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Global drying of major saline lakes

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Water resources are deteriorating across the world, which is of particular concern in water-scarce arid and semi-arid regions. Saline lakes often lack outflow, and are vulnerable to environmental change. When they start to shrink, salinity levels increase, due to evapoconcentration of salts in the reduced water volumes. This may harm the aquatic environment and limit the usability for humans. The associated exposure of their dry lakebeds may also bring severe regional problems of wind-blown saline dust and soil degradation. Although some of the world's major cases of lake drying have been well studied, like the case of the Aral Sea desiccation, there is a lack of coherent assessments made at the global scale. Such assessments are critical for identifying vulnerable regions and main drivers of change, which may contribute to the prevention of future catastrophes. We here synthesise information on and analyse the desiccation status of 28 major saline lakes, each one of them having a surface area of $\geq 100 \text{ km}^2$ and salinity of $\geq 10 \text{ g}\cdot\text{L}^{-1}$. They are geographically distributed over the world's all continents, except Europe and Antarctica. In total, our results show that more than half of the world's major saline lakes have dried up considerably in the last couple of decades. Out of these, 36 % are already, or are close to being completely desiccated. Preliminary analyses show correlations between original lake depth, lake bathymetry and resulting lakebed exposure from drying, suggesting that a lake's general resilience to drying may be predictable. Our estimates further show that the world's major saline lakes together contain 1177 billion tonnes of salt, of which 79 billion tonnes are currently in drying or already dried up lakes. If all of these lakes would desiccate, around 1 billion people are currently living within reach of saline dust storms that could spread from dry lakebeds.