



SDG 14. Life Below water

14.5. MAINTAINING LOCAL ECOSYSTEM

14.5.2. MONITORING THE HEALTH OF AQUATIC ECOSYSTEMS

A Tool To Combat Plastic Waste
Litterlog Training
Cum Pollution Awareness Class

Venue:
Hidayathul Islam Higher Secondary School,
Edavanakad, Ernakulam

24 August 2023 at 3 PM

Supported By

US consulate, Chennai
TechCamp
Centre for Public Policy Research
Cochin University of Science and Technology

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NEW WATER PURIFICATION TECHNOLOGY FROM CUSAT!

Scientists from the Department of Polymer Science and Rubber Technology at CUSAT have developed a **Nanocellulose Nanofilter** using plant waste and beeswax. This new filter effectively removes **antibiotics** and **microplastics** from water, offering a **cost-effective** and natural solution to clean contaminated water.

Project Lead

Prof. Jinu Jacob George

Collaborators

Ajith Vattothukunnel

Mentor

Dr. Deepu A. Gopakumar
(Nava Kerala Postdoctoral Fellow)

Aishwarya Poullose

Read more in **ACS Applied Biomaterials**

14.5.2 MONITORING THE HEALTH OF AQUATIC SYSTEM

1. PLANT WASTES AND BEESWAX USED TO PURIFY WATER CONTAMINATION

Scientists from the Department of Polymer Science and Rubber Technology, Cochin University of Science and Technology, have developed an innovative technology to purify water using natural waste materials. The nano-filter, fabricated by combining engineered nanocellulose and hydrophobic beeswax, demonstrates exceptional efficiency in water purification. Large amounts of pharmaceutical waste from drug manufacturing companies and hospitals contaminate water bodies, eventually reaching reservoirs such as lakes, rivers, water tanks, and swimming pools. The traditional and commercial water purification methods are inadequate for filtering out antibiotics and microplastics present in water. The newly developed cost-effective water filter, named the "Nanocellulose Nanofilter," offers a rapid and efficient solution for purifying water. The novel technology was developed under the guidance of Prof. Jinu Jacob George from the Department of Polymer Science and Rubber Technology, Cochin University of Science and Technology, in collaboration with the University of Bretagne-Sud, France, and the Federal University of Uberlandia, Brazil. The research was carried out by Ajith Vattothukunnel and Aishwarya Poulouse under the mentorship of Dr. Deepu A. Gopakumar, the Nava Kerala Postdoctoral Fellow. The results and findings are published in the international journal ACS Applied Biomaterials. The research work was started in May 2023 and the continuous and tireless effort of the faculty members and scholars yielded in developing a new water purifying technology to treat water contamination.



Fig. 14.5.3. Newspaper report on the establishment of new water purification Technology from CUSAT



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Fig. 14.5.4 Pamphlet released by University mentioning the outstanding achievement by the department of Polymer Science and Rubber Technology, CUSAT in developing water purifying technology to treat water contamination

2. ANALYSIS OF TROPHIC STATUS OF TWO FRESHWATER SYSTEMS WITH THE HELP OF HYDROGRAPHIC PARAMETERS

Researchers from the Department of Marine Biology, Microbiology and Biochemistry, Cochin University of Science and Technology, regularly assessed the water quality of two freshwater ponds in central Kerala, over two years. Regular monitoring of the seasonal variations in hydrographic parameters and the trophic status in terms of Carlson's trophic state index was employed to assess the water quality, which could help in further trophodynamic studies in the system. Eutrophic to hypereutrophic conditions were observed in the study area with a continuous occurrence of harmful cyanobacterial blooms dominated by *Microcystis* sp. observed from both freshwater ponds which indicated the polluted and deteriorating condition of the selected ponds. Increasing trends in anthropogenic stressors are more likely to amplify in the future, causing severe damage to the natural biodiversity and ecosystems. The Carlson's trophic state index is one of the easiest methods widely used for understanding the trophic status of such disturbed aquatic ecosystems. This index utilises the most prime factors such as chlorophyll a, Secchi depth and total phosphorous that mainly influence the eutrophic conditions and identifying the trophic status of an aquatic ecosystem plays a pivotal role in determining its productivity, resilience and sustainability.

The research was carried out as a part of the Seed Money for New Research Initiatives (SMNRI) programme under the State Plan Grant of Cochin University of Science and Technology (CUSAT), Kerala, India, under the guidance of Dr. Lathika Cicily Thomas and Dr. K. B. Padmakumar. The results and findings are published in the international journal: International Journal of Limnology.

3. BIOMONITORING OF COASTAL POLLUTION ALONG THE SOUTHWEST COAST OF INDIA

Continuous monitoring of the south west coast of India is conducted since 2023, by the researchers at Department of Marine Biology, Microbiology and Biochemistry. Monitoring and documentation of the different types of pollutants such as microplastics and heavy metals are being carried out at different coasts including harbor regions and tourist beaches. Pollution indicator organisms such as bivalves, gastropods, sponges and sea urchins are used for the study. The concentration of heavy metals and microplastics are analyzed in water, sediment and various body parts of the organisms collected. The bioaccumulation potential of these organisms is also evaluated using the bio-water accumulation factor and bio-sediment accumulation factor. Water parameters such as temperature, salinity, pH, nutrients, dissolved oxygen and sediment texture analysis are also conducted in the study regions. Microplastics and heavy metals were detected in water, sediment as well as different body parts of all organisms studied with the highest at harbor regions.

4. LITTERLOG APP AND PLASTIC POLLUTION AWARENESS CAMPAIGN

Plastic pollution has emerged as a critical threat to both human well-being and the environment, with the issue of plastic dumping areas escalating to unprecedented levels. In response to this pressing concern, a revolutionary solution is being introduced to empower communities to identify and address plastic dumping sites. Introducing Litterlog, an innovative mobile application designed to track and mitigate plastic pollution.

To combat this menace and foster awareness, a collaborative effort is being undertaken by Litterlog in partnership with the U.S. Consulate in Chennai, TechCamp, Centre for Public Policy Research, Kochi, and the School of Marine Sciences. An awareness event to enable citizens to actively participate in identifying and documenting plastic dumping zones will be conducted on August 24, 2023, at 3 PM at Hidayathul Islam Higher Secondary School, Edavanakad, Ernakulam. Dr. A. A. Mohamed Hatha, Senior Professor & Director, School of Marine Sciences, CUSAT will lead the awareness class and training session. Aseena Abdul Salam, President, Edavanakkad Grama Panchayat and Nejiyya V. U Principal, HIHSS, Edavanakkad will also join the event. Project Litterlog is coordinated by Akhil Prakash E and Midhun Shah Hussain, who are part of the TechCamp programme and are research scholars at Cochin University of Science & Technology.

This breakthrough application will help in mapping out these areas and facilitating targeted cleanup initiatives. As a crucial step towards spreading awareness, Litterlog is organising a plastic pollution awareness class and workshop. Litterlog's launch event and plastic pollution awareness program align perfectly with the shared vision of creating a cleaner, more sustainable future. By harnessing the power of technology, community engagement, and education, Litterlog is set to make a significant impact in the ongoing battle against plastic pollution. The program aims to not only unveil the potential of the Litterlog app but also equip participants with the knowledge and skills to actively combat plastic pollution. The collaboration between diverse stakeholders underscores the urgency of this issue and the need for collective action. Litterlog is a pioneering web application developed to combat plastic pollution by engaging citizens in identifying and addressing plastic dumping areas. Through a combination of user participation and artificial intelligence, Litterlog aims to map out plastic pollution zones and promote community-driven cleanup initiatives.



Fig. 14.5.5. Brochure of Litterlog app and plastic pollution awareness campaign

5. SELECTION OF DR. A. MOHAMED HATHA TO THE NATIONAL COMMITTEE FOR SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR), JANUARY 1, 2024 – DECEMBER 31, 2026

Dr. A. Mohamed Hatha was selected as a member of National Committee for Scientific Committee on Antarctic Research (SCAR) for January 1, 2024 – December 31, 2026. The Scientific Committee on Antarctic Research (SCAR) is a thematic organisation of the International Science Council (ISC). SCAR is charged with initiating, developing and coordinating high quality international scientific research in the Antarctic region (including the Southern Ocean), and on the role of the Antarctic region in the Earth system. The scientific business of SCAR is conducted by its Science Groups which represent the scientific disciplines active in Antarctic research and report to SCAR. In addition to carrying out its primary scientific role, SCAR also provides objective and independent scientific advice to the Antarctic Treaty Consultative Meetings and other organisations such as the UNFCCC and IPCC on issues of science and conservation affecting the management of Antarctica and the Southern Ocean and on the role of the Antarctic region in the Earth system. SCAR's history looks back at six decades of successful international collaboration.



राष्ट्रीय ध्रुवीय एवं समुद्री अनुसंधान केन्द्र

पृथ्वी प्रणाली विज्ञान संगठन
पृथ्वी विज्ञान मंत्रालय (भारत सरकार)

हेडलैण्ड सडा, वास्को-डा-गामा, गोवा-४०३ ८०४, भारत



NATIONAL CENTRE FOR POLAR AND OCEAN RESEARCH

Earth System Science Organisation
Ministry of Earth Sciences, (Government of India)
Headland Sada, Vasco-da-Gama, Goa - 403 804, INDIA

सं. / No. HRA-14011/1/2021-ADMIN-NCPOR

दिनांक/ Date: 23.02.2022

कार्यलय ज्ञापन / OFFICE MEMORANDUM

The undersigned has been directed to convey that the Competent Authority has constituted following Committee towards simplification of environmental clearance process under diverse scientific streams and Antarctic Specially Protected Area (ASPA) / Antarctic Specially Managed Area (ASMA) clearance: -

(i)	Dr. Rahul Mohan, Scientist F, NCPOR	Chairman
(ii)	Prof. G. N. Nayak, CSIR Emeritus Scientist, Goa University	Member
(iii)	Prof. E.V. Ramasamy, Dean, Faculty of Environmental & Atmospheric Sciences, MG University	Member
(iv)	Prof. A.A. Mohamed Hatha, Professor, Dept. of Marine Biology, Microbiology & Biochemistry, CUSAT	Member
(v)	Dr. K.P. Krishnan, Scientist E, NCPOR	Member
(vi)	Dr. Yogesh Ray, Scientist E, NCPOR	Member
(vii)	Dr. Anoop Kumar Tiwari, Scientist E, NCPOR	Member Secretary

2. The committee may co-opt additional member(s)/ domain expert(s) for special purposes as and when required with the permission of the Chair.

3. The mandate for the Committee is as under:

(i) Review and simplify the existing format(s) for environmental clearance for working in Antarctic Specially Protected Area (ASPA) / Antarctic Specially Managed Area (ASMA);

(ii) Review of proposals /applications for visit to areas classified under ASPA/ ASMA with due consideration of the ATCM guidelines and accord in time approvals to PI's/ Participating Members of the Indian Scientific Expeditions to Antarctica;

(iii) Assist / advise NCPOR on issues of environmental management of Indian Stations in Antarctica, following CEP/ ATCM guidelines.

4. The Committee shall submit recommendations on the mandate at para 3(i) above by **14 March 2022**.

5. Travel and logistic expenses for the purpose would be borne by NCPOR. Sitting fees to the external members would be paid in accordance with Department of Expenditure, Ministry of Finance O.M. 19047/10/2016-E-IV dated 12.04.2017. Secretarial Assistance to the Committee shall be provided by Environmental Impact Assessment Section, NCPOR.

6. This issues with the approval of Competent Authority.

(एस. अनूप/ S. Anoop)

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Fig. 14.5.6. Office memorandum issued by NCPOR on the election of Dr. A. Mohamed Hatha to the National Committee for SCAR