



Abstract

Are Cyanobacteria an Overlooked Risk for Ecosystems and Visitors in Spanish National Parks? [†]

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Abstract: Potentially toxic cyanobacterial communities are prolific in freshwater ecosystems and in national parks where vulnerable fauna tend to be found. This study focuses on the proliferation of toxic cyanobacteria and the risks they represent in the rivers and reservoirs of two Spanish national parks. As far as we know, this is the first time that an ecological, taxonomical and toxicological characterization of planktonic and benthic cyanotoxin-producing cyanobacteria is carried out in this type of protected areas in Spain. Our results, obtained during 2021 sampling campaigns, have confirmed the occurrence of cyanobacteria in these ecosystems and assessed the risks of these cyanobacteria to these ecosystems. An alarming occurrence of benthic mats, dominated mainly by *Phormidium autumnale* (also called *Microcoleus autumnalis*), a potentially anatoxin producer, has been observed in rivers from Sierra de Guadarrama National Park. In reservoirs from Monfragüe National Park, the planktonic communities have been dominated by *Microcystis*, *Aphanizomenon*, *Arthrospira* and *Planktothrix*. Genetic screening by PCR and sequencing have confirmed the presence of cyanotoxin biosynthesis genes (*mcyE*, *anaF* and *sxtA*) in all communities studied. The relationship among community diversity, the presence/concentration of cyanotoxins (microcystins, saxitoxins and anatoxins) and the environmental parameters measured is discussed. These results will contribute to preparing protocols for evaluating and managing the potential risk to visitors to, workers in and fauna of these protected ecosystems.

Keywords: planktonic; benthic; *Phormidium*; anatoxin; microcystins; saxitoxins



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