**PN23300202 – Development of an ecosystem-based approach to the sustainability of marine biological resources (jellyfish, macrophyte, molluscs) and of production methods for expanding their biotechnological use**

*Phase no. 3: Analysis of the current situation regarding the availability and accessibility of healthy and sustainable blue foods (resources/products from mussels, rapes, macrophytes) on the Romanian market and their promotion*

Through the research carried out in this phase, non-fish resources from the Romanian Black Sea coast were analyzed, of which marine mollusks (mussels and rapa whelks) are the most valued and commercialized. In addition, based on the developed and analyzed questionnaires, the availability and accessibility of healthy and sustainable blue foods (resources/products from mussels, rapa whelks, macrophytes) on the Romanian market have been evaluated.

A list of blue food products from non-fishery resources from the Romanian Black Sea coast and another one of products in the top of consumer preferences have been elaborated. It has been found that the first list includes few products, and among them breaded mussels and rapana are the most popular. Food products based on seaweed and jellyfish from the Black Sea have not been identified, which indicates s potential for development in this area. Therefore, the Romanian Black Sea coast has a limited range of non-fish resources and the development of other products is necessary to reduce the pressure on the currently exploited resources. At the same time, the multifunctional aquaculture activity currently non-existent on the Romanian coast is one of the priority measures for implementation.

*Phase no. 4: Mapping of benthic and pelagic habitats in the feeding areas of anadromous and pelagic fish in the context of identifying the diversity and available food stocks as well as the quality of benthic and pelagic habitats*

The geophysical, geological, biological, hydrochemical and geochemical surveys carried out in the feeding areas of anadromous and pelagic fish (coastal area between Mamaia-Constanța), in the context of identifying the diversity and available food stocks and the quality of benthic and pelagic habitats, have led to a valuable dataset. The data acquisition took place on board R/V Mare Nigrum, in the MN268 Cruise, which has been held between August 6 – 13, 2024. The geophysical measurements were performed on an area of ​​app. 53.46 km2, being carried out 41 profiles with a total length of 415 km, and the processing of the acquired data allowed to obtain of the following maps: bathymetric map of the study area; map of the reflections of different types of substrates; map of the distribution of sediments and benthic habitats in the study area. From a sedimentological point of view, the studied area is relatively uniform, the sedimentary layer being mostly fine sediments (fine and very fine sand, silt and clay). According to the grain size analysis, 3 types of physical habitats were identified. The first type, which occupies almost the entire surface (99%, 21.282 km2) is represented by fine sediments, the second type is represented by areas covered by rocks, which cover an area of ​​1% (0.1135 km2), while the third type (0.0618 km2) is represented by the areas between or in the immediate vicinity of rocky surfaces, which are mixed sediments with varying proportions of mud, sand and shell fraction.

The characterization of the water column in the studied area is based on the results of the CTD profiles performed in 5 stations and of the analyses carried out in the geochemistry laboratory in Constanța on water samples collected with the CTD system. The following analyses were performed on the collected water samples: nutrients (phosphates, silicates, nitrites, nitrates and ammonium), chlorophyll, mercury and metals in the water. The spatial distribution of the analyzed heavy metals showed lower concentrations at the water-sediment interface compared to the surface layer. Chlorophyll a also showed a slightly higher spatial variability, with a maximum concentration recorded near the city of Constanța, chlorophyll c also registering significantly higher values ​​in the surface layer due to the presence of diatoms among the phytoplankton community.

In terms of sediment sampling and analysis, samples were collected in all 20 stations with the Van Veen grab sampler. Sub-samples were taken for the following analyses: carbonates, organic carbon, heavy metals and mercury. The concentrations of heavy metals in the sediments showed relatively low values, within normal limits. Co and Cd showed concentrations below the detection limit, respectively 0.085 mg/kg in both cases. The other metals analyzed showed concentration values ​​in surface sediments within the following limits: 40.8 – 76.7 ppm (V); 77.9 – 122 ppm (Cr); 25.6 – 47.5 ppm (Ni); 8.7 – 27.2 ppm (Cu); 42.9 – 76.3 ppm (Zn); 4.7 – 8.6 ppm (As); 12.8 – 22.8 ppm (Pb) and 0.03 – 0.10 ppm (Hg).

The pelagic habitat demonstrated a good status in terms of structural and functional parameters; both diversity and zooplankton production were high compared to the 90s. The holoplanktonic zooplankton communities were composed of: 3 species of cladocerans, of which *Penilia avirostris* reached almost 85% of the total abundance, 4 species of copepods, of which *Acartia clausi* and *Centropages ponticus*, with over 55%, 2 cnidarian species, *Podocoryne carnea* and *Podocorynoides minima*, both, but especially the latter, recording considerable densities, up to 30% of the total abundance, *Oikopleura dioica* and *Parasagitta setosa*, which were notable for their biomass and, especially, for their high demographic diversity, suggesting a reproductive peak.

In the case of benthic habitats (infralittoral mud and sandy-muddy with *Upogebia pusilla* and circalittoral mud and sandy-mud with *Upogebia pusilla*), a recovery of endangered and/or rare species populations has been observed in the last decade. Thus, the reappearance of mollusk species macrobenthic (*Donax trunculus, Lucinella divaricata, Pitar rudis*) associated with sedimentary bottoms in the shallow areas represents a major event for the infralittoral habitats. The taxonomic composition of these communities was represented by 44 species, dominated by habitat-forming species, such as *Upogebia pusilla, Abra nitida*, together with associated species such as *Heteromastus filiformis, Spio decorata, Micronephthys longicornis* and *Prionospio maciolekae*. While the most important trophic resource for pelagic fish is zooplankton, for anadromous fish such as sturgeons, it consists of macrobenthic species (*Heteromastus filiformis, Ampelisca sp.* etc.). The presence of these species in high abundances, together with larvae of decapods, polychaetes, bivalves etc., indicates that the studied areas are suitable for the reproduction and feeding of anadromous and pelagic fish.

Dissemination of results:

Papers published in ISI journals:

* + **Menabit, S.,** Lavin, P., **Begun, T., Muresan, M., Teaca, A.,** Purcarea, C. 2024 - First screening of bacteria assemblages associated with the marine polychaete Melinna palmata Grube, 1870 and adjacent sediment. Frontiers in Marine Science, 10. DOI10.3389/fmars.2023.1279849. IF 2.8 - Q1
  + **Popa, A., Stanciu, IM.,** Dragusin, V., **Teaca, A., Balan, SV.,** Popa, ME., **Ion, G., Ispas, BA.** 2024 Geophysical and geochemical investigations of underwater sulphurous seeps from Western Black Sea (Mangalia area, Romania), in support of habitat conservation. Frontiers in Marine Science, 11. DOI10.3389/fmars.2024.1414673. IF 2.8 - Q1

Papers published in BDI journals:

* **Popa, A., Stanciu, IM., Teaca, A., Begun, T., Ispas, BA., Popa, ME., Ion, G.** 2024 - Physical habitat structure in marine ecosystems: Case study Reyna Bay Constanta. *Geo-Eco-Marina, 30*, 1-14 pp.