

SDG 13 CLIMATE ACTION



13.1 WHO WE ARE?

The Centre for Climate Change Studies (CCCS) was established in the year 2014 at International Research Centre (IRC) with the primary mandate of investigating the impact of predicted climate change on marine organisms associated to various ecosystems like coral reefs, sea grass meadows, seaweeds, intertidal zones and mangrove ecosystems etc. In addition, we are committed to achieve United Nation's Sustainable Development Goals (SDGs), mainly SDG 13 and SDG 14 that cover's Climate Action and Life Below Water by 2030.

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

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

13. 2 RESEARCH AREAS

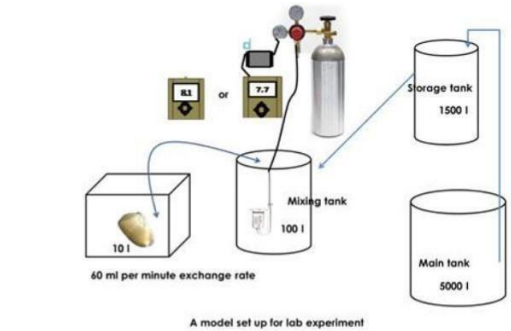
- **Understanding the impact of ocean acidification on marine invertebrates**

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

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

1. Understanding the impact of ocean acidification in intertidal clam

Ocean acidification has become increasingly severe in coastal areas. It poses emerging threats to coastal organisms and influences ecological functioning. *Donax faba*, a dominant clam in the intertidal zone of the Bay of Bengal, plays an important role in the coastal food web. This clam has been widely consumed by the local communities and also acts as a staple diet for shorebirds and crustaceans. In this paper, we investigated how acidified conditions will influence the physiology, biochemical constituents, and energetics of *Donax faba*. Upon incubation for 2 months in lowered pH 7.7 ± 0.05 and control 8.1 ± 0.05 conditions, we found a delayed growth in the acidified conditions followed by decrease in calcium ions in the clam shell. Although not significant, we found the digestive enzymes showed a downward trend. Total antioxidant was significantly increased in the acidified condition compared to the control. Though not significant, the expression level of MDA and antioxidant enzymes (SOD, CAT, GST, GPX, and APX) showed an increasing trend in acidified samples. Among nutrients such as amino acids and fatty acids, there was no significant difference between treatments, however, showed a downward trend in the acidified conditions compared to control. Among the minerals, iron and zinc showed significant increase in the acidified conditions. The above results suggest that clam growth, and physiological energetics may have deleterious effects if exposed for longer durations at lowered pH condition thereby affecting the organisms involved in the coastal food web.



Clam exposed to control (8.1) and lowered (7.7) pH conditions

	Control (8.1)	Acidified (7.7)
Daily growth rate	↑	↓
Calcium concentration	↑	↓ #
Digestive enzymes	↑	↓ #
Total antioxidants	↓	↑
Antioxidant enzymes	↓	↑ #
Nutritional profile	↑	↓ #

Non significant

Chasing corallimorpharian anemone infestation in the coral reefs of Lakshadweep

Coral reefs have undergone a phase shift in several instances due to the dominance of soft corals, sea anemones or sponges. Such phase shifts could be triggered either by natural calamities or due to the anthropogenic disturbances that resulted in the reduction in coral cover and coral health. As a part of The Habitat Trust SEED grant (HCL Foundation) surveys were conducted along the lagoon areas of Agatti Island, Lakshadweep, India. The dead corals, shells of giant clams and some live corals were infested by corallimorph sea anemone. These are invasive and naturally thrive in man-made or environmentally disturbed coral reef habitats. They are considered as secondary colonizers that cover as a carpet the empty spaces of coral reefs. They are also resistant to pollutants and could be a potential indicator for pollution studies. The present corallimorph sea anemone species was identified as *Condylactis* sp. due to its typical brown colour, short tentacles with pink-coloured tips and oral disk diameter of 0.5–4 cm with mouth turned upside down, which are characteristic features of corallimorph sea anemones. Like other sea anemones, the corallimorph sea anemones also possess zooxanthellae inside their bodies to perform photosynthesis and provide nutrients to the host. The present infestation of corallimorph

sea anemones in Lakshadweep is only observational and subsequent damage to the coral reefs needs to be examined.



13.4 CONSERVATION AND OUTREACH

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

As a part of South Asian Regional Hub on Ocean Acidification, subject experts are invited at regular intervals to share their knowledge and experience working with ocean acidification.



**SAROA hub
WEBINAR series**

**The Ocean Acidification Mediterranean-Hub
(OA Med-Hub)**

18 October 2023; 5 PM IST



Dr. Abed El Rahman HASSOUN
GEOMAR Helmholtz Centre for Ocean Research Kiel,
Germany

Register here: <https://forms.gle/oGgnBrQd5stnzHZ18>
You will receive zoom link after registration



Hosted at Zoom by Sathyabama Institute of Science and Technology, Chennai



**SAROA hub
WEBINAR series**

**Coastal carbonate system dynamics in
Southeast Asia**

29 November; 5 PM IST



Dr. Patrick Martin
Nanyang Technological University
Singapore

Register here: <https://forms.gle/2vt7DguEGjEarUicA>
You will receive zoom link after registration



Hosted on Zoom by Sathyabama Institute of Science and Technology, Chennai

Recently, scientists from Centre for Climate Change Studies has participated in the International Ocean Acidification Workshop “Ocean Acidification: Linking Science with Society” organized by IISER, Kolkata and Plumouth Marine Laboratory, UK during February 1 – 2, 2024.



Participated in the International Ocean Acidification workshop at Kolkata

Recently, we have also created a Climate Change Action Plan for the year 2020-2030.



SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
12B status by UGC



Climate Action Plan (2020-2030)



Protect People and Planet...



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

DEEMED TO BE UNIVERSITY

(ACCREDITED WITH "A++" BY NAAC)

CATEGORY-1 UNIVERSITY BY UGC



WEBINAR

WORLD MOSQUITO DAY 2024



Exploring Mosquito Ecology and Vector-Borne Disease Dynamics in the Context of Climate Change



WEDNESDAY | 21 AUGUST 2024

11:00 AM (IST)

Registration link:

<https://forms.gle/3bKy9DsoqYgqjAHi7>



Invited Speakers



Dr. Devojit Kumar Sarma
ICMR-NIREH, Bhopal



Dr. Ranjan Ramasamy
ID-FISH Technology, USA

Patrons:

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

Email: training.cccs@gmail.com

Organizing Secretary:

Dr. Amit Kumar, Associate Professor
Centre for Climate Change Studies
Dr. Krupakar Parthasarathy, Professor
Centre for Drug Discovery and Development

Conveners:

Dr. S Prakash, Associate Professor
Ms. K Kunjulakshmi, Research Assistant
Dr. C. Arokiyaraj, Project Research Scientist
Ms. S Sreelakshmi, Project Technical Support

13.3 TEACHING AND LEARNING

We are committed to provide a high-quality education that enables our students to engage with sustainability challenges and to create indigenous solutions to the burning issues of climate change at the local, national and international levels. In support of this, we will encourage organizational training inviting subject experts from different university/institutions towards sustainability-oriented change.

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

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

13.4 RESEARCH FUNDING

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

S. No	Name of PI	Title of the project	Amount (in Rs.)	Funding agency	Status
1.	Dr. Thanga Suja	Adaptation of <i>Nilaparvata lugens</i> (Stahl) (brown planthopper) to resistant rice: Characterizing the role of salivary gland plasticity in insect virulence	60,79,476	SERB-CRG, India	Ongoing
2.	Dr. Thanga Suja	Agri Innovation Hub for Holistic Development of Scheduled Tribe Population in Anaicut Block in Jawadu Hills, Vellore District, TN	2.6 Crore	DST-STI Hub, India	Ongoing
3.	Ms. Shruthika Raut	Assessing diversity, population genetics and conservation status of Electric Rays along Bay of Bengal, India	Rs. 6.0 lakhs	The Rufford Foundation, London	Completed
4.	Ms. K. Kunjulakshmi	Assessing the conservation priorities of freshwater ornamental shrimp (family Atyidae and Palaemonidae) from the central western ghats, India	Rs. 5.82 Lakhs	The Rufford Foundation, London	Completed
5.	Dr. Amit Kumar and Dr. Krupakar Parthasarathy	Exploring temperature and salinity tolerant mosquitoes along the coastal Tamil Nadu and its influence on mosquito-borne disease dynamics	Rs. 95 Lakhs	ICMR	Ongoing

13.6 RELEVANT PUBLICATIONS (Research articles)

1. **S. Prakash** and Amit Kumar. 2024. Influencing intertidal food web: Implications of ocean acidification on the physiological energetics of key species the ‘wedge’ clam *Donax faba*. **Marine Pollution Bulletin.** 202: 116366.
<https://doi.org/10.1016/j.marpolbul.2024.116366>
2. Amit Kumar and **S. Prakash**. 2023. Molecular phylogeny reconstruction and biogeographic pattern of Rays (Elasmobranchii: Myliobatiformes) from Indian coastal waters. **Indian Journal of Geo-Marine Sciences.** 52(02): 65-78.
<https://doi.org/10.56042/ijms.v52i02.6928>