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MONITORING AND ASSESSMENT OF THE URBAN ENVIRONMENT IN A TOURISTIC MEDITERRANEAN CITY

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Short Description

This paper presents an integrated, two-level monitoring system for urban planners, combining environmental stations and thermal cameras and allowing real-time monitoring and analysis of traffic load, mobility and environmental data, and hence supports decision making, assessment and improvement of the SUMP action plan in Rethymno.

The system was developed, by the Technical University of Crete in cooperation with the Municipality of Rethymno, during the CIVITAS DESTINATIONS.

Main part

European cities face vital challenges due to the negative impacts of the current transport modes on the environment, energy, health, and economy. All these factors affect safety, accessibility and quality of life in the cities. Under this scope, the Horizon 2020 CIVITAS DESTINATIONS project, funded by the European Commission, integrates the tourist mobility and the fluctuation impacts on the design of mobility solutions in order to enforce the accessibility, attractiveness, efficiency and sustainability of transport services and infrastructure for both residents and tourists in six island destinations.

The absence of reliable spatiotemporal traffic and environmental data was a crucial challenge for transport planning and the monitoring of the sustainable mobility plan developed to address the citizens and visitors needs in the city of Rethymno. To this end, environmental monitoring stations and thermal cameras, operating in compliance to the European Data Protection Regulation (GDPR), were installed in selected locations in the city center and the city's entrances, and other critical spots. They are connected with a web-based platform to collect, real-time, and to analyse numerous data sets for traffic load.

This paper presents the methodology followed by the Technical University of Crete and the findings from field measurements analysis regarding traffic data, weather conditions (temperature, humidity, wind speed), pollutant levels (CO, CO₂, NO₂, Particulate Matter), and noise level by using the installed network of stations in the Mediterranean tourist city of Rethymnon. The monitoring methodology has been established and applied, incorporating the seasonality, the fluctuation due to several city events and the influence of a set of mobility measures recently implemented in the Municipality area.

Correlations between critical traffic and environmental indicators, showcase the impact of tourism flows penetration into the city's transportation, and the quality of the environment, and ascertain the points requiring interventions.

After analysis of the obtained results, important outcomes were drawn, as concerns the impact of the congestion to the air quality levels during rush hour and during peak/off-peak seasons due to tourism and increased outdoor activities during major cultural or athletic city events. This work is developed in order to be used as a prototype for further replication in other municipalities of Crete, as well as in other Mediterranean island tourism destinations.

What is new?

The system proposes an integrated approach for obtaining reliable, uninterrupted, on-line based supervision of mobility and urban environmental conditions, allowing urban planners to locate traffic congestion points and analyse the environmental impact of transportation on air quality levels; therefore, to adapt their mobility strategies and to formulate suitable sustainable mobility solutions if / when /

where needed. There is a limited number of such systems globally; most are focusing on meteorology and traffic conditions; some others on critical environmental indicators. The analysis showcases the interrelation of transport with air quality and meteorological conditions, as well as the direct impact on carbon, nitrogen oxide and other traffic-related emissions, and on noise levels. Also, the system is flexible to monitor changes in the city life and daily commuting habits due to crises or unexpected situations (such as COVID-19) or tourism seasonality.

What is transferable to other cities and regions?

This low-cost data monitoring and management system is dynamic and adaptable to several parameters and allows cross-analysis of numerous data sets on meteorological, environment land traffic load parameters crucial for efficient planning . This is much relevant today, as most city planners, especially for small and medium-sized cities, are missing accurate information to adopt measures towards Green Deal, and to make cities more resilient in crises (healthy, economic, social), increasing transparency in the decision-making process. In parallel, statistical analysis can provide very useful tools to estimate the impact of future measures in the environmental quality and the traffic load in the cities.

What are outcomes and conclusions?

The environmental indicators analysis illustrates- a clean, air-pollution free urban environment for the city of Rethymno, even in the high season of tourism.

As for the future, sustainable mobility infrastructures and plans are taking place in the city, and the air quality is monitored. Indicatively, problems with CO concentration occur over long-term exposure on levels above 10 ppm. Consequently, Rethymno is an environmental clean Mediterranean city as the CO levels do not exceed 1 ppm even in touristic season (fig.1).

It is worth to mention that even in a city like Rethymno, an extreme situation like COVID-19 made a significant difference on pollutant levels due to the lockdown and therefore the decreased traffic congestion. For example, the average value of CO before the lockdown was 0.055 ppm, during the lockdown decreased to 0.048 ppm (12% reduction) and after the lockdown increased to its normal levels of 0.055 ppm in this specific part of the city (Fig 2).

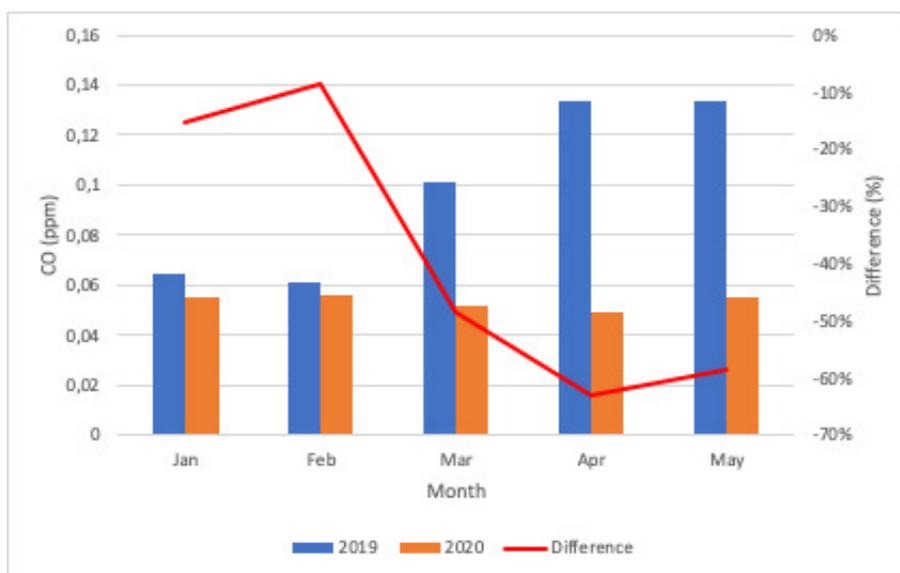


Figure 1. Difference between levels of CO in the city of Rethymno due to COVID-19 (Rethymno-Old City).

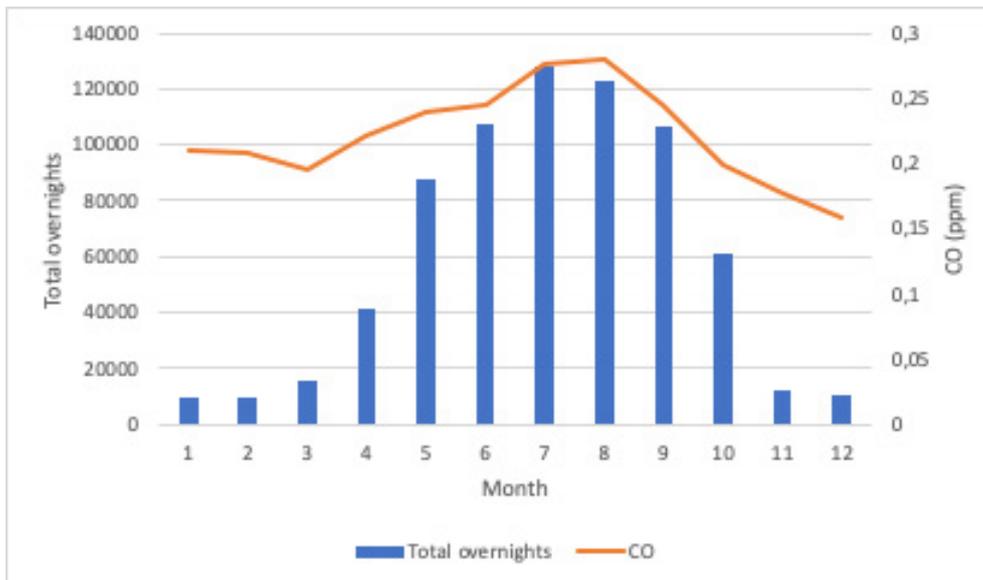


Figure 2. Correlation of total tourism overnights and CO at (Rethymno-Old City, 2018).

Who are the main target groups?

The installed monitoring system has different target groups: (1) city and regional authorities to monitor and assess the mobility plans; (2) the European Commission to evaluate the impact of measures financed partially or entirely by European funds; (3) the academia for future research exploiting this valuable amount of data; (4) the citizens to understand and feel safe living in a clean and safe environment; (5) experts in planning and designing of new mobility services/products.

And what now? - what will change? - what is the relevance for the future?

Which are the future mobility measures for tourism destinations suffering due to seasonality fluctuation? How will these cities become resilient to face COVID-19 and other crises in the future? The monitoring systems will play a critical role. Sustainable mobility for tourism destinations should be integrated with transparency in the urban planning system; however should face uncertainties due to various crises (such as COVID-19), the fluctuation due to tourism seasonality and due to the local traditions (festivals, flea market days, etc.). For this purpose, accurate data are a prerequisite to improve the overall planning and design of mobility works and initiatives.

Especially during the COVID-19 period, it is essential to plan their recovery phase, as well as a forthcoming new health crisis. The installed system will support the rational decision making of the green future of the city towards Green Deal allowing the accurate estimation of the sustainability (cost efficiency, environment, society) of the applied mobility measures

Link to the project

civitas.eu/destinations/