

Aspects of environmental impacts of seawater desalination

Cyprus as a case study

Xevgenos, D.; Marcou, M.; Louca, V.; Avramidi, E.; Ioannou, G.; Argyrou, M.; Stavrou, P.; Mortou, M.; Küpper, F. C.

DOI

[10.5004/dwt.2021.26916](https://doi.org/10.5004/dwt.2021.26916)

Publication date

2021

Document Version

Final published version

Published in

Desalination and Water Treatment

Citation (APA)

Xevgenos, D., Marcou, M., Louca, V., Avramidi, E., Ioannou, G., Argyrou, M., Stavrou, P., Mortou, M., & Küpper, F. C. (2021). Aspects of environmental impacts of seawater desalination: Cyprus as a case study. *Desalination and Water Treatment*, 211, 15-30. <https://doi.org/10.5004/dwt.2021.26916>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

Aspects of environmental impacts of seawater desalination: Cyprus as a case study

D. Xevgenos^{a,b,*}, M. Marcou^c, V. Louca^d, E. Avramidi^d, G. Ioannou^c,
M. Argyrou^c, P. Stavrou^c, M. Mortou^b, F.C. Küpper^{d,e,*}

^aTU Delft, Applied Sciences Faculty, Lorentzweg 1, 2628 CJ Delft, The Netherlands, email: D.Xevgenos@tudelft.nl

^bSEALEAU B.V., Rotterdamseweg 183 C, 2629 HD Delft, The Netherlands, emails: d.xevgenos@sealeau.com (D. Xevgenos), m.mortou@sealeau.com (M. Mortou)

^cDepartment of Fisheries & Marine Research, Ministry of Agriculture Natural Resources & Environment, Nicosia, Cyprus, emails: mmarcou@dfmr.moa.gov.cy (M. Marcou), margyrou@dfmr.moa.gov.cy (M. Argyrou), pstavrou@dfmr.moa.gov.cy (P. Stavrou)

^dSchool of Biological Sciences, University of Aberdeen, Cruickshank Building, St. Machar Drive, Aberdeen AB24 3UU, Scotland, UK, emails: fkuepper@abdn.ac.uk (F.C. Küpper), v.louca@abdn.ac.uk (V. Louca)

^eMarine Biodiscovery Centre, Department of Chemistry, University of Aberdeen, Aberdeen AB24 3UE, Scotland, UK

Received 27 July 2020; Accepted 7 December 2020

ABSTRACT

Cyprus relies on seawater desalination for a large part of its drinking water supply, with reverse osmosis providing more than 95% of the total desalination capacity in the country. Nevertheless, the environmental impacts of desalination for the Cypriot environment remain poorly understood. Using a combination of mining existing governmental and corporate survey data and reports, this study explores the scale of desalination in Cyprus, the impacts on the coastal marine environment and its overall carbon footprint. Surveys of *Posidonia oceanica* seagrass meadows show strongly reduced density of shoots and leaf surface area, respectively. Analysis of the available data relating to the overall production of desalinated water and energy consumption reveals that 68.7 million m³ of desalinated water were produced in Cyprus in 2017, resulting in the release of 160 ktons of CO₂ equivalent, representing around 2% of the total carbon emissions in Cyprus. The results are directly applicable for understanding the impacts of brine discharge on seagrass meadows, one of the most common types of Mediterranean seabed ecosystems and useful for providing guidance to decision makers as they are striving to achieve a zero-carbon economy. Strategies for achieving greater sustainability in terms of reduced CO₂ emissions and less brine discharge are discussed.

Keywords: Cyprus; Brine; Carbon footprint; Desalination; *Posidonia oceanica*; Seagrass

* Corresponding authors.