



ALL-ATLANTIC OCEAN RESEARCH ALLIANCE

Creating an Atlantic Ocean Community by Implementing
the Galway and Belém Statements

AA-TP Report: White Paper on Capacity Development Requirements and AA-TP Roadmap



**BUILDING AN ALL ATLANTIC
OCEAN COMMUNITY**
Implementing the Belém Statement



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JOINT PILOT ACTIONS

ALL-ATLANTIC JOINT PILOT ACTIONS

Following a year-long collaborative process among more than 70 stakeholders at the Atlantic level, the All-Atlantic Ocean Research Alliance Multi-Stakeholder Platform, divided into 5 sub-multi-stakeholders platforms, identified more than 1000 initiatives towards strengthening marine research and innovation collaboration at the Atlantic level, 56 gaps and 79 needs/recommendations to achieve the All-Atlantic Ocean Research Alliance ambition, guided by a total of 20 Strategic Objectives, 20 Operational Objectives, and 10 Key Performance Indicators.

Based on these findings and on the idea of collaboration, alignment, and use of existing resources, they have developed six ambitious and long-term collaborative Joint Pilot Actions:

- [All-Atlantic Training Platform \(AA-TP\)](#)
- [All-Atlantic Aquaculture Technology and Innovation Platform \(AA-ATiP\)](#)
- [All-Atlantic Marine Biotechnology Initiative \(AA-BIOTECMAR\)](#)
- [All-Atlantic Data Enterprise 2030 \(AA-DATA2030\)](#)
- [All-Atlantic Blue Schools Network \(AA-BSN\)](#)
- [All-Atlantic Marine Research Infrastructure Network \(AA-MARINET\)](#)

This report is developed by the **All-Atlantic Training Platform (AA-TP)** Joint Pilot Action, that plans to establish the “All Atlantic Training Platform” as a tool to identify training needs, gaps, initiatives and create workshops, summer schools, and floating universities for the benefit of early-career scientists and technicians in Ocean Science. Streamline and bring together existing training measures, new challenges and find new and attractive formats to include all stakeholders is essential to provide the best possible education for young talents.

This report is a deliverable in scope of All-Atlantic Training Platform, Activity 1: Kick-off Conference for the establishment of the Priorities and the Management Structure for the All-Atlantic Training Platform that aimed to identify gaps and needs and take advantage of synergies from existing networks such as CANEMS, AIR Centre and POGO and has as major outcome a white paper on capacity development requirements and a roadmap as the basis for implementing and conducting the AA-TP. This report corresponds to AA-TP White Paper, and includes requirements for the management structure of the JPA and its Steering Groups.





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1. Objective

The overall goal is setting up an All-Atlantic Training Platform (AA-TP) for the organization of capacity development measures in marine science in the Atlantic Ocean.





2. Background

Training and education are the cornerstone of the present policy brief, which underscores the development and well-being of society. Well trained personnel are key to reducing differences among regions, promoting business and leading to better life conditions in a sustainable environment. The All-Atlantic Training Platform (AA-TP) aims to create synergies across the Atlantic to overcome regional fragmentation in capacity development activities. In the Blue Economy framework, AA-TP will contribute to attain the Belém Statement goals and promote the advanced goals of the Washington declaration for the benefit of the All Atlantic society.

Despite significant North-South cooperation in capacity development for security and political economy (e.g., between African Union and the ECOWAS states) institutionalized scientific collaborations in the South Atlantic or North-South Atlantic are few. This, in particular, is true for shared training and education opportunities in both, technical and academic scopes, including scientific institutions.

In 2017, the Belém Statement underpinned the need for strategic partnerships in this field with both South American and African partners.

This is the main goal of the present proposal, the creation of a cross-Atlantic platform for training and education – AA-TP.

The AA-TP governance structure includes a Management Committee to oversee the formation of thematic steering groups, which define and coordinate the necessary activities based on needs and gaps in the Atlantic countries and regions.

A first discussion of such organization was realized during the AA-TP kick-off meeting, 31 May 2021, which was inspired by examples of institutions such as North Pacific Marine Science Organization (PICES), as an intergovernmental marine science organization, the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) representing a university-based research infrastructure and capacity in West Africa, and the World Meteorological Organisation (WMO) Capacity Development panel. This discussion was continued at the 2nd stakeholder meeting, 1 February 2022.

This White Paper describes needs and gaps, identifies target audiences and exemplifies some existing programs for capacity development in the 6 thematic areas identified in the Belém Statement. It is also dedicated to define the role of the Management Committee in relation to the Steering groups as outlined below.

The Strategic Objectives of the AANCHOR Capacity Development work package are to:

- a: Align and create synergies amongst existing and future EU training programs in the area of the Blue Economy, including industrial apprenticeship opportunities and networking, with national programs in Atlantic countries and international programs.
- b: Create innovative and targeted approaches in Capacity Development to address ocean issues.



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3. Structural concepts for an All-Atlantic Training Platform – AA-TP

Here we propose a potential organizational structure for the AA-TP with a list of potential cooperation and implementation partners (examples and not exclusive) and highlight the core elements, i.e. Management Committee and Steering Groups. They have the task to identify the needs in activities to address the Belém Statement thematic areas and Washington declaration goals, and the Capacity Development instruments and partners for their implementation.

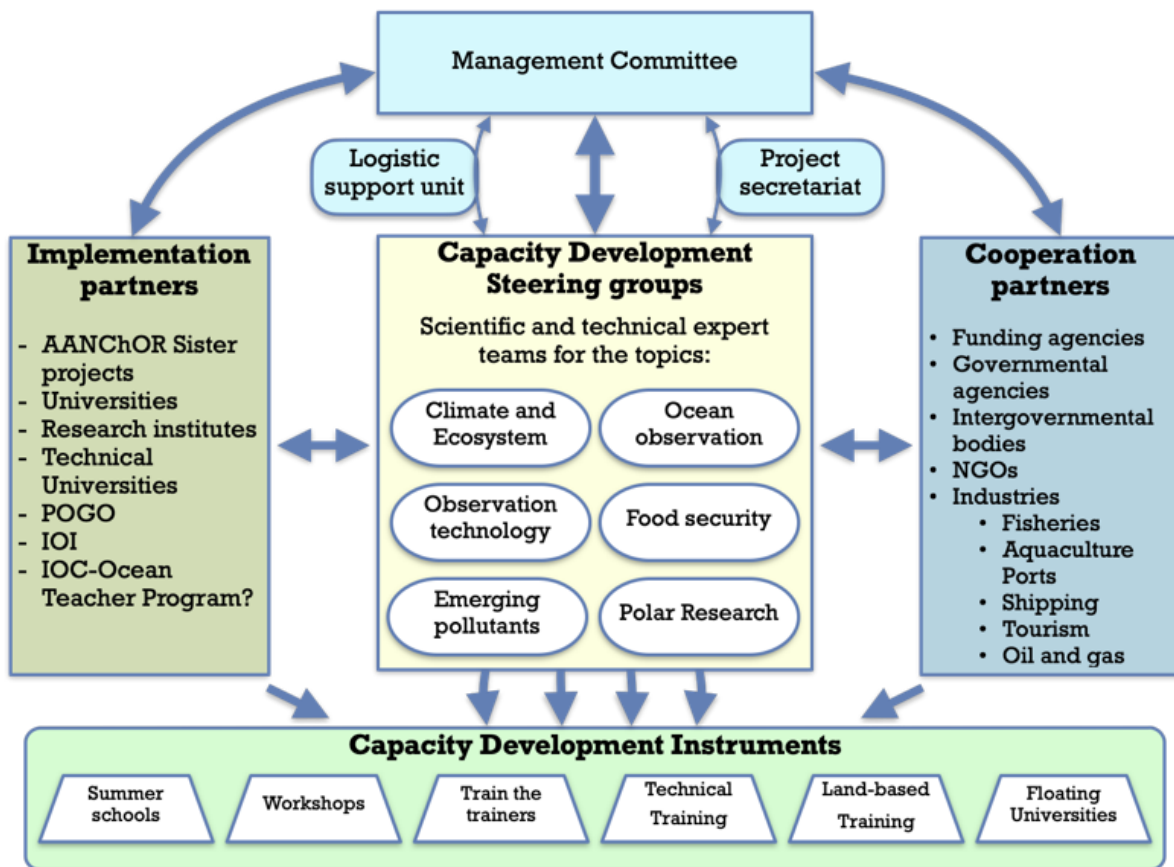


Figure 1: Management structure of AA-TP.

3.1 Management Committee

In order to realize AA-TP effectively, a Management Committee is appointed to oversee the strategic program of the platform and to represent the interests and contributions of the signatory countries. In addition, the Steering Groups that the management committee oversees, address Capacity Development needs and articulates synergies in the thematic topics of the Galway and Belém Statements. To this end,





the Terms of Reference are drafted here to be further discussed and developed. The Management Committee is also responsible for establishing, where necessary, working groups/side panels to address stakeholder needs (science, industry, society).

The Management Committee will:

- Ensure that the interests and needs of the various countries are respected.
- Give strategic direction and approval of joint activities to be implemented.
- Evaluate and monitor the activities.
- Guarantee geographic, disciplinary and gender balance of activities.

3.2 Steering Groups

The implementation of Capacity Development Steering Groups (CDSG) is proposed to address each of the key thematic areas of the Belém Statement with a range of experts from various fields in marine research. Besides identifying training needs in the different countries, CDSG bridge different Capacity Development activities in already existing national and international programs and projects (e.g. Horizon 2020/Horizon Europe sister projects, but also projects funded by all other participating countries), and initiate new training formats, where necessary.

Stakeholders who are prepared to contribute meaningfully will be gradually involved. Importantly, they represent a variety of sectors from academia or research and training institutions, industry, commerce, fisheries, environment, etc. coming from both the international and regional/local level.

Terms of reference for Steering Groups:

- Identify needs and gaps in training at different levels: academic and technical, disciplines
- Propose instruments/mechanism to bridge the training needs and gaps
- Identify existing activities in relevant national and international programs/projects
- Identify/develop new approaches if relevant to include all stakeholders
- Report back to high-level representatives the results and impacts of the approved joint activities being implemented in each multi-stakeholder group
- Promotion of synergistic activities among the different groups
- Networking with other Atlantic stakeholders to promote their engagement in the AA-TP, and to seek cooperation and ensure complementarities with other already similar ongoing initiatives/projects



Cross-cutting topics to be considered in all steering groups and thematic areas and Capacity Development instruments are in relation to the following All-Atlantic Joint Pilot Actions:

- Data management – link with All-Atlantic Data Enterprise 2030 (AA-DATA2030), etc (list not exhaustive)
- Citizen Science – link with All-Atlantic Blue School Network (AA-BSN), etc (list not exhaustive)
- Instruments – link with All-Atlantic Marine Research Infrastructure Network (AA-MARINET), etc (list not exhaustive)

An outline of the six different Steering Groups following the 6 thematic areas as given in the Belém Statement:

3.2.1 Climate and Ecosystem

Needs and gaps in Capacity Development

(e.g. climate change critical shorter-term impacts: extreme weather events, coastal erosion)

- capacity to adapt to extreme events e.g. sudden and prolonged temperature changes and their effect on production
- Long-term monitoring programs (biology, geology, physico-chemical characteristics), to better understand ecosystem trajectories (and to evaluate the success of management and governance interventions)
- Adopting adaptive ecosystem management approaches
- Awareness creation

Target audience for Capacity Development

- Established Research institutions (academia and government), NGOs
- Early career scientists

Identify existing relevant programs for Capacity Development (examples):

- UN Climate Technology Centre & Network
- The Global Environment Monitoring System for the Ocean and Coasts (GEMS Ocean) Programme



- FAO course on Climate Adaptation and Mitigation in Fisheries and Aquaculture (Result of the ClimeFish project) - <https://elearning.fao.org/course/view.php?id=544>

[Link to other All-Atlantic Joint Pilot Actions, sister projects and future national/international initiatives](#)

In an analysis of response pathways towards climate change effects and risks associated with it, McDonald et al. (2019) pointed out that only proactive pathways as compared to inactive and reactive strategies can lead to a mitigation of impacts in the fields of nature conservation, fisheries and coastal economies and coastal communities. Likewise, proactive response strategies have been suggested as the best tools for combating negative impacts on marine pollution (see 3.2.2) and food security (see 3.2.3) in relation to climate change (Marvin et al., 2013; Komolafe et al., 2014).

Evidently, an AA-TP could significantly promote and augment proactive strategies through promotion and training of respective science tools, reporting of early warning information and reviews of policy strategies attempting to mitigate and combat climate change. For fisheries and aquaculture, guidance on how to develop mitigation strategies can be seen in Pham et al. (2021). Workshops and science symposia for specific and summer schools for more generic goals could be instruments to achieve these goals. For example, basin-scale modelling of risk of coastal erosion, flooding events, heat waves could help focus on impact hotspots and in a jointly organized way assist establishing mitigation measures, given that Zhang et al. (2004) indicated that the rate of sandy beach erosion will be two orders of magnitude greater than the rate of sea-level rise. Toimil et al. (2020) point out that currently no fully satisfactory model for coastal erosion is available, and a screening of the literature shows that while for North Atlantic and Mediterranean regions initial models are available, for the South Atlantic the number of operational models is very low.

3.2.2 Emerging pollutants

Anthropogenic pollution is a main threat to the marine ecosystems. Two main pathways of marine pollution with regards to emerging pollutants can be identified, i.e. eutrophication on the one hand and chemicals of emerging concerns (CECs) and microplastics on the other.

Eutrophication remains the number one challenge in coastal systems and penetrates estuaries and semi-enclosed seas as a result of an overload of nitrogen and phosphate substances causing (harmful) algae blooms and hypoxic and anoxic conditions followed by deep impacts on productivity, species composition and fish mortality.

Contaminants of emerging concern are defined as those substances that are not commonly monitored but have the potential to enter the environment and cause adverse ecological and human health effects (Geissen et al., 2015; Calvo-Fores et al., 2018). Currently, microplastics are probably the most prominent type of emerging pollutants and have turned into a significant threat to the environment (Avio et al., 2017). Plastic contamination of aquatic environments is complex, ranging from macro scale debris like ghost nets,



plastic containers and packaging, to micro and nano-plastics from hygiene and cleaning. All plastic pollution is of terrestrial origin and measures have to start there.

In Europe, the EC funded NORMAN network (<https://www.norman-network.net/>) was established in 2005 as a framework to identify and monitor these xenobiotic substances (Dulio et al., 2018). Since then, more than 700 substances categorized into 20 classes have been identified in the European aquatic environment. In light of their potential impact action is urgently required (Geissen et al., 2015).

An AA-TP could ideally be the first step towards establishing a NORMAN-like survey for the South Atlantic, providing a platform for drafting analytical protocols and sampling standards as well as providing training facilities and providing first means for assessing corresponding impacts. For comparison, NORMAN has organized interlaboratory studies on substances of priority interest in research and has more recently extended these inter-comparison activities to passive sampling, bioassays, and non-target screening methods (Dulio et al., 2018).

The vision for NORMAN encompasses that NORMAN should take an active role in the discussions about chemicals of emerging concern (CECs) in the marine environment involving active support of non-EU Partners in shared marine basins (Dulio et al., 2018), a clear reference to South Atlantic coastal states. All AA-TP activities in this regard should be further aligned to the Ocean Best Practices Network and further contribute to the development and dissemination of analytical protocols and procedures therein (see Pearlman et al., 2019). As such, an AA-TP contribution to this field could be in terms of organizing workshops for technical personnel and scientists, conducting review meetings and help implement international standards into national legislation, and thereby deliver a significant contribution to the goals of UN Decade, Ocean Mission, ongoing work on plastic/marine litter in G20/G7; international ocean governance etc.

3.2.3 Food security

Needs and gaps in capacity development

To ensure food security for a growing world population, without depleting natural resources and harming the marine environment, fisheries and aquaculture must engage in sustainable harvesting and producing practices (quote). This implies to open to new technology advancement, underutilized species and production methods, to lower the losses (as by-catch and post-harvest), considering the whole value chain, guaranteeing food quality from 'farm to fork'. To achieve this goal, the interdisciplinary approach must be applied, not only within the natural sciences, but also including technology development and the socio-economic dimensions.

Enhancing capacities to ensure food security has been one of the guiding principles of EU's maritime policies since 2013 and has been re-iterated in the Belém Statement of 2017, focusing on fisheries, aquaculture and biodiversity.



- Fisheries

Topics related to food security at a regional scale comprise inter alia data collection and education in stock assessment techniques for transboundary marine resources, training in food processing and aquaculture technologies, and development of joint management plans as well as establishing regional fisheries management organizations (RFMOs) capable of planning and conducting research and surveys suitable to support the management goals. Accordingly, capacity development endeavours span a wide range of potential activities, ranging from academic research, technical training at individual and institutional level, seagoing research and land-based processing research and development to institutional build-up and establishing of international legal frameworks.

- Aquaculture

Currently there is no clear overview of what is on offer regarding aquaculture-related training. The offer fragmentation results in repeated work, therefore a common searchable capacity-building platform is needed. Many academic institutions have implemented courses and programmes in aquaculture production and related topics; however, the offer is skewed towards fin fish production focusing on production and fish welfare. When considering aquaculture, we should distinguish between fin-fish aquaculture and low trophic species aquaculture. The two forms of aquaculture face various challenges and gaps in capacity building. Fin-fish aquaculture industry is continually improving its practices to become more sustainable and reduce its carbon footprint, however, the capacity building gaps are still evident when it comes to technical skills required for the daily upkeep of more advanced technologies such as RAS and strengthen the regulatory frameworks concerning the new, and offshore technologies. Furthermore, one of the biggest challenges fed aquaculture faces is the feed's cost and sustainability. Capacity-building should also focus on alternative protein sources and circularity. There is a need for diversification of produced marine species, and it has been concluded that species found at the lower trophic levels have the biggest potential to contribute to increased seafood production in the foreseeable future (SAM, 2017).

https://www.ae-info.org/attach/Acad_Main/Activities/SAPEA/Press%20release%20November%202017/sam_food-from-oceans_report.pdf

Therefore, we must look into underutilized low-trophic species, as well as production methods beyond monoculture, such as polyculture or integrated multi-trophic aquaculture (IMTA).

Aquaculture provides livelihood in many parts of the world, and it is a growing economy in medium-low income areas, integrating and/or substituting fisheries. For this reason, besides the academic offer, a specific approach is needed for segments of the population and areas where the education offer is limited or too expensive; the development of online (often free) courses represent a good opportunity. There is also the need to establish short and dedicated courses on specific topics to target workers that need specialisation and youth/unemployed that would like to enter the job market.



Sustainable aquaculture must consider regional aspects as local species and farming techniques, local environmental challenge and socio-economic structure. Often this knowledge is not included in official courses, but is still a great source of knowledge and inspiration. The possibility to give local internships as well as the organisation of exchanges of students and worker across the Atlantic (East-West and North-South) would globally enrich the knowledge of the sector, providing inspiration and “out-of-the-box” thinking, without falling into the usual practice of “one-solution-fit-all”.

International capacity development activities within the reaches of the WASCAL program for West-Saharan countries or in the BCC show the way ahead, but makes also clear, that a multilateral training platform needs to be established so that these activities can be coordinated and made accessible to more than smaller regional composites. In WASCAL, academic capacity development is conducted in terms of teaching and training. Research subjects range from inland water resources and genetic stock differentiation, assessment modelling, to habitat modelling in relation to populations relevant for nature conservation but also for the prevention of coastal erosion, for instance seagrasses. The BCC has a dedicated multi-annual science and training program, covering aspects of ecosystem-based management with regards to (1) reducing threats to species and habitats, (2) strengthening ability to monitor Ecosystem Health, (3) strengthening the fisheries management in the Benguela region, and (4) identifying, monitoring and manage pollution at hotspot locations. Likewise, for the link between maritime security and food security, the latter shows that food security is not a stand-alone topic but strongly interlinked to other Belém thematic areas.

Examples of institutions dealing with all forms of maintaining food security are ICES in the North Atlantic and PICES in the Pacific and their relevant training programmes.

Target audience for Capacity Development

Capacity Development in Aquaculture and Fisheries must have a long and a medium-short term impact. For the long-term impact, academic courses (undergraduate and graduate) should be developed and include an inter- and transdisciplinary approach. On the medium and short term, the implementation of short courses, internships and apprenticeship would from one side train a more technical work force, on the other side give the opportunity to students and worker to increase their knowledge in specific technologies, production methods or species.

Existing relevant programs for Capacity Development (examples)

Many universities offer dedicated programs or single courses in aquaculture related topics; a good list can be found at the following link <https://www.masterstudies.com/Masters-Degree/Aquaculture-and-Fisheries/>. In addition, International projects funded by EU, as well as international bodies, are encouraged to implement courses in aquaculture related topics, from the overarching Massive Open Online Course (IMPAQT <https://www.open.edu/openlearncreate/course/view.php?id=7116> or AquaVitae in "Sustainable Aquaculture for Low Trophic Species" accessible to the public from spring 2023) covering from production



techniques and best practices, circularity principles and socio-economic assessments, to more specific and technical short term engagements in technologies or sustainable topics (ASTRAL "Women and youth engagement in Aquaculture", Various projects "Aquaculture production under biofloc technology (BFT) system"). It would be extremely beneficial to collect all these initiatives (academic courses and short education and training) under one “umbrella” or at least keeping trace in an international database, offering courses and training ranging from very broad and long term to short and specific, nonetheless all focused to improve the future availability of sustainable food from aquatic resources. A common space where such capacity building is listed and coordinated would be beneficial also for future projects, even at the proposal stage, able to quickly screen what, where and how CB is already offered and link to it, or to propose courses and training where gap of knowledge is identified, fostering collaborations, and reducing duplication.

Suitable instruments for Capacity Development

AA-TP can play a strong strategic role by serving as information hub, brokering between customers and providers, and identifying gaps and needs of countries and stimulate new approaches in training methods and disciplines. A wide portfolio of instruments is available for this purpose, ranging from academic courses on aquaculture production and fisheries management to workshops and land-based training introducing new techniques for processing and conservation, regular resource assessment meetings and data analysis. Emphasis should be placed on co-operation with the industry, and short, technical and specialized courses should be offered to people working in fisheries and aquaculture. With regards to university students there should be emphasis on practical skills, which could be achieved through internships and exchange programs placing the students with industry partners.

Link to other AANChOR work packages, sister projects and future national/international initiatives

The Food Security thematic area is linked to all the thematic areas in the AANChOR Project, as well as the Joint Pilot Actions. Within the Blue Economy call of HORIZON 2020, AANChOR sister projects such as TRIATLAS or iAtlantic have been established, which will enable baselines for sustainable management of marine living resources. The projects investigate structures, productivity and carrying capacity of ecosystems in the Atlantic. By comparing the structure and processes in different Atlantic systems, new insights into the carrying capacity, productivity and stresses of these systems can be gained, which is only possible within the framework of Atlantic-wide cooperation. Here, AA-TP plays an essential role for the exchange of knowledge to better link scientific results.

The projects awarded in the subtopic “New value chain for aquaculture”, namely AquaVitae and ASTRAL are dedicated to the development of sustainable aquaculture in the Atlantic area, enhancing the exploitation of low-trophic species as monoculture and their combination in integrated multi-trophic aquaculture (IMTA) production systems, both open (cages in the sea) and closed (on-land systems, recirculating or flow-through).



3.2.4 Observation technology

The future of ocean observation will to some degree rely on automated in-situ systems and satellite imagery as well as citizen science projects. This will include low-cost technologies (connect with AA-MARINET) to be distributed and applied around the Atlantic to enable less powerful institutes to contribute significantly to monitoring programmes.

To develop a strategic regional approach to the application of new technologies, an AA-TP appears to be well suited to facilitate such a process. Within the Global Ocean Observing System (GOOS), led by the Intergovernmental Oceanographic Commission (IOC), plans are developed to review under Special Objective 8 (New Technology) long term plans at regional scale with regards to availability of these technologies (see 3.2.5).

Citizen science projects (CSPs) depend on WiFi exchange of information collected by people by means of cell phones and other hand-held devices, and specific apps guarantee tailor-made solutions for data collection and reporting. A self-reporting application of artisanal fisheries has for example been developed in the H2020 TRIATLAS project. However, to become a powerful instrument, CSPs need to be organized at a scale relevant to the processes monitored – again, AA-TP could be an integrative player and supporter in such a network. Workshops and land-based training in cooperation with AA-MARINET are needed and can be used to develop and adopt low-cost technologies for local needs.

3.2.5 Ocean observation

Needs and gaps in capacity development

Observational oceanography is a global science with significant local and regional applications. Greater human capacity is needed to observe and interpret ocean processes in regional contexts to meet regional needs (Miloslavich et al., 2019). Yet many coastal countries, especially developing countries, still have limited capacity in terms of the number of practicing oceanographers, the infrastructure to make observations and manage the data, and the means to apply the information. Changing this matter of fact is required to reach the UN Sustainable Development Goal 14 “Life Below Water”, which in particular recommends to increase scientific knowledge, develop research capacity and transfer marine technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries.

The Cabo Verde Declaration on Ocean Observations, signed in 2019 by directors of around 40 major oceanographic institutions, warns that the expected growth towards the full deployment of the Global Ocean Observing System (GOOS), a programme led by the Intergovernmental Oceanographic Commission (IOC) that is part of UNESCO, has slowed down in the last decade, and identifies four major gaps: (1) the capacity for conducting ocean observations is lacking in many parts of the world, particularly in developing



countries; (2) several critical sustained ocean observation activities are supported by short-term, research project funding with uncertain sustainability; (3) although technological developments are taking place for biological and biogeochemical observations, their high cost makes these technologies inaccessible to developing countries and currently prohibits their routine and large-scale deployment; and (4) the resources available for international coordination are currently insufficient for the scale of the work that is required. It concludes on the need to prioritise ocean observations in developing countries, through capacity development.

Also, the current GOOS implementation programme (2021 Tenth GOOS SC meeting, part 1) identifies under Special Objective 7 (SO7 Data work) the need to connect the many single national actions under a more strategic approach, under SO9 (Capacity Development) the need to review the number of long term plans, single elements, and address the gap between impact and Roadmap outcomes, and under SO8 (New Technology) to review long term plans at regional scale with regards to availability of these technologies (see 3.2.4).

Target audience for Capacity Development

Capacity Development in Ocean observing should, for long-term impacts, primarily target young ocean scientists from developing countries. This includes undergraduate or graduate students with career perspectives in their countries or early career researchers who could more directly apply newly acquired skills.

Existing relevant programs for Capacity Development (examples)

The Partnership for Observation of the Global Oceans (POGO) runs a range of programs aimed to train young scientists from developing countries in oceanographic observation methods and techniques. It covers training of different lengths (few days to ten-months), organized in either developing or developed countries. While it has worldwide objectives, most of its 55-member institutions are actually located around the Atlantic, with new members from West Africa having joined in the last few years.

While Capacity Development is not its main focus, the AtlantOS program supports the Atlantic basin scale implementation of the GOOS. It aims at coordinating basin-scale activities for better modelling, monitoring, and forecasting products that benefit societal needs. AtlantOS was initially a H2020 project that lives on as a longer-term program.

Suitable instruments for Capacity Development

An AA-TP should help foster monitoring programmes on a national and international scale. The existing EU H2020 project AtlantOS is undertaking steps towards optimising and enhancing the Integrated Atlantic Ocean Observing Systems, however, of the 62 partners of the project consortium, but only 2 are from the southern hemisphere.



As such, an AA-TP is the ideal link between the local and the regional scale and could significantly contribute to the goals of the Global Ocean Observing System (GOOS) in order to also provide means for standardization and QC (see All-Atlantic Joint Pilot actions AA-DATA2030 and AA-MARINET), an Intergovernmental Oceanographic Commission (IOC)-led programme. The IOC is part of UNESCO. The current GOOS implementation programme (2021 Tenth GOOS SC meeting, part 1) identifies under Special Objective 7 (SO7 Data work) the need to connect the many single national actions under a more strategic approach, under SO9 (Capacity Development) the need to review the number of long term plans, single elements, and address the gap between impact and Roadmap outcomes, and under SO8 (New Technology) to review long term plans at regional scale with regards to availability of these technologies (see 3.2.4). GOOS also aims at assessing roles, responsibilities and interplay between regional bodies, including GRAs, GOOS Projects (AtlantOS/TPOS2020), and national bodies such as GOOS National Focal Points/or committees, and major national systems, plus IOC, Argo Focal Points. For the South Atlantic including West Africa, GOOS has 8 national focal points as compared to 2 participants in the AtlantOS programme, indicating a clear need for establishing the AA-TP as linking network structure.

Ship-based training is the standard way to develop capacity in ocean observation. This can be done by giving young researchers of developing countries the opportunity to take part in a scientific cruise and learn first-hand from a scientific crew. Floating universities, where specific activities are offered onboard to a batch of supervised trainees allow to reach a larger audience. Development, application and maintenance of New Technologies for continuous monitoring of automated physical, biogeochemical and biological parameters should make an essential part in the training programmes. These activities should also, beyond data collection, educate trainees on the best practices for data quality control and the FAIR open data principles.

[Link to other AANChOR work packages, sister projects and future national/international initiatives](#)

These activities are to be strongly linked to training workshops of technical personnel (JPA Technical training), development and broadcast of low-cost instruments (AA-MARINET), and the Belém Statement thematic area coastal observation, and further activities from other projects.

The TRIATLAS project's CANEMS (Cross-Atlantic Network of Excellence in Marine Science) Capacity Development component promote hands on training in all fields of marine sciences on board of research vessels involved in TRIATLAS.

3.2.6 Polar Research

Understanding the impacts of Southern Ocean circulation on the performance of the sub Antarctic and subtropical frontal systems and the entrainment of cold mixed water on the Patagonian Shelf and the Malvinas confluence as well as into the Benguela Current underpin the close linkage of South Atlantic and Southern Ocean ecosystems. The importance of the Southern Ocean influence and the need to conduct research in this area is already acknowledged in the national Antarctic Programmes of for instance Brazil



(Programa Antártico Brasileiro; PROANTAR), Argentina (conducted by Instituto Antartico Argentino), and South Africa (South African National Antarctic Programme, SANAP). An AA-TP could further help bridging between these programmes. Tools and instruments could be summer schools and post-graduate research schools, for which examples are available in the Arctic region (e.g. <https://arice-h2020.eu/training/mosaic-school-2019/>, <https://uit.no/research/changingarctic>)

Moreover, coordinating observation efforts with those under the southern ocean observing system (SOOS) umbrella should generate strong synergies, especially in processes related to teleconnections between high and low latitudes.

Needs and gaps in capacity development

- The more integrative view (in terms of areas of expertise and connection from regional to global) of the polar processes in a climate-driven scenario (see Henley et al. 2020, *Frontiers*; <https://doi.org/10.3389/fmars.2020.00581>. Other interesting work in Special Issue: <https://www.frontiersin.org/research-topics/10606/marine-ecosystem-assessment-for-the-southern-ocean-meeting-the-challenge-for-conserving-earth-ecosys#articles>)
- Improve observation design, coverage and efficiency. (see <https://www.soos.ag/activities/cwg>)

Target audience for Capacity Development

- Early Career Scientists and PhD/MSc. Students

Existing relevant programs for Capacity Development (examples)

- SCAR and SCOR fellowships (<https://www.scar.org/awards/fellowships/overview/>)
- GOA-ON Pier to Peer program – <http://www.goa-on.org/pier2peer/pier2peer.php>
- SOLAS Summer School – <https://www.solas-int.org/392.html>
- BRICS projects on Polar Oceans – <http://brics-sti.org/>
- Marie Skłodowska Curie Action (MSCA) RISE funded project CoastCarb for Research and Innovation Staff exchange: <https://coastcarb.eu>

Suitable instruments/measures for Capacity Development

- Use of the possibilities of SCAR/SCOR grants to promote lectures by visitors, workshops and training in polar research and its connection with the South Atlantic in the most varied themes.
- Use of established global networks (SOOS, GOA-ON) to promote shared activities (lectures, seminars, actions...)



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- Promote greater interaction with programs that develop Summer Schools (SOLAS) for themes within the Antarctic/Arctic vs Atlantic connection theme.
- Promote staff exchange (see MSCA RISE projects)
- Facilitate floating-universities cooperation between BRICS projects and Antarctic programmes.

3.3 Capacity Development Instruments

Ideally, capacity development activities should be organized and provided under an institutional umbrella with clearly defined contributions of the different partner states. The All-Atlantic Training Platform (AA-TP) could be such a format suitable to reach the desired overarching goals, providing tailor-made solutions for the different tasks. The following section provides an outline of the mechanisms/instruments following the 6 thematic areas given in the Belém Statement. Each of the instruments is supposed to encompass both elements of academic and technical training.

In terms of tailor-made solutions, the AA-TP could play a significant role in facilitating partnerships between universities and research institutions, given that in the applied sector much research work is done by federal agencies etc. In the case of aquaculture, private-public partnerships could be enhanced in order to train personnel under production conditions.

3.3.1 Floating Universities

Where ship time is available, Floating Universities allow dedicated inter-disciplinary training opportunities covering many aspects of sea-going research at the same time. This is an ideal approach to demonstrate to students the complexity of inter- and multidisciplinary research, with many disciplines depending on one another in order to achieve results. Examples of Floating Universities are the SEAmester program of South Africa (<https://www.sanap.ac.za/south-africas-class-afloat-seamester>), the Brazilian Floating Laboratories Program (<https://cienciasdomarbrasil.furg.br/documentos/relatorios-tecnicos>), the WASCAL Floating University of 2021 , Cabo Verde (<https://www.fona.de/de/akademische-ausbildung-auf-hoher-see-start-erster-wascal-floating-university>), the activities combined under the umbrella of the recently created All-Atlantic floating university network @SeaNetwork (<https://www.allatlantic2021.eu/a/all-atlantic-floating-university-network>), in the scope of AA-TP, and the numerous training cruises within international (POGO) and national (SPACES) programs.

Additionally, European funded projects like Eurofleets, EurofleetsII and Eurofleets+ have developed a Floating University Program providing both Multidisciplinary and specialist hands on training opportunities. <https://www.eurofleets.eu/education/floating-universities/>





Based on experience gained since 2009 A Research Vessel Training Tool Kit for Course Directors has been developed (<https://zenodo.org/record/6418304#.YpomOKjMLDc>) providing tools for course directors to organize Floating University courses by:

- defining common procedures and templates, to ensure a standardised approach to course development
- providing information on how to produce module descriptors, learning outcomes, organize pre- and post-cruise workshops
- developing digital learning resources
- identifying on-board social media and outreach activities
- supporting the courses organizers by providing a suite of e-modules

This guide is aimed to help course organizers to plan and conduct the course by providing information on the main steps and stages in sequence from the designing a training course, to evaluation for feedback into further development.

3.3.2 Land-based training

High-end laboratory analysis techniques and computer-intensive data mining and modelling techniques require specific opportunities to be trained. This can be best achieved providing access to respective facilities where these means are available and accessible. One of the main areas for land-based training lies in the field of ocean technology, co-designing new instruments in specialized laboratories.

3.3.3 Summer Schools

Summer Schools provide an extra level of academic training for and help establish networks between early career scientists at an international level. Free of the need and pressure to obtain credit points as for their normal studies, students can approach certain topics also from a perhaps uncommon side and with the help of a combination of lecturers and instructors that under normal conditions do not teach together at the same time and place.

3.3.4 Technical training

Technical training is partially related to land-based training, but may also include seagoing training specifically for technical personnel in order to train handling and maintaining equipment and conducting analyses under rough conditions.

Examples of existing Technical Training programmes are Eurofleets+ dedicated thematic “Blue Skills Labs” or via the Eurofleets+ Marine Internship Program which offers seagoing placements for students or technicians of marine related sciences and technologies on the Eurofleets+ partner research vessels, utilising spare berths.



3.3.5 Train the trainers

An essential element of the training measures must be to anchor the knowledge imparted in workshops and summer schools in the regions in the long term. For this purpose, it is necessary to train multipliers who can effectively disseminate the knowledge gained and thus create an effective Capacity Development system in the regions. "Train the trainers" as a training goal and strategy! Here, too, a central coordinating platform such as the AA-TP is necessary for effective implementation.

3.3.6 Workshops and Webinars

Workshops, particularly if organized as part of research and innovation projects/activities, are suitable instruments to update knowledge of groups of pre-informed professionals. New developments in assessment techniques and software, preparation of required data for a certain analysis procedure and in the case of new policy requirements, conducting gap analysis to define the needs for future management and governance are typical subjects for workshops. Workshops bring together multiple stakeholders and countries all with a certain interest in the.



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4. Secretariat

Structures and their interactions will be supported by a Secretariat and logistic support unit.

Terms of reference for the Secretariat:

- Organises AA-TP communication
- Maintains AA-TP data bank on training activities
- Acts as hub for information between training providers and users
- Organises meetings of board and steering groups
- Maintains links to other All-Atlantic Joint Pilot Actions, EU funded H2020/ Horizon Europe/or nationally funded projects and enlarge the network with links to other similar initiatives
- Organises own AA-TP pilot training courses on selected topics and formats if necessary
- Supports third party and performs own fund raising for Capacity Development measures from international and national organisations
- Compiles reports to member countries and stakeholders
- Provides logistic support for the Capacity Development activities
- Communicates results



5. Time scales / time line and cross-links

While certain activities are further carried out under the umbrella of EU funded H2020/ Horizon Europe/or nationally and internationally funded projects and therefore have a limited life-time, a mid- to long-term perspective is needed. The following list exemplifies some short-term activities:

- Floating universities: WASCAL floating university 2023, RV Polarstern, the creation of an All-Atlantic Floating University Network (@SeaNetwork)
- Technical training: Pilot course performed in December 2022 in Cape Town on FRS Algoa
- Academic training: e.g. TRIATLAS Summer School Recife, Brazil, October 2022

Therefore, it is of utmost importance to start establishing the platform itself to have an institutional backbone to build up the AA-TP framework. For secretariat issues, a 1st workshop should be held in 2023 to develop the long-term structure.



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6. Participants that expressed their interest working in the Steering groups and on training instruments and/or contributed to this document

BS thematic area SG	
Climate and Ecosystem	Isabelle Ansorge, Naima Hamoumi, Mary Gasalla
Emerging pollutants	Peter Croot, Ngozi Oguguah
Food security	Heino Fock, Elisa Ravagnan (ASTRAL), Mary Gasalla, Adrianna Kochanska
Observation technology	Doug Wallace
Ocean observation	Gael Alory, Peter Croot, Debany F. Batista
Polar Research	Isabelle Ansorge
Training instruments	
Summer Schools	Naima Hamoumi, Ziya Ince, Marcus Polette
Workshops	Naima Hamoumi, Ziya Ince, Heino Fock, Marcus Polette
Train the trainers	
Technical training	
Land-based training	
Floating Universities	Luis Pinheiro, Danilo Calazans, Ziya Ince
	Alberto Piola,, Niamh Flavin
Instruments	Johann Augustyn, Lica Krug (POGO)
Data management	Antonio Fetter
MOOCs	Phil James, Adrianna Kochanska

Table 1: Participants that expressed their interest working in the Steering groups and on training instruments and/or contributed to this document:



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7. Draft Budget

For the implementation of measures beyond the AANChOR time range, the AA-TP needs a basic funding of 1000k€ per year for coordination and to realize 10 activities. Further funding is to be raised through the cooperation partners. National and EU projects and programmes are applied for and used.

	FINANCIAL MECHANISMS	FUNDING AMOUNTS	POLITICAL ASPECTS
Implementation of a secretariat with a logistics support unit	Project funded	300,000€ p.a.	2 scientists, 2 technical assistants, infrastructure including a pool of equipment for the courses, running costs
Annual Management Committee meetings	To be reimbursed to participants, organized via secretariat	50,000€ p.a.	Composed by representatives from EC, countries, sMsP: total 10 members. Further institutions intended to support AA-TP should be independent of AA-TP funding
Support of Capacity Development Steering group	To be reimbursed to participants	50,000 € p.a.	Members of thematic-Steering Groups meet on irregular basis on; national or regional level, normally online
10 activities (summer school, workshops, shipboard- and technical training etc.) p.a. organized through secretariat	Through secretariat	550,000 € p.a.	55T€ per activity including travel for participants and part of lecturers (local lecturers should be identified and used), infrastructure and accommodation
Adaptation and hosting of suitable courses and training modules into an online environment, including the exploring the use of virtual reality for selected training activities		50,000 € p.a.	Suitable topics/ courses will be adapted to an online training environment, increasing the target audience, including the possibility of translation into relevant languages.
Total		1,000,000 € p.a.	

Table 2: Draft Budget for the AA-TP



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