



## **SDG 14. Life Below water**

**14.3 SUPPORTING AQUATIC ECOSYSTEMS THROUGH ACTION**

**14.3.3.MAINTAIN ECOSYSTEM AND THEIR BIODIVERSITY**



## 14.3.3.MAINTAIN ECOSYSTEM AND THEIR BIODIVERSITY

### 1. SELECTION OF PROF. MOHAMMED HATHA ABDULLA, CUSAT AS THE COUNTRY AMBASSADOR TO SOUTH INDIA BY AMERICAN SOCIETY FOR MICROBIOLOGY

Prof. Mohamed Hatha Abdulla (Director School of Marine Sciences) was selected as the country Ambassador to South India by American Society for Microbiology. Various activities pertaining to maintain the ecosystem and biodiversity are carried out by his able guidance in CUSAT in connection with ASM. As one of the largest professional life science organizations in the world and a leader in scientific publishing, ASM is the home for microbial scientists to connect, learn, discover and prepare for the future. ASM connect more than 32,000 members and millions of experts around the globe, harnessing their science to serve humanity and solve the most pressing global and public health challenges.



Fig.14.3.35. Certificate received from ASM regarding the country Ambassadorship of Prof. Mohamed Hataha, CUSAT

## **2. SCREENING AND IDENTIFICATION OF HIGH EFFICIENCY GENOME WIDE SSR MARKERS IN TRUE MANGROVES OF RHIZOPHORA SP. FOR TAXONOMIC IDENTITY AND POPULATION STRUCTURE FROM WEST COAST OF INDIA: SERB FUNDED PROJECT**

Mangroves occupy estuarine ecosystems in the tropical regions of the world. Despite their highly productive nature and the protective roles they play in the coastal region, the ecosystem as a whole is under severe threat due to various climatic and anthropogenic factors. The true mangroves of the genus *Rhizophora* are vital to coastal ecosystems, providing critical habitat and ecological services. However, their genetic diversity and population structure still need to be better understood. This research aims to screen and identify high-efficiency genome-wide SSR (Simple Sequence Repeat) markers in *Rhizophora* sp. from the west coast of India. By developing these markers, it will be able to elucidate the taxonomic identity and population structure of these mangroves. The current study will employ advanced genomic techniques to discover polymorphic SSR markers, which will be validated for their efficiency and reliability. The findings are expected to enhance our understanding of genetic diversity, aid in conservation efforts, and inform sustainable management practices for these ecologically significant species.

## **3. TRACING POTENTIALLY TOXIC BLOOMS OF CYANOBACTERIAL SPECIES FROM FRESHWATER SYSTEM OF CENTRAL KERALA, SOUTH INDIA**

Researchers from the Department of Marine Biology, Microbiology and Biochemistry, CUSAT, as part of the survey of cyanobacterial blooms across diverse aquatic ecosystems in Kerala, identified potentially toxic blooms from different freshwater ponds in Ernakulam district. One of the studies reported the intense blooms of a potentially toxic species, *Microcystis aeruginosa* from two freshwater ponds and another study reported an intermittent occurrence of another potentially toxic species, *Woronichinia naegeliana* along with the continuous bloom of *Microcystis* from one of the same freshwater systems. The stagnant water conditions with higher surface water temperature and elevated nutrients were found to be the major factors influencing the growth and abundance of the cyanobacteria, *M. aeruginosa* while *Woronichinia* was favoured by higher temperature with a moderate nutrient value. Even though these cyanobacteria have a cosmopolitan distribution and pose a negative impact on aquatic ecosystems, animals and humans, their bloom reports or detailed studies from south India particularly freshwater ponds along Kerala are sparse. Considering the ecological and economic impacts such nuisance bloom formers can cause, detailed study in these aspects stands significant for the development of eco-friendly control and mitigation techniques to reduce the occurrence of blooms and to preserve the biodiversity of aquatic systems.

The research was carried out under the guidance of Dr. K. B. Padmakumar and Dr. Lathika Cicily Thomas. The results and findings are published in two international journals named Biologia and Annales de Limnologie - International Journal of Limnology.

#### 4. KSCSTE FUNDED PROJECT (16 LAKHS): PHENOLOGY AND SPATIAL GENETIC STRUCTURE OF KANDELIA CANDEL (RHIZOPHORACEAE) A RARE VIVIPAROUS MANGROVE SPECIES ENDEMIC TO KANNUR DISTRICT OF KERALA

Mangrove tree species form ecologically and economically important forests along the tropical and subtropical coastlines of the world. Although low intrapopulation genetic diversity and high interpopulation genetic differentiation have been detected in most mangrove tree species, no direct investigation of phenology, pollen and viviparous propagule dispersal through paternity and/or parentage analysis and genetic structure within populations has conducted in natural population of Kandelia candel. Kandelia candel is a typical viviparous rare mangrove tree species, endemic to Kannur district of Kerala. This research aims to study the phenology and spatial genetic structure of Kandelia candel to enhance the understanding of its reproductive biology and genetic diversity. By investigating flowering and fruiting patterns, as well as genetic variation across different populations, it is possible to uncover factors influencing its survival and propagation. This project employs field observations to monitor phenological events and uses molecular markers to analyze genetic diversity and population structure. The findings will provide essential insights into the conservation and management of this species, ensuring its continued presence in the delicate coastal ecosystems of Kerala.



Fig.14.3.36. Newspaper report on KCSTE grant to the faculties in conducting research in Mangrove ecosystem

## **5. SERB SRG FUNDED PROJECT (23 LAKHS): MARINE MICROBIOME TO ASCERTAIN THE ROLE OF MICROBES IN BIOGEOCHEMICAL CYCLING IN THE EASTERN ARABIAN SEA**

The marine microbiome, comprising diverse microbial communities, is integral to the biogeochemical cycles that regulate the health and functioning of marine ecosystems. This research investigates the role of microbes in biogeochemical cycling within the Eastern Arabian Sea, a region characterised by its unique oceanographic and ecological features. The study aims to elucidate the contributions of these microorganisms to key processes such as carbon sequestration, nitrogen fixation, and sulfur cycling. Using advanced metagenomic and metatranscriptomic techniques, we will profile the composition and functional capabilities of microbial communities in various marine environments, including surface waters, deep-sea sediments, and hydrothermal vent systems. By linking microbial diversity with biogeochemical processes, this research seeks to provide a comprehensive understanding of how microbial activity influences nutrient dynamics and ecosystem stability. The findings will enhance our knowledge of marine microbiomes and inform strategies for the sustainable management of marine resources and the preservation of marine biodiversity in the Eastern Arabian Sea.

## **6. MARC: RESTORING AND CONSERVING MANGROVES**

The MARC (Mangrove Restoration and Conservation) project addresses the urgent need to restore mangrove forests along Kerala's coast. Mangroves provide natural coastal protection, support biodiversity, and play a crucial role in carbon sequestration. Dr. Hareesh guides Plan@earth in identifying ideal sites for promoting eco-tourism and sustainable aquaculture linked to mangrove areas, the project blends ecological benefits with economic opportunities.

## **7. CUSAT SIGNED MOU WITH NIIGATA UNIVERSITY, JAPAN ON INTERDISCIPLINARY RESEARCH OF INDO-PACIFIC OCEAN**

CUSAT signed MoU with Niigata University Japan for Interuniversity exchange programme. Along with CUSAT IISc, Bangalore, IIT Kanpur, IIST, Thiruvananthapuram are part of this programme. The field activities will be focused on Indo-Pacific region and the funding for the research will be provided by Japan Science and Technology Agency. The main focus of the initiative is to contribute to the idea of sustainable environment. Dr. Mohamed Hatha, Senior Professor and Director, School of Marine Sciences, CUSAT and Dr. RT . Ratheesh Kumar are the academic coordinators of the programme from CUSAT.

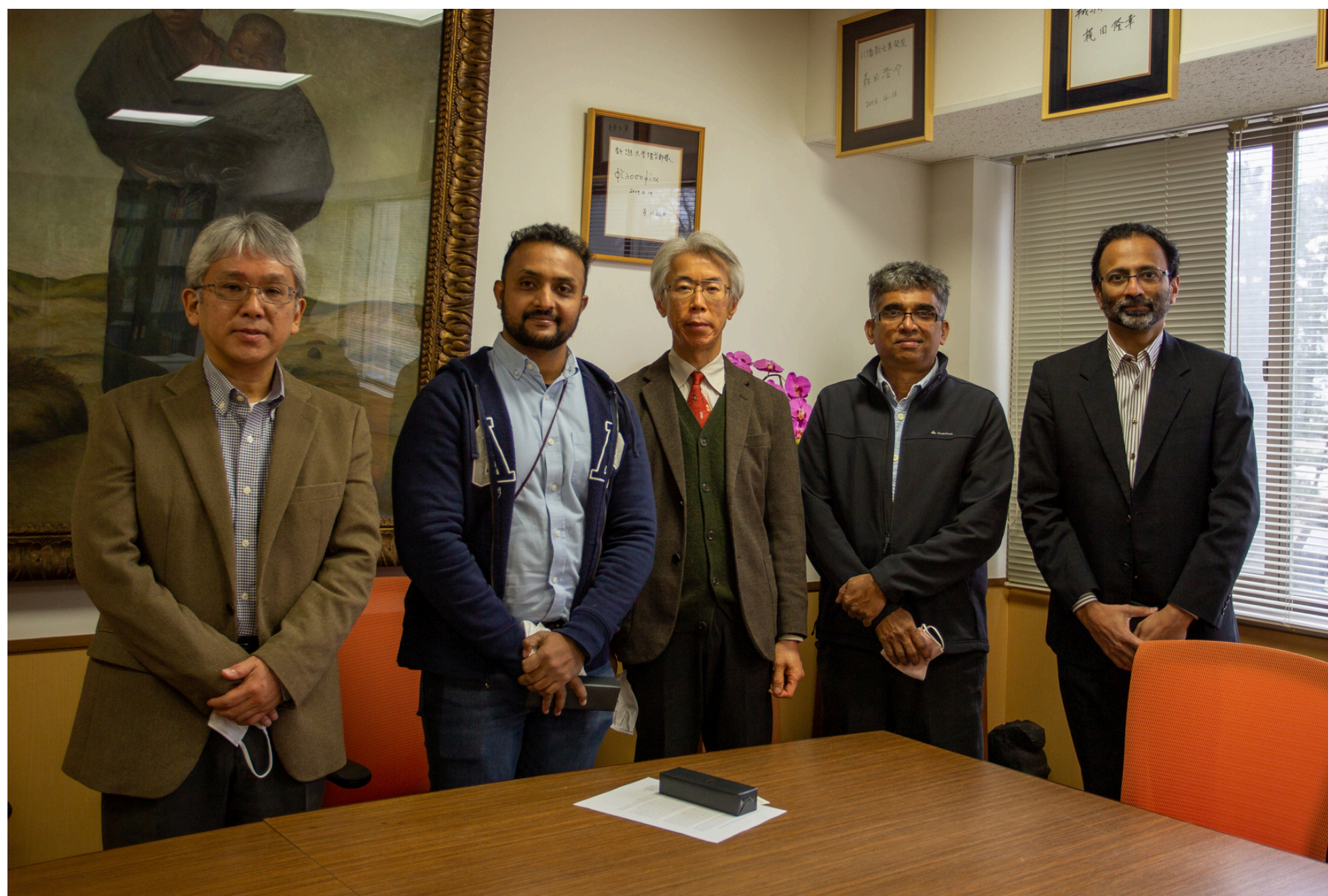


Fig.14.3.37. Academic coordinators of the student exchange programme from CUSAT with officials of Niigata University



Fig.14.3.38. Students and Researchers from CUSAT along with other Institutions from India at Niigata University