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S T A T E M E N T

by Prof. Dr. Mariyana Nikolova, National Institute of Geophysics, Geodesy and Geography at the Bulgarian Academy of Sciences, on a PhD thesis submitted for defense to a Scientific Jury, formed by order No. 96/23.12.2024 of the Director of Institute of Biodiversity and Ecosystem Research (IBER-BAS) for the acquisition of an educational and scientific degree "Doctor" in the field of higher education code 4. "Natural Sciences, Mathematics and Informatics", professional field 4.3. "Biological Sciences", scientific specialty "Ecology and Ecosystem Protection", at the Department "Ecosystem Research, Ecological Risk and Conservation Biology" of IBER-BAS.

Author of the PhD thesis: Kostadin Marinov Katrandzhiev

Title: "Spatial analysis and assessment of the state and ecosystem services of ecosystems in the upper forest line of Rila" (form of presentation - bound articles)

Kostadin Katrandzhiev is graduated as a bachelor "Ecologist" and a master of "Ecological Management" from the New Bulgarian University, Sofia. He was a full-time doctoral student at IBER - BAS in the period 01.01.2016 - 31.12.2018 and was discharged with the right to defend his thesis on 01.01.2019. In the implementation of his educational program, he has so far completed one language and eight specialized computer courses, as well as specialized training at the Institute for Space Research and Technology (ISRT) at BAS. This good preparation contributes to the application of modern methods and techniques in the presented study and to the achievement of the set goal and four tasks to it.

The PhD thesis contains 58 pages plus 87 pages of bound publications on the investigated topic. It contains 10 sections, including five tables and 17 figures. There are 73 sources cited. The part with the results and discussions of the research conducted is presented in four scientific publications (two of them are in journals indexed in the world databases and one is only prepared for publication). This is in accordance with Art. 9 of the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at the Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences, which allows the thesis to be presented in the form of bound scientific publications. The abstract is 26 pages long and sufficiently reflects the content of the dissertation.

The aim of the study is to conduct a "critical analysis and assessment of the functional state of a defined highland ecosystem in the southwestern parts of the Rila National Park, as well as an

assessment of its capacity to provide selected ecosystem services, with the application of remote sensing methods and geoinformation technologies". To achieve this, the following tasks have been completed: 1. Structural and functional characterization of a selected highland ecosystem on the territory of the Rila National Park; 2. Analysis and assessment of existing data; 3. Assessment of the functional state of the selected highland ecosystem using vegetation indices through remote sensing (orthophoto, satellite), GIS-based and other methods; 4. Selection and assessment of ecosystem services in the highland ecosystem (with a focus on cultural ecosystem services). The study is essentially interdisciplinary, and its basis is the idea of determining the relationship between the observed dynamic changes in highland ecosystems and climate change. Although the latter do not appear in either the title or the aim and objectives of the dissertation, two of the contributions (one scientific and one methodological) confirm this. This fact emphasizes the relevance of the topic and the importance of these studies for solving a number of methodological and practical problems in connection with the assessment of the vulnerability/resilience of highland ecosystems to climate and other environmental changes, as well as their adaptability to changing conditions. The chosen methodological approach is in line with the aim of the study and represents an adapted version of the Methodological Framework for Assessment and Mapping of the State of Ecosystems and Ecosystem Services in Bulgaria, in the part of the framework concerning the Methodologies for Assessment and Mapping of the State of Forest, Grassland, Shrub and Ericoid Ecosystems and Their Ecosystem Services and a Whole System Approach. The proposed methodology for assessing highland ecosystems and services is based on a wide range of data (spatial, climatic, remote sensing and field studies) and on various methods for their interpretation using specialized software products (ArcGIS, ArcMap 10.3, ERDAS 14.0). The results presented in the scientific publications on the PhD thesis fully correspond to the tasks set and leave no doubt that they have been fulfilled. The conclusions are well structured and reasoned. The results convincingly defend the contributions of the dissertation work, indicated in the reference to it, which are structured as scientific, methodological and scientifically applied and are essential.

CONCLUSION:

Based on the presented original author's scientific results and the compliance of the documents under the procedure with the requirements of the Law on the Protection of Biological and Biological Resources of the Republic of Bulgaria and the Regulations for its implementation at the Institute of Biological and Biological Resources of the Republic of Bulgaria - BAS, I give a

positive assessment of the presented dissertation work and recommend to the Scientific Jury to vote "FOR" awarding the scientific and educational degree "Doctor" to Kostadin Marinov Katrandzhiev in the field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.3. "Biological Sciences", scientific specialty "Ecology and Conservation of Ecosystems", at the Department of "Ecosystem Research, Ecological Risk and Conservation Biology" of the Institute of Biological and Biological Resources of the Republic of Bulgaria - BAS.

Date: 18.03.2025 **PREPARED THE STATEMENT:**

Prof. Dr. Mariyana Nikolova