


Chapter 4

Impact of Climate Change on Subterranean Wetland Biodiversity in Tafilalet South–Eastern Morocco

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ABSTRACT

Groundwater in Tafilalet supports diverse faunas (stygo fauna) that include many obligate groundwater-dependent species (stygo bites). Prospecting campaigns on underground fauna in Tafilalet region were collected in a database that was later used to develop distribution patterns for each species harvested. Tafilalet is characterized by low rainfall, high temperatures, and very high evaporation. Those severe climate conditions influence water availability for vegetation growth and fauna stability. The present work aims to, assess stygo biont richness in subterranean environment of Tafilalet. Species data were organized in database form and geographic information system (GIS) was used to establish geographical patterns of species and test fauna and environment parameters relationship, to identify a network of stygo fauna sites priority for conservation and defined areas with high taxonomic richness and high level of endemism. Risk assessment and decision-making framework for managing groundwater-dependent ecosystems (GDEs) development are required.

DOI: 10.4018/978-1-7998-9289-2.ch004

INTRODUCTION

In the south of Morocco, the groundwater of Tafilalet region supports several interesting species richness. In recent years, the region has experienced overexploitation of its natural resources; the succession of long periods of drought and rainfall not exceeding 120 mm/year, and the impact of climate change, on one side, and demographic pressure and the effect of human activities, particularly since the construction of the Hassan Eddakhil dam, which has dramatically reduced the piezometric level of the water table and its biodiversity and has also increased the degree of groundwater pollution.

From another side, they have contributed to the change in the biodiversity of underground aquifers and to the increase in the degree of endemism of species, sometimes even to their extinctions. Permanent environmental degradation affects the stability of underground aquatic habitats. As a result, many stygobiont species are threatened the higher their degree of endemism, the more threatened they are. In addition, ongoing global changes (climate change, drought, floods, deforestation, habitat destruction and the spread of alien and invasive species...) that are extremely rapid and human-induced continue to impoverish biodiversity. These problems are affecting many parts of the region called “hot spots”, where the frequency of occurrence is greater, the sensitivity is higher; like springs of Meski and Zoual which research proved their specific richness (Messouli et al., 2009). The devastation is more severe, and local communities are more vulnerable. Water resources are a crucial area of vulnerability in Tafilalet, affecting water supply, agriculture, pasture, forest, and others.

Since the 1970s, several Moroccan zones have experienced a general rainfall decline (Driouech, 2009; Khomsi, 2015). For the Tafilalet Oases, groundwater and surface water are interconnected resources. This connectivity can have significant implications for both water availability and quality and presents major challenges for water managers and policymakers (Messouli et al., 2009). In this area, a typical gradient can be observed from humid/sub-humid subtropical mountains and sandy deserts. In the Oro-Mediterranean (mountainous Mediterranean) zone, between 2600 and 3400 m which coincides, with the most important zone for karstic groundwater creation, a large-scale degradation of vegetation has occurred. Regarding the climatic conditions, Tafilalet is characterized by low rainfall, high temperatures, and evaporation. Those severe climate conditions influence the availability of water for vegetation growth and fauna stability. The present work aims to, firstly, assess stygobiont richness in subterranean environment of Tafilalet. Species were organized in database form and projected by using geographic information system (GIS) to establish geographical patterns of species to test relationship between fauna and environment parameters, to identify a network of stygofauna sites priority for conservation and defined areas

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