



**Międzynarodowa Środowiskowa Szkoła Doktorska
przy Centrum Studiów Polarnych
w Uniwersytecie Śląskim w Katowicach**

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IEDS/2026/IO/04

Title of PhD project: Role of benthic macrofauna in biogeochemical processes and carbon cycling in coastal environments under changing environmental conditions

The leading unit: Institute of Oceanology Polish Academy of Sciences

Requirements:

The candidate is expected to:

1. Hold a Master's degree or equivalent in oceanography, marine biology, ecology, biology, environmental protection, Earth and environmental sciences, or a related discipline.
2. Have knowledge of marine ecology, functioning of coastal ecosystems and benthic communities, or organic matter cycling in the marine environment.
3. Have experience in laboratory work involving benthic organisms.
4. Be familiar with basic statistical methods used in ecology or biology.
5. Demonstrate an interest in carbon cycling in coastal ecosystems and functioning of marine sediments.
6. Have a good command of English, sufficient for working with scientific literature, writing scientific manuscripts, and communicating within an international research group.
7. Be willing to participate in fieldwork, laboratory experiments, data analysis, and collaboration within an interdisciplinary and international research team.

Additional assets:

1. Experience in the analysis of ecological or environmental data, preferably using the R programming language.
2. Interest in long-term scientific development, including publishing results in international journals.
3. Experience in fieldwork in marine and coastal environments.

Tasks description:

1. Taking part in research on the role of benthic communities in regulating biogeochemical processes and carbon cycling in coastal ecosystems.
2. Participation in fieldwork, including biological, sediment, and environmental sampling.
3. Analysis of taxonomic composition, structure, biomass, abundance, and/or functional traits of benthic macrofaunal communities.
4. Preparation, organization, and harmonization of biological, biogeochemical, and environmental datasets obtained from various sources.
5. Statistical and ecological analyses, including multivariate analyses and analyses of relationships among benthic community structure, sediment properties, and carbon cycling processes.



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6. Results interpretation in the context of coastal ecosystem functioning.
7. Preparation of scientific publications and conference presentations.
8. Collaboration with team members as well as national and international partners.

Summary of a doctoral project:

The proposed research topic focuses on the role of benthic macrofauna as a key regulator of biogeochemical processes in coastal sediments, including seagrass ecosystems. The activity and diversity of benthic organisms inhabiting the surface layer of marine sediments influence the rate of organic matter mineralization, as well as the magnitude and direction of nutrient fluxes across the sediment–water interface. However, the dynamics and mechanisms of these interactions, and consequently the ability to predict them, remain insufficiently understood. This issue is of particular importance in coastal ecosystems, which potential for carbon storage has not yet been fully quantified.

This doctoral project aims to assess the influence of benthic fauna on carbon cycling and related biogeochemical processes using incubation experiments and field studies. The research will take into account the various environmental conditions occurring across different coastal areas, as well as the effects of thermal stress, thereby placing the obtained results within a broader context of coastal ecosystem functioning under changing environmental conditions.

Other information:

The work will be carried out under supervision of:

Prof. Monika Kędra IO PAN (kedra@iopan.pl)

Dr Marta Szczepanek IO PAN (slominska@iopan.pl)

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