PONDICHERRY UNIVERSITY
(A Central University established by an Act of Parliament No. 53 of 1985)
Accredited with A+ Grade by NAAC – V[th] Cycle

One-Day National Workshop on Ocean Energy & Water for Sustainable Future:

OEWSF-2026 Samudra Shakti

POTENTIAL & CHALLENGES 2026

19th March 2026

Hosted by
DEPARTMENT OF GREEN ENERGY TECHNOLOGY
MADANJEET SCHOOL OF GREEN ENERGY TECHNOLOGIES

In Association with
NATIONAL INSTITUTE OF OCEAN TECHNOLOGY (NIOT)
Ministry of Earth Sciences
Government of India - Chennai

UNDER UNSECO CHAIR (RCESD) ACTIVITY
Sponsored By South Asia Foundation (MSF/SAF)

EVENT COMPENDIUM

PONDICHERRY UNIVERSITY

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One-Day National Workshop on Ocean Energy & Water for Sustainable Future:

POTENTIAL & CHALLENGES 2026

UNDER UNSECO CHAIR(RCESD) ACTIVITY

Sponsored By MSF/SAF

Organized By
Department of Green Energy Technology
Madanjeet School of Green Energy Technologies
PONDICHERRY UNIVERSITY

IN ASSOCIATION WITH
NIOT - CHENNAI

OEWSF-2026
Samudra Shakti

OEWSF
2026

புதுவைப் பல்கலைக்கழகம்
(மத்திய பல்கலைக்கழகம்)
पांडिच्चेरी विश्वविद्यालय
(केंद्रीय विश्वविद्यालय)
PONDICHERRY UNIVERSITY
(A Central University)

பேராசிரியர் ப. பிரகாஷ் பாபு
துணை வேந்தர்
आचार्य प. प्रकाश बाबू
कुलपति
Prof. P. PRAKASH BABU
VICE - CHANCELLOR

டாக்டர். அம்பேத்கர் நிர்வாக கட்டிடம்,
ஆர். வெங்கட்ராமன் நகர்,
डॉ. अंबेडकर प्रशासनिक भवन
आर.वेंकटरामन नगर,
Dr. Ambedkar Administrative Building
R. Venkataraman Nagar,
காலாப்பட்டு, புதுச்சேரி,
कालापेट पुदुच्चेरी,
Kalapet, Puducherry - 605 014.

17.03.2026

MESSAGE

I am pleased to note that the **UNESCO Chair at Pondicherry University** is hosting the first-ever National Workshop on "**Ocean Energy & Water for Sustainable Future: Potential & Challenges 2026" (OEWSF-2026)** in collaboration with the premier institute, National Institute of Ocean Technology (NIOT), which marks another milestone in our academic journey toward sustainability. In an era defined by the urgent need for climate resilience and resource security, the dual challenges of sustainable energy and clean water access remain at the forefront of the global developmental agenda. India, with its vast coastline and strategic maritime position, holds immense untapped potential in ocean-based resources. This workshop serves as a vital platform to explore these frontiers, aligning perfectly with the United Nations Sustainable Development Goals (SDGs) and India's commitment to a "Blue Economy."

I am especially pleased to note that this landmark event is being organized in collaboration with the **NIOT, Chennai,** an institution of premier national importance in the maritime sector. The presence of EIGHT leading experts and researchers from NIOT brings an invaluable synergy between academic research and practical technological application. Their insights into Ocean Thermal Energy Conversion (OTEC), desalination, deep-sea pipelines, and marine engineering will undoubtedly provide our participants with a comprehensive understanding of the technical and logistical complexities involved in offshore energy and clean water harvesting. The focus on cutting-edge subjects like **AI-driven ocean energy solutions** and **marine infrastructure resilience** reflects Pondicherry University's strategic commitment to fostering innovation at the intersection of technology and sustainability.

I am confident that the deliberations at **OEWSF-2026** will serve as a powerful catalyst, inspiring students, researchers, and policymakers to transform immense natural potential into tangible solutions for a sustainable, energy and water-secure future.

I wish the organizers, collaborators, and all the participants a highly productive and intellectually enriching experience.

17/3/2026

(P. PRAKASH BABU)

राष्ट्रीय समुद्र प्रौद्योगिकी संस्थान
NATIONAL INSTITUTE OF OCEAN TECHNOLOGY
पृथ्वी प्रणाली विज्ञान संगठन/Earth Systems Sciences Organisation
(पृथ्वी विज्ञान मंत्रालय, भारत सरकार)
(Ministry of Earth Sciences, Government of India)
एन.आई.ओ.टी. केम्पस, वेलच्चेरी ताम्बरम मेन रोड, पल्लिकरणै, चेन्नै-६०० १०० भारत.
NIOT Campus, Velachery - Tambaram Main Road, Pallikaranai, Chennai-600 100 INDIA.

प्रो. बालाजी रामकृष्णन
निदेशक
Prof. BALAJI RAMAKRISHNAN
DIRECTOR

02.03.2026

Welcome Message to OEWSF- 2026

It is my privilege to welcome the participants, scholars, and experts to the National Workshop on "Ocean Energy & Water for Sustainable Future: Potential & Challenges 2026 (OEWSF-2026)." As the Director of the National Institute of Ocean Technology (NIOT), Ministry of Earth Science (MOES), I am particularly heartened to see this collaborative initiative held under the prestigious UNESCO Chair on Renewable and Clean Energy for Sustainable Development at Pondicherry University.

Our oceans represent the final frontier for sustainable development. With India's expansive coastline, the transition toward a "Blue Economy" is no longer a peripheral goal but a national priority. This workshop arrives at a critical juncture where the integration of Ocean Energy Technologies and Clean Water Solutions is essential to meeting the growing demands of our population while adhering to global climate commitments. I am pleased that our leading researchers and experts from NIOT are joining this forum to share technical insights into groundbreaking areas such as Ocean Energy Technology, Ocean Thermal Energy Conversion (OTEC), Deep-sea pipeline engineering, and advanced Desalination techniques. The inclusion of Artificial Intelligence (AI) applications and infrastructure resilience in the agenda highlights our shared vision of using "smart" engineering to overcome the unique challenges of the marine environment.The synergy between a national premier research organization like NIOT and an esteemed academic institution like Pondicherry University is the ideal catalyst for innovation. It is through such partnerships that laboratory breakthroughs are transformed into scalable, real-world technologies that can provide infinite energy and life-sustaining water.

I extend my gratitude to Prof. Prakash Babu, Vice Chancellor of Pondicherry University, and congratulate Prof. R. Arun Prasath, UNESCO Chairholder and Convenor, for his dedication and for spearheading this collaborative event between NIOT and Pondicherry University under the UNESCO chair activity. I am certain that the deliberations at this workshop will inspire the next generation of engineers and scientists to look towards the horizon for the solutions of tomorrow.

I wish the workshop every success and look forward to continued collaboration.

(PROF. BALAJI RAMAKRISHNAN)

Phone: +91-44-66783303, 66783304 / Fax: +91-44-66783571 / e-mail: director@niot.res.in / web: http://www.niot.res.in

Madam France Marquet
Principal Trustee, Madanjeet Singh Foundation, Representative of the South Asia Foundation (SAF) to UNESCO

Welcome Message to OEWSF- 2026

I am pleased to extend my warmest greetings to the organizers, collaborators and participants of the National Workshop on "Ocean Energy & Water for Sustainable Future: Potential & Challenges 2026 (OEWSF-2026)." This landmark event, under the UNESCO Chair activity hosted by the Department of Green Energy Technology at Pondicherry University, beautifully aligns with the vision of the Madanjeet Singh Foundation and the South Asia Foundation to foster regional cooperation and sustainable development through education and innovation.

The choice of theme is both timely and vital. As we confront the global climate crisis, the pursuit of clean water and renewable energy is no longer a choice but a necessity for our collective survival. This workshop serves as a testament to the power of academic synergy in addressing the most pressing challenges of our time. The collaboration with the National Institute of Ocean Technology (NIOT), Chennai, is particularly heartening to me regarding the chosen topic. By convening EIGHT leading experts to share their knowledge on Ocean Thermal Energy Conversion (OTEC), desalination, and AI-driven marine solutions, this workshop provides a unique platform for young scholars and researchers to learn from the vanguards of ocean science. Such initiatives are essential for building the technical capacity and "Green Energy to Clean Water" leadership that South Asia requires to thrive in a blue economy.

On behalf of my fellow trustees and me, I express my gratitude to Prof Prakash Babu, Vice Chancellor of Pondicherry University, for his administrative support. I took this opportunity to express my appreciation to Prof. R. Arun Prasath, UNESCO Chairholder and Convenor of this workshop, for his unwavering commitment to UNESCO's ideals and to those of the Madanjeet Singh Foundation, which made this important event possible. Your efforts in bringing together high-level expertise to solve real-world problems regarding water and energy security are truly commendable. I extend my thanks to Prof. R. Prasanth, Head of the Department of Green Energy Technology, and his team for their support for this event.

I wish all participants an intellectually stimulating experience and look forward to the innovative ideas that will emerge from these deliberations, paving the way for a more sustainable and resilient future.

Best regards & Thank you,

France Marquet

46 Bd des Invalides 75007 Paris, France
madanjeetsaf@gmail.org

Foreword

Dr. Benno Böer

CHIEF OF NATURAL SCIENCES
UNESCO, SOUTH ASIA
REGIONAL OFFICE, NEW DELHI

Dear Professor Arun Prasath, UNESCO Chair on Renewable and Clean Energy and Sustainable Development at Pondicherry University, Distinguished Scientists from the National Institute of Ocean Technology, Esteemed Colleagues, Dear Students, Ladies and Gentlemen, It is a great honor to address you at this pioneering workshop on Ocean Energy & Water for Sustainable Future: Potential & Challenges 2026. We are living in a decisive decade. Climate change, freshwater scarcity, and rising energy demand are redefining our responsibilities. The solutions we design today will determine the resilience of our societies tomorrow. Increasingly, the answer lies in the ocean. The ocean is not only a climate regulator and biodiversity reservoir, but also one of the greatest untapped sources of sustainable energy.

Let me share a few practical examples showing that this future is already unfolding. In Scotland, the MeyGen project has installed seabed-mounted tidal turbines that harness predictable tidal currents to generate electricity. Because tides follow the rhythm of the moon, tidal energy is among the most reliable renewable sources available. Similarly, Orbital Marine Power has developed a floating tidal turbine capable of powering around 2,000 homes. Floating on the surface, its underwater rotors capture the kinetic energy of moving water, essentially functioning like an underwater wind turbine.

In India, Lakshadweep is preparing to launch its pioneering OTEC plant in 2026, which will harness the ocean's vast thermal energy to generate sustainable electricity and fresh water, reduce fossil fuel dependence, protect the environment, and showcase how innovation can build climate-resilient, self-sufficient island communities. These examples demonstrate that ocean movement, driven by gravitational forces, can provide predictable, clean base-load electricity. But the future goes further. Kinetic turbines placed in strong marine currents could form underwater energy farms, generating power for coastal cities with minimal environmental impact. Beyond electricity, the ocean can also generate renewable biomass. A visionary initiative supported by UNESCO in collaboration with the University of New South Wales is exploring floating mangrove forests. Inspired by experimental work in Qatar and now field-tested near Fiji, these platforms cultivate mangroves directly on seawater. Mangroves are salinity tolerant, and they produce biomass. In the future, such ocean- grown biomass, floating on buoyant modules, could be harvested for bioenergy production, making available a carbon-negative pathway while restoring marine ecosystems. At the same time, large-scale seaweed cultivation is emerging globally. Seaweed grows rapidly, requires no freshwater or arable land, and can be processed into biofuels and sustainable materials, offering major opportunities for coastal nations.

What unites these examples is a systems perspective:

- Harnessing tidal forces
- Capturing kinetic ocean energy
- Integrating Ocean Thermal Energy Conversion with desalination
- Cultivating marine biomass
- Strengthening resilient marine infrastructure
- And applying artificial intelligence to optimize these systems

This is a technological innovation and a transformation of our relationship with the ocean. For centuries, we treated the ocean as a resource to extract from. The 21st century calls us to treat it as a partner, working with its rhythms and designing regenerative technologies. Workshops like this, aligned with UNESCO's commitment to sustainable development, are essential. They bring together engineers, scientists, policymakers, and young innovators to develop solutions that are both scientifically sound and socially responsible. The young researchers of today are the architects of the future blue economy. Your work may power communities, secure freshwater supplies, and strengthen coastal resilience. India, with its long coastline and scientific excellence, has enormous potential to lead in ocean-based sustainability solutions. Let this workshop inspire bold and responsible energy pilot projects. The ocean holds vast energy. Our responsibility is to unlock it wisely. Let me recognize Prof. Ramaswamy Arun Prasath's remarkable efforts under UNESCO Chairholder initiatives, fostering renewable and clean energy solutions that illuminate the path toward a sustainable world with clean water and resilient communities. May your discussions be forward-looking, your partnerships enduring, and your innovations contribute to a sustainable ocean future for India and the world. With my very best wishes for a successful workshop.

Dr. Benno Böer
Chief, Natural Sciences, South-Asia

PONDICHERRY UNIVERSITY

DEPARTMENT OF GREEN ENERGY TECHNOLOGY
MADANJEET SCHOOL OF GREEN ENERGY TECHNOLOGIES

Message from the DEAN's Desk

It gives me immense pleasure to extend my warm greetings to all participants, academicians, researchers, industry professionals, and students on the occasion of the one-day **National Workshop on Ocean Energy & Water for Sustainable Future: Potential & Challenges 2026**, organized by the Department of Green Energy Technology, Pondicherry University, under the aegis of UNESCO Chair Activities, in collaboration with National Institute of Ocean Technology, Ministry of Earth Sciences, Govt. of India. The chosen topic of workshop aptly reflects our pursuit for sustainable development and to realize the commitment toward net-zero goals.

The rapid transition in global energy scenario and our shared commitment towards net-zero demands innovative and sustainable technological interventions to solve the problems. This one-day workshop **OEWSF- 2026** aimed for dissemination of pioneering research in Ocean Technologies, Renewable Energy, Sustainable Development, Carbon Sequestration and Decarbonization strategies can serve as a stimulant for intellectual exchange and research collaboration among the stake holders.

The **Madanjeet School of Green Energy Technologies** has always been committed to promoting excellence in education, research, and industry collaboration in sustainable energy domains. The Department of Green Energy Technology, recognized for its contributions to renewable energy technologies, continues to play a pivotal role in nurturing competent human resource and impactful research for national development. I am happy to note that a wonderful workshop sponsored by UNESCO Chair Activities is being held by the department.

I congratulate the organizing committee, convenors, advisory members, and all stakeholders for their dedicated efforts in bringing together distinguished Scientists of NIOT as resource persons for the workshop. I am confident that this workshop will stimulate meaningful discussions, foster research collaborations and contribute significantly to sustainable development goals.

I extend my best wishes for the grand success of OEWSF- 2026.

Prof. B.M. Jaffar Ali
Chairman, OWESF-2026
Dean i/c, MSGET
Pondicherry University, Puducherry, India

PONDICHERRY UNIVERSITY

DEPARTMENT OF GREEN ENERGY TECHNOLOGY
MADANJEET SCHOOL OF GREEN ENERGY TECHNOLOGIES

Message from the Head of the Department, DGET

It gives me great pleasure to welcome all participants to the **One Day National Workshop on "Ocean Energy & Water for Sustainable Future: Potential & Challenges 2026"** organized by the **Department of Green Energy Technology, Pondicherry University**, as part of the activities under the **UNESCO Chair in Green Energy Technologies.**

The growing global demand for clean energy and sustainable water resources has made it imperative to explore alternative and renewable solutions. Ocean energy—encompassing wave, tidal, ocean thermal, and salinity gradient energy—represents one of the most promising yet underutilized renewable resources available to humankind. At the same time, the increasing stress on freshwater resources calls for innovative and energy-efficient technologies for water production, desalination, and management. Integrating ocean-based renewable energy with sustainable water technologies offers a powerful pathway toward addressing these twin global challenges.

India, with its vast coastline and rich marine resources, possesses significant potential for harnessing ocean energy. However, realizing this potential requires multidisciplinary research, technological innovation, and collaborative efforts among scientists, engineers, policymakers, and industry stakeholders. Platforms such as this workshop play a crucial role in bringing together experts and young researchers to discuss emerging technologies, share research findings, and examine the practical challenges associated with ocean energy systems and sustainable water solutions.

This workshop aims to provide an academic and professional forum for meaningful discussions on recent advances, resource assessment, system design, environmental considerations, and the techno-economic feasibility of ocean energy technologies. It will also highlight the role of ocean energy in powering desalination and water treatment systems, thereby contributing to a resilient and sustainable future.

I sincerely hope that this workshop will stimulate insightful discussions, inspire innovative research ideas, and foster collaborations among participants from academia, research institutions, and industry.

Prof. R. Prasanth Ravindran
Co - Chairman , OWESF-2026
Head of the Department, DGET
Pondicherry University, Puducherry, India

PONDICHERRY UNIVERSITY

DEPARTMENT OF GREEN ENERGY TECHNOLOGY
MADANJEET SCHOOL OF GREEN ENERGY TECHNOLOGIES

PREFACE

I am honored to present the National Level Ocean Energy and Water for Sustainable Future (OWESF-2026), organized under the UNESCO Chair on Renewable and Clean Energy for Sustainable Development (RCESD) in partnership with the National Institute of Ocean Technology (NIOT) at Pondicherry University. This event reflects our continued commitment to advancing sustainable energy–water solutions through research, innovation, and global collaboration

India, with its vast coastline of over 7,500 km, holds tremendous untapped potential in ocean energy resources, including wave, tidal, thermal, and offshore wind. Harnessing these resources is critical for meeting the nation's growing energy demand while advancing its net-zero carbon-emission targets and global climate commitments. The transition toward decarbonization and sustainable energy systems is no longer optional; it is essential to ensuring long-term environmental and economic resilience. Ocean energy uniquely addresses the twin needs for clean power and fresh water. Technologies like Ocean Thermal Energy Conversion (OTEC) and desalination can produce renewable electricity and clean water simultaneously, supporting coastal and island communities. The OTEC project was developed by NIOT under the Ministry of Earth Sciences. This integrated approach is a cornerstone of the Blue Economy, where sustainable ocean use drives economic growth and environmental health.

OWESF-2026 is organized in collaboration with the NIOT, with distinguished resource persons contributing their expertise in ocean science, engineering and technology. The event aims to serve as a platform for academicians, researchers, industry experts, and students to exchange ideas, showcase innovations, and explore pathways to tap the vast and largely untapped ocean energy resources for a sustainable future.

I sincerely hope that OWESF-2026 will inspire meaningful discussions, foster collaborative research at Pondicherry University, and significantly advance sustainable ocean-energy and water solutions for a cleaner, greener, and more resilient future.

Prof. R. Arun Prasath
Convenor, OWESF-2026
UNESCO Chairholder – RCESD
Pondicherry University, Puducherry, India

About OEWSF 2026

OEWSF-2026
Samudra Shakti

"SAMUDRA SHAKTI"-SUSTAINABLE SEAS THROUGH ADVANCED TECHNOLOGY

The One-Day National Workshop on Ocean Energy & Water for Sustainable Future: Potential and Challenges 2026 (OEWSF-2026) is organized by the Department of Green Energy Technology under the UNESCO Chair on Renewable and Clean Energy for Sustainable Development at Pondicherry University, in collaboration with the National Institute of Ocean Technology (NIOT), Chennai. This high-impact event brings together leading scientists, academicians, industry experts, and policymakers to explore marine renewable energy, desalination, infrastructure resilience, and sustainability pathways. The workshop aims to accelerate India's ocean energy roadmap through knowledge exchange, technological insights, and strategic dialogue toward sustainable coastal and marine development.

Topics

Ocean Energy Technologies and Resource
Potential Engineering and Infrastructure
Challenges for Ocean Energy
Environmental Sustainability and Policy
Marine Engineering and Infrastructure Resilience
Policy, Economics, and the National Roadmap
Environmental Stewardship and Coastal Zone Management

About Pondicherry University

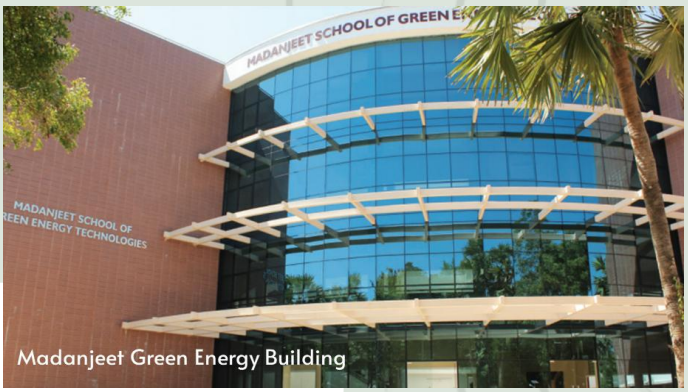
Celebrating 40 YEARS OF EXCELLENCE

Pondicherry University, established in 1985 is an Indian Central University is one of the most sought-after campuses amongst the students from across the nation as a destination for the Higher Education and Research. Pondicherry University has 15 Schools, 38 Departments, 11 Centres and 1 Chair offering over 144 PG, PG-Diploma/ certificate & Research programmes with a student strength of 7000 including foreign students. Currently the University has more than 130 funded research projects including SAP & FIST Projects from various agencies like UGC, DST, CSIR and DBT. The University has two-off campuses, one located in Port Blair (Andamans) with two Departments viz., Ocean Studies and Marine Biology and Coastal Disaster Management and another Post-Graduate Centre at Karaikal. Fresh green sprawling campus spread over 880 acres, features great Instrumentation & Resource facility, 100% Wi-Fi connectivity with 100% power back-up, 24x7 Library facility, 22 well-furnished hostels, Round the clock medical facility, Placement Cell, Community Radio (Puduvai Vaani) and Study India Programme.

Celebrating 4 YEARS OF EXCELLENCE

Department of Green Energy Technology

The Department of Green Energy Technology was established in 2010 under the aegis of Madanjeet School of Green Energy Technologies with a vision to promote education and research in Renewable and Green energy. DGET offers M. Tech in Green Energy Technology which is supported by South Asia Foundation and Ph.D. in the field of renewable energy & related subjects. The Ministry of New and Renewable Energy has recognized and approved the Department as a Nodal Centre in the fields of all clean energy sources. DGET has proficient faculties to teach, offer consultancy and take up research work in several core areas of energy.



Madanjeet Green Energy Building

DGET has several MOUs with leading academic institutions and industries specializing in energy. In 2024, under the effort of DGET, the Madanjeet School of Green Energy Technologies was recognized as UNESCO Chair on Renewable and Clean Energy for Sustainable Development. DGET is constantly evolving and excelling in various fields of energy technologies, both in research and product development.

OEWSF-2026
Samudra Shakti

About NIOT

National Institute of Ocean Technology

The National Institute of Ocean Technology (NIOT) was established in November 1993 as an autonomous society under the **Ministry of Earth Sciences(MoES)**, Government of India. NIOT is managed by a Governing Council and the Director is the head of the Institute. Major aim of starting NIOT under the Ministry of Earth Sciences, is to develop reliable indigenous technologies to solve the various engineering problems associated with harvesting of non-living and living resources in the Indian Exclusive Economic Zone (EEZ), which is about two-thirds of the land area of India.

सत्यमेव जयते
Goverment Of India

राष्ट्रीय समुद्र प्रौद्योगिकी संस्थान
रा स प्रौ सं
NIOT
National Institute of Ocean Technology

MISSION STATEMENT

- To develop world class technologies and their applications for sustainable utilization of ocean resources.
- To provide competitive, value added technical services and solutions to organizations working in the oceans.
- To develop a knowledge base and institutional capabilities in India for management of ocean resources and environment.

Prof. Balaji Ramakrishnan
Current Director, NIOT

KEY OBJECTIVES

- ✓ To develop technologies related to harnessing of ocean renewable energies namely wave energy, hydrokinetic energy and ocean thermal energy conversion (OTEC) and generating fresh water from seawater.
- ✓ To develop technologies for offshore structural components and establish desalination plants in the Islands of Union Territory Lakshadweep.
- ✓ To develop technology along with capacity building for the exploration and exploitation of deep ocean mineral resources such as poly-metallic manganese nodules and Hydro-thermal Sulphides occurring at Central and Southern Indian Ocean and gas hydrates within Exclusive Economic Zone.
- ✓ To develop acoustic systems for ocean applications such as ambient noise measurements, acoustical oceanography, underwater communication and coastal surveillance.
- ✓ To design and develop indigenous underwater acoustic imaging systems and allied technologies and to design and develop wide band underwater acoustic transducers and hydrophone arrays.
- ✓ To design, develop and demonstrate new autonomous ocean observation technologies and systems for oceanographic applications.
- ✓ To develop marine algal biotechnology, marine microbial biotechnology, open sea cage culture and ballast water treatment technologies.
- ✓ To develop environmentally sustainable solutions for beach restoration and shoreline management by integrating state-of-the-art field measurements, numerical modeling studies and comprehensive detailed engineering designs.
- ✓ To maintain the moored ocean observation network consisting of met-ocean and tsunami buoys for real time data transmission and to support RAMA program under the Indo-US collaboration and to disseminate data to INCOIS. To develop ocean observational tools prototype technology development.
- ✓ To conduct operational management and maintenance of research ships and on board scientific equipment.
- ✓ To develop and maintain a state of the art seafront research facility to enable activities in development and testing of prototype systems, validation of indigenously developed marine systems in the ocean environment.

https://www.niot.res.in/

UNESCO CHAIR ON

Renewable and Clean Energy for Sustainable Development

Professor R. Arun Prasath holds the established UNESCO chair on "Renewable and Clean Energy for Sustainable Development (RCESD)" in the UNESCO Madanjeet School of Green Energy Technologies (UMSGET) at Pondicherry University (2024-2028). The official inauguration of the 16th prestigious UNESCO chair in India was held on 10th December 2024 to promote green and clean energy technologies. The UNESCO chair at Pondicherry University was achieved through collaborative efforts involving the Ministry of Education - Govt of India, UNESCO - India, South Asia Foundation Madanjeet Singh Foundation (MSF) Trustee, and with endorsements from international partners (Germany, Australia, Brazil, USA, and UK), as well as national hosts and collaborators of Prof. R. Arun Prasath. Additionally, Prof. R. Arun Prasath's extensive international experience in research and his extensive out-reach sustainable practices such as promotion of solar campus at PU campus, Invest in Our Planet Earth, Sustainable Campus Campaigns, Green Campus Auditing, Sustainability@PU, Net-zero Pondicherry University, has been instrumental in securing this chair.

This initiative is part of the broader UNITWIN/UNESCO Chairs Programme, which aims to enhance institutional capacities through international cooperation and knowledge sharing among higher education institutions. The UNESCO Chair will serve as a platform to promote research, education, and capacity-building in sustainability, renewable energy, and community development. To work with governments, schools, colleges, universities, industries, NGOs, businesses, researchers, technology developers and environmentally conscious individuals working towards the promotion of renewable energy, also It will actively engage in fostering global partnerships, advancing knowledge-sharing, and supporting innovative practices that align with UNESCO's mission to build peace through education, science, and culture. This achievement marks a new chapter for Pondicherry University in its ongoing journey toward academic excellence and sustainable development.

The official inaugural function of the UNESCO Chair on "Renewable and Clean Energy for Sustainable Development" was held on 10th December 2024. The Chair Establishment Report is attached here.

unesco
Chair on Renewable and Clean Energy for Sustainable development

Webpage **Inaugural Report**

Professor R. Arun Prasath

UNESCO – Chairholder
Department of Green Energy Technology
Madanjeet School of Green Energy Technologies
Pondicherry University

- UNESCO Chairholder to promote "Renewable and Clean Energy for Sustainable Development," which was established with the support of UNESCO Madanjeet School of Green Energy Technologies (UMSGET) and his international partners at Pondicherry University (2024-2028).
- Active member in promoting renewable energy and sustainability at the Pondicherry University campus. "Solar Campus Master Plan" initiative for Pondicherry University, Invest in Our Planet Earth, Sustainable Campus Campaigns, Green Campus Auditing, Sustainability@PU, Net-zero Pondicherry University

unesco
Chair on Renewable and Clean Energy for Sustainable development

R. ARUN PRASATH is a Professor in the Department of Green Energy Technology at Pondicherry University. He received the prestigious DAAD fellowship (1999-2001) for his doctoral research work at the Max-Planck Institute for Polymer Research, Mainz, GERMANY. He worked as a material researcher in several prestigious institutes, as a research associate at the Indian Institute of Science, Bangalore, INDIA (2002-2004), a postdoctoral researcher at the University of Strathclyde, Glasgow, UNITED KINGDOM (2004-2006) and at University of New South Wales, Sydney, AUSTRALIA (2006-2008), and as a senior researcher in Ghent University (2008-2010), BELGIUM with special fellowship named BOF and received the prestigious RAMAN fellowship to work at University of Wyoming, UNITED STATES OF AMERICA in the year 2014-15. Currently, he is leading a research group on energy materials and sustainability. He extensively focuses on materials synthesis, characterization, and application in solar energy, bio-energy, batteries, fuel cells, and other green and clean energy technologies. He has authored over 60 peer-reviewed journal articles, proceedings, and book chapters and is a co-inventor in 3 International patents and 2 European patent applications to his credit. He has presented more than 80 oral presentations at various conferences, seminars, courses, and invited talks, mainly on research progress and outreach on renewable energy technologies. He was involved as PI/Co-PI in projects funded by DST-SERB, MNRE, and ICSSR. He has guided several students on their PG degree projects, and some Ph.D. students have obtained their doctoral degrees under his guidance on material development for solar cells, bio-energy, battery, and fuel cells.

Prof. R. Arun is also actively involved in the outreach and promotion of renewable energy technologies and sustainable development practices at Pondicherry University. His achievements include the detailed project report for the "Solar Campus Master Plan" for the Pondicherry University Main Campus, Invest in Our Planet Earth, Sustainable Campus Campaigns, Green Campus Auditing, Sustainability@PU, and Net-zero Pondicherry University. His team's project proposal to Pondicherry University in 2012-2013 for a "Solar Campus" has contributed to promoting Solar Energy Generation on campus, with a current installed capacity of ~3 MWp in 2021, making Pondicherry University one of the largest affordable and clean energy generators among educational institutions in India. He also served as chairman of the green audit for the Pondicherry University campus and as a member of the QS Sustainability Ranking and the Times Higher Education World University Rankings for the campus, focusing on SDG 7: "Affordable and Clean Energy." In addition, he is a member of several university-administration initiatives that promote sustainable practices. Under his leadership, the UNESCO chair aims to promote greener and cleaner energy technologies, energy security, and sustainable development. The UNESCO chair advocates for a rapid and massive transformation toward greener and cleaner energy generation via solar, wind, hydro, ocean, wave, waste-to-energy, geothermal power, hydrogen energy, and the development of efficient technologies like fuel cells, hydrogen electrolyzers, electrical mobility, more efficient energy storage systems, carbon capture, utilization, and storage technologies, green building and, sustainable chemical technologies, etc. to address the global climate change issues for the promotion of sustainability in energy generation and use.

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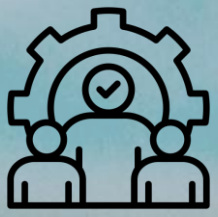

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in Collaboration with
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Under UNESCO CHAIR(RCESD) activity

PROGRAM SCHEDULE

CCC Auditorium **19.03.2026**

TIMING	EVENTS	
8:00 AM – 9:00 AM	REGISTRATION	
9:00 AM – 10:30 AM	WORKSHOP INAUGURATION	
10:30 AM – 11:00 AM	HIGH TEA	
11:00 AM – 11:25 AM	**Dr. G. Venkatesan** SCIENTIST-G, Group Director –Energy & Project Director - DOM V-5, NIOT	**Desalination and OTEC - Indian Context**
11:25 AM– 11:50 AM	**Prof. K. Srinivasamoorthy** HoD, Department of Earth Science, PU	**Submarine Groundwater Discharge as a pathway for Freshwater-Marine interactions**
11:50 AM – 12:15 PM	**Dr. S. V. S. Phani Kumar** SCIENTIST G, Group Director -Water & Climate Change and Mission Mausam, NIOT	**Clean Water Technologies : NIOT's Perspective**
12:15 AM – 12:40 PM	**Dr. A. Ganesh Kumar** SCIENTIST-E	**Innovations in Microbial Energy Production and Next Gen Fuels**
12:40 PM – 01:30 PM	LUNCH BREAK	
01:30 PM – 01:55 PM	**Dr. V. Samson Packiaraj** SCIENTIST-E, Joint Project Director –OTEC, NIOT	**Comparative Study on Desalination using LTTD and OTEC Technologies**
01:55 PM– 02:20 PM	**Dr. S. Sivasankari** Assistant Professor, DGET, PU	**Bioenergy from Water Hyacinth: A Sustainable Solution for Invasive Species in the Marine Backwater Systems**
02:20 PM – 02:45 PM	**Mr. S. S. Prakash Kumar Lagudu** SCIENTIST-E, NIOT	**Overview of Desalination Technologies and their Economics**
02:45 PM – 03:10 PM	**Mr. Biren Pattanaik** SCIENTIST-E, NIOT	**AI Applications in Ocean Energy Development Activities**
03:10 PM – 03:30 PM	TEA BREAK	
03:30 PM – 03:55 PM	**Mr. Ashwani Vishwanath** SCIENTIST-E, NIOT	**Deep Sea Pipelines for OTEC & Desalination**
03:55 PM – 04:20 PM	**Dr. Krishna Kumar Jaiswal** Assistant Professor, DGET, PU	**Microalgal desalination cell for energy and sustainability**
04:20 PM – 04:45 PM	**Mr. Abhijeet Sajjan** SCIENTIST-E, NIOT	**Numerical studies on long deep sea cold water pipe for OTEC**
04:45 PM – 05:30 PM	VALEDICTORY SESSION	

Expert Talks

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ABSTRACTS

Desalination and OTEC – Indian Context

Dr. G.Venkatesan[1] Dr. Vijaya Ravichandran[2], Prof. R Balaji[3]

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Dr. G. Venkatesan
SCIENTIST-G, Group Director -Marine Energy & DOM Vertical-5, NIOT- MoES

The National Institute of Ocean Technology (NIOT) has been at the forefront of harnessing ocean energy to address water scarcity in India's island communities. The implementation of Low Temperature Thermal Desalination (LTTD) plants is a testament to this effort, with the first plant established at Kavaratti in 2005, followed by installations in Minicoy, Agatti, Amini, Kalpeni, Kadamat, Chetlat, and Kiltan. These plants have had a profound impact on the health and well-being of island residents, providing access to high-quality potable water. However, the current reliance on island grid power for LTTD operation poses a challenge. To address this, NIOT is pioneering Ocean Thermal Energy Conversion (OTEC) at Kavaratti, aiming to generate 100 m3/day of fresh water using the natural temperature gradient between warm surface waters and cold deep-sea waters. This innovative project will not only provide a sustainable energy source but also reduce dependence on diesel generators, contributing to a cleaner environment.

The OTEC plant's open cycle system is designed to optimize energy production while minimizing environmental impact. Warm water is flash-evaporated in a chamber, producing water vapour that drives a turbine to generate electricity. This vapour is then condensed using cold water drawn from the ocean depths, yielding potable water without any additional power from external grid/source. This process has been successfully tested in laboratory scale level at NIOT, currently demonstrating OTEC's viability for Lakshadweep islands.

Comprehensive studies, including bathymetry, temperature and depth profiles, have identified the optimal location for the OTEC plant on Kavaratti's shore. NIOT's approach focuses on reducing environmental impact, capital costs, and energy consumption. The institute has introduced novel techniques and technologies to achieve these goals, making this project a significant step towards scaling up OTEC technology and integrating it with other renewable energy sources, such as solar power, to meet the energy demands of desalination systems.

This pioneering effort has the potential to transform the way India's island communities access clean water and energy, showcasing a sustainable model for other regions.

Dr. G.Venkatesan is scientist - "G" at the National Institute of Ocean Technology, an autonomous institute of Ministry of Earth Sciences.

He has more than twenty years of experience in design, fabrication, erection, installation and commissioning of mechanical engineering system of low temperature thermal desalination system both for on shore and offshore applications. His main research work includes optimization and enhancement on low temperature thermal desalination. He has filed patent applications for four inventions in the area of Desalination. He has also received certificate of merit award from the government in the field of desalination. He is a member of the scientific sub-committee on energy for Science City - Chennai Science Festival; Internal Auditor for Quality Management System based on ISO 9001: 2008 and life member of Indian Desalination Association (InDA) & Ocean Society of India (OSI). He conducted theory and practical classes on Ocean energy and fresh water for ITI course for staff members.

He also guided projects for both bachelor and master students for their partial fulfillment of award of engineering degree. He has been interviewed by doordarshan on "Different techniques used for desalination of seawater, their advantages, limitations etc" by Prasar Bharathi and telecasted for 30 minutes by All India Radio.

Dr. G.Venkatesan may be contacted at Energy and Fresh water group in National Institute of Ocean Technology, Chennai, Tamil Nadu. Email: venkatesang.niot@gov.in

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Submarine Groundwater Discharge as a pathway for Freshwater – Marine interactions

Ponnumani. G, Srinivasamoorthy. K*, Rajesh Kanna. A, Ramesh. K, Gopalakrishnan. V, Supriya Varshini. D
*Department of Earth Sciences, Pondicherry University
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Prof. K. Srinivasamoorthy
Professor & Head, Dept of Earth Sciences, PU

Submarine groundwater discharge (SGD) is increasingly recognised as a critical process at the land-sea boundary, influencing coastal water balance, nutrient dynamics, and ecosystem productivity (Burnett et al. 2001; Moore 2010; Knee and Paytan 2011; Klostowska et al. 2020; Wang et al. 2022; Abdelwahab et al.2026). An attempt has been made along the coastal aquifers of Pondicherry and Tamil Nadu regions, using hydrogeological surveys, tracers, and water chemistry techniques to identify and quantify SGD. Higher radon levels, salinity variations, and distinct hydrochemical signatures confirm the presence of significant discharge zones along the estuaries (Figure 1). Fresh and saline discharge zones were found to be influenced by monsoonal recharge and dry seasons, respectively, along the estuaries. Engineering techniques such as desalination and OTEC are proposed to address water-energy challenges. But SGD represents a natural pathway that contributes freshwater/saline water to the marine environment, alters microbial productivity and nutrient cycling, and helps understand natural discharge pathways by providing valuable information for coastal resource management. The study also highlights SGD as a natural complement to technological advances and as a measure to gain a clear perspective on freshwater–marine interactions. Identifying appropriate SGD zones can be incorporated into water resource planning to strengthen sustainable development strategies, aligning natural processes with innovative technologies for the coastal regions of India.

Prof. Srinivasamoorthy has over two decades of expertise in Groundwater Resources: Assessment and Management, integrating advanced geochemical techniques with sustainable water resource strategies. He has established a Hydrogeology Lab at the Department of Earth Sciences, Pondicherry University, which serves as a hub for advanced groundwater research and practical training by supporting cutting-edge investigations and hands-on training for M.Sc and doctoral scholars. He has published more than 117 research papers, book chapters, and conference contributions in leading SCI/SCOPUS-indexed journals, with about 8,100 citations, an H-index of 45, and an i10-index of 98, reflecting his significant contributions to water resources. He has edited in leading Earth Science and Water Resources journals, and contributes to academic governance through research committees, studies, and technical panels. He has completed several nationally funded projects on groundwater recharge, aquifer vulnerability, and water quality monitoring, supported by DST, UGC, and MoES. His current projects under the World Bank–supported National Hydrology Project (Ministry of Jal Shakti) aim to develop predictive models for groundwater sustainability under changing climate and hydrological scenarios. He serves as Coordinator for SDG-6 and SDG-14 at Pondicherry University, is actively engaged with the Pondicherry Groundwater Authority, and chairs the State Level Expert Appraisal Committee under the Department of Science, Technology and Environment, Government of Puducherry. His research contributions are in the field of vulnerability, saline water intrusion, SGD, and aquifer dynamics, by adopting advanced techniques such as resistivity imaging, flow modeling, and tracer techniques. Through his work, Prof. Srinivasamoorthy develops practical, scalable solutions for water quality remediation and sustainable groundwater management. His research makes a significant contribution to India's efforts to address climate change, strengthen water governance, and ensure long-term water security.

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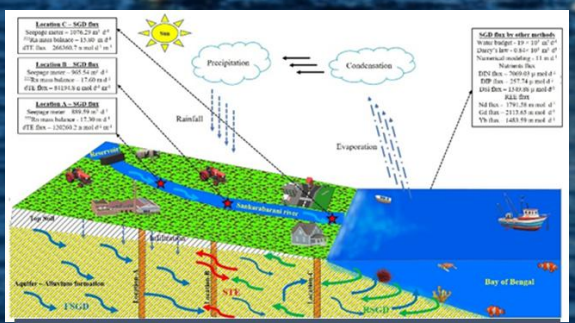

Figure 1. Schematic representations of SGD fluxes and methodological framework.

Clean Water Technologies : NIOT Perspective

Dr. S V S Phani Kumar[1]
[1]Scientist G, National Institute of Ocean Technology, Chennai

Dr. S V S Phani Kumar
Scientist-G, Group Director Water & Climate Change and Mission Mausam
NIOT- MoES

Growing population; advancements in technology and lifestyles; and, uncertainties associated with monsoon exert pressure on the limited natural resources for water, resulting in revised outlook for alternative mechanisms such as Desalination. National Institute of Ocean Technology under Ministry of Earth Sciences (MoES-NIOT) developed Low Temperature Thermal Desalination (LTTD) that was demonstrated in Kavaratti island of UT Lakshadweep (2005). Based on the performance of the desalination plant and request from local administration, MoES-NIOT subsequently installed plants in Agatti and Minicoy (2012); Kalpeni and Amini (2022); Kadamat (2023); Kiltan and Chetlat (2024) islands of UT Lakshadweep. The works for installation in Androth are in progress.

The LTTD plant uses the naturally available thermal gradient in the oceans, evaporating the warm surface water at room temperature (~22oC) and condensing the resulting pure vapour with deep sea cold water from about 400m depth (~12oC). The plant simple to operate and environmentally friendly and over the years, MoES-NIOT optimized the system. Apart from LTTD MoES-NIOT has also worked on Sea Water Reverse Osmosis systems in Lakshadweep region and extraction of water from air. The talk outlines some of the salient feature of the prohects handled by MoES-NIOT.

Education:

- Ph. D. (Mech Engg) (Tennessee Tech Univ),
- M. Sc (Aerospace Engg) (IISc, Bengaluru),
- B. Tech(Mech Engg) (JNTU, Hyderabad)

A Mechanical Engineer with experience in Desalination, Ocean Structures, Fluid Mechanics and Thermal Sciences. Group Director for Water, Climate Change and Mission Mausam Activities at NIOT. Worked extensively on Low Temperature Thermal Desalination plants, Island based plants working in all of the inhabited Lakshadweep islands (2008-Current), except Androth, North Chennai Thermal Power Station (2009), Barge Mounted Desalination plant (2007). Contributed in the installation of the first Offshore LIDAR based Wind measurement platform in India, 25 km off Pipavav port, Gujarat.

Experienced in the Thermal systems, Fluid Mechanics, Desalination Plants, Design of flexible submarine HDPE pipelines, Ocean Modelling. Had previous work experience at Indian National Center for Ocean Information Services (Hyderabad) in ocean modeling, University of Western Ontario (London, ON, Canada) in vortex dynamics, Tennessee Technology University (Cookeville, TN, USA) in power plant analysis.

Member of Professional Bodies such as IEEE-OES, Indian Desalination Association, Ocean Society of India, Indian Society of Hydraulics and a Chartered Engineer from Institution of Engineers of India (IEI). Authored about 40 papers in Peer Reviewed Journals, National / International Conferences and Invited Lectures.

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Innovations in Microbial Energy Production & Next Gen Fuels

Dr. A. Ganesh Kumar[1], Dr. G . Dharani[2] , Prof. R Balaji[3]

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[2]Scientist G, Marine Biotechnology Division, National Institute of Ocean Technology, Chennai - 600100. Email: dharani.niot@gov.in
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Dr. A. Ganesh Kumar Ph.D
SCIENTIST-E Marine Biotechnology,
NIOT- MoES

Marine microorganisms including microalgae, oleaginous yeasts, and bacteria have emerged as key factors for the development of sustainable biofuels and renewable energy solutions. This presentation highlights technological innovations in marine microbial bioenergy with emphasis on third-generation biofuels, waste to energy systems and advanced biofuel molecules. Marine microalgae represent a promising source of third-generation biofuels based on their high photosynthetic efficiency, growth rates and ability to accumulate lipids. At National Institute of Ocean Technology (NIOT), large cultivation of Chlorella sp. using tubular and bubble-column photo-bioreactors and solar-powered raceway culture systems have achieved significant biomass and lipid accumulation. Biodiesel derived from algal lipids met ASTM fuel quality standards and successful field trials of B10 biodiesel blends demonstrated the techno-economic feasibility of algal biofuels. Marine oleaginous yeasts are a promising source of microbial oil since these microorganisms can accumulate up to 70% of their dry biomass as intracellular lipids. The marine oleaginous yeast Meyerozyma guilliermondii demonstrated 42% lipid accumulation when cultured on raw glycerol, highlighting the potential and sustainable feedstock for biodiesel production. Marine bacteria isolated from deep-sea sediments enable innovative waste to energy applications, including microbial fuel cells that convert the metabolic processes into electrical power. Marine fermentative microbes (green and sulphur bacteria) facilitate biological hydrogen production through bio-photolysis or dark fermentation. Additionally, marine derived bio-butanol emerges as a high-energy-density biofuel alternative to ethanol. By focusing on cutting-edge research third generation biofuels, waste to energy systems and advanced hydrogen and butanol production using marine derived technologies, sustainable pathways for next-generation energy production can be realized.

Recent advances in Multi-Omics approaches are being used to identify key regulatory networks controlling lipid accumulation, hydrogen generation and solvent production in marine microbes. These approaches accelerate strain improvement and process optimization for biofuel production. Synthetic biology studies have transformed marine bioenergy research by tailoring marine microbes through genome editing, promoter engineering and redesigning metabolic pathway. Together, advances in marine microbial biotechnology, synthetic and systems biology concepts are rapidly transforming marine microbes into next-generation platforms for sustainable energy production.

Dr. A. Ganesh Kumar is a Scientist-E in the Marine Biotechnology division at the National Institute of Ocean Technology (NIOT), Chennai. His research focuses on marine microbial biotechnology, bioremediation, and environmental biotechnology.

- **Field of interest:** deep-sea microbial culture, wastewater pathogen removal catalysts, and salt recovery from wastewater, oil spill bioremediation, microbial compositions for crude oil remediation, bioactive extraction, and lipid production from oleaginous yeasts.
- **Publications:** 50 research publications (38 international, 12 national), h-index: 21, i10-index: 42, with 2472 citations.
- **Patents & Technology:** Granted – 03 | Filled – 4
- **Achievements:** Deposited 4 comparative transcriptome datasets and 12 whole genome sequences in NCBI. Participated in IODP Expedition 355 aboard the JOIDES Resolution (USA ocean drilling research vessel) in 2015. 4 technologies transferred through NRDC, including MARESOL (marine oil spill bioremediation) and BIOREMESOL (biosurfactant for environmental cleanup).

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Comparative Study on Desalination using LTTD & OTEC Technologies

Dr. G.Venkatesan[1] Dr. Vijaya Ravichandran[2], Prof. R Balaji[3]

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[2]Deputy Director, National Institute of Ocean Technology, Chennai - 600100. Email: vijaya.niot@gov.in
[3]Director, National Institute of Ocean Technology, Chennai - 600100. Email: director.niot@gov.in

Dr. V. Samson Packiaraj
SCIENTIST-E,
Joint Project Director -OTEC, NIOT- MoES

Qualification: PhD from Institute of Energy Studies, CEG, Anna University

Area of research:

- Design & development of Ocean thermal gradient, waste heat and solar thermal energy based desalination systems
- Design & development of OTEC cycles, Design & development of evaporators and condensers for OTEC cycles.

List of Publications :

- Journal Publications: 3 | Conference Presentations : 8
- Patents Granted: 1 | Patents filed: 1

National Institute Ocean Technology (NIOT) has established its first ever Low Temperature Thermal Desalination (LTTD) plant using ocean thermal gradient in the year 2005 at Kavaratti Island of Union Territory of Lakshadweep. Subsequently, five more plants have been put up based on the experience gained. All these plants draw power from local grids driven by diesel generators and hence it is important to find ways to provide this energy using a renewable form. Efforts at NIOT are now focused on powering desalination using Open Cycle Ocean Thermal Energy Conversion (OC-OTEC) principle. This study compares technical parameters of LTTD and OC-OTEC powered desalination plants. In an LTTD plant, the surface sea water from upper layers is flash evaporated in a low pressure flash chamber and the resultant pure vapor is condensed in a surface condenser that makes use of cold sea water at 12oC – 13oC from the deeper layers of the ocean at a depth of 300 – 350 m. In the OC-OTEC powered desalination plant, the generated water vapor from the flash chamber drives a turbine and generates electricity, before being condensed back to drinking water using deep sea cold water at 8oC to 9□C drawn from the ocean depths of 900 – 1000 m. Hence this OC-OTEC powered desalination plant is designed in a way that the entire parasitic power requirement is met from the power generated by the OC-OTEC turbine to make the plant self powered.

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In this study, the temperature distribution between the components and its percentage of sharing in both LTTD and OC-OTEC are compared. Flash chamber cum de-aerator considered in the plants is a single stage flashing type evaporator with an inbuilt de-aerator to remove the partial Non-Condensable Gases (NCG) such as Oxygen, Nitrogen, Carbon di-oxide, etc The condenser (Shell & Tube type) used in these plants is one of the expensive components. To obtain an optimum condenser design, a trade-off between fixed and operating costs of the condenser is needed. In this study, flash chamber parameters, condenser parameters of both LTTD and OC-OTEC are compared. The vacuum system plays a vital role in the operation of the LTTD and OC-OTEC desalination plants. Estimation of vacuum system load is critical and should be done precisely to come up with a proper selection of vacuum system during the design phase of these plants. In this study, parameters of the vacuum systems of both plants are compared. Also seawater pump parameters also presented. Comparison of the LTTD plant parameters with the OC-OTEC powered desalination plant parameters shows that by increasing the length of the deep sea cold water pipe, increasing flashing area in the flash chamber, reducing the condenser tube side pressure drop, reducing hydraulic losses in the plant piping and introducing of the turbine by proper distribution of the available temperature gradient make the plant self-powered.

Bioenergy from Water Hyacinth: A Sustainable Solution for Invasive Species in the Marine Backwater Systems

S. Sivasankari *
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Department of Green Energy Technology
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Kalapet, Puducherry – 605 014, India.

Dr. S. Sivasankari
Assistant Professor, DGET, PU

The present investigation deals with the development of technology for the production of biofuel using hydrolytic enzymes, including cellulase and xylanase, from water hyacinth (Eichhornia crassipes), an invasive weed species that grows in sources such as lakes, rivers, and backwater systems for commercial and industrial applications. The study also aimed to evaluate the native fungal strains MAFI-1 and MAFI-2 for enzyme production under optimized conditions and preprocessing technology. The local native isolates effectively produced the hydrolyzing enzymes from preprocessed biomass under optimized conditions at 30-40°C. The enzyme produced was stabilized using a suitable material for sustainability. The present invention provides a simple and cost-effective way to produce cellulase using selective fungi on water weed, resulting in sustainable production with reduced energy use. Through this invention, the water weed has been effectively eradicated from the waterbodies through utilization, and the enzyme can be used for biofuel production.

Keywords: Water hyacinth, Cellulase, Xylanase, Bioenergy, Back water

Dr. S. Sivasankari, awarded doctoral degree in Microbiology-Energy from University of Madras, Chennai (2010) and a "Young Scientist" fellowship award, DST, New Delhi [2008-2010], IITM Women PDF (2015), UGC Women PDF at Pondicherry University (2015-2021), international travel fellowship award from Miyazaki University (Japan). As an experienced microbiologist with the ability to understand, analyze various aspects of biomass-biotechnology, expertise in relating to its synthesis and characterization studies. She has hyper-reviewed journal publications, book chapters, citations with cumulative impact factor of 55. Indian patents (4) have been granted on bioenergy and one is on pipeline [2020]. Delivered around 16 invited/special lectures to reputed institutions (2022-26) and given interviews (4 times) public radio stations (Akashvani Puducherry). Handling industrially important issues and consultancy projects on bioenergy. Active member of numerous scientific associations and industries. Received first prize for best innovative technology in PU Demo Day 2026.

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Overview of Desalination Technologies and their Economics

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Mr. S. S. Prakash Kumar Lagudu
SCIENTIST-E, NIOT- MoES

Mr. S. S. Prakash Kumar Lagudu is a Scientist-E at the National Institute of Ocean Technology (NIOT), Chennai, an autonomous institute under the Ministry of Earth Sciences, Government of India. He holds a B.Tech. in Mechanical Engineering and an M.E. in Energy Engineering from Anna University, where he was awarded the Gold Medal for academic excellence.

He has significant experience in the areas of low-temperature thermal desalination, ocean energy systems, and sustainable marine technology development. His technical expertise includes process design, thermodynamic analysis, renewable energy integration, system optimization, and techno-economic assessment of ocean-based technologies. He has authored and presented multiple research papers in reputed international and national journals and conferences, contributing to advancements in the fields of desalination and ocean energy.

Desalination has emerged as a key technological solution to address the growing global imbalance between freshwater demand and available natural resources, particularly in arid coastal regions and islands. It involves the removal of dissolved salts from seawater or brackish water using thermal, membrane, electrical, and hybrid processes. Among these, reverse osmosis (RO), multi-stage flash (MSF), and multi-effect distillation (MED) are the most widely deployed, while vapor compression, electrodialysis (ED/EDR), membrane distillation (MD), forward osmosis (FO), humidification–dehumidification (HDH), and capacitive deionization (CDI), systems are at various stages of commercialization and development aimed at improving energy efficiency and enabling low-temperature and decentralized operation. The global installed desalination capacity has exceeded 110–120 million m³/day, with RO accounting for nearly 65–70% due to its lower specific energy consumption (~3–4 kWh/m³) and modular scalability, while MSF and MED together contribute about 25–30%, largely in cogeneration-based installations in the Middle East. Electrodialysis and electrodialysis reversal (ED/EDR) represent a smaller share (~3–5%) and are commercially mature for brackish water desalination.[1]

In terms of technology readiness level (TRL), RO, MSF, MED, MVC/TVC, and ED/EDR are fully commercial (TRL 9), whereas MD, FO, and HDH are at pilot to demonstration scale (TRL 5–7), and CDI and other emerging concepts remain at lower TRLs. Renewable-energy-driven desalination particularly solar photovoltaic-RO and wind-RO has reached near-commercial maturity for small and medium capacities, while OTEC-based and solar-thermal membrane systems are still in the demonstration phase.

Economically, desalination is dominated by capital cost and energy consumption, with energy contributing about 40–60% of the total water production cost. Large-scale seawater RO currently provides the lowest unit water cost (~0.5–1.2 US$/m³), whereas thermal systems are costlier (~1.0–1.8 US$/m³) but remain viable in cogeneration mode. Brackish water desalination is significantly cheaper (~0.2–0.6 US$/m³), while emerging technologies have higher present costs but strong potential for reduction through process intensification and integration with low-cost renewable or waste heat sources.[2]. Declining solar and wind tariffs, modular design, and hybrid energy systems are progressively improving the levelized cost of water for decentralized and island applications

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AI Applications in Ocean Energy Development Activities

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Dr. Biren Pattanaik
Scientist-E, NIOT- MoES

Today, the world faces several climate change-related issues due to environment pollution. The globe is seeing several alternate sources of renewable energy. Ocean energy includes power generated from Ocean thermal gradient, waves, and currents. In India, this development is led by the National Institute of Ocean Technology (NIOT). In ocean energy where new technologies can be tried and tested without affecting human settlement or the environment. Artificial Intelligence (AI) plays a major role in making ocean energy more efficient and reliable. Because the ocean is dynamic and unpredictable, AI helps manage complexity and improve performance in Ocean energy application. This paper talks about Internet of things (IoT) and Artificial Intelligence (AI) applications on ocean energy work carried out in NIOT ocean energy activities as few case studies.

Open Cycle (OC)-Ocean Thermal Energy Conversion (OTEC) is a promising technology in tropical islands for generation of power and freshwater from seawater. This OTEC technology uses the temperature gradient between warm surface sea water and cold deep-sea water for generation of electricity and freshwater. In order to control and operate the process remotely, there is a need to develop & incorporate smart automation system. This AI and IoT based smart system helps to optimize and forecast the process. In this process, the generation of power and freshwater depends on several parameters including the temperature gradient, mass flow rate, and pressure in the flash chamber. Change in any of the parameters will result in the drastic changes in the quality of power and freshwater generation. Hence, monitoring these OTEC parameters in real time plays a vital role in operating the plant more effectively. An Android/iOS Compatible User-Friendly mobile application has been created enabling the client for Real Time monitoring and which has display the historical parameters of the operation of plant. Also it has real time data of sea surface temperature (SST) from mobile based weather and Predictions application. Basically, the application has several math functions to monitor several plant performance parameters. All are linked with a single database. LSTM network has been deployed to forecast the SST (Sea Surface Temperature) by taking the past pre recorded data as input. Hyper parameter tuning is carried out by iterating over epochs thereby finding the best fit model. The indigenously developed software application based embedded controller can effectively perform and smart way demonstrated and being operational as a simulator in NIOT. Here the Open cycle OTEC desalination plant run automatically. The model system has already been developed and demonstrated at the laboratory and same enhanced model will be implemented in the upcoming plant at Kavaratti.

Expert members: International Standards IEC TC 114 and BIS ETD 54.

On job Experience:

- Eighteen years of experience in electrical and instrumentation engineering related to ocean energy.
- Leading of Electrical and Instrumentation (E&I) on research and development in Ocean renewable energy & freshwater (EFW).

Research work projects :

Involved in projects an ocean thermal energy conversation (OTEC) powered desalination plant in Kavaratti, as well as an OTEC-LTTD laboratory in the City of Chennai, a wave-powered navigational buoy, worked on a variety of research including desalination plants in Chennai and Lakshadweep Islands, a backward bent ducted buoy at Kamarajar Port and a wave energy plant in Vizhinjam, Kerala.

Major works on contribution :

Offshore instrumentation and data acquisition; desalination instrumentation and automation; and Design and development of electrical power takeoff systems.

Areas of Interest :

Developments of ocean energy technologies, Internet of Things (IoT) and Artificial Intelligence (AI) application in ocean energy and Desalination, Control and automation, Development of electric drives for Ocean energy devices on grid and off grid application, Underwater energy storage.

Publication:

Patents granted : 2 Patent under process : 2

International journal : 4 | Book chapter: 2 | Conferences : 24

Education:

- Bachelor of Technology in Electrical and Electronic Engineering from the Biju Patnaik University of Technology.
- Master of Technology in Ocean Technology and Management from the Institute of Technology Madras (IITM).
- Ph D in Anna University on topic AI-based predictive control schemes for OC-OTEC process.

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Deep Sea Pipelines for OTEC & Desalination

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Mr. Ashwani Vishwanath
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Ocean thermal gradient principle based desalination plant requires a floating platform with good station keeping characteristics and a long conduit/ conduit bundle to draw deep sea cold water. National Institute of Ocean Technology (NIOT), Chennai has studied various configurations of floating platform and has designed and tested scaled down models of Semi-submersible and SPAR based floating platform for accommodating Low Temperature Thermal Desalination (LTTD) and Ocean Thermal Energy Conversion (OTEC) plant utilizing thermal gradient present in ocean depths. The article describes the analysis of long HDPE pipeline system connected to SPAR shaped platform housing LTTD/OTEC plant.

The SPAR platform is to be permanently moored at 1000 m of water depth. Since the conduit is long and go upto 1000 m of water depth to draw desired temperature, it is important to study the coupled effects of floating platform on the pipeline and vice versa. Complete behavioural assessment of deep sea conduit carrying cold water for process plant is very essential in overall functioning of an offshore energy/desalination system. A numerical study on this was carried out taking care of the non-linearties of external forces induced in the system. The pipeline consisted of a HDPE pipe having diameter to thickness ratio as 17. The pipeline was modeled as homogenous line element with free flooding of seawater. The top end is connected to the SPAR and bottom end is free. Since the density of HDPE is less than unity the pipeline overall needs to be made negatively buoyant by distributing weights along the pipe length. After the addition of weights along the length, a clump weight is added at the bottom of the pipe to eliminate compression in the pipe and also to reduce the bending stresses, arising due to the motions caused by waves and current. A configuration was arrived following various iterations. The article discusses these results carried out for operating and survival conditions. The preliminary results from these studies would be helpful in carrying out further detailed engineering.

Mr. Vishwanath received a Bachelor of Technology in Mechanical Engineering in 2009. He also received a Master of Technology in Ocean Technology and Management from the Indian Institute of Technology at Madras in 2011. Mr.Vishwanath is currently pursuing a Doctor of Philosophy in Ocean Engineering. Mr. Vishwanath has authored several publications on various topics, including offshore desalination plants; wave-powered navigational buoys; ocean energy and freshwater; and the blue economy in India. He was awarded three patents and filed one related to floating body dynamics and ocean energy devices. In this capacity, he is responsible for the design and analysis of long-cold high-density polyethylene water pipelines as well as the deployment of cold-water pipelines for an ocean thermal energy conversion (OTEC) desalination plant in Kavaratti, Lakshadweep. Mr. Vishwanath takes a leading role in a deep ocean mission that supports offshore energy and freshwater development near Chennai, including preparing floating high-capacity OTEC desalination plants. His area of interests is in deep sea scaled-down platforms, moorings and pipelines. His work at NIOT includes coordinating the design, development and field demonstration of a wave-powered buoy system to help ships navigate the Kamarajar Port.

Exploration of the oceanic world through microalgae desalination cells for energy and sustainability

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Dr. Krishna Kumar Jaiswal
Assistant Professor, DGET, PU

The transition toward microbial bioenergy systems has fascinated researchers seeking to achieve sustainability, fostering a greener ecosystem and a better life on Earth. However, the potential frontrunner in this bioenergy race—ocean-based biomass production—suffers from considerable neglect. Ocean bioenergy involves generating renewable energy from marine biomass, primarily algae (macroalgae and microalgae). Additionally, desalination methods have become increasingly important as water scarcity worsens. Reverse osmosis, forward osmosis, electrodialysis, ion exchange, membrane distillation, multi-effect distillation, and vapor compression distillation constitute the conventional desalination processes; these are costly and impose various environmental impacts. Microalgae-based desalination is an emerging, nature-based technology that offers a sustainable and low-energy alternative to conventional, energy-intensive methods such as reverse osmosis (RO). The microalgal desalination cells (MDCs) approach establishes a water-energy-carbon nexus by simultaneously producing freshwater, generating renewable bioenergy, and sequestering carbon dioxide. In the present work, MDCs have been explored through biological and electrochemical processes. Microalgae act as biocathodes in MDCs; they produce oxygen through photosynthesis, which serves as a cost-effective electron acceptor to drive desalination and generate small amounts of electricity. The harvested microalgal biomass can be converted into various biofuels (biomethane, bioethanol, biodiesel, or biohydrogen). MDC technology directly addresses several of the United Nations Sustainable Development Goals (SDGs), including Goal 6 (Clean Water) and Goal 7 (Affordable Energy).

Keywords: Microalgae; electrochemical; desalination; freshwater, biofuels; SDGs

Dr. Krishna Kumar Jaiswal obtained his Ph.D. in Green Energy Technology (Pondicherry University) and has postdoctoral experience (Durban University of Technology, South Africa) in a broad area of research, including bioenergy and biofuels. He is working as an Assistant Professor at Pondicherry University (a Central University of the Ministry of Education, Govt. of India), India. Dr. Krishna's research and teaching (B.Tech., M.Tech., and Ph.D. courses) focus on bioprocess engineering, nanotechnology, and biofuels technologies in the Department of Green Energy Technology. He is actively engaged in researching and developing new technologies with his lab group members (Post-doc, Ph.D., and M.Tech.) for bioprocessing and biofuels. In recognition of his significant research contribution, Elsevier-Stanford University has listed him among the world's top 2% of scientists in 2024 and 2025. Dr. Krishna is also a subject expert for the National Testing Agency (Govt. of India). He has published over 100 articles in reputable journals, including two patents, with an h-index of 32+. He is an active life member of several renowned scientific societies, serves on the editorial board, and has been a reviewer for several reputable scientific journals. He also serves as a member of U.G. and P.G. Boards of Studies, various Doctoral Committees, and other Administrative Positions in different Universities.

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Numerical studies on long deep sea cold water pipe for OTEC

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Mr. Abhijeet Sajjan
Scientist-D, NIOT- MoES

Mr. Abhijeet sajjan is a post graduate in Offshore structures. He is currently working with Marine Energy and Freshwater group in National Institute of Ocean Technology as Scientist for last 12 years. His expertise are in the design of offshore and onshore structures, deep sea cold water intake pipelines, flow induced vibrations of subsea pipelines. He is currently involved in execution of civil and pipeline works for OTEC powered desalination plant being established at Kavaratti Island, U.T. Lakshadweep.

He has mentored around 50 post graduate and under graduate students from various IITs, NITs and private universities in India.

Ocean Thermal Energy Conversion (OTEC) is a technology that utilizes the naturally available thermocline in oceans to generate power and can be utilized to co-generate freshwater also. The temperature difference between deep sea cold water and warm surface seawater is utilized by rankine cycle to produce freshwater and power. The temperature difference of at least 20°C is required for operation of the OTEC power cycle. Thus the deep sea cold water is required to be drawn from a depth of 1000m which requires a large diameter High Density Polyethylene pipe (HDPE) of approx. 4000m in length typically at Indian Islands.

The OTEC plant is currently being established at Kavaratti Island in Lakshadweep archipelago, where the entire plant is located onshore and the cold water intake pipeline is connected to the onshore water intake structure. This pipeline traverses various water depths from deep sea to onshore. The seabed at the proposed installation location features a gentle slope upto water depth of -6m w.r.t chart datum (CD) beyond which exhibits a steep slope of 45 degrees to the deep water. Thus the pipeline is rested on the seabed in shallow waters and the rest of pipeline floats subsea. Several weights are required to be attached along the length to maintain the position of the pipeline and the intake point at 1000m depth. The HDPE material possesses high internal damping and exhibits improved fatigue resistance. The specific gravity of the material is 0.95, the pipe is inherently buoyant and the mass ratio (m*) is less than 1. The aspect ratio (L/D) of the pipe in the current study is 4300. The pipe is also susceptible to Vortex Induced Vibrations (VIV) owing to its high aspect ratio and low mass ratio. This paper presents the complexities in the design and installation of HDPE cold water pipelines for OTEC plants.

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PROGRAM REPORT

OEWSF -2026

One-Day National Workshop on Ocean Energy & Water for Sustainable Future: Potential and Challenges 2026

30th January 2026 | Pondicherry University

The **One-Day National Workshop on Ocean Energy & Water for a Sustainable Future: Potential and Challenges (OEWSF 2026)** was organized under the **UNESCO Chair on Renewable and Clean Energy for Sustainable Development** by the **Department of Green Energy Technology, Pondicherry University**, in collaboration with the **National Institute of Ocean Technology (NIOT), Ministry of Earth Sciences, Government of India**. Held on **19 March 2026** at the Cultural Cum Convention Centre, Pondicherry University, the workshop carried the theme *Samudra Shakti* and brought together leading scientists, academicians, and experts to deliberate on sustainable solutions in ocean energy and water technologies.

The inaugural session featured addresses by university leadership and distinguished guests, including **Prof. R. Arun Prasath (UNESCO Chairholder and Convenor)**, **Prof. K. Tharanikkarasu (Director, SEI & RR)**, **Prof. B. M. Jaffar Ali (Dean, MSGET)**, and **Dr. G. Venkatesan (Scientist-G, NIOT)**. A video message from **Dr. Benno Boer, UNESCO Regional Office, New Delhi**, was added. The release of the Event Compendium marked the formal commencement of the technical program.

The technical sessions were enriched by eminent NIOT scientists and faculty experts. Invited Expert speakers presented on desalination, ocean thermal energy conversion (OTEC), microbial energy, AI applications, and deep-sea pipeline technologies. Faculty contributions from Pondicherry University further highlighted innovative approaches to bioenergy and microalgal desalination.

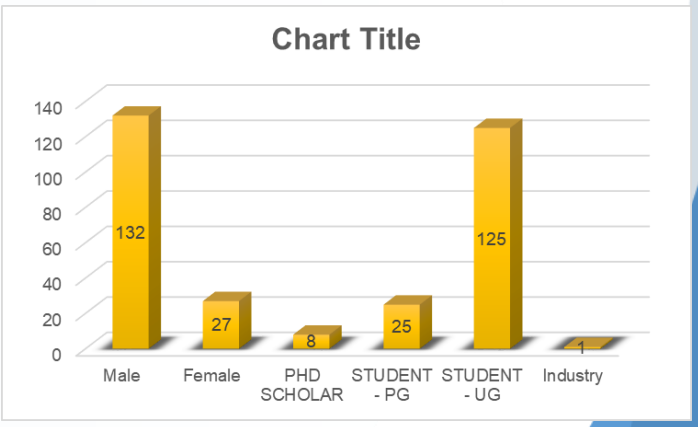
The workshop concluded with a valedictory session led by **Prof. P. Natarajan (Director, C&CR)**, accompanied by guest remarks and acknowledgments. Certificates were distributed to participants, marking the successful completion of a day dedicated to advancing knowledge in ocean energy and water sustainability. OEWSF 2026 reinforced the collaborative role of Pondicherry University and NIOT in building capacity and driving innovation for India's sustainable future.

159
PARTICIPANTS

23
SPOT-REGISTERED

100
EXTERNAL PARTICIPANTS

59
INTERNAL PARTICIPANTS



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CLICKED MOMENTS

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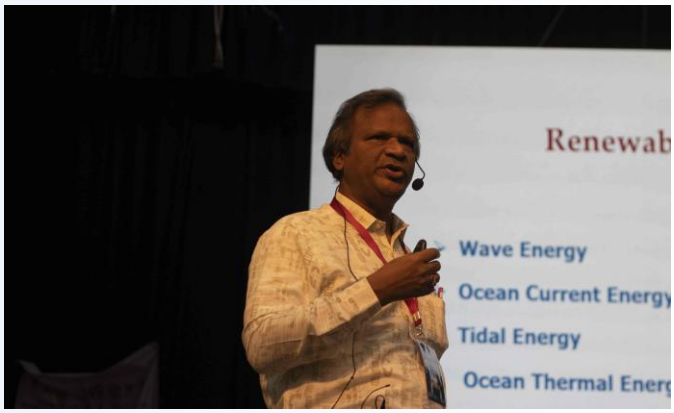
CLICKED MOMENTS



PRESS RELEASE

PRESS RELEASE- ENGLISH

Title: Samudra to Sustainability: Pondicherry University & NIOT Unlock Ocean Energy and Clean Water Potential

Puducherry, March 19, 2026

The inauguration of the National Workshop on Ocean Energy & Water for Sustainable Future (OEWSF-2026), organized as part of the UNESCO Chair series by the Department of Green Energy Technology, Pondicherry University, in partnership with NIOT, Chennai, began with the traditional lamp lighting and the felicitation of dignitaries.

In his address, Professor Ramaswamy Arun Prasath, UNESCO Chairholder and Convenor of OEWSF-2026, emphasized the urgent need to harness the ocean's vast potential for low-carbon energy and clean water. He noted that as India aspires to become a USD 30 trillion economy by 2047, it must meet rising energy demand while addressing water stress and emissions. Highlighting India's 7,500 km coastline, he pointed to opportunities in wave, tidal, thermal, and bio-energy, as well as integrated offshore solar-wind energy, and stressed that technologies such as Ocean Thermal Energy Conversion (OTEC) can deliver both power and potable water, supporting the nation's Blue Economy vision. Professor Arun proposed that, much like India's flagship initiatives such as the Solar Energy Mission, Wind Energy Mission, Bio-Energy Mission, Nuclear Energy Mission, and Green Hydrogen Mission, OEWSF-2026 should act as a catalyst to ignite a "Twin Engine Mission" for the nation focused on "Ocean Energy and Clean Water Mission". He emphasized that this integrated approach can address both rising energy demand and water scarcity. The inaugural session also featured a video address by Dr. Benno Boer, UNESCO Regional Office, New Delhi, who appreciated the UNESCO Chair initiatives in fostering global cooperation in sustainable energy and environmental stewardship.

The inaugural session was presided over by Prof. K. Tharanikkarasu, Director (SEI&RR), Pondicherry University. In his presidential address, he highlighted the strategic importance of ocean-based resources and stressed the need for interdisciplinary research to harness marine energy for sustainable growth. In his felicitation address, Prof. B. M. Jaffar Ali, Dean (i/c), MSGET, emphasized the integration of ocean energy technologies with other renewable energy sources to ensure long-term energy and water sustainability. Prof. R. Prasanth, Head of Green Energy Technology, highlighted the department's academic and research strengths in renewable energy and sustainability. He emphasized DGET's commitment to interdisciplinary research, innovation, and capacity building in emerging energy domains, including ocean energy and water technologies.

The workshop was graced by Chief Guest Dr. G. Venkatesan, Scientist-G and Group Director – Energy, NIOT, who delivered an insightful address on ocean energy and desalination in the Indian context, highlighting NIOT's contributions. The vote of thanks was delivered by Dr. S. Sivasanakari. The event saw enthusiastic participation from faculty, scientists, researchers, and students, offering a valuable platform to explore advanced ocean energy and water technologies and engage with experts from NIOT. The sessions enriched participants' knowledge, promoted interdisciplinary thinking, and highlighted the importance of academia–industry collaboration in advancing ocean energy, desalination, and Blue Economy research.

PRESS RELEASE

கடல் ஆற்றல் மற்றும் தூய்மையான நீர் திறனை வெளிக்கொணர – புதுச்சேரி பல்கலைக்கழகம் & NIOT இணைந்து நடத்திய பணிமனை (OEWSF-2026)

புதுச்சேரி, மார்ச் 19, 2026

புதுச்சேரி பல்கலைக்கழகத்தின் பசுமை ஆற்றல் தொழில்நுட்பத் துறை மற்றும் சென்னை தேசிய கடல் தொழில்நுட்ப நிறுவனம் (NIOT) இணைந்து, யுனெஸ்கோ இருக்கை தொடர் நிகழ்வுகளின் ஒரு பகுதியாக நடத்தப்பட்ட கடல் ஆற்றல் மற்றும் நீர் நிலைத்தன்மைக்கான தேசிய பணிமனை (OEWSF-2026) பாரம்பரிய விளக்கேற்றத்துடன் மற்றும் சிறப்பு விருந்தினர்களின் பாராட்டுகளுடன் தொடங்கியது.

தொடக்க உரையில், யுனெஸ்கோ தலைவர் மற்றும் OEWSF-2026 ஒருங்கிணைப்பாளர் பேராசிரியர் ராமசாமி அருண் பிரசாத், குறைந்த கார்பன் ஆற்றல் மற்றும் தூய்மையான நீருக்காக கடலின் பெரும் திறனை பயன்படுத்துவதன் அவசியத்தை வலியுறுத்தினார். 2047-ஆம் ஆண்டுக்குள் 30 டிரில்லியன் அமெரிக்க டாலர் பொருளாதார இலக்கை நோக்கி இந்தியா முன்னேறும்போது, அதிகரிக்கும் ஆற்றல் தேவையையும் நீர் பற்றாக்குறையையும் சமாளிக்க வேண்டும் என அவர் குறிப்பிட்டார்.

இந்தியாவின் 7,500 கிமீ கடற்கரைப் பகுதியைச் சுட்டிக்காட்டிய அவர், அலை, அலைச்சல், வெப்ப, உயிரியல் ஆற்றல் மற்றும் ஒருங்கிணைந்த கடல்சார் சூரிய-காற்று ஆற்றல் வாய்ப்புகளை வலியுறுத்தினார். குறிப்பாக கடல் வெப்ப ஆற்றல் மாற்றம் (OTEC) போன்ற தொழில்நுட்பங்கள் மின்சாரம் மற்றும் குடிநீரை வழங்கி, நாட்டின் நீல பொருளாதாரக் காட்சிக்கு ஆதரவாக இருக்கும் என அவர் தெரிவித்தார்.

இந்தியாவின் சூரிய ஆற்றல், காற்றாலை, உயிரியல், அணு மற்றும் பசுமை ஹைட்ரஜன் திட்டங்களைப் போலவே, OEWSF-2026 "இரட்டை இயந்திர இயக்கம்" – கடல் ஆற்றல் மற்றும் தூய்மையான நீர் இயக்கம் – உருவாக்கும் ஊக்கியாக செயல்பட வேண்டும் என அவர் பரிந்துரைத்தார்.

தொடக்க அமர்வில், யுனெஸ்கோ பிராந்திய அலுவலகம், நியூடெல்லி சார்பில் டாக்டர் பென்னோ போயர் வீடியோ உரையாற்றி, நிலைத்த ஆற்றல் மற்றும் சுற்றுச்சூழல் பாதுகாப்பில் யுனெஸ்கோ தலைவர் முயற்சிகளை பாராட்டினார்.

அமர்வை புதுச்சேரி பல்கலைக்கழக SEI&RR இயக்குநர் பேராசிரியர் கே. தரணிக்கரசு தலைமை தாங்கினார். அவர் கடல்சார் வளங்களின் மூலோபாய முக்கியத்துவத்தை வலியுறுத்தி, நிலைத்த வளர்ச்சிக்காக கடல்சார் ஆற்றலைப் பயன்படுத்த துறைமுக ஆராய்ச்சி அவசியம் எனக் கூறினார்.

பேராசிரியர் பி. எம். ஜாஃபர் அலி, MSGET டீன் (i/c), கடல்சார் ஆற்றல் தொழில்நுட்பங்களை மற்ற புதுப்பிக்கத்தக்க ஆற்றல்களுடன் ஒருங்கிணைப்பது நீண்டகால ஆற்றல் மற்றும் நீர் நிலைத்தன்மைக்கு உதவும் எனக் குறிப்பிட்டார். பசுமை ஆற்றல் தொழில்நுட்பத் துறைத் தலைவர் பேராசிரியர் ஆர். பிரசாந்த், துறையின் கல்வி மற்றும் ஆராய்ச்சி வலிமைகளை வலியுறுத்தி, புதுமை மற்றும் திறன் மேம்பாட்டில் துறையின் அர்ப்பணிப்பை வெளிப்படுத்தினார்.

முக்கிய விருந்தினராக கலந்து கொண்ட NIOT விஞ்ஞானி மற்றும் ஆற்றல் குழு இயக்குநர் டாக்டர் ஜி. வெங்கடேசன், இந்திய சூழலில் கடல்சார் ஆற்றல் மற்றும் உப்பு நீக்குதல் குறித்து விரிவான உரையாற்றி, NIOT பங்களிப்புகளை எடுத்துக்காட்டினார்.

நன்றி உரையை டாக்டர் எஸ். சிவசனகரி வழங்கினார். பேராசிரியர்கள், விஞ்ஞானிகள், ஆராய்ச்சியாளர்கள் மற்றும் மாணவர்கள் உற்சாகமாக பங்கேற்ற இந்த நிகழ்வு, கடல்சார் ஆற்றல் மற்றும் நீர் தொழில்நுட்பங்களில் மேம்பட்ட அறிவை பகிர்ந்து, துறைமுக சிந்தனையை ஊக்குவித்து, கல்வி–தொழில் ஒத்துழைப்பின் முக்கியத்துவத்தை வலியுறுத்தியது.

MEDIA RELEASES

https://www.youtube.com/watch?v=to_H2505bZ8

https://www.youtube.com/watch?v=Ubs1gA9vF3g

THANK YOU

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