



**The NF-POGO Alumni Network for the Ocean
Annual Report
(August 2024 - July 2025)**

Report compiled by POGO Secretariat

1. The NF-POGO Alumni Network for the Ocean

The idea of building a Network of Alumni was first suggested by the Nippon Foundation (NF), as a means of keeping track of the career progression of the Alumni and to provide them with further support after their training. The NF and POGO organised a Network Planning Meeting in October 2010, at the Royal Society in London. The meeting was attended by representatives of the Nippon Foundation and POGO, as well as alumni and trainers of the NF-POGO training programmes. The meeting laid the foundations for the establishment of the network of former scholars that was to be called the NF-POGO Alumni Network for the Ocean (NANO). It defined the principles and potential structure of the Network, discussed plans for a major Alumni Meeting and ideas for joint research projects that could be carried out by the Alumni.

The general management of NANO is overseen by the POGO Secretariat, which maintains a database of former NF-POGO scholars as well as a website and is responsible for communication and supervision of the network projects. The goals of the network are to maximize the benefits to the alumni from the training they have received; to facilitate active contacts among the alumni and with the training faculty; and to promote joint research activities that build on the training.

The present report summarises the activities completed during the period between August 2024 and July 2025.

2. NANO members

Among the different programmes offered by the partnership between NF and POGO (Centre of Excellence, Centre of Excellence Regional Training, Visiting Professorship Programme and Shipboard Training) a total of 611 fellowships have been offered to 575 individuals since 2004. After completion of the training, fellows are invited to join the network by registering on the NANO Website (www.nf-pogo-alumni.org). As of October 2025, NANO has 437 alumni members from 72 countries, which represents approximately 74% of the trainees.

Once accepted, the fellow is asked to fill in a profile questionnaire, which includes education, professional and academic information, as well as the fellows' impressions of the training. It is also suggested to the member to keep this profile updated. Unfortunately, these guidelines are not always followed and not much information is available or updated in the database with the desired frequency. Nevertheless, the data available provides a general idea of the NANO member profiles (Figure 1).

NANO members also have the opportunity to attend POGO annual meetings and other high-level events. These spaces give our alumni a chance to bring fresh voices into the discussion and to showcase

the perspective of the next generation. For the members themselves, it is a unique chance to boost their skills and networks through direct exposure to global processes and leaders. And the impact multiplies: when they return, they bring this knowledge back to their communities. So far, more than 120 members have participated in such events with POGO. In July 2025 we launched a call offering support for a limited number of members to attend the 2026 Ocean Sciences Meeting in-person and present either an oral or poster contribution.

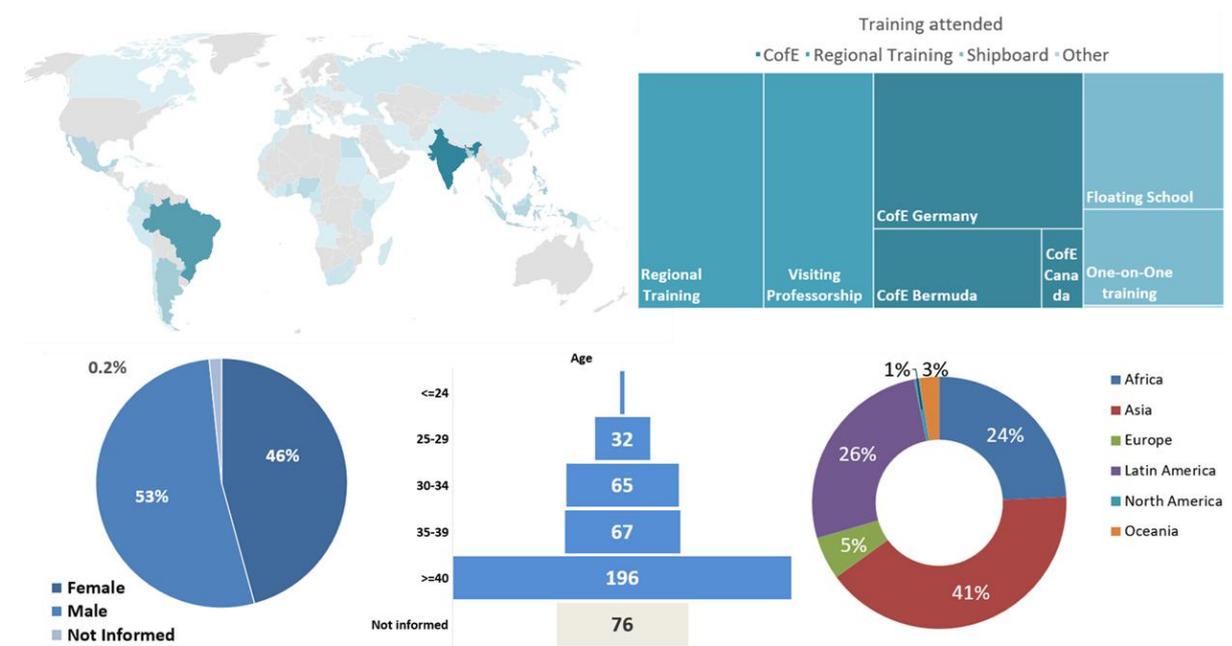


Figure 1 – NANO Network members' profile.

3. NANO communications

NANO uses different platforms to inform members and the public of its activities as well as to share opportunities and news of interest to early career ocean scientists. The [NANO website](#) receives around 660 views per month and NANO social media accounts have approximately 2000 followers on the [Facebook page](#) and [Twitter](#). Posts of jobs, scientific events and training opportunities are the most popular items in our social media, followed by sharing of our alumni scientific activities of relevance such as publications, professional recognition and webinars.

A fellowship has been awarded to a NANO member, Mr. Pedro Carrasco, to support the dissemination of opportunities of interest (e.g., training announcements, job positions, scientific events, ocean sciences-related news) to members via the NANO website and social media, for 20 hours per month. The website serves as a central resource hub by gathering information on the training programmes and alumni, contact details of members, and dedicated pages for our projects, materials, and

opportunities of interest to ocean professionals. This positions the NANO website as a go-to platform, not only for members but also for the wider community.

NANO has also issued newsletters since its foundation. The newsletter helps keep the network alive by introducing new members, sharing updates on initiatives, and showcasing alumni achievements from personal reflections to research highlights. The editorial board is led by members on a rotating basis, with different people taking part in every issue. This shared ownership allows more members to build valuable skills in writing, editing, teamwork, and leadership. And beyond communication, the NANO newsletter drives engagement: more than 270 members have contributed to at least one of the 25 issues, either as part of the editorial board or by submitting articles. The 25th issue was launched in January 2025 and the 26th issue will be launched in October/November 2025.

Since 2019, NANO has run a regular webinar series on a wide range of topics and guest speakers, which attracts early-career professionals from around the world. Between Aug 2024 and July 2025, 5 webinars were conducted (Figure 2). The 25th NANO-DOAP webinar was presented by Ms Evgeniia Kostianaia, global coordinator of the UN Ocean Decade endorsed Programme Early Career Ocean Professionals. This special webinar was the fruit of a coordination between Lilian Krug and Ms Kostianaia, who met in person during the last Climate COP29 in Azherbaijan and are exploring synergies between NANO and the ECOP Programme. Dr Krug presented NANO and POGO Capacity Development Programme in the [ECOP Webinar series](#) in May 2025. Recordings of NANO webinars are available at the [POGO YouTube channel](#) and have gathered over 4000 views.



Figure 2 - NANO webinars during the period Aug 2024 and July 2025.

4. NANO Projects

NANO maximizes the benefits of the training by providing further opportunities for members to collaborate in joint research initiatives. Between 2012 and 2017, with the support of NF and POGO, NANO members successfully conducted five joint regional research projects in Northwest Africa, Southeast Asia, the Caribbean, India Subcontinent and Latin America. These involved nearly 100 researchers in 21 countries and aimed coastal monitoring on different subjects such as Harmful Algal Blooms, ocean circulation, coastal erosion, and exotic species invasion.

In 2017, NANO launched “A global study of coastal Deoxygenation, Ocean Acidification and Productivity at selected sites” (NANO-DOAP), which aims to advance knowledge of the coastal ocean by consolidating existing, or establishing new, monitoring stations for essential ocean variables (EOVs) in the alumni locations. The project currently encompasses 33 study sites in 18 countries (Asia, Africa, Latin America), where members conduct regular sampling of specific EOVs (temperature, salinity, pH, dissolved oxygen, chlorophyll-a concentration), and promote local outreach and citizen-science activities. Since 2018, NANO has also supported the Social AGITation for Temperature Analysis (SAGITTA) project, which aims to implement a citizen science approach for consistent and regular temperature profile data collection in the coastal ocean. The project is developing a simple-to-use, low-cost temperature sensor and a smartphone app to operate the sensor and transmit data to an online database. Since 2022, in collaboration with the Fishing Vessels of Opportunity Network (FVON), NANO is supporting the establishment of pilot sites at alumni locations. Here, we report on the activities of these projects within the period.



Figure 3 – NANO projects focus on coastal ocean monitoring, the NANO-DOAP (A global study of coastal Deoxygenation, Ocean Acidification and Productivity at selected sites), and the SAGITTA (Social AGITation for Temperature Analysis).

4.1 A global study of coastal Deoxygenation, Ocean Acidification and Productivity at selected sites (NANO-DOAP)

The ocean is an essential part of the global environment. It influences climate and weather around the world and is home to millions of different forms of life. Increasing emissions of greenhouse gases into the atmosphere from the burning of fossil fuels are causing changes in the ocean. Climate change and

high carbon dioxide levels in the atmosphere are causing changes in the ocean, such as increased temperature, decreased oxygen content, and acidification. The NANO-DOAP project aims to advance knowledge and observation of the coastal ocean by consolidating existing or creating new monitoring stations of essential oceanographic variables (EOVs) by taking advantage of the global distribution of NANO members and their access to facilities with minimum level of monitoring capabilities at institutions they are affiliated with. The specific objectives of NANO DOAP are: 1) support in situ and promote satellite remote sensing observations of EOVs at participating coastal sites; 2) conduct local analysis and inter-site comparative analysis, producing global results; 3) organise capacity development activities, where members can share experiences and best practices; and 4) promote outreach and citizen-science activities in the participating sites.

4.1.1 Participating countries and study sites

Currently, NANO-DOAP includes 33 study sites in 18 countries (Argentina, Bangladesh, Brazil, Colombia, Ecuador, Ghana, India, Indonesia, Kenya, Lebanon, Mexico, Nigeria, Pakistan, Peru, Senegal, Thailand, Togo and Tunisia; Figure 4). A total of 93 researchers are involved in the activities, working under 21 sampling site representatives in the NANO-DOAP project (Table 1).

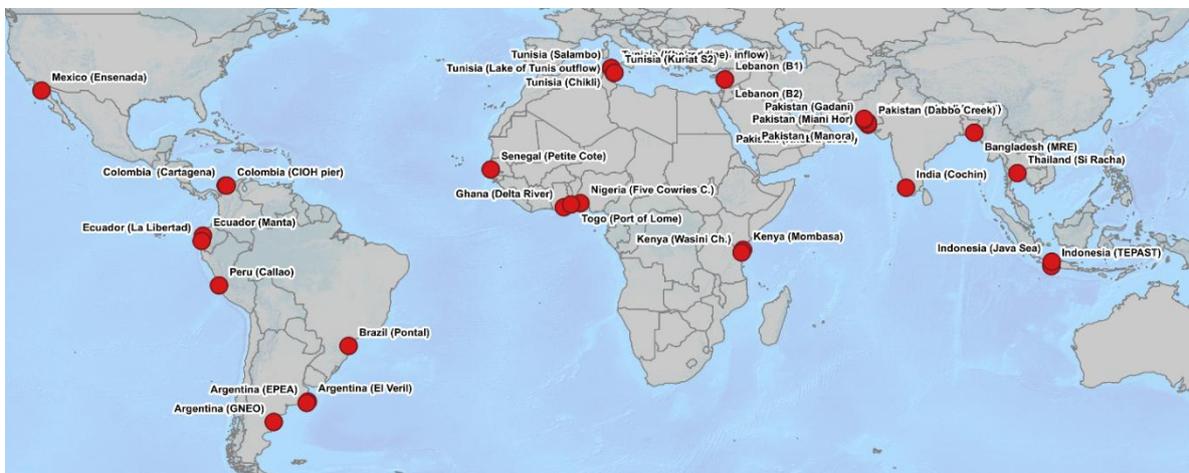


Figure 4 - Sampling sites of NANO DOAP Global Project as of July 2025.

Table 1: List of NANO-DOAP participant stations and representatives (Freq = Sampling frequency, BM = bi-monthly and M = Monthly)

	Country – Station	Freq	Team	Institute	Representative	joined
1	Argentina - El Veril	BM	10	National Institute of Fisheries and Development - INIDEP	Carla Berghoff	Dec-18
2	Argentina – EPEA	BM				Jan-18
3	Argentina - GNEO	M	7	Centre for the Study of Marine Systems, in the National Scientific and Technical Research Council	Rodrigo Hernandez Moresino	Sep-21
4	Bangladesh - MRE	M	3	Shahjalal University of Science and Technology	Subrata Sarker	Dec-19
5	Brazil - Pontal	M	4	Centre for Marine Studies	Maurício Noernberg	Aug-20

6	Colombia - Cartagena	BM	8	Ministry of Defence; General Maritime Directorate	Stella Betancur	Feb-18
7	Colombia – CIOH Pier	M				Mar-19
8	Ecuador - Manta	M	2	Oceanographic Institute of the Navy – INOCAR	Maria Tapia	Jan-18
9	Ecuador- La Libertad	M				Jan-18
10	Ghana - Delta River	BM	3	University of Ghana	Bennet Foli	Dec-19
11	India - Cochin	BM	3	Nansen Environmental Research Centre	Nandini Menon	Sep-18
12	Indonesia - TEPAST	M	3	Department of Marine Science, Faculty of Fishery and Marine Science	Noir Primadona Purba	Sep-21
13	Indonesia – Java Sea	BM	3	Dept. Oceanography, Faculty of Earth Science and Technology, Institut Teknologi Bandung	Lamona Bernawis	Nov-21
14	Kenya - Mombasa	M	3	Kenya Marine and Fisheries Research Institute	Mohamed Ahmed	Sep-20
15	Kenya - Shimoni	M				Sep-20
16	Lebanon – B1	M	9	National Council for Scientific Research in Lebanon	Abed El Rahman Hassoun & Milad Fakhry	Sep-21
17	Lebanon – B2	M				Sep-21
18	Mexico - Ensenada	BM	5	Autonomous University of Baja California	Adriana Gonzalez	Feb-18
19	Nigeria – Five Cowries Creek	BM	5	Nigerian Institute for Oceanography and Marine Research	Akinnigbagbe Akintoye Edward	Jul-21
20	Pakistan - Manora	M	5	National Institute of Oceanography	Samina Kidwai	Nov-21
21	Pakistan - Khobar Creek	M				Nov-21
22	Pakistan - Waddi Khuddi	M				Nov-21
23	Pakistan - Dabbo Creek	M				Nov-21
24	Pakistan - Gadani	M				Nov-21
25	Pakistan – Miani Hor	M				Nov-21
26	Peru - Callao	BM	4	Maritime Institute of Peru – IMARPE	Luís Escudero	Jan-18
27	Senegal – Petite Cotê	BM	3	Université Iba Der Thaim de Thiès	Ousmane Diankha	Sep 21
28	Thailand – Si Racha	M	3	Department of Marine Science, Chulalongkorn University	Sutaporn Bunyajetpong	Dec-21
29	Togo – Port of Lome	BM	2	University of Kara	Essowé Panassa	Nov 21
30	Tunisia – Kheireddine	M	5	National Institute of Marine Sciences and Technologies	Yosra Khammeri	Feb-22
31	Tunisia - Salambô	M				Dec-21
32	Tunisia – Kuriat S1	BM	3	University of Tunis	Houssem Smeti	Jun-22
33	Tunisia – Kuriat S2	BM				Jun-22
		TOTAL	93			

4.1.2 Fieldwork

The NANO members responsible for the study sites are required to coordinate regular samplings, either monthly or bi-monthly, to monitor EOVs at the surface. During the period from August 2024 to July 2025, a total of 231 fieldwork activities were completed (Figures 5 and 6). These variables include temperature, salinity, pH, dissolved oxygen, and chlorophyll-a concentration (Figure 7). Additional variables, such as total alkalinity, suspended particulate matter, turbidity, and plankton community structure, are also sampled for, but these are not mandatory and depend on the local resources and

interests at each site. The data is compiled by the NANO fellowship holder Nabanita Das who works closely with the project coordinator, Dr. Subrata Sarker.

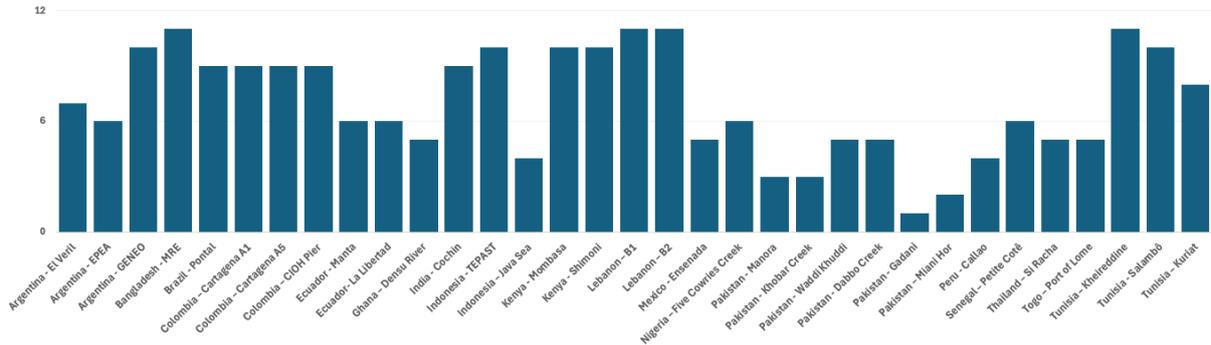


Figure 5 - Number of fieldwork activities conducted at each NANO-DOAP station during the period.



Figure 6 - Fieldwork activities conducted between August 2024 and July 2025 at NANO-DOAP stations.

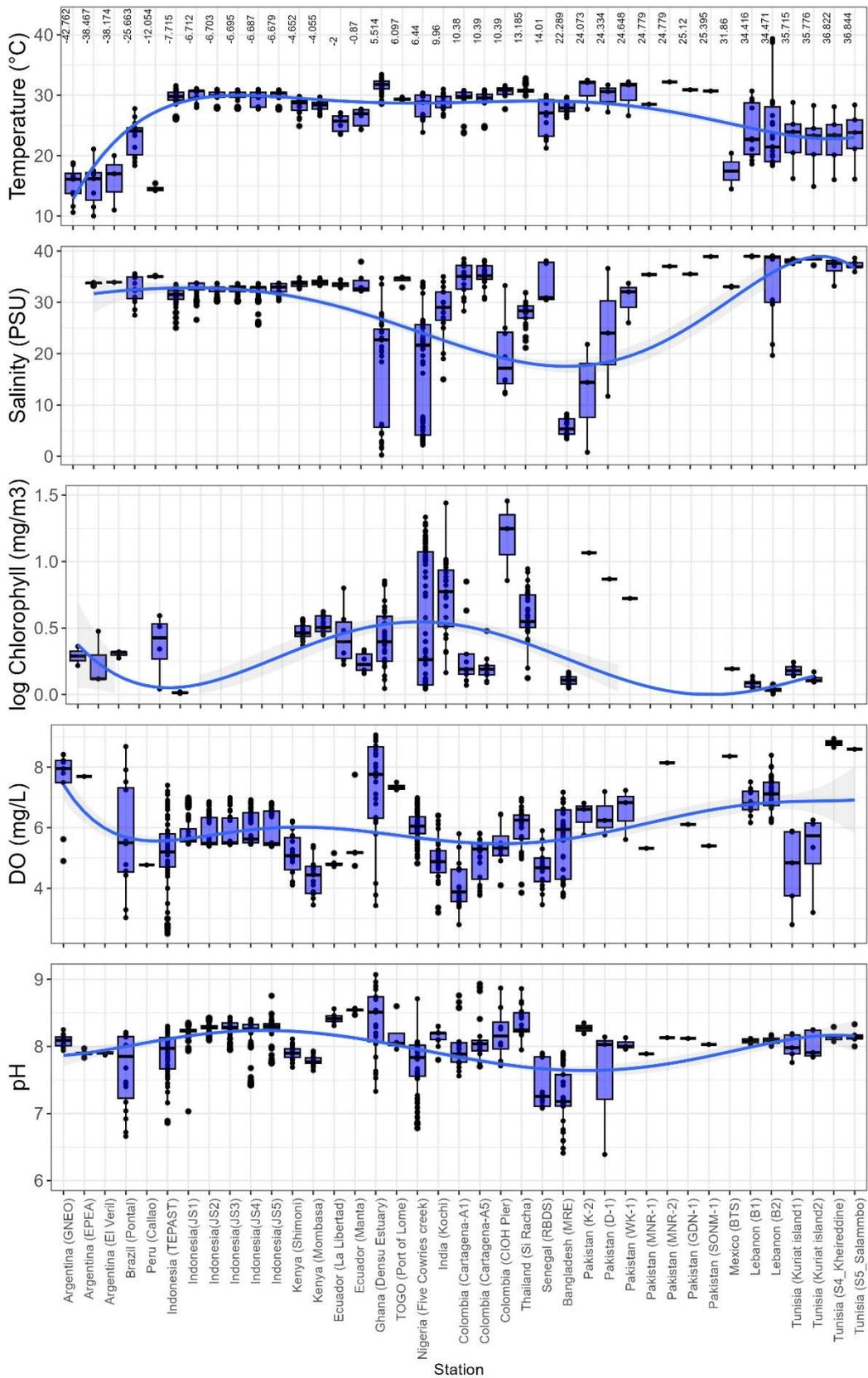


Figure 7 - Latitudinal variation of the mandatory EOVs sampled between 0 and 5 m depth at the NANO-DOAP study sites between August 2024 and July 2025.

4.1.4 Outreach activities

An important component of NANO-DOAP is to encourage our members to participate in outreach activities in their affiliations. During this period, participants from NANO-DOAP stations engaged with the general public, from children to adults, to teach the importance of the ocean and its conservation, while encouraging curiosity and participation in science.

Argentina:

- The Argentinean participants joined a celebration organised by the *Centro de Actividades Submarinas Escualo (CASE)* on the occasion of the 40th sampling event. A talk was delivered at that event by Dr. Georgina Cepeda (INIDEP) to introduce the concept of zooplankton and its ecological relevance. A hands-on training was conducted for divers on sampling methodology and data significance related to ocean acidification and deoxygenation, where more than 40 participants attended this training.
- Members Valeria Segura, Lucía Epherra, Bárbara Gorriti, and Guillermina Facal conducted an outreach session for 22 senior high school students from San Alberto School (Mar del Plata). They presented research conducted at EPEA and El Veril stations to raise ocean awareness.
- Representatives from the NANO-DOAP Argentina GNEO station conducted an outreach session at School as part of the “Science and Technology Conference: Challenges Changing the World are Underway”. They delivered a talk titled “Marine Microbial Communities and Their Biotechnological Application: Monitoring Station Luis Piedrabuena Pier” to explain to high school students about their research methods and findings, demonstrating how marine ecosystem studies inform scientific and environmental decision-making.
- During the National Data Visualization Competition “*Contar Con Datos*” on August 2024, NANO-DOAP members collaborated with Adriana Fainstein (a specialist in visual thinking and creator of Ojoquepiensa) to create an artistic installation that merged visual thinking and data science to explore metadata from the EPEA time series.
- EPEA & El-Veril representative, Dr Carla Berghoff, presented EPEA and El Veril research activities to 26 oceanography students at the Universidad Nacional de Buenos Aires.

Brazil:

- The Brazilian participants organised an activity on “Bringing the Experience of Ocean Monitoring Closer”. Over 200 participants engaged with lecture and exhibition of oceanographic equipment

Colombia:

- Members of the Cartagena station hosted the activity “Navigating the Colours of the Ocean”. In this program, 27 sixth-grade students and 9 naval cadets participated in activities that included hands-on ocean colour study using mini-Secchi disks and testing a newly developed modular platform designed to standardize measurements of water clarity via mobile phone photography and disk deployment. Additionally, the University of Cartagena delivered in a rally format across five thematic stations prepared by 26 final-year Biology students from the campus. The results from this pilot were analysed to be included in a citizen science publication and documentary video.

Indonesia:

- Participants from the TEPAST stations organised two workshops to introduce participants to plankton and microplastics using Foldscope microscopes. About 16 participants, including undergraduate, master’s students and one lecturer attended this workshop to assemble Foldscope, collect samples, observe the microscope, and discuss the ecological roles of plankton and the environmental impact of microplastics.

Mexico:

- In October 2024, NANO-DOAP Ensenada participated in the Science Night (*Noche de las Ciencias*) where members of the general public visited the University to learn how science generates benefits for society. Project representatives highlighted the role of phytoplankton in ocean ecosystems.
- Mexican representatives also participated in the Science and Technology Exposition of the Autonomous University of Baja California (*Expo Ciencia y Tecnología UABC*). Students from all educational levels interacted with researchers, participated in workshops, and explored projects developed by the Faculties of Science, Marine Sciences, Engineering, Architecture and Design, and the Institute of Oceanographic Research. Our group contributed with an exposition titled ‘Phytoplankton and the Colour of the Oceans’.

Nigeria:

- In Nigeria, the members of the Five Cowries Creek station initiated an ocean awareness activity focused on teaching ocean literacy to pupils. This event was a follow-up to the outreach conducted in 2023. During this phase, senior students and previously trained teachers were revisited, and additional Foldsopes were distributed.

Togo:

- Members of the NANO-DOAP station organized a two-day celebration of World Oceans Day in collaboration with the University of Kara. The activities were a combination of educational, scientific, and ecological activities. These included awareness campaign led by students on ocean conservation and plastic pollution, a talk delivered by Dr. Panassa (NANO-DOAP representative) on “Impact of Climate Change on Food Security: The Role of the Oceans”, radio broadcast, community cleanup, and reforestation event of planting more than 100 trees near Kara River.



Figure 8 – Outreach activities organised by NANO-DOAP members.

4.1.5 Citizen science

The NANO-DOAP C4CEM initiative in Bangladesh has successfully expanded its citizen science-based coastal monitoring efforts to support the declaration of new Marine Protected Areas (MPAs), in collaboration with the Department of Fisheries and WorldFish Bangladesh. Biodiversity and habitat data collected through the C4CEM mobile application were analysed to identify potential MPA sites.

In addition, new features in the C4CEM are improving oceanographic services for coastal communities, accessible by fishers in real-time. Tools included cyclone early warning system, potential fishing zone advisory, and seven-day forecasts of sea conditions. The latter is based on Delft3D Flow model simulations of storm surges.

With over 2000 geo-referenced observations contributed by citizen scientists, C4CEM now spans the entire Bangladesh coast. It continues to play a pivotal role in marine biodiversity monitoring, fisher safety, and the sustainable management of coastal ecosystems.



Figure 9 – Presentation on C4CEM by NANO-DOAP coordinator, Dr Subrata Sarker.

4.1.5 Scientific outputs

The publications utilizing data from NANO-DOAP project include presentations in scientific events, book chapters, journal articles, technical reports and academic theses. The list of publications during this period is presented below. For the complete list of publications since the start of NANO-DOAP, visit the [NANO-DOAP webpage](#).

Presentations at Scientific Event(s)

- Sarker, S., Das, N., Huda, A. N. M. S., Chowdhury, G. W., Krug, L.A and Seeyave, S. Taking Science to the Community: Innovative Approaches for Affordable Coastal Ecosystem Monitoring. **Oral presentation** at One Ocean Science Congress, Nice, France, 3-6 June 2025
- Gonçalves, R., Cian, A.D., Martelli, A., Moresino, R.H. Microplastics Entering the Food Web – A Preliminary, More Realistic Test with Zooplankton from Patagonia, Argentina. **Poster presentation** at the III SIBECOL Meeting and XVII AEET Conference in Pontevedra, Spain, 3 June 2025
- Sarker, S., Huda, A. N. M. S., Das, N., Riya, S.C., Chowdhury, N.M., and Hossain, M.S. Application of the Citizen Science Approach to Identify Biodiversity Hotspots Along the Bangladesh Coast. **Poster presentation** at the 26th POGO Annual Meeting (POGO-26), Penang, Malaysia, 25-28 February 2025
- Chowdhury, N.M., González, P.E.M., Sarker, S. From Science to Community: Developing an Early Warning Advisory Service for Fishers Along the Bangladesh Coast. **Poster presentation** at the 26th POGO Annual Meeting (POGO-26), Penang, Malaysia, 25-28 February 2025
- Das, N., Sarker, S., and Krug, L.A. NANO-DOAP Bangladesh: Environmental Monitoring in the Meghna River Estuary. **Oral presentation** at the virtual forum of Ocean Acidification Week 2024, organized by the Global Ocean Acidification Observing Network (GOA-ON). 18 November 2024
- Sarker, S. Towards an integrated, cost-effective and efficient coastal ecosystem monitoring strategy for developing countries. Oral presentation at the 8th China-Southeast Asian Countries Marine Cooperation Forum, Jakarta, Indonesia, 28-29 November 2024.
- Gonzalez A. Long-term monitoring of Phytoplankton, Nutrients and Alkalinity off Baja California. **Poster Presentation** at Ocean Observing conference in California, 14-16 May 2024.
- Sarker, S. and Krug, L.A. NANO-DOAP Global Project: An Alumni Network Global Monitoring Program. **Oral Presentation** at the Indian Ocean Regional Decade Conference, INCOIS, India, 1-3 February 2024

Journal Article(s)

- Brewin, R.J.W.; Sun, X.; Wood, J.L.; Brewin, T.G.; McBride, D.; Frensley, B.T.; Bresnahan, P.J.; Simis, S.; Schmidt, N.; George, G.; Stoy, A.C.; Menon, N.N.; Chekidhenkuzhiyil, J.; Abdulaziz, A.; Sathyendranath, S.; Krug, L.A.; Das, N.; Sarker, S.; Pasche, N.; Glass-Haller, L.; Ghadyani, Y.; Odermatt, D.; Camus, A.; Mader, S.; Bonny, A.; Pochelon, A.; Edward, A.A.; Noernberg, M.A.; Mahu, E.; Diankha, O.; Gonzalez-Silvera, A.; Ahmed, W.; Kidwai, S.; Hernandez-Moresino, R.; Mohamed, A.H.; Panassa, W.E.; Purba, N.P.; Betancur-Turizo, S.P.; Bernawis, L.I.; Smeti, H.; Moshi, H.A. 2025. An innovation of two established methods for monitoring water colour and clarity: Participatory science using the mini- and mid- Secchi disks. *Frontiers in Environmental Science*. <https://doi.org/10.3389/fenvs.2025.1610130>
- Purba, N. P., Faid, G. M., Zheng, W., Akhir, M. F., Yu, W., Mulya, R. A., Syamsudin, F., Faizal, I., Pasaribu, B., Agustyadi, T., Priyono, B., Fadli, M., Santoso, P.D., Pandoe, W.W., Wang, H., Li, S., Wei, Z., Susanto, R.D., Nugroho, D., Purwandana, A. (2025). Two Centuries of Oceanographic Data in the Indonesian Seas and Surroundings: Historical Trends, Gaps, and Future Challenges. *Earth System Science Data Discussions*, 2025, 1-39. <https://doi.org/10.5194/essd-2025-196>

- Mullan, S., Hossain, M. S., Okyere, O. O., Diogoul, N., AbouElmaaty, E. E., Puthukulangara, P., Suhita, N. P. A. R., Echevarría Rubio, J. M., Cabiguin, M., Otieno, D., & Alves de Lima, A. J. (2025). Accessible ocean monitoring technologies in developing countries: NF-POGO global scholar perspectives on low-cost solutions. *The Journal of Ocean Technology*. [10.48336/ktd4-k787](https://doi.org/10.48336/ktd4-k787)
- Sarker, S., Nahiduzzaman, M., Riya, S.C., Hossain, M.S., Hossain, M. M., Das, N., Uddin, M.S., Alam, S., Tethe, J.T. (2025) Towards Data-Driven Saltmarsh Habitat Conservation: A Study from the Southeast Coastal Ecosystem of Bangladesh. *Regional Studies in Marine Science*: <https://doi.org/10.1016/j.rsma.2025.104385>
- Sarker, S., M. S. Hossain, N. Das, S. C. Riya, S. Smriti, M. M. Hossain and M. J. Rahman (2024). Integration of socio-ecological data to prioritize biodiversity hot-spots for Marine Protected Area (MPA) delineation in the coastal zone of Bangladesh. *Regional Studies in Marine Science*: 103622. <https://doi.org/10.1016/j.rsma.2024.103622>
- Das, N., G. W. Chowdhury, A. B. Siddique, S. C. Riya, M. A. Fazal, F. Sobhan and S. Sarker (2024). The silent threat of plastics along the coastal frontiers of Bangladesh: Are we concerned enough? *Marine Pollution Bulletin* 205: 116567. <https://doi.org/10.1016/j.marpolbul.2024.116567>
- Larios-Muñiz, M.; Gonzalez-Silvera, A.; Santamaria-del-Angel, E.; Guzman-Hernandez, M.E.; Betancur-Turizo, S.; Torres-Beltrán, M.; López-Calderón, J. 2024. Light absorption properties of dinoflagellate blooms in Todos Santos Bay, Mexico (northeast Pacific Ocean). *Regional Studies in Marine Science* 72, 103438. <https://doi.org/10.1016/j.rsma.2024.103438>
- Sarker, S., Krug, L.A., Islam, K.M., Basak, S.C., Huda, A.N.M.S., Hossain, M.S., Das, N., Riya, S.C., Liyana, E., Chowdhury, G.W. (2024). An integrated coastal ecosystem monitoring strategy: Pilot case in Naf-Saint Martin Peninsula, Bangladesh. *Science of The Total Environment*, 913, 169718.

Technical Report(s)

- O. Diankha. Physical-Chemical parameters monitoring at Saloum Delta Biosphere Reserve station. NANO NEWS NF-POGO Alumni E-Newsletter–Volume25, January 2025.
- I.C. Medina, A.G. Silvera, K. Lowder and J.M.H. Ayón. Time series of pH and Total Alkalinity at Todos Santos Bay (Baja California, Mexico): an application in aquaculture. NANO NEWS NF-POGO Alumni E-Newsletter–Volume25, January 2025
- S. Bunyajetpong, and K. Khaodon. NANO-DOAP time series station in the Inner Gulf of Thailand. NANO NEWS NF-POGO Alumni E-Newsletter–Volume25, January 2025.

Academic dissertation(s)/thesis

- Larios-Muñiz, M. (2025). Optical properties of Todos Santos Bay, Baja California, Mexico: application to the remote sensing of ocean color. Thesis submitted for the title of PhD in Coastal Oceanography Program at the University of Baja California. <https://catalogocimarron.uabc.mx/cgi-bin/koha/opac-detail.pl?biblionumber=278698>

- Córdova-Medina, I. (2025). Temporal surface variability of Co₂ system parameters in Todos Santos Bay, Ensenada: an application in aquaculture. Undergraduate dissertation submitted for the title of Bachelor of Sciences in Oceanography at the University of Baja California. <https://catalogocimarron.uabc.mx/cgi-bin/koha/opac-detail.pl?biblionumber=279378>
- Serrano-Silva, A. (2024). Structure of the phytoplankton community from Todos Santos Bay (Ensenada, BC) during the autumn of 2021. Undergraduate dissertation submitted for the title of Bachelor of Sciences in Oceanography at the University of Baja California. <https://catalogocimarron.uabc.mx/cgi-bin/koha/opac-detail.pl?biblionumber=268184>

4.1.6 Collaborations

NANO-DOAP engages in collaborations with external partners to enhance its potential and capabilities. In 2023, the POGO Secretariat offered midi-Secchi disks developed by [Brewtek](#) to members who were participating in the Workshop at Plymouth Marine Laboratory. These low-cost yet scientifically robust instruments were integrated into the stations' monitoring programmes (Figure 10), expanding the range of variables measured to include water colour and transparency, which is especially important in coastal environments. Data collected by the NANO-DOAP sites were included in an [international study](#) that helped demonstrate the reliability of this instrument and its potential to contribute to global science and citizen science initiatives.



Figure 10 –Participants of NANO-DOAP Nigeria show the midi-Secchi disc. Data was incorporated in Brewin et al., 2025.

In 2024, an informal conversation was initiated with representatives from the *Shaping an Ocean of Possibilities* ([SOOP](#)) initiative. SOOP is a Helmholtz innovation platform jointly implemented by AWI, GEOMAR, and HEREON. It aims to foster science–industry collaboration by developing a market for easy-to-use, reliable, and affordable ocean observation technologies and data utilisation tools.

We reached out to SOOP seeking guidance on how best to coordinate our global NANO-DOAP project. We explained that we are a network of coastal monitoring stations operating with limited resources, largely dependent on modest funding and the invaluable dedication of our participants to conduct fieldwork at their respective stations. Over the course of the year, we held further discussions with SOOP and shared information about the profile of our stations, including sampling platforms, available instrumentation, and operational characteristics. The SOOP team expressed a strong interest in supporting NANO-DOAP, proposing the donation of up to 10 sensor sets for profile measurements, assistance with installation and data management, collaboration in the co-development of common data standards to ensure long-term data comparability, and participation in joint training activities. The coordination team has selected 10 NANO-DOAP representatives to join this collaboration and receive the sensors to incorporate into their regular fieldwork. A call was scheduled for early August with SOOP and the representatives of these stations to discuss the next steps.

The collaboration with both, Brewtek and SOOP, not only upgrades our technical capacity at minimal cost, but also ensures that we will be able to collect high-quality, standardised data across the entire network. It is a significant step forward in making NANO-DOAP a reliable contributor to global ocean observing.

4.2 Social AGitation for Temperature Analysis (SAGITTA)

The coastal ocean remains insufficiently covered by reliable oceanographic data, which significantly limits its sustainable use, protection, and management. Expanding the spatial coverage and frequency of sampling across the world's coastal zones would greatly enhance scientific understanding of oceanographic and ecological processes, thereby supporting more informed management and conservation decisions.

The Social AGitation for Temperature Analysis (SAGITTA) project aims to implement a citizen science approach for consistent and regular temperature profile data collection in coastal waters. This involves developing a simple, low-cost, and scientifically reliable probe that can be used by the general public. The project also seeks to create a smartphone application to operate the sensor and transmit data to the SAGITTA web portal via the internet.

The SAGITTA project has been supported by POGO and Nippon Foundation since 2017. The first year focused on planning and design, while from 2018 onwards the main objectives were the development and testing of the probe, preparation for production, and creation of an integrated system linking the probe, smartphone application, and web portal. In 2022, the project experienced disruptions due to geopolitical conflicts, resulting in difficulties in collaborating with Russian scientists. Consequently, the

project continued through contractors in the United States and Israel, focusing on hardware and app development. In 2024–2025, the project leadership was transferred to Bangladesh.

4.2.1 – Project coordination

During the first semester of 2024, it was agreed that project leadership would be transferred to Dr Subrata Sarker, NANO-DOAP coordinator, thereby integrating the NANO-DOAP and SAGITTA initiatives. As Head of the Department of Oceanography at the Shahjalal University of Science and Technology (SUST), Bangladesh, Dr Sarker has access to technical and IT staff with the expertise needed to advance the project. He and his team are collaborating with SAGITTA’s programmer, Mr Alexander Rakhman (based in Israel), and other contributors, including Ocean Data Network (ODN) and ENC Data.

The transfer took place in April 2025, when the former project coordinator, Mr Kirill Kivva, visited SUST to hand over the project materials and provide details on the project’s achievements and outstanding tasks. The meeting coincided with the visit of an ODN representative for the establishment of the new NANO-FVON pilot site (see Section 4.3.2), allowing for a joint field trial.

Following the field test, a hands-on technical session between Mr Kivva and the SUST team enabled a comprehensive review of project activities and a step-by-step technical walkthrough. The session included demonstrations on updating the sensor firmware, accessing previously collected data via the device’s IP address, navigating the internal database, and performing basic diagnostics and troubleshooting (Figure 11).

At the conclusion of the visit, several essential device components were officially handed over. These included:

- two sensor devices (one confirmed functional and one labelled non-functional),
- three batteries for powering the devices,
- a device maintenance tool for assembly and disassembly,
- a set of spare O-rings,
- silica gel for sealing and moisture protection, and
- magnet keys used to turn the devices on and off.

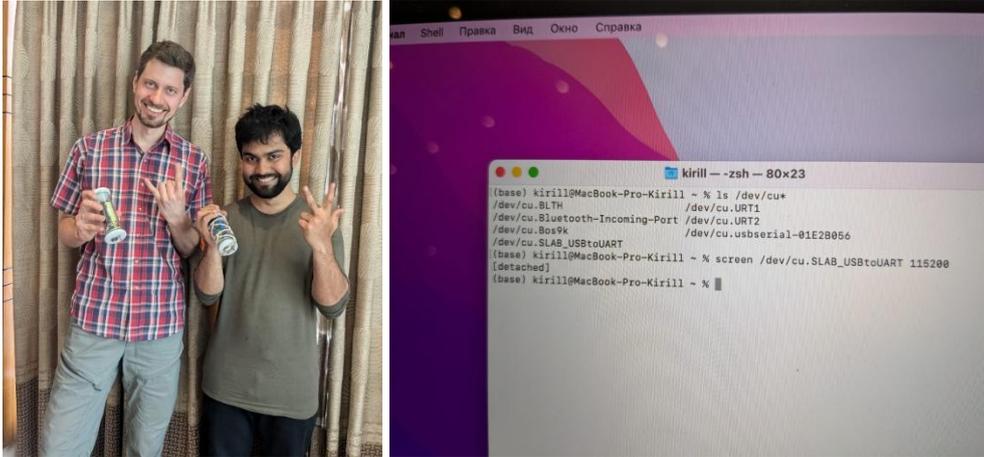


Figure 11 – Meeting at Dhaka for sharing the technical issues of SAGITTA probe

3.1.2 – Field test

Field tests of the SAGITTA sensors were conducted in Israel (August 2024) and Bangladesh (April 2025). In Israel, the tests took place in Haifa Bay, with three separate deployments (Figure 12). The raw data exhibited a noticeable level of noise, necessitating post-processing to obtain accurate temperature profiles. A moving average and smoothing filter were applied to minimise noise and enhance data clarity. These processing techniques ensured that the final dataset more accurately reflected the conditions observed during the sea trials.

Analysis of the processed data revealed no significant temperature gradient throughout the water column. The maximum variation observed at 50 metres depth was approximately 1.5 °C, indicating a relatively uniform temperature profile. This suggests that the water column was well mixed at the time of measurement, likely due to recent wind or wave activity that prevented the formation of distinct thermal layers (thermoclines).

Overall, the profiler successfully captured temperature profiles at varying depths; however, no thermocline was detected, contrary to initial expectations. For future deployments, it will be essential to address the noise produced by the pressure sensor and improve its calibration. Enhancing calibration and minimising sensor noise will contribute to greater measurement accuracy and more reliable datasets in subsequent sea trials.

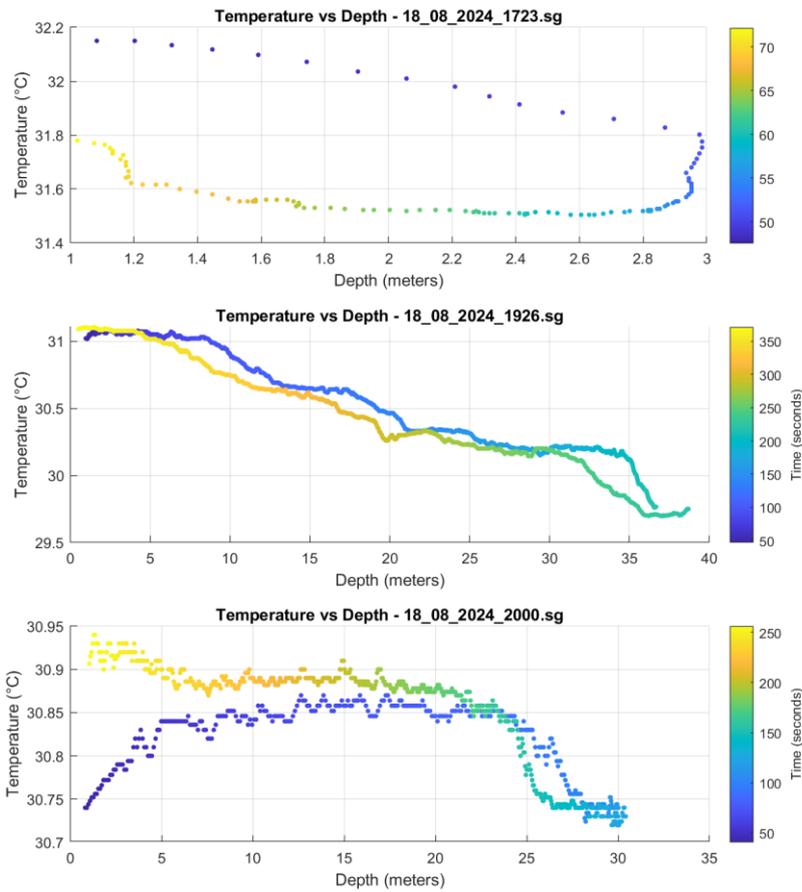


Figure 12 – SAGITTA temperature profiles during field test in Israel.

In April 2025, the SAGITTA sensors were tested in Bangladeshi coastal waters, from a fishing boat. The field test involved seven fishers and the project team. Two SAGITTA probes were tested at a depth of 11.2 metres (Figure 13).



Figure 13 – Field test of SAGITTA in Bangladesh.

During the trial, the procedures for probe activation, app usage, and data collection were demonstrated. To collect data, the probe was securely tied with a rope and weight, then slowly lowered into the water until it reached the bottom. After allowing time for data acquisition, the probe was retrieved, and the app was used to stop the measurement and review the results.

Of the two sensors tested, one device functioned properly, providing clear data on temperature, pressure (depth), and time step. The second device, however, failed to connect to the app and did not record any data. The functioning sensor also did not capture GPS coordinates, an issue that will need to be addressed in future versions.

Upon reviewing the data (Figure 14), it was found that the pressure readings were unusually high (over 35 dB), despite the probe being lowered only to 11.2 metres. This discrepancy indicates a need for improved pressure sensor calibration. Throughout the test, the fishers actively participated, observing how the device operated and testing it themselves under supervision.

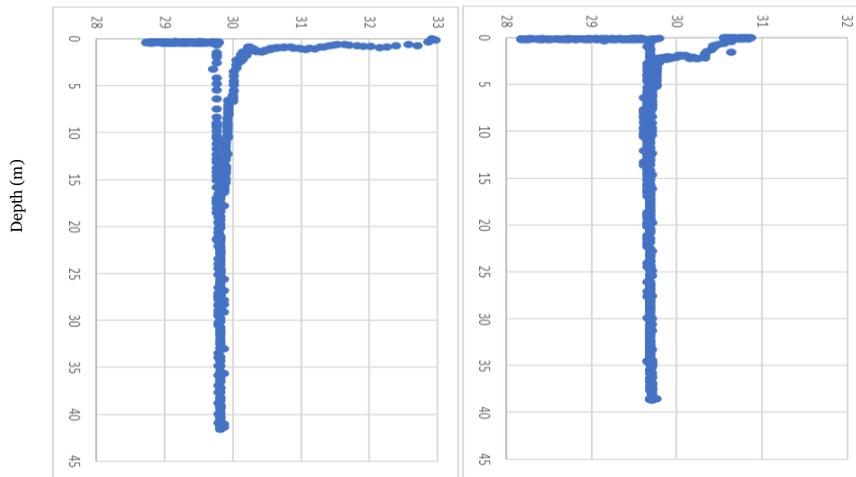


Figure 14 – SAGITTA temperature profiles during field test in Bangladesh.

4.3 Fishing Vessel Sensor Network Pilot Sites

The Fishing Vessel Ocean Observing Network (FVON) equips fishing boats with sensors that collect water column data during their regular fishing activities. This enables continuous monitoring of coastal waters and helps fill gaps that other observation systems cannot cover. FVON is an initiative of the Ocean Data Network (ODN).

Since 2022, we have partnered with FVON to establish pilot sites for the project at alumni locations. Led by our alumni, these initiatives have created strong connections between science and local communities. They provide alumni with valuable experience in leadership and project management, while offering fisherfolk the chance to become active partners in ocean observation and sustainable practices. This collaboration also fosters trust and contributes to marine spatial planning on a local level. The first pilot site was established in Ghana in 2022. Between Aug 2024 and July 2025, two new pilot sites were established in Tanzania and Bangladesh.

4.3.1 Pilot site: Tanzania

Led by NANO member Hellen Kizenga from the Institute of Marine Sciences (IMS) of University of Dar es Salaam, the activity sought collaborations with several local and regional organisations, conducting visits and meetings with multiple stakeholders to present the project’s objectives and explain how the FVON sensors can contribute to global ocean observations. Collaborative links were formed with the Western Indian Ocean Marine Science Association (WIOMSA), WorldFish Organization, and the Zanzibar Fisheries and Marine Resources Research Institute (ZAFIRI). These organizations were already implementing a similar initiative with the installation of the Pelagic Data Systems (PDS), a fishing tracking system, on fishing boats in Unguja and Pemba Islands. The PDS allows the monitoring of the boats routes and helps identify potential fishing grounds.

4.3.1.1 Community engagement

In September 2024, IMS, WorldFish, and ZAFIRI organised a one-day training workshop bringing together technical research teams from all partnering organisations and representatives from the fisheries community, including the Department of Fisheries, 4 fisheries officers, 6 leaders from local fisheries committees and 15 fishermen (Figure 15). The primary objective of the session was to strengthen the participants' understanding of the critical role that fishermen play in contributing to scientific research and data-driven ocean management. The session provided a detailed introduction to the functionality, purpose, and application of both FVON sensors and PDS technology, highlighting their contribution to sustainable fisheries management and coastal ocean monitoring efforts. The team proceeded to the field where the ODN representative demonstrated the sensor installation process (Figure 15). This fieldwork allowed a valuable practical learning experience for the Tanzanian research teams, providing direct exposure to the deployment protocols and sensor handling techniques, thereby reinforcing their capacity to independently manage future installations and data collection efforts.



Figure 15 – Installation of the sensor and workshops were part of the activities in Tanzania (Credits: H Kizenga, P Thoya).

A series of capacity-building workshops were conducted in both Unguja and Pemba locations to further strengthen the ability of local fishermen to contribute effectively to scientific research and data-driven ocean resource management. The sessions provided continuous engagement, focusing on enhancing the understanding of how oceanographic data can inform sustainable fishing practices. In addition to the workshops, two major Fishers' Forums brought together over 150 participants, including fishermen, community leaders, and a diverse range of stakeholders such as marine conservation organisations, research and training institutions, and various government departments (Figure 15). IMS presented the preliminary findings from the data collected with the FVON sensors. The presentation sparked significant interest among the attending fisherfolk, many of whom expressed enthusiasm and curiosity upon learning how their fishing success often correlates with changing oceanographic conditions such as temperature and depth. This insight reinforced the importance of integrating scientific tools into traditional fishing practices and fostered a greater appreciation for the role of science in supporting more sustainable and informed fisheries management.

4.3.1.2 Results

Initially, the FVON sensors were installed in 3 vessels: Big Up Nike, Muhsin and Kambi Popote. Due to some operational issue, in January 2025, the devices on Kambi Popote were transferred to a new vessel, Huskiyallah. The data is available at the Fisheries Ocean Data ERDDAP system and the Fishing Ocean Data Portal operated by ODN (Figure 16).

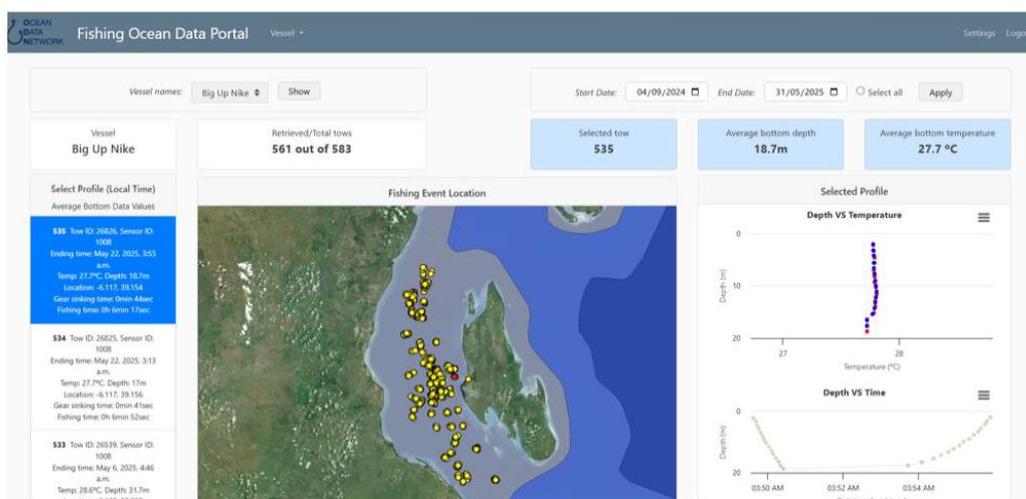


Figure 16 – Fishing Ocean Data Portal page showing the information of Big Up Nike, one of the Tanzanian vessels.

Between September 2024 and June 2025, a total of 1004 temperature profiles across the entire Zanzibar Channel have been collected. From the data gathered through daily expeditions, daily and

monthly fluctuations in surface and subsurface temperature can be observed in Figure 17a. The highest peak in temperature is observed in April followed by another peak in January and December. The September-October period recorded the lowest temperatures, followed by February and June. Figure 17b further signifies the observed temperature fluctuations through the temperature-depth profile. The maximum temperature depth recorded is at 40m, little variation along the water column indicates a well-mixed layer. Small temperature variations at depths are observed between December and March, where the temperatures below 30m are lower than the surface temperatures. In the remaining months, the temperature is more uniform throughout the profiles. The maximum depth shown here, depicts the fishing depth for pelagic fish along the Zanzibar Channel. This result is of paramount importance to the government and other decision-making bodies in the management of pelagic fisheries resources along the Zanzibar Channel and the entire Tanzanian coast.

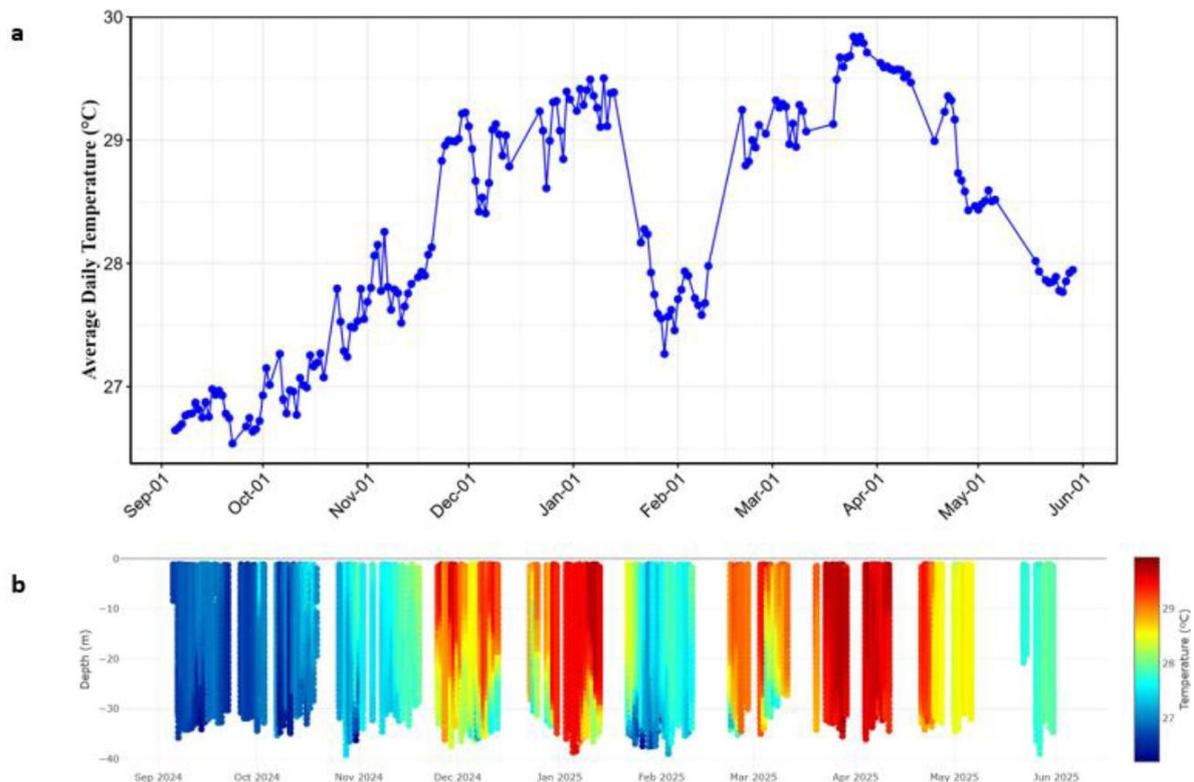


Figure 17 (a) Temperature time-series; (b) T-D profiles in Zanzibar channel.

Ms. Ephrazia Mlelema, an MSc student at IMS, was recruited as an intern at WorldFish. She will dedicate her studies to map fishing routes and identify potential fishing grounds using data collected through the PDS. In addition, she has also been assigned to monitor the FVON sensors by conducting regular field visits to fish landing sites. During these visits, she also records catch data, including species composition and quantities landed by the vessels installed with sensors. The integration of biological catch data with environmental parameters such as temperature and depth is expected to provide

deeper insights into species distribution patterns, fishing effort, and ecosystem dynamics, thereby supporting more sustainable fisheries management strategies.

In addition, Ms. Hellen Kizenga and Mr. Roman Mkenda, PhD students at the University of Bologna and University of Dar es Salaam, respectively, are working on a collaborative publication to assess various oceanographic processes and fisheries using the FVON sensor data and fisheries information collected from the fishing vessels. This paper will show the contribution of citizen science to inform current coastal issues and coastal resources management.

The implementation of the project has faced several challenges, primarily related to operational, financial, and technical limitations. The absence of local technical expertise to handle equipment failures further complicates operations, underscoring the need for targeted capacity-building initiatives. Moreover, the project's current focus on temperature–depth profiles limits its ability to capture other essential coastal parameters, constraining comprehensive understanding of ocean conditions. Looking ahead, the project team has taken proactive steps to ensure long-term sustainability and growth. Continued collaboration with other initiatives that are procuring complementary ocean observing instruments demonstrates a collective move towards strengthening coastal observation systems and promoting science-based decision-making along the Tanzanian coast. Importantly, the ODN team has committed to maintaining data management services beyond the project's two-year duration, ensuring that monitoring continues as long as the instruments remain operational and recalibrated. These efforts collectively lay a solid foundation for sustained coastal observation, enhanced technical capacity, and improved management of ocean and coastal resources.

4.3.2 Pilot site: Bangladesh

Activities at the pilot site in Bangladesh were initiated in April 2025 and are led by Dr Subrata Sarker, coordinator of NANO-DOAP and SAGITTA, and Professor at the Department of Oceanography at Shahjalal University of Science and Technology (SUST). The activities were scheduled to occur at the same time as the visit of the former SAGITTA coordinator, who was coming to deliver the materials to the new coordinator and provide instructions. The field trials took place from 28th April to 2nd May 2025, and included meetings with the SUST team, device installations, and field tests.

A day-long meeting was held at the Department of Oceanography, SUST, on 28th April 2025 (Figure 18). The meeting was attended by the SUST team, Dr Kirill Kivva (former SAGITTA coordinator), and Mr Carles Castro Muniain (Ocean Data Network). The objective of the meeting was to introduce the SAGITTA and FVON projects to SUST participants. Kirill Kivva gave a presentation on the SAGITTA activities and the probe, explaining its assembly, the use of the SAGITTA Android application, data

retrieval, and visualization. After the presentation, all parts of the SAGITTA probes were handed over to SUST. Carles Castro Muniain provided a brief introduction to the FVON activities, detailing how to use the device and retrieve the data. Following the presentations, a field trip plan was developed.



Figure 18 – Dr Kivva and Mr Muniain give instructions on SAGITTA and FVON sensors assembling during the meeting at SUST.

4.3.2.1 Community engagement

On 29 April, a meeting was held at the Khan Palace Hotel in Kuakata with local fishers to provide an overview of FVON. The session covered how the FVON sensor and receptor function, the proper methods for installing the receptor on the boat and the sensor on the fishing gear, and the types of data that can be collected from the sensor. It was also emphasised that installing the FVON device would not interfere with the fishers' regular workflow.

During the meeting, the fishers actively participated by asking questions and offering suggestions — including recommendations on where to install the FVON device on the boat and how to best attach the sensor to the fishing gear. They also proposed adding a tracking feature that could operate without a mobile network, allowing their families to monitor the vessel's location and ensuring a safer return

to shore. The fishers expressed strong interest in the initiative and agreed to support the project by using the devices for data collection.

The meeting was attended by five fishers representing three fishing boats, one local volunteer, and three students from SUST, plus Carles Castro Muniain, Kirill Kivva, and Subrata Sarker (Figure 19).



Figure 19 – Participants of the meeting in Kuakata included SUST students, FVON, SAGITTA representatives and fishermen.

Mr Fazlu Rahman, Mr Ibrahim Khan, and Mr Masum Hawladar agreed to have FVON sensors installed on their fishing vessels. On 30 April, the receptor units were mounted in open areas on each boat to ensure unobstructed signal transmission to the satellite (Figure 20). The boat owners were trained in properly attaching the sensor units to the lower sections of their gill nets, ensuring that the sensors reach the deepest possible point in the water — essential for accurate data collection.

Due to a temporary fishing ban, the sensors were not immediately attached to the fishing gear. Instead, the fishermen participated in a field test to learn how to operate the devices and received the sensors along with detailed instructions for installation once the ban was lifted. The field test was conducted in coastal waters from a fishing boat, with seven fishers and the project team taking part. Four sensors were deployed together, all functioning correctly and providing accurate depth and temperature profiles (Figure 20).

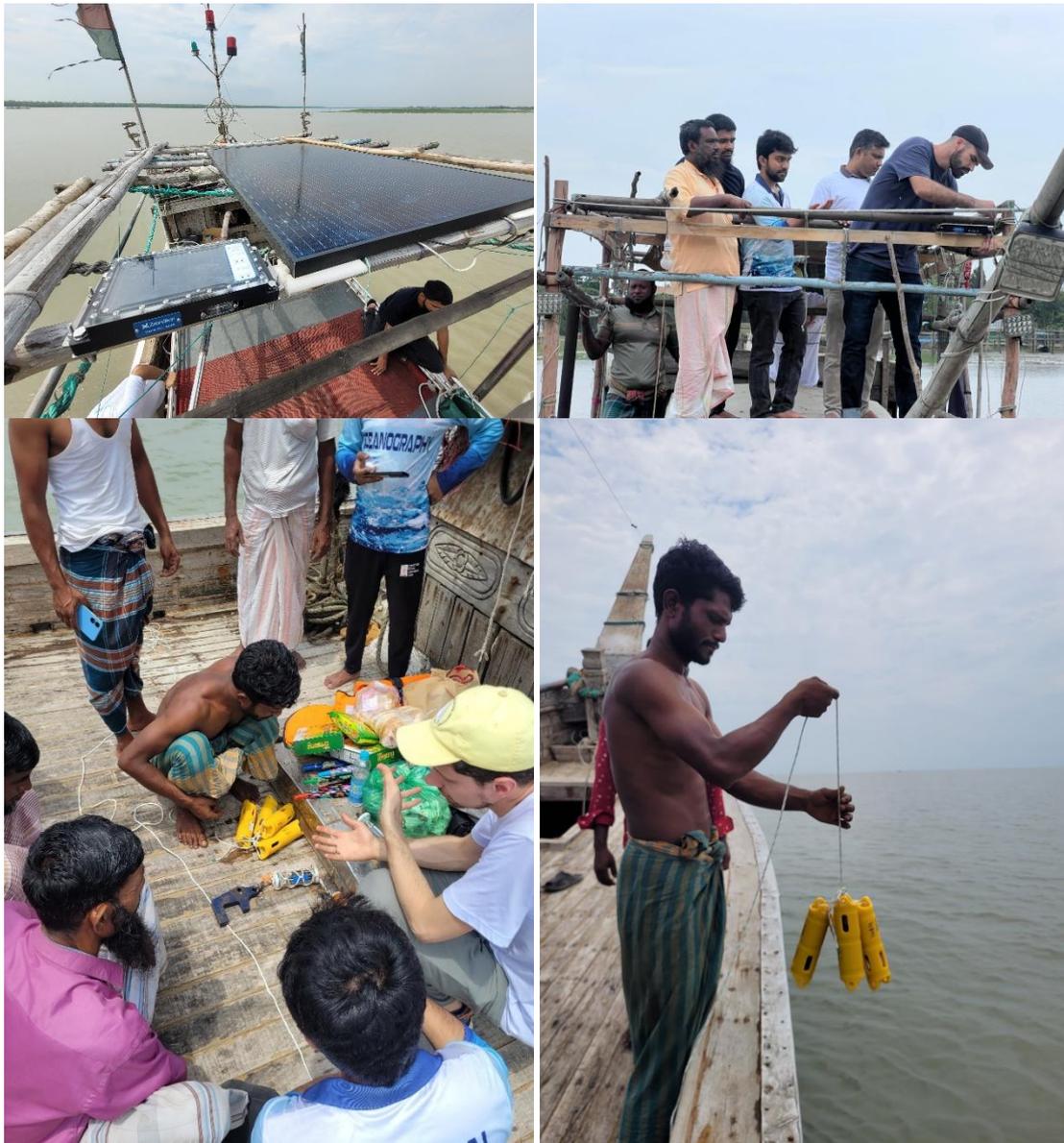


Figure 20 – Installation of receptor units and fishermen handling the sensors.

In September 2025, once the ban is lifted and fishing resumes, the devices will automatically begin collecting temperature and depth data as soon as they are submerged, without requiring any manual input from the fishermen.