

Influence of salinization and water intermittency on morphological and biological characteristics of the genus *Luciobarbus* Heckel, 1842: comparative approaches

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Abstract

Context/Purpose: Climate change presents a significant challenge in Morocco, particularly in relation to its impact on freshwater ecosystems. The country's arid zones, characterized by limited rainfall and high evaporation, are experiencing increasing salinity levels, while once flourishing wetlands are facing a range of altering factors.

Methods: This unique duality provides an opportunity to explore the effects of high salinity on freshwater fish, specifically focusing on species of the *Luciobarbus* genus found in two contrasting watersheds - Draa and Zat. By comparing various biological and morphological characteristics, this research aims to understand the impact of salinity and intermittency on these fish.

Results: Investigation findings reveal significant differences among the studied populations. Fish in the Haut-Draa basin, characterized by lower salinity and permanent water presence, showcased a higher gonadosomatic index, suggesting more active sexual activity at 13%. Conversely, fish in the Middle Draa basin, with intermittent and higher salinity conditions, exhibited a much lower index of 4%, implying a slower rate of sexual activity. Additionally, the weight-length relationship varied across basins, with the Middle Draa basin recording the lowest scaled mass index of 11 g, while the Zat basin exhibited the highest at 14 g. The morphological analysis also displayed notable distinctions in fish from the Middle Draa basin, with shorter total and standard lengths compared to counterparts from the Haut-Draa and Zat basins.

Interpretation: The results suggest that high salinity and intermittence impact the reproductive activity, weight-length relationships, and morphological characteristics of *Luciobarbus* species. The differences observed between the basins underscore the influence of environmental stressors on freshwater fish populations.

Conclusion: These findings underscore the need for a comprehensive understanding of the challenges posed by high salinity in different regions, providing a foundation for the development of effective conservation and adaptation strategies. By mitigating the impacts of climate change on freshwater ecosystems and the organisms' dependent on them, it is possible to safeguard these valuable resources for the future.

Keywords: Draa and Zat Basin, Freshwater fish, *Luciobarbus* genus, Salinization, Intermittency, Biological parameters.