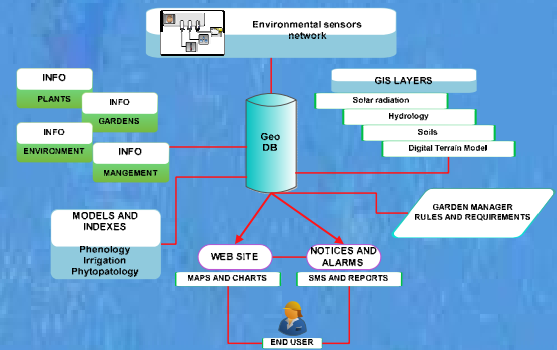


Advanced management and remote control of green areas: new techniques for the sustainability



GARANTES is a research and technological transfer project of the Institute of Biometeorology of Florence. The main aim is the integration of the most advanced hardware for the monitoring and control of plant status with an advanced agrometeorological modeling. The prototype version of the system already shows all the potentialities for the management of green areas with a progressive automatization of agronomic interventions in the next future.

Module for irrigation management

Irrigation efficiency depends on the type of irrigation used and on irrigation scheduling, which is the method used to determine the amount of water to be applied to a crop and the timing for application. The application of systems that integrate sensors and models able to estimate plant water requirements, allows the optimization of irrigation scheduling. For the irrigation management GARANTES system integrates two methods, one based on direct measurements of soil moisture by dedicated sensors (SOIL METHOD) and the other one based on reference evapotranspiration estimation from meteorological data (CLIMATE METHOD).

SOIL METHOD: it measures soil water potential or soil water content and controls electrovalves according to defined thresholds chosen by the user

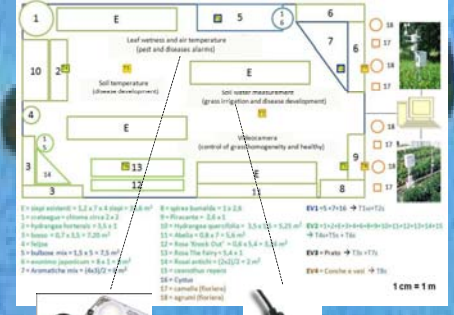
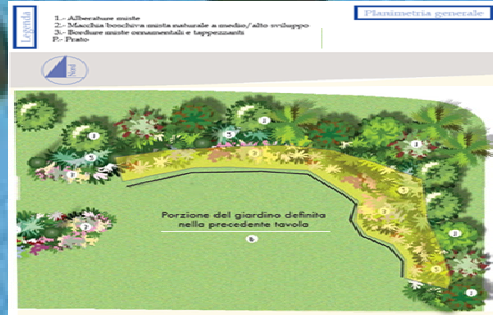
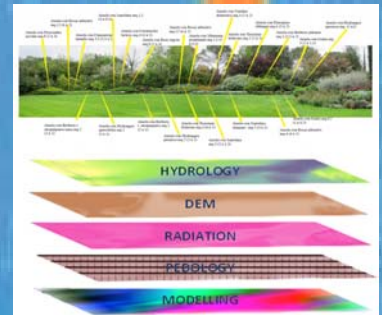
Problem: low representativity of the measurement

CLIMATE METHOD: it estimates actual evapotranspiration from the measurements of meteorological parameters and the crop coefficient (Kc) of specific plant species.

Problem : Kc available only for few plant species

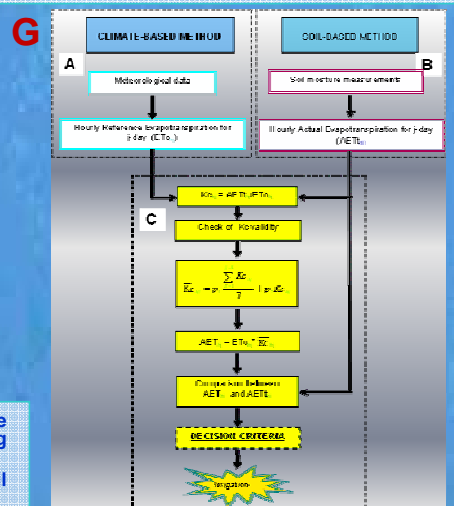
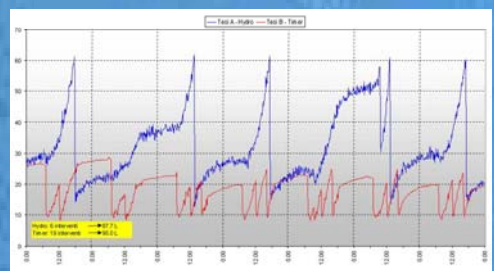
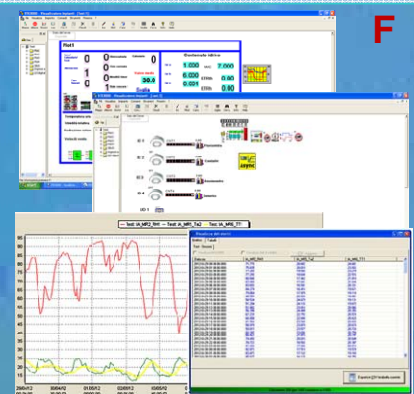
THE INTEGRATION OF THE TWO METHODS ALLOWS THE USE OF FEWER SENSORS AND ASSURES A HIGHER ESTIMATION REPRESENTATIVITY AND RELIABILITY

Green area characterization and monitoring network components



Using the integration of different informative layers (A), the system identifies homogeneous areas for evapotranspiration levels (B), and drives the spatial installation of the main sensors (C) and of the other hardware components (D – wireless module for air temperature and solar radiation, E – soil water sensor). Anytime the user can modify and update system configuration by dedicated interfaces (F).

Control algorithm and software components



The irrigation activation is driven by soil moisture threshold values, set by the user, (SOIL METHOD) after the check of sensor measurement reliability by means of the comparison with CLIMATE METHOD outputs according to the algorithm G.

The system not only manages the irrigation automatically but also gives a graphical representation of soil moisture trend to the user (H).