"Florence: Climate Change & Biodiversity" - Study models and address

PREMISE

Cities are particularly affected by the effects of climate change: concrete and asphalt surfaces heat up and heat is captured between buildings; rainwater cannot penetrate the sealed soil; anthropization has almost eliminated biodiversity. This reduces the quality of life and hinders the inclusion of urban greenery that could mitigate the impact of climate change.

Too often impromptu urban reforestation programs are used as slogans. The key to these campaigns is that they must, instead, be based on science, also by exploiting new technologies: planting the right trees, in the right conditions, with the right care and above all measuring their impact.

CAPELLINO FOUNDATION AND ACTIVISM FOR BIODIVERSITY

The **Fondazione Capellino** (https://fondazionecapellino.org/it/fondazione-capellino) is a non-profit commercial organization whose purpose is the protection of biodiversity and the fight against climate change. The foundation is financed with 100% of the revenues - less costs and taxes - accrued by Almo Nature, a wholly owned company of food for dogs and cats. This economic model is called Reintegration Economy and was born in 2018 as a result of the irreversible donation of Almo Nature to the foundation by Lorenzo and Pier Giovanni Capellino.

THE FLORENCE PROJECT

An ambitious research and implementation project was launched in Florence on 1 January 2023, conceived and financed by the Capellino Foundation, with the participation of the CNR for the scientific part (the Institute for Bioeconomics is responsible for the scientific activity and which will see the involvement also of other Institutes of the CNR), Municipality of Florence, University of Florence and other private entities under the coordination of Dr. Alberto Giuntoli. The project aims to create a model of possible nature-based urban solutions capable of mitigating the impact of climate change, of promoting urban biodiversity and the health conditions of citizens, as well as of interdisciplinary analysis capable of studying these phenomena and their relationships as a whole, which becomes easily exportable and replicable in other urban realities.

GOALS

1) Identification of some particularly impacting urban typologies from a thermal point of view to experiment with mitigation actions. The urban typologies represent a standardized selection of urban sites, made in relation to the homogeneous characteristics in terms of morphology and urban materials: from high-density building typologies typical of historic centres, to gradually more open areas also including more or less relevant, up to including industrial and commercial areas (e.g. car parks), in which predominantly nature-based climate change mitigation interventions will be tested.

2) Construction of an open-air laboratory on an area of about 16 hectares along the Arno for the creation of a habitat that enhances urban biodiversity. A real open-air laboratory where an analysis and monitoring system will be tested, which can be replicated and exported as much as possible in other urban contexts, aimed at scientifically supporting the effects of integrating nature into the city, where the small fauna and flora can collaborate in restoring a balance of biodiversity. The latter will be observed and studied through some spot locations in this very large area along the Arno branch. The various subjects will carry out investigations and detailed research to scientifically support what will be the effects of a greening intervention planned in this area, monitoring the ecosystem situation, current and following the nature-based interventions of this "laboratory" area, through the systematic assessment of the state of health of some animal and plant species. The state of the plant species, herbaceous and shrubs, most representative of the study area will be evaluated also through the quantification of stress biomarkers. The objective is

therefore also to evaluate the state of health of the vegetation ex-ante and ex-post intervention, with attention also to the characteristics of the soil and the mud coming from the Arno river. This will be accompanied by weather-climate monitoring, air quality, soil, plant biodiversity, with attention also dedicated to monitoring animal biodiversity.

3) 20 years of scientific monitoring of the results obtained. For each urban typology, monitoring systems of the physical parameters and ecosystem services will be activated which, compared with the reference benchmarks detected in the comparison areas, will allow the identification of the most effective solutions to adopt. It is about collecting data to identify those adaptation strategies that make the ecosystem more resilient, and are able to influence the urban development model and lifestyles. All the information collected will be integrated on a platform that can be consulted online aimed at informing and sensitizing the population on environmental issues relating to plant and animal biodiversity and the contribution provided by urban green areas. These data will be used to plan and implement the future actions of this project which aims to improve the environment of a very beautiful area with great potential.

Expected results

The objective of the project carried out in Florence is the creation of an objective reference framework for interventions aimed at mitigating the effects of climate change in urban areas, as well as promoting and integrating biodiversity in its spaces. On the basis of the scientific evidence found, we intend to develop a series of action strategies that can constitute an abacus of best practices which - also through international projects such as LIFE, Horizon, or other forms of collaboration / alliance - become a model to be used as a reference on an international scale, giving prestige to the Florentine experience.

Duration

An estimated 5 years for implementation, with 20 years of scientific monitoring.

Actors involved & Roles

1) The **Capellino Foundation**, creator and leader of the project, intends to make the results of the work that will be carried out by the research team available to the city of Florence, financially supporting its implementation;

2) the **Municipality of Florence**, which benefits from the project, undertakes to make the jointly identified sample areas available and to guarantee their maintenance, as well as to promote the dissemination of the results obtained, integrating them into its Green Plan and giving them public visibility;

3) **Alberto Giuntoli** is project coordinator and collaborates with the scientific team, and is also in charge of ensuring the adequate connection with the Green Plan of the Municipality of Florence;

4) the **Institute for Bioeconomy** of the National Research Council (CNR-IBE) is scientific manager of the project, with a team led by Marco Morabito for the study, simulation of the expected effects and monitoring of a large set of environmental variables of all areas;

5) the Department of Agricultural, Food, Environmental and Forestry Sciences and Technologies (**DAGRI**) of the **University of Florence**, with a group coordinated by Francesco Ferrini, provides support for the identification and characterization of the best plant associations;

6) the Department of Civil and Environmental Engineering (**DICEA**) of the **University of Florence**, with a group coordinated by Alessandro Marradi, will contribute to the project as regards the paved surfaces subject to intervention;

7) **Duccio Berzi**, Forestry and Faunistic Technician, will deal with aspects related to the management and monitoring of biodiversity as well as the natural area to be twinned with the city of Florence.