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*PS 5.3 The Future - Changing Environment*

# Dynamic and Integrated Territorial Data Infrastructure for ATER Roma

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ATER ROMA

Consiglio Nazionale delle Ricerche

DECA Srl.

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# Dynamic and Integrated Spatial Data Infrastructure

- Integrated and Dynamic Territorial Data Infrastructure encourages the **digital transition**
- Collecting dynamic **data from environment** through the platform
- Data processing Indicators for **forestry actions**
- Artificial Intelligence for outlook and **predictions**
- ATER green areas **contribution in improving air quality** in Rome

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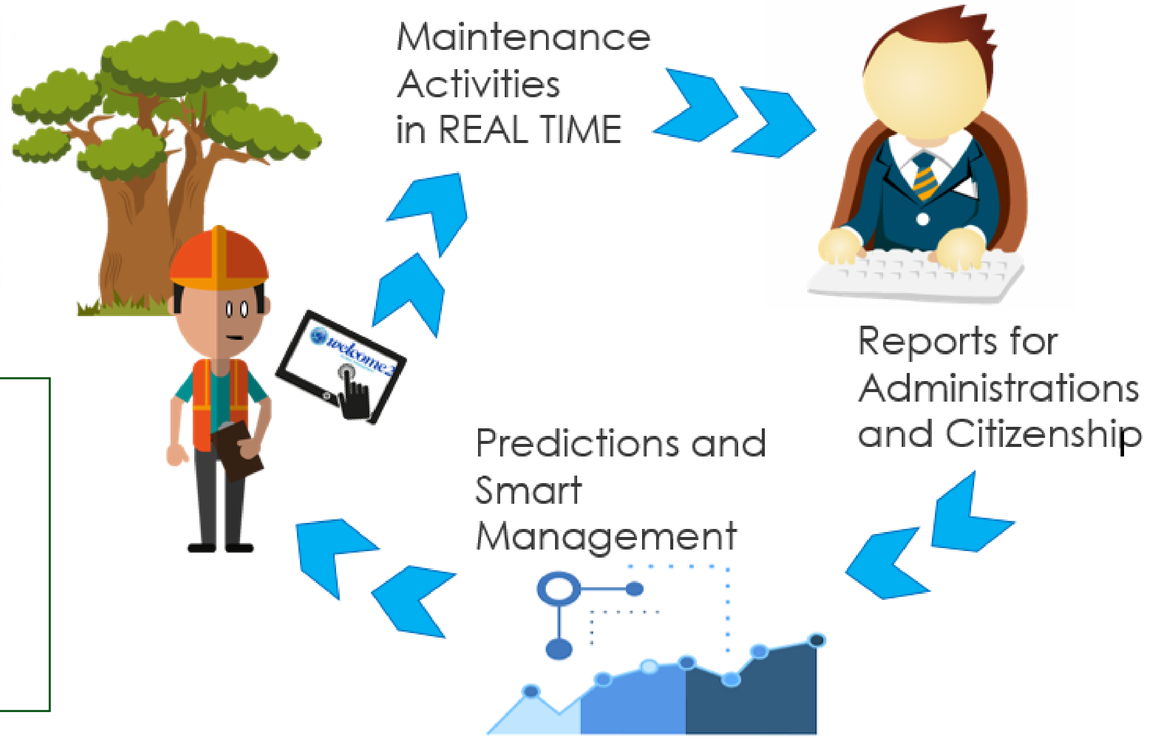
# Dynamic system and urban forest


Trees census → trees status and properties → activities planned for maintenance → **efficient green dynamic system**




The management of
ATER greenery
as a model for urban forest

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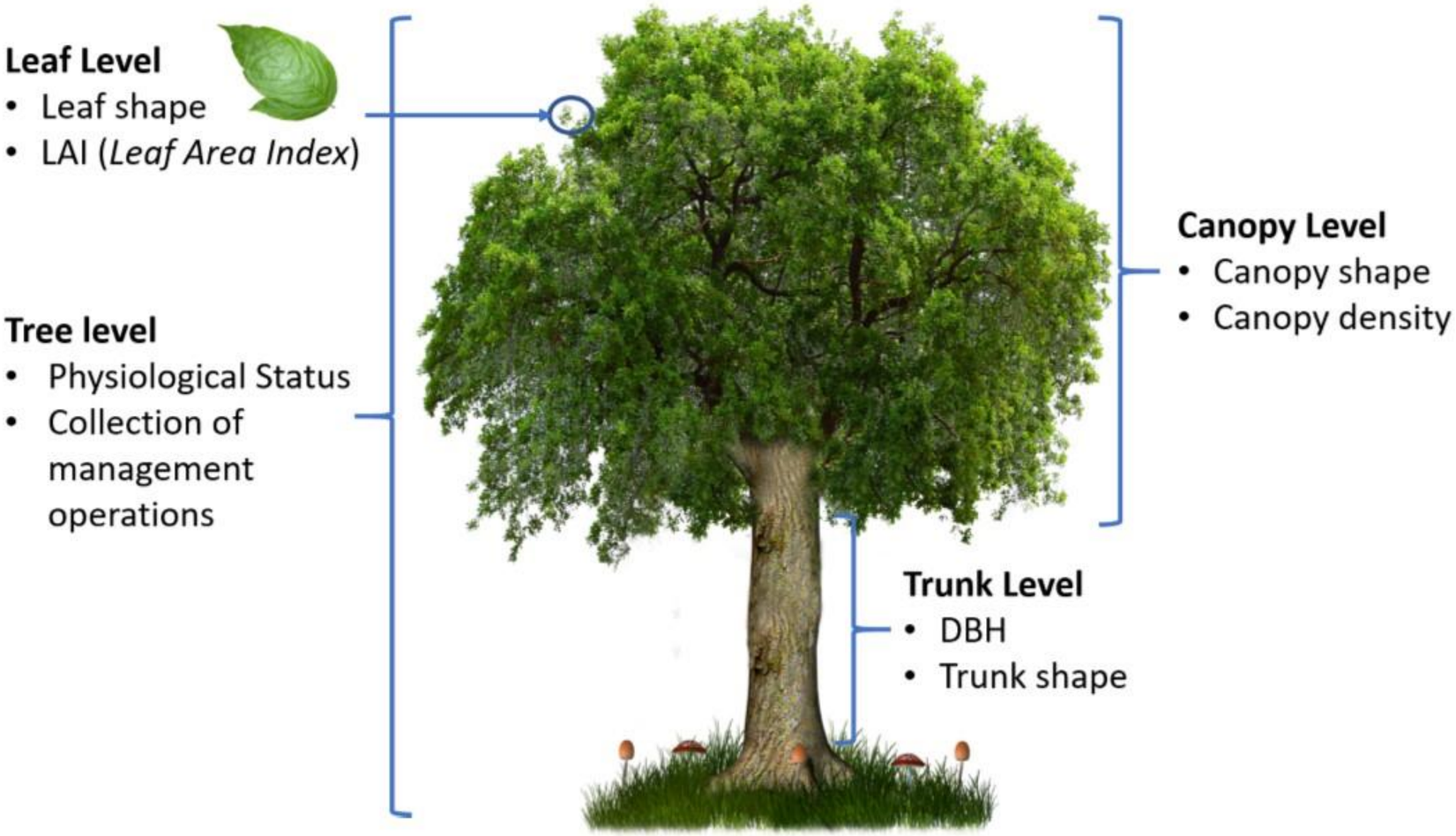
# Improving urban trees data collection

Data from different sources
→ correlated
→ information are shared
**=** a unique platform to support the development of **total sustainability.**



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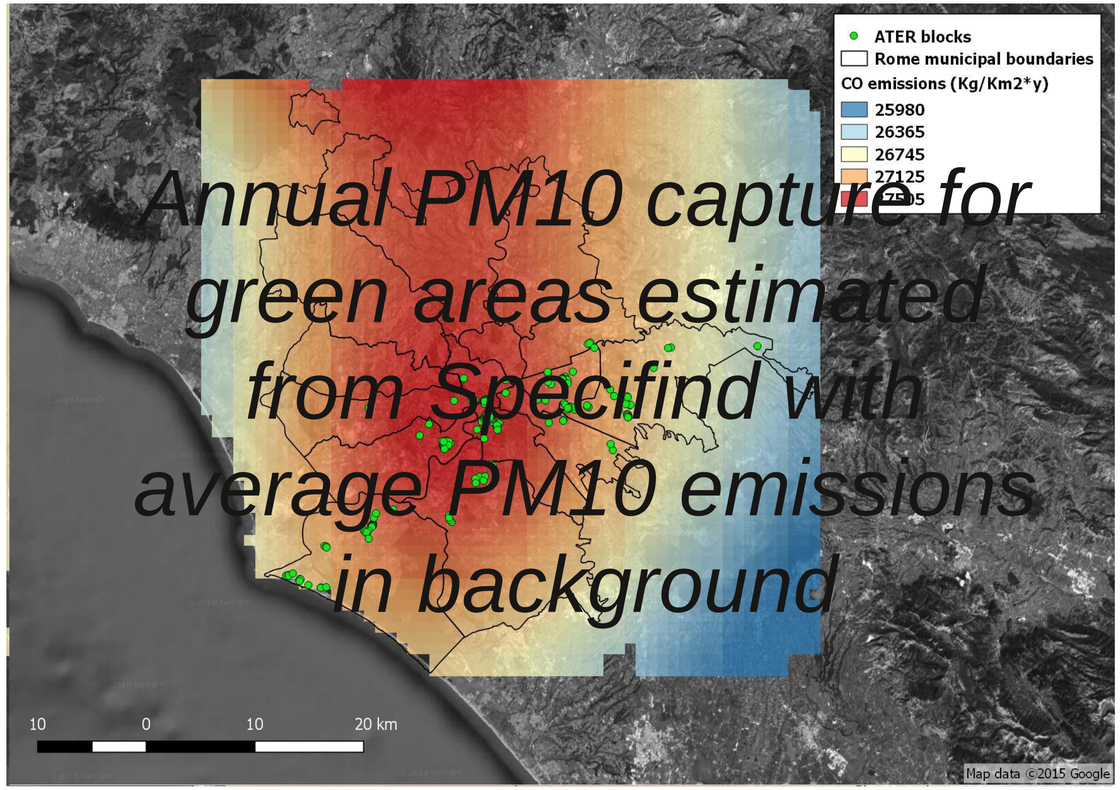
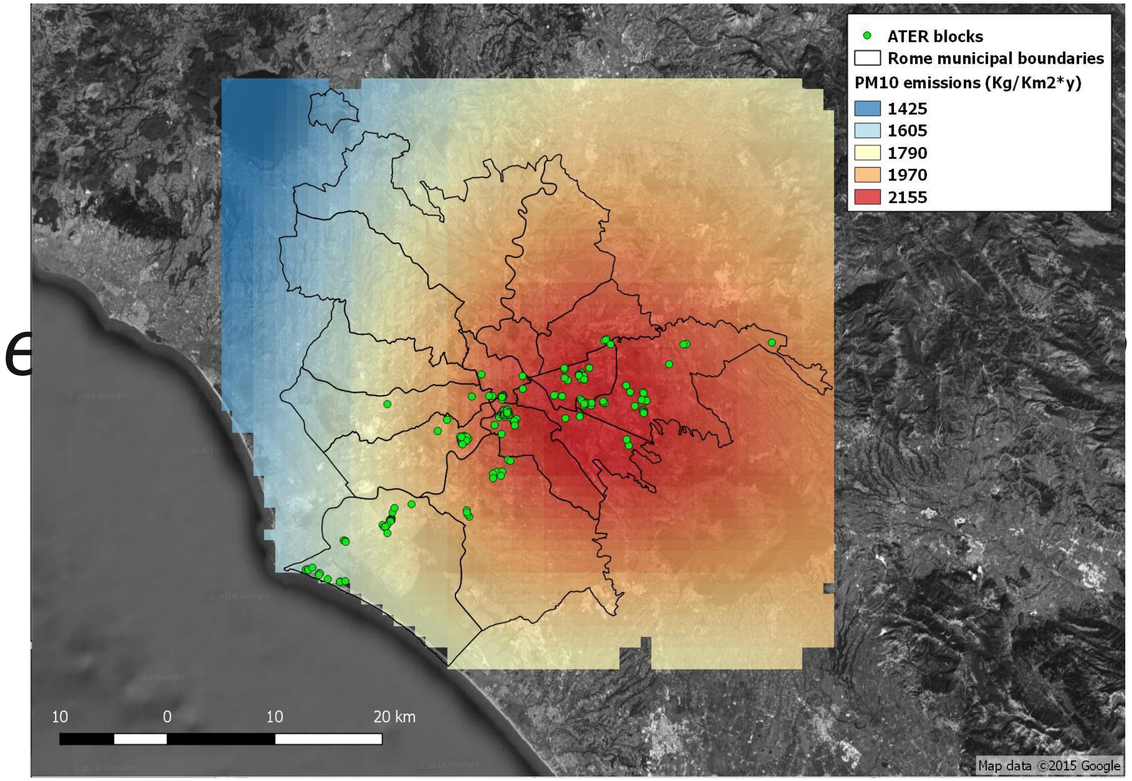
# Trees influence on air quality

Increasing data collection to improve the estimation of pollutants sequestration and C storage




*Annual PM10 capture for green areas estimated from Specifind with average PM10 emissions in background*



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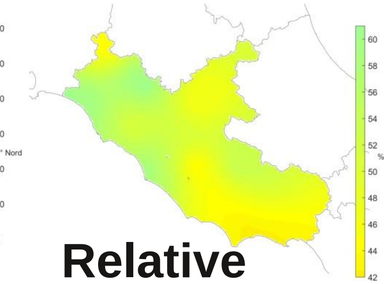
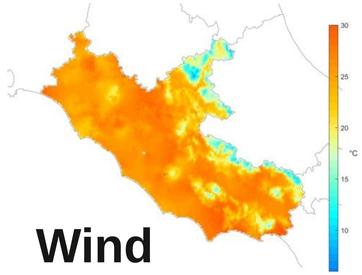
# Weather influence on air pollutants

**SPATIAL FIELDS REALIZED WITH Statistical methods GPR (Gaussian Process Regression) Relations between Meteorological Variables and PM10 concentration by AI**

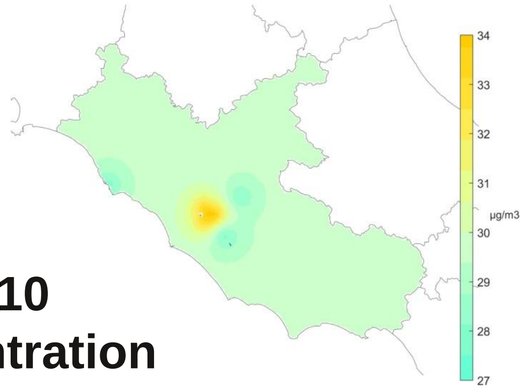

**Maximum Temperature**




**Relative Humidity**

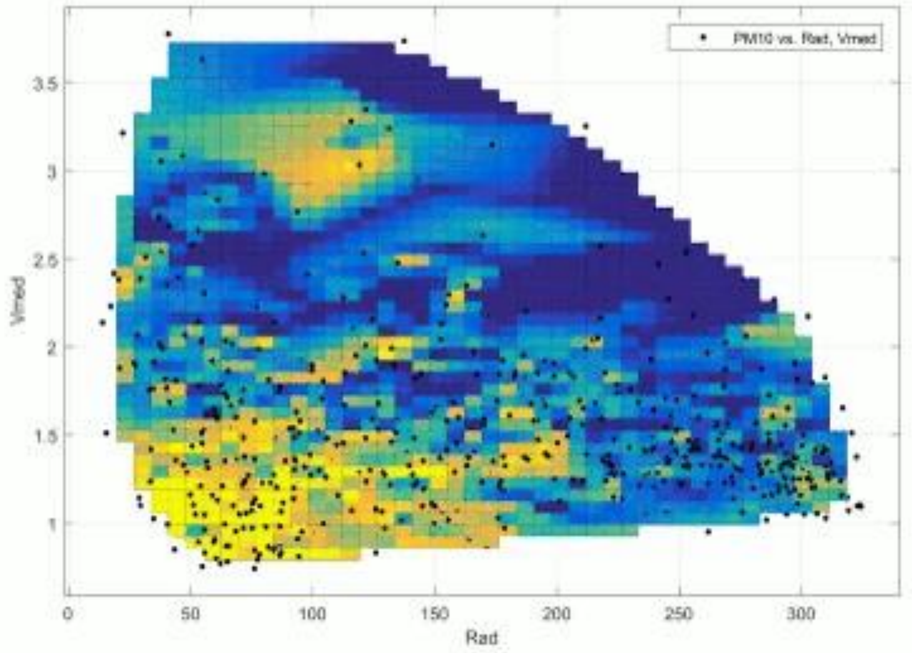



**Wind Direction**




**PM10 Concentration**

High concentration areas of PM10 in YELLOW



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# Prediction of pollutants concentrations

1-day forecast of PM10 concentration (daily average) in the atmosphere on Cinecittà's Air Control Unit (Rome)

**INPUT:** Today's meteorological conditions (daily averages).

**METHOD:** Expert System by Artificial Intelligence, calibrated on 3 years time series.

**OUTPUT:** Punctual estimation of tomorrow's PM10 values.

**VALIDATION:** Model forecasts correct values in 77% of cases.

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# Big data and artificial intelligence in this project

The data generated by the same source are rarely made to interact with those generated by other sources: the analysis of data from a single source leads to a knowledge related only to the area from which they come; and analysis and data are often lost after their use.
The applications presented here are based instead on Artificial Intelligence, a methodology able to extract as much information content as possible generated by the confluence of all these data from different sources, thus arriving at a **more complete and deeper knowledge**, just because it analyzes the totality of data and their mutual relations.

In this project we used a **system based on AI** which allowed us to reach the best performance. We used different types of algorithms Supervised Classifier, such as Support Vector Machines, Discriminant Analysis and others. On a set of input/output training and in test mode building the system, to obtain the best capacity of generalization.

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# The ATER project aims to:

- Realize the model for a **dynamic green city**;
- Develop a system integrated with a smart infrastructure to improve the **efficiency** and **social aspects;**
- Give a contribution in the **reduction of pollution** in Rome city.