



# Weathering of evaporites: natural versus anthropogenic signature on the composition of river waters

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**Abstract** Weathering of evaporites strongly influences the chemistry of continental runoff, making surface waters poorly exploitable for civil uses. In south-central Sicily, this phenomenon is worsened by the occurrence of abandoned landfills of old sulphur and salt mines. The industrial evolution of the Bosco-S. Cataldo mining site leaved two landfills from the early exploitation of a sulphur mine followed by that of a kainite deposit. In particular, the weathering of these landfills leads the dissolved salt (TDS) values up to about 200 g l<sup>-1</sup> in the Stincone–Salito Stream waters. This process induces the V, Cr and Fe desorption from sediments and particulates in the aqueous phase under reducing conditions. At the same time, the weathering of salt minerals releases Rb and Cs, originally contained in halite.

The overall processes lead to the V, Cr, Fe, Rb and Cs enrichment of waters from the Stincone–Salito Stream system accompanied by a sharp growth of As content, up to about 13 µg l<sup>-1</sup>, caused by As release from Fe-bearing solids due to the high salinity. Therefore, the scenario of the weathering of Bosco-S. Cataldo mine landfills depicts an environment strongly influenced by effects of the growing salinity and euxinic water conditions where the attained TDS, Eh and pH conditions reduce the natural scavenging capability of the interested river system, favouring a growth of residence time of toxic elements in river waters.

**Keywords** Evaporites · Trace elements · Landfill · Salt waters

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## 1 Introduction

South-central Sicily is a semi-arid area with about 544 mm annual precipitation (Bellanca and Neri 1993; Bordi et al. 2004), where the presence of about 1 million people and

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