



The sea as science: ocean research institutions and strategies in Portugal in the twentieth century (from the First Republic to democracy)

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Abstract

Historical perspective has revealed the many aspects of Portugal's interest in the sea, evident in a series of initiatives and entities throughout the twentieth century. From the beginning of the century until the 1974 Revolution, the genesis of organizations devoted to the scientific study of the sea is analyzed, observing their specific missions in the context of the formulation of science policy, and more specifically "ocean policies." The Portuguese valued knowledge of the sea due to their maritime vocation, coastal life and geographic position. Traversing different historical and political contexts and development cycles, the assumptions and political implications that accentuate the strategic dimension of science policy, visible in the geopolitical affirmation of oceanography, are studied.

Keywords: scientific institutions; science policies; oceanography; ocean; Portugal.

This article studies the genesis of the organizations devoted to the scientific investigation of the sea that emerged in Portugal between the beginning of the twentieth century and the Revolution of 1974 (which began a distinctly different cycle in relation to this subject), reflecting on how they were related, evolved and interacted within the historical context of the country, both with respect to their specific fields and with respect to the formulation of science policies and, more concretely, the definition of “ocean policies.” We wish to understand how these organizations were structured in accordance with national and international science agendas, their possible centralizing and/or regulating role and to what extent they reflected the concerns that arose – especially after World War II and the affirmation of the role of the State – with respect to identifying and evaluating maritime resources, their conservation and environmental protection, together with the increasing presence of defense-driven technological innovations and improvements, motivated by foreign policy objectives and international cooperation after World War II.

This reflection must take into consideration the context of accelerated economic growth that characterized the beginning of the twentieth century, due to the strong and growing industrialization of the prior century, in which science and technology were already strongly associated with economic development. This alliance, confirmed and reinforced between the wars, would confirm the trend of progressive recognition of science for its social value and for its associated political, economic and cultural dimensions. A new chapter in the history of the organization of science soon opened, with accentuated scientific internationalism, a reaction to the growing demands that appeared in the period between the wars and especially in the wake of the developments during World War II and the Cold War, a cycle that was deeply conditioned – beyond the economic dynamic that characterized the period – by the relations between the political powers defined on a global scale.

With respect to the Portuguese case and the question of the sea, it is important to note, first of all, how the vision was structured – whether in terms of scientific thinking or political power – in the field of ocean studies and how this area was related to other supporting scientific and technological fields since the beginning of the century. It is also interesting, for this general, diachronic view of the genesis of the research organizations in this field, to characterize the progressive definition of strategic interests, along with basic research objectives.

Given this path, this article will follow the transformations in scientific research in general, and strategic policies related to the sea in particular. It will attempt to understand them both in the international context of cooperation, associated with the redefinition of strategies, and in the national context, in which there was increasing debate on the need to support scientific research, its applicability to and relationship with industry, given the change driven by the international climate, but limited by the backwardness of the Portuguese economy and political framework.

Interest in and ability to globally analyze ocean-related issues became apparent in the final phase of the conjuncture being studied in the context of institutions associated with the Navy, based on the strategy promoted by the National Board on Scientific and Technological Research (Junta Nacional de Investigação Científica e Tecnológica, JNICT), created in 1967, and through involvement in international institutions. The persistence

of the deficit in training and scientifically trained personnel was an essential problem throughout the entire period.

Oceanography would play a fundamental role in “national science policy” at the end of the 1960s, as a strategy to foster Portuguese scientific and even economic growth. It positioned the country, whether through mere prestige or through actual technical-scientific progress, in an area which, it was felt, was inherent to the Portuguese vocation, reinforced and legitimized by the historical and maritime vocation of the Portuguese nation.

Portugal is in an exceptional position to participate in ocean-related programs, not for historical reasons, but rather due to the length of its coast and its geographical position (European continent, passage between the Central Atlantic and the Mediterranean, Azores, Madeira, Cape Verde, etc.) (JNICT, 4 jul. 1969, p.7).¹

Genesis of marine biology studies in Portugal

Oceanography, as an interdisciplinary area, already leading towards a scientific formulation of “ocean policy,” has a strong tradition in Portugal, intertwined with the history of cartography and meteorology, with problems like safe navigation and the need to investigate the depths of the ocean. It benefitted, above all, from the charisma and scientific passion of various men, many of them following military, technical-scientific careers, as the case of Afonso Chaves – one of many – illustrates (Aguilar et al., 2001, p.29).²

The dedication and involvement of scientific organizations and the government in areas such as fishing and fish farming became visible in the second half of the nineteenth century. The effort resulted mainly from the perception of the value and importance of oceanographic and marine biology research in themselves and the stimulus of the progressive industrialization of Portuguese fishing – namely with the proliferation of canning factories. (Garrido, 2005, p.2). The interest coincided with the start of the Portuguese Regeneration, and political commitment, especially through the unavoidable actions of Fontes Pereira de Melo, who implemented a material improvement program accompanied by a set of ministerial and organizational reforms to improve technological progress and economic development.

During this period, given the progressive recognition of fishing as an industry, State governance of sea-related issues, their respective technical regulation and stipulation of rights related to the capture of specific species was performed by the Ministry of the Navy (Ministério da Marinha) through subordination of tasks to fishing agencies, including fishing industry inspections, the promotion of hydrographic campaigns and encouragement for the establishment of “maritime laboratories.”

The Fishing Commission (Comissão de Pescarias) of the Ministry of the Navy has played a significant role in regulating legal rights related to fishing since the middle of the nineteenth century (Garrido, 2005, p.2). At the end of the nineteenth century, however, the first crisis related to ocean resources in the industrial age arose, to which British legislation at the start of the twentieth century attempted to respond, reconciling the pressures from the owners of vessels and traders with the position of the naturalists. This “crisis” in the North Sea led to the foundation of the first intergovernmental organizations for managing fishing and evaluating

maritime resources such as, among the most significant, the International Council for the Exploration of the Sea in 1902.

In Portugal, the institutional framework of scientific research in the field of marine biology and the fostering of its development began with the construction of the Vasco da Gama Aquarium (Aquário Vasco da Gama), in 1898, inaugurated on the occasion of the four hundred year anniversary of the discovery of the sea route to India. The Aquarium was founded for “public use,” and obtained special support a few years later from the Portuguese Society for the Natural Sciences (Sociedade Portuguesa de Ciências Naturais)³ (Séance..., 1907), whose honorary president was King Carlos.

The purpose of the Vasco da Gama Aquarium was “recreation” and the “education of the people,” rather than scientific research, although its use for this purpose had been planned and it did have some structural facilities to support marine biology research. The need to build a center to serve the multiple, complex needs of research would be affirmed following the 15th International Conference on Medicine, held in Lisbon in April, 1906 (Costa, 1918, p.1). Thus a Marine Biology Station was founded, along with a “fostering commission” that included a few renowned naturalists.

The opening of the Vasco da Gama Aquarium in Dafundo, near Lisbon, had facilities that could be used for the desired station. In 1909, the Portuguese Society for the Natural Sciences took over the management of the Vasco da Gama Aquarium, for a period of five years, under the supervision of the Directorate-General of the Navy, with the objective of developing “scientific research related to marine and fluvial fauna and fish farming, promoting the dissemination of knowledge on these subjects” (Costa, 1918, p.4).

In the context of the higher education reform introduced by the First Republic in 1911, it seemed unquestionable that the future Marine Biology Station should be placed under the aegis of the University, in order to transition supervision from the Navy to the Ministry of Public Education. In 1914, a draft law was prepared in order to annex the Station to the University of Lisbon (Universidade de Lisboa), but it was never discussed in parliament, as a proposal to create a Central Fishing Commission in the Aquarium overlapped it. It also established a Marine Biology Station (Estação de Biologia Marítima, EBM), in which the University of Lisbon and the Portuguese Society for the Natural Sciences were represented, in addition to the Fishing Commission (Portugal, 27 abr. 1914, p.37). The solution arrived at on May 6, 1915, was to reconcile the two previous proposals, with the future Station under the Directorate-General of the Navy, but with technical and scientific management by the Portuguese Society for the Natural Sciences (Costa, 1918, p.12-14).

The Marine Biology Station’s mission was carried out by the physician and Society member Augusto Pires Celestino da Costa,⁴ with contributions from Alfredo Magalhães Ramalho,⁵ who joined the Aquarium’s scientific team as a naturalist and whose work would influence the future of the EBM.

Under Celestino da Costa’s direction, there was no question but that the Station’s “principal objective” was “scientific research” (Costa, 1918, p.23-24). He believed that the biology stations should have a mission oriented towards teaching, scientific dissemination and the training of “men who make their living from sea and river industries.” Moreover, the “usefulness of the Biology Stations for industrial ends” appeared to be evident, whether

through the guidance that could arise from scientific research in the solution of fishing problems and species cultivation, or through the support of species cultivation to “restock fresh and salt waters” (p.24-25). However, the relationship between the EBM and industry seemed unlikely, given the difficulty in obtaining the resources and facilities needed to provide effective responses in this domain (p.30). However, the Station needed the autonomy of a “scientific establishment,” which in actuality only became true in 1951, and, even more difficult to obtain, personnel with university training to carry out the Station’s scientific work.

The process of establishing the EBM faced many obstacles and difficulties, including the impact of World War I, until, finally, decree n.5615 of May 10, 1919, formalized the transformation of the Vasco da Gama Aquarium into a marine biology station.

Thus, in the emerging post-war international scenario, in a context that led to Portugal’s joining the International Council for the Exploration of the Sea (ICES) and, following the stimulus of the visit of Prince Albert of Monaco (namely the growing commitment of the Ministry of the Navy) (Costa, 1922), a new cycle of “ocean studies” began. The renamed Vasco da Gama Aquarium-EBM was then established as a “technical and scientific institution,” remaining under the Ministry of the Navy (Directorate-General) (Portugal, 10 maio 1919). The directive included sections devoted to specialized courses in biology and oceanography, among other areas, in addition to courses “on the art of fishing exclusively for fishermen” (p.954). An oceanographic Commission was added to the Board of Directors, in order to “promote the development” of the Station (p.955).

The early 1920s marked the beginning of a relationship with the Hydrographic Mission (Missão Hidrográfica) of the Ministry of the Navy, namely through scientific monitoring of the missions carried out and the performance of studies on some species, namely on the local characteristics of sardines and the reproduction of octopuses and flounders. Among the studies carried out, as in almost everything related to research on the sea, the constant presence of Magalhães Ramalho stands out. He defended, among other aspects, the importance of marine biology and physical oceanography in supporting the fishing industry and the need to ensure and promote relationships between scientists, fishermen and industry (Ramalho, 1927, p.5-7).

It was at about the same time, following the reinforcement of the need to promote marine zoology studies in a university context, specifically focusing on teaching, that stations were annexed to the scientific colleges of Lisbon and Oporto. In Oporto, the Institute for the Scientific Study of Zoology (Instituto de Investigação Científica de Zoologia) (Portugal, 31 mar. 1921) was founded under the direction of Augusto Nobre, followed by the Marine Zoology Station (Nobre, 1946, p.14). In Lisbon, the Experimental Marine Zoological Station (Estação Zoológica Marítima Experimental) of the Bocage Museum (Museu Bocage) of the Lisbon Faculty of Sciences (Faculdade de Ciências de Lisboa), was established and run by the Museum’s director, Artur Ricardo Jorge.

Training and research

In January 1929, during the military dictatorship (which, in May 1926, had overthrown the First Republic), the Board of National Education (Junta de Educação Nacional, JEN) was

established (Portugal, 16 jan. 1929). It was the first institution that emerged in Portugal with the specific mission to promote and support scientific organization,⁶ and its foundation and management was ably carried out by Celestino da Costa. One of the JEN's essential missions was to grant scholarships and grants for research in Portugal and abroad. In the field of marine biology, up until World War II, support was given to only two researchers, Magalhães Ramalho (between 1931 and 1934) and Alberto Nunes Aboim (between 1938 and 1941) and to the Institute of Zoology. In 1923, Magalhães Ramalho began to monitor the hydrographic missions carried out by the Ministry of the Navy, as technical director, aboard the ship *Cinco de Outubro*. His objective was "general and systematic study of the oceanographic conditions along the coast of Portugal" (Aguilar et al., 2001, p.154), continuing the missions that had begun aboard the *Albacora*⁷ with studies on physical oceanography, marine biology and fishing.

However, in 1936, as part of the *Estado Novo* reforms, the Ministry of Public Education was transformed into the Ministry of National Education (Ministério da Educação Nacional), and the JEN was renamed the Institute for Refined Culture (IAC), and became the seventh department of the Board of National Education, with obvious loss of autonomy.

After World War II, a new cycle began, which in the field of the history of science and technology would be highlighted by the explicit, massive recourse to scientific research, marking the transition from "little science" to "big science," involving some resizing of the role of science (Price, 1963). At various levels, the European Recovery Program, commonly known as the Marshall Plan, was an important driver or logical reference for technology, productivity and even science in Western Europe during the following decade, especially through one of its most important and long-lasting programs, the Technical and Productivity Assistance Program.⁸

As for Portugal, the *Estado Novo*, although resisting and with distaste, could not afford to stay on the sidelines of the international cooperation process and the organizations that were created. It immediately benefitted from the Marshall Plan and the Technical Assistance and Productivity Program, and took part in the Organization for European Economic Cooperation (OECD) (with particularly active participation in the sub-committee on Fisheries), the European Payments Union and the European Productivity Agency.⁹ Portugal's participation, although understood by Oliveira Salazar, the head of the government, as a "necessary evil," introduced specific cooperation frameworks and resulted in significant effects in terms of scientific research (Rollo, 2004), namely in the scientific study of the ocean (Garrido, 2005, p.1).

The framework was actually favorable, given the cycle of rapid growth of the Portuguese fishing industry from the eve of the War till the late 1950s – an estimated increase of approximately 83% (Garrido, 2005, p.5). This explosive growth, which evidently was partially due to the impact of World War II on the Portuguese economy, was mainly a result of increased cod fishing (a production growth of 472% between 1938 and 1954-1958). The intensification of the fishing industry would eventually require the definition of specific lines of cooperation in the protection and conservation of biodiversity, in the context of a political debate on the defense of its territorial waters, in which Portugal participated actively. The national strategy would combine intergovernmental dynamics associated with the management and

exploitation of marine resources, especially when linked to the national fishing industry, with active representation in international organizations and conferences related to marine biology and the law of the sea (Garrido, 2005, p.6-8).

In the early 1950s, the focus on greater depth and further specialization in marine biology research was marked by a number of initiatives that resulted in the reform of existing and establishment of new organizations – always under the Ministry of the Navy – stimulated by the context of cooperation. Some which stand out include the transformation of the EBM into the Institute of Marine Biology and the establishment of the Bureau for Fishing Research (Gabinete de Estudos das Pescas) (Portugal, 9 feb. 1952), created in 1952 with funds from the Marshall Plan.

With respect to participation in the US Technical and Productivity Assistance Program, a project approved on April 14, 1950, was approved to study sardine fishing techniques along the Pacific coast, biology research methods in this field and the method for establishing a correlation between biology studies and conservation of this type of fish (Rollo, 2007, p.405 e s.). The project involved sending two Portuguese specialists, Alfredo Magalhães Ramalho and José Mouzinho de Figueiredo, on a mission to study fishing and the US fishing industry and interact with the California Cooperative Sardine Research Program.

A few months after the completion of this mission, the EBM was separated from the Vasco da Gama Aquarium, and its name changed to the Institute of Marine Biology (IBM) (Portugal, 5 dez. 1950). It was placed directly under the Directorate-General of the Navy and was directed by Alfredo Magalhães Ramalho.

These modifications, however, were part of a much larger context at the start of the 1950s, related to a change in perception with respect to the role of science echoing in the broad debate on scientific research in Portugal.

It was in this context that the Center for the Study of Biological Oceanography (Centro de Estudos de Oceanografia Biológica) was founded. This field was considered crucial in the face of the progressive application of scientific research in the broader context of Portugal's exploitation and rationalization of its marine resources, as the coastline was a very significant part of economic activity; The IAC's management addressed this question fully, adding to it the importance of discovering the richness of the marine resources of Portugal's colonies (IAC, 31 dez. 1956a).

The Center for the Study of Biological Oceanography was founded in 1956 (IAC, 1956b) as part of the Guia Marine Laboratory (Laboratório Marítimo da Guia) of the Lisbon School of Sciences (IAC, 31 dez. 1956a), with the fundamental purpose of training researchers who would then constitute "a pool for recruitment by existing specialized organizations;" moreover, it sought to address the needs of research that had not been contemplated by the directives of other organizations (IAC, 12 fev. 1957). In reality, the IBM, whose basic scientific work was focused on fisheries, was struggling, especially since it became autonomous, with a chronic difficulty in recruitment and training of specialized personnel, a situation that only began to be solved in 1960, with the enlargement of its staff (Portugal, 18 abr. 1960; 15 fev. 1961).

The ocean as the focus of research in the “big science” era

The years following World War II were characterized by a global, geopolitical and organizational change of the world order involving, among many other aspects, the affirmation of international cooperation at various levels and the appearance of many international organizations, including, of course, the fields of science and technology and which was reflected in various ways in the development of national science policies and practices (Miller, 2006, p.133).

The international science agenda, significantly influenced by the historical context of the Cold War, would be largely dominated by the nuclear issue, the arms race and the conquest of space. However, as predicted by one of the key protagonists of the politics and organization of the Portuguese scientific system, Francisco de Paula Leite Pinto,¹⁰ over time two new fields in the arena of international science would assert themselves, oceanography on the one hand, and “the study of the environment and its pollution,” on the other.

Certainly, as an interdisciplinary field, oceanography would not only benefit from the implications of and interdisciplinary relationships with other domains, such as nuclear energy or ecology, but would also intersect with environmental issues, particularly in international panels (Hamblin, 2002, 2008).

Interest in oceanography thus grew significantly due to the boost from the post-War international context. Often equated with the “atmosphere-ocean interaction” problem, the subject was politically classified as “very important.” In geopolitical terms, oceanography was part of the spirit of scientific internationalism after World War II, despite being pervaded by a permanent tension between civil and military objectives, aligned with the thesis that saw international science as a “linkage policy” (Flippen, 2008, p.615), as a detente link between nations, capable of safeguarding freedom, cohesion between allies (Krige, 2003, p.904; Hamblin, 2000) and even promote Portugal’s scientific growth and economic development.

Portugal, meanwhile, for the same reasons that inspired it to join the ICES in 1922, asserted its interest in participating in the major international projects that went forward in the 1950s and 1960s within three main organizations: the United Nations (UN), the European Economic Community (EEC) and the North Atlantic Treaty Organization (NATO). Cooperation with the European Communities also included projects related to oceanography, through the JNICT (JNICT, 8 ago. 1970), beginning in the late 1960s.¹¹ Other entities could also have connections to topics related to oceanography: the Portuguese Commission for the International Hydrological Decade (Comissão Portuguesa para o Decénio Hidrológico Internacional) (Portugal, 3 mar. 1967); the National Commission against Pollution of the Sea (Comissão Nacional Contra a Poluição do Mar),¹² the National Commission for Nuclear Ships (Comissão Nacional para os Navios Nucleares), and the Commission for the Study of the Utilization of the Sea Bed (Comissão para o Estudo do Aproveitamento do Leito do Mar) (Portugal, 25 jun. 1969). Even later, the National Environment Commission (Comissão Nacional do Ambiente), a standing JNICT committee, marginally addressed issues that were of interest to oceanographers and marine biologists.

Along with the reality of participating in international projects, the post-war period, especially beginning at the end of the 1950s, was marked in Portugal, with respect to the

history of the organization of science and research, by the broadening of education and scientific research planning, by the idea of the “definition” of a science policy (which was not, incidentally, foreign to the international debate, namely within the OECD) and by the establishment or affirmation of some science support organizations, especially the Gulbenkian Foundation (1956) and the JNICT (1967).

It was in this context that the IAC’s agenda, prepared on April 15, 1967, included the the establishment of new research centers as one of the priorities for scientific promotion, together with the identification of existing research, the definition of the fundamental research themes underway, in addition to a set of points where it indicated, among other things, the definition of “research areas of particular national interest,” which included oceanography (IAC, 15 abr. 1967).

The initiatives that confirmed a growing interest in research relating to matters of the sea were multiple and converging. The Navy’s traditions in this field must be highlighted, as it covered and monitored several advances in science and technology, in hydrographic organization and activities, in land cartography and oceanographic research (Aguilar et al., 2001). In fact, this tradition converged in the foundation of the Hydrographic Institute (Instituto Hidrográfico) on September 22, 1960 (Portugal, 22 set. 1960), integrated into the structure of the Ministry of the Navy, bringing together the agencies within this Ministry and the Ministry of Overseas Colonies (Ministério do Ultramar), which at that time was responsible for hydrography and oceanography (Aguilar et al., 2001, p.29). The Hydrographic Institute’s impact on Portuguese oceanography was significant, even though the fire at its Ribeira das Naus facilities in 1969 hampered its activities (p.31). However, while the oceanographic campaigns promoted by the Navy continued (p.160) and grew, another Portuguese institutional actor began to play a highly significant and relevant role, resulting in oceanography meriting a national science policy statute.

Oceanography as a strategic “national science policy” option

Established in 1967 (Portugal, 11 jul. 1967), due to both internal drivers, namely the Portuguese Estado Novo regime, and external ones, such as the geopolitics of Big Science and the Cold War, this new institutional actor, the JNICT and its principal driver, Francisco Leite Pinto, understood early on the importance of some interdisciplinary areas in the context of international science, in the transition from the 1960s to the following decade, and also comprehended the inherent potential of international circles for obtaining funding and support for the new “national science policy” coordinating body (Brandão, 2012).

Oceanography was then clearly identified as a strategic option. It was understood that Portugal could “not distance itself from the new directions in oceanographic research” (JNICT, 8 abr. 1968). In the scientific arena, national interests were seen to be in the various dimensions of oceanographic sciences: (a) the “interaction between the atmosphere and the ocean” – seen as strategic, including for weather forecasting; (b) “marine biology resources” – pointing to “scientific exploration of the seas,” with the objective of reconciling economic criteria with aspects of ecological balance; (c) “pollution of the ocean” – understanding of the effects of industrialization grew, along with the awareness of the fact that the principle

of dilution in the environment was not scientific; (d) “study of the ocean floor” – aspects of geological science, especially for exploiting mineral resources, and in particular for discovering oil deposits (Pinto, 20 maio 1970).

The Portuguese authorities recognized oceanography as “an important and vast junction of Science and Technique” (Pinto, 30 jun. 1970); even further, at a certain point, the president of the JNICT saw oceanography as an opportunity to apply a “shock treatment” to the Portuguese scientific community, by establishing a unique center in Portugal, at the international level, that would polarize and attract European researchers (JNICT, 8 abr. 1968). The history of the proposed establishment in Portugal – with the support of the international community and even NATO – of an Oceanographic Institute like the famous Scripps Institution of Oceanography (1903, San Diego, California), planned as an authentic international laboratory, was the epitome of this strategy applied to international oceanography.

According to Francisco Leite Pinto (1967; Portugal, 11 jul. 1967), the “definition of national science policy” included the understanding and identification of strategic areas, namely as part of the JNICT’s task of coordinating and reorganizing scientific and technological research in Portugal.

With respect to the Portuguese authorities, in fact, oceanography had been identified as a priority since the JNICT’s first days.

Another important problem – without a doubt at the national scale – is with respect to oceanographic studies. ... Portugal, whether it wants to or not, cannot ignore the new directions in which oceanographic research is heading: the behavior of man under water, submarine surveys, submarine navigation, and many other specialties that are opening to Applied Science and Technology (JNICT, 8 abr. 1968).

The strategic selection of oceanography was, moreover, endorsed and defended in other significant contexts, especially by the Portuguese representative at NATO.¹³ According to Francisco Leite Pinto, oceanography was an interdisciplinary field and, as such, was interconnected with several issues, both scientific and potentially immediate applications. He sought to understand its many, varied dimensions, and its complexity – from its relationship to defense to its environmental issues.

The JNICT’s arrival on the scene and clear interest in the field of oceanography led to some tension between the protagonists. Within the JNICT, while recognizing the work developed by the Ministry of the Navy on important issues of a scientific nature, the “emphasis” and relationship with “modern oceanography,” “which is very different from that practiced before World War I,” was perceived to be still quite deficient (JNICT, 4 jul. 1969).

Francisco Leite Pinto saw the vast possibilities and the universe enveloped by modern ocean sciences, including the global dimension of the water problem and Portugal’s potential, given that it was “a country mostly overlooking the sea” (JNICT, 4 jul. 1969). However, even as recognition of and focus on oceanography was accentuated, he highlighted the lack of technical preparation, unavailability of resources, and absence of trained personnel to work on the many initiatives in this area. They were insufficient even to keep up with the projects that dominated the agendas of various international organizations at the time and, along with this recognition, the constraints created by the exclusive management of oceanographic matters by the Navy.

The problem was that, while the JNICT saw oceanography as a strategy to stimulate Portuguese scientific growth, in an area seen as inherent to the country's vocation, on the other hand the Ministry of the Navy did not want to lose its leadership in a domain in which the military had a long history of traditions and results. However, the new oceanography, requiring complex technical and logistical resources, required a different scientific framework for organization, preparation and scientifically and technically trained personnel.

It was in this sense that Francisco Leite Pinto sought to propose oceanography as a project with an important potential for attracting funding, perceiving the opportunity to obtain international sponsorship for the construction of an international-level scientific laboratory. It was thus that the project of establishing an international Oceanographic Institute in Portugal – using NATO resources – emerged. Francisco Leite Pinto envisioned the construction of “an artificial island that would consist of a huge set of laboratories located on submarine floors. This island would be connected to the European continent via a bridge, a replica of another institution already established in San Diego... The existence here of an international laboratory of this magnitude would be a ‘shock treatment’ to jump start our scientific and technological research at a high level” (JNICT, 8 abr. 1968). Note that the proposal reached the level of “draft law,” with an estimated cost, in 1967, of “six million dollars,” and was even placed before the head of the government, Oliveira Salazar, for consideration (JNICT, 2 out. 1968).

As can be inferred, in addition to the specific interest in oceanography, the attempt to construct an international laboratory in Portugal could have been a way to implement that “shock treatment,” in order to boost and consolidate Portuguese science at the international level.

The proposal received political and financial support and effort from the government, including support from the NATO Science Committee, which sought to obtain the necessary financing for the laboratory (JNICT, 26 jun. 1969; Pinto, 16 jul. 1969). Note that the Portuguese proposal had the support of the USA delegation; however, the president of the NATO Science Committee, Gunnar Randers, was clearly aligned with the group that preferred that a laboratory of that nature be built in Northern Europe, “(perhaps in Denmark or Norway), but never in Portugal” (JNICT, 26 jun. 1969).

It seems evident that various circumstances hindered the intentions of the Portuguese authorities; the most obvious were the lack of university laboratories and of a critical mass of national researchers, as well as the limitations and difficulties faced by the Hydrographic Institute. Despite the benefits offered, the Portuguese were frustrated in their attempt. The oceanography institute project was set aside; however, the Portuguese government systematically sought inclusion in international research in this field.

The JNICT's interest and involvement in issues related to oceanography did not lag, since oceanography was seen as one of the paradigms of international science. It sought to take advantage of any opportunities that might arise for Portuguese science; moreover, in many cases, the JNICT was responsible for providing scientific support “to the Ministry of Foreign Affairs and other agencies involved in international relations” (Pinto, 31 mar. 1970).

Among the projects and entities that the JNICT monitored, by sending scientific delegations and coordinating their activities related to oceanography, the following stand out:

- (a) the “Pollution of Coastal Waters” project of the NATO Committee on the Challenges of Modern Society;
- (b) participation in the Oceanography Subcommittee of the NATO Science Committee;
- (c) monitoring of UN groups devoted to the subject, such as the International Oceanographic Commission, the International Council for the Exploration of the Sea, and the International Commission of the Northwest Atlantic Fisheries (ICNAF),¹⁴ which was part of the UN’s oceanographic studies group – in particular the Ocean Air Project of the European Economic Commission;
- (d) the EEC “Oceanography-Meteorology” project;
- (e) the “Hydrocarbon Pollution” project (Pinto, 21 abr. 1971).

The JNICT then formulated the idea of establishing a coordinating entity specifically devoted to oceanography, a sort of subcommittee. The strategy was to take advantage of the few resources that existed, making JNICT facilities available in strict cooperation with the Hydrographic Institute; namely, the “small, poorly-equipped laboratories,” and, beginning with these centers, “training some youths” by sending them to the large foreign research centers (in USA, Canada, Great Britain, Norway, Denmark, Germany, the Netherlands, Belgium and France). The idea was also to encourage on the involvement and collaboration of organizations like the IBM, the IAC Radiochemistry Laboratory, the Biochemistry Laboratory of the School of Pharmacy (Faculdade de Farmácia) of the University of Oporto (Universidade do Porto) (Pinto, 8 jul. 1970).

The proposal, as drawn up by Francisco Leite Pinto (12 jan. 1970), involved the establishment of a Portuguese organization that would be responsible for coordinating oceanographic activities, an entity that would centralize decisions and analyze initiatives, ensuring both a skilled and strategic position on the international stage. Moreover, it was understood that Portugal’s geographical and historical position legitimized the intention and opportunity to participate in the work of international organizations, although the vast range of issues meant that it could not “dispense with the help of advanced countries” (Pinto, 21 abr. 1971).

Thus, Francisco Leite Pinto (12 jan. 1970) wished to establish a Standing Committee on Oceanography within the JNICT to centralize scientific, technical and technological oceanographic studies – at the time dispersed among the ministries of the Navy, Overseas Colonies and Education – stressing “the importance of many branches of Science, Techniques and Technologies in the study of the oceans and the need to coordinate and plan them.” It would include representatives from the Ministry of Foreign Affairs, continental and overseas universities, the Hydrographic Institute, the Overseas Research Board (Junta de Investigação do Ultramar), the IAC, the Naval Academy (Escola Naval), the National Weather Service (Serviço Meteorológico Nacional), the IBM, the Directorate-General for Maritime Development (Direcção-Geral de Fomento Marítimo), the National Board of Fisheries Development (Junta Nacional de Fomento das Pescas), the National Civil Engineering Laboratory (Laboratório Nacional de Engenharia Civil), the Nuclear Energy Board (Junta de Energia Nuclear), the Commission Against Ocean Pollution (Comissão Contra a Poluição da Água do Mar), the Ministry of Health (Ministério da Saúde), the National Institute of Industrial Research (Insti-

tuto Nacional de Investigação industrial), Sociedade Anónima Concessionária da Refinação de Petróleos (Sacor), the Naval War Institute (Instituto Superior Naval de Guerra), the Lisbon Technical University (Universidade Técnica de Lisboa), the Directorate of Naval Construction (Direcção de Construções Navais), the Electricity and Communications Directorate (Direcção de Electricidade e Comunicações) and even professors of geology, geophysics, international law and international maritime law. Its mission and objectives were set to the high ambitions of the institutional plan.

Despite all efforts, the proposal was not carried out. Its role was restricted to coordinating the various Portuguese institutes and centers in the same technical-scientific field. The JNICT's position stressed the advantage acquired by the Ministry of the Navy, namely its access to vessels, machinery and publications (Pinto, 21 abr. 1971) – even if it lacked scientific knowledge... The choice was clearly to not start a conflict, and the JNICT's role continued to be generic coordination, but without the ability to orchestrate and mobilize the actors in the field of oceanography.

That was the intention of the reorganization of the Ministry of the Navy on March 20, 1971 (Portugal, 20 mar. 1971), which precisely confirmed the role of the Navy with respect to “maritime promotion and the study of the ocean.” The coordination of the scientific study of the ocean was the responsibility of this ministry, where “according to long tradition” (Pinto, 21 abr. 1971), as had been argued, the various services had been concentrated.

It was only after democracy was restored, in 1979, that the JNICT, which by then was acquiring another type of influence in the Portuguese scientific system, managed to establish a Standing Oceanology Commission (Comissão Permanente de Oceanologia) (Portugal, 19 dez. 1979). It was finally recognized that the idea of the importance of the sea had already had “some reflection” in Portugal, but until then had not been translated into “coherent plans,” with “oceanographic research” dispersed “among many organizations, with duplication or poor definition of roles, isolation of related technicians, underutilization of equipment and laboratories, poor flow of information and lack of control and coordination” (Portugal, 19 dez. 1979).

Final considerations

Historical perspective has revealed that interest in the sea, in its many aspects, was evident in a series of initiatives and entities realized to a greater or lesser extent throughout the twentieth century in Portugal, until the clear shift in the 1970s.

The Portuguese maritime vocation, coastal life and geographic position always stimulated the search for scientific – physical and biological – knowledge of the sea, as the importance of this knowledge and its relationship with the economy and industry was becoming increasingly clear. The period after World War II accentuated the strategic dimension of oceanographic studies for multiple reasons, including the Cold War and the affirmation of a new cycle of economic, scientific and technological development. As innovative possibilities that widened its field of study emerged, creating extensions to ever more vast, interdisciplinary fields, unparalleled technical and scientific complexity arose, together with growing geopolitical support for these themes under the “scientific umbrella” of oceanography.

By that time, the change in Portugal in terms of scientific and technological policy, of which the JNICT was the most obvious institutional representative, gave rise to and exemplified a renewed, contemporary understanding of oceanography, encompassing an overview of “ocean policy,” based on a scientific formulation, namely oceanography. The intention coincided with the assessment of the importance of oceanography in political and defense terms, as proven by the Portugal’s persistent presence in international institutions and projects and, of course, its significance in positioning Portugal within the international geopolitical system in the context of the Cold War.

The oceanographic project, however, suffered successive defeats, including the failure to obtain international resources to build a European oceanographic laboratory, and the tensions, difficulties and even resistance to establishing a coordinating entity for the initiatives and campaigns already underway. Evidently the internal disagreements encompassed, among other aspects, the disputes, and a vast, complex spectrum of tensions within an authoritarian regime that was profoundly conservative in regard to economics, science and technology, which sought to survive not only growing opposition and external challenges, but also the differences within its own administration, where the most progressive proposals and most modernizing pressures clashed or became obfuscated among the many intrigues of the political struggle.

Along with all this, as mentioned, the strategy of taking advantage of the developments of international science was pursued, when international cooperation did not result in dilution of national interests. Portugal’s participation in international projects was, indeed, seen as a way to project national pride and prestige, a dimension especially highlighted by the Portuguese authorities.

The Navy had an important role in all of these issues, sometimes driving them, sometimes participating or even resisting some changes, a logic that only changed (in institutional terms) after April 25, 1974, and the beginning of a new democratic regime in Portugal. During the First Provisional Government (1974) the Directorate-General for Research and Protection of Live Resources and the Aquatic Environment (Direcção-Geral de Investigação e Protecção dos Recursos Vivos e do Ambiente Aquático) was established on June 5, 1974, as an agency of the Secretary of State for Fisheries (Secretaria de Estado das Pescas), then under the aegis of the Ministry of Economic Coordination (Ministério da Coordenação Económica), which at that time was the focus for various areas connected to fishing, which until then had been under the Ministry of the Navy, namely fishing research carried out by the IBM. The National Institute for Fisheries Research (Instituto Nacional de Investigação das Pescas) was founded in 1977, succeeding the Directorate-General cited above. It, in turn, was succeeded in 1992 by the Portuguese Institute for Marine Research (Instituto Português de Investigação Marinha, Ipimar), structurally under the Ministry of Agriculture and Fisheries, and, in 1977, by the Institute for Research in Fishing and Oceans (Instituto de Investigação das Pescas e do Mar), which kept the same acronym (Ipimar). In 2002, Ipimar was merged with the National Agrarian Research Institute (Instituto Nacional de Investigação Agrária, Inia), resulting in the National Institute for Agrarian and Fisheries Research (Instituto Nacional de Investigação Agrária e das Pescas, Iniap) and, in 2007, Ipimar

and Inia, already together in Iniap, were joined by the National Laboratory for Veterinary Research (Laboratório Nacional de Investigação Veterinária) to form the current National Institute for Biological Resources (Instituto Nacional dos Recursos Biológicos).

NOTAS

¹ In this and other citations of texts from Portuguese, a free translation has been provided.

² Colonel Francisco Afonso Chaves, an important individual in Portuguese oceanography, is seen as the force behind meteorology and geophysics in the Azores. See the reference biography by Tavares (2009).

³ The Portuguese Society for the Natural Sciences was founded one year after the Conference was held by Augusto Pires Celestino da Costa, Abel Salazar and Marck Athias, and officially inaugurated on April 29, 1907.

⁴ Augusto Pires Celestino da Costa (1884-1956) took over as technical director on June 3, 1916. After completing his medical degree at the Lisbon Medical School (Escola Médica de Lisboa) in 1905, he chose to pursue a career in scientific research under the guidance of Marck Athias, studying further in Berlin (1906-1908). A Professor at the Lisbon School of Medicine (Faculdade de Medicina de Lisboa), he was a founding member of the National Education League (Liga de Educação Nacional) in 1908, and became a member of the Society of Pedagogical Studies (Sociedade de Estudos Pedagógicos) in 1918. President of the Board of National Education (Junta de Educação Nacional) (1934-1936) and president of the Institute for High Culture (Instituto para a Alta Cultura, IAC) (1936-1942). As a science administrator, he strove to increase the development of research in Portugal, promoted exchanges and contacts with scientific institutions in other countries (including the Rockefeller Foundation in the 1930s) and defended the researcher career path, independent of an academic career, with its own statute and salary. Celestino da Costa was influenced by the German model for organizing teaching and research, believing that the solution of the Portuguese education problem depended on the university elite. In 1947, he was temporarily suspended from teaching during the wave of academic “purges” carried out by the Estado Novo. From then on he devoted most of his attention to scientific activities, far from more prominent public positions.

⁵ Alfredo Sobral Mendes de Magalhães Ramalho (1894-1959). With a degree in medicine from the University of Lisbon (1911-1917), he became Celestino da Costa’s assistant in 1915, devoting himself to research in histology and embryology in fish organs. A member of the Portuguese Society for the Natural Sciences, he began working at the EBM upon its foundation, in 1919, as an assistant naturalist. Beginning in 1924, he replaced Celestino da Costa as the EBM technical director. He directed a significant series of oceanographic missions with the vessel *Albacora*, together with other organizations, during which systematic studies on the physical-chemical conditions and biological aspects of the waters off the coast of Portugal were carried out. He was the first director of the Marine Biology Institute (Instituto de Biologia Marítima, IBM) that succeeded the EBM in 1951 and pioneered oceanographic studies in Portugal.

⁶ On the establishment and history of the JEN, and on the organization of science in Portugal, see: Rollo, Queiroz, Brandão (2011) and Rollo et al. (2012).

⁷ Built in Norway and equipped for this purpose in 1923.

⁸ See Hogan (1989), Kipping, Bjarnar (1998) and especially McGlade (1998), among other texts. In relation to Portugal, see Rollo (2004, 2005).

⁹ On Portugal’s participation in the Marshall Plan and the organizations and programs cited, and the impact of its involvement, see Rollo (1994) and Rollo (2007).

¹⁰ Francisco de Paula Leite Pinto (1902-2000), due to his thinking and actions, should be seen as a central figure in the promotion of science policy in Portugal. He had many university diplomas, namely a bachelor’s degree with teaching certificate in mathematics, a geographical engineering degree (Lisbon School of Sciences) and a degree from the Lisbon Teacher Training School (Escola Normal Superior de Lisboa). While receiving a scholarship from the JEN in the early 1930s (1929-1934), in Paris, he also obtained a degree in astronomy (Paris School of Sciences) and obtained an Engineering degree (Ingénieur des Ponts e Chaussées) from the famous Paris school. He was the first president of the IAC Commission on the Study of Nuclear Energy (1954). Between 1955 and 1961 he was minister of National Education. In 1962, he served as president of the Nuclear Energy Commission, for which he had been a promoter and vice president. He was also rector of the Technical University (Universidade Técnica) (1963-1966). His actions resulted in the establishment of the JNICT in July, 1967, an organization whose objective was to coordinate Portuguese scientific research. After April 25, 1974, he moved to an exile in France and Brazil.

¹¹ The dynamics of Portuguese participation in European Cooperation in Science and Technology initiatives would lead to the creation of a Permanent Commission for Scientific and Technical Cooperation with the European Communities and the OECD (COCEDE – Comissão Permanente para a Cooperação Científica e Técnica com as Comunidades Europeias e com a OCDE) within the JNICT (Portugal, 3 jul. 1971).

¹² As part of the structural reform of the Directorate-General of the Navy, which was renamed the Directorate-General of Maritime Service Promotion (Direcção-Geral dos Serviços de Fomento Marítimo) (Portugal, 25 jun. 1969).

¹³ This was the position of ambassador Vasco da Cunha, Portugal's NATO representative (JNICT, 4 jul. 1969).

¹⁴ Currently known as the Northwest Atlantic Fisheries Organization (NAFO).

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