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OPINION

on the dissertaon for awarding the educaonal and scienfic degree "Doctor" in the scienfic specialty: 02.22.01 "Ecology and Ecosystem Conservaon"

Author of the dissertaon: Kostadin Marinov Katrandzhiev, full-me doctoral student at the Instute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences (IBER-BAS). Field of higher educaon: 4. "Natural Sciences, Mathemacs, and Informacs"; professional field: 4.3. "Biological Sciences"; scienfic specialty: "Ecology and Ecosystem Conservaon" in the Department of " Department of Ecosystem Research, Environmental Risk Assessment and Conservaon Biology" at the Instute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences, with academic supervisor Assoc. Prof. Dr. Svetla Valova BratanovaDoncheva and scienfic consultants Prof. Dr. Nesho Hainrih Chipev and Prof. Dr. Stoyan Tsvetanov Nedkov.

Dissertaon topic:
Spaal analysis and assessment of the status and ecosystem services of ecosystems in the upper forest boundary of Rila

Member of the scienfic jury:
Prof. Dr. Tzvetan Mladenov Zlatanov, Instute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences.

Relevance of the Issue
The topic of the dissertaon is relevant in the context of the increasingly necessary adapve management of natural ecosystems in response to climate change condions and the insufficient understanding of the dynamics in high-mountain ecosystems, as well as the role of remote sensing methods in assessing their status.

Level of knowledge of the issue and creave interpretaon of the literature review At the required level.

Goal, tasks, hypotheses, and research methods. Consistency of the chosen research methodology with the stated goals and tasks of the dissertaon

The goals and tasks are formulated in a clear manner, providing a solid foundaon for construcng the dissertaon. The research objects are described in detail. In this part of the dissertaon, improvements are observed compared to the inially presented versions, such as the analyses being described in more details and addional informaon being provided about the studied objects. The chosen methodology aligns with the stated goals and tasks. Significant improvements have also been made in the formulaon of the conclusions and contribuons of the dissertaon, both scienfic and praccal. At the same me, it should be noted that from the very beginning of the work, the doctoral student atempted to cover a very broad range of issues, which hindered a deeper exploraon of many of the topics addressed (especially those related to forest ecosystem management). In the assessment/analysis of parameters directly related to the structural-funconal characteriscs of the chosen high-mountain ecosystem in the Rila Naonal Park, observaons were made with very few field measurements, which I consider to be unconvenonal. This includes the almost complete absence of high-resoluon remote sensing images, taken by the researcher. This was compensated by the extensive use of vegetaon indices through remote sensing (orthophotos, satellite data) and other methods. What has been said does not diminish the achievements of the dissertaon, but it does make it somewhat unconvenonal, according to my understanding.

Visualizaon, presentaon and discussion of the Results

The results are presented in sufficient detail and at a good level. In my opinion, the discussion is somewhat less emphasized, parcularly in the atached publicaons. Personally, I do not prefer the approach where a discussion does not follow the presentaon of the results. This way, the sense of coherence in the work is lost. Nevertheless, I respect the doctoral student's decision and accept it.

Conclusions, recommendaons and contribuons

The conclusions, recommendaons, and contribuons presented are consistent with the results established in the work and are significant. I have a comment regarding conclusion 3 – I quote: "The overall study proves that high-mountain ecosystems are dynamic and primarily sensive to changes in climac condions" – this is too general as a conclusion. I also believe that conclusion 5 – I quote "...based on the results regarding the status of the vegetaon cover, it is concluded that the studied highmountain ecosystem demonstrates resilience and flexibility" – in order to make such a conclusion, physiological studies and those related to the growth of the main tree species constung the studied high-mountain ecosystem would be necessary.

Assessment of the doctoral student’s personal contribuon to the work The doctoral student has made a sufficient personal contribuon.

Other comments:

I would like to note that the enre text is presented at a good level, both in terms of language and wring style.

Quesons:
I have none.

Evaluation of the credits achieved and publicaons related to the dissertaon:
Sufficient and in accordance with the requirements. Congratulaons on the published paper in the presgious journal "Diversity."

CONCLUSION:
Based on the methods learned and applied by the doctoral student, the properly conducted experiments, and the generalizaons and conclusions drawn, I believe that the presented dissertaon meets the requirements of the Higher Educaon and Science Act and the Regulaons for its applicaon, which gives me grounds to evaluate it as **POSITIVE**.
I recommend the esteemed Scienfic Jury to also vote posively and award Kostadin Marinov Katrandzhiev the educaonal and scienfic degree "Doctor" in the scienfic specialty: 02.22.01 "Ecology and Ecosystem Conservaon."

Date: 27.02.2025

Opinion by:

Sofia

Prof. Dr. Tzvetan Zlatanov