

Title: Key challenges facing saline lakes: Findings from participants at the 15th International Conference on Saline Lakes Research

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Abstract

At the 15th International Conference on Salt Lake Research a survey was conducted to gather insights from participants on the key challenges facing saline ecosystems, with a focus on saline lakes. The main goal of this review is to explore the current status of research on saline ecosystems by addressing four main questions: (i) in what parts of the world are saline ecosystems being studied; (ii) what social and ecological issues threaten the stability of saline ecosystems globally; (iii) what are the consequences if those social and ecological issues threat are not resolved; and (iv) what current and past restoration plans and projects have been successful in addressing threats to saline ecosystems. First, we briefly discuss the diverse ecological characteristics of saline lakes, other saline ecosystems, and the importance of their ecosystem services. Second, we provide an overview of the types of research being conducted on saline ecosystems. Finally, we review the findings from the survey and how those findings shape our understanding of saline ecosystems. Survey results indicate that the primary drivers of saline lake decline are agricultural water use and climate change including factors such as increased temperature and decreased precipitation. The most frequently identified consequences of declining lake levels include ecological imbalance and loss of ecosystem services, followed by reduced biodiversity and diminished water quality. Additionally, the survey revealed that while restoration efforts are in place for 50% of the studied ecosystems, their effectiveness varies significantly.

1. Introduction

Saline lakes, defined as water bodies with salinity exceeding 35 g/L, are some of the most ecologically unique environments on Earth. These ecosystems support highly specialized biota, including halotolerant and halophilic organisms, which thrive in extreme conditions. Despite their ecological and biological importance (Gajardo & Redón, 2019; Saccò et al., 2021; Shadrin, 2018; Williams, 2002) saline lakes are often perceived as having low commercial value, overshadowing their role as biodiversity hotspots and their potential as reservoirs of critical resources, such as sodium chloride, magnesium chloride and lithium which has become vital to modern technology and industrial uses.

The distribution of saline lakes is largely concentrated in arid and semi-arid regions, which make up approximately 40% of the Earth's terrestrial landscape (Okin et al., 2006). Also,