

## **Vulnerability of water bodies to diffuse pollution in small islands: a hydrological perspective**

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Eutrophication of water bodies, resulting from anthropogenic activities, is one of the most serious problems of degradation of their physical, chemical and biological quality. The complexity of the processes involved includes the strong effect caused by climatic, orographic and hydrological characteristics of the regions affected. The vulnerability of the natural resources in small islands increases our concern about the extent of the eutrophication problem in their water bodies.

In this work we will report about the situation in some of the surface water bodies in the Portuguese archipelago of Azores, located in the North Atlantic Ocean. This archipelago is included in the Macaronesian region together with Madeira (Portugal), Canary (Spain) and Cape Verde archipelagos. The Azores archipelago is formed by 9 small islands, with areas ranging from 17 to 747 Km<sup>2</sup>. These islands are of volcanic origin and are characterized by very steep landscapes. In general, orography is responsible for significant climatic variations among and within the islands. The Azores is strongly influenced by its oceanic location; it is characterized by high precipitation and high humidity. Precipitation shows a prominent east-west gradient with substantially higher annual rainfall in the westerly islands. The freshwater (surface and aquifers) systems in the Macaronesian islands are unique due to their volcanic origin and oceanic setting, catchment morphology, storage processes, and the presence of distinct freshwater communities.

In the Azores some of the water bodies have or are suffering a process of eutrophication boosted by the existence of intensive agriculture practices, in particular those that result from increased livestock in recent years. Tourism industry is also increasing; in some cases, natural lagoons are the pole of attraction. The degradation of the water quality and subsequent changes in the aquatic ecosystems are of concern to the population and to the regional governmental agencies. To follow the evolution of this problem periodic monitoring campaigns are sought.

Effects of climate change will probably lead to adjustments in the global hydrological cycle, which could affect the distribution, availability and sustainability of regional water resources. Climate variability on seasonal to interannual time scales can cause changes in e.g. precipitation and air temperature. Characteristics of small islands that increase their vulnerability to these changes are, for example: their small physical size; limited natural resources (particularly freshwater resources); highly sensitive small economies; rapidly growing populations with high densities. These characteristics often limit the capacity of small islands to mitigate and adapt to future climate change and sea-level rise. With respect to eutrophication of fresh water bodies, all these issues have to be carefully taken into account when planning mitigation and remediation measures towards the sustainability of the lagoons in these islands.