



CSIR-CSMCRI Year Report – 2024



CSIR – Central Salt & Marine Chemicals Research Institute

Explore, harness, and transform marine resources for the
good of the people of India

Mission of CSIR-CSMCRI – R&D Verticals



Marine Products & Processes

- Salt
- Water
- Marine Chemicals
 - Inorganic
 - Organic
 - Natural Products
- Marine Elements



Marine Biology

- Marine Aquaculture
 - Seaweeds
 - Microalgae
- Halophytes
- Salt Tolerant Plants
- Marine Biotechnology
- Marine Microbes
- Marine Bio-actives
- Processing & Products (including food and nutrition)



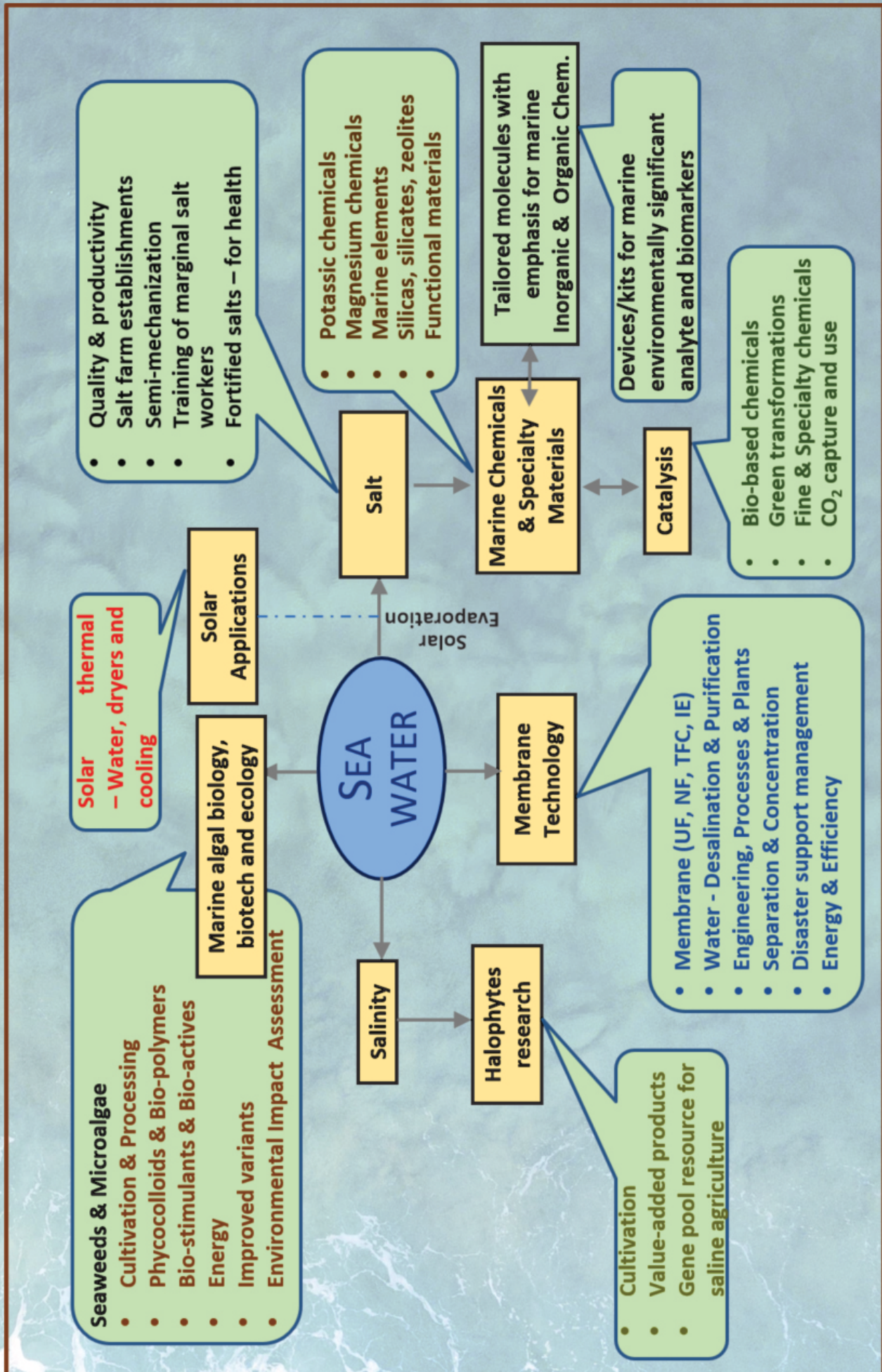
Marine Environment

- Marine Pollution
 - Abatement Processes
 - Microplastics
- Marine Ecology
- Monitoring & Impact Assessment

Technology Portfolio of CSIR-CSMCRI

Salt & Marine Chemicals	Inorganic & Organic Chemicals; Polymers & Membranes	Waste to Wealth (for CPIs)	Marine Biology
<ul style="list-style-type: none"> • High purity salt • Low sodium salt • Double fortified salt • IP grade salt • Potash and magnesia from bittern • Hydrotalcite • LB and HB $MgCO_3$ • Dry sea mix 	<ul style="list-style-type: none"> • Zeolite-A • $CaCO_3$ (rubber and paper grade) • Precipitated silica (diff. grades) • Green brominating agent • Bromo compounds • Bio-diesel (oil-seeds and algae) • 2-Phenylethanol • Membranes/Polymers (TFC RO/HF for water desalination/purification) • Mobile desalination plant • New Gen HF Membrane • Interpolymer cation and anion exchange membrane for ED/EDI/energy applications • Solvent-resistant membrane • Polymeric ion-exchangers • Bio-based chemicals (γ-valerolactone, polymers, etc.) • Membrane-based took kits (curd strip, pathogen, etc.) 	<ul style="list-style-type: none"> • ZLD process for distilleries (with recovery of potash and organics as cattle feed); 100% water soluble FCO grade SOP from distillery ash • Separation/Recovery of salts (inorganic) from different chemical processes/ effluents (salt washery, textile, leather, paper & pulp, etc.) • Valorization of Kimberlite waste tailings • Recovery of precious metals (like Pd, Li) from spent catalysts/e-waste/ effluent streams • Recovery of lac from effluent and recovery of aleuritic acid from seedlac • Activated carbon from rice husk ash waste • Membrane rejuvenation 	<ul style="list-style-type: none"> • Cultivation technology for Kappaphycus, Gracilaria, Gelidiella species and their processing to bio-stimulant/animal/poultry feed and phycocolloids (carrageenan, agar, agarose, and alginate) • Liquid Seaweed Plant Bio-stimulant (LSPB) from brown algae – Sargassum • Microalgae cultivation and processing to crude oil, nutra/pharmaceuticals and pigments • Cultivation of Salicornia, a salt-tolerant plant, processing to value-added products • Bio-degradable thin films, capsules from carrageenan • Microbial synthesis - PHA
❖ IP Protected ❖ Licensed & Commercialized	❖ TRL Level 6 & above ❖ Industry supported		

Research and Development Areas of CSIR-CSMCRI



Broad R&D Domains of CSIR-CSMCRI





Dear well-wishers of CSIR-CSMCRI Bhavnagar,

Greetings of the year 2025 !!

May the new year brings exciting opportunities & lots of happiness to you.

I thank and appreciate your association with us. Your trust, collaboration, and passion invoke and inspire us to hustle more for the growth of our nation. I take this opportunity to reflect at 2024 and share some significant strides that we made in that year.

CSIR One Week One Theme (OWOT) Celebrations

The 'One Week One Theme' initiative by the Council of Scientific and Industrial Research (CSIR) aims to promote inclusive innovation across its eight themes of CSIR. This initiative was inaugurated by Dr. Jitendra Singh, Hon'ble Minister of State (Independent Charge) for S & T and Earth Sciences on June 24, 2024 at New Delhi.



Energy & Energy Materials

We organized a one-day workshop focusing on the challenges and opportunities in energy materials under the Energy & Energy Devices theme on June 27, 2024, bringing together industry leaders, researchers, and stakeholders to explore the complexities and potential of energy technology and energy materials. Over 120 participants from various organizations showcased their working models/activities, and presented posters.

Marine Chemicals

Similarly, we organized a Workshop on Marine Chemicals 2024 (WMC 2024) under the Chemicals and Petrochemicals theme on July 18, 2024. The one-day workshop comprised of six invited lectures, panel discussions, and poster presentations. The workshop served as a platform for knowledge-sharing, networking, and collaborative efforts to harness and exploit marine resources in a sustainable manner.





E30W 2024

A one-day workshop was organized under the Ecology, Environment, Earth & Ocean Sciences and Water theme on December 12, 2024. Invited Lectures were delivered by experts in the area of water research (Prof. A. Mudgal) and environmental issues (Mr. Rajendra Prasad).



Research Frontier Highlights

At the forefront of scientific innovation, CSIR-CSMCRI is dedicated to serving society and supporting industry.

Manufacturing of 100% Soluble Fertilizer-Grade Potash (SOP)

CSIR-CSMCRI technology (Co-developed with M/s Chem Process Systems) to recover “100% Water Soluble FCO Grade Sulphate of Potash from Distillery Ash” has been successfully deployed at DCM Shriram’s 4600 TPA potash plant (Hariawan, Hardoi, UP) and the plant started production from January 2024.



Rejuvenation of membranes

CSIR-CSMCRI has developed a process for the Rejuvenation of End-of-life Reverse Osmosis Membranes to enhance the permeate flux with a modest decline in salt rejection. The technology has been successfully transferred to Membrane Engineering Private Limited, Gurgaon, Haryana



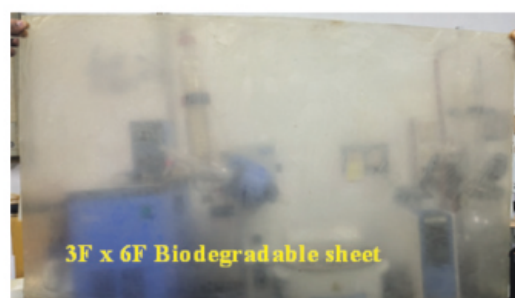
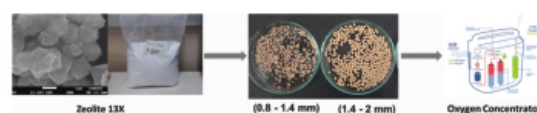
Integrated process for preparation of pure brine for industrial use

An innovative and sustainable process for obtaining high-purity brine (99% NaCl) suitable for direct industrial applications while simultaneously recovering marine salts from seawater, subsoil brine, or desalination plant reject brines was developed.



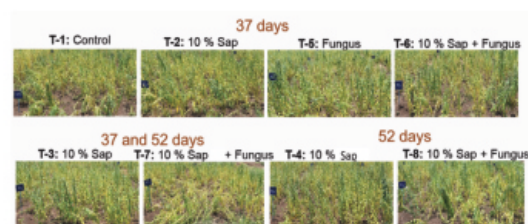
A nearly zero-waste process for the preparation of Zeolite-X

The preparation process was successfully scaled from 20 g to 1 kg, ensuring consistent crystallinity, adsorption capacity, and characteristics. The final product exhibited high crystallinity with a BET surface area of $\sim 700 \text{ m}^2/\text{g}$. These characteristics are comparable with commercially available Zeolite-X, validating its suitability for gas separation applications.



Seaweed based Biodegradable film

Seaweed-derived biodegradable and less toxic thin films and porous foam-like materials/sheets for eco-friendly packaging were successfully developed. A few scale-up experiments for biodegradable thin films were done and successfully cast 20 pieces of 3 feet x 6 feet long films for packaging applications. Such thin films were successfully used & tested/validated for the packaging of agro-products and other solid materials.



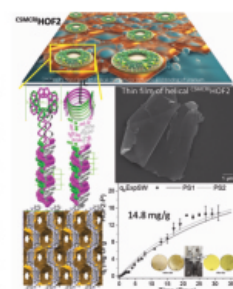
Effect of Sargassum-extract on sesame towards fungal tolerance

The application of S-extract on the sesamum for its resistance to fungus was studied at field level. Sap treatment was found to exhibit better growth and disease tolerance than control and fungal-treated plants.



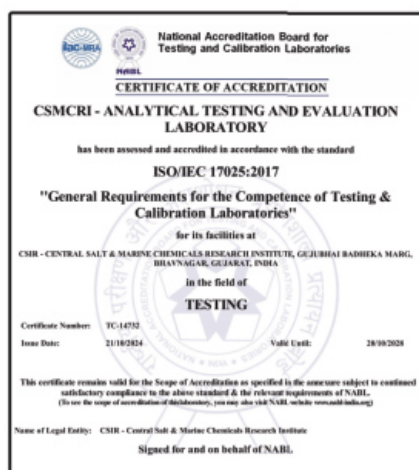
Efficient recovery of Uranium from Seawater

We have developed different hydrolytically, chemically stable U selective HOFs and selective polymers that can achieve highest extraction efficiency. De-solvation led CSMCRIHOF2-P that showcased improved mass transfer and adsorption of uranyl carbonate. CSMCRIHOF2-P thin film can effectively extract $\sim 14.8 \text{ mg g}^{-1}$ in four weeks from natural seawater, with better U/V selectivity (~ 2.0).





Academic Excellence and Honors



- CSIR-CSMCRI provides Ph.D. in Sciences and Engineering under the Academy of Scientific and Innovation Research (AcSIR). In 2024, 30 scholars enrolled for Ph.D. CSIR-CSMCRI also provides an internship program for master's and undergraduate students. In 2024, 165 students from various universities completed their internship in the institute.
- The year 2024 was promising, with 252 research publications and an average impact factor of 5.85. We also filed 14 patents (Indian-13; Foreign - 01) and were granted 10 patents (Indian-09; Foreign -01). Some of our research works appeared in the cover photos of prestigious journals.
- CSIR-CSMCRI received coveted NABL accreditation for "General Requirements for the Competence of Testing & Calibration Laboratories" in the field of Testing (Scope includes Ambient air, Soil/Sediment, and Surface Water).
- A Stanford University study indicated 14 of our scientists are among the Top 2% Most Influential Scientists of 2024 in different domains.
- Our Scientist, Dr. Govind Sethia, received the "Young Scientist Award" for his work on porous materials in the Advanced Material Congress held during September 24-26, 2024 at Jodhpur organized by the International Association of Advanced Materials.
- One of our students received "Gandhian Young Technological Innovation Award -2023" and many of our students have bagged best poster & oral presentation awards and medals in national and international conferences and seminars.





Events and Footfalls at CSIR-CSMCRI

CSIR-CSMCRI celebrated International Women's Day 2024 on March 18, 2024, to commemorate equity, diversity, and inclusion of women in the workplace. Dr. Radha Rangarajan, Director, CSIR-Central Drug Research Institute, Lucknow, graced the event as Chief Guest and delivered the Women's Day Lecture.



We celebrated our 71st Foundation Day on April 10, 2024. Padma Shri, Prof. GM Vyas, VC, NFSU, Gandhinagar has graced the occasion as Chief Guest and given a lecture on "Science and Spirituality". Earlier, the day was announced as an open day, and around 250 school children visited the institute and seen the R&D capabilities of the institute as exhibitions.

Dr. P K Mishra, Principal Secretary to the Hon'ble Prime Minister, along with the Inspector General (IG) of the Border Security Force, visited Kori Creek, Kutch, on April 20, 2024, where CSIR-CSMCRI trained more than 100 fishermen on seaweed cultivation. He monitored the progress of the seaweed cultivation project, interacted with the fisherman, and expressed his happiness over the work undertaken by the institute.



Shri Sagar Mehra, Joint Secretary, (Inland Fisheries), DoF, Govt of India, visited and interacted with scientists at Marine Algal Research Station, Mandapam Regional Centre, Ramanathapuram on June 29-30, 2024.



IP Awareness Program was organized on June 14, 2024, for the scientific staff and students of CSIR-CSMCRI. Prof. N C Desai (Ex. Senior Professor, MK Bhavnagar University) has delivered a lecture on "Patent-An important tool for achieving sustainable development goals"



CSIR-CSMCRI celebrated World Environment Day-2024 on June 05, 2024. Dr. S. Venkata Mohan, Chief Scientist, CSIR-IICT, Hyderabad, delivered expert talk on "Nature Based Strategies for Earth System Resilience."

CSIR-CSMCRI along with CSIR-URDIP and CSIR-IPU has organized a first-of-its-kind 2-day patent filing meeting during December 23-24, 2024, to outline strategies to enhance patent filing, key pointers while protecting & emphasized provisional filing and design patents.





Conferences Organized



ICASMC 2024: CSIR-CSMCRI along with its knowledge partner Indian Salt Manufacturers' Association (ISMA) and Salt India Expo 2024 organized International conference on "Advances in Salt and Marine Chemicals: Brine Mining, Purification and Resource Recovery (ICASMC 2024)" during February 22-23, 2024 for the benefit of the salt and allied industry fraternity and researchers. This conference provided a distinctive and stimulating platform for stakeholders in salt and marine chemicals production, brine mining, and resource recovery for the overall benefit of the nation's growth.

Distinguished speakers from esteemed institutions, industry giants, government bodies, and research organizations from India and across the globe illuminated the audience with their expertise and shared cutting-edge research findings.

ISSE-2024: CSIR-CSMCRI and ICC successfully organized and convened the 5th India International Seaweed Summit and Expo (ISSE 2024), at the India International Centre in New Delhi during March 19-20, 2024. Different stakeholders from India and across the world, including entrepreneurs, government policymakers (NITI Aayog), government officials, technocrats, bureaucrats, academicians, international and national scientists, start-ups, students, and commoners enthusiastically participated in the deliberations of the event.





MMWE-2024

CSIR-CSMCRI organized the International Conference on Materials and Membranes for Water and Energy from July 10-12, 2024.

Around 50 foreign delegates from more than 25 countries participated during the above mentioned three conferences.



Webinar on Recent Developments in Molecular Catalysis

CSIR CSMCRI, in association with the Indian JSPS Alumni Association organized a one-day webinar on July 13, 2024, with the aim to update the recent advances in molecular catalysis. Around 250 participants, such as academicians at various levels including scientists, research scholars and industry personnel, attended the webinar.

Outreach Activities



CSIR-CSMCRI participated in the 'Garvi Gujarat 2024' organized under the "Rural Technologies & Aatmanirbhar Bharat" theme by the Gujarat state government on March 09-11, 2024 at Rajkot. Shri. Parshottam Rupala, Hon'ble Union Minister of Fisheries, Animal Husbandry & Dairying, appreciated the R&D capabilities of the institute. We bagged Best Display award in the event.

CSIR-CSMCRI participated in ChemExpo India 2024, held at the Bombay Exhibition Centre, Mumbai, from April 24-25, 2024, and showcased the technologies related to salt & marine chemicals, water desalination, seaweed cultivation, downstream processing & natural products.





CSIR-CSMCRI participated and showcased various products in the CSIR Foundation Day function and OWOT Theme Exhibition from 26-28 September 2024, New Delhi.



The first Mahakoshal Vigyan Mela 2024 was jointly organized by Vijnana Bharati (Vibha), Madhya Pradesh Council of Science And Technology (MPCOST), and IIITDM Jabalpur from November 15-18 2024 in Veterinary College Jabalpur (M.P.). CSIR-CSMCRI participated in the event and showcased the research capabilities of the institute.



India International Science Festival (IISF) is an initiative of the Ministry of Science and Technology and the Ministry of Earth Science of the Government of India in association with Vijnana Bharati. The IISF 2024 Expo organized from November 30 to December 3, 2024, at IIT Guwahati. CSIR-CSMCRI took part in the event and showcased the different technological advancements. We also organized IISF-2024 Prelude at institute level on November 6, 2024.



CSIR-CSMCRI participated and showcased various products and technologies in the Gujarat Global Expo at Rajkot from December 19 – 21, 2024.



Industry Interactions

CSIR-CSMCRI has undertaken 36 new projects of various kinds, including Grant-In-Aid, collaborative, sponsored, consultancy, and technical services projects valued at ₹37.4 million. Along with few start-ups, various industries like Reliance Industries Limited, Grasim Industries Limited (Aditya Birla Group), DCM Shriram Bio Enchem, Membrane Engineering Private Limited, Memtrix Technologies Private Limited, NPS Energy India Private Limited became stakeholders of the institute during this period.

Technology Transfers



CSIR-CSMCRI successfully transferred five (05) different technologies accruing ₹5.04 million, encompassing areas such as hollow fiber ultra-filtration membrane, reverse osmosis membrane rejuvenation, self-powered mobile desalination van, Indigenous sulfide oxidising bacteria containing aquaculture symbiotic and carrageenan processing technology.

MoUs and Agreements for Collaborations

During this period, we signed 33 MoUs/Agreements with different stakeholders for the collaboration. Besides the industries, we signed agreements with various educational institutions like Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Maharashtra, Gyanmanjari Innovative University, and IIT Delhi. We also extended our collaboration with NGOs like Ramakrishna Math, Ahmedabad and Gram Daxinamurti Trust, Center for Agri-Horticulture Development (CAHD), Manar.





Societal Activities



Under PMMSY scheme initiated by Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, CSMCRI – MARS team distributed 35 tons of fresh Kappaphycus seed and 400 kgs elite Kappaphycus seed to the identified beneficiaries (50 nos) as a support system to improve their livelihood in Rameswaram.



Using CSR opportunities supported by Central Electronics Limited, we established a brackish water desalination plant @ 2000 litres per day capacity @ KV School, Mandapam, Tamil Nadu

Jigyasa (Science Outreach) & Skill development

Following the philosophy of learning by doing, we believe in imparting skills at a very young age. To implement this, over 7,290 school students and 395 teachers from various parts of Gujarat have been sensitized by CSIR-CSMCRI staff under the JIGYASA initiative. Similarly, through our CSIR-Integrated skill development program, approximately 460 individuals have been trained, empowering them to venture into business in areas related to seaweeds, soil testing, biotechnology, microalgae, salt production activities, etc.



As a part of the Swachhata Pakwada initiative, we undertook cleanliness drives across various places in and around Bhavnagar.





Staff Club & Family Interactions



The CSIR-Central Salt & Marine Chemicals Research Institute (CSMCRI) Staff Club has consistently provided a diverse range of activities to engage and to enhance community spirit, promote wellness, foster creativity, and celebrate cultural traditions among members throughout 2024. The Club's activities catered to the staff, their families, and children, offering something for everyone from sports and wellness programs to movie screenings and cultural events.



As part of the entertainment initiatives, the Staff Club organized screenings of the movies periodically.

An outdoor excursion was arranged for the entire staff on 29th March 2024, marking the Gram Yatra program. This initiative allowed members to explore local culture and heritage, strengthening community ties and offering a refreshing break from the usual work routine.



A two-day art workshop titled Jharokha was organized from July 6 – 7, 2024 under the Fine Arts initiative. The workshop focused on enhancing creativity among the staff & family members, allowing them to learn new art techniques and explore their artistic potential.

The Staff Club arranged a swimming camp for its members and their children during May and June, 2024. Additionally, Taekwondo classes were held three times a week for the children of Staff Club members. On August 15 2024, the Staff Club officially opened its new gym facilities, reinforcing its dedication to promoting health and wellness. Equipped with state-of-the-art machines, the gym offers staff members the opportunity to stay fit and maintain a healthier lifestyle.

राजभाषा हीरक जयंती वर्ष

भारत के लिए नई दिशा

Other Important Activities/ Achievements

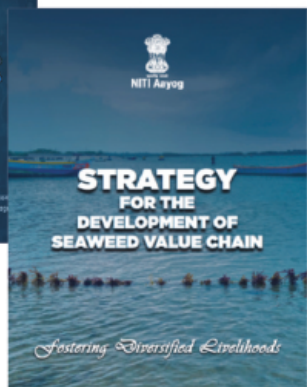


CSIR-CSMCRI has been awarded Third Prize among all CSIR labs in recognition of outstanding innovation, dedication, and contribution towards energy conservation and promoting energy efficiency at CSIR Foundation Day Celebrations and a Thematic Exhibition at NASC Complex, Pusa, New Delhi on September 26, 2024



The Department of Official Language has conferred CSIR-CSMCRI the National Official Language “Kirti Award” for the fourth consecutive time.

We have prepared and published scientific videos on the institutes’ research capabilities, outreach activities and specific technologies in multiple languages (English, Hindi and Gujarati). Technology compendium in Gujarati language was also published.



We published a brochure about the institute detailing the various research work carried out in the institute.

We contributed to NITI Aayog in framing and publishing “Strategy for the development of seaweed value chain” for India.

We wish to continue our efforts in the service of society through our science & technology.

May the future brings us great promise, excitement and fulfillment!

Kannan Srinivasan

Director, CSIR-CSMCRI

Thank You Stakeholders...





Scan to know more about CSIR-CSMCRI



CSIR-CSMCRI Video

