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Review

The main characteristics of the urban climate and the air quality in Greek cities



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ABSTRACT

The factors that determine the extent to which an urban climate differs from the climate of the surrounding area are formed by the characteristics of the built environment and the activities that take place there. Greek cities, regardless of their difference in size, have similar town-planning characteristics. In addition, the buildings in them have similar and specific architectural and constructional features and operating characteristics. These facts produce similarities in the basic qualitative characteristics of the environments of Greek cities. This study identifies and describes the basic characteristics of the urban climate and air pollution conditions prevailing in Greek cities. It also identifies and describes the factors that help form these characteristics, the effects that these factors have and the consequences of these effects.

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Contents

1. Introduction	50
2. The main characteristics of the built environment in Greek cities	52
3. The factors that determine the urban climate in Greek cities	54
4. The effects of urban climate in Greek cities	60
5. Conclusions	61
References	61

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1. Introduction

Greece, with an overall land area of approx. 132,000 km², is situated in the south-eastern part of Europe. It is both a maritime country, with numerous islands and a coastline of over 15,000 km in length, and a mountainous one, with four-fifths of the mainland consisting of mountainous terrain. The country's population, according to the last census, stands at about 10.8 million, the bulk of which lives in urban areas ([Hellenic Statistical Authority, 2012](#)) ([Table 1](#)). Most urban centres, including the capital, Athens, and the second largest city, Thessaloniki, lie on the coast ([Fig. 1](#)).

The climate in Greece is predominantly of the Mediterranean type, with mild and rainy winters, relatively warm and dry summers and sunshine almost all year round. The coldest months are January and February, with mean minimum temperatures ranging between 5 and 10 °C near the coasts and 0–5 °C in inland areas, and lower values in the northern part of the country. The warm season lasts from April until September. The warmest period is in July and August, with mean maximum temperatures in the range of 29–35 °C. Precipitation is concentrated in the cold period, with almost no precipitation in the warmest months. The eastern part of the country receives approximately half the amount of rain that falls in the western part of the country ([Hellenic National Meteorological Service, 2011](#)).

The urban climate, as the result of the transformation of the climate in a particular region, possesses features that are formed by the built environment related to it and the activities that take place there. The built environment, in turn, is analysed into urban-planning and architectural features. These features, such as the organisation of urban space, the forms of the urban structures, the behaviour of surfaces in the management of solar radiation, the heat capacity of the construction materials and the water permeability of the soil, affect, through specific mechanisms and processes, important meteorological factors like radiation, temperature, humidity and wind. Therefore, it is logical that, unlike other types of climate which are based on geographical data only, the study of the urban climate in a particular region should take into account the characteristics of the structures and human activities in that region. In Greece, the basic urban-planning characteristics of large cities, as well as the architectural and constructional characteristics of buildings in such urban environments, display notable similarities ([Papamanolis, 2005](#)). Several of these similarities, related either to design choices or to constructional choices, are based mainly on elements that help form the characteristics of urban climate.

Studies of the factors that form the urban climate in Greek cities were first made in the 1960s, when the effects of the intense urbanisation that had been taking place since the World War II began

Table 1

The 18 Greek cities with a population of over 50,000 inhabitants, according to the 2011 census.

	City	Population
1	Athens	3,089,698
2	Thessaloniki	788,952
3	Patra	168,034
4	Larisa	144,651
5	Heraklio	140,730
6	Volos	86,046
7	Ioanina	65,574
8	Trikala	61,653
9	Chalkida	59,125
10	Seres	58,287
11	Alexandroupoli	57,812
12	Xanthi	56,122
13	Katerini	55,997
14	Kalamata	54,100
15	Kavala	54,027
16	Chania	53,910
17	Lamia	52,006
18	Komotini	50,990

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