UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
INSTITUTO DE BIOCIÊNCIAS
DEPARTAMENTO DE ECOLOGIA

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EVALUATION OF THE DOCTORAL DISSERTATION OF RAYANE FERNANDES VANDERLEY, ENTITLED "SPATIAL AND TEMPORAL PATTERNS OF PHYTOPLANKTON IN TROPICAL AND TEMPERATE LAKES", DOCTORAL SCHOOL OF CHEMISTRY AND ENVIRONMENTAL SCIENCES, UNIVERSITY OF PANNONIA.

CLASSIFICATION: Recommend for acceptance

GENNERAL COMMENTS

The theme of the dissertation is current and scientific relevant as it discusses the temporal and spatial variation of the phytoplankton community, including cyanobacteria in tropical and temperate aquatic ecosystems, contributing with relevant aspects of the ecology of these organisms. Some of the work's constitutions have direct implications from the point of view of the multiple uses of aquatic ecosystems, since mechanisms and processes related to climate change were explored in the work both in tropical ecosystems and in the studied temperate lake.

The thesis is well structured and organized. In general, it presents the following items: Abbreviations, Summary, Resumo (in Portuguese), General introduction, Scientific achievements, three chapters (each with introduction, methodology, results and discussion), General discussion and future global change scenarios, Conclusion, Acknowledgment, References, List of academic activities during the doctoral training, Supplementary material.

The dissertation exhibits a robust literature review, presenting classic and updated studies on the ecology of the phytoplankton considering the approaches, themes and ecosystems studied.

The scientific backgrounds related to the topics are well presented in the general introduction of the dissertation, but also in the introduction of each of the three chapters presented.

The general introduction is very well organized and revisits the main themes covered in a concise manner. In a very clear and objective way, it contextualizes from aspects of the evolutionary history of phytoplankton, the initiative of functional approaches, the influence of spatial and environmental filters and interactions in the control of community patterns, finally, culminating in aspects related to eutrophication and cyanobacteria blooms.

The objectives presented in each chapter were properly grounded in the respective introductions and critically based on scientific literature. The methodological design was correctly applied in each of the chapters according to the proposed objectives. The methods used are considered suitable, modern and reliable by the scientific community for achieving the proposed objectives.

The graphs, figures and tables are clear and understandable, comprising the results of each chapter.

The results presented in the chapters are adequate and accurately based on statistical tests. Likewise, the results are properly compared to findings in the scientific literature. The conclusions of each chapter are adequately established based on the results obtained.

A topic of general discussion and global change scenarios is properly presented, integrating the main results obtained in the chapters linked to the climate change scenario, showing its implications in a more direct way.

Finally, the conclusions summarize the main products of the thesis as a whole, extrapolating the ecological mechanisms and processes involved in the observed patterns for phytoplankton ecology and dynamics for other systems.

Regarding candidate's publication activity related to the dissertation, two manuscripts were already published in highly relevant scientific journals (Environmental Monitoring and Assessment; Hydrobiologia), evidencing the quality of the results achieved and the propriety with which they were discussed.

Considering the strengths and the new scientific results of the dissertation, the following points may be highlighted, in my view:

1) A very relevant aspect today is knowing how climate change will impact ecosystems and aquatic communities, given their peculiarities considering, for example, typology, latitude and trophic state. A very important result presented for the studied tropical reservoirs (Brazilian semi-arid region, Chapters I and II) was that face of a prolonged atypical drought scenario effects in the rainy periods, other than the expected dilution of nutrients or increase in depth or volume of water were observed. Instead, higher concentrations of nutrients and suspended solids, together with reduced Zeu, influenced the functional structure of phytoplankton. Furthermore, the effects of drought-induced water level reductions were identified as drivers of the biomass and composition of cyanobacterial blooms in these tropical reservoirs. This has direct implications for the purpose of research that seeks to understand the effects of climate change on tropical aquatic ecosystems, so that extreme events cannot be neglected, nor should only conventional limnological responses be expected.

2) Likewise, the contribution presented in Chapter III showed that long-term monitoring is extremely important regarding the responses face to the climate change. Based on this, in the studied lake (deep, dimictic, sometimes warm monomitic), it was possible to register a dominance never seen before of cyanobacterial species. Furthermore, the study showed that classic limnological investigation methods (profile measurements, for example) need to be revisited so that commonly uninvestigated events, such as the Deep Chlorophyll Maximum, are captured.

The results of the present work constitute an important contribution to the ecology of the phytoplankton community of temperate and tropical aquatic ecosystems. Thus, after a critical evaluation, the content presented in the thesis demonstrates the student's involvement and

scientific maturity, with the development, results, discussion, conclusions and scientific contributions *adequate to a PhD title achievement.*

Thus, after careful evaluation of the candidate's doctoral thesis, I recommend it for acceptance, highlighting the quality of the research and the scientific contribution of the generated knowledge.

Porto Alegre, May 22nd, 2023.

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