Desalination in view of environmental and climate change impacts: the case study of Cyprus

D. XEVGENOS[1], M. ARGYROU[2], M. MARCOU[2], P. STAVROU[2], M. MORTOU[1], F. C. KÜPPER[3]

[1]SEALEAU B.V., Delft, The Netherlands, [2]Department of Fisheries & Marine Research, Ministry of Agriculture Natural Resources & Environment, Nicosia, Cyprus, [3]School of Biological Sciences, University of Aberdeen, Aberdeen, Scotland, UK

Introduction

Cyprus is the 3rd largest island in the Mediterranean, after Sicily and Sardinia, occupying an area of 9,251 km^2. The area of Cyprus studied in this paper is the southern part of the island, covering an area of 5,800 km^2, which is under the effective control of the Government of the Republic of Cyprus. It has an intense Mediterranean climate with a typical seasonal variation in temperature and rainfall patterns. Freshwater availability depends almost entirely on rainfall which is highly variable with frequent prolonged periods of drought. Cyprus ranks as the most water-stressed nation across Europe, having the highest water exploitation index.

These effects are further exacerbated by climate change. During the last 50 years rainfall reveals a stepped drop of 18%, from 560 mm (period 1901-1930) to 463 mm (period 1971-2000) [1], resulting in more than 40% surface runoff reduction. Consecutive years of drought have led to the depletion of surface water stored in reservoirs and the over-exploitation of aquifers (direct climate change effect) especially for agriculture as the irrigation period elongated. Drought in 2008 resulted in 100% reduction of water supply for irrigation/agricultural purposes. It is often that the water demand exceeds water supply [Figure 2]. In these cases, part of the water demand for agriculture is not covered.

Methods

The methodology of this work included two main steps: (a) recording of desalination plants and collection of data regarding the impacts from desalination plants in Cyprus; (b) communication and collection of primary data from the competent authorities in Cyprus (Department of Fisheries & Marine Research) with reference to marine environmental impacts from the brine effluents generated by two desalination plants (Dhekelia and Larnaka) in Cyprus. Selected results are presented below.