama Institute of Science and Technology, Chennai. 1-161 pp. ISBN 978-93-83409-76-1.
2. S. Prakash and Amit Kumar. 2021. An introduction to the seashells of Rameswaram. Sathyabama Institute of Science and Technology, Chennai. 85 pp. ISBN 978-93-83409-10

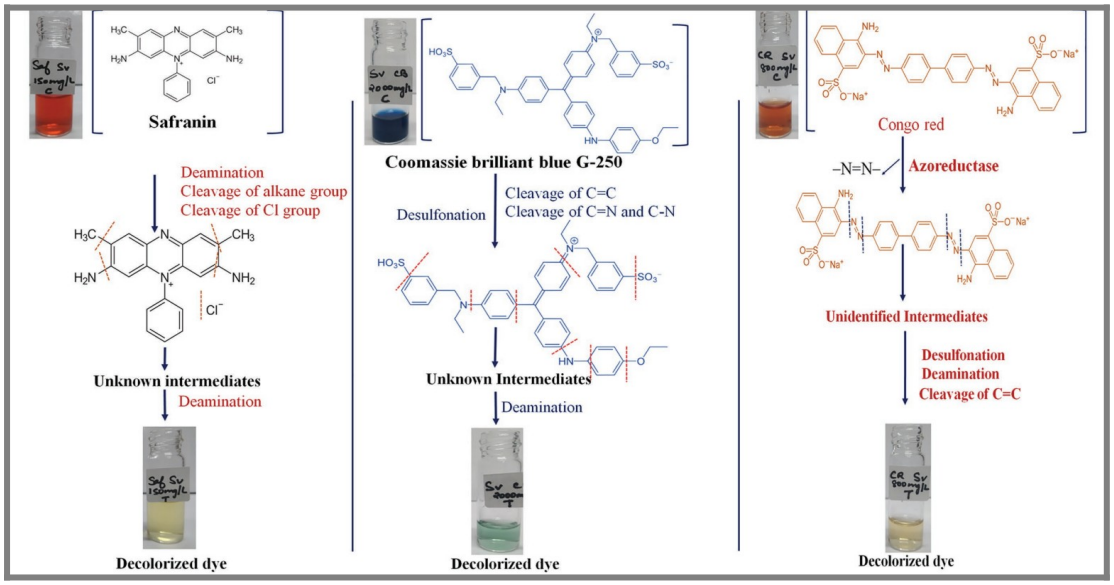
14.1.3 Microbial Diversity and Bioprospection

We isolate and identity marine bacteria, in particular halophiles from the saltpans of Tamil Nadu. We have more than 25 halophilic bacterial isolates in our laboratory. Many of these isolates have shown potential for various industrial applications. We did whole genome sequencing of two bacteria: *Salinivibrio kushnerii* and *Pontibacillus salipaludis*. We regularly send the isolates to our aquaculture industry part
suitability for commercial applications su
shrimps etc.

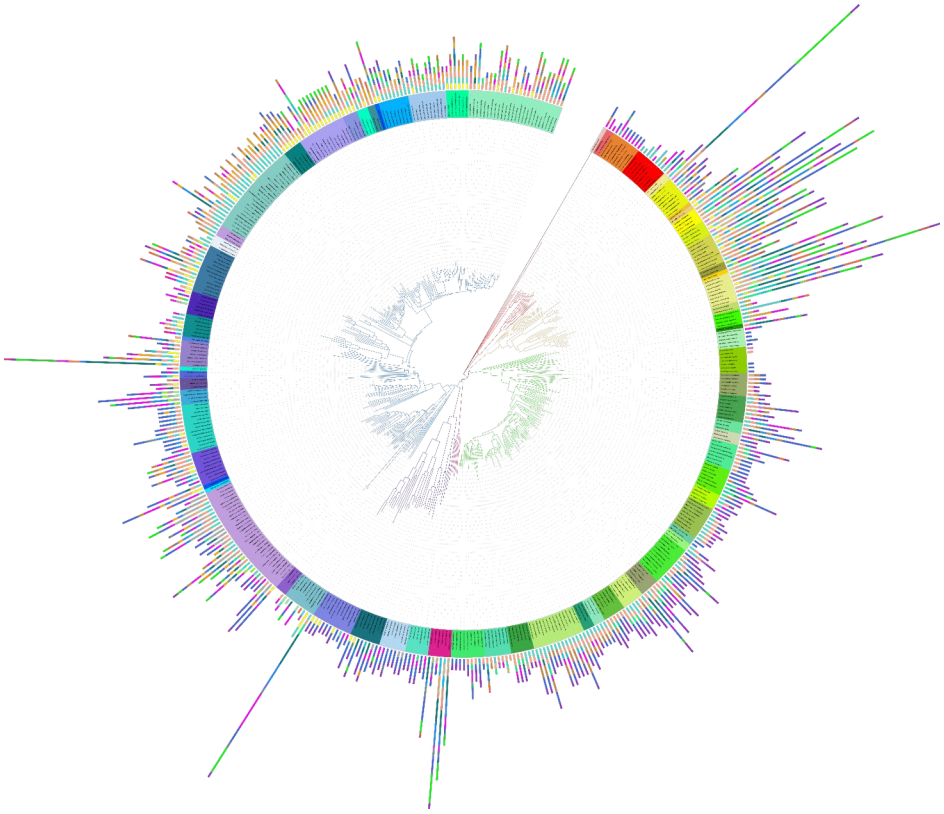




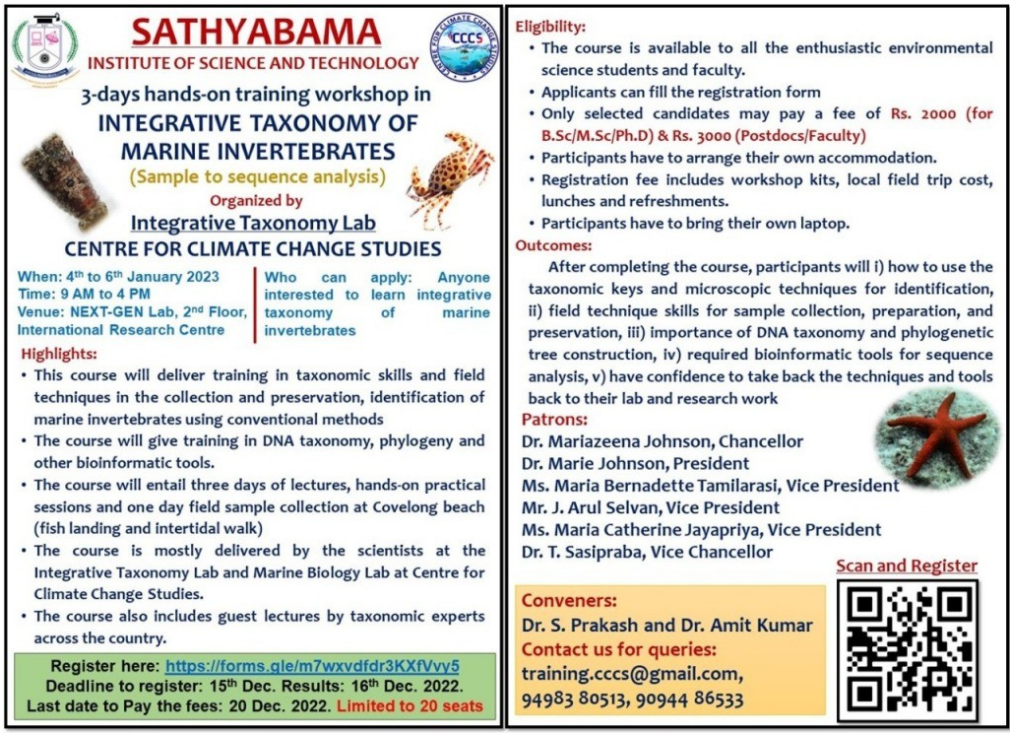
Biodecolorization of synthetic dyes by a Halophilic bacterium *Salinovibrio* sp.



In Silico genome mining for Biosynthetic Gene Clusters from halophilic microbes



Workshops organized related to Life Below Water SDG14



SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY

3-days hands-on training workshop in
INTEGRATIVE TAXONOMY OF MARINE INVERTEBRATES
(Sample to sequence analysis)
Organized by
Integrative Taxonomy Lab
CENTRE FOR CLIMATE CHANGE STUDIES

When: 4th to 6th January 2023
Time: 9 AM to 4 PM
Venue: NEXT-GEN Lab, 2nd Floor, International Research Centre

Who can apply: Anyone interested to learn integrative taxonomy of marine invertebrates

Highlights:
- This course will deliver training in taxonomic skills and field techniques in the collection and preservation, identification of marine invertebrates using conventional methods
- The course will give training in DNA taxonomy, phylogeny and other bioinformatic tools.
- The course will entail three days of lectures, hands-on practical sessions and one day field sample collection at Covelong beach (fish landing and intertidal walk)
- The course is mostly delivered by the scientists at the Integrative Taxonomy Lab and Marine Biology Lab at Centre for Climate Change Studies.
- The course also includes guest lectures by taxonomic experts across the country.

Register here: https://forms.gle/m7wxvdfdr3KXfVvy5
Deadline to register: 15th Dec. Results: 16th Dec. 2022.
Last date to Pay the fees: 20 Dec. 2022. Limited to 20 seats

Eligibility:
- The course is available to all the enthusiastic environmental science students and faculty.
- Applicants can fill the registration form
- Only selected candidates may pay a fee of Rs. 2000 (for B.Sc/M.Sc/Ph.D) & Rs. 3000 (Postdocs/Faculty)
- Participants have to arrange their own accommodation.
- Registration fee includes workshop kits, local field trip cost, lunches and refreshments.
- Participants have to bring their own laptop.

Outcomes:
After completing the course, participants will i) how to use the taxonomic keys and microscopic techniques for identification, ii) field technique skills for sample collection, preparation, and preservation, iii) importance of DNA taxonomy and phylogenetic tree construction, iv) required bioinformatic tools for sequence analysis, v) have confidence to take back the techniques and tools back to their lab and research work

Patrons:
Dr. Mariazeena Johnson, Chancellor
Dr. Marie Johnson, President
Ms. Maria Bernadette Tamilarasi, Vice President
Mr. J. Arul Selvan, Vice President
Ms. Maria Catherine Jayapriya, Vice President
Dr. T. Sasipraba, Vice Chancellor

Scan and Register

Conveners:
Dr. S. Prakash and Dr. Amit Kumar
Contact us for queries:
training.cccs@gmail.com,
94983 80513, 90944 86533

Conservation of Electric rays related to SDG14


SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
CENTRE FOR CLIMATE CHANGE STUDIES
in asscociation with
TAMILNADU TOURISM
DEVELOPMENT CORPORATION
(A Govt. of Tamilnadu Undertaking)
Presents
Electric ray awareness campaign
Let's protect
ELECTRIC RAYS
JOIN US TO KNOW THESE SUPERCOOL GROUP OF RAYS!
We invite you to join us !!
Together, we will do fun learning about electric rays through interactive games and activities!
Electric rays are endangered and need our attention today more than ever! Let us save them before they are gone!!
Fun games
Competitions
Saturday, 8 April 2023
Blue Flag beach, Kovalam
Chennai- 603112
Start at 04:00 pm
Care
Love
Protect
Fun learning
ALL ARE WELCOME!!
Contact Person:
Dr. Amit Kumar: 9094486533
For more details, visit
https://projectrays.wordpress.com/ or scan
Supported by,
Ruffor


SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
ONE DAY ONLINE SYMPOSIUM
ON
BATOIDS(RAYS) OF INDIA
The symposium aims to raise awareness and bring attention to the species-rich yet under-studied group of Rays in India .
Theme I : Taxonomy and phylogeny
Theme II: Ecology and Behaivour
Theme III: Rays in fisheries
Theme IV: Socio-cultural perceptions
14th March 2023; 9:15 AM - 1 PM
on ZOOM
Anyone interested to learn about rays can attend
List of confirmed speakers (so far)
Dr. Shoba Joe Kizhakudan
Central Marine Fisheries Research Institute, Chennai
Dr. Amit Kumar
Sathyabama Institute of Science and Technology, Chennai
Trisha Gupta
University of Oxford, United Kingdom
Dr. Divya Karnad
Ashoka University, Haryana
Shrutika Raut
Sathyabama Institute of Science and Technology, Chennai
E-certificates will be provided to all the active participants
To register, click here or scan: https://forms.gle/2QYYdpQ3RTuNaJiZ7
Organizers:
Dr. Amit Kumar
Ms. Shrutika Raut
Dr. S. Prakash
Ms. Kunjulakshmi
Supported by
Ruffor
Email: training.cccs@gmail.com
or call: 9094486533 for more info.
Patrons
Dr. Mariazeena Johnson, Chancellor
Dr. Marie Johnson, President
Vice- Presidents
Mr. J. Arul Selvan
Ms. Maria Bernadette Tamilarasi
Ms. Maria Catherine Jayapriya
Dr. T. Sasipraba, Vice Chancellor

14.1.4 Awards and Honors

S.No	Name	Awards/honors	Year
1	Ms. Shruthika Raut	Rufford small grant to assess diversity, population genetics and conservation of electric rasys	2022
2	Dr. S. Prakash	INSA visiting Scientist by Indian National Science Academy (INSA), New Delhi	2022
3	Dr. Amit Kumar	International Travel grant to attend 5th International symposium on the high CO2 world at Lima, Peru by US Federal agencies	2022

14.2 THE CENTRE FOR OCEAN RESEARCH- TOWARDS SDG 14

The Ocean plays a significant role in the functioning of earth system and in the provision of the goods and services. Oceans are responsible for various benefits, such as livelihoods, subsistence, and economic opportunities in sectors like fisheries and tourism. Though, many ecological services provided by the marine ecosystem, their biodiversity found less sustainable

in the name of urbanization along the coastal areas. Life below water faces various threats, including overfishing, pollution, climate change, sea level rise and illegal fishing. These threats can lead to the depletion of marine resources, endangering the livelihoods of millions of people. Sustainable Development Goal 14, also known as "Life below water," is one among the 17 Sustainable Development Goals established by the United Nations in 2015 that aimed to conserve and sustainably use the oceans, seas, and marine resources for sustainable development. This goal recognizes the importance of protecting marine ecosystems, promoting sustainable fishing practices, and reducing marine pollution to ensure the health and well-being of both marine life and human communities that depend on these resources.

Sathyabama Institute of Science and Technology is focusing to conserve and sustainably use the oceans, seas and marine resources for sustainable development (SDG 14) though its premier research centers like Centre for Ocean Research, Centre for Climate Change Studies, Centre for Remote Sensing and Geoinformatics and Centre for Earth and Atmospheric Sciences. Centre for Ocean Research (COR) was established in 2007 as a joint initiative of National Institute of Ocean Technology (NIOT) Chennai and Sathyabama Institute of Science and Technology to encourage targeted sectors like reduce marine pollution; protect and restore ecosystems; reduce ocean acidification; sustainable fishing; conserve coastal and marine areas; end subsidies contributing to overfishing; increase the economic benefits from sustainable use of marine resources; increase scientific knowledge; research and technology for ocean health; support small scale fishers; and implement and enforce international sea law.

14.3 SUPPORTING AQUATIC ECOSYSTEMS THROUGH EDUCATION:

SDG14_Q14.2.1: To commemorate the International Women's Day, Sathyabama Ocean Research Field Facility, Center for Ocean Research, in

association with MoES - Earth Science and Technology Cell has jointly organized a "Skill based training programme for Women on Backyard Fish Culture". The programme intended to provide an educational training to the fisher women from Kanathur Village in Cheyyur (Kancheepuram) Tamil Nadu on the fish culture using the Backyard Tilapia Rearing Technology using Collapsible FRP tanks. Hon. Chancellor gifted the seeds of GIFT (Genetically Improved Farmed Tilapia) Tilapia to each fisher woman for their livelihood option with the skill certificate. She also released the seeds in 10,000 litres volume FRP tanks for training the women on water quality management, feed technology and disease control. Director Research, Dr. B. Sheela Rani graced the occasion with her presence along with the Scientists of Center for Ocean Research.

SDG14_Q14.2.2. As a part of Life Below water, Centre for Ocean Research, Sathyabama Research Park, organized a Ministry of Earth Sciences-Earth Sciences Technology cell (MoES-ESTC), supported Lecture series on the

Sensitization Programme on importance of Marine Biotechnology". The lecture series aimed to gather communities of college students (with a zoology background) to catalyze information exchange and networking between researchers and entrepreneurs from ocean backgrounds

for advancement in the field of marine biotechnology and integrated approaches to ocean ecosystems.

SDG14_Q14.2.3_E1 Centre for Ocean Research, Sathyabama Research Park in association with Earth Science and Technology Cell, Ministry of Earth Sciences offered a Training programme on “Sea Shore- Mangrove Associated Fauna along Chennai Coast: From Basic Taxonomy to Recent Trends. This training programme offered a field knowledge to the participants about the mangrove environment and their associated fishing activities. The programme attributed knowledge sharing among the young generation on the unregulated fishing activities nearby mangrove region and also trained the participants in collecting, processing and identifying the marine samples specific to mangroves and Corals. Invited Guest speakers Dr.K. Venkataraman, Former Director, Zoological Survey of India and Mr. M. Kathirvel, Former Principal Scientist, Central institute of Brackish water, Chennai delivered special address during the training programme. The participants of the training programme include Faculty, Research scholars and Students from various universities and colleges across India.

14.4 SUPPORTING AQUATIC ECOSYSTEMS THROUGH ACTION

SDG14_Q14.3.1. Centre for Ocean Research, Sathyabama Research Park, organized a DST-SERB sponsored National Conference on "Integrative-Omics in the Ocean Climate Change" This conference aimed to gather the eminent research communities to catalyze for information exchange and networking between researchers and entrepreneurs from Ocean backgrounds for advancement in the field of Ocean Climate Change and integrated approaches for Ocean Conservation. Over 31 participants were attended from various state Universities, Colleges of Tamil Nadu and delivered oral and poster presentation during the conference. Guest Speakers invited for the conference gave an insightful talk on their current research and acted as a Session Chair for evaluating the poster and oral presentations.

SDG14_Q14.3.3. As a marine ecosystem management and conservation, our research team from Centre for Ocean Research focusing and performing research on the marine foundation ecosystem. In specific, we are doing research on the seagrass ecosystem, as it acts as major ecological engineers and mitigates warming through blue carbon sequestration. Since there found a decline in the seagrass biodiversity globally, we are working on the extension of seagrass meadows along the Palk Bay regions. As a part, we have established a Halophyte Micropropagation lab where the seagrasses are propagated under the laboratory condition and started a field trial in order to cclimatize for their extension, so that the ecosystem will be conserved and will pave a way for developing the management strategies towards conservation and restoration.

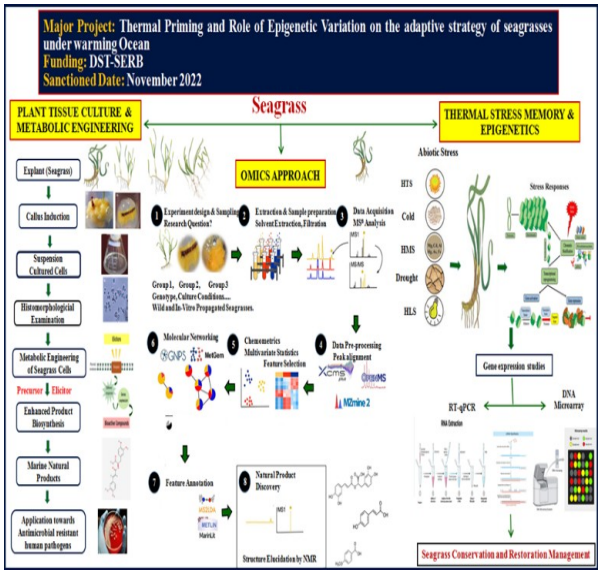
SDG14_Q14.3.4. As a part of SDG goal 14.3.4, Centre for Ocean Research team performing research on the potential effects of sulfated polysaccharides (SP) from seaweeds against the virus which infect the fish community. As a part to minimize or prevent damage to aquatic ecosystems, we studied in extracting the polysaccharides from brown seaweed *Sargassum ilicifolium* and then evaluated its antiviral activity against fish Betanoda virus. The results indicated that the polysaccharides obtained from *S. ilicifolium* exhibited the high antiviral potential to Betanodavirus infection in fishes

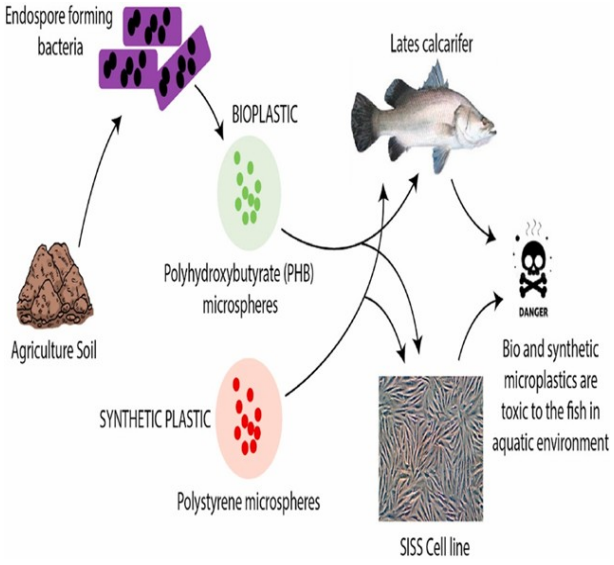
both in vitro and in vivo. The article was published in Aquaculture International.

14.5. MAINTAINING A LOCAL ECOSYSTEM

SDG14_14.5.2. As a part of monitoring the health of an aquatic Ecosystem, a major research project was sanctioned in Centre for Ocean Research funded by Ministry of Earth Sciences entitled “Studies on the implications of engineered nanoparticles and bio-nanocomposites in aquatic animal health”. The main objective was to understand the negative impacts of synthetic plastic debris particles in the aquatic ecosystem and its influence in reducing the fish populations. Hence as a part of the project, comparative analysis of toxicities induced by bio and synthetic plastic microspheres in Lates calcarifer cell line were studied and monitored for monthly intervals. The baseline results suggest, that even bioplastic have the risk of inducing toxicity similar to the synthetic plastic in aquatic species. The above research work was published in Chemosphere Journal.

SDG14_14.5.2_E2. A major research project was sanctioned from DST-SERB during November 2022 in monitoring the Seagrass ecosystem under different anthropogenic and climate factors along the Tamil Nadu Coasts. The major objective of the research project is to implement the advanced integrated approach for understanding the stress tolerance mechanisms of seagrasses towards conservation and restoration practices. Field surveys will be performed on a monthly basis for sample collections and transported to the mesocosm facility established at Halophyte Micropropagation Lab, Centre for Ocean Research for exposing to different abiotic stress factors. This would help to understand how the seagrasses attain the adaptive strategy and stress tolerance mechanisms towards developing the management practices for restoration and conservation.





SDG14_14.5.2. As a part of a research performance related to health of an aquatic Ecosystem, Centre for Ocean Research has published an article in developing antimicrobial nanomaterials with antimicrobial activity in

FILE NO. SRG/2022/000185
SCIENCE & ENGINEERING RESEARCH BOARD(SERB)
(A statutory body of the Department of Science & Technology, Government of India)
Science and Engineering Research Board
3rd & 4th Floor, Block II
Technology Bhavan, New Mehrauli Road
New Delhi - 110016

Dated: 27 October, 2022

ORDER

Subject: Financial Sanction of the research project titled **THERMAL PRIMING AND ROLE OF EPIGENETIC VARIATION ON ADAPTIVE STRATEGY OF SEAGRASSES UNDER WARMING OCEAN** under the guidance of Dr. Jeyapragash Danaraj, Centre for Ocean Research, Sathyabama Institute of Science and Technology , Jeppiaar nagar, rajiv gandhi salai, chennai, Chennai, Tamil nadu-600119 - Release of 1st grant.

Sanction of **Science and Engineering Research Board (SERB)** is hereby accorded to the above mentioned project at a total cost of **Rs. 2450260/- (Rs.** Twenty Four Lakh Fifty Thousand Two Hundred and Sixty **Only)** with break-up of **Rs. *600000/-* under Capital (Non-recurring) head** and **Rs.*1850260/-* under General (Recurring) head** for a duration of 24 months. The items of expenditure for which the total allocation of **Rs. 2450260/-** has been approved are given below:

The following budget may be considered for **Sathyabama Institute Of Science And Technology , Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai**

order to exhibit the potential efficacy against the fish pathogen Providencia vermicola that affecting the commercial Rohu fish. A green synthesized (AgNPs) from butter fruit pulp showed a good efficiency in reducing the infection caused by P. vermicola in Rohu Fish. Following the results, bioactive nano-material was used in the aquafeeds to control the infections caused in the fishes cultured under farming conditions at local scale.

Our team from Centre for Ocean Research in partnership with Marine Products Export Development Authority (MPEDA) created awareness on the demerits of ghost net to the local fisher community at Pondicherry Fishing Villages as a part of Network for Fish Quality Management and Sustainable Fishing (NETFISH - MPEDA) from 12-08-22 to 13-08-22.

As a part of SDG 14 Life under Water, Centre for Ocean Research from Sathyabama Institute of Science and Technology has implemented an indoor Ocean Research Facility with watershed management for sustainable aquaculture practices. The facility was inaugurated by Dr. M. Ravichandran, MoES Secretary, Ministry of Earth Sciences, Government of India on 14.03.2022 for engaging the basic and applied research involving Fish spawning, rearing, grow out and nutritional studies.

The coastal cleanup drive was carried out at 75 beaches across the country with for every kilometre of the coastline. National Institute of Ocean Technology, Ministry of Earth Sciencesand Ocean Society of India (NGO) requested Sathyabama Institute of Science & Technology to joint hands with this coastal cleanup drive. As part of the Students Outreach Activity, around 125 students from Sathyabama - National Service Scheme and 30 faculty members from Center for Ocean Research, Col. Dr. Jeppiaar Research Park were actively participated in the International Coastal Cleanup Day on 17th September 2022.

As an IUCN member from our university Dr. D. Inbakandan, Professor and Head, Centre for Ocean Research has actively engaged in fostering the sustainable development of aquaculture and to promote the conservation of

related marine and freshwater biodiversity. The meeting was held with IUCN experts and groups with global expertise on aquaculture management and development, including biodiversity, ecosystem processes and precautionary approaches.

Centre for Ocean Research have made research collaboration with Universiti Tunku Abdul Rahman and Lee Kong Chian Faculty of Engeneering and Sciences, Malaysia and published a research article pertaining towards developing the approaches in tackling the SDGs. As a part, nanotechnology has brought advancements in the environmental and medical applications in controlling diseases and maintains proper human health. Zinc oxide nanoparticle (ZnO NP) is commonly used to treat a wide range of bacterial and fungal skin infections due to its antimicrobial property and the research investigation studied the antimicrobial effect of ZnO NP on *Pseudomonas aeruginosa* by testing the bacterial inhibition and the morphological damages caused by ZnO NP on *P. aeruginosa*.

Our team from Centre for Ocean Reseach, Sathyabama University of Science and Technology in collaboration with Ocean Society of India monitors the marine plastic pollution along the coastal villages of Tamil Nadu. As a part of SDG17, we used to organize programmes and creating awareness to the public on the demerits of plastics and its consequences to the marine biodiversity and humans. Moreover, our team has participated and will participate yearly in the coastal cleanup along with the OSI team to control and tackle the coastal plastic pollution.

14.6 FUNDED RESEARCH PROJECTS ADDRESSING SDG 14

S.No	**Department**	**Name of the Investigators**	**Title of the project**	**Funding Agency**	**Duration of the project with sanctioned year**
1.	Centre For Ocean Research	Dr.V.Karthick	Development of C60 Fullerene - PDMS based catheter endowed with reduced inflammation & infection	DAE-BRNS, Govt. of India	Three Years (2022 - 2025)
2.	Centre For Ocean Research	Dr.V.Karthick, Dr. T. Stalin Dhas, Dr.M.Ravi	Studies on the implication of engineered nanoparticles and bio nano composites in aquatic animal health	MoES - ESTC, Govt. of India	4 years (2019-2023)

S.No	Department	Name of the Investigators	Title of the project	Funding Agency	Duration of the project with sanctioned year
3.	Centre For Ocean Research	Dr. D. Inbakandan, Dr.L. Stanley Abraham	Marine microbial product based eco friendly nanocomposites for marine antifouling application	DBT	3 years (2021-2024)
4.	Centre For Ocean Research	Dr.K.Govindaraju, Dr.D.Inbakandan, Dr.V.Ganesh Kumar	Isolation and identification of bioactive compounds from marine sponges for white spot syndrome virus (WSSV) control	MoES - ESTC, Govt. of India	Four Years (2019-2023)
5.	Centre For Ocean Research	Dr. M. Ravi	Characterization and DNA barcoding of polychaetes from the South East Coast, India	MoES, Govt. of India	Three years and six month (2019-2023)
6.	Centre For Ocean Research	Dr. L. Stanley Abraham, Dr. D. Inbakandan, Dr. K. Govindaraju	Enhancement of marine microbial products for biomedical applications	MoES - ESTC, Govt. of India	Four Years (2019-2023)
7.	Centre For Ocean Research	D. D. Jeyapragash	Thermal priming and role of e genetic variation on the adaptive strategy of sragrasses under warming Ocean	DST-SERB	2 years (2022-2024)
8.	Centre For Ocean Research	Dr. D. Inbakandan, Dr. L. Stanley Abraham	Surface modification and nanotechnological approach for antifouling applications	MoES - ESTC, Govt. of India	4 years (2019-2023)
9.	Centre For Ocean Research	Dr. D. Inbakandan	Development of antifouling technologies against green mussel fouling for process cooling water system of MAPS	DAE-BRNS, Govt. of India	3 years (2021-2024)

S.No	Department	Name of the Investigators	Title of the project	Funding Agency	Duration of the project with sanctioned year
10.	Centre For Ocean Research	Dr.B.Sheela Rani,	Earth Science & Technology Cell (ESTC) Network Project entitled Marine Biotechnological Studies	MoES	4 Years (2019-2023)
11.	Centre For Earth And Atmospheric Sciences	Dr. P.M. Velmurugan	Ocean Acidification and its Impact on Benthic Calcareous Organisms: Implications from Palk Strait Bay of Bengal	DST-SERB	3 Years (2020-2023)

14.7 PUBLICATIONS

S.NO	Name of the Faculty	Department	Designation	Title of the Paper	Name of the Journal	DOI	I.F
1	Dr. R. Thirugnanasambandam	Centre For Ocean Research	Assistant Professor (Research)	Growth and biochemical profiling of marine microalgae Chlorella salina with response to nitrogen starvation	Marine Biology Research	https://doi.org/10.1080/17451000.2022.2131823	1.1
2	Dr.V. Ganesh Kumar	Centre For Ocean Research	Professor (Research)	Macroalgae-associated halotolerant marine bacteria Exiguobacterium aestuarii ADCG SIST3 synthesized gold nanoparticles and its anticancer	Journal of Molecular Liquids	https://doi.org/10.1016/j.molliq.2023.122061	6

				activity in breast cancer cell line			
3	Dr. M. Ravi	Centre For Ocean Research	Associate Professor (Research)	Laccase-assisted degradation of emerging recalcitrant compounds– A review	Bioresource Technology	https://doi.org/10.1016/j.biortech.2022.128 031	11.4
4	Dr. T. Stalin Dhas	Centre For Ocean Research	Assistant Professor (Research)	Antagonistic activity of a novel chitosan-selenium nanoflower against common aquaculture pathogen Aeromonas caviae	Aquaculture International	10.1016/j.envpol.2021 .117361	2.9
5	Dr. T. STALIN DHAS	Centre For Ocean Research	Assistant Professor (Research)	Optically active organic and inorganic nanomaterials for biological imaging applications: A review	Micron	10.1016/j.micron.2023.103486	2.4
6	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Development of new marine sourced liquid extract and their field experiments on tea (Camellia sinensis) cultivation	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-02997-x	4
7	Dr.M. Moov	Centre For	Assistan	Isolation, chemical characterisation of	Biomass	https://doi.org/	4

	endhan	Ocean Research	t Professor (Research)	and in vitro bioactive potential of polysaccharides from seaweed Portieria hornemannii	Conversion and Biorefinery	10.1007/s13399-022-03276-5	
8	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Formulation of biocontrol agents from Trichoderma viride and evaluation of viability, compatibility with metallic nanoparticles and decomposition efficacy of organic wastes	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03318-y	4
9	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Development of high organic-rich low-cost medium derived from microbial consortium decomposed vegetable wastes for the viable inocula production of potential fungal biopesticide Metarhizium anisopliae	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03345-9	4
10	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Res	Biocompatible formulation of cationic antimicrobial peptide Polylysine (PL) through 4nanotechnology	International Journal of Biological Macro	https://doi.org/10.1016/j.ijbiomac.2022.09.2 38	8.2

			earch)	principles and its potential role in food preservation — A review	molecules		
11	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Production and characterization of biosurfactant from Enterobacter cloacae SJ2 isolated from marine sponge Clathria s	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03466-1	4
12	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Effect of distillery industry discharge wastewater and dye in aqueous solution treated by chemical modified Penicillium biomass on Arachis hypogaea growth parameters and its antioxidants efficiency	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03394-0	4
13	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Enhanced Antibacterial Activity of Highly Biocompatible Polymeric Core–Shell Levofloxacin Gold Nanocomposite Formulation Against Pseudomonas aeruginosa	Applied Biochemistry and Biotechnology	https://doi.org/10.1007/s12010-022-04256-1	3
15	Dr.M. Moovendha	Centre For Ocea	Assistant	Effective removal of fluoride ions from aqueous	Chemosphere	https://doi.org/10.101	8.8

	n	n Research	Professor (Research)	solution by marine microalgae as natural biosorbent		6/j.chemosphere.2022.137312	
16	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Removal of fluoride from water by natural biosorbents and evaluation of microstructure and functional groups in removal process	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03588-6	4
17	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Chitosan nanocomposite as an effective carrier of potential herbicidal metabolites for noteworthy phytotoxic effect against major aquatic invasive weed water hyacinth (Eichhornia crassipes)	International Journal of Biological Macromolecules	https://doi.org/10.1016/j.ijbiomac.2022.11.2 72	8.2
18	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Aquatic biomass cellulose fabrication into cellulose nanocomposite and its application in water purification	Journal of Cleaner Production	https://doi.org/10.1016/j.jclepro.2023.1363 86	11.072
19	Dr.M. Moov	Centre For	Assistan	Synthesis, characterization,	Biomass	https://doi.org/	4

	endhan	Ocean Research	t Professor (Research)	cytotoxicity, and antimicrobial studies of green synthesized silver nanoparticles using red seaweed Champia parvula	Conversion and Biorefinery	10.1007/s13399-023-03775-z	
20	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Marine bioactive compounds as antibiofilm agent: a metabolomic approach	Archives of Microbiology	https://doi.org/10.1007/s00203-022-03391-x	2.8
21	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Exopolysaccharide production by Anabaena sp. PCC 7120: physicochemical parameter optimization and two-stage cultivation strategy to maximize the product yield	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03696-3	4
22	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Food and drug industry applications of microalgae Spirulina platensis: A review	Journal of Basic Microbiology	https://doi.org/10.1002/jobm.202200704	3.1
23	Dr.M. Moovendhan	Centre For Ocean	Assistant Prof	Production, nanoformulation, and potential anticancer effect of	Biomass Conversion	https://doi.org/10.1007/s13399	4

		Research	essor (Research)	camptothecin metabolites from biomass of Aspergillus niger	and Biorefinery	-023-03861-2	
24	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Sustainable approach to manage the vulnerable rodents using eco- friendly green rodenticides formulation through nanotechnology principles –A review	Process Safety and Environmental Protection	https://doi.org/10.1016/j.psep.2023.01.050	7.8
25	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Green synthesis of gold nanoparticles using Halymenia pseudofloresii extracts and their antioxidant, antimicrobial, and anti-cancer activities	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-023-03873-y	4
26	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Adsorption isotherm, kinetics and response surface methodology optimization of cadmium (Cd) removal from aqueous solution by chitosan biopolymers from cephalopod waste	Journal of Environmental Management	https://doi.org/10.1016/j.jenvman.2023.117484	8.7
27	Dr.M. Moovendha	Centre For Ocea	Assistant	Formulation, optimization and characterization of	Chemical Biology	https://doi.org/10.111	3

	n	n Research	Professor (Research)	raloxifene hydrochloride loaded PLGA nanoparticles by using Taguchi design for breast cancer application	and Drug Design	1/cbdd.14222	
28	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Biocontrol of Trichoderma gamsii induces soil suppressive and growth-promoting impacts and rot disease-protecting activities	Journal of Basic Microbiology	https://doi.org/10.1002/jobm.20230016	3.1
29	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Serine Threonine-Protein Kinase-Derived IW13 Improves Lipid Metabolism via C/EBP-α/SREBP1/FAS Signaling Pathways in HFD-Induced Zebrafish In Vivo Larval Model	Applied Biochemistry and Biotechnology	https://doi.org/10.1007/s12010-023-04480-3	3
30	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	Anti-microbial efficacy and notable biocompatibility of Rosa damascene and Citrus sinensis biomass-derived metabolites	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-023-04439-8	4
31	Dr.M. Moovendhan	Centre For Ocean	Assistant Prof	Evaluation of antidiabetic potential of Fragaria × ananass	Biomass Conversion	https://doi.org/10.1007/s13399	4

		Research	essor (Research)	Duch., Annona squamosa Linn, and Salvia hispanica L. methanolic extract–based composite and in silico analysis	and Biorefinery	-023-04532-y	
32	Dr.M. Moovendhan	Centre For Ocean Research	Assistant Professor (Research)	In silico analysis of plants biomass phytochemicals against β2 adrenergic receptor	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-023-04241-6	4
33	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Jellyfsh Acromitus fagellatus (Maas) nematocyst venom-mediated biogenic synthesis of gold nanoparticles and its anti-proliferative effects	Aquaculture International	https://doi.org/10.1007/s10499-023-01081-z	2.9
34	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Antioxidant and anticancer activities of nematocyst venom protein of five scyphozoan Chrysaora jellyfsh's species from the coastal waters of Tamil Nadu	biomass Conversion and Biorefnery	https://doi.org/10.1007/s13399-023-04206-9	4
35	Dr.K. Govin	Centre For	Professo	Biosynthesis of gold nanoparticles	Chemical	https://doi.org/	2.8

	daraju	Ocean Research	r (Research)	using jellyfish nematocyst venom protein and evaluation of their anticancer activity against breast cancer cells: In-vitro study	Physics Letters	10.1016/j.cplett.2023.140523	
36	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Computational identification and molecular dynamics simulation of potential circularRNA derived peptide from gene expression profile of Rheumatoid arthritis, Alzheimer's disease, and Atrial fibrillation	Marine Pollution Bulletin	https://doi.org/10.1016/j.marpolbul.2023.114682	5.8
37	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Polyvinyl alcohol (PVA) nanofbre matrix encapsulated with tebuconazole fungicide: a smart delivery system against dry root rot disease of black gram	Polymer Bulletin	https://doi.org/10.1007/s00289-022-04509-3	3.2
38	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Population phenology of insect pests in vegetable French bean, Phaseolus vulgaris L. and environmental	international Journal of Tropical Insect Science	https://doi.org/10.1007/s42690-023-00947-2	1.2

				forecast modeling for major pests using ARIMAX analysis			
39	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Preparation and characterization of silica nanoparticles (sol–gel & river sand): A comparative toxicity studies against seed weevil (Sitophilus oryzae L). and effect on agro-morphological characteristics of maize seeds	Materials Science & Engineering B	https://doi.org/10.1016/j.mseb.2023.116503	3.6
40	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Hepato and renoprotective activity of Kappaphycus alvarezii ethanolic extract in cisplatin causes hepatic and kidney harm in Albino Wistar rats	Aquaculture International	https://doi.org/10.1007/s10499-023-01064-0	2.9
41	Dr.K. Govindaraju	Centre For Ocean Research	Professor (Research)	Carbon offset potential of biochar based straw management under rice- wheat system along Indo-Gangetic Plains of India	Science of the Total Environment	https://doi.org/10.1016/j.scitotenv.2023.165 176	9.8
42	Dr. V. Karthick	Centre For Ocean Rese	Assistant Professo	Nanoarchitectonics horizons: materials for life sciences	Nanoscale	https://doi.org/10.1039/D2NR02293A	6.7

		arch	r (Research)				
43	Dr. V. Karthick	Centre For Ocean Research	Assistant Professor (Research)	Recent Advancements in Novel Sensing Systems through Nanoarchitectonics	Biosensors	https://doi.org/10.3390/bios13020286	5.4
44	Dr. V. Karthick	Centre For Ocean Research	Assistant Professor (Research)	Anti-adipogenic β-sitosterol and lupeol from Moringa oleifera suppress adipocyte differentiation through regulation of cell cycle progression	Journal of Food Biochemistry	https://doi.org/10.1111/jfbc.14170	4
45	Dr. V. Karthick	Centre For Ocean Research	Assistant Professor (Research)	Biological Activities of Selenium Nanoparticles Synthesized from Camellia sinensis (L) Kuntze Leaves	Applied Biochemistry	https://doi.org/10.1007/s12010-023-04348-6	3
46	Dr. D. Jeyapragash	Centre For Ocean Research	Assistant Professor (Research)	Anti-fouling potential and in-silico analysis of carotenoid and fatty acids from Rauvolfia tetraphylla L	Environmental Research	https://doi.org/10.1016/j.envres.2023.116158	8.3

47	Dr.J.Baalamuruga n	Centre For Ocean Research	Assistant Professor (Research)	Recent applications of steel slag in construction industry	Environment, Development and Sustainability	https://link.springer.com/article/10.1007/s10668-022-02894-3	4.9
48	Dr. D. Jeyapragash	Centre For Ocean Research	Assistant Professor (Research)	New perception about the use of nanofungicides in sustainable agriculture practices	Archives of Microbiology	https://doi.org/10.1007/s00203-022-03324-8	2.8
49	Dr. D. Jeyapragash	Centre For Ocean Research	Assistant Professor (Research)	Green Synthesis of Magnesium Oxide Nanoparticles with Antioxidant Potential Using the Leaf Extract of Piper nigrum	JOM	https://doi.org/10.1007/s11837-022-05548-x	2.6
50	Dr. D. Jeyapragash	Centre For Ocean Research	Assistant Professor (Research)	Utilization of Red Algae Gracilaria edulis for Bio-fabrication of MgO Nanoparticles and an Evaluation of their Anti-oxidant Activity	JOM	https://doi.org/10.1007/s11837-022-05546-z	2.6
51	Dr. S. Sivaraj	Centre For Ocean	Assistant Prof	Assessment of blue carbon sequestration potential of	Regional Studies in	https://doi.org/10.1016/j.rsma.	2.1

		Research	essor (Research)	Avicennia marina in the semi-arid zone of Gulf of Kutch, Gujarat, India	Marine Science	2023.102937	
52	Dr. S. Sivaraj	Centre For Ocean Research	Assistant Professor (Research)	Marine plastics on the beaches of Cuddalore coast, Southeast coast of India: A assessment of their abundance during Covid lockdown and post lockdown	Regional Studies in Marine Science	https://doi.org/10.1016/j.rsma.2023.103051	2.1
53	Dr. R. Srinivasan	Centre For Ocean Research	Assistant Professor (Research)	Lipid ROS- and Iron-Dependent Ferroptotic Cell Death in Unicellular Algae Chlamydomonas reinhardtii	Cells	https://doi.org/10.3390/cells12040553	6
54	Dr. R. Srinivasan	Centre For Ocean Research	Assistant Professor (Research)	Co-culture approach for effective biomass utilization and enhanced solvent production by Clostridium acetobutylicum DSM 792 and Enterobacter hormaechei subsp. xiangfangensis SW2	Biomass Conversion and Biorefinery	https://doi.org/10.1007/s13399-022-03082-z	4

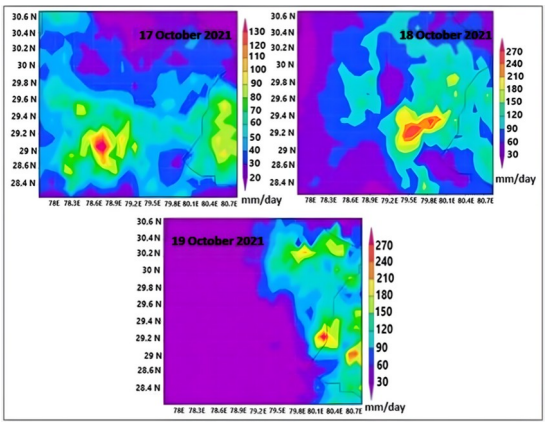
SDG 15: LIFE OF LAND

In 2015 the United Nations adopted 17 interconnected Sustainable Development Goals (SDGs) addressing the global challenges of poverty, inequality, climate change, environmental degradation, prosperity, peace, and justice. The goals are to be achieved by 2030.

The 15th Sustainable Development Goal is to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. It has 12 specified targets related to how to preserve and sustainably use the Earth's terrestrial species and ecosystems.

Centre for Remote Sensing and Geoinformatics of Sathyabama Institute of Science and Technology has taken significant steps for achieving these targets. We have undertaken a major research project sponsored by Council for Scientific and Industrial Research (CSIR), India focussing on developing flash flood monitoring. Flash flooding is responsible for heavy loss and degradation of land and environment.

This research project contributes a devised a unique approach of flash flood forecasting by using a set of hydrological parameters (2021 – 2022). a lot towards SDG 15.1 (CONSERVATION AND RESTORATION OF TERRESTRIAL AND FRESHWATER ECOSYSTEMS). Figure below highlights the visual representation of the distribution of rainfall over the course of three days.



Many studies adopted a remote-sensing approach to undertake analysis on the SDG 15 components. We have conducted a national workshop on "Hyperspectral Remote Sensing and Its Applications. This conference was sponsored by IIT Tirupati Navavishkar I-Hub Foundation (DST) and aimed at exchanging ideas on attempt to address this dearth of knowledge on Hyperspectral Remote Sensing (LINK: https://drive.google.com/file/d/1LPxGA2bpmtSmYNGPv9stf76rf0LMleZJ/view?usp=share_link) Students learnt a lot about hyperspectral techniques to monitor Urban Studies, Water Resources Studies, Agriculture and Soil Studies, Environmental Studies. This workshop also aids at addressing SDG 15

Sustainable water management means meets current, ecological, social, and economic needs without compromising the ability to meet those needs in the future on SDG 15.3. We have conducted an International Conference on Sustainable Water Management and Ecosystem Restoration. he focusses of the conference is to analyse the relations between human society, water resources and ecosystems, to clarify why and how vital ecosystems have to be protected and to indicate how this effort can be better incorporated in integrated water resources management.(Link: ttps://drive.google.com/file/d/1_5eGM_m3EYRngYBHw8pRk08WliWp_R-C/view?usp=drive_link) Students learnt how to manage the ecosystem in a sustainable way.

We are engaged in research focussing on Simulation of chain of tanks to augment water supply: a case study from Tamil Nadu. This work examined The peculiar problems faced by watersheds include over exploitation, large scale development due to fast urbanization and continuous reduction in cropping area. This research pertains to a scientific approach to access the available surface water potential from a chain of tanks in Guduvanchery watershed and groundwater in the area to harness and augment the utilisable water. The study concludes that for semi-arid region like Tamil Nadu, accurate estimation of runoff is essential for effective management and utilization of the available water resources. NRCS – model with simulation modelling can be effectively utilised for irrigation scheduling of small watersheds for sustainable management of available water resources. (Marykutty Abraham, K. Venugopala, R. Arunkumar and S. K. Pramada. "Simulation of chain of tanks to augment water supply: a case study from Tamil Nadu". (*AQUA — Water Infrastructure, Ecosystems and Society Vol 71 No 9, 975 doi: 10.2166/aqua.2022.038*.). This significant work contributes to SDG 15.3.1 (CONSERVATION, RESTORATION AND SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS)

To represent the territorial subsurface water flow is a worthwhile contribution to the regulation and governing of underwater reserves as they provide the components of hydrological processes as well as the flow of water in an aquifer was explored for a case study in Thirukkazhukundram block, Southern India. An attempt is made in applying this type of modeling study in the Palar river basin, Thirukkazhukundram block, southern India, which is chosen as the study area. The research area is signalized by multiple aquifer system consumed for agrarian and intake purposes. This model is helpful in forecasting the active groundwater flow under various pumping tests also, in monitoring the release and recharge of water. This important research contributes towards to SDG 15.3 (END DESERTIFICATION AND RESTORE DEGRADED LAND). This research work yielded few quality publications (Amuthini Sambhavi ArunaJadesan, Nagamani Kattukota,

Senthilkumar Mohanavelu, Gowtham Balu, Venkatesan Selvaraj, Jothi Karmegam, Vinodh Kumar.. Three-dimensional numerical model to simulate regional groundwater flow in Thirukkazhukundram block, Southern India. *Arabian Journal of Geosciences (2021) 14:1425 https://doi.org/10.1007/s12517-021-07119-x.).*

Remote sensing techniques present an advanced tool for improved monitoring of marine plastics and natural habitats. We have conducted a two days national Workshop funded by Ministry of Earth Sciences on "Advanced Space Technologies for Measuring Marine Plastic Debris". Various techniques to monitor marine plastics and natural habits were discussed in the workshop and students learnt a lot about these tools. Sustainable Development Goal 15.5 (PROTECTION OF BIODIVERSITY AND NATURAL HABITATS) was addressed during this workshop. A picture showing Dr. Pravakar Mishra, Scientist G, National Centre for Coastal Research, Ministry of Earth Science, Government of India, NIOT campus, Chennai inaugurated the workshop and insisted that sustained observations are required to determine the marine plastic debris mass balance and to support effective policy for planning remedial action.

Dr.B.Sheela Rani,Director-Research, Felicitated Dr. Pravakar Mishra, Scientist G, National Centre for Coastal Research,Ministry of Earth Science, Government of India ,NIOT campus, Chennai

We have devised a unique technique by integrating methods combining the information obtained by geo-hydrological field mapping and those obtained by analysing multi-source remotely sensed data in a GIS environment for better understanding the Groundwater condition in hard rock terrain. This work contributes very significantly towards conservation of mountain ecosystems. Thus, this work adds to partial accomplishment of 15.2 (SUSTAINABLE MANAGEMENT OF LAND FOR AGRICULTURE). Research finding has been published in (K. Nagamani, Prabhu Dass Batvari, S. Packialakshmi, C. Sai Kumar Reddy and B. Anuradha. Groundwater Recharge Planning Using Field Survey for Talupula Mandal in Anantapur District, Andhra Pradesh, India. *Vol. 20, No. 5 (Suppl), 2021 • Nature Environment and Pollution Technology*)

We also have devised techniques for exploring the detection of freshwater possible sites in the hard rock terrain of Sakkottai, Sivagangai zone, using thematic layers such as lithology, geomorphology, steepness, and drainage density with the use of advanced techniques such as satellite data, GIS-based raster, and AHP. Thus, this significant work is very crucial for the accomplishing the goal 15.4 (ENSURE THE CONSERVATION, RESTORATION AND SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS). Results were published in peer reviewed journals with following details:

Rajani Ramachandran, Mohana Perumal, Udayaganesan Palaniraj, Muthusamy Subramaniam, Dhinesh Selvam, “Geospatial and an AHP approach for delineating potential groundwater zone for Sakkottai block, Tamil Nadu", Arabian Journal of Geosciences (2022) 15:633 *https://doi.org/10.1007/s12517-022-09783-z*

We only have one planet, and we are proud to be working hard to protect it. We are committed to use it responsibly now, and conserve it for the future and for the betterment of our next generation.

We only have one planet, and we are proud to be working hard to protect it. We are committed to use it responsibly now, and conserve it for the future and for the betterment of our next generation.

SDG 16: PEACE, JUSTICE AND STRONG INSTITUTIONS

Conflict, insecurity, weak institutions and limited access to justice remain a great threat to sustainable development. Goal 16 is dedicated to the promotion of peaceful and inclusive societies for sustainable development, the provision of access to justice for all, and building accountable institutions at all levels. National and global institutions have to be more transparent and effective, including local governance and judicial systems which are critical to the guarantee of human rights, law and order, and security.

Application of sustainability principles is of paramount importance and teaching SDG-16 related issues is the most direct way to contribute towards implementation, Sathyabama Institute of Science and Technology (Deemed to be University) at the front line in terms of contributing to the generation of sustainable practices, improving the ways sustainability is perceived, taught, modeled, and implemented. Towards this end sathyabama included proper education and training, involve new ways of doing research, and promoting an authentic engagement with the community. Education for sustainable development (ESD plays a central role in our unavoidable commitment to build a sustainable future for the good of our society and the planet. One of the key areas of is the reorientation of the curriculum towards sustainability.

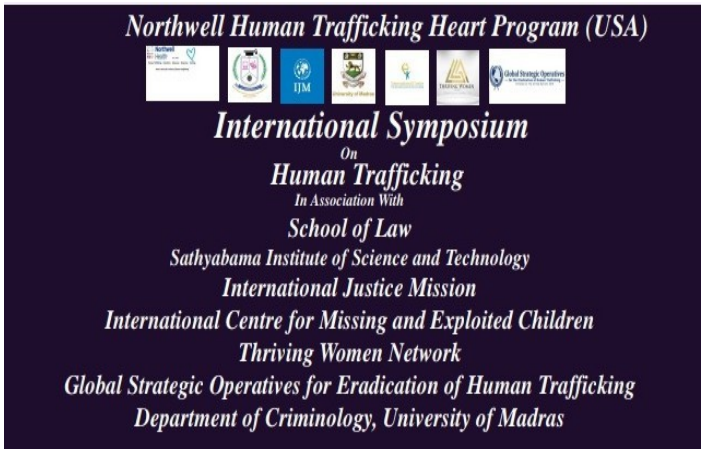
Sathyabama implements changes in areas such as leadership; management; research; and, mainly, in the training of teachers.

16.1ACCESS TO JUSTICE:

SDG16 to reflect that creating peaceful, just and inclusive societies requires simultaneous efforts in other interlinked SDGs. Justice is a thread that runs through all 17 Sustainable Development Goals (SDGs). SDG16.3 promises to ensure equal access to justice for all by 2030. Without increased justice, the world will not be able to end poverty, reduce inequality, reach the furthest behind first, create conditions for shared and sustainable poverty, or promote peace and inclusion. Importance of Alternative Dispute Resolution is one such measure that can help and training of trainers is an initiative towards the change. The School of law conducts two days International Virtual symposium on Alternative Dispute Resolution.

School of Law offers a great opportunity for the successful implementation of the SDG 16. The school functions with a people-centered approach to justice starts with an understanding of people's justice needs and designs solutions to respond to them. School of law in collaboration with Indian Red

Healthy ageing and Sustainable Development Goals.



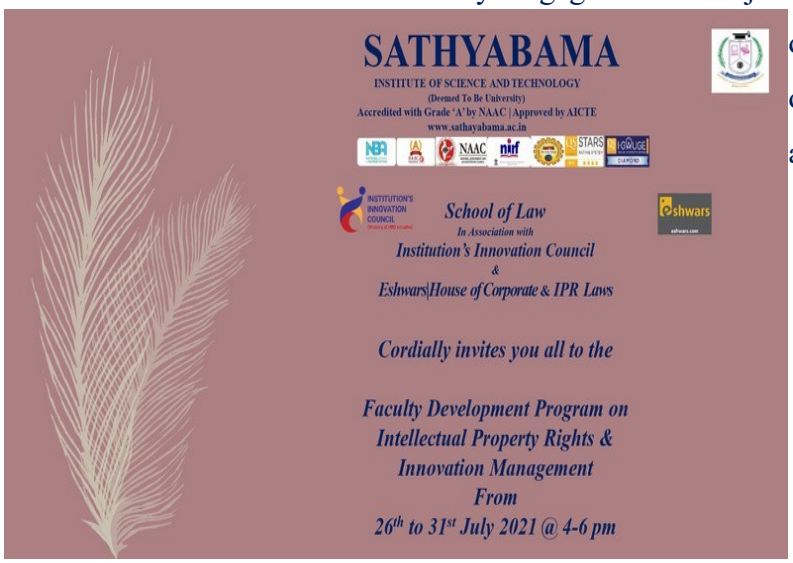
Human trafficking is a global problem that often crosses borders. Access to justice in cases of transnational trafficking requires international cooperation and agreements to facilitate the extradition of traffickers and the protection of victims.

To significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime- Awareness programs conducted on organized crime. School of law organizes legal aid camp in Mambakkam.

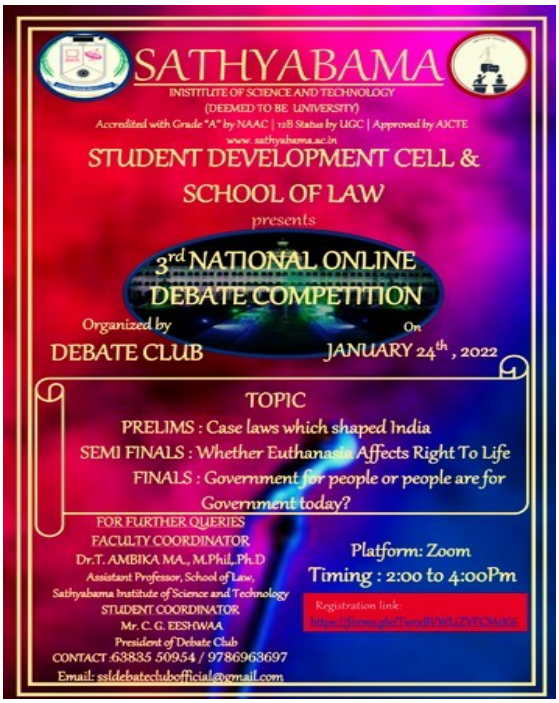
II National Online Debate Competition. School of Law organized National Debate Competition on the topic Access to Justice to Promote and enforce non-discriminatory laws and policies for sustainable development. Access to justice refers to the ability of individuals and communities to seek and obtain a fair and effective resolution to their legal problems, regardless of their social and or Economic status.

Faculty Development Program on Intellectual Property Rights – 26th to 31st July 2021. The relationship between intellectual property (IP) rights and access to justice is an important and complex one. Intellectual property encompasses patents, copyrights, trademarks, and other legal protections for creations of the mind, such as inventions, artistic works, and brand identities. Access to justice, on the other hand, involves the ability of individuals and entities to seek legal remedies and protection when their rights are violated.

Virtual Mock Parliamentary Debate Competition – 17th & 18th September 2021. School of law organizes Debate Competition. Debates can raise awareness about legal and justice issues, making them more visible to the public and policy makers. This increased awareness can lead a better understanding of the challenges faced by marginalized and undeserved communities in accessing justice. Debates can empower communities and individuals to actively engage with the justice system. The outcome of debates can influence the development of policies aimed at improving access to justice.



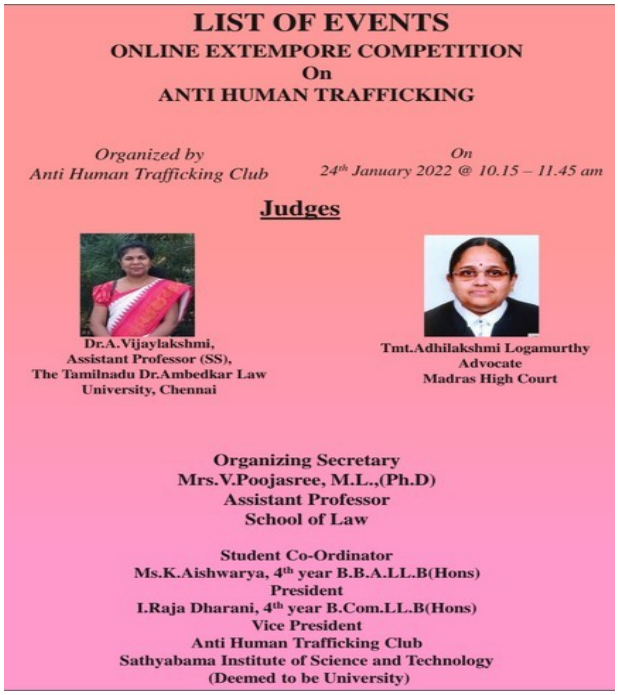
One day International Workshop on Research and Law, 13th January 2022. The one day international workshop on Research and Law was held on 13th January 2022 at 03.00 pm. The one day international workshop on Research and Law was organised by school of law, Sathyabama institute institute of science and technology. The speakers for the workshop are Dr. Sai Ramani Garimella, Associate Professor, Faculty of Legal Studies, South Asian University, New Delhi. Dr. Chandrashekar, Associate Professor, Saveetha School of Law, Chennai. Mr. Mohd Imran, Lecturer, Faculty of Shariah and Law Villa College, Maldives.



National Online Debate Competition, 24th January 2022. The 3rd National online debate competition was held on January 24th 2022 at 02.00 pm through Zoom platform. The national debate competition was organised by Debate club of Student development cell and School of Law, Sathyabama institute of science and technology. The topic for Prelims are "Case laws which shaped India" and the topic for Semi finals was "Whether euthanasia affects

right to life". The topic for the finals was "Government for people or people are for Government today?"

Online Extempore Competition on Anti Human Trafficking, 24th January 2022. On the occasion of 73rd Republic day celebration, online extempore competition on Anti Human trafficking was held at 24th January 10.15 am. It was organized by Anti Human Trafficking Club, School of Law. The judges for the event was Dr. A. Vijayalakshmi, Assistant Professor, The Tamil Nadu Dr. Ambedkar Law University, Chennai. Tmt. Adhilakshmi Logamurthy, Advocate, High Court of Madras. The resource person was Shri.R. Venkatesan, Senior Examiner of Trademarks and G.I Trademarks registery, Intellectual Property Office, Chennai.



SDG 17: PARTNERSHIPS FOR THE GOALS

Stronger partnerships are very essential for sustainable development to mobilize resources, share knowledge and technologies and gain synergistic advantage. Sathyabama Institute of Science and Technology strives to promote partnerships and collaborative agreements with national and international organisations and Universities that facilitate the achievement of sustainable development.

Sathyabama is well connected both at national and international level. It is involved in the collaborative activities such as Joint Academic Programmes and Joint research Programmes with partners across the world. The collaboration has resulted in knowledge sharing with academicians, scientists and researchers across the world. The Collaborations keeps the research and development efforts of our Institution on par with the research and development happening throughout the world. We are able to set targets, goals and benchmarks for us when we work with international counterparts, so that we are sure that we don't lag behind anyone in terms of quality education, research and innovation.

We work in coordination with many Government organisations, Government Agencies, local administrative bodies and Non-Governmental organisations to enhance, support and achieve the sustainable development goals.

17.1 RESEARCH COLLABORATORS AT NATIONAL LEVEL

The Institution is involved in various sponsored and collaborative R&D projects funded by National Organizations like

- Indian Space Research Organization (ISRO)
- Department of Science and Technology (DST)
- Department of Bio Technology (DBT)
- Indira Gandhi Centre for Atomic Research (IGCAR)
- Defence Research and Development Organization (DRDO)
- Board of Research in Fusion Science and Technology (BRFST)
- Combat Vehicles Research and Development Establishment (CVRDE)
- Central Leather Research Institute (CLRI)
- Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI)
- All India Council for Technical Education (AICTE)
- Indian Space Research Organization (ISRO)
- Indian council for Medical Research (ICMR).

Many of our research projects are sponsored by various Ministries like

- Ministry of Human Resource Development (MHRD),
- Ministry of Earth Sciences (MoES) and
- Ministry of Environment and Forests (MoEF).

Our researchers have also collaborated with the Universities across India for doing joint research and made joint publications with the faculty working in other Indian Universities.

17.2 INTERNATIONALIZATION AT SATHYABAMA

Over the past 10 years India has become an increasingly attractive study destination for students across the globe. To cater to the growing demands of Internationalization of education, Indian Universities are undergoing transformation transcending National boundaries.

With its admirable academic ambience and excellent research facilities, Sathyabama Institute of Science and Technology has all the features of a world class University that has the potential to become an attractive destination for Higher Education to the students across the Globe.

Objectives of Internationalization

- To promote internationalization and create a favourable impact on the institution's international reputation.
- To promote international academic and research cooperation and engage in collaborative activities like joint research, joint academic programmes and the exchange of staff and students.
- To improve the global rankings

17.3 CENTRE FOR ACADEMIC PARTNERSHIP AND INTERNATIONAL RELATIONS

Sathyabama Institute of Science and Technology has a devoted Centre, known as Centre for Academic partnership and International Relations that establishes international linkages and alliances to promote collaborative activities. The Centre has been instrumental in the establishment of international tie ups and has initiated collaborations with International Universities and Research Organisations across the globe. The Centre coordinates all the International Programmes.

Functions of the Centre

- Facilitating academic and research collaboration with partners
- organizing and participating in International Education Fairs, participating in networking events and Summits
- Responsible for coordinating Faculty Exchange Programmes, Student Exchange Programmes, Semester Abroad Programmes, Internship Abroad Programmes and Summer Schools with Partnering Universities

- Applying for various funded Programmes and International Credit Mobility Projects for Faculty and Students
- Coordinating International Joint seminars/symposiums/conferences
- Taking care of international students on campus

17.4 INTERNATIONAL ALLIANCES AND COLLABORATION

Sathyabama has alliances with leading Universities and research establishments across the globe.

Institution has more than 200 partner universities across the world. It is involved in the following collaborative activities with international partners:

- Student exchange
- Faculty exchange
- Twinning programmes
- Semester abroad programmes
- Internships and summer schools
- Joint research
- Joint publication
- Joint conference, symposium and workshop, webinars
- Participation in bilateral research calls announced by India and the partner country to promote academic and research collaborations

In a truly globalised institution, everyone should have opportunities to acquire international exposure, and career experience. Sathyabama aims at promoting internationalisation and believes that internationalisation strategies are to be driven by educational imperative. The University wishes to provide international exposure and learning experience to students and thereby improving their employability through Student mobility programmes. The University also provides opportunity to the

Faculty members to network and learn among international counterparts through staff exchange programmes. Our Institution sends faculty members on exchange programmes to partnering Universities and receives Faculty members from the Partnering Universities across the world.

Our Students at MAHSA University, Malaysia

17.5 ERASMUS PLUS-INTERNATIONAL CREDIT MOBILITY PROGRAMME

We send our staff and students to our partner universities in the European Union through the Erasmus+ Staff Mobility Programme and Erasmus+ Student Mobility Programme (International Credit Mobility Project).

Sathyabama has signed Inter-Institutional agreement with the following universities:

- Wszechnica Polska Academy of Applied Sciences in Warsaw, Poland
- Powislanski College in Kwidzyn, Poland

- Transilvania University in Brasov, Romana
- Craiova University, Romania
- Cukurova University, Turkey
- Andolu University, Turkey

Student from the Department of English at Wszechnica Polska Academy of Applied Sciences in Warsaw, Poland, under the Erasmus Plus student mobility programme,

Faculty members at Wszechnica Polska Academy of Applied Sciences in Warsaw, Poland on Erasmus Plus Staff Mobility

Faculty members at Powislanski College in Kwidzyn, Poland on Erasmus Plus Staff Mobility

17.6 SEMESTER ABROAD/INTERNSHIP PROGRAMME AT INTERNATIONAL UNIVERSITIES

Students at National University of Singapore(NUS), Singapore

Students at University of Texas at Dallas, USA

Students at University Technology Mara (UiTM), Malaysia

Student from Daffodils International University, Bangladesh

17.7 VISITING INTERNATIONAL PROFESSORS

Our Institution invite Professors working in Universities abroad as Visiting International Professors, who come and work for a period ranging from 2-12 weeks. We have Professors from France, Malaysia, Singapore, Bangladesh, and Indonesia working with us.

Collaborations

Collaboration	Number
International Universities	178
National Universities	10
National Industries	103

A GLIMSE OF MoU SIGNING

MoU with the Copperbelt University, Zambia

MoU with St. Louis University, USA

MoU with Taylor's University, Malaysia

MoU with the University of Memphis, USA

MoU with the University of West Georgia, USA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MoU with the University of Hull, UK

Research Fellowships

TWAS Fellowships/HPSR Fellowship	Mevlana Exchange Projects	CV Raman Fellowship & ISRF Fellowship	MARIE CURIE Fellowship
ICMR DHR Fellowship	Erasmus Plus Projects	European Research Council / EPSRC Grant- UK	DST-OVDF Fellowship
ASEAN Fellowships & DST NAM –DCS-RTF	Full bright Scholarships	SPARC Funding / INSA Fellowship	JSPS / HRDC Fellowship
Global Doc Mobility Fellowship	Fondecyt Fellowship	Korea Research Fellowship	Takeda Science Foundation Fellowship

17.8 INTERNATIONAL/ NATIONAL COLLABORATIVE ACTIVITIES

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
1	Prince Sattam Bin Abdulaziz University, Al-Kharj, 11942, Saudi Arabia	2022	Research work
2	Tamil Nadu Agricultural University, Coimbatore, 641 003, India	2022	Research work
3	Bharathiar University-Coimbatore, Bharathidasan University-Tiruchirappalli, Karpagam Academy of Higher Education-Coimbatore	2022	Animal experiments and joint publication
4	Odisha University of Agriculture and Technology, Bhubaneswar	2022	Animal experiments and joint publication
5	School of Biosciences, Faculty of Medicine, Biosciences and Nursing, MAHSA University Malaysia	2022	Research article
6	Collaborative research with Central Metallurgical Research and Development Institute (CMRDI)	2022	Funded Project
7	Laboratory of Cyanobacterial Biotechnology, Department of Biochemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand	2022	Publication
8	Academy of Science, Royal Society of Thailand, Bangkok 10300, Thailand	2022	Publication
9	International Center for Materials Nanoarchitectonics (WPI-MANA), National Institute for Materials Science (NIMS), 1-1 Namiki, Ibaraki, Tsukuba 305-0044, Japan	2022	Publication
10	IHE Delft Institute for Water Education, The Netherlands	2022	Publication
11	Department of Environmental Health, College of Medicine and Health Sciences, Wollo University, P. O. Box 1145, Dessie, Amhara, Ethiopia	2022	Publication

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
12	Department of Genetic Research, Institute for Research and Medical Consultations (IRMC), Imam Abdulrahman Bin Faisal University, 34212, Dammam, Saudi Arabia	2022	Publication
13	Centre for Materials Engineering and Regenerative Medicine, Bharath Institute of Higher Education and Research, Chennai, 600073 Tamil Nadu	2022	Publication
14	Department of Food Science, Faculty of Agricultural and Food Sciences, Széchenyi István University, 15-17 Lucsony Street	2022	Publication
15	Department of Food Science and Biotechnology, Sejong University, Gwangjin-gu, Seoul 05006, Republic of Korea	2022	Publication
16	Department of Botany and Microbiology, College of Science, King Saud University, Riyadh 11451, Saudi Arabia	2022	Publication
17	Department of Chemistry, College of Sciences and Health, Cleveland State University, Cleveland 44115, USA	2022	Publication
18	Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Islam Indonesia, Yogyakarta, Indonesia	2022	Publication
19	Department of Biotechnology, Islamiah College (Autonomous), Vaniyambadi, Tamil Nadu, India	2022	Publication
20	Department of Biotechnology, Thiruvalluvar University, Vellore, Tamil Nadu, India	2022	Publication

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
21	Meenakshi Academy of Higher Education and Research, India, Dr. M.G.R. Educational and Research Institute, Chennai, India College of Dentistry, King Khalid University, Abha, Saudi Arabia College of Dentistry, Jazan University, Jazan, Saudi Arabia, Dental Health Department, King Saud University, Riyadh, Saudi Arabia, Sri Venkateswara Dental College and Hospital, Chennai, India University of Rome La Sapienza, Rome, Italy, College of Dentistry Jazan University, Jazan, Saudi Arabia	2022	Systematic Review & Meta Analysis Process
22	Thai Moogambigai Dental College, Meenakshi Ammal Dental College	2022	Systematic Review Process
23	White Lab	2022	Research
24	Sri Sairam Engineering College, Chennai, India	2022	research and academic development of faculty
27	Sri Sankara Arts and Science College	2021	Animal experiments and joint publication
28	SRM Medical College Hospital and Research Center, and Sundarama Health Center	2021	Animal experiments and joint publication
29	MoES	2021	Funded Project
30	MoES	2021	Funded Project
34	School of Biosciences, Faculty of Medicine, Biosciences and Nursing, MAHSA University Malaysia and Centre for Materials Engineering and Regenerative Medicine BIHER Chennai	2021	Research article
35	International Center for Materials Nanoarchitectonics (WPI-MANA), National Institute for Materials Science (NIMS), 1-1 Namiki, Ibaraki, Tsukuba	2021	Research article

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
36	International Center for Materials Nanoarchitectonics (WPI-MANA), National Institute for Materials Science (NIMS), 1-1 Namiki, Ibaraki, Tsukuba	2021	Book Chapter publication
37	Chemical Section, Salalah College of Technology, 211, Salalah, Oman	2021	Research article
38	School of Bioscience, Bioscience and Nursing, MAHSA University, Jenjarom, Selangor, Malaysia	2021	Research article
39	SIST, India/Széchenyi István University, Hungary/Sejong University, South Korea/King Saud University, Saudi Arabia/ Cleveland State University, USA/Universitas Islam Indonesia, Indonesia	2021	Research Article
40	Nutrition and Bromatology Group, University of Vigo	2021	Research Publication
41	Nutrition and Bromatology Group, University of Vigo	2021	Research Publication
42	Collaborative research with The Robert H. Smith Institute of Plant Sciences & Genetics in Agriculture	2021	Funded Project
43	Collaborative research with Department of Biochemistry	2021	Funded Project
44	Collaborative research with Department of Chemical Science, Department of Biomedical Science, & Life Science Division	2021	Funded Project
45	Senthilkumar Mohanavelu, Scientist (Sr.Hydrogeologist), Central Ground Water Board, CHQ, Dept of WR, RD&GR, Min of Jal Shakti, Govt of India, NH-IV, Bhujal Bhavan, Faridabad 121001 Haryana	2021	Research Publication
46	Mongolian University of Science and Technology, Mongolia	2021	Conference Publication
47		2022	Proceedings of International conference

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
48	National Research Development Corporation 20-22, Zamroodpur Community Centre, Kailash Colony Extension, New Delhi, Delhi 110048	2021	The workshop series focused on how to convert a research project to patent, patent drafting, how to avail trademarks and copyrights and PCT application process
49	Bishop Moore College, Mavelikara, India	2021	Joint Publication
50	Amity School of Architecture and Planning, Amity university Kolkata in association with centre for science and Environment, New Delhi	2021	Faculty Training program
51	Amity School of Architecture and Planning, Amity university Kolkata in association with centre for science and Environment, New Delhi	2021	Faculty Training program
52	Amity School of Architecture and Planning, Amity university Kolkata in association with centre for science and Environment, New Delhi	2021	Faculty Training program
53	Council of Architecture Training & Research centre in collaboration with Griha council	2021	Training Program
54	Council of Architecture Training & Research centre in collaboration with Griha council	2021	Training Program
55	Council of Architecture Training & Research centre in collaboration with Griha council	2021	Training Program
57	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy	2021	Faculty Training program
58	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy	2021	Faculty Training program

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
59	Faculty of Architecture, Dr.MGR Educational and Research Institute, Chennai	2021	Faculty Training program
64	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy	2021	Faculty Training program
65	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy	2021	Faculty Training program
66	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy	2021	Faculty Training program
67	Centre for research and development & institution's Innovation Council, Sathyabama Institute of Science and Technology	2021	Faculty Training program
68	Faculty of Architecture, Dr.MGR Educational and Research Institute, Chennai	2021	Faculty Training program
69	All India Council for Technical Education, Nelson Mandala Marg, Vasant Kunj, New Delhi	2021	Faculty Training program
70	Council of Architecture Training & Research centre in collaboration with Griha council	2021	Faculty Training program
71	All India Council for Technical Education, Nelson Mandala Marg,Vasant Kunj, New Delhi	2021	Faculty Training program
72	Indian Green Building Council	2021	Training program
73	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy	2021	Faculty Training program
74	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Indian Institute of technology ,Indore	2021	Faculty Training program
75	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at BMS college of Engineering	2021	Faculty Training program

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
76	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at School of Planning and Architecture, Vijayawada	2021	Faculty Training program
77	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Govt Mahila Engineering College, Ajmer	2021	Faculty Training program
78	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Govt Mahila Engineering College, Ajmer	2021	Faculty Training program
79	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Engineering College at Bikaner	2021	Faculty Training program
80	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Pimpri Chinchwad College of Engineering	2021	Faculty Training program
81	Department of Architecture and Regional Planning, IIT Kharagpur	2021	Faculty Training program
82	Council of Architecture Training & Research centre in collaboration with Griha council	2021	Faculty Training program
83	School of Planning and Architecture ,New Delhi ,Building Materials & technology Promotion Council, Ministry of Housing & Urban Affairs, Government of India, New Delhi	2021	Certificate Course
84	NPTEL , conducted by Indian Institute of Technology, Chennai	2021	Workshop
85	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Bharathi Vidyapeeth College of Engineering	2021	Faculty Training program

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
86	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at D Y Patil institute of management & research	2021	Faculty Training program
87	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at College of Engineering ,Bhuvaneswar	2021	Faculty Training program
88	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Gujarat Technological University	2021	Faculty Training program
89	Department of Civil Engineering of St Martin Engineering college ,Dhulapally, Secunderabad, T.S.India	2021	Workshop
90	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Gujarat Technological University	2021	Faculty Training program
91	Amity School of Architecture and Planning, Amity university Kolkata in association with centre for science and Environment, New Delhi	2021	Faculty Training program
92	All India Council for Technical Education, AICTE Training and Learning (ATAL) Academy, at Gujarat Technological University	2021	Faculty Training program
93	SSN College of Engineering, Chennai, India. M. Kumarasamy College of Engineering, Karur 639113, India, Agni College of Technology, Chennai, India, Vidya Jyothi Institute of Technology, Hyderabad, India	2021	Research paper publication

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
94	M.Kumarasamy College of Engineering, Karur 639113, India, Ponjesly College of Engineering, Nagarcoil 629003, India, Annamalai University, Chidambaram 608002, India, Heliopolis University, Cairo 11785, Egypt, University of Naples Federico II, 80138 Naples, Italy, 'Dunarea de Jos' University of Galati, 6200 Galati, Romania	2021	Research paper publication
95	Saveetha Institutions	2021	Project
96	Saveetha Institutions	2021	Project
97	SSN College of Engineering	2021	Project
98	SSN College of Engineering	2021	Project
99	SSN College of Engineering Dr.Prabu	2021	Project
100	Yeungnam University, Gyeongsan, 38541, Republic of Korea, Pusan National University, Busan, 46241, Republic of Korea	2021	Project
101	SSN College of Engineering	2021	Project
102	Oral Cancer Screening Vertical, Indian Cancer Society, Mumbai, Maharashtra, India, Adhiparasakthi Dental College & Hospital, Melmaruvathur, Tamil Nadu, India, Shri Sathya Sai Medical College & Research Institute, Ammapettai, Nellikuppam Post, Tamil Nadu, India, College of Dental Sciences, Davangere, Karnataka, India, Adhiparasakthi Dental College & Hospital, Melmaruvathur, Tamil Nadu, India	2021	Research
103	Conservative Dentistry and Endodontics , Bharath Institute of Higher Training and Research, Tamilnadu, India; Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College and Hospital, Tamilnadu, India	2021	Paper publication

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
104	Dr. M.G.R Educational and Research Institute, Chennai, India	2021	Research with Biotechnology Department - Dr. M.G.R Educational Institute of Research
105	Thai Moogambigai Dental College and Hospital, Chennai, India;	2021	Survey - Research
106	Thai Moogambigai Dental College and Hospital, Chennai, India; King Abdulaziz University, Jeddah, Saudi Arabia; College of Dentistry, King Khalid University, Abha, Saudi Arabia; College of Dentistry, Jazan University, Jazan , Saudi Arabia; College of Dentistry, King Faisal University, Al-Ahsa, Saudi Arabia; Sri Venkateswara Dental College and Hospital, Chennai, India	2021	Systematic Review & Meta Analysis Process
107	Dr. M.G.R. Educational and Research Institute, Thai Moogambigai Dental College and Hospital, The Tamil Nadu Government Dental College and Hospital, Sree Balaji Dental College and Hospital, Chennai, Tamil Nadu, India	2021	Systematic Review & Meta Analysis Process
108	Water and Steam Chemistry Division, BARC Facility, Kalpakkam	2021	Research
109	Symrise Pvt. Ltd.,	2021	Research
110	Water and Steam Chemistry Division, BARC Facility, Kalpakkam	2021	Research
111	NML-CSIR-Taramani Chennai	2021	Research
112	NML-CSIR-Taramani Chennai	2021	Research
113	College of Engineering Guindy, Anna University, Chennai, India	2021	Publication

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
114	Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Chennai, India	2021	Publication
115	Anna University, Chennai 600032, India	2021	Publication
116	CMR Institute of Technology, Bengaluru, Karnataka 560037, India	2021	Publication
117	CSoft Technologies	2021	Internship
118	University of Huddersfield, UK	2021	Research Seminar
119	Panimalar Engineering College	2021	research and academic development of faculty
120	Malaysia KDU Penang University College, Penang, Malaysia	2021	research and academic development of faculty
121	Penang University College, Penang 10400, Malaysia	2021	research and academic development of faculty
122	TNSCST	2021	Student Project
125	Cognizant	2021	Internship
133	Capgemini	2021	Internship
134	Tiger Analytics	2021	Internship
135	Juspay-Anhushree	2021	Internship
138	EnY	2021	Internship
142	HCL	2021	Internship
151	RapidData	2021	Internship

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
156	Freshworks	2021	Internship
160	Siemens	2021	Internship
162	Transact	2021	Internship
164	PublicisSapient	2021	Internship
166	Visteon	2021	Internship
168	Sasken	2021	Internship
172	Cisco	2021	Internship
174	Mirketa	2021	Internship
186	BotreeSoftwares	2021	Internship
190	KaarTechnologies	2021	Internship
191	Nokia	2021	Internship
192	Aptean	2021	Internship
193	Capgemini	2021	Internship
195	Capgemini	2021	Internship
202	PWC	2021	Internship
204	Institut Informatika Indonesia (IKADO), Indonesia	2021	Online Faculty Exchange
205	UNIS, Brazil	2021	Certification course on International Law
241	Daffodil International University (DIU), Bangladesh	2021	Virtual International Social Business Summer Program 2021

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
242	Institut Informatika Indonesia (IKADO), Indonesia	2021	Online Faculty Exchange
243	University Malaysia Pahang, Malaysia	2022	Semester Abroad Programme
250	Sekolah Tinggi Infomatika @ Komputer Indonesia	2022	Short term Certification course on Financial Technology and Supply Chain Management
260	University of Buea, Cameroon	2022	Online Faculty Exchange
263	University of Transport and Communications(UTC), Vietnam	2022	4th FRACTION Project Management Board Meeting
265	DST-SERB	2021	Fellowship
266	Yilfiz Technical University, Turkey	2022	Post-Doctoral Fellowship
267	University Technology Malaysia, Malaysia	2022	Research Internship Programme
268	Purdue University, USA	2022	Overseas Visiting Doctoral Fellowship
269	Alexander Dubcel University of Trencin, Slovakia	2022	Post Doctoral Fellowship
270	University Of Texas, Dallas, USA	2022	Internship on Machine Leaning and Big Data
274	University Putra Malaysia, Malaysia	2022	Virtual Cultural Programme

Sl. No.	Name of the collaborating agency	Year of collaboration	Nature of the activity
278	Wszechnica Polska Academy of Applied Sciences in Warsaw, Poland	2022	STA Scholarship (Staff Mobility Programme for Teaching Assignments) through Erasmus Plus
280	MAHSA University, Malaysia	2022	Staff Mobility Programme
282	University of Kentucky, USA	2022	Post Doctoral Fellowship
283	Tohoku University, Japan	2022	JSPS Post Doctoral Fellowship
284	United Arab Emirates University, UAE	2022	Research Internship

17.9 FACULTY EXCHANGE/RESEARCH PROGRAMME-2021-2022

Our faculty members visited International Universities on academic and research exchange programmes. The following is the

S.NO	NAME OF THE FACULTY	DEPT	UNIVERSITY	DURATION	PROGRAMME	PERIOD
1.	Dr. Albert Pravin	CSE	Institut Informatika Indonesia (IKADO), Indonesia	3 Weeks	Online Faculty Exchange	30th Sept - 21st Oct 2021
2.	Dr. Vigneshwari	CSE	University of Buea, Cameroon	3 months	Online Faculty Exchange	March - May 2022

3.	Mr. Murali D Kamalesh	CSE	University of Buea, Cameroon	3 months	Online Faculty Exchange	March - May 2022
4.	Dr. K Ashok Kumar	CSE	University of Buea, Cameroon	3 months	Online Faculty Exchange	March - May 2022
5.	Dr. G. Bhuvaneswari	MBA	University of Transport and Communications, Vietnam	1 week	4th FRACTION Project Management Board Meeting	20th April – 26th April 2022
6.	Dr. T R Kalailakshmi	MBA	University of Transport and Communications, Vietnam	1 week	4th FRACTION Project Management Board Meeting	20th April – 26th April 2022
7.	Dr. A. Chitra Devi	CAPIR	Transilvania University of Brasov, Romania	3 days	Erasmus Plus Staff Mobility for Training (Virtual)	15th to 17th June 2022
8.	Dr. Preethi Sheshadri	CAPIR	Transilvania University of Brasov, Romania	3 days	Erasmus Plus Staff Mobility for Training (Virtual)	15th to 17th June 2022
9.	Dr. D. Velumoni	MBA	WszechnicaPolska Academy of Applied Sciences in Warsaw, Poland	5 days	Staff Mobility for Teaching through Erasmus Plus Programme funded by the European Union	25th July – 29th July 2022
10.	Dr. J. Rani	MBA	WszechnicaPolska Academy of Applied Sciences in Warsaw, Poland	5 days	Staff Mobility for Teaching through Erasmus Plus Programme funded by the European Union	25th July – 29th July 2022
11.	Dr. M. Bavanilatha	Biotechnology	MAHSA University, Malaysia	1 week	Staff Mobility Programme	29th July – 7th August 2022

12.	Dr. S. UshaNandhini	Biotechnology	MAHSA University, Malaysia	1 week	Staff Mobility Programme	29th July – 7th August 2022
13.	Mr. Manigandan	Aero	United Arab Emirates University, UAE	7 months	Research Internship	August 2022

Sathyabama is Committed towards achieving the United Nations