

National Research and Development Core Program - Continuity Support for Marine Research <i>(Vasile Pătraşcu)</i>	“Cercetări Marine” Issue no. 52 Pages 159-179	2022
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NATIONAL RESEARCH AND DEVELOPMENT CORE PROGRAMME - CONTINUITY SUPPORT FOR MARINE RESEARCH

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ABSTRACT

Launched in 2003, the Core National Research and Development Programme has become an essential source of national funding for scientific research. With its core, the National Marine Research and Development Institute (NIMRD) "Grigore Antipa" ensures the implementation of scientific research programs, which supports the national research strategy in the marine field. Thus, NIMRD has run six Core Programs so far. The paper presents 2003-2020 funding details, focused on the analysis of financial distribution by programme during the period, revealing the influence of political and internal management decisions. The paper concludes with the presentation of the ongoing basic programme at the time of writing.

An obvious conclusion is that without basic support, it is not possible to guarantee the operation of NIRDs and the regular coverage of the national research strategy. This minimum basis also creates the conditions for international collaborations in the field, and involvement in European research programs, without forgetting the fulfillment of external community obligations and the internal alignment in which Romania participates.

NIMRD has been operating for over 50 years and continues to meet the increasingly complex requirements of environmental research. This is shown by the experience of over 18 years of participation in the National Core Research-Development Programme.

Keywords: Core Programme, scientific research programs, national research founding, marine environment, NIMRD

AIMS AND BACKGROUND

Scientific research, technological development and innovation represent an area of activity included in the strategy and development plan of any governance. Achieving the set economic, socio-human, knowledge and environmental objectives can be addressed by allocating the necessary resources for their implementation.

One of the main instruments through which research funding is provided is the Core Programme, a component of the National Plan for Research-Development and Innovation (Ministry of Research, Innovation and

Digitalization). Its application at the level of the National Institute for Marine Research-Development (NIMRD) is made for the implementation of the research-development strategy in the marine and coastal field, as specific field of activity. The research needs are taken over in several multidisciplinary objectives, each subscribing to dedicated research and development projects.

The multi-annual budgeting of the Core Programme provides a basic financing of the institute's expenses, related to the research-development activity and is done in a competitive system; by order of the state authority for research and development, the annual amounts are allocated, within the limit between 20% and 60% of the income achieved through its research and development activity (Website Ministry of Research, Innovation and Digitization-Government Ordinance 57/2002). The Core Programme proposal is approved and contracted based on the evaluation and selection of the projects carried out by the Advisory Board for Research, Development and Innovation (CCCDI), through the specialized commissions, organized within it, respectively Commission 2: Environment, Energy and Climate Change (Website Ministry of Research-Government Ordinance 1023/2015). The advance granted quarterly to commence the works in the Core Program is 30% of the value of the phases, starting with teaching within this execution interval. Launched in 2003 (Website Ministry of Research-Government Ordinance 57/2002), the Core Program has proven to be a key support in maintaining the stability of the national research and development institutes, in order to ensure the continuity of specific research activities, while maintaining the research infrastructure and human resources, being the permanent component of the annual income and expenditure budget. This was confirmed by all the administrative periods of preparation of annual contracts and funding stages when any delay could have had immediate financial effects.

NIMRD has run six Core Programs since its launch in 2003. Their name (including the abbreviated one), the code assigned by the national research authority and the running period are listed as follows (Patrascu, 2020):

1. 2003-2005, CORE National Research Programme: Conserving the marine ecosystem and promoting its sustainable use / CEMAR / PN0314;
2. 2006-2008, CORE National Research Programme: Conserving the marine ecosystem and promoting its sustainable use / CEMAR / PN0628;
3. 2009-2015, CORE National Research Programme: Conserving the marine ecosystem and promoting its sustainable use / CEMAR / PN0932;
4. 2016-2017, CORE National Research Programme: Research aimed at the “Blue Growth” in order to demonstrate the opportunities of the Black Sea and its development / PROMARE / PN1623;

5. 2018, CORE National Research Programme: Scientific and informational support to help the sustainable development of maritime activities / SIMAR / PN1834;
6. 2019-2022, CORE National Research Programme: Consolidation of scientific, technical and technological foundations in order to protect the marine ecosystem, sustainable development of maritime activities by implementing smart specializations / INTEL MAR / PN1926 (is still in progress at the time of this writing).

A synthetic financial analysis (Patrascu, 2020) shows that in the period 2003-2020, NIMRD accessed a total funding of 69,118,660 lei, through the six Core Programs, a necessary and sustainable support for an institutional presence in Romanian marine research for over 50 years. The allocation of this amount was not uniform, the annual contributions presenting large variations, between 1,114,000 lei and 8,142,000 lei (Fig.1). The differences between the amounts allocated annually are due to several causes, even if the annually approved Revenue and Expenditure Budget - REB was growing and the percentage from revenues would have been constant.

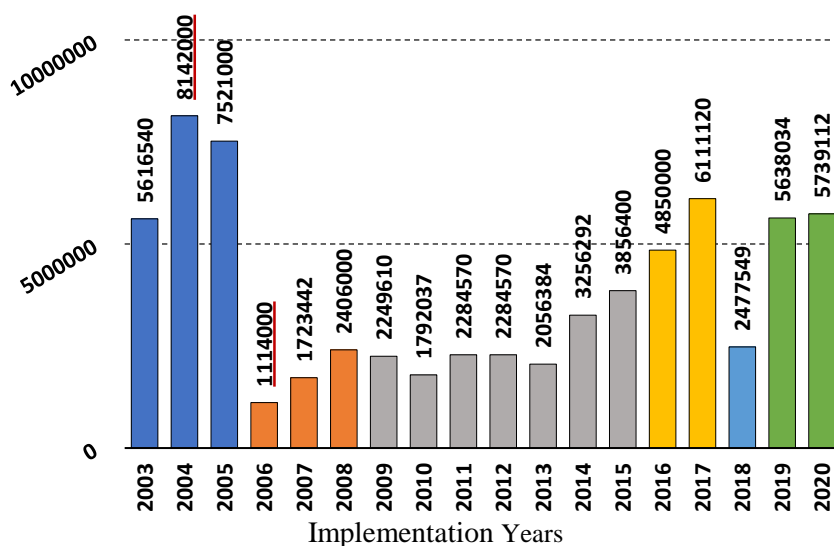


Fig. 1. Annual funds allocated by Core Programs to the NIMRD (lei)

Following a better initial national budget support for research (2003-2005), this effort has subsequently declined (2006-2020), affecting source allocations, including the Core Program. There was a sharp decline in 2006, as the Research budget was reduced by more than half (from 0.6% of gross

domestic product-GDP, to somewhere around 0.2%!), The effect being clearly visible in our chart (Fig. 1). Another spectacular reduction occurred in 2018, because the National Research Authority was lowered to the rank of Directorate, obviously with a diminished allocated budget, the funds from the Core Programs being also reduced in consequence. The post-2018 effort of the central research authority is also visible in the increase of institutional allocations on the Core Program, the national target for Research being 1% of GDP, which would also increase this component (Website Ministry of Research-Government Ordinance 57/2002). Therefore, the structural organization and the vision of the government (with many governments in the period 2003-2020) can influence the smooth running of the Research, the functioning and sustainability of the national institute on them. A positive adjustment was allowed in 2014 and 2015, thanks to the request of NIMRD for additional phases (Phase 1-*Initial assessment study: Creation of the structure of the reference spatial database - support for assessing the efficiency and impact of short-term rehabilitation works of the coastal area in the southern part of the Romanian coast*, Phase 2-*Initial assessment study: Network restoration bounded base in the area of coastal protection works designed in the short term in the southern part of the Romanian coast*, Phase 3-*Study of initial assessment of environmental conditions, in particular geomorphological (sea-land interface) and efficiency of works in the context of current coastal protection measures*, within the project PN09320101-“Study of the mechanisms that govern the short and medium term geomorphological processes under the action of natural phenomena and anthropogenic influences in the coastal area”, for 2014; and Phase 6-*Increasing the operational capacity of the Oceanographic and Environmental Data Center by developing the biological database, under the conditions of intensifying the anthropic impact*, within the project PN09320202-“Characterization of benthic and planktonic communities on the Romanian continental shelf”, from 2015), against the background of interest on the extension of the tourist beaches and interest for the marine biodiversity under the impact of human activities, fact that allowed the consolidation of future allocations to the Core Program. The involvement of the internal management in the distribution and adjustment of funds on projects, stages and phases, within the Core Program is important for implementation, the national research authority and the specialized commission justifiably admitting, changes to the executive schemes, whenever necessary.

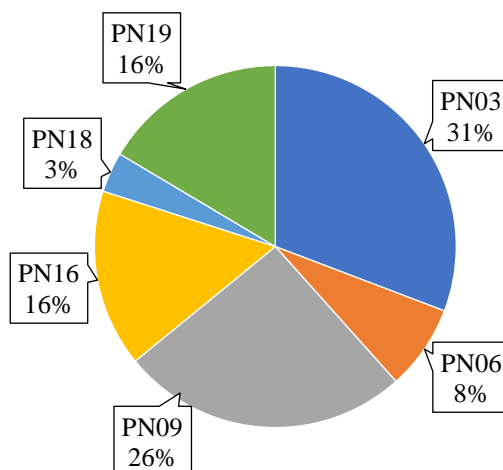


Fig. 2. Relative financial comparison of NIMRD Core Programs

The individual share of the Core Programs in the total amount contracted in the period 2003-2020 was between 3% and 31% (Fig. 2). Previously we saw the differences between the annual allocations (Fig. 1), but at same time, along with them, we must take into account the duration of each program, because there are different extensions periods (Fig. 3). It should be noted that PN1926 is in progress, considering only the years of execution completed so far (2019 and 2020).

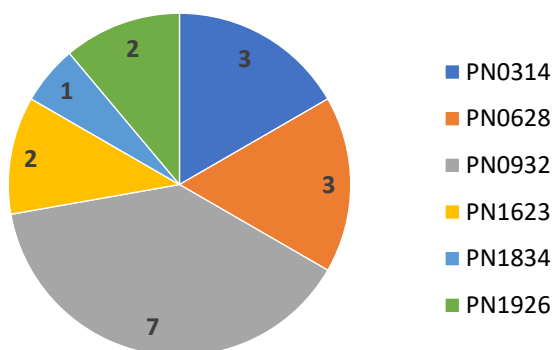


Fig. 3. Annual Relative Duration of NIMRD Core Programs (number of years)

It is noted that NIMRD and the National Research Authority have managed to continue the Core Programs in the institute, amid government changes (structure and governance program), launching new programs (those under 3 years: PN1623, PN1834 or 3-4 years: PN0314, PN0628, PN1926) or extending the previous ones (those over 3 years, PN0932). The average annual

financial value of the Core Programs varied between 1,747,814 lei and 7,093,180 lei, during 2003 - 2020, according to the general budget of the Research. The growth trend in recent years shows the interest in the good progress of national institutes and research in general (Fig. 4).

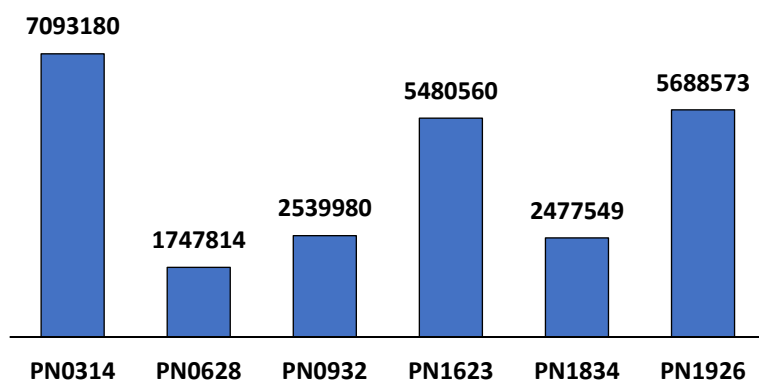


Fig. 4. Average annual financial value of NIMRD Core Programs (lei)

In conclusion, NIMRD, together with the other national research and development institutes, is related to the funding sources contracted by the National Research Authority, many past and present achievements being due to the funding obtained through it (mainly through the Core Program). Changing governments and internal institutional management will have to find solutions for continuity and increase interest in research and development, keeping up with current challenges.

CURRENT DATA, INDICATORS AND RESULTS

The condition of marine environment

The world's seas and oceans continue to be under great pressure due to human activities, which have recently been amplified by the effects of climate change, leading to huge geopolitical consequences, especially in the long term. The effect of this pressure is felt in the form of the following main threats: pollution, habitat degradation, biodiversity loss, overexploitation of resources, coastal erosion, species transfer, etc. The feature of a semi-enclosed sea, a large river basin, as well as its unique hydrobiological features make the Black Sea an extremely sensitive ecosystem, exposed to all these threats. The progressive degradation of the Black Sea ecosystem, which began in the 1960s, experienced high levels, especially during the period 1980-1995. Many experts have argued that perpetuating this situation could lead to an ecological collapse. In the context of important restructuring and rearrangements of the economic and social system in the Black Sea catchment countries, which took

place after the 1990s, there have been dynamic changes in the components of the marine ecosystem, characterized by slight and continuous improvements in physical and chemical parameters. At the same time, biological indicators have improved structurally, functionally and in terms of productivity, showing trends towards new balances in biodiversity and marine living resources. On the other hand, the use of the marine and coastal environment is experiencing an unprecedented development, generating economic sectors developed based on minimum sustainability. Urbanization and expansion of coastal settlements, development of tourism and recreational activities, development of industry, including processing, fishing and aquaculture, shipping, energy production (including offshore operations), agriculture are the most important sectors to be harmonized, planned and managed in an integrated way based on sustainability. Against this background, there is a marked increase in the frequency and amplitude of extreme natural phenomena caused by climate change, the effect of which can be amplified by the impact of human interventions on the marine and coastal environment. At the same time, the pressures on land use, on the natural environment and on valuable habitats are facing unprecedented amplitudes in certain sectors of the Romanian coastal area. The current condition of the marine ecosystem is in a fragile balance and any other major adverse intervention can even lead to irreversible effects (extinction of endangered species, loss of natural habitats, etc.) (NIMRD Report on the State of the Marine and the Coastal Environment, 2015).

European instruments supporting the need for the program

With the accession of Romania and Bulgaria, the Black Sea became a community sea, benefiting from the common policies of the European Union. The recognition of the issues raised above has materialized at this level in several strategic documents, which are the tools for implementing European policies in the maritime field. Among these, we list the most important:

- Global Monitoring for Environment and Security (GMES) initiative;
- INSPIRE Directive, which includes the specialized WISE component for water;
- Water Framework Directive and Mollusks Directive;
- Habitats Directive, Birds Directive and Natura 2000 Network;
- Common Fisheries Policies (CFP);
- Directive establishing a framework for maritime spatial planning and European maritime policies, including maritime spatial planning;
- Framework Directive for Marine Strategy.

Each of the instruments presented above also contains informational elements, for which marine research is supported under a common policy, included in the European Research Area. The European Union's strategy aims at the sustainable development of the entire marine and maritime sector. This

one recognizes the importance of the seas and oceans for Europe's economy, as well as their potential for innovation and development, helping to achieve the goals of smart, sustainable and broad growth. However, the strategy identifies several areas for improvement. A positive approach to solving development problems is based on smart specialization. Among the defined areas of competence, with high economic and social potential, bioeconomy, energy, environment and climate change can be mentioned. Reorienting research policies to ensure the direct relevance of RDI results, by concentrating resources and mobilizing a critical mass of researchers, can increase competitiveness on a regional or global scale, but also identify solutions to pressing public problems.

Institutional implementation capacity

There is experience in carrying out international projects, including experts appointed by international bodies. Thus, NIMRD has a qualified research staff: a total of 48 people, of which 26 PhD and 10 PhD students (NIMRD annual activity report, 2020).

NIMRD's position in the current research network of the Black Sea could not have been achieved without the existence of a competitive research infrastructure that ensures the institute's participation in various national, regional or European research consortia (NIMRD annual activity report, 2020). At present, the endowments of the institute can cope with all the institutional obligations incumbent on it by law, but also with the implementation of various related obligations at national level and provided by the legislation. Thus, starting from basic measurements of the abiotic environment to genetic determinations on populations of micro and macro-organisms, these are currently being carried out through the joint use of the institute's RDI infrastructure by research departments (NIMRD annual activity report, 2020).

The institute is currently able to cover the most demanding requirements for seawater quality analysis in terms of physical, chemical and biological parameters. The Laboratory of Analysis and Measurements cover all the parameters of water quality and marine sediments required by the integrated monitoring program of the marine environment. Measurements are made for the nutrient load of marine waters, measurements are made for the heavy metals, pesticides, organochlorine substances or hydrocarbons load of the waters and sediments. The Oceanography Department uses equipment to measure the seawater physical quality (temperature, conductivity, turbidity, etc.). The measurements are performed as part of the expeditions at sea, and the results obtained in real time allow for the adjustment of collection depths of the chemical and biological samples. Coastal measurements of the shoreline evolution are performed using direct field measurement techniques with

DGPSs and total stations, or more recently, using AUV technology or aerial and remote sensing photography. The Department of Ecology and Marine Biology conducts surveys on the status of plant and animal organisms in the Black Sea plankton and benthos. In order to make these observations, both self-produced sampling equipment (nets and dredgers) and sampling equipment purchased from various specialized companies in Europe are used.

The equipment offers the possibility to collect samples according to the standards in the field as well as in accordance with the recommendations of the methodologies accepted as practice around the Black Sea. The state of marine resources is assessed by the Department of Living Marine Resources which, through expeditions with the research vessel “Steaua de Mare 1”, establishes the level of total allowable catches of fish for commercial interest. Also, at the aquaculture testing laboratory there is a closed-circuit aquaculture system in which experiments can be performed on the cultivation of various species of marine organisms in the environmental conditions of the Black Sea.

In addition to the activities listed above, there is the logistics infrastructure of NIMRD, which allows researchers to travel on the ground, or be it along the coast (off-road vehicles and ATVs), in the shallow area of the sea (boats), or on the entire Romanian continental shelf (marine research vessel “Steaua de Mare 1”). One of the strong points in the research activity is the possibility of researchers accessing the data *in situ* using the current infrastructure (vessel, morpho dynamic measurements, observations with divers, etc.). NIMRD is affiliate member of the Association of Universities, Institutes of Research-Development and Central University Libraries in Romania ANELIS PLUS, based on Government Ordinance 26/2000 amended and supplemented.

Expected results of the Core Program

Direct results are as many advantages as the development of the INTEL MAR Core Project creates:

- The projects considered in the Core Program are planned to ensure, the continuity of scientific data available to Romanian oceanology, as the main tool for the analysis and comparative assessment of trends in the evolution of marine ecosystem. The databases in the fields of physical, chemical and biological oceanography, those related to marine living resources, as well as to coastal morpho dynamics cover periods of over 40 years, some even exceeding 70 years;
- The program also aims to promote new directions of marine research aimed at deepening the knowledge of the forces governing the balance of the marine ecosystem, at the interface of indicators of pressure, impact and status, as well as the impact of climate change;

- Solutions and technologies are sought for the sustainable development of marine activities, in particular the sustainable use of living resources and the reduction of environmental risks arising from natural phenomena, anthropogenic impact and climate change;
- The proposed program will support the national process of integrated coastal zone management, by providing the historical data series, updated data and real-time data required for the functioning of the Permanent Coastal Secretariat and its Specialized Working Groups;
- An essential component in the process of integrated human activities management with a direct or indirect effect on the marine ecosystem is the provision of data and information necessary for the implementation of the European Directives applicable to the marine and coastal environment: Water Framework Directive, Marine Strategy Framework Directive, Habitats Directive, Mollusks, the Infrastructure Directive for Spatial Information in the European Community, the Framework Directive for Spatial Planning, etc.;
- At the same time, the sustainable development of the coastal zone imposes the need to develop impact studies of economic activities, studies that require the existence of information and historical data for the most relevant potential marine locations for these types of activities;
- The main tool for providing data and information for these users are provided by the National Center for Oceanographic and Environmental Data-CNDOM;
- Finally, by its nature, the proposed Core Programme is an important instrument for providing information on regional and international cooperation, targeting, first and foremost, the Convention for the Protection of the Black Sea against Pollution, the General Fisheries Commission for the Mediterranean, the Intergovernmental Oceanographic Commission, Agreement for the conservation of cetaceans in the Black Sea and the Mediterranean Sea, etc.
- Implementing these international agreements / conventions, NIMRD has received concrete responsibilities from the direct end users: the Ministry of Research and Innovation, the Ministry of Environment, the Ministry of Waters and Forests, the Ministry of Agriculture and Rural Development, the Ministry of Regional Development, which require reporting, transposition of data and assessments based on the latest data and information. Also, noteworthy are the emergence of new requirements, such as those created by the newly created National Agency for Offshore Activities and the National Agency for Protected Natural Areas.

Indirect results, due to the of the Core Programme development; Supporting the technological transfer and attracting extra-budgetary funds

The acquired knowledge and intellectual capital are considered to be the “hidden” assets of NIMRD, forming competitive advantages in the emergence of new research directions. Technology transfer, as a process that disseminates the formal transfer of findings from NIMRD research to industry, for marketing as new products and / or services, is a relevant feature that will lead to the introduction in practice of research results or new information. The transfer will also take place within educational processes, scientific literature, or direct contact with interested economic sectors and public authorities. The subject of technology transfer mainly refers to new patents, technical designs, manufacturing formulas, but also non-patented technical assistance, such as know-how, action plans, etc. Promoting partnerships between business and the institute as bridges to support the collaboration of public and private sector research specialists, as well as the use of a spin-off to market the skills or knowledge of the institute are new approaches that will be taken into consideration. Based on the national and international responsibilities assigned by the various ministries and assumed by the institute, it will be considered to attract private funds to facilitate the fulfillment of these tasks. The institute enjoys national and international prestige with collaborators in both the public and private fields, through the services and products offered, based on the best practices of research, technological development and innovation.

Strategic partnerships and visibility

The policy support for the expansion of collaborations will be based mainly on participation in consortia within European projects and bilateral collaborations, cooperation on thematic areas in order to establish partnership in regional programs, cooperation for the creation of networks of excellence, to the extent that, for the implementation of European directives.

The collaboration with relating marine research institutions, such as the International Center for Advanced Research Rivers-Delta-Seas “DANUBIUS” providing the opportunity for an organized and competitive framework. NIMRD, as founding member of the Danube Delta-Black Sea Cluster will contribute to supporting the sustainable development of the coastal area and neighboring regions, by capitalizing on the results of scientific research carried out by the Core Programme.

The establishment of the “Romanian Black Sea Research Consortium” (Fig. 5) by Ministry of Research and Innovation (Order 551/13.09.2017) brings together the National Institute for Marine Research-Development “Grigore Antipa”, the National Research-Development Institute for Marine Geology and Geo-ecology, “Danube Delta” National Research and

Development Institute and “Dunărea de Jos” University of Galați in a national platform, developing common national and European research priorities and marine strategies, and promoting the experience exchanges by joining the European Marine Board (EMB)-IVZW (Fig. 6).



Fig. 5. Romanian Consortium logo at European Maritime Board



Fig. 6. NIMRD co-organizers at the EurOCEAN 2019 Conference, EMB-UNESCO-Paris

The institute is present in the European EMB network of maritime countries, since 2007, brings together 35 prestigious universities, oceanographic institutes and national research agencies from 18 countries, with a tradition in marine research; the “National Network of Research Centers in the Field of Biological Chemistry” (created within the European Strategy Forum on Research Infrastructures (ESFRI) EU-OPENSREEN infrastructure project); the “Black Sea Cetacean Network” (created in 2015 to establish a collaboration network for the study of the Black Sea dolphin diseases); the

“National Network of Cyanobacteria Experts” and the integration of Romania in the international action COST ES1105 – “Cyanobacteria blooms and toxins in water resources: Occurrence, impacts and management” (CYANOCOST, along with 33 other European countries); the “International network of marine science territories”, which includes institutions from Argentina, Canada, China, France, Germany, Italy, Mexico, Portugal, Spain and Vietnam; as well as in the DNAqua-Net COST network; EPA Network - Interest Group on Plastic (IG Plastic); MSFD Joint Technical Expert Group on Marine Litter, Marine Litter Watch community of the European Environment Agency, etc.

Brief description of the activities of the first two years of implementation (2019 and 2020)

The new Core Programme “*Consolidation of scientific, technical and technological foundations in order to protect the marine ecosystem, sustainable development of maritime activities by implementing smart specializations – INTEL MAR*”, code PN1926 was launched for the period 2019-2022. The general aim of the program is to have an in-depth knowledge of the marine environment and to ensure the continuity of the data and information necessary for the scientific substantiation of decisions at national, regional and community level, for the protection and sustainable development of the marine environment. The direct/indirect beneficiaries are mainly the national public authorities: Ministry of Research, Innovation and Digitalization, Ministry of the Environment, Waters and Forests, Ministry for Development, Public Works and Administration, Ministry of Agriculture and Rural Development, but also international organizations, such as the European Environment Agency/ EIONET, GFCM, Commission for the Protection of the Black Sea against Pollution.

The development of integrated systems for monitoring the evolution of the components of the marine ecosystem under the impact of climate change and human activities is being considered, with the identification of solutions for a sustainable management of maritime activities, including through smart specialization. The research-development strategy of NIMRD and the Institutional Development Plan thus support the National Strategy for Research-Development and Innovation 2014-2022.

The projects related to each specific objective and entered into force starting with 2019 is presented in Table 1, as well as the activities (execution phases) carried out and some examples of their specific results, for the first two years of implementation. The duration of the program is 48 months, between January 2019 and December 2022. The total value proposed for the implementation of the INTEL MAR Program for the entire 4-year duration is 28,275,312 lei. For the first two years, 5,638,034 lei allocated for 2019 and

5,739,112 lei for 2020, less than the initial estimate, but in accordance with the financial resources and the total budget assigned by the national contracting research authority.

To fulfill the objectives of the INTELMAR Programme, documentations and analyzes were carried out, as well as actions on the field and laboratory, within the activities provided for each project. Six projects were contracted, with a total of 34 phases being carried out by the end of 2020 (for administrative reasons, some phases were divided into *a* and *b*, due to their contracting at different stages). The coding imposed by the national contracting research authority started from the code given to the INTELMAR program, PN1926, further adding the objective double digit (in order 01, 02, 03), the project number (01, 02, ... 06) and the phase number, respectively (01, 02, 0n), in accordance with the structure of the program by objectives and projects (important to note for further documentation and orientation activity in the database of the NIMRD library). The projects and phases of the first two years of execution, 2019 and 2020, with generic results, are listed in Table 1 (NIMRD, Annual activity Report for PN1926-INTELMAR Core Programme, 2019).

CONCLUSIONS

The research activity carried out in 2019 and 2020 within the INTELMAR Core Programme (NIMRD, Annual activity report for PN1926-INTELMAR Core Programme, 2020) led to the preparation of 34 scientific reports, which, grouped annually and on a project-by-project basis, form the basis of valuable research studies in support of the proposed objectives. The results were presented by over 35 contributions to scientific meetings, 9 published articles in listed scientific journals, over 27 articles in other relevant publication, two national regulations (ministerial order), one Maritime Spatial Planning Plan. Annually, a significant flow of data was reported to the European Environment Agency (EEA), Intergovernmental Oceanographic Commission (IOC), Commission for Protection Black Sea Against Pollution, General Fisheries Commission for the Mediterranean / the Black Sea Working Group (annual reports), Agreement for the Conservation of the Black Sea, the Mediterranean Sea and contiguous cetaceans North Atlantic Commission, International Commission for the Scientific Exploration of the Mediterranean, European Marine Board (EMB).

The recognition gained by NIMRD at international level is due to the expert reports carried out over the years, based on reliable and continuous data. Romania thus fulfills its obligations under the European directives in this field.

A positive effect was the foundation created by the INTEL MAR Programme to access the European research programs (over 27 projects in international partnership), but also at national level (5 projects).

The capitalization in the economic sector of the results and expertise obtained through the Core Programme was appreciated in 2020 by ongoing collaboration with local authorities and economic operators (13 significant ones), supporting the increase of their economic competitiveness and ensuring their compliance with the requirements for the environment and population protection. This increases the visibility and economic competitiveness of NIMRD. Support was provided for drafting the 2 national regulations (ministerial order). The communication activity during 2019-2020 period was significantly improved, registering a total of 34 TV presentations, 7 Radio shows, 12 newspaper notes, books. The institutional website and Facebook page providing real-time information.

As a result, NIMRD's operational capacity has significantly increased, thanks to the long-term data collection and real-time data production needed to support the decision-making process; improving the national integrated physical, chemical and biological monitoring system; improving methods and techniques / tools for process monitoring and evaluation; the development of both laboratory and field infrastructure and methodologies; the approach of new directions of research and investigation of the marine environment; the development of GIS and remote sensing techniques for coastal surveillance, analysis and forecasting. NIMRD will further provide to the central, regional or local public administration technologies, services / strategic or prospective studies in the areas of responsibility for which it is nominalized.

The INTEL MAR Programme has conveyed a better institutional stability, a security of the human resource in research, allowed to ensure and strengthen the material base of research, as well as the operation of new or existing research laboratories (Laboratory of Molecular and Genetic Biology, Laboratory of Granulometry, Laboratory of Ecology, Laboratory of Measurements and Analyzes, Laboratory of Living Marine Resources, Microscopy and Aquaculture), to adequately meet the quality criteria. The scientific activity and its results were based on fieldwork, ensuring, each time, sufficient evidence for analysis, but also current data / observations, some in real time.

In conclusion, the further funding of the Core Program is perfectly justified, taking into account the real institutional needs, in order to be able to capitalize on the full functional capacity and to provide further useful scientific results and services.

Maintaining sources of funding through national research and development programs is a condition for the proper functioning of the institutes in the national system. The existence, integration and visibility of the national research and development institute and the results obtained so far have been possible through the constant funding of the Core Programs, which has provided basic support since its launch. The Research, Development and Innovation Strategy (RDI Strategy) in the marine and coastal field will be able to be consolidated and sustained by continuing to access funding sources facilitated by the National Research Authority.

Acknowledgement. The full list of thanks has been difficult to be done for more than two decades, within a complex institutional programme. These results would not have been possible without the participation of all NIMRD employees, as well as the support of National Research Authority's specialized departments. We are left with the memory of beautiful collaborations, with the priceless image of each person, with the results of work well done, with the joy that we experienced going through all difficulties of a huge volume of work, beyond any personal restraint. What will continue comes on solid ground and will carry forward the half-century institute's tradition for the benefit of the environment and a responsible community.

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Table 1. The objectives, funded projects, phases achieved in 2019 and 2020 and the final results foreseen for the INTEL MAR Core Program

No.	Objective/Project name	Code	Phases 2019	Phases 2020	Selective final results
Objective 1: Studying the impact of natural processes and anthropogenic activities on the physical components of the marine ecosystem in order to substantiate protection measures and its reduction; Code PN192601					
1	Study of the dynamics of physical and hydro-geomorphological processes in order to assess the risks and vulnerabilities of the marine and coastal area in the context of climate change and anthropogenic pressures	PN19260101	01a, 01b, 02, 03, 04	05, 06, 07a, 07b, 08	Inventory of coastal protection structures and works with an impact on the integrity of the seabed and geomorphology of the coast; Maps representing the mapping of coastal protection structures and the morphology of the adjacent shore; Data sets representing the typology of sediments in the coastal sectors with coastal protection structures; 3D micro-network made by placing in the field the control landmarks (topographic bolts mounted in the dam structure), on which high precision topographic measurement sessions will be performed) in 3 experimental polygons (Mamaia, Constanta, Eforie); Report of the spatial and statistical evaluation of the variability of hydro-geomorphological factors at the level of the Romanian shelf and of the coastal area (waves, level, shallow and offshore currents, upwelling phenomena) and result of determining their cyclicity in the context of climate change; Real-time sea level monitoring station in the Danube mouth area (Sulina) and inclusion in the national leveling network; Coastal station for continuous monitoring of hydrological / hydrodynamic parameters; Validation study of CMEMS models on the Romanian coast; Spatial data sets on shallow hydrodynamics (level, waves, currents) at Constanta and Mangalia stations and shore dynamics (geomorphological profiles of the beach, aerial images, shoreline) after the cold season; Sets of spatial data and thematic maps regarding the dynamics of the geomorphological parameters of the shore in the areas adjacent to the protection structures and in the sectors with evolution in semi-natural regime; Geospatial data sets and meta data necessary for the

					evaluation of hydro-geo-morphodynamical processes according to the INSPIRE Directive, resulting from direct field measurements representing: shallow and regional hydrodynamics (level, currents, waves), coastal geomorphology (beach parameters, bathymetry profiles, digital terrain models, aerial and satellite image collections), types of sediments and their distribution, continuous and impulsive underwater noise, coastal protection structures and other hydrotechnical works, etc.; Evaluation of geomorphological changes resulting from medium and short-term spatial analysis of the evolution of the deltaic and lagoon shores, especially of recent sandy formations; Thematic maps regarding the mapping of the background noise of the Black Sea along the Romanian coast; Study on the correlations between variations in recorded noise and sedimentary material on the seabed.
Objective 2: Complex marine ecology research to characterize the distribution, structure, functions, and interactions of the Black Sea ecosystem components; Code PN192602					
2	Application of emerging environmental DNA metagenomic technologies (eDNA) in assessing the structure and function of the Black Sea coastal ecosystem	PN19260201	01, 02	03, 04	Prospective study on the use of environmental DNA technology (eDNA) in monitoring the communities of organisms in the Romanian marine sector; Romania's integration in regional and international specific networks (eDNA) in marine monitoring; Analysis of the socio-economic impact of the use of environmental DNA technology (eDNA) in monitoring the communities of organisms in the Black Sea; New metagenomic data on the biodiversity of fish communities in the Romanian marine sector; New information on the presence of allogeneic species penetrated in the Romanian sector of the Black Sea through ballast waters from ships, obtained based on advanced metagenomics technologies (eDNA); updating the list of invasive species transported by ship ballast, in the Romanian Black Sea area.
3	Ecological, eco-physiological and biotechnological research of ecosystems in Romanian marine waters	PN19260202	01, 02, 03	04, 05, 06, 07, 08	The inventory of the zoobental species from the updated Romanian marine sector; Qualitative and quantitative data distribution maps; Updated data necessary to establish / review the main ecological indicators that characterize the state of

					<p>marine ecosystems; Information on the role of benthos, of the main functional groups in ensuring the resilience of the marine ecosystem under the conditions of intensifying anthropogenic pressures; Information on the identification of some compounds (pigments) with biologically active properties from selected seaweeds from the Romanian Black Sea coast; Obtaining algal material in laboratory controlled conditions with possibilities of capitalization in various fields; Data on the content of heavy metals, pollutants and lipids of <i>Porphyra</i> specimens obtained in culture compared to those collected from the environment. Common database with information on phytoplankton and zooplankton species (density, biomass of phytoplankton and zooplankton species, as well as physical and chemical parameters (temperature, salinity, nutrients); Qualitative model of the causal relationships between phytoplankton, zooplankton and physical and chemical parameters; Scenarios regarding the environmental conditions (temperature, salinity, nutrients) that favor the development of microalgae in the natural environment; Working methods for testing statistical hypotheses resulting from the analysis of data from the common database; Information on the effects of temperature variations and nutrient concentrations on the development of the diatomaceous species, <i>S. costatum</i>, under laboratory controlled conditions; Information on the role of <i>S. costatum</i> in the marine food chain under the conditions of intensified anthropogenic pressures; Methodology regarding the translocation of endangered species <i>Donacilla cornea</i>, under the conditions of habitat modification through coastal protection works; New data on the possibilities of biotechnological capitalization of mussel shells resulting from the processing of meat in the form of organic calcium; <i>Cystoseira barbata</i> algal material obtained under laboratory controlled conditions for future relocation needs of the species.</p>
4	Development and testing of methods for assessing the ecotoxicity of pollutants under	PN19260203	01, 02a, 02b		<p>Achieving a stable culture of <i>Acartia clausi</i> starting from the adults collected from the natural environment to ensure individuals in early stages of development (larvae, juveniles) for</p>

	specific conditions in the Black Sea, in order to assess the environmental impact				toxicity testing; Development of the protocol for testing the toxicity of some pollutants on the species <i>Acartia clausi</i> ; Data on the toxicity of some dangerous substances on the species <i>Acartia clausi</i> ; Initiation of the database on the toxicity of dangerous substances to organisms in the Black Sea, in order to develop proposals on maximum permissible limits; Study on the state and trend of evolution of living marine resources under the influence of limiting factors; Report on the assessment of the impact of limiting factors on living marine resources; New data from the assessment of the impact of marine currents on living marine resources; Improving the adverse functional effects of Beam trawl on fishery marine resources and their specific habitats; Recent data on the assessment of the health status of the main species of pelagic fish of commercial interest.
Objective 3: The evolution of the distribution of the diversity and productivity of living resources and drafting of the technological bases for the cultivation of some marine species of interest; Code: PN192603					
5	Scientific, technical and technological support for the development of mussel aquaculture on the Romanian coast	PN19260301	01, 02	03, 04	Descriptive list of native and non-native species of bivalve mollusks suitable for aquaculture on the Romanian coast; Descriptive inventory of available technologies, as well as those suitable for application to the Romanian coast for bivalve aquaculture, with an emphasis on mussel aquaculture; Guidance for the designation and sustainable management of Allocated Zones for Aquaculture; Opinion poll to substantiate a market study on the acceptability of seafood in Romania.
6	The impact of limiting factors on living marine resources in the coastal zone and the improvement of stock assessment methodologies and population parameters	PN19260302	01, 02a	02b, 03, 04a	Study on the state and trend of evolution of living marine resources under the influence of limiting factors; Report on the assessment of the impact of limiting factors on living marine resources; New data from the assessment of the impact of marine currents on living marine resources; Improving the adverse functional effects of Beam trawl on fishery marine resources and their specific habitats; Recent data on the assessment of the health status of the main species of pelagic fish of commercial interest.

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