

Chapter 19

Planted Roofs Over Buildings: Case Study at a School in Athens

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ABSTRACT

Humans in addition with other factors have increased the environmental pollution of the planet. Many highly populated cities like Athens have problems with air quality due to the poor quality of construction, high temperatures in summer, noise, no existence of city plans, etc. The scope of this study is the investigation of urban towns' benefits using planted roofs. All types of planted roofs have many environmental, constructional, social, and financial benefits. The research suggests a method from the design, the study until the construction, using decision making, informing the citizens, and taking into account their opinion. The original design of buildings must have adopted an integrated energy strategy such as the solution of planted roofs so as to maximize the benefits to the environment and human beings. The research is specialized using a case study about a planted roof of an existing school building in Athens. The advantages and disadvantages of the usage are shown focusing on environmental, social, and construction aspects.

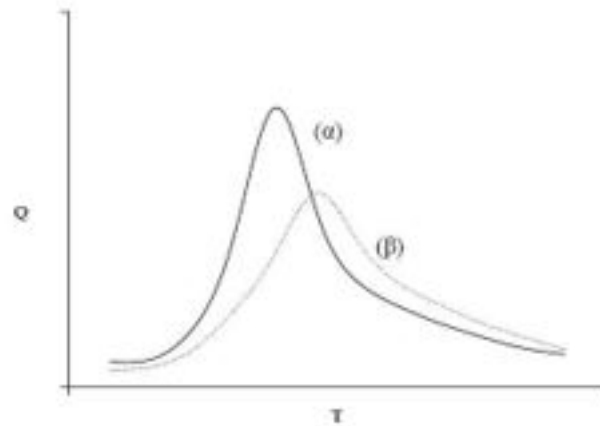
INTRODUCTION

The environmental burden that our planet has suffered is growing rapidly mainly due to reckless industrial activity. Green roofs (or planted roofs) can slow down climate change, creating better living conditions. Germany has been a world leader in the theory and practice of green roofs since the 1960s. Internationally, 13.5 million roofs were green by 2001. Research shows that in highly polluted urban areas, plants retain even heavy metals which would pollute the aquifer through water runoff (Bartfelder and Kohler, 1986). Also, during a storm the planted roof can hold large amounts of water, discharging the sewer system.

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Planted Roofs Over Buildings

Figure 1. Typical flood hydrograph at the natural recipient a) without terrace garden and b) with terrace garden (Vaitsis Tr., 2009)



In a case study, runoff is completed smoothly within 24 hours after the end of the storm (Katzschner, 1991). June 6 is World Green Roof Day (Center for Architectural Ecology, 2020). In Greece the use of green roofs is studied (Evmofofopoulou 1994, Gernot Minke 2009, Michailidou & Rodi 2011, Vavanou 2013), Conferences are created (TEE / TKM, 2010) etc.

Horizontal green roofs are divided into 3 categories depending on the plant growth substrate: Extensive, Semi-Intensive and Intensive (Green Roof, 2020). The type of plants to be used is determined based on the substrate (Agricultural Center, 2020).

Table 1. Categories of planted rooms

Green roof type	Substrate thickness	Planting	Application
Extensive	8-15 cm	Wild flowers, ground cover plants	In inaccessible roofs
Semi-intensive	15-25 cm	Shrubs, ground cover plants	Mainly on accessible roofs
Intensive	25-100 cm	Shrubs, plants, trees	Exclusively on rooftops with access

Regardless of the category to which they belong, the planted roofs must have the following stratigraphy regarding the arrangement of the materials that make it up, so that they are functional and efficient (without the appearance of problems in the construction).

Instructions for planning, execution, and practical advice are given by researchers (Cuenca Ar., 2012; Goya Ngan, 2004). The faithful application of these, for example in the laying of construction materials, is a necessary condition for the correct construction (waterproofing, etc.) and the absence of future failures.

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