

Monitoring climate change adaptation plans for Urban Green Areas using indicators: LIFEGRIN project, a case study in Greece

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INTRODUCTION

Temperatures are already rising in cities around the world due to both climate change and the urban heat island effect. Understanding the impact of climate change on the urban environment will become even more important, with increasing urbanization. Cities already face harsh climate, due to obvious anthropogenic impacts, responsible for the alteration of both natural surface and atmospheric conditions. These impacts range from microscale (e.g. replacing trees with a parking lot) to macroscale (e.g. carbon dioxide effects on global climate by fossil fuel combustion and emissions). In Greece, 49% of the population lives in cities of different sizes. Urbanization has severe environmental, social and economic impacts on cities, since buildings contribute considerably to energy consumption and CO₂ emissions. Adapting a strategic management plan for monitoring Urban Green Areas (UGAs) in relation to climatic changes includes the monitoring of indicators which may track adaptation in a microscale and a macroscale time framework. During the pandemic crisis of COVID 19, UGAs was the only solution for cities residents for outdoor activities.

The project: "Promoting urban Integration of Green Infrastructure to improve climate governance in cities"

The LIFE GrIn project aims to incorporate the climate change adaptation and mitigation perspectives and green infrastructure management and conservation in local governance in cities, through the establishment of an integrated policy framework focusing on Urban Green Areas (UGAs). LIFE GrIn will utilize all available tools and indicators at European level to assist in strategic planning and management of UGAs in the context of climate change adaptation and mitigation.

The program started at 2018 and has a 3.5 year duration. Six different partners are participating from Greece. Scientific Coordinator for the project implementation is the HAO DEMETER-Institute of Mediterranean & Forest Ecosystems and other partners are the Environmental Management Company - Homeotech Co, the Central Union of Hellenic Municipalities, the Greek Municipalities of Amaroussion and Heraklion and the Hellenic Ministry of Environment and Energy. The LIFE GrIn project conclusively will change the way of perception and management of urban green spaces, to make our lives and cities more resilient to climate changes.

Materials and methods

According to European platform Climate ADAPT (<https://climateadapt.eea.europa.eu/knowledge/tools>) there is a valuable informative tool in order to guide cities to implement an effective strategic climate adaptation plan. The Urban Adaptation Support Tool (UAST) was developed as a practical guidance for urban areas, in recognition of their importance in the European economy. There are six main steps in order to obtain and prepare the ground for adaptation; indicators are used in order to monitor the process and the success of the adaptation plan.

In LIFEGrIn project initial assessment of UGAs targeted at pilot municipalities of Amaroussion and Heraklion (Figure 1). By performing several steps the team measured for UGAs:

1. Biodiversity indicators of UGAs (Dr. Alexandra Solomou)
2. Bio meteorological indicators of UGAs (Dr. Nikolaos Proutsos)
3. Insect variation of UGAs as an indicator (Dr. Dimitrios Avtzis)
4. Phenotypic and biometric estimation of UGAs (Dr. Evangelia Avramidou)



RESULTS

By estimating all these indicators and according to UAST platform we have now accomplished to retain the "Guidelines for the strategic planning and management of urban green areas in response to climate change". In this deliverable we have an holistic approach for every municipality in order to ensure and quantify a strategic plan for adaptation. As a first step to adaptation is the signature of Covenant of Mayors. Some indicators that we have included and have to be measured and evaluated after the management plans for a city are:

1. Biodiversity indicators (Species richness, Shannon and Simpson's diversity indexes)
2. Bio meteorological indicators (Physiological Equivalent Temperature; PET, Predicted Mean Vote; PMV)
3. Phenotypic and biometric estimation of UGAs (Tree health indicator; Tree mortality indicator)
4. Indicator for number of invasive alien species;
5. Indicator for: share of UGAs; distribution of UGAs; effective green infrastructure
6. Indicator for insects variation for UGAs
7. Indicator for CO₂ storage For UGAs

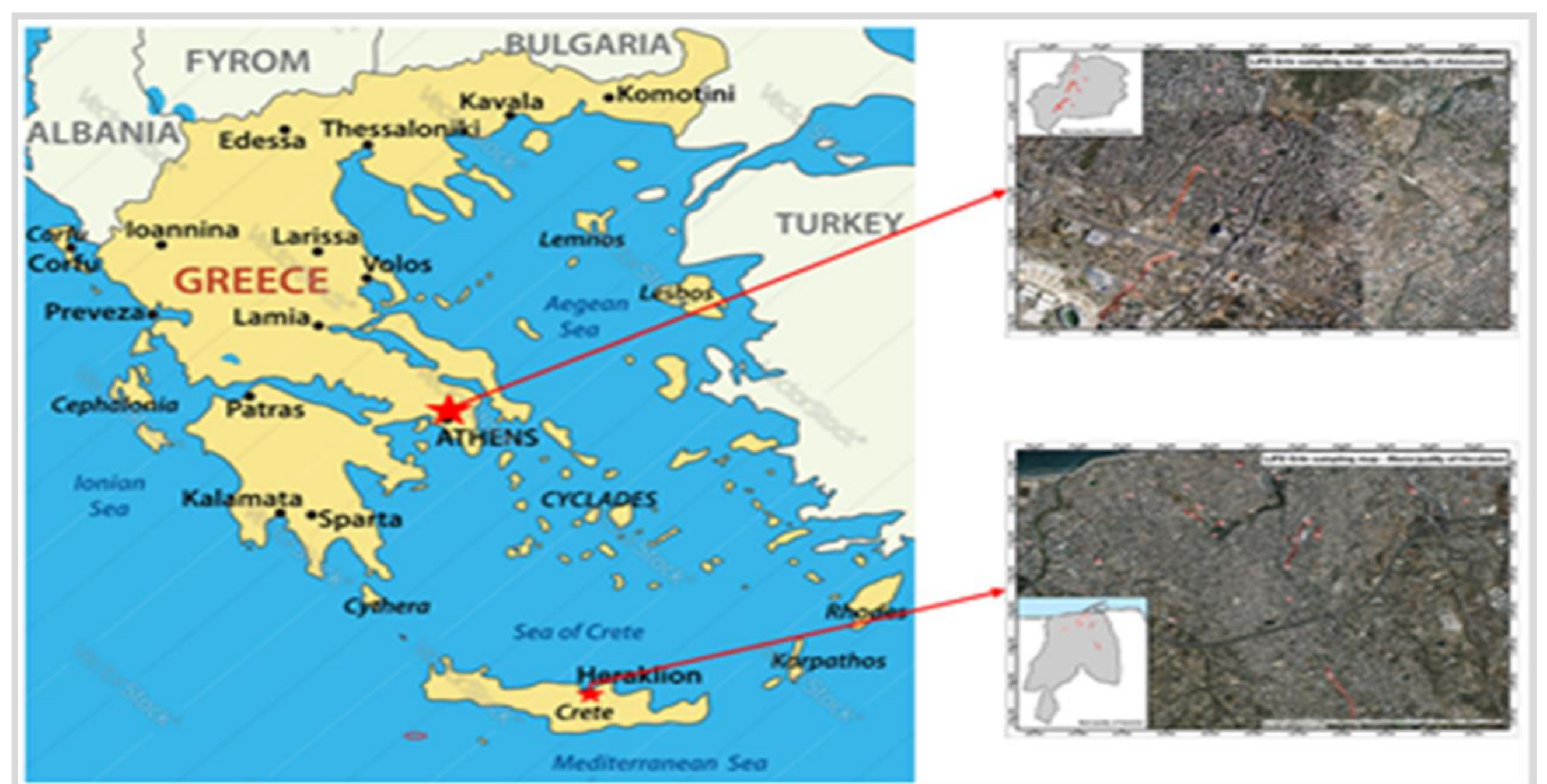


FIGURE 1: The project will be based on the implementation of actions in two Greek Municipalities. Municipality of Amaroussion (Map1, upper picture), located in Athens and the municipality of Heraklion, located in Crete (Map 1).

CONCLUSIONS

A strategic planning and management of UGAs for adaptation and resilience of cities includes several processes such as political support; collecting meteorological data; biodiversity data; health index for trees, engagement of stakeholders and appropriate selection of indicators.

By incorporating the Knowledge from UAST, scientific experience and field measurements, Guidelines which were produced from LIFEGrIn project will serve as the primary tool for each municipality in Greece, in order to facilitate and ensure adaptation and mitigation due to climatic changes.

Future steps include the publication of this guideline as a State Constitutional Law in order to assist all municipalities to cope with climatic changes and secure sustainable life for citizens.

For further information please visit: lifegrin.gr

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