

Thesis: Statistic study of the potential use of fog as a water resource on the Mediterranean coast of the Iberian Peninsula.

Abstract

Fog has been mainly studied for its problems, such as the loss of visibility, which may cause delays and accidents on roads, harbors and airports. However, and to a lesser extent, it has also been studied for one of its most positive aspects, such as its use as a water resource. In many different countries all around the planet, like, for instance, Chile, South Africa, Guatemala, and Eritrea; or places with which we are more familiar, like the Canary Islands, there are projects dedicated to the use of water generated from fog, being supplied for human consumption in small villages or schools, or allowing the development of agricultural and forestry activities by means of irrigation. The Mediterranean basin of the Iberian Peninsula is a particularly sensitive area to problems arising from water shortage, therefore the search for alternative sources of water may help to reduce this problem. At the same time, this area gathers many of the geographical and climatological characteristics which have led the rest of the countries and places mentioned to initiate works on fog collection. Consequently, this thesis studies, for the first time, the potential use of fog-generated water in the Iberian Peninsula and, more specifically, in its Mediterranean basin. To that end, an experimental passive fog collector is first designed and built, because such sensors are not currently on the market. Secondly, a Network of Fog Collectors is launched, consisting of 23 collectors, all of them located in mountain areas along the Mediterranean coast, an 800-kilometer expanse from the eastern Pyrenees to Cape Gata. The Network, in the longest-lasting of its locations, remained operative since 2003 to 2012, registering fog collection data, together with the rest of basic meteorological variables (rain, temperature, relative humidity, wind speed and wind direction). By using statistical techniques, this thesis studies the meteorological data obtained by the collectors of the Network, so as to know the potential of water collection in every location studied, along with other basic characteristics of the behavior of fog, such as: maximum values daily registered, duration of fog episodes or wind directions which optimize the capture. Likewise, atmospheric circulation patterns on fog collecting days are analyzed, as well as the chemical quality of the water captured. Finally, a number of activities adapted to the survey area are proposed in order to use the water captured, paying special attention to the type of technology used as well as the social and demographic background in which we find ourselves.

