The Mediterranean Basin: From a biodiversity hotspot to a climate change hotspot

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The Mediterranean Basin, which began to form with the northward movement of the African Plate during the Cretaceous Period and was shaped by complex paleogeographic events, is one of the biodiversity hotspots on Earth. Hosting 22 different ecological regions, the biodiversity in the Mediterranean Basin has emerged as a result of the interaction of region-specific geomorphological, climatic, and tectonic factors. However, the unique geography of the region has also placed the Mediterranean Basin among the most climate change-sensitive areas: Both global and regional climate models rank it at the top of the list of climate change hotspots (1,2).

Despite numerous attempts to combat climate change and limit global warming to 2°C over the past 50 years, the annual average temperature in the region has already increased by 1.4°C compared to pre-industrial levels.

It is predicted that the basin will warm faster than the global warming rate, accompanied by a decrease in annual precipitation levels. This vulnerability to climate change, together with the negative impacts of intensive land use changes and other environmental problems, threatens the sustainability of ecosystem services in the Basin, which will in turn increase the incidence of infectious diseases, including vector-borne diseases, lead to disruptions in agricultural activities due to decreased available water and increased risk of food security, and result in an increase in migration due to regional economic disparities (3).

Like other arthropod vectors, climate change is expected to cause significant changes in the ranges and phenologies of sand flies. However, despite the diverse sand fly fauna present in the Mediterranean Basin,

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studies on how different sand fly species and the disease agents they transmit will respond to changing environmental conditions are scarce. By constructing a comprehensive temporal and spatial sand fly database mainly focusing on the Mediterranean countries, the CLIMOS project will shed light on our understanding of the current and future distribution and phenology of Mediterranean sand flies. Moreover, the data related to sand fly-transmitted pathogens and vertebrate hosts will help to resolve the complex interactions between the vector-pathogen-host triangle under the changing environmental conditions in the Mediterranean Basin. Taking into account the social factors that influence the emergence and spread of sand flies and sand fly-borne diseases, the CLIMOS project will enable risk assessment by bringing together experts and stakeholders from different disciplines parallel to the biodiversity present in the Mediterranean Basin.

The outcomes of this project will serve as a significant guide for Mediterranean countries to achieve their goals related to reducing the negative impacts of climate change on human and animal health, as well as education, awareness, and capacity building on climate change adaptation and early warning.

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