

OPINION
on the PhD dissertation

for the award of the educational and scientific degree **“Doctor” (PhD)** in the professional field **5.5. Transport, Navigation and Aviation**

Topic of the dissertation: **“Optimization of the management of marine coastal macro-litter along the Bulgarian Black Sea coast “**

Author of the dissertation: **Miroslava Damyanova Robinson**, TU - Varna

Reviewer: **Assoc. Prof. PhD Elena Katelieva Katelieva**, Nikola Vaptsarov Naval Academy, Varna

This opinion has been prepared in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, its Implementing Regulations, and the Regulations for the preparation of an opinion on a dissertation for the award of the educational and scientific degree “Doctor” at the Technical University – Varna.

1. Relevance of the research problem addressed in the dissertation

Marine litter pollution represents a global environmental problem that negatively affects the marine environment and coastal ecosystems. Despite numerous studies on the subject, the insufficient development of effective systems for managing marine coastal macro-litter necessitates the implementation of the present research, which focuses on identifying the main problems and challenges related to the protection of the marine environment.

The accumulation of marine litter deteriorates the quality of the marine environment, causes health risks, and reduces the economic potential of coastal areas. This determines the relevance of the problem addressed in the dissertation and highlights its importance from environmental, health, economic, and social perspectives.

The doctoral candidate, Eng. Miroslava Robinson, has carried out a detailed study of the spatial distribution of marine litter, its seasonal dynamics, and the factors determining its entry, distribution, and accumulation in the marine environment and along coastal areas. The analysis of 213 literature sources, the conducted research, and the contributions declared in the dissertation provide sufficient grounds to conclude that the author possesses an in-depth understanding of the research topic.

In the dissertation, Eng. Miroslava Robinson presents her position on issues related to marine environmental pollution. Opportunities for improving the monitoring and management system for marine coastal litter in Bulgaria have been identified and analyzed. Recommendations have been proposed for optimizing the subsystem “Monitoring of Marine Coastal Macro-Litter along the Bulgarian Black Sea Coast.”

The selected research methodology includes both systemic and analytical approaches. The study synthesizes information regarding the current state of the problem and applies in situ methods, laboratory-analytical activities during a four-season monitoring of marine litter, as well as drone-based observations. The processing of the obtained results includes analysis and synthesis, as well as retrospective and comparative analyses. These methods have enabled the doctoral candidate to successfully address the research tasks and achieve the objectives set in the dissertation.

2. Scientific and scientific-applied contributions of the dissertation

2.1. Scientific novelty (new approaches and methods)

- A methodology has been developed for assessing the load of marine macro-litter on sandy beaches, which includes parallel conduct of conventional monitoring and drone surveillance, as well as a comparative analysis of the results obtained.

2.2. Contribution to the enrichment of existing knowledge

- A one-year monitoring study covering four seasons has been carried out on marine coastal macro-litter, including the determination of the seasonal dynamics of shoreline variation. New data have been obtained and the composition, density, accumulation, and seasonal dynamics of marine coastal litter have been evaluated.
- The marine litter load and the condition of the beach strip within the Orlovo Blato monitoring site for the year 2024 have been assessed. The seasonal dynamics and the dominant factors influencing the entry, transport, and accumulation of marine litter have been analyzed.
- Confirmatory data have been obtained demonstrating the key importance of water currents and wind fields in the transport of marine litter deposited along the coast of the Northern Black Sea region.

2.3. Practical application of scientific results and economic significance

- The developed methodology has been applied to test the applicability of drone-based observations at the Orlovo Blato monitoring site. Data have been accumulated that can be used for scientific research purposes as well as for preventing and limiting pollution by coastal macro-litter.
- The applicability of aerial drone observations for environmental monitoring of marine coastal macro-litter has been demonstrated.
- A set of complementary measures has been proposed to optimize the subsystem “Monitoring of Marine Coastal Macro-Litter along the Bulgarian Black Sea Coast.” These measures will contribute to obtaining accurate and up-to-date monitoring information, ensuring more effective management of marine litter.

3. Critical remarks and recommendations

I have no critical remarks regarding the content of the dissertation. I recommend that the dissertation candidate promote the results of her research so that they reach interested institutions in Bulgaria (Ministry of Environment and Water). The analysis and recommendations presented in the dissertation can be used in developing a clear definition of "marine litter", optimizing the monitoring and management of marine coastal macro-litter and in activities related to environmental protection.

Conclusion

My assessment of the dissertation thesis submitted by Eng. M. Robinson is positive. The author demonstrates thorough and in-depth knowledge of the research topic and the ability to solve significant scientific problems. Based on the presented research, its relevance, the scientific-applied contributions contained in it, I find it reasonable to propose to the esteemed Scientific Jury to award Eng. Miroslava Damyanova Robinson the educational and scientific degree **Doctor (PhD)** in the doctoral program **“Systems and Devices for Environmental Protection”**, within the professional field 5.5 **“Transport, Navigation and Aviation.”**

13 March 2026

Prepared by:

Assoc. Prof. PhD Elena Katelieva