

Parco Italia

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Parco Italia

Brief introduction to the report:

This report represents the Final Outcome of two years of collaborative efforts between Stefano Boeri Architetti and Alberitalia on the Parco Italia project, spanning from September 30, 2021, to September 30, 2023.

Its primary objective is to provide comprehensive insights into the different tasks (Work Packages WP) and their respective achievements. The report comprises an executive summary, organized into sections, which encapsulates the completed activities and the progress status of each working package. Additionally, it offers a more extensive narrative for each working package, delving into the activities and associated findings.

This Interim report is being presented by the Coordinator, acting on behalf of all participating organizations involved in the project.

The technical component of this Report is designed to provide an in-depth overview of the project's evolution and adherence to the original contract, which outlines the partnership between the three principal parties: Amazon, Stefano Boeri Architetti, and Alberitalia.

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Project title: PARCO ITALIA

Reporting period: 09/2021 to 29/09/2023

Organizations: STEFANO BOERI ARCHITETTI, ALBERITALIA

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General instructions:

The final report covers the activities, results and expenditure of the entire reporting period. This should provide a detailed picture of the project and its progress during the reporting period as described in the original contract among the three parties: Amazon, Stefano Boeri Architetti, and Alberitalia.

Overview:

This document comprises the following sections:

Section 1: Project Brief

Section 2: Working Packages (WP) Sheets

Section 3: Baseline Studies

Section 4: Detailed Working Packages progress

Annex 1: Pilot Projects

Annex 2: Maps

Annex 3: Stakeholders network

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SECTION 1. PROJECT BRIEF





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Parco Italia aims to improve the forest area and environmental benefits of the Italian natural capital by working on the ecosystems that generate the most biodiversity, forests. We thus envisioned the Parco Italia project, which aims to extend, connect, protect, sustainably manage, and enhance a network of natural areas, protected areas, ecological corridors, semi natural terrestrial ecosystems, and forests across Italy. In the future, this network could constitute a natural connective matrix bridging urban and coastal areas to remote mountain ranges, linking the Alps and the Apennines to the Mediterranean coast. Parco Italia is an act of care practiced through the construction of cultural and ecological connections - linking protected and unprotected natural areas and slow mobility paths - designed to be part of a broader vision that takes into consideration ecosystem services, climate mitigation and adaptation.

A project born from a vision conceived by Stefano Boeri developed with the AlberItalia Foundation, and initiated thanks to the support of Amazon. Taking inspiration from the UN Agenda 2030, Parco Italia plans to achieve an initial goal of planting 70,000 trees and shrubs within three years, during which the research and implementation phases of the project will be developed with the support of Amazon. Parco Italia is inspired by Richard Weller's vision of a World Park capable of connecting all the biodiversity hotspots on the planet.

The ambition of Parco Italia lies in building a long-term vision that imagines planting a tree for each citizen of the 15 Italian metropolitan cities: 22 million trees planted by 2040.

The Parco Italia research and implementation phases have a total duration of three years and started in September 2021. The implementation phase of the Parco Italia project will commence with the planting of 70,000 trees on selected sites in the territory, which the AlberItalia Foundation together with Stefano Boeri Architetti will complete by September 2024.

The Parco Italia project comprises two phases:

The research phase

In its initial phase, the Parco Italia team undertook a series of research activities that led to a comprehensive understanding of Italy's current natural capital and the identification of future potential areas for afforestation.

The research phase of Parco Italia is based on five essential points:

- Develop thematic maps describing metropolitan areas, municipalities, inner areas, ecoregions, forests, ecological fragmentation, hiking and cycling routes, mobility networks, the risks of forest fire, tree cover loss, landslides and floods,

along with national afforestation projects developed and implemented during the past decade. All the information layers were also quantified at regional and metropolitan levels to identify environmentally critical areas with high priority given to afforestation.

- The team also conducted stakeholder mapping and surveys, establishing a network of contacts. Responses were collected, and initial discussions with nurseries, metropolitan areas, regions, smaller cities, and private organizations were held to identify the criticalities and potentialities of afforestation initiatives in Italy.
- Guidelines for promoting, designing, and sustainably managing new forests and vegetated lands were defined and compiled as a list of Frequently Asked Questions (FAQs) to ensure the successful implementation of the Parco Italia project.
- In addition, environmental indicators were established to support the monitoring of forests in natural, urban, and extra-urban areas. This set of indicators will allow for the continuous detection and measurement of forest status and ensure that Parco Italia activities and plantations meet the required goals.
- The team also developed the roadmap for Parco Italia's next steps, focusing on the long-term implementation of its vision. This framework covers communication strategies, integrated governance and partnership models, the fostering of national and regional regulations, and the development of innovative funding models and tools. These elements aim to encourage the involvement of partner stakeholders in supporting the project and ensuring its success.

The research phase covers the following activities and outputs:

1. Defining priorities for afforestation on a national scale with which to guide the construction of a network of forests, existing afforestation projects, and other vegetated ecological corridors throughout the country, including urban areas, while bearing in mind the ongoing socio-ecological transformations throughout the country.
2. Defining the guidelines (in the form of FAQs) that provide directions for planning, designing, implementing, and managing the network of forests and vegetated areas in Italy.
3. Encouraging the reconnection of natural and semi-natural areas and urban and periurban forests and creating strategic green infrastructures (GI) within cities, and transforming them into ecologically valuable areas.
4. Exploring the potential coupling of ecological corridors to existing or planned sustainable mobility infrastructures such as cycling paths, hiking trails, and running routes.
5. Defining a set of environmental monitoring indicators to enable the continuous analysis of the multifunctional status of forests in natural or urbanized and semi-urbanized areas.
6. Promoting integrated governance and partnership models, funding tools, and the fostering of regional and national regulations to encourage the involvement of a sufficient number of people supporting the Parco Italia project.

The implementation phase

The second phase of Parco Italia kickstarted a number of pilot projects to demonstrate the development of nature-based solutions and forestation projects within natural and semi-natural areas, metropolitan areas, cities, towns, and small urban settlements. The implementation phase, which includes afforestation, reforestation, and restoration campaigns, will define and harmonize planning, design, and management tools for forests, as well as actions aimed at reducing fragmentation and improving the spatial continuity of natural habitats. During the implementation phase, started from April 2023, Parco Italia has planted over 15,000 trees and shrubs, with the objective of increasing the total number by an additional 25,000 plants by the end of 2023, and ultimately reaching a total of 70,000 trees planted by the end of 2024.

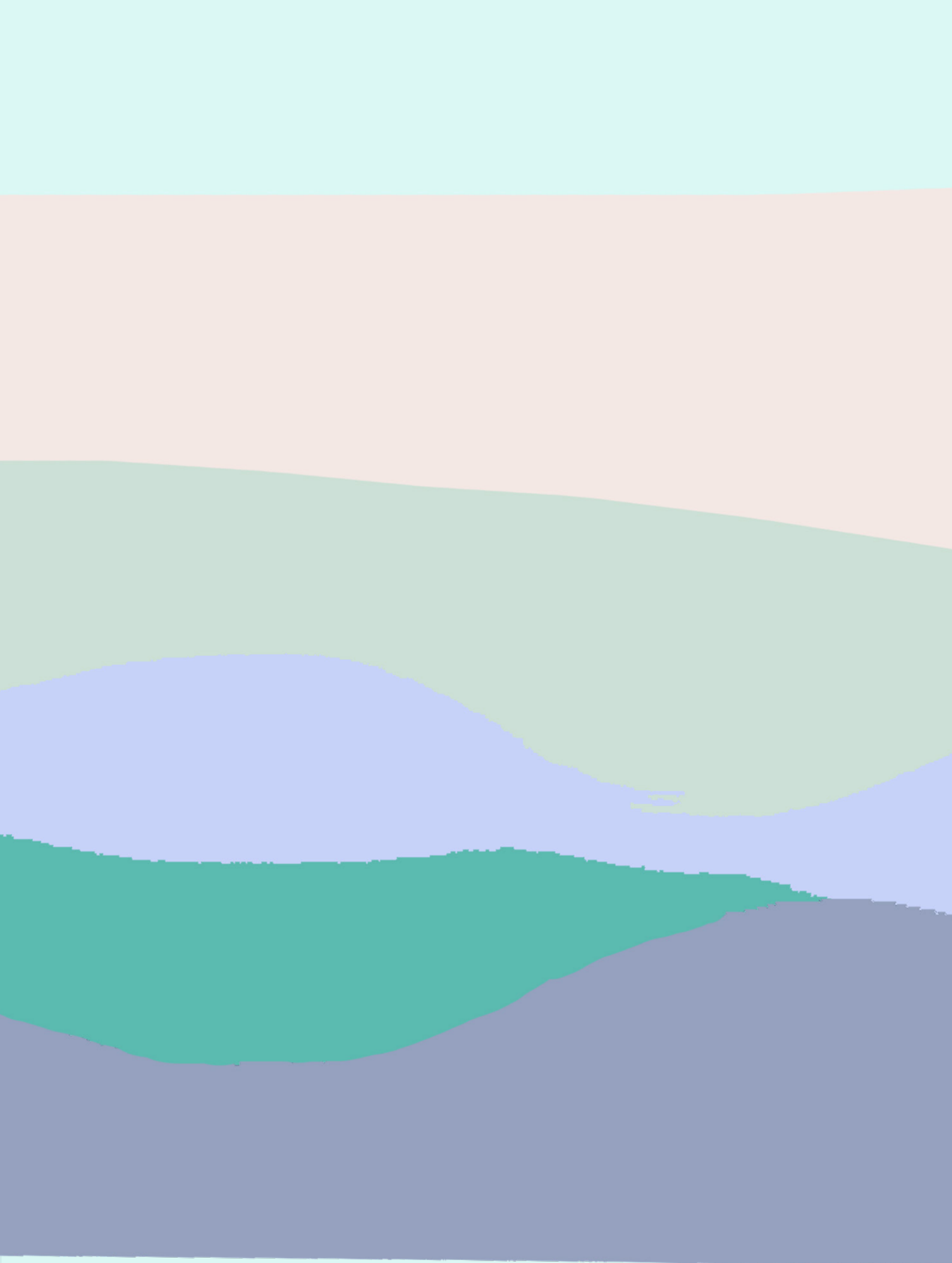
The implementation phase of Parco Italia is based on six essential points:

- Building the capacity for selecting and developing appropriate solutions with which to transform a site into a healthy forest.
- Establishing robust and dependable scientific and technical knowledge.
- Raising awareness within urban and extra-urban communities about the primary importance and the added value of forest-derived ecosystem services.
- Connecting local communities' needs with the potential functions and structures of future forests.
- Acknowledging that planting campaigns occur in a multi-stakeholder and multi-scalar arena. The campaigns represent the starting point of the socio-ecological transformations within the relationships between human beings and the landscape.
- Adopting a flexible style in readiness to engage with unforeseen changes in policies and governance, financial support, and ecological and societal needs.

The implementation phase will consist of the following activities and outputs:

1. Assessing and mapping the state of Italy's tree nurseries.
2. Providing a progressive inventory of potentially suitable sites (Bank of Tree Places) for implementing tree plantation activities.
3. Defining and designing pilot projects.
4. Planting trees and forests and implementing ecological connections.
5. Monitoring and testing the results of tree planting.

SECTION 2. WORKING PACKAGES SHEETS



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WP1 - Surveying and mapping of the state of Italy's green systems

Description: WP1 consists of the analysis of the state of green systems in Italy and the survey of the active and planned projects on Italian territory.

Output: Construction of synthetic cartographies and reports containing the mapping and collection of relevant projects.

Schedule: Started in September 2021. To be submitted in Draft version by the end March 2023. To be completed in June 2023.

1. Which activities have been conducted until now:

The baseline mapping activities that informed the research:

- A collection of Italy's natural capital including forested areas and protected areas (Nature 2000 and national).
- The definition of thematic maps related with the specific objectives of the research, in particular: network of metropolitan areas, municipalities by population, inner areas, ecoregions, forests, degree of ecological fragmentation, hiking paths, cycling routes, protected areas, mobility network (motorways, primary roads and railways), forest fires, tree cover loss, landslide hazards, flooding hazards, national afforestation projects, temperature trends (scenario RCP4.5 for 2050).
- A preliminary map of the priorities for afforestation in Italy, which uses thematic maps to define the critical areas in which to engage in activities of forest planting, based on two criteria and two scales, ecological connectivity on a territorial scale, and urban ecosystem services on the scale of the metropolitan areas.
- A preliminary map of natural capital in specific afforestation sites within pilot project areas.
- Adaptation of the Natural Capital Map of Italy for a new output regarding the different strategies of communication within the project: Website, Printed Map, and Salone Exhibition.
- Mapping of forestation activities promoted by the MASE - Ministry for the Environment and Energy Security (former MITE) in Bando Costa, and many other private and public stakeholders.

The above mentioned activities are sustained by a sound data collection that is building a growing database which is continuously updated and can possibly support further research.

2. Which are the planned activities for the project's next phases.

-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

-

WP2 - Identification and interaction with national and international stakeholders with expertise in climate change issues, environmental benefits of green and related physical and mental well-being

Description: WP2 aims to identify and build networks of local, national, and international stakeholders that can support the research and implement the vision on the environmental and landscape issues.

Output: Organization of working groups, internal seminar activities and one-to-one discussions in order to collect knowledge and experiences with which to co-design a shared vision.

Schedule: Started in September 2021, and continues in 2022. Finishes with the end of the project, in September 2023.

1. Which activities have been conducted until now.

- Mapping of stakeholders: collection and creation of a network of contacts of possible stakeholders for the project;
 - Development of an online survey to be carried out among the relevant stakeholders collected to gather information and raise interest;
 - Administration of the survey through email, social media channels, websites, etc. - responses have been collected and processed;
 - First one-to-one discussions have been conducted with the nurseries' stakeholders group, with some of the metropolitan cities, regions, cities and with private organizations;
 - Questions for the interviews have been defined;
 - One-to-one discussions with different stakeholders to understand and map the private and public forestry projects in Italy.
-

2. Which are the planned activities for the project's next phases.

-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

Organization of Workshop / seminar with the stakeholders will be organized on the occasion of the kick-off event that will be held in Rome, November 14th. On that occasion experts, representatives of tree planting companies, academia and representatives of Metropolitan Cities etc will be invited.

WP3 - Construction of a Guideline Document

Description: WP3 consists of the definition and writing of a guideline document that can support the implementation of afforestation strategies and their immediate impact assessment.

Output: Guidelines to be used for the plantation activities.

Schedule: Started in March 2022, extended and completed in June 2023.

1. Which activities have been conducted until now.

- Analysis of twenty pre-selected guidelines (concluded);
 - Selection of 10 afforestation guidelines for evaluation (concluded);
 - Definition of a methodology for the evaluation of the existing afforestation guidelines. For the most frequent topics addressed by the guidelines, we proceed to assign, for each guideline, a score (from 0 to 3) to each of the identified topics of interest to evaluate the accuracy of information (concluded);
 - Definition of the data gaps (concluded);
 - Definition of the target audience/ user typology (concluded);
 - Definition of the most frequent topics in the guidelines, which will be converted into a list of FAQs - frequently asked questions (concluded);
 - Selection of the FAQs through an analysis of the FAQs in similar afforestation projects (concluded);
 - Writing the questions and their answers, to be included in Parco Italia's website (concluded);
 - Develop the illustration associated with the FAQs (concluded).
-

2. Which are the planned activities for the project's next phases.

-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

The WP3 (that was due in March 2023) was extended until June 2023 to cover more detailed information on design, planning and management of the new plantations in the FAQs in order to guide the local stakeholders, the municipalities and professionals towards sustainably planned and managed forests. The first two sections of the FAQs (1. Questions on Italy's natural capital; 2. Questions on the Parco Italia project) were thus accompanied by a third section (3. Questions on Design, Planning, Management and Maintenance for tree planting sites) that may be used as guidelines by administrators and professionals to implement projects at local scales following certain quality criteria and standards.

WP4 - Activation of plantation activities

Description: WP4 envisages the definition and design of pilot projects in public and private sectors; expert cross-checking of plantation programs indicated by the implementation phase.

Output: Database of sites and their connections with the larger areas, Masterplan of the site.

Schedule: Started in February 2022, to complete by the end of 2024.

1. Which activities have been conducted until now.

- In the first phase, we created a network of contacts between local administrators, forestry experts, non-governmental organizations, and policymakers.
 - Within the network, we shared a set of practical indicators to identify the most suitable areas for the project. We therefore started a phase of consultation with the delegates of each area to establish an implementation program and overcome any obstacles.
 - We have thus built a database of suitable areas which is constantly updated.
 - We formalised the collaboration with the landowners through specific agreements and designed the plans for the first pilot projects.
-

2. Which are the planned activities for the project's next phases.

- Complete the planting phase for those areas that have been formally identified (through contracts with owners and forestry experts)
 - Based on seasonal trends we will plan the 2023 planting campaign.
 - Continue the consultation and interaction phase with local administrators and private owners to identify new sites, especially in those regions that are less covered by the project.
-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

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WP5 - Definition of goals related to ecosystem services (ESS) and construction of indicators to assess the impact of implemented strategies

Description: WP5 foresees the identification of criteria and indicators to evaluate the impact of the pilot interventions on the Italian territory.

Output: Report document with the definition of indicators, data collection and results.

Schedule: Started in April 2021, to complete in September 2023.

1. Which activities have been conducted until now.

- Indicators for climate and environmental regulation, biodiversity, cultural services and social benefits provided by urban forests have been collected and reviewed from scientific literature and existing policy documents. A first shortlist of indicators to evaluate the impact of pilot plantations has been drafted, together with the definition of a methodology for indicators measurements, expected thresholds for success and methods for evaluation.
 - The list of indicators has subsequently been refined and detailed with specific protocols for measurement at time zero and monitoring along and at the end of the project.
-

2. Which are the planned activities for the project's next phases.

- Publish a review paper about the criteria from voluntary certification schemes for sustainable management of forest management and plantations
-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

-

WP6 - Monitoring and testing activities of indicators and ecosystem services (ESS) through sensor technology and mapping on representative pilot projects

Description: WP6 aims at monitoring and field testing the indicators selected for the evaluation of the impact of the pilot projects.

Output: Report containing Mapping and data collected.

Schedule: Started in September 2022, to be completed in September 2023

1. Which activities have been conducted until now.

- Designing protocols for remote- and site-based sensing of tree plantation performance.
 - Collecting data on performance and environmental indicators in pilot plantations; validating and analyzing plantation data in the monitoring period and extracting ecosystem service indicators consistent with WP5.
-

2. Which are the planned activities for the project's next phases.

- Review of scientific literature and innovative IT solutions for monitoring ecosystem service indicators from the field- and remote-based sensors in forests and forest plantations;
 - Address and identify criteria and principles for choosing a qualified and suitable forest reproductive material, as well as the Parco Italia approach to selecting the best forest reproductive material for the pilot projects, concerning forest nursery system and supply chain.
-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

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WP7 - Communication and participation strategies for the enhancement and extension of green areas and green systems

Description: WP7 relates to the construction of a program of sharing and participation, both in scientific and non-specialist, local, national, and international contexts, which can inform and build knowledge about the project and start co-design practices on the work activities undertaken and in progress.

Output: Report that collects the project outcomes, organization of international conferences, participation in international conferences, and presentation of the project in specialized and non-specialized areas. Support for awareness raising activities that will be agreed upon each time with the client.

Schedule: Started in February 2022 to complete in September 2023.

1. Which activities have been conducted until now.

- Presentation and promotion of Parco Italia at national and international events; conferences and webinars to discuss and promote the project (World Forum on Urban Forests 2023 - Washington D.C.);
 - Linking the project to other relevant national plantation events and institutions since the start of the project in the country (i.e., Centro Nazionale per la Biodiversità, EFI Biocities Facility Rome, Italian Government Ministries MASE, MIPAAF);
 - Design of plantation campaigns for the current and the next agronomic seasons. Definition and organization of the Institutional Parco Italia Kickoff event to be held in Rome, Lazio between September and October 2023;
 - Organization of the Biodiversity Walks, to be held between July and September 2023;
 - Design and development of the Parco Italia website structure and relaunch of the website through Stefano Boeri Architetti official channels, in order to boost the growth of the Parco Italia website;
 - Social media publication, enhancement and storytelling of the project on social media, with specific hashtags, for an already established community;
 - Support the press coverage of the project on international and local media;
 - Development of the Parco Italia website;
 - Organization of the Parco Italia Biodiversity Walks.
-

2. Which are the planned activities for the project's next phases.

- Design of the plantation campaigns for the following agronomic season;
 - National workshops with stakeholders and ongoing forestry activities in connection to biodiversity (Kickoff event 2023)
-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

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WP8 - Construction of roadmaps for research implementation

Description: WP8 gives guidance on the next steps of the research and implementation to achieve the 22 million trees goal and their environmental, societal, and economic impact on the national and international level.

Output: Report to define the construction of roadmaps for research implementation including the following areas: governance; feasibility; stakeholders' engagement; and communication.

Schedule: Started in February 2022 and to be completed in September 2023.

1. Which activities have been conducted until now.

Review of the national research and international projects that can complement and leverage Parco Italia; discussion with the different Ministries of the ongoing activities that can be connected with Parco Italia (MIMS; MASE; MASAF in particular); definition of Parco Italia's general objectives, milestones, and potential final results.; breakdown of Parco Italia medium- and long-term topics and objectives.

- Presentation to MASAF to embody the research within the regional afforestation policies
- Definition of Alberitalia as the keyrecipient to private donation to the project the enabling environment requirements: ParcoItalia Partnership;

2. Which are the planned activities for the project's next phases.

-

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

Possible update will be added in November 2023 together with the completion of WP7

WP9 - Coordination and scientific guidance of activities

Description: WP9 is about the coordination and management of the project in all its phases.

Output: Internal reports, programming activities, adherence to the GANTT timeline of the project and reporting.

Schedule: Started in September 2021 to be completed in September 2023.

1. Which activities have been conducted until now.

- Monitoring the weekly progress of the project;
 - Planning meetings and organizing project logistics;
 - Checking adherence and compliance with the project's GANTT Chart;
 - Programming activities to complete assigned tasks on time;
 - Internal reporting and reporting to the Client; Specific coordination meetings with Amazon Italy Communications, PR, and Operations Public Policy Departments.
-

2. Which are the planned activities for the project's next phases.

To continue the above-mentioned activities and support the organization and production of the planting activities and campaigns. .

3. Deviation from the work plan. (In case of deviations or changes, please clearly explain which project activity was not implemented in line with the initial project work plan and the proposed or Implemented Solution.)

-

SECTION 3. BASELINE STUDIES





Introduction

According to the climate and environmental data, it appears quite clearly that the climate crisis is affecting Europe and Italy with an increase in extreme weather events that could affect our forests as well as our cities. The climate crisis is exponentially increasing the risks of wildfires and increasing the frequency of climate extremes on Italian natural resources, its flora, and fauna, as well as violently hitting urban settlements.

According to a report from the World Meteorological Organization and the Copernicus Climate Change Service, Europe is warming faster than any other inhabited continent, with rising temperatures fueling increasingly severe heat waves, floods, and wildfires. The Paris Agreement set a goal of halting warming at 2 degrees C, such that the average temperature across the globe over several years does not exceed this target. So far, the planet has warmed by 1.2 degrees C overall, but some regions have already surpassed the 2-degree mark, including Europe, which last year measured 2.3 degrees C warmer than in the preindustrial era, according to the report.

Europe saw a staggering 16,000 heat-related deaths in 2022, while weather-related economic damages totaled \$2 billion. Storms and floods accounted for most of the losses, according to the report. Italy is particularly vulnerable to hydrogeological disasters¹ (WMO, 2023).

Floods and landslides are among the risk factors that affect multiple areas in Italy. According to data from ISPRA, 3.5% of the Italian population lives in areas with a high risk of flooding. As for the risk of landslides, ISPRA reports that 1.7 million people live in high-risk landslide areas. Recent events in Emilia Romagna and Marche bring to mind other recent disasters in Italy, such as the flood in Genoa in 2011 or the more recent one in Ischia. Recently, the government has approved a weather-related decree law that includes a €2 billion intervention to address the most urgent expenses. That being said, Italy must first and foremost, invest in prevention, and stop acting on emergencies, as extreme events like these will become more frequent and intense in the future. Prevention, adaptation strategies, and restoration of ecosystems, such as river banks, are words that must enter predominantly in our vocabulary as well as in our actions.

Regarding ecological connections, at the European scale, several studies carried out on multiple countries' ecological networks highlighted a considerable lack of connectivity and a generalised fragmentation of protected areas. The studies on European ecological connections (PEEN) pointed out a clear need for the strengthening of ecological corridors by each individual nation in order to establish a shared coherence between all member states. For instance, the EU is pushing toward the creation of a 'Trans European Nature Network' that would involve each

1. World Meteorological Organization, 2023. *The State of the Climate in Europe 2022*. Retrieved on web: <https://storymaps.arcgis.com/stories/>

EU Member State in increasing biodiversity through the creation of ecological corridors, strengthening and enlarging the presence of protected areas and highly protected areas in Europe. According to EEA paper² (2022) the authors mapped the fragmentation of Natura 2000 areas, pointing out the huge potential of a network of green infrastructure segments connecting Natura 2000 sites dominated by forest and woodland patches larger than 3,500 ha.

There are already many examples of continuous protected areas in border countries in Europe. The territorial system merging the Swiss National Park of Engadine with the Stelvio National Park and the Adamello-Brenta regional park in Italy represents an excellent example of ecological connections beyond borders. Another outstanding example is the system of parks connecting, through a spectacular series of protected areas, the cities of Grenoble and Chambéry in France to Turin in Italy.

These existing examples deeply inspired the Parco Italia project, whose main purpose is to work on extending, connecting, protecting, and enhancing a network of natural areas, protected areas, ecological corridors, semi-natural terrestrial ecosystems, unprotected forests, woodlands, etc. that could strengthen the connectivity between natural areas, increase the genetic diversity of species, and reduce ecological fragmentation. These regeneration interventions are meant to be diversified according to the variety of landscapes: they will be following rivers and canals to activate processes of restoration (according to the EU Biodiversity Strategy 2030, the EU should restore at least 25,000km of free-flowing rivers); connecting cities and making them more permeable; placed in agricultural areas to be vectors of biodiversity (according to one of the fundamental points of the EU Biodiversity Strategy 2030 at least 10% of EU agricultural areas should be under high-biodiversity landscape features), or located in areas with a strong industrial character in order to remediate polluted soils. Furthermore, by working on the protection of natural areas and managing the processes of naturalization of other natural or semi-natural spaces, through multiscale and multimodal strategies it will be possible to tackle the environmental risks of the territory locally (from fire to hydrogeological risks).

2. EEA, European Environment Agency, *Building a Trans European Nature Network*, Retrieved on Web on September 13th, 2022, <https://www.eea.europa.eu/publications/building-a-coherent-trans-european>

3. Copernicus Climate Change Service, retrieved on the web on September 9th, 2022 <https://climate.copernicus.eu/surface-air-temperature-august-2022>

4. Stella Levantesi, "Assessing Italy's climate risk" in *Nature*, November 2nd, 2021, retrieved on the web on September 12th, 2022, <https://www.nature.com/articles/d43978-021-00136-0>.

5. Fontana, E., Morabito, A., Nicoletti, A., 2021. *L'Italia in fumo. Gli incendi del patrimonio naturale, i fattori di rischio e le proposte di Legambiente*. Retrieved on web on September 9th, 2022 <https://www.legambiente.it/wp-content/uploads/2021/11/report-incendi-2022.pdf>

Background data on Italy's climate and environmental conditions

- It is well known that the average temperature over Europe in 2022 was the highest on record for both August and summer (June – August) by substantial margins of 0.8°C over 2018 for August and 0.4°C over 2021 for summer³. According to the European Severe Weather Database, Italy was hit by 1,499 extreme weather events in 2020 compared to 380 extreme weather events in 2010. Future scenarios tell us that such situations will intensify if no action is taken. More intense rainfall, increase in temperatures, more consecutive days without rain and heat waves will all affect the Italian territory, with negative effects on agriculture, forests, and even the hydrological system, and of course, consequent social, economic, and health risks.⁴
- As far as forests are concerned, in Italy, we're already experiencing an increase in fire risk, up to 20%, and a lengthening of the fire season. There is also an increase in the area covered by fire, especially in the southern regions, where the vegetation is drier and more flammable⁴.
- According to a study conducted by Legambiente, between 40 and 50% of the fires are located in forests, while the remaining 60 and 50% start in rural/urban areas and then spread to the surrounding forests.⁵

- In 2019 in Italy, for the first time in centuries, forests have exceeded land dedicated to agriculture ⁶. The increase in forests has been caused by a series of concomitant factors, of which the most important is undeniably linked to the depopulation of mountain and hilly areas in favour of the growth of the urban population. This uncontrolled growth of forests, as good as it may sound, may be a trigger for the intensification of risks - e.g., the already mentioned increase in the number and the intensity of fires - if not well managed.
- Another relevant data to point out is that in 2021, over a quarter (25,11%) of the Italian national territory showed high fragmentation due to urbanization. Lombardy and Veneto are the regions with the highest percentage of the territory with very high fragmentation due to the high rate of low and medium-density urbanization in the more accessible areas.⁷
- It is well known that higher rates of fragmentation are affecting the biodiversity and overall health of habitats. According to a study⁸, the extraordinary variability of climatic, geological, and biogeographical features is reflected by the high rate of habitat types (according to the European Red List of Habitats - EU-RLH) detected in its territory (around 159), accounting for more than two-thirds of all terrestrial and freshwater habitats (TFH) surveyed throughout Europe (Janssen et al. 2016). Indeed, the assessment confirms Italy as one of the European countries with the highest biodiversity. Nevertheless, around 89% of the habitats are at risk⁹. Around 49% of habitats are considered to be in inadequate conditions and 40% in bad conditions, with only 8% in positive conditions, including the alpine and boreal moors, which are reported as being in good status. Last but not least, the habitats classified as 'maritime and inland dunes' are in a critical situation due to the development of tourist infrastructures⁹.

6. Mipaaf, CREA Politiche e Bioeconomia, Compagnia delle Foreste, 2019. *RaFITALIA. Rapporto sullo stato delle foreste e del settore forestale in Italia, May 2019*. ISBN: 978-88-98850-34-1

7. Munafò, M. (a cura di), 2022. *Consumo di suolo, dinamiche territoriali e servizi ecosistemici*. Edizione 2022. Report SNPA 32/22, retrieved on Web on September 2022, <https://www.snpambiente.it/2022/07/26/consumo-di-suolo-dinamiche-territoriali-e-servizi-ecosistemici-edizione-2022/#:~:text=Edizione%20>

8. Gigante, D., Acosta, A.T.R., Agrillo, E. et al. *Habitat conservation in Italy: the state of the art in the light of the first European Red List of Terrestrial and Freshwater Habitats*. *Rend. Fis. Acc. Lincei* 29, 251–265 (2018). <https://doi.org/10.1007/s12210-018-0688-5>

9. Ercole S., Angelini P., Carnevali L., Casella L., Giacanelli V., Grignetti A., La Mesa G., Nardelli R., Serra L., Stoch F., Tunesi L., Genovesi P.(ed.), 2021. *Rapporti Diretti veNatura(2013-2018). Sintesi dello stato di conservazione delle specie e degli habitat di interesse comunitario e delle azioni di contrasto alle specie esotiche di rilevanza unionale in Italia*. ISPRA, Serie Rapporti 349/2021.

Afforestation global projects and networks.

In recent years, the awareness of governments and communities regarding the urgency of taking effective action and following policies that will counteract the trend of climate change and its often devastating effects on the environment and on the very life of human societies has been increasing. A considerable number of international organisations (C40, 100 Resilient Cities, World Mayor Council on Climate Change, Sustainable Cities Network, FAO, ICLEI, Global Platforms, and Sustainable Cities, etc.) have launched initiatives aimed at increasing the resilience of cities and promoting nature-based solutions as active components for the future of urban areas. Among them, those related to urban forests and green infrastructures have the greatest significance and effectiveness for urban systems. In addressing climate change in mitigatory and adaptive terms, both institutions and large international organisations recognize the central role of cities. This approach affects both direct relations regarding the planning, design and management of urban areas and also the ecological, cultural, economic, and political responsibility for the decisions and governance of those areas well beyond the limits of the actual physical influence of cities.

Urban agglomerations are rightly considered the main culprits of surplus CO₂ emissions compared to natural carbon cycles, while at the same time, they are the first victims of the effects of climate change. Many cities around the world have thus initiated specific strategies and actions regarding forests and urban vegetation (e.g., Melbourne, Vancouver, Singapore, Bogotá, Curitiba, London, Barcelona, Milan, Turin, Tirana, Copenhagen and Ljubljana to name but a few). Most of these cities have sound factual awareness when referring to the themes of arboriculture,

Very often, however, these initiatives remain limited to an urban context, and there is very little dialogue and integration with the natural wealth distributed on a regional and national scale, while there is an urgent need to address the environmental issue on a global level with diversified strategies and actions. The Parco Italia project, without having the presumption to address issues globally, wants to implement a national ecological network, also looking at international coherence potentially through the development of trans-continental ecological corridors.

THE AUS-ROC TRAIL

38,000 km
23,500 MILES // 76,000 km² RESTORED LAND

23
NATIONS

7
HOTSPOTS

MOROCCO / SPAIN / FRANCE / ITALY / GREECE / TURKEY / GEORGIA / RUSSIA / UZBEKISTAN / AZERBAIJAN / IRAN / AFGHANISTAN / TAJIKISTAN / KAZAKHSTAN / PAKISTAN / NEPAL / INDIA / BANGLADESH / THAILAND / MALAYSIA / SINGAPORE / INDONESIA / AUSTRALIA

MEDITERRANEAN BASIN / BRINDI-HANGKUI WATERSHED OF CENTRAL ASIA / HIMALAYAS / INDO-BURMA / SUNGAILAND / FORESTS OF EASTERN AUSTRALIA

TARFAYA MOROCCO

HOBART TASMANIA

Legend:
 - Restored Area (Yellow)
 - Trail Area (Red)
 - Hot Spotting Area (Black)
 - Trail Route (Red line)
 - Scale: 0 500 1000 2000 km

A single large-scale vision such as the World Park project was proposed by Richard Weller (Weller R., 2015). This idea came firstly out of a study of the areas considered to be biodiversity hotspots, 160,000 protected areas unevenly and discontinuously spread throughout 235 countries, and secondly from the overlapping of the various ventures that affect our world heritage sites, i.e. those sites considered part of the UNESCO World Heritage. The key to the development of this vision came after the interpretational observation of the areas carried out by other studies such as the United Nations Convention on Biological Diversity (CBD) and the Pan-European Ecological Network (PEEN) which aims to connect the green corridors found all over Europe (Jongman et al. 2011). The PEEN was

developed as a guide for a coherent vision of biodiversity conservation, following research needs on establishing coherent ecological networks through Europe as an operational tool for biological diversity conservation (e.g. Boitani et al., 2007) the result of which was the development of three maps (Central and Eastern Europe, Eastern Europe and Southern Europe, and Western Europe), which were produced by comparing the various national databases and bringing them together under a single mapping.

Notes on afforestation history in Italy (1923-today)

During the 19th century, the rapid growth of population in Italy and the rise of industrial economy issues determined profound changes in the anthropogenic impact on the landscape, first of all on the country forest cover, which decreased from 11 million hectares of forests, as estimated at the beginning of 1800, to just 5 million, as depicted by the national statistics of 1870. The result of the Italian so-called “deforestation age” was affecting much beyond the shortage of timber and wood and had dramatic impacts on hydrology, flood risk, biodiversity, and soil fertility. The recognition of the disasters caused by the landscape changes started an intense, albeit discontinuous, afforestation and reforestation programme during the 20th century. Actually, a large-scale reforestation activity had already begun at the end of the 19th century, aimed above all at combating erosion and reforestation of mountain areas. Between 1912 and 1922, reforestation campaigns were carried out on approximately 35,000 hectares of public and private land.

The first strong impulse to reforestation and mountain reforestation was followed by the Royal Decree n. 3,267 of 30 December 1923 and the related implementation regulatory framework of 1926. From 1926 to 1940, an average of 10,000 ha per year were reforested. After World War II, a second reforestation phase started in 1949, challenging both erosion and forest cover problems, as well as social objectives, namely growing unemployment phenomena in the mountain and hilly areas. 30,000 ha per year were afforested or reforested for about 20 years, mainly using exotic species such as black pine, Douglas fir, and eucalyptus. A drastic decrease in reforestation campaigns occurred from the early 80s, simultaneously with the increase in natural afforestation processes due to the ultimate abandonment of agriculture and grazing activities in the mountain and hilly landscapes.

In the last decade of the 20th century, reforestation was very limited in terms of extension and carried out essentially to compensate for forest transformation interventions. In the period 1990-2008, an annual “deforestation” of about 7,000 ha was observed, mainly due to the construction of large infrastructures, urbanization, and, to a lesser extent, agriculture. However, in the same period of time, an annual growth of forest of 37,000 hectares was observed, mainly due to the abandonment of marginal and mountain agricultural land. Towards the end of the century, EU Regs. 2080/1992 and 1257/1999 encouraged the plantations of forest species, which, in the context of the European Commission Common agricultural policy, favored the planting of fast-growing species in timber arboriculture plants with production purposes. During the twentieth century in Italy, almost one million hectares were reforested by planting at least 1 billion trees.

At the beginning of the 21st century, there was a new wave of reforestation activity. The reasons are instead primarily linked to restoration ecology and to the need for urgent actions for tackling the climate crisis through carbon absorption and storage. This change also led to a reorganization of nursery activities both as

regards the methods of reproduction and growth and as regards the species used. It is important to note that the expansion of Italian forests (11 million hectares in 2020) in recent decades has not occurred uniformly throughout the territory but has been concentrated in hilly and mountainous areas. In the lowland areas and, above all, in large urban centers and their suburbs, forests have instead decreased mainly due to deforestation, urbanisation, and soil sealing.

The new urban forests, as well as the functional recovery and optimized management of existing vegetation (forest and non-forest), can play a fundamental role in the mitigation of climate extremes by significantly contributing to the reduction of temperature. In parallel, the presence of trees and woods in the city contributes substantially to the reduction of atmospheric pollution in both rural and urban environments and also reduces flood events.

Legislative Framework (EU Directives and PNRR)

With regard to the regulatory system at an international level, it is noticeable that one of the United Nations SDGs (UN Sustainable Development Goals - n.15 “Life on Land”) is devoted to life on earth and, in particular, to forests. One of the first considerations that emerges in relation to this SDG is the promotion of sustainable forest management aimed at providing ecosystem services (production of water, food, wood, microclimate regulation and air purification, and biodiversity) and foremost aimed at optimizing the conservation and improvement of the health of the forests themselves and at guaranteeing the increase of protected areas, considered to be areas for the conservation of biological diversity. Another SDG is dedicated to cities (Sustainable Development Goals - n.11 “Sustainable Cities and Communities”). One of the main objectives of SDG number 11 is to ensure universal access to public green spaces that are safe, inclusive, and accessible, in particular for women and children, the elderly, and people with disabilities, by 2030. In regard to forests, the United Nations Strategic Plan for Forests 2030 features a set of six Global Forest Goals and 26 associated targets to be reached by 2030. The six Global Forest Goals are the following:

- Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation, and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort to address climate change;
- Enhance forest-based economic, social, and environmental benefits, including by improving the livelihoods of forest-dependent people;
- Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests;
- Mobilize significantly increased, new, and additional financial resources from all sources for the implementation of sustainable forest management and strengthen scientific and technical cooperation and partnerships;
- Mobilize significantly increased, new, and additional financial resources from all sources for the implementation of sustainable forest management and strengthen scientific and technical cooperation and partnerships;
- Enhance cooperation, coordination, coherence, and synergies on forest-related issues at all levels, including within the UN System and across Collaborative Partnership on Forests member organizations, as well as across sectors and relevant stakeholders.

In the European legislative framework, the recent European Green Deal is a comprehensive deal covering many topics (from economy to environment) that

aims to protect and restore the European natural habitats while working on the EU's climate, energy, transport, and taxation policies for reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. In addition to the European Green Deal, reference must be made to a series of Communications from the European Commission with regard to forests - COM (2006); COM (2011); COM (2013), and COM (2021) -, that offer important guidelines for policies, especially with regard to the management of natural resources.

The EU Forest Strategy for 2030, which replaced the EU Forest Strategy 2014-2020, was developed to provide a coherent framework both for European policies on the subject and to guide the single national policies with regard to forest protection. Developed in line with the EU Biodiversity Strategy 2030, the EU Forest Strategy for 2030 is considered one of the flagship initiatives of the European Green Deal. It aims to increase the presence of forests in the territory as well as protecting, restoring and improving the resilience of existing forests¹⁰.

The EU is also planning to create an EU Nature Restoration Plan - with Restoration Targets - together with an EU Restoration Law. A first proposal was released in June 2022 (SWD(2022) 168 final), especially after the concerns about global food security due to geo-political instabilities that Europe has lately experienced, in order to lay down rules at the Union level on the restoration of ecosystems to ensure the recovery of bio-diverse and resilient nature across the Union territory. The Commission is proposing the first-ever piece of legislation that targets the restoration of Europe's nature, including forest, agricultural land, marine, and urban ecosystems. In the proposal, it is also mentioned how soils are an integral part of terrestrial ecosystems, referring to the Commission's 2021 communication on the EU Soil Strategy for 2030 that outlines the need to restore degraded soils and enhance soil biodiversity. Furthermore, according to the proposal, in order to put in place large-scale restoration efforts, it is appropriate to group habitat types according to the ecosystem to which they belong and set the time-bound and quantified area-based targets for groups of habitat types. This will allow member States to choose which habitats to restore first within the group. Restoration targets and obligations for protected habitats and species (see the Directives 92/43/EEC and 2009/147/EC), for pollinators, freshwater, for urban, agricultural, and forest ecosystems should be complementary and work in synergy with a view to achieving the overriding objective of restoring ecosystems across the Union's land and sea areas. The restoration measures required to achieve one specific target will, in many cases, contribute to the achievement of other targets or obligations. Italy should therefore plan restoration measures strategically with a view to maximising their effectiveness in the recovery of nature.

10. https://ec.europa.eu/environment/strategy/forest-strategy_en; COM(2021), 572 final).

11. Other Directives to look at that will help building a national restoration plan: Directives 92/43/EEC and 2009/147/EC (on Natura 2000 sites); Directive 2000/60/EC (on the ecological and chemical status of water bodies); Directive (EU) 2016/2284 (national air pollution control programmes); Art. 6 of the Convention on Biological Diversity (on Biodiversity strategies and action plans).

Restoration measures in Italy and in other member States should be planned in such a manner that not only would they address climate change mitigation and climate change adaptation but also aim at optimising the ecological, economic, and social functions of ecosystems, including their productivity potential, taking into account their contribution to the sustainable development of the regions and communities. An additional impact assessment will also look at the possibility of an EU-wide methodology to map, assess and achieve a good condition of ecosystems so they can deliver benefits such as climate regulation, water regulation, soil health, pollination, and disaster prevention and protection.¹¹

With regards to Italian legislation, to strengthen the central role of Biodiversity in the country, in February 2022, the Italian Parliament approved two articles of its Constitution Chart (9 and 41) in order to introduce the central role of biodiversity as a constitutional value that deserves specific protection for the public interest.

In particular, the legislation adds the protection of ecosystems, and not only the “environment.” Quoting the article of the Constitution: “The Republic promotes the development of culture and scientific and technical research [cfr. articles 33, 34]. It protects the landscape and the historical and artistic heritage of the Nation. It protects the environment, biodiversity, and ecosystems, also in the interest of future generations. State law regulates the methods and forms of animal protection.” Furthermore, Italy has worked on a National Strategy for biodiversity, called *Strategia Nazionale per la biodiversità*, adopted in 2010, which is a potentially useful tool for identifying the major areas /spheres of interest, as well as the National Plan for adaptation to climate change, called *Piano Nazionale di adattamento ai cambiamenti climatici (PNACC 2017)*, which provides for specific medium-long term actions to increase territorial connectivity and green infrastructures.

The National Forest Strategy, *Strategia Forestale Nazionale*, (published in December 2021, in accordance with the art.6, comma 1, Decree-law of April 3rd, 2018 n.34 - TUFF - Testo unico in materia di foreste e filiere forestali) lays out the ground rules for the sustainable management of forests in Italy and their protection, identifying objectives, actions, financial instruments, and possible indicators for evaluation and monitoring of the state of Italian forests. The three main goals of the Italian National Forest Strategy are a development of the guiding principles given by the EU Forest Strategy 2030. The three elements of the Italian National Strategy are:

1. Favour sustainable forest management and the multifunctional role of forests to guarantee the provision of ecosystem services at multiple scales (National, regional and local);
2. Use the forest resources efficiently for the sustainable development of economies in Italy’s rural, internal and urban areas;
3. Monitor and develop multidisciplinary knowledge and global responsibility in forest protection, including through multisectoral scientific research, technical assistance, professional training and the promotion of forest products and sustainable practices, production, and sustainable consumption. (Mipaaf, 2021)

Prior to that, the “White Paper on Italian Forests,” “*Libro bianco sui boschi d’Italia*,” prepared by the National Rural Network 2014 -2020 and Mipaaf, prepared the ground for the development of the National Forest Strategy, while the Law on forests and forestry supply chains, *Testo Unico in materia di foreste e filiere forestali* (Legislative Decree 3 April 2018, n.34), contains fundamental governance tools for the protection and sustainable management of forests in a perspective of integration on a national scale.

As regards the directives on urban and peri-urban forests in Italy, the regulatory instrument for the development of a network of forests between and within cities is law n. 10 passed on 14 January 2013, called “Rules for the development of urban green spaces,” or *Norme per lo sviluppo degli spazi verdi in città* which, among other things, has set up the Committee for the development of urban green spaces, called *Comitato per lo sviluppo del verde urbano*. The work of the Committee led to the definition of the National Urban Green Strategy, the so-called *Strategia Nazionale del Verde Urbano*. A final legislative instrument that promotes the creation and management of urban forests is the “Climate Decree” (decree-law 111 dated 14 October 2019), the so-called *Decreto Clima*, which provides for financial support mechanisms for the implementation of an “experimental program for planting trees, of afforestation or silviculture, and for the creation of urban and peri-urban forests, in metropolitan cities.”

In this legislative framework, there are principles for working on the threats that are affecting the forestry sector in Italy, as well as the forests, natural areas, and their biodiversity. There is an urgent need to engage with different stakeholders and with the authorities at different levels and operate on monitoring, protection, restoration, and the enhancement of different wooded areas, natural areas, and protected areas and ultimately linking the climatic, environmental, and social issues in a more cohesive way. The principles, objectives, and actions listed and stated in the laws on the main reports and plans should eventually find their application in the territories through diversified financial and governance support systems while keeping an eye on an overall vision.

The table below shows the summary of legislations / initiatives that are currently ongoing and shows how Parco Italia is contributing for each initiative. (Table 1)

Jurisdiction	Organisational body	Legislation/ Initiative	Target	How will Parco Italia contribute?
Italy	Government	National Forest Strategy (Strategia Forestale Nazionale)	- Promote a sustainable management of forests against risks - Promote an integrated, multidisciplinary, and interterritorial forest programming. - Protect and monitoring the biodiversity	Parco Italia aims at minimizing the risks (natural and anthropic disturbances), through sustainable management of the new forests as well as through active monitoring (See WP5 for details)
Europe	EU - European Union	New EU Forest Strategy for 2030	Plant 3 billion trees across Europe	70,000 trees planted by 2024, following EU directives
Europe	EU - European Union	Biodiversity Strategy 2030	Protect at least 30% of the EU's land area, 30% of the sea	Parco Italia aims at enlarging the protected areas by working on buffer, semi-natural areas and ecological corridors (See the Parco Italia Strategies and Actions)
Global	UN - United Nations	Agenda 2030 - SDGs - Sustainable development goals – Life on Land (SDG 15 and SDG 11)	SDG 15 aims to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests,(...) and halt and reverse land degradation and halt biodiversity loss”. SDG11 aims to “Make cities and human settlements inclusive, safe, resilient and sustainable”	Parco Italia aims to restore, protect and connect fragmented forests, consolidating and expanding regional and National ecological networks. It also aims to reduce locally the effects of climate extremes in fragile contexts in urban and peri-urban areas.

Table 1. Summary of legislations / initiatives that are currently ongoing and Parco Italia contribution

A focus on the EU Biodiversity Strategy 2030 - Summary of the Strategies and Actions and considerations for the Parco Italia project

The EU Biodiversity Strategy 2030, released in May 2020, aims to put Europe's biodiversity on a path to recovery by 2030 and contains specific actions and commitments. Some of them have been used by the Parco Italia project to frame its project objective, strategies, and goals.

The following are some of the goals that the EU is planning to carry forward and that the Parco Italia project is using to frame its targets of intervention and strategies.

The EU is planning to:

- **Legally protect at least 30% of the EU's land area and 30% of its seas.**

In this regard, the Natura 2000 network of protected areas covers 18% of the EU's land and 8% of its seas. National protection schemes cover an additional 8% of land and 3% of sea. Member States will therefore need to collectively protect a further 4% of their land and 19% of their seas in order to reach the 30% target set by the 2030 Biodiversity Strategy.

Consideration for the Parco Italia project: Applying the same percentage of 30% to Italy would mean extending the protection to 8.7% by 2030, considering that the protected areas in Italy (including Natura 2000 areas) are currently covering 21.3% of the national land. That would potentially mean protecting around 26,000 km² more land.

- **Strictly protect at least a third of EU's protected areas** - representing 10% of the EU land and 10% of EU seas - including all remaining primary and old-growth forests as well as other carbon-rich ecosystems, such as peatlands, grasslands, wetlands, mangroves, and seagrass meadows.

Consideration: Today, only 3% of land and less than 1% of marine areas are strictly protected on EU territory. The Commission will provide guidance on the selection and designation of strictly protected areas to ensure all Member States apply the same principles and conditions across the EU.

- **Create and integrate ecological corridors as part of a Trans European Nature Network** to prevent genetic isolation, allow for species migration and to maintain and enhance healthy ecosystems.

Consideration: In order to have a truly coherent and resilient Trans-European Nature Network, the Biodiversity Strategy calls on Member States to create ecological corridors between protected sites. The aim is to prevent genetic isolation, allow for species migration and climate adaptation, and maintain and enhance healthy ecosystems. This could involve, for instance, the designation of additional protected areas, the restoration of high diversity landscape features outside protected areas, such as buffer strips, fallow land, coppices, ponds, or hedgerows, the creation of buffer zones, or the use of other measures to improve the permeability of the landscape. In order to do that the EU will promote investments in green and blue infrastructures and enhance cooperation across borders.

- **Effectively manage all protected areas, defining clear conservation objectives and measures and monitoring them appropriately.**

Consideration: To effectively manage the protected areas, conservation objectives must be site-specific, comprehensive, realistic, correspond to the ecological requirements of the habitat species present, and, wherever possible, be quantifiable and measurable.

- **Propose legally binding EU restoration targets by 2021 and restore significant areas of degraded and carbon-rich ecosystems by 2030.**

Consideration: The identification of carbon-rich lands is essential to prevent fragmentation and the overall detriment of valuable landscapes and soils. That is

the reason why it is fundamental to target government, corporate and civic action on the highest priority landscapes. It is therefore important to identify the places that Italy must protect to keep the effects of climate change in check.

- **Ensure habitats and species show no deterioration in conservation trends and status**, and at least 30% reach favorable conservation status or at least show a positive trend by 2030.

Consideration: In Italy, around 89% of the natural habitats are at risk. Around 49% of the habitats are considered to be in inadequate conditions and 40% in bad conditions, with only 8% in positive conditions, including the alpine and boreal moors, which are reported as being in good status. Furthermore, the habitats classified as “maritime and inland dunes” are in a critical situation due to the development of tourist infrastructures (Ercole, S. et al., 2021).

- **Restore at least 25,000 km of free-flowing rivers.**

Consideration: River restoration means repairing waterways that can no longer perform essential ecological and social functions such as mitigating floods, providing clean drinking water, and supporting fisheries and wildlife. Italy this year has experienced a severe drought affecting northern Italy and the Po river basin in particular, with consequences on water supply and affecting the agro-food chain. Reducing the stress we impose on freshwater ecosystems is therefore more crucial than ever, and it is possible through river restoration, allowing nature to take back control by fixing at least some of the damage.

- **Adopt ambitious Urban Greening Plans for cities with at least 20,000 inhabitants.**

Consideration: In Europe - Italy is no exception - metropolitan cities are facing the effects of climate change and the rise of climate hazards. With the support of EU funds coming from the European Green Deal, many cities in Europe are adopting plans to adapt to the effects of climate change and rethink their infrastructures in order to be more resilient. In Italy, bigger cities are already putting in place composite plans of urban and peri-urban forestry through multiple strategies and actions (depaving gray infrastructures, tree planting campaigns, etc.). The challenge will be applying similar strategies to a big variety of smaller cities spread throughout the territory (i.e., cities and villages with less than 100,000 inhabitants).

EU Forest Strategy 2030 - Summary of the Strategies and Actions

In addition to the EU Biodiversity Strategy 2030, the EU has developed the EU Forest Strategy 2030 that follows its directives. The EU is planning to increase the quantity, quality, and resilience of its forests, notably against fires, droughts, pests, diseases, and other threats that are likely to increase with climate change, by strictly protecting all remaining EU primary and old-growth forests and by developing a roadmap for planting at least 3 billion additional trees in the EU by 2030, in full respect of ecological principles. The MapMyTree counter (created for the 3 Billion Trees Pledge) was launched in December 2021, and it counts new trees that comply with the criteria of the 3 Billion Trees Pledge since the adoption of the EU Biodiversity Strategy in May 2020.

The EU Forest Strategy 2030 will also support the socio-economic functions of forests for thriving rural areas and boosting non-forest-based bio-economies within

sustainability boundaries, ensuring sustainable use of wood-based resources for bioenergy and forest restoration, and reinforcing sustainable forest management for climate adaptation and forest resilience. The EU is also supporting afforestation, reforestation, and tree planting interventions with financial incentives to strengthen biodiversity, while ecosystem restoration will be promoted through the CAP (Common Agricultural Policy) Strategic Plans and the Cohesion Policy funds. The new European Urban Greening Platform¹² will also facilitate urban tree planting, including under the LIFE programme (an EU funding instrument for environment and climate action). To gain a better picture of the health of European forests, the EU Commission will work with other data providers to further develop the Forest Information System for Europe. This will help produce up-to-date assessments of the condition of European forests and link all EU forest data web platforms. The EU also established in 2020 a new Knowledge Centre for Biodiversity to gather all the important data on the topic and to ensure the monitoring and protection of forests and natural habitats in Europe¹³.

The EU Forest Strategy 2030 commitments to protect nature, in line with the EU Biodiversity Strategy 2030, can be briefly summed up with the following statements:

- Recognise the central and multi-functional role of forests and the contribution of foresters and the entire forest-based value chain for achieving by 2050 a sustainable and climate-neutral economy.
- Strengthen forest protection and restoration.
- Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately.
- Improve the monitoring and effective decentralised planning on forests in the EU with a view to ensuring resilient forest ecosystems and enabling forests to deliver on their multifunctional role.
- Enhance sustainable forest management.
- Support sustainable forest-based bioeconomies for a climate-neutral future.
- Boost the non-wood forest economy, including ecotourism.
- Promote new materials and products to replace fossil-based counterparts.
- Promote sustainable reforestation and afforestation interventions by planting at least 3 billion additional trees in the EU by 2030.
- Develop a 2050 roadmap for reducing whole life-cycle carbon emissions in buildings, developing a standard, robust methodology to quantify the climate benefits of wood construction products and other building materials.

PNRR and current afforestation projects and strategies in Italy

Urban forestry is now at the top of the agenda in many cities on our planet. Among the wide range of topics concerning Urban Forestry, trees and forest plantation campaigns are by far the most supported, and popular. The year 2020 has shown us how health, social and environmental emergencies are now changing the state of health of our cities and their citizens. The advent of the COVID-19 pandemic, still ongoing, provided further evidence of the essential role of nature and its benefits on human health. From this point of view, the EU Strategies on biodiversity and forests are deploying precise guidelines throughout the member states toward effective protection of the natural capital of the European Union.

As already mentioned, following the European Biodiversity Strategy and the European New Urban Agenda, Italy launched the National Strategy on Urban Green Spaces as a reference framework for developing best practices in urban areas concerning urban forests and green infrastructure. Urban forests are a key

12. <https://platformurbangreening.eu/>

13. https://knowledge4policy.ec.europa.eu/biodiversity/about_en

target also in the recently launched National Forest Strategy. A specific action (A.6) is dedicated to “Urban and periurban forests” following the EU Forest strategy 2030 and the EU strategy for Green Infrastructure - COM(2013) 249 final- (that was a key step towards the old EU Biodiversity Strategy - 2011/2020).

In Italy, many cities are launching programs related to urban afforestation. Among these, are Naples, with the development of the Ossigeno Bene Comune project; the city of Prato with the Prato Urban Jungle - a project funded by the E.U. as one of the Urban Innovative Actions (UIA) - and with the development of its 2020 Green Plan; there are also regions such as Emilia-Romagna, with the goal of planting 4.5 million trees and creating in the next 5 years, new “green infrastructures” in the cities and in the neighboring areas to urban centers, and restoring the natural ecosystem of the plains. A similar effort is being made by the Lazio Region with the Ossigeno project and its 6 million new trees, one for each inhabitant of the Region, with the aim of tackling climate change, compensating for the CO₂ emissions, and protecting biodiversity; the KM Verde project in Parma; and Forestami, within the Metropolitan area of Milan, with the goal of planting 3 million new trees by 2030, tackling air pollution and the urban heat island effect, and increasing biodiversity among the many objectives. Milan, with its goal of planting 3 million trees by 2030, is a candidate to become one of the first Italian cities to set a major campaign to reverse climate change.

At the national level, the Italian government has launched different calls since 2020. The first call, within the governmental Climate Decree, also called Bando Costa, has promoted urban afforestation projects within the 15 Italian metropolitan cities, allocating €30 million to financing afforestation projects currently under implementation (April 2022). The results of this action are mapped in Map 37 and table 6.

On the European scale, the European Council approved in July 2020 a massive “recovery fund” called Next Generation EU (NGEU) for the purpose of supporting Member States affected by the COVID-19 pandemic. This call has been further developed in Italy with the “Piano Nazionale di Ripresa e Resilienza ” (PNRR). At this time, there are at least two different open calls that are intertwined within this project.

- The first is M2C4 – Inv. 3.1 “Tutela e valorizzazione del verde urbano ed extraurbano” (source: <https://www.mite.gov.it/bandi/avviso-i-progetti-di-forestazione-nelle-citta-metropolitane>) aiming at promoting tree planting campaigns within the 15 metropolitan areas (for a total of €330 m, and 6.6 million new trees. The call was announced on the 31st of March 2022, with three years of planting campaigns, up to 2026. In a recently released document (Decreto Direttoriale MiTE of August 19, 2022), the share out has been divided into 3 years, with around €74m for 2022, €74m for 2023, and €139m for 2024, with respectively 1,650,000 trees to plant in 2022 (Target UE M2C4-19), 1,650,000 trees to plant in 2023, and 3,300,000 trees in 2024 (Target UE M2C4-20). The following charts (fig xx) show the projects and the Municipalities that have been recently admitted to getting financial support from the PNRR for the year 2023, with the number of trees assigned for project/intervention. Many forestry projects/ interventions that got financial support are located in the center-south of Italy, with the only exception of three northern Italy cities (Genoa, Turin, and Venice).

The current urban afforestation/reforestation campaigns have peculiar characteristics compared to those carried out in the recent past. In fact, the

interventions of planting trees in Italian cities were mainly inspired by criteria of ornamental and urban arboriculture. The planting target, therefore, envisaged the use of the medium- and large-sized trees derived from rather long periods of preparation in the tree nursery. The planting design only rarely referred to the constitution of real urban forests. In the new course triggered by the measures mentioned above, the prevailing trend is to proceed to build forests in tune with the dictates of ecosystem recovery and the reconstitution of forest patches also in cities. The trees used for this purpose are therefore smaller in size, and land preparation interventions are preferred. Therefore, we are talking about a new deal in the implementation of urban forests where the evolutionary characteristics of forest ecosystems are amplified. The reason for this choice has strong roots in the decisive ecological function that urban forests and green spaces have, and will increasingly have, in the urban environmental dynamics.

- The second call, within the Next Generation EU (NGEU) developed in Italy with the “Piano Nazionale di Ripresa e Resilienza” (PNRR), is related to the establishment of 5 national centres (21-12-2021) ¹⁴ dedicated to cutting edge research relating to technological fields around these issues:
 - High-performance simulations, computation, and data analysis
 - Agricultural Technologies (Agritech)
 - Development of gene therapy and drugs with RNA technology
 - Sustainable mobility
 - Biodiversity

The intervention proposals intend to strengthen the research structures and the creation of ‘national champions’ of research and development on some key enabling technologies” and concerns investments of €1.6 billion. In our opinion, the call regarding biodiversity results in one of the most important elements in relation to this research project.

Final considerations on the legislative framework

In order to increase the protected areas in Italy, a complete assessment of the state of Italy’s protected areas, green corridors, natural areas, and ecosystems would be required. Nevertheless, the status quo of forests in Italy itself is not representative of the criticalities that are threatening the natural areas and its biodiversity. The Trans European Nature Network, for instance, and several studies (Carrao H. et al., 2020) show through extensive mapping the numerous network discontinuities between green infrastructure systems in Italy and in Europe. In the study, areas dominated by forests and woodland patches larger than 3,500ha are taken into account between Natura 2000 sites. Studies of this type represent a useful tool with which to select and frame areas of intervention to effectively connect natural protected areas. Other reports and laws mentioned in the previous paragraphs represent a tremendous contribution to the collection of data and information, as well as identifying useful existing strategies and programmes to adopt. Italy, thanks to the EU directives, has today a strong base of normative tools to efficiently put in place governance systems, allocate sufficient resources and invest in the spreading and training of administrations and professionals to implement the necessary protection, conservation, and restoration measures.

14. source: <https://www.mur.gov.it/it/atti-e-normativa/decreto-direttoriale-n3138-del-16-12-2021>)

The state of Italy's natural capital

The State of the Forests

In the first report on the state of the Forests and Forestry in Italy¹³ (Mipaaf, 2019) it is stated that the wooded areas cover a territory equal to about 11 million ha, of which 9.1 million hectares is forest, equal to 35% of the national surface (ibid.). The forest expansion between 1985 and 2019 occurred over approximately 2.8 million hectares of land. However, forests are subject to various disturbances and land use changes that, between 2017 and 2018 alone, affected about 90 thousand hectares (Atlante dati ambientale, 2023). Nevertheless, forests are the country's great green infrastructure. Some protected areas also contain peri-urban areas and, more rarely, urban areas; a rather limited part of these (about 4%) concern lowland areas in relation, more or less in proximity, to urban areas and areas with high infrastructural intensity. The rest, the vast majority, involve hilly areas (to a lesser extent) and mountainous areas.

	Broadleaves in an urban setting (ha)	Broadleaves in an urban setting (%)	Conifers in an urban setting (ha)	Conifers in an urban setting (%)	Broadleaves in an agricultural setting (ha)	Broadleaves in an agricultural setting (%)
Tree cover in the three land use categories	303,113	2.23	7,742	0.06	3,417,364	25.10
	Conifers in an agricultural setting (ha)	Conifers in an agricultural setting (%)	Broadleaves in a natural setting (ha)	Broadleaves in a natural setting (%)	Conifers in a natural setting (ha)	Conifers in a natural setting (%)
Tree cover in the three land use categories	40,070	0.29	8,286,191	60.86	1,559,773	11.46

Table 2. Forest Cover Distribution

Protected Areas

Protected natural areas are territories characterized by unchanged or partially altered ecosystem matrices, representing the relationship between humans and nature that has ensured the preservation of biodiversity richness and landscapes over time. The establishment of protected natural areas, both terrestrial and marine, through the identification and pursuit of unified objectives, creates a "national network" capable of promoting rational and sustainable land and resource management, ensuring the conservation and functionality of ecosystems, habitats, and the plant and animal species that characterize them. The "protected areas" indicator (ADA 2019) provides quantitative information, such as the number of established areas and the hectares of land and sea protected. Over time, the indicator has shown a positive trend. The number of protected areas has steadily increased since the mid-1970s until 2008, when it stabilized at a total of 843 protected natural areas, which now safeguard over 3 million hectares of land. (Atlas of Environmental Data, 2023).

Natura 2000. The main objective of the Natura 2000 Network is to maintain a favorable conservation status for species and habitats of community interest present in the national territory. Natura 2000 Sites (SIC-SC/PS), along with protected natural areas, contribute to achieving the objective of the new

Biodiversity Strategy, which aims to protect at least 30% of the European Union's territory. The Habitat Directive, in particular, recognizes the value of areas where historical human presence has allowed for a balance between human activities and nature, ensuring the conservation of semi-natural habitats as well (areas used for traditional agriculture, pastures, forests used for forestry, economic purposes, or simply tourist enjoyment). The Directive also recognizes the importance of landscape elements that serve as connections for flora and fauna.

Ramsar. The main objective of the Ramsar Convention is the international protection of wetlands through their identification, delimitation, the study of their characteristic aspects, particularly avifauna, and the implementation of programs to conserve their habitats, flora, and fauna. Internationally Important Wetlands may include swamps, marshes, bogs, natural or artificial bodies of water, permanent or temporary, with stagnant or flowing water, fresh, brackish, or saline, including expanses of marine water that do not exceed six meters in depth during low tide. Special consideration is given to areas or bodies of water that are important habitats for waterbirds. Wetlands constitute areas of great economic, cultural, scientific, and recreational value, and their loss would be irreparable due to the significant ecosystem services they provide to humans (phytodepuration, carbon capture from the atmosphere, water supply, fertile soil, etc.).

In Italy, protected areas (comprehensive of the previous categories) cover around 6 million hectares, around 21.3% of the total Italian land surface.

Artificially sealed surfaces in Italy, on the other hand, count for 9.15% of the total national surface, with a strong acceleration in the last 50 years (Munafò M., 2020). The data analysis for 2021 shows an extension of high-density urban areas covering 2.9% of the national territory, while suburban areas cover 15.4%. The remaining 81.7% of the territory is occupied by rural areas with sparse or absent artificial surfaces. Between 2006 and 2021, there has been an expansion of over 800 km² of dense urban areas, while suburban expansion has covered nearly 2,500 km². The monitoring of land consumption in our country is carried out by the National System for Environmental Protection (SNPA), coordinated by the Institute for Environmental Protection and Research (ISPRA), which annually produces a report that quantifies and studies the phenomenon of land consumption. In 2021, new artificial land covers accounted for 69.1 km², which is equivalent to an average of about 19 hectares per day, the highest value in the last 10 years. This increase shows a clear acceleration compared to the data recorded in the recent past, sharply reversing the trend of reduction in recent years and causing our country to lose 2.2 square meters of land every second⁷.

Furthermore, we need to take into account that according to the World Atlas on Desertification¹⁵, developed by the Joint Research Centre of the European Union, Italy is present among the thirteen European countries affected by this phenomenon, with a fifth of the territory at risk of desertification due to the climate crisis. The European situation stands at 8%, in particular, the most affected countries are only those of southern, eastern, and central Europe. These regions represent an area of approximately 14 million hectares¹⁵.

15. Cherlet, M., Hutchinson, C., Reynolds, J., Hill, J., Sommer, S., von Maltitz, G. (Eds.), *World Atlas of Desertification*, Publication Office of the European Union, Luxembourg, 2018.

Conclusions

This background research has allowed the laying down of the scientific foundations for the Parco Italia project by exploring the direct and indirect influences determined by the cultural and socio-economic components as well as climate and environmental factors in a perspective of integral ecology that could have positive effects on the overall health of natural habitats and their ecosystems as well as mitigating the effects of extreme climate hazards on anthropized environments. Approaching these issues with a holistic approach, a comprehensive national vision of natural areas could provide support for their protection and for the growing forest ecosystems, limiting as well the advancement of desertification and its multiple effects, and yet it can reinforce weighted growth in areas that could represent future epicenters of development, such as the inner areas, that are rural areas towards whom cities have a great debt. This debt could be described as an “ecosystemic debt” where fresh water, clean air, food, wooden products, and related accessories coming from the surrounding countryside and mountain territories are entangled in the artificial environment of cities.

From this perspective, the Parco Italia vision could also create or strengthen circular economies in these places, linked to the timber industry and ecotourism, supporting the much-needed ecological transition of the whole country. From a national point of view, it is therefore important to propose the adoption of a country-wide project that has both a solid scientific base as well as the ability to involve as many sectors as possible (both public and private actors, and involving different communities) while safeguarding the territory through targeted maintenance and management strategies, and on the other hand, promoting an economic model based on ecosystemic services at the center of the development process. The inhabited centers spread throughout the country could thus become ‘focal points’ or ‘nodes’ of vast green infrastructure, connected to the Apennine ridge and the Alpine system that runs down the entire peninsula.

From a national point of view, it is essential to devise and adopt a national plan with strong scientific foundations, which will be able to utilise and make the best use of the know-how of forestry organisations, primarily SISEF, but also FAO, AIEL, CONAF, Legambiente, WWF Italy, UNCEM, the Forestry Coordination Alliance, CREA PB, CNR and PEFC and involving trade associations, tertiary sector members, public administrations and local authorities as well as professionals from the urban planning, landscape planning, and design sectors.

SECTION 4. DETAILED WP PROGRESS







1.1 Introduction

Italy is well known for its long history of human civilization that has generated an almost unique cultural landscape based on the intense and diversified intertwining of nature and anthropogenic transformations. The country's distinctive geomorphology has the form of an extended North to South peninsula, ranging from the Alps to the center of the Mediterranean Sea at its southernmost boundary. While the Alps define the Northern geographic boundary, the mountain ridge of the Apennines constitutes a sort of backbone of the peninsula, splitting the southern half into two parts leaving the Adriatic sea to the east, and on the west the Tyrrhenian Sea. The mountain system of the Apennines represents an outstanding continuum of natural areas, mainly consisting of forests and upper tree line habitats, until reaching the Alpine glaciers. This is where we can find the highest concentration of protected areas.

Today, thanks to the availability of open datasets covering Italy and large parts of Europe, supported by the European Environmental Agency, Eurostat with the Geographic Information System of the Commission (GISCO), the European Space Agency (ESA) with the Copernicus Program, on a national level by ISPRA, or also by using data coming from OpenStreet Map, we are now able through Earth Observation (EO) techniques along with data from remote sensing technologies, to monitor the terrestrial and marine landscapes, overcoming the limits of traditional observation.

Mapping is the first step of knowledge in the Parco Italia context. The objective of the mapping process is to collate, synthesize, and query the existing geospatial and environmental information in a spatially explicit ecosystem. The ultimate aim is to generate a series of thematic maps supporting the knowledge and decisions on afforestation programs as well as future management interventions. WP1 will proceed by archiving, classifying, and constructing the interlinks between territorial and environmental data as fundamental steps in the construction of the future work of the project, both in terms of defining the actual state of the Italian landscape for setting the bases (quantitative and qualitative) for the definition of future visions. The proposed analysis of this part of the research concerns three sections: Italy's Natural Capital; Thematic Maps; Priorities for afforestation.

The mapping action is supported by the use of a Geographic Information System (GIS). The GIS mapping tools and methods refer to the fields of landscape ecology and ecological planning and are initially based on the so-called McHarg's "layer cake" method, otherwise termed "suitability analysis," forerunner of the Geographic Information Systems. The method was developed in collaboration with University of Pennsylvania students in the ecological planning program after McHarg himself founded the school's landscape architecture department in the 1950s. For McHarg the mapping technique of overlaying polygons comprised within the same

spatial frame and connecting various landscape features, from bedrock geology to soils, plants, animals, and land use meant that each overlay can be understood as a “step” that has the role of correcting or reinforcing the overall amount of information. Data together with science were for him the most effective tool in shaping visions and moving forward toward them.

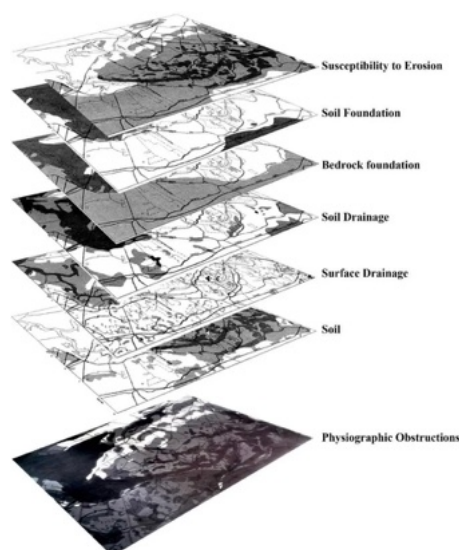


Fig 2. Ian McHarg's "layer cake" method

1.2 Methodology.

The main objective of the mapping activity is to reconstruct, by gathering and processing spatially, the physical structure of the Green Infrastructure that defines the Italian territory, with the use of a Geographic Information System (GIS). Establishing the state of the art as a baseline makes it possible to identify critical areas and territorial strategies to apply. The mapping activity, which uses different available sources and updated data, is helping further to define the objectives of the project.

Mapping also means collecting large amounts of data, based on different scales and themes, so as the specific demands of the project evolve, so does the scale of the survey, passing from the large-scale mapping of Italy into the local specific details of the planting areas, recognizing in this process the elements of the territory that need to be taken further into consideration.

The first mapping exercise of defining Italy's Natural Capital is followed by a subdivision of thematic issues that have a national scale and a selection of themes which is later indexed to define the critical aspects, which include: population density, forest fragmentation, the distance from protected areas, rivers and wetlands, temperature trends, air pollution and the closeness to hiking trails. By overlapping and defining a system of values and the relevance between these themes it is possible to identify areas where afforestation activities would be most effective.

We note that afforestation is not the only nature-based solution available to solve critical aspects related to climate change, biodiversity loss, soil consumption, environmental pollution and their effects on natural capital and its benefits to society. Forest-based solutions also include, in suitable areas, the improvement of existing forest management, the enhancement of nature protection status, the

restoration of degraded forests and habitats, and the prevention of permanent forest loss both domestically and, even more importantly, caused by products imported from deforestation-risk countries. For its first phase, Parco Italia will nevertheless be focused on afforestation and tree planting as a measure to promote biodiversity, mitigate or adapt to climate change impacts, and improve the delivery of regulating ecosystem services provided by urban and rural areas to society.

In synthesis, WP1's main objectives are:

- Definition of the current state of Italy's green systems, by analyzing the most updated territorial data regarding forest and protected areas.
- Construction of a database comprising the most critical issues of the territory at national and metropolitan scales.
- Creation of the tools and method of support for the planning of future planting activities.

All of the cartographic outputs: the Natural Capital Map, the Thematic Maps, and Priorities for Afforestation have been re-developed adapting to the different needs of the communication strategies of the project. We developed dynamic maps for Parco Italia's website, produced posters for the tree planting events, and a large-scale printed map for the 2023 Milan Design Week Exhibition.

1.3 Italy's Natural Capital.

This map aims to represent the structure of the green infrastructure throughout Italy by representing areas with a high ecosystemic and biodiversity value based on land cover (forest and other natural areas) or by its protection regime as well as the slow mobility network that accompanies natural areas.

To do so the team collected data from: Forest areas (broad-leaved, coniferous, and mixed forests) and other natural areas (natural grasslands and prairies, moors and heathlands, shrublands and transitional shrub to forest successions, mediterranean maquis-like vegetation) and water bodies and other features of the landscape coming from the Corine Land Cover 2018, together with a series of different areas that make up the general framework of the protected areas, from the ones inserted in the EUAP (Official List of Protected Natural Areas) and the ones belonging to the EU program of Nature 2000 listed under the Birds Directive and the Habitats Directive. The IBA areas (Important Bird Areas), even though a large part of them overlaps with the previously mentioned network of protected areas, some parts however are not under any kind of safeguarding measure; then there are the RAMSAR areas (Wetlands of International Importance) that are considered in Italy as Landscape Heritage and therefore areas protected by law, and finally the 58 Properties registered on Unesco's World Heritage List.

On the other hand, data regarding anthropized surfaces –urban fabric and industrial or commercial units were represented by using the data from the Corine Land Cover 2018 – and the slow mobility networks, consisting of hiking paths and the network of long-distance cycle routes –ranging from a large European scale (Francigena Path or Eurovelo cycling routes) to local tourist routes – was gathered and reconstructed from several open databases (Strava, Komoot, OSM) as well as from Italian ministerial and EU sources. It was also relevant to visualize the topographic complexity of the territory, by building a high-resolution DEM (Digital Elevation Model).



Parco Italia



0 km 37.5 km 75 km 150 km



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Map 01. Natural Capital of Italy

As a final output the team produced a unique map, that is open and available to the public, which includes forests, all types of protected areas, and the slow mobility network. One version is available on ParcoItalia.it and another version was created for the Parco Italia stand during the Salone del Mobile in Milan, Italy, in April 2023.

1.4 Mapping Criticalities and Territorial features

A series of large-scale 1:3.500.000 maps of the Italian territory represent each phenomenon in an isolated way, divided into several macro categories such as “Human Geography, Nature Infrastructure, Mobility, Criticalities”. These have the aim of developing different strategic themes for research in the following phases. All of the maps were re-developed by the research team based on the data gathered from many different sources which are the following:

Human geography:

- Metropolitan Areas (Map 2). Established by law in 2014, Metropolitan Cities are large territorial entities with the aim of encouraging the union and merging of municipal administrations to simplify local governance and return cities to the role of national economic systems. About 22 million people live in the 15 metropolitan cities, making up 36% of the total population of the country. The sources of data are: ISTAT 2022, Corine Land Cover 2018.
- Municipalities by population (Map 3): - Using data on the population on a municipal scale from The Italian National Institute of Statistics (ISTAT). The territory was divided into the following categories: a) under 5,000 inhabitants (small municipalities by law), b) between 5,000 and 50,000 inhabitants, and c) more than 50,000 inhabitants. The municipalities belonging to the metropolitan cities were excluded. The source of data is: ISTAT 2022.
- Inner Areas (Map 4): Italian rural areas comprising municipalities with low levels of accessibility to basic public services (education, health, and mobility). Inner Areas make up 53 % of Italian municipalities (4,261), are home to 23 % of the Italian population (13,540,000 inhabitants), and cover 60% of the national territory. Demographic decline and population aging are more pronounced in Inner Areas than in the rest of Italy, although they are counterbalanced by strong growth in immigration. Despite these negative characteristics, Inner Areas still contain important environmental resources (water, high-quality agricultural products, forests, and natural and human landscapes) and cultural assets (archaeological assets, historic settlements, abbeys, small museums, and skill centers). The source of data is: ISTAT, Strategia Aree Interne - Agenzia per la Coesione Territoriale 2019.

Nature Infrastructure

- Ecoregions (Map 5): Ecologically homogeneous portions of territory. A hierarchical and divisive classification of the territory is envisaged in line with specific combinations of climatic, biogeographic, physiographic, and hydrographic factors that determine the presence and distribution of different species, communities, and ecosystems. The source of data is: ISTAT 2022.
- Forests (Map 6). Using data from the 2018 Corine Land Cover, the categories that represent the forest were extracted: 311 - Broad-leaved forest, 312 - Coniferous forest, 313 - Mixed forest, 324 -Transitional woodland-shrub. From this data it can be deduced that 30%, equal to 90,666,5 km², of the Italian territory is covered by forests. The source of data

is: Corine Land Cover 2018. Currently, the Italian National Forest Inventory (2015) attributed to forest cover a total land area of 109,800,00 km², i.e. 36,34% of Italian territory. ¹

- Protected Areas (Natura 2000 + National Protected Areas) (Map 7): The current state of the art regarding the protected areas can be subdivided between the areas belonging to the EUAP (Official List of Protected Natural Areas), a list drawn up, and periodically updated, by the Ministry of the Environment and the Protection of the Territory and the Sea - Directorate for the Protection of Nature, which gathers all the officially recognized protected marine and terrestrial natural areas; and areas belonging to the EU program of Nature 2000, which is the main instrument of the European Union policy for the conservation of biodiversity, an ecological network spread throughout the Union. The areas that make up the Natura 2000 network are not strictly protected reserves where human activities are excluded; the Habitats Directive intends to guarantee the protection of nature also taking into account “economic, social and cultural needs, as well as regional and local particularities”. The areas are divided between the Birds Directive and the Habitats Directive, each one covering a specific ecosystem. Between both of these categories and removing the overlapping areas, we can state that 21.3% of the territory is actually under some form of protection. Natura 2000 + National Protected Areas). The source of data is: World Database on Protected Areas (WDPA)

- Protected areas (IBA + RAMSAR + UNESCO Heritage sites) (Map 8). Other territorial classifications that make up the framework of protected areas are the IBA, RAMSAR, and Unesco areas, even though these might not propose regulations of activities, they highlight areas of particular natural or cultural value. The areas of IBA (Important Bird Areas), while a large part of them overlaps with the previously mentioned network of protected areas, emerged from a BirdLife International project and carried out in Italy by Lipu. These IBAs play a fundamental role for wild birds and are therefore an essential tool for knowing and protecting them. The RAMSAR areas are wetlands of international importance that are considered in Italy as Landscape Heritage and therefore areas protected by law. Finally, the 58 landmarks or areas registered on the Unesco World Heritage List are under legal protection by an international convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). World Heritage Sites are designated by UNESCO for having cultural, historical, scientific, or other forms of significance. The sources of data are: LIPU, Birdlife International, Ramsar Sites Information Services, Geodati.gov.it, World Bank Data Catalog.

- Tree Cover Gain (Map 9). Based on the research published by Hansen, Potapov, Moore, Hancher, et al. The map comes from a time-series analysis of Landsat images and is defined by the change of state from a non-forest area to forest entirely within the period 2000–2012. The source of data is: Hansen - Global Forest Change.

- Afforestation projects (Map 10): an overview of the national forestry projects concluded and in progress, both public and private, as part of WP2 activities for WP2 interaction with national and international stakeholders. As a result of the survey, interviews and data gathering for more than 400 projects were geolocalized.

1. Gasparini, P., Floris, A., Di Cosmo, L., De Laurentis, D. (eds.) (2022) *Italian National Forest Inventory - Methods and Results of the Third Survey: Inventario Nazionale delle Foreste e dei Serbatoi Forestali di Carbonio - Metodi e Risultati della Terza Indagine*. Springer, Cham <https://doi.org/10.1007/978-3-030-98678-0>

Mobility

- Hiking trails (Map 11). The routes can be defined as cultural itineraries of particular European and/or national importance, which can be traveled on foot or with other forms of sustainable soft mobility, and which represent a way of enjoying the widespread natural and cultural heritage, as well as an opportunity to enhance natural and cultural aspects and promote these territories as new attractors. Mapped in 2016 by the Ministry of Cultural Heritage, they conform to a network of about 15,400 km that crosses the entire peninsula and the islands, crossing 1,435 municipalities, of which 944 are small municipalities, and meet over 2 thousand cultural heritage and 179 PDO / PGI typical local products. The sources of data are: Cammini di Italia, Atlante dei Cammini di Italia - Ministero della Cultura, Komoot.
- Biking trail (Map 12): This dataset comprises large-scale networks dedicated to bike mobility for example, EuroVelo the European network of long-distance cycling routes crisscrossing Europe, of which the Via Romea Francigena (EV5), Sun Route (EV7) and Mediterranean Route (EV8) are in Italy, together with the 10 nationwide-level bike paths promoted by the Ministry of Infrastructures and Transportation (MIT) and Ministry of Culture (Mibact) between 2015 and 2018, to promote sustainable tourism and give proper cultural value to the historical landscape of the country. Besides these also some small-scale regional tourist trails are included. The sources of data are: Eurovelo, Bike Italia, Komoot.
- Grey Mobility Network (Motorways, Primary roads, and Railways) (Map 13). Mobility infrastructure is part of the category of gray infrastructures: while they are necessary to organize the movement of people and goods along the Italian peninsula, they also represent one of the main disruptive elements that fragment the landscape and interrupt the mobility of animals and continuity of biodiversity corridors. In Italy, there are more than 39,000 km of these gray infrastructures between railways and motorways. The source of data is: Open Street Map (OSM).

Criticalities

- Wildfire (Map 14): The data comes from MODIS Burnt Areas, a module of the European Forest Fire Information System (EFFIS). It is derived from the daily processing of MODIS satellite imagery at a 250 metres spatial resolution. The perimeters of the burned scars represent areas burned by fires as detected from MODIS satellite imagery. Therefore, no distinction is made between wildfires and intentionally controlled fires. The spatialized data ranges from 2008, until September 2022, and it can be seen that 7,900 km² of land has been marked by wildfires. (2008-2022). The source of data is: The European Forest Fire Information System (EFFIS)
- Tree Cover Loss (Map 15). Based on the research published by Hansen, Potapov, Moore, Hancher, et al. The map comes from time-series analysis of Landsat images. The Forest Cover Loss represents the change from a forest to a non-forest state, during the period 2000 - 2020. From this data it can be concluded that 4,560 Km² have been temporarily lost in Italy in twenty years. (2000-2020). The source of data is: Hansen - Global Forest Change.
- Hydrogeological hazard (Map 16): Flooding is the temporary covering by water of land not normally covered by water. It includes floods from rivers, mountain torrents, Mediterranean ephemeral water courses, and floods from the sea in coastal areas. The high probability of flood hazard zones in Italy

amounts to 12,405 km² equal to 4,1% of the national territory. The resident population exposed to flood risk in Italy is 2,062,475 inhabitants (3.5%) in a high probability scenario (return period of 20-50 years). The source of data is: ISPRA.

- **Landslide hazard (Map 17).** Landslides are several different forms of mass wasting or movement that may include a wide range of ground movements, and occur when the slope (or a portion of it) undergoes any one of a number of processes that change its condition from stable to unstable. Italy is one of the European countries most affected by landslides with 620,808 landslides affecting an area of 23,700 km², equal to 7.9% of the national territory. These data derive from the Italian Landslide Inventory produced by ISPRA. If we take into account the most hazardous classes (high H3 and very high H4), the area amounts to 25,410 km², equal to 8.4% of the Italian land area. The source of data is: ISPRA.

- **Temperature trends. (Map 18).** A re-working of data coming from the Council for Agricultural Research and Economics - Forestry Research Centre (CRA-SEL) of Arezzo (Italy) under the Trees4Future project. It is based on the Parameter Regression of Independent Slopes Model (PRISM) interpolation method for current climate, and the Coupled Model Intercomparison Project phase 5 (CMIP5) for future projections corresponding to the 5th IPCC Assessment Report (2013). In particular, it utilized the HadGEM2-ES, UK scenario - which contains different weather variables for the periods of 2020, 2050 and 2080 in Europe. The minimum temperatures were used to create the temperature trend. The source of data is: ClimateEU: historical and projected climate data for Europe.

- **Forest Fragmentation (Map 19).** The map represents the “relative cost” of reconnecting fragmented forest areas in Italy. Starting from the Corine Land Cover, all forest areas were selected as a starting point, assigning a “cost” (or penalty) to cross/reforest non-forest areas and to connect wooded areas. The pixels with a higher value (darker red on the map) are those that describe a greater distance between already tree-lined surfaces or a concentration of “very expensive” surfaces to convert to a green surface, or both. The result suggests the least green and most disconnected areas. The source of data is: Giorgio Vacchiano, Susanna Galimberti, Research: Relative cost to reconnect fragmented forest areas in Italy.

1.5 Map of Afforestation interventions priorities.

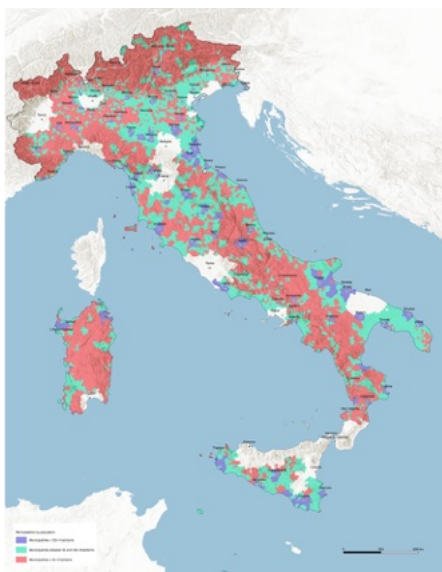
The main goal of Parco Italia is to strengthen the ecological connectivity between already existing natural ecosystems, protected areas, and other forests throughout Italy through the creation of new forests in urban and rural territories. In addition to this, afforestation will aim to speed up the restoration of degraded forests (e.g. in areas hit by wildfires) and to improve the provision and value of regulating ecosystem services - such as clean air, cooling, habitats for biodiversity, recreational and educational activities, protection from flood and landslides, and the promotion of ecotourism. However, nationwide afforestation projects need to be supported by an assessment of spatial priorities, to understand where forest restoration and planting would be more urgent.

To combine and compare the potential benefits of afforestation in every part of Italy, and to discern the most urgent needs, the team carried out a multicriteria

Human Geography



Map 02. Metropolitan areas



Map 03. Municipalities by population



Map 04. Inner areas

Nature Infrastructure



Map 05. Ecoregions



Map 06. Forests



Map 07. Protected areas (Natura 2000 + National Protected Areas)



Map 08. Protected areas (IBA + RAMSAR + UNESCO Heritage sites)



Map 09. Tree Cover Gain



Map 10. Afforestation projects

Mobility



Map 11. Hiking trails



Map 12. Biking trails



Map 13. Grey Infrastructures (Motorways, Primary roads, and Railways)

Criticalities



Map 14. Wildfires (2008-2022)



Map 15. Tree cover lost (2000-2020)



Map 16. Hydrogeological hazard



Map 17. Landslide hazard



Map 18. Temperature trends



Map 19. Forest fragmentation

analysis of all possible natural and societal criticalities that can be addressed by afforestation. By estimating the severity of each criticality at all locations in Italy, and assigning a relative weight to each severity class reflecting the importance of each need to society, we developed maps of afforestation priorities throughout the country. Summing up the weights associated with each criterion and severity class at any given location allowed us to highlight afforestation priorities on a national scale, to be used as first support to planning decisions at the regional or provincial scale. The same system of scores could then be used on a much finer scale (not visible in the national maps published below) to optimize the actual location of each afforestation project, compatible with other local constraints (economic, social, environmental, or other).

The choice of variables and their relative weight has been validated by consulting forestry and natural science experts. A survey was distributed among professional networks in Italy, with a structured interview on the importance (very low to very high on a 3 class rating) of all variables that has been chosen as relevant for both the connectivity and the urban ecosystem services assessments. More than 200 replies were received from all regions of Italy. The ratings were transformed in quantitative scores via the geometric mean of their numeric equivalent (1, 2 or 3) and used to refine the final assessment and geographic map of reforestation priorities.

We assessed afforestation priorities twice, first assigning weights based on a predominant goal of ecosystem connectivity in rural areas, and secondly by giving priority to regulation services for urban and peri-urban areas. Already existing forests, unproductive land covers, wetlands (with RAMSAR designation), and elevations above 1,600 m were excluded from the analysis. Agricultural and urban areas were not excluded, with the caveat that afforestation in these land cover types requires specific project designs (e.g., agroforestry and/or planting along field edges and urban afforestation with all its particular characteristics). The spatial layers entered in the analysis were the following (see maps from page 62 - 67):

- Population density per municipality: More populated areas generally correspond to more urbanized areas with higher average temperatures, more severe pollution, and higher accessibility for educational-recreational activities. This variable was assigned a greater weight in the scenario of reforestation in urban areas. The Parco Italia project will prioritize Metropolitan areas in which the highest score weight has therefore been given.
- Ecological fragmentation: the severity of ecological fragmentation was calculated by an algorithm which takes into account both the distance from existing forests and the current land use of all potential paths connecting the location under analysis to those forests. Land uses presenting more difficulties for afforestation projects (e.g. urban and agricultural land) were assigned a lower potential. Greater weight was given to areas nearby, but not directly attached to, existing forests, which may be the basis for further future improvement of the ecological network. Very close or even attached areas can mitigate the anthropic impact of already existing forests (edge effect, etc.) and can still have a positive effect.
- Distance from protected areas: locations nearby, but not attached to, existing protected areas were given the highest importance. Locations < 1 km from existing protected areas were prioritized, followed by locations at 2-5 km. No distinction was made between different types of protected areas.

- Distance from bodies of water: Natural or semi-natural ecosystems around rivers and other bodies of water can be particularly important as ecological corridors for biodiversity. For this reason, riparian forests were listed among the top three restoration priorities in the Italian National Forest Strategy of 2022.
- Distance from hiking trails: these trails generally run outside the cities; their proximity can be useful for promoting ecotourism. This is not considered a high-priority criterion, but together with cycling paths, it may improve accessibility to ecosystem services for urban and periurban citizens.
- Distance from the mobility network (Motorways, Primary roads, and Railways): they represent one of the strongest drivers of habitat fragmentation. Reforested areas near roads and railways can have a positive impact and increase connectivity. Furthermore, the trees could constitute an acoustic barrier and contribute to the reduction of atmospheric pollution. Therefore, greater weight is given to areas near existing roads and railways.
- Wildfire and Tree cover loss: Areas disturbed by high severity forest fires and having lost their tree cover may be targeted by afforestation if their natural recovery is insufficient or too slow to provide the desired ecosystem services (e.g., hydrologic protection in mountain areas). Fire perimeters for the last 10 years (up to November 2022) were extracted from the European Forest Fire Information System (EFFIS) and overlapped onto the tree cover loss layer by Global Forest Watch for the same period (originally at 25 m resolution). In general, however, this criterion is not as strategic as the other ones for the Parco Italia project.
- Hydrogeological hazards: Afforestation in areas at risk of flooding and river-related events can decrease hydrologic hazards in fluvial systems (but not in mountain streams and torrents, where it may be counterproductive), and mitigate the hazard of shallow landslides in mountainous terrains. We assigned a higher weight to locations classified with high flood hazards around river systems and with high (but not extreme) landslide hazards by ISPRA. In general, however, this criterion is not as strategic as the other ones for the Parco Italia project.
- Average temperature and temperature trends: As a result of the potential cooling effect of trees and forests, greater weight was given to areas with high minimum summer temperatures (e.g., tropical nights), and to areas where the greatest increase in average temperatures is expected before 2050 (scenario RCP4.5), with a focus on urban adaptation to climate change.

As an outcome of this activity, the team produced a set of maps. One is a general map of the entire Italian territory, indicating the areas where afforestation would have a greater impact in terms of increasing ecological connectivity and biodiversity. On a national scale, the map clearly shows a higher afforestation priority for improving ecological connectivity in the Po Plain in northern Italy, lower mountain sectors of Piedmont and Lombardy, the interior of Tuscany, some coastal areas in Marche and Lazio, and scattered locations in Campania and Sicily. On a more detailed scale (500m pixels), and for the scenario of urban ecosystem service improvement, the team produced a set of zooms (50 km x 50 km) to better visualize the specific areas where Parco Italia is planting, and the relationship

between their location and the potential impact they could have. This mapping activity could provide an overall direction to different stakeholders with which to select accurate locations for afforestation. Currently, the team is using these maps to assess the relevance and potential of the planting activities. Of the 14 planting locations represented here, 7 overlap completely or partially with high-priority areas for afforestation. In the future, it could be used to provide proper direction for the Parco Italia planting activities by narrowing the range of areas where the project could be implemented, both at regional and local levels.

Population Density		Cycling and Hiking trail		Summer min Temperature	
High	6	<1.000 mt	5	Between 20,1 - 24,7 °C	4
Medium	2	>1.000 mt	0	Between 18,7 - 20,1 °C	1
Low	0			Between -0,5 - 18,7 °C	0
Fragmentation		Mobility Network		Temperature trend	
1-50	7	<500 mt from Roads	7	Variation between 0 - 0,9 °C	0
50 - 250	21	<500 mt from railways	2	Variation between 0 - 1,4 °C	1
250 - 50.000	0	>500 mt	0	Variation between 1,4 - 1,9 °C	2
Protected Areas		Wildfire		River and wetlands	
0 -1 km	1	Wildfire + Forest Loss	4	<1.000 mt	18
1 - 2 km	10	Wildfire (no forest loss)	0	> 1.000 mt	0
2 - 5 km	4	No fire	0		
>5 km	0				

Table 3. Connectivity extra-urban

Population Density		Cycling and Hiking trail		Summer min Temperature	
High	12	<1.000 mt	9	Between 20,1 - 24,7 °C	20
Medium	4	>1.000 mt	0	Between 18,7 - 20,1 °C	4
Low	1			Between -0,5 - 18,7 °C	0
Fragmentation		Mobility Network		Temperature trend	
1-50	1	<500 mt from Roads	6	Variation between 0 - 0,9 °C	0
50 - 250	4	<500 mt from railways	2	Variation between 0 - 1,4 °C	3
250 - 50.000	0	>500 mt	0	Variation between 1,4 - 1,9 °C	9
Protected Areas		Wildfire		River and wetlands	
0 -1 km	0	Wildfire + Forest Loss	2	<1.000 mt	2
1 - 2 km	2	Wildfire (no forest loss)	0	> 1.000 mt	0
2 - 5 km	1	No fire	0		
>5 km	0				

Table 4. Ecosystem services - urban



Map 20. Priorities for afforestation interventions. Connectivity on a territorial scale



Population density



Ecological fragmentation



Buffer of the protected areas



Highways and railways buffer



Wildfire and tree cover lost



Highest minimum summer temperature



Temperature increase trends



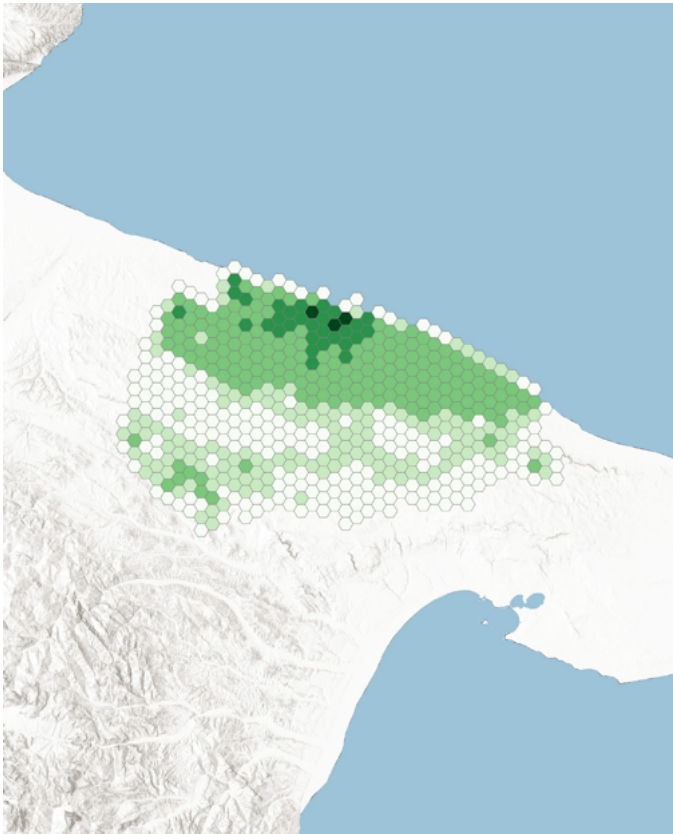
River buffers



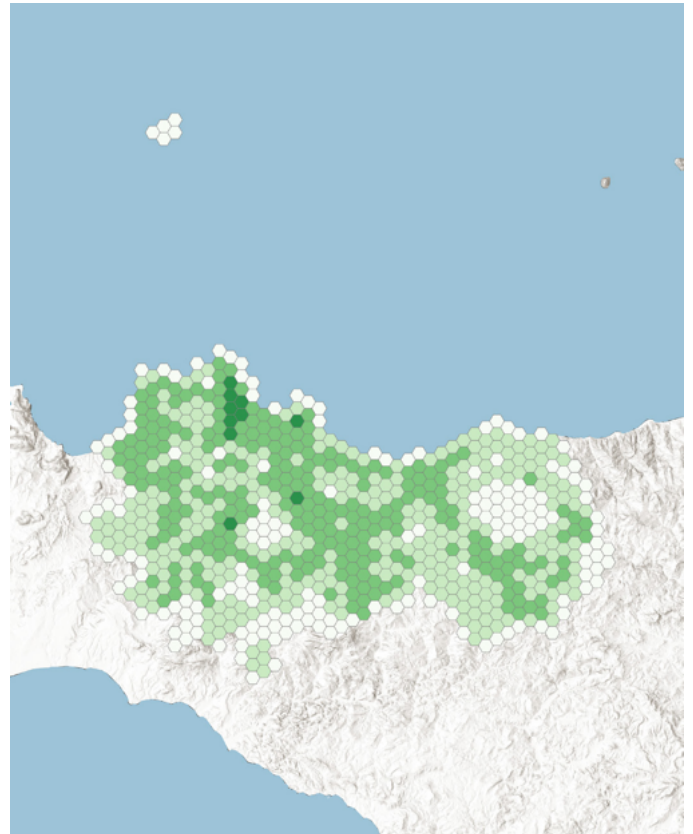
Cycle paths and trail paths buffers

Fig 3. Spatial Layers for the definition of the priorities for afforestation

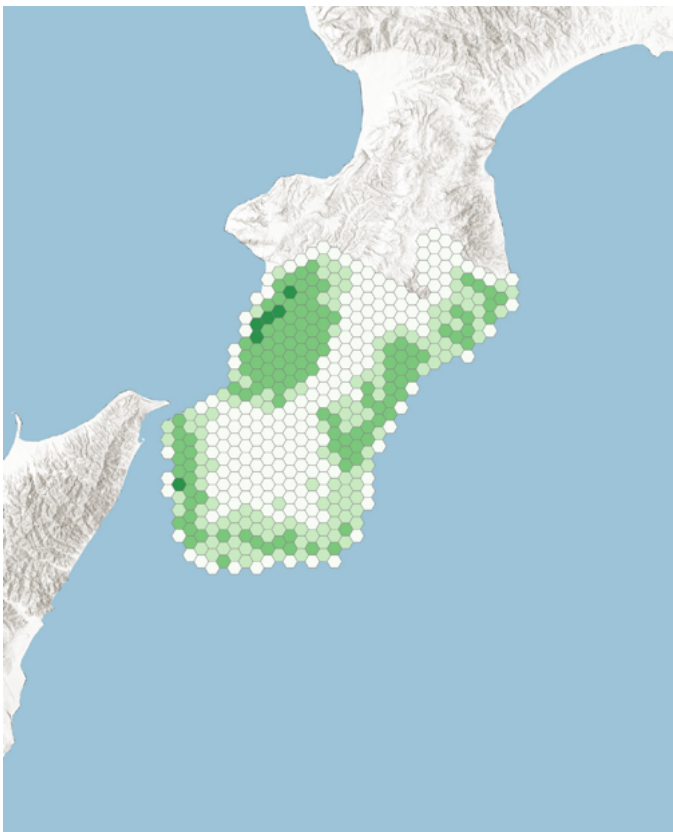
Priorities for afforestation interventions. Ecosystem services on a Metropolitan City scale



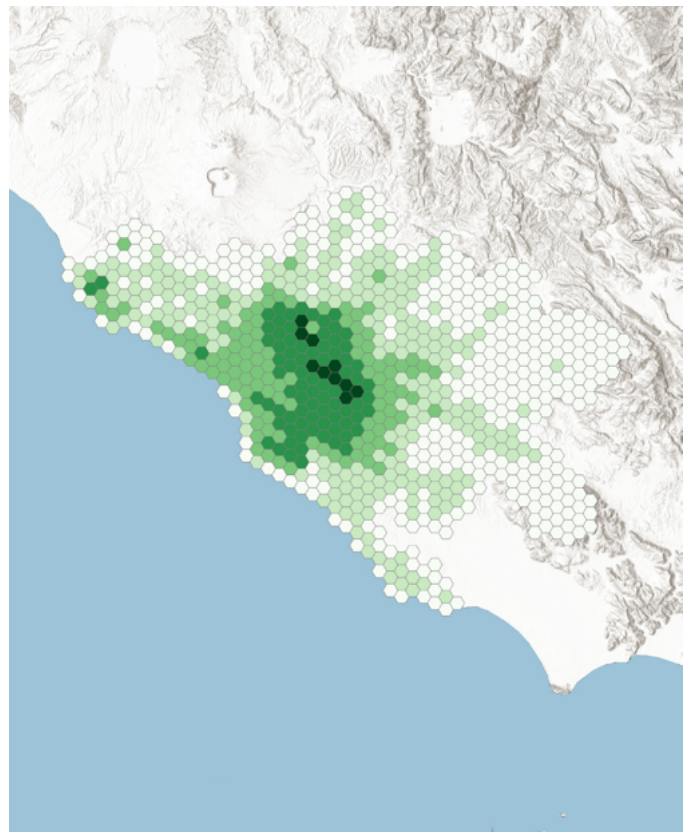
Map 21. Metropolitan City of Bari



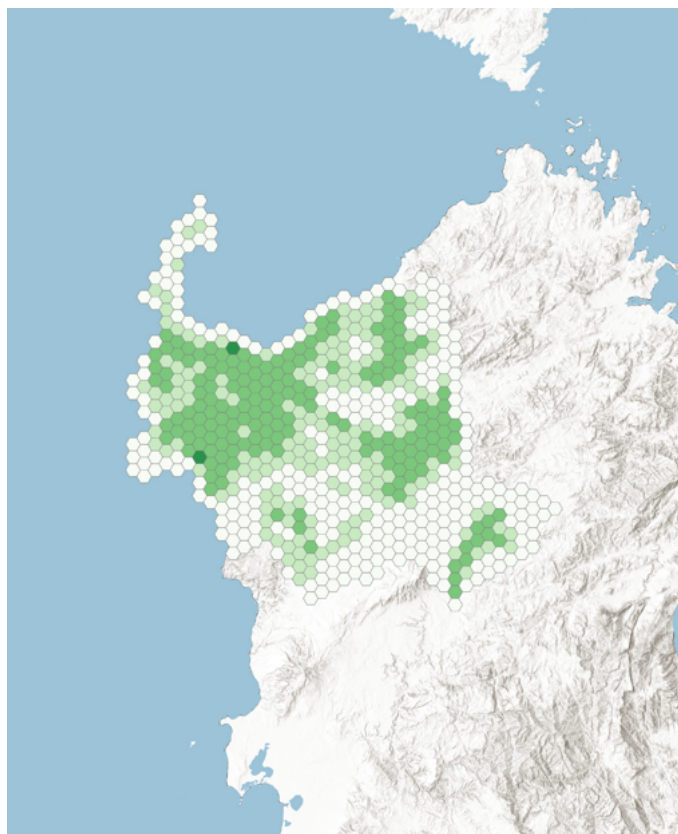
Map 22. Metropolitan City of Palermo



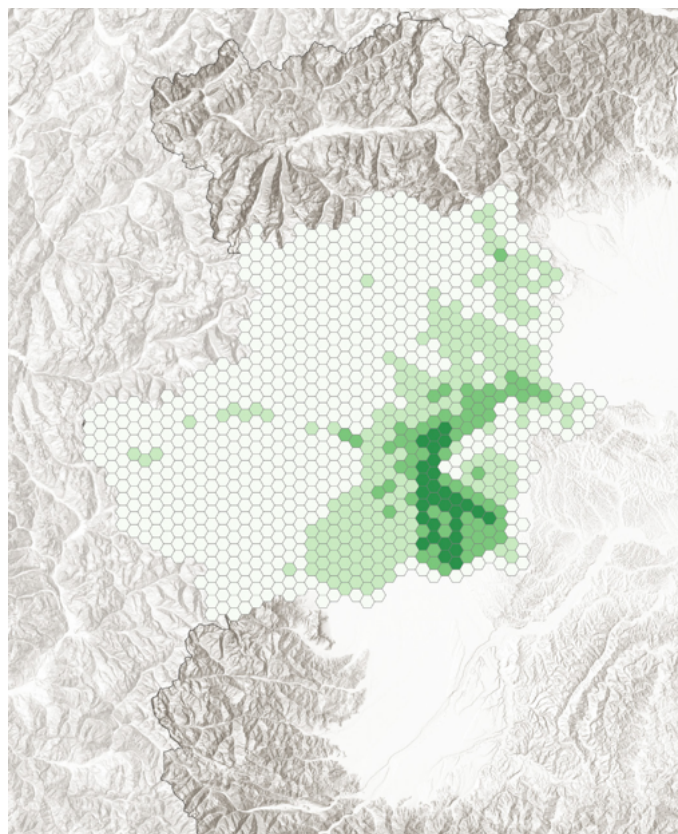
Map 23. Metropolitan City of Reggio Calabria



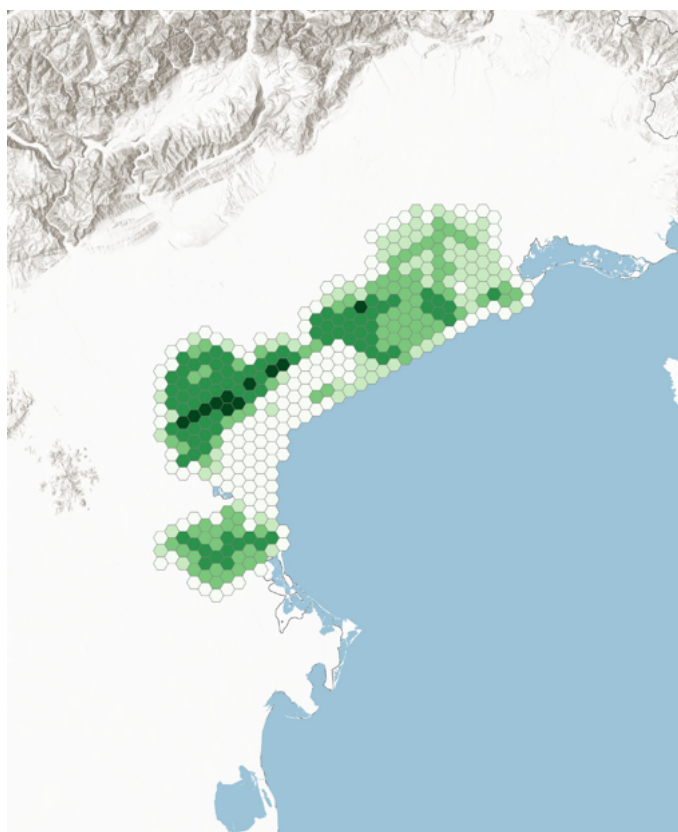
Map 24. Metropolitan City of Roma



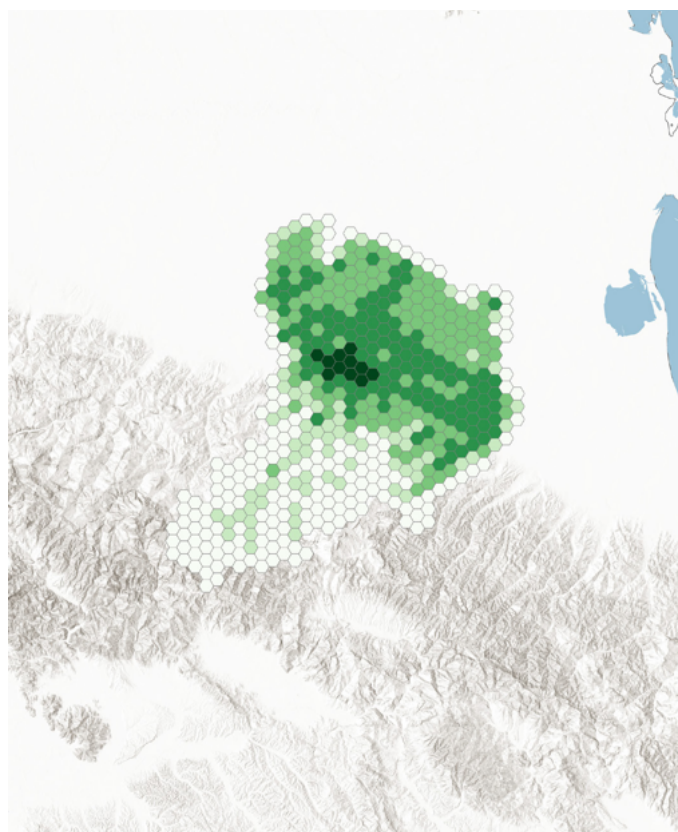
Map 25. Metropolitan City of Sassari



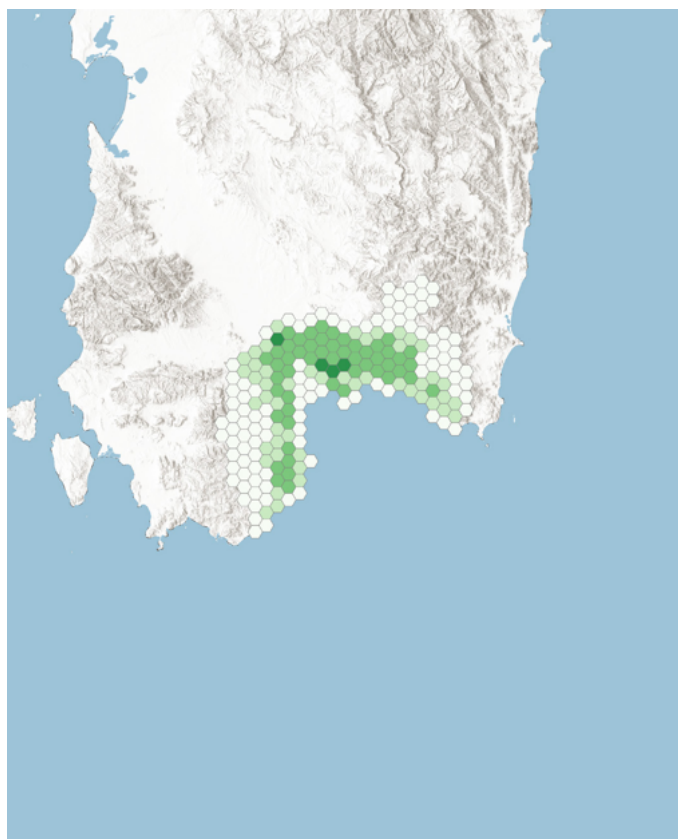
Map 26. Metropolitan City of Torino



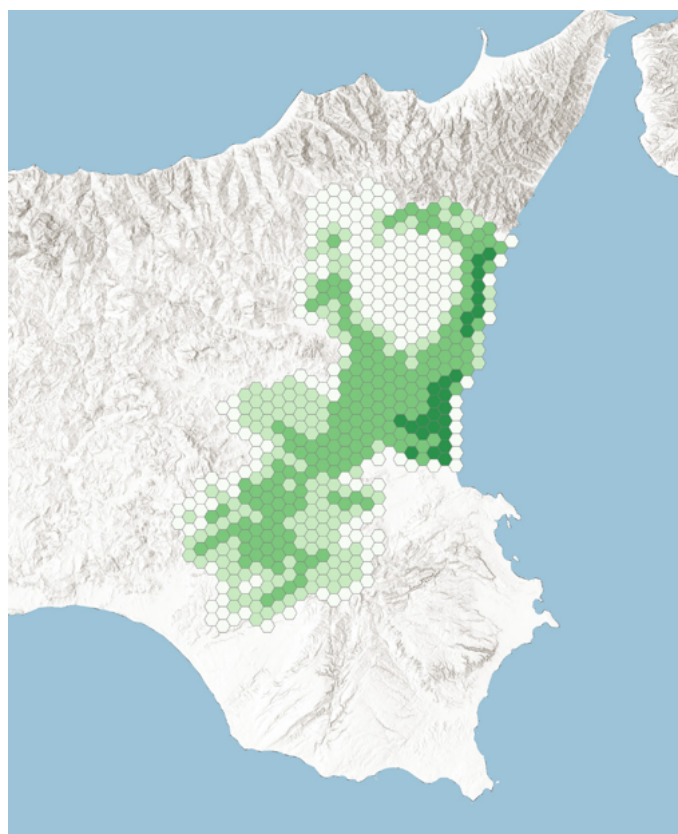
Map 27. Metropolitan City of Venezia



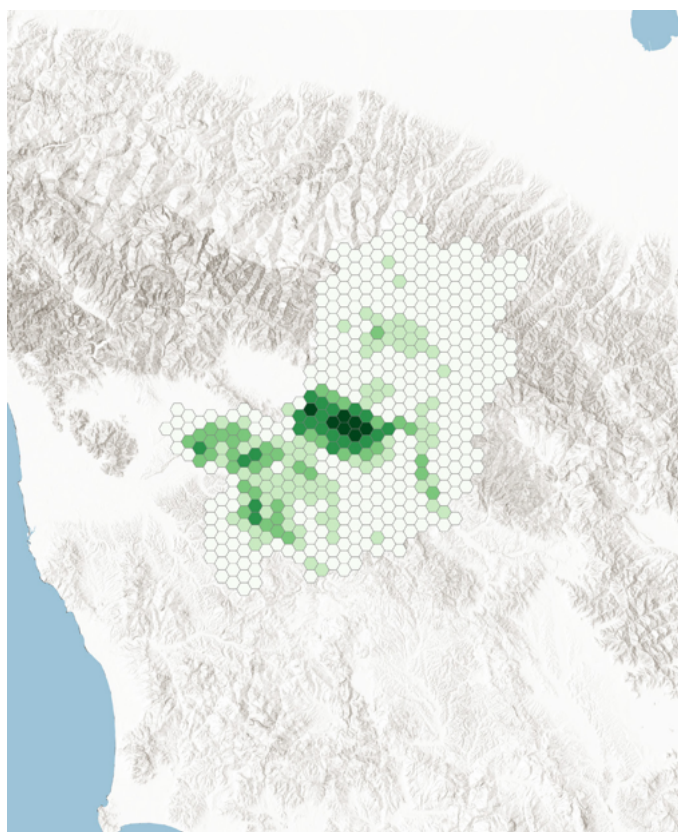
Map 28. Metropolitan City of Bologna



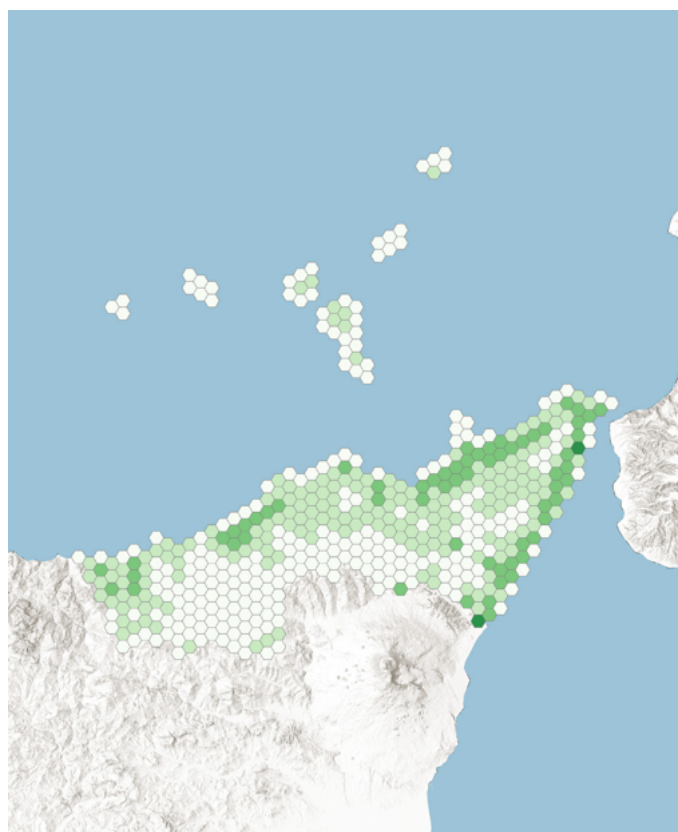
Map 29. Metropolitan City of Cagliari



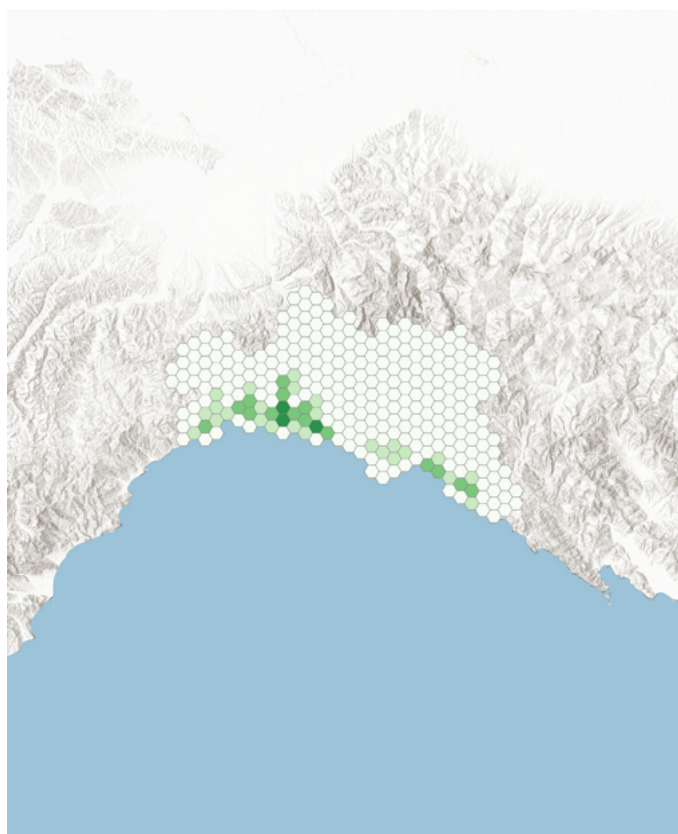
Map 30. Metropolitan City of Catania



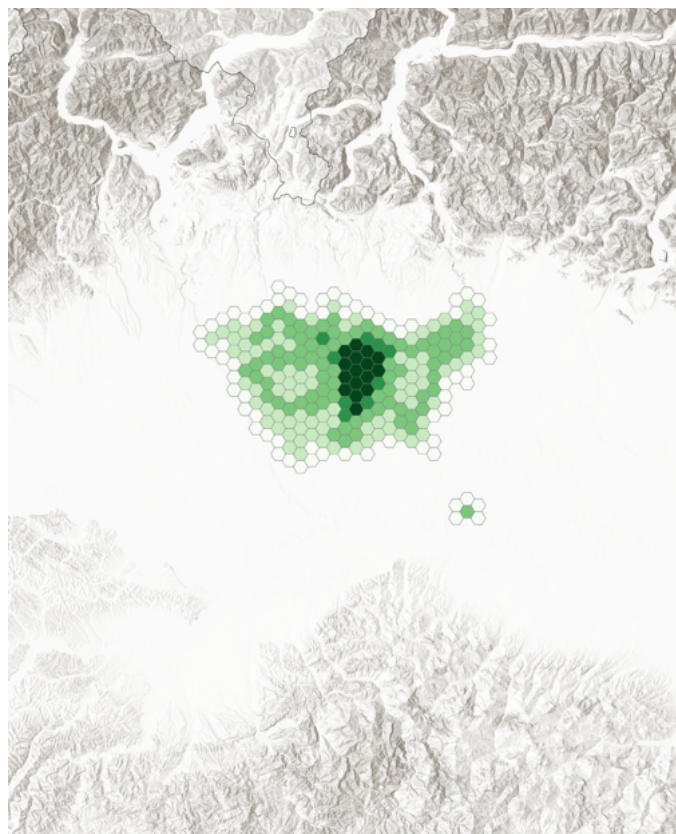
Map 31. Metropolitan City of Firenze



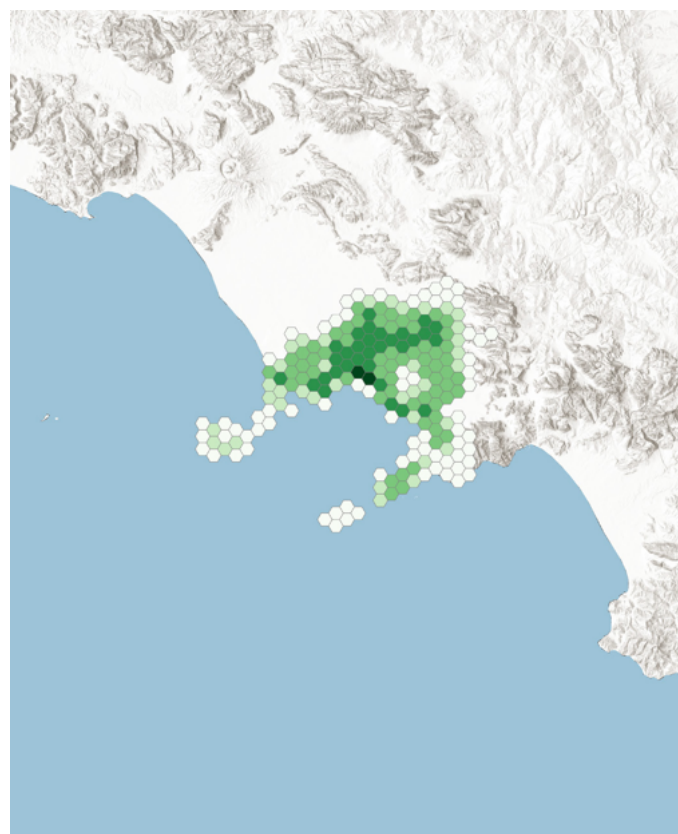
Map 32. Metropolitan City of Messina



Map 33. Metropolitan City of Genova



Map 34. Metropolitan City of Milano



Map 35. Metropolitan City of Napoli

1.6 Findings

From this activity, the team was able to:

- Recognize the normative and territorial complexity of the territorial protection regimes, based on the analysis of the different typologies of protected areas (from national legislation to European policies) and how they are physically distributed along the peninsula.
- Reconstruct a precise and data-driven baseline for protected and forested areas, afforestation campaigns, and critical themes. As of today, forests cover a third of the country (35%), while protected areas cover around 21%, which is close to the EU target of 30% by 2030. However, the challenge remains of improving the connectivity between these high biodiversity value areas.
- Create a multiple-scale assessment tool covering the whole Italian territory, indicating the areas where forestry activities would have the greatest impact in terms of increasing ecological connectivity and biodiversity. These areas include the Po Plain in northern Italy, the lower mountain sectors of Piedmont and Lombardy, the interior of Tuscany, some coastal areas in Marche and Lazio, and scattered locations in Campania and Sicily.
- The methodology has highlighted a critical point: if the model is applied in a region, the results obtained within metropolitan areas may be less relevant. The selected criteria indeed work well in a broad-scale, non-urban context, while they can be misleading when used in metropolitan areas, which obviously have significantly issues related to imperviousness, land consumption, and land use competition. Therefore, the model highlights that afforestation priorities would need to be calibrated based on soil type and should, if applied to metropolitan areas, adhere to different criteria.

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WP2

Identification and interaction with national and international stakeholders with expertise in climate change issues, environmental benefits of green and related physical and mental well-being

2.1 Introduction

The purpose of WP2 is to investigate the current afforestation projects and networks, the latest news related to afforestation programs in Italy, and the mapping of Italian tree nurseries and their capacity to support local and national projects. In addition to the aforementioned objectives, WP2 also involved conducting interviews with relevant private and public stakeholders to gather valuable insights and perspectives. These interviews allowed a comprehensive understanding of the various stakeholders' roles, challenges, and aspirations related to afforestation projects in Italy.

Furthermore, as part of the research conducted for WP2, a detailed map of Italy's afforestation projects was created. This mapping effort aimed to provide a visual representation of the geographical distribution of afforestation initiatives throughout the country. By identifying and mapping these projects, the team gained a comprehensive overview of the existing afforestation efforts, including their scale, location, and specific focus areas. This information proved instrumental in assessing the current state of afforestation in Italy and identifying potential areas for future growth and collaboration within Parco Italia.

2.2 Methodology.

Within the activities of WP2 – Identification and interaction with national and international stakeholders, the research group developed an extensive collection of stakeholder's contacts, collected in an Excel file which have been continuously updated and used throughout the research activity.

A second activity was carried out in the form of an online survey with a set of questions in Italian and English. The survey was distributed to the potential stakeholders of the project according to the set mapping. Moreover, several online interviews were organized and performed with the different categories of stakeholders. This activity's results have provided a detailed map of Italy's afforestation projects and an extensive collection of afforestation projects in Italy in the last ten years (2013-2023).

Inter-institutional agreements have been stipulated to build a robust urban forestry network and facilitate the development of afforestation projects on various scales, from global to local.

More specifically, the following are among the most relevant agreements:

- An agreement between SBA, Politecnico di Milano, SISEF, and FAO for the World Forum of Urban Forests;
- An agreement between SISEF, SBA, and twelve other European research institutions for the BIOCITIES project - a European Forest Institute (EFI)

project devoted to constituting a European facility for resilient and green cities of the future;

- An agreement between SBA, Politecnico di Milano, and a wide range of institutional and local community stakeholders for the Forestami project.

2.3 Mapping of Local, National, and International Stakeholders.

2.3.1 Collection of stakeholder's contacts (See Annex 3)

During the first year of research, a list of subjects was collected and categorized as follows. The stakeholders mapping has been continuously updated and compiled.

- Companies and Organizations
- Network of leaders
- Governmental institutions & administrations (some examples below)
 - Municipal Administrations of Prato, Torino and Genova.
- Nurseries (some examples below)
 - Veneto Agricoltura, contact person: Giustino Mezzalana; Allasia Plant,
 - Piedmont, contact person: Enrico Allasia; Allasia Plant Magna Grecia,
 - Calabria, contact person: Franco Fazio; Vivaio Castellaro di Galeata,
 - Emilia Romagna, contact person: Gabriele Locatelli;
- Associations
- Academic contacts (some examples below)
 - University of Bari, contact person: prof. Giovanni Sanesi;
 - State University of Milan, contact person: prof. Giorgio Vacchiano;
 - University of Turin, contact person: prof. Renzo Motta;
 - University of Bologna, contact person: prof. Federico Magnani;
 - University of Firenze, contact person: prof. Alberto Maltoni
 - University of Sassari, contact person: prof Fabio Salbitano;
 - University of Molise, contact person: prof. Marco Marchetti;
 - University of Palermo, contact person: prof. Federico Maetzke;
 - Politecnico di Milano, contact person: Dr. Arch. Maria Chiara Pastore;
 - Centro Nazionale per lo studio e la conservazione della biodiversità di Firenze, AGRI-UNIFI, contact person: Fabio Salbitano
 - Centro Nazionale per lo studio e la conservazione della Biodiversità
 - Centro regionale di castanicoltura, Piemonte, contact person: Renzo Motta
- Professionals (some examples below)
 - CONAF, Consiglio Ordine Nazionale Dottori Agronomi e Forestali, contact person: Sabrina Diamanti
- Specialization schools and professional schools

2.3.2 Online Survey

An online survey with a set of questions was developed by the team in Italian and English. The survey was distributed to the potential stakeholders of the project according to the set mapping. The aim of the survey is to collect further information and data on afforestation projects, relevant scientific papers, relevant legislative frameworks and to identify new potential stakeholders to engage. See Fig 4.

The online survey was sent via email to more than 100 key stakeholders from a specific email address created for the Parco Italia project (progettoparcoitalia@gmail.com) to start building direct relationships.

Moreover, the online survey has been made available through the following



Parco Italia

ITALIANO (English below)

Gentile,

La invitiamo a partecipare alla seguente indagine di ricerca sul progetto **Parco Italia**.

Gli obiettivi del progetto Parco Italia sono:

- Aumentare la connettività tra aree naturali (protette, non protette e hotspot di biodiversità) al fine di evitare la frammentazione degli habitat sul territorio italiano;
- Creare corridoi ecologici tra le aree protette, prevenire l'isolamento genetico, consentire la migrazione delle specie e l'adattamento climatico e conservare e proteggere gli ecosistemi sani;
- Individuare e sostenere la creazione di nuove aree naturali protette attraverso azioni rigenerative;
- Migliorare la qualità delle aree protette e delle loro zone cuscinetto;
- Ridurre gli effetti dei cambiamenti climatici e migliorare l'adattamento;
- Garantire che gli habitat e le specie non mostrino deterioramento dello stato di conservazione e trend;
- Aiutare a costruire città più verdi (dai paesi alle aree metropolitane italiane), migliorando la connettività tra le aree verdi urbane e le aree naturali.

Siamo un gruppo di ricercatori e professionisti composto dal dipartimento di ricerca di Stefano Boeri Architetti, Alberitalia, Università degli Studi di Firenze, Università Statale di Milano e stiamo studiando i progetti di Forestazione Urbana e Periurbana in Italia ed il possibile coinvolgimento degli stakeholders. Il Vostro contributo a questo studio sarebbe di grande rilevanza per il progetto.

Grazie mille per il Suo tempo e impegno.

Parco Italia team (progettoparditalia@gmail.com)

Fabio Salbitano
Università degli studi di Firenze

Maria Chiara Pastore
Stefano Boeri Architetti

ENGLISH

The Parco Italia project aims at:

- Increasing connectivity between natural areas (protected, not protected, and biodiversity hotspots) in order to overcome the fragmentation of habitats;
- Creating ecological corridors between protected areas, preventing genetic isolation, allowing species migration and climate adaptation, and maintaining and enhancing healthy ecosystems;
- Identifying and supporting the creation of new natural protected areas through regenerative actions;
- Improving the quality of protected areas and their buffer;
- Reducing the effects of climate extremes and improving the adaptation;
- Ensuring that habitats and species show no deterioration in conservation trends and status;
- Helping build greener cities (from towns to metropolitan areas), improving the connectivity between urban green areas and natural areas.

We are a group of researchers and professionals from Stefano Boeri Architetti, Alberitalia, Università degli Studi di Firenze, Università Statale di Milano and we are investigating Urban and Periurban Forestry programs in Italy and possible stakeholders engagement. Your contribution to this study would be of great relevance to the project.

Thank you very much for your time and effort.

Parco Italia team (progettoparditalia@gmail.com)

Fabio Salbitano
Università degli studi di Firenze

Maria Chiara Pastore
Stefano Boeri Architetti

arch.simonemarchetti@gmail.com [Cambia account](#)

* Indica una domanda obbligatoria

Email *

ENG: Which sector do you belong to? *

ITA: Qual'è il suo settore di appartenenza?

☐ Academia and research / Università e ricerca

☐ Nurseries / Vivai

☐ Institutions / Istituzioni

☐ Administrations / Amministrazioni

☐ Arborists / Arboricoltori

☐ Association / Associazioni

☐ Planners and designers / Pianificatori e progettisti

☐ Technicians / Tecnici

☐ Altro: _____

ITA: Ha suggerimenti specifici in merito al modello di governance? Per favore, li descriva di seguito.

La tua risposta

ENG: Can you list up to 3 key challenges for establishing Urban Forests in metropolitan cities in Italy?

ITA: Potrebbe elencare le 3 sfide principali per la creazione di foreste urbane nelle città metropolitane italiane?

La tua risposta

ENG: Are you aware of specific legislative frameworks in Europe or Italy? If so, please list them below.

ITA: È a conoscenza di specifici riferimenti normativi in Europa o in Italia? Per favore, li elenchi di seguito.

La tua risposta

ENG: Are you aware of key research studies that we should include as references for this project? If so, please list them below.

ITA: È a conoscenza di studi e ricerche che dovremmo includere come riferimenti chiave per questo progetto? Per favore, li elenchi di seguito.

La tua risposta

ENG: Do you know other stakeholders (academia, administration, nurseries, technicians, etc.) that we should contact for this project? If so, please provide their contact details.

ITA: Conosce altri stakeholders (università, ricerca, amministrazione, vivai, tecnici, ecc.) che dovremmo contattare per questo progetto? In caso affermativo, per favore indicare i contatti.

La tua risposta

ENG: Is there anything else you would like to add?

ITA: C'è altro che desidera aggiungere?

La tua risposta

Fig 4. Online survey sample

channels:

- Stefano Boeri Architetti website
- Stefano Boeri Architetti social media pages (Instagram, Facebook)
- SISEF website
- SISEF social media pages (Twitter, Facebook)
- SISEF newsletter

2.3.3 Results of the Online Survey

Below is the report of the main questions and results of the online survey.

Which sector do you belong to? (Fig 5)

- Nurseries
- Academia and research
- Institutions
- Administration
- Association
- Arborists
- Planners and designers
- Technicians
- Other:

What is your role?

Some of the answers were: Consultant and postdoctoral researcher, public forest nursery manager, forestry technician, Freelance agronomist dealing with fauna and forests, Biologist, graduate AgroTechnician, Urban Ecology manager etc.

In conclusion, we can say that in this first phase, the survey successfully reached a wide audience in the field of Forestry.

Are you Italy-based? If not, from which country?

The great majority of the answers are from Italy-based professionals. One postdoctoral researcher from Canada joined too.

Have you been involved in Urban and Periurban Forestry projects in Italy since 1993 and especially since 2015? Please, list them below with the location and number of trees planted.

Many respondents participated from Urban and Peri-urban Forestry projects and initiatives. One example was a compensation project developed from 2007-2011 (new woodlands, hedges, and ponds) near Cremona (Persico Dosimo) and Brescia (Poncarale, Bagnolo Mella), implemented by Autostrade Centro Padane S.p.A. in which 76,500 trees and shrubs were planted. The answers have been integrated into the mapping of forestry interventions.

Do you know any Italian and International case studies of Urban and Periurban afforestation projects that you would recommend as a key example for Parco Italia's development? Please, provide a brief description or a web link for further information.

The answers have been integrated into the mapping of forestry interventions.

Do you have any specific suggestions regarding the governance model? Please describe them below.

The answers were multiple, spanning different topics; some examples are:

- Engaging and devolving control to local communities that desire and want to engage with reforestation.

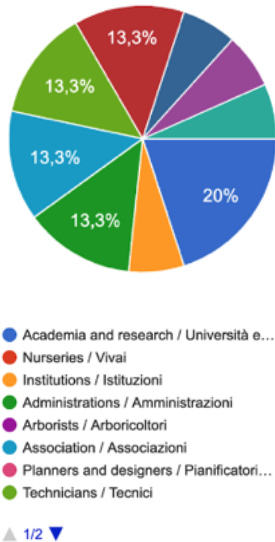


Fig 5. Sector Distribution of the stakeholders

- Engaging youth in a meaningful way (e.g., via employment and youth leadership, working with mentors) could be a win-win for gathering community support and providing ongoing care for forests.
- A maintenance plan must be envisaged that includes the identification of local supply chains of use or disposal of the resulting biomasses.
- Planning forest roads within the wooded areas, necessary for the forest thinning interventions as well as for use.
- Ecological approach: 1) considering and including also trees and other vegetation already present in the site (including wasteland and spontaneous plants); 2) looking at the project with an ecosystemic vision; 3) choosing indigenous plants in particular ; 4) enhancing the faunistic and ornithological components in the area.
- Multi-year management and maintenance plans.
- Shared management between public and private
- Using native shrubs or tree species to reduce the costs of creating and managing these areas significantly.
- Connection and synergies shared with the PTCP, PIF, PAC, PSR, and PNRR.
- Creation of a private-public supply chain for nursery production, planting, crop care, full operation, and consequent management with an adequate economy of scale.
- Defining what “urban forests” includes and their role as ecosystems: the Lombardy Region did it in detail in 2006, including in addition to forests: hedges, rows of trees, wetlands, water networks, permanent meadows, etc.

Can you list up to three key challenges for establishing Urban Forests in metropolitan cities in Italy?

Some of the key challenges listed by the stakeholders are:

- Lack of available space;
- Lack of tolerance for natural “wild” areas and areas undergoing natural regeneration;
- Shortsighted projects;
- Include private, rural peri-urban areas with hedge creation and agroforestry;
- Coordinating urban forestry plans with agro-environmental measures;
- Public involvement;
- Possibility of long-term management and monitoring;
- Citizenship involvement;
- Ordinary management with the contribution of volunteers;
- To consider urban forestation with ecological and not political criteria;
- Raise public awareness;
- Interaction between civic society, the scientific community, and policymakers.

Are you aware of specific legislative frameworks on European and Italian scales? If so, please list them below.

- d.lgs 386 in Italy for native plants;
- Law n. 10 of 14 January 2013 “Norme per lo sviluppo degli spazi verdi urbani”;
- Decree n. 63 of 10 March 2020 by Environmental Ministry “Criteri ambientali minimi per il servizio di gestione del verde pubblico (CAM)”;
- Strategia forestale italiana e D.Lgs 34/2018;
- La nuova normativa proposta il 22 giugno 2022 dalla Commissione al Parlamento UE per ripristinare la natura (Nature Restoration Law).

Are you aware of key research studies that we should include as references for this project?

The recommended bibliography by the stakeholders is:

- World Resources Institute publication: Better Forests, Better Cities. Coming soon, to be launched in Dec 2022
- Lipu, 2017. Il verde urbano e gli alberi in città. Indirizzi e linee guida per la progettazione e la gestione ecologica. Documenti per la conservazione della natura. Lipu, Parma.
- Dinetti M., 2021. Verde urbano: gestione ecologica. Manuale di progettazione e cura di parchi, giardini e reti ecologiche nelle città. Ecologia Urbana 33 (1-2). Bandecchi e Vivaldi, Pontedera (PI).
- Precision restoration: A necessary approach to foster forest recovery in the 21st century / J. Castro, F. Morales-Rueda, F.B. Navarro, M. Löf, G. Vacchiano, D. Alcaraz-Segura. - In: RESTORATION ECOLOGY. - ISSN 1061-2971. - (2021)
- Hession, W., Johnson, T., Charles, D. et al. Ecological Benefits of Riparian Reforestation in Urban Watersheds: Study Design and Preliminary Results. Environ Monit Assess 63, 211–222 (2000). <https://doi.org/10.1023/A:1006495805300>
- Tidball, K.G., Metcalf, S., Bain, M. et al. Community-led reforestation: cultivating the potential of virtuous cycles to confer resilience in disaster-disrupted social-ecological systems. Sustain Sci 13, 797–813 (2018). <https://doi.org/10.1007/s11625-017-0506-5>

Do you know other stakeholders (academia, administration, nurseries, technicians, etc.) that we should contact for this project? If so, please provide their contact details.

The suggested stakeholders have been included in our contact list.

2.3.4 Online Interviews

Within the activities of WP2 – Identification and interaction with national and international stakeholders (Table 5 and Map 36), the research group organized and performed several interviews with the different categories of stakeholders. The interviews, among other objectives, aims to overview and map the national forestry projects concluded and in progress, both public and private, in Italy. This activity's results provide information for a detailed map of Italy's afforestation projects. Information regarding the teams of professionals involved, the areas, the perimeters, the status of the projects, the difference between public and private initiatives, and in general, the main issues and the positive aspects of the processes have been gathered. In addition, questions regarding the overall supply chain of the different operations - from design to implementation to maintenance - have been asked.

Specifically, we have been contacting and interviewing the following categories:

Private stakeholders:

- Private organizations
- Foundations
- Companies

Public Nurseries	Private Nurseries
<i>Vivaistica Forestale - Regione Abruzzo</i>	<i>Vivai Guagno</i>
<i>Vivaistica Forestale - Regione Basilicata</i>	<i>Allasia Piante</i>
<i>Vivaistica Forestale - Regione Campania</i>	<i>Allasia Plant Magna Grecia</i>
<i>Vivaistica Forestale - Regione Emilia Romagna</i>	<i>Vivai Torsanlorenzo</i>
<i>Vivaistica Forestale - Regione Friuli Venezia Giulia</i>	<i>Vivai Mola della Badia</i>
<i>Vivaistica Forestale - Regione Liguria</i>	<i>Vannucci Piante</i>
<i>Vivaistica Forestale - Regione Marche</i>	<i>Piante Mati</i>
<i>Vivaistica Forestale - Regione Molise</i>	<i>Vivai Vincenzo Russo</i>
<i>Vivaistica Forestale - Regione Piemonte</i>	<i>Vivai Lambo</i>
<i>Vivaistica Forestale - Regione Sardegna</i>	Regions
<i>Vivaistica Forestale - Regione Sicilia</i>	<i>Emilia Romagna</i>
<i>Vivaistica Forestale - Regione Valle d'Aosta</i>	Private Stakeholders
<i>Vivaistica Forestale - Prov Autonoma di Trento</i>	<i>Fondazione Sylva</i>
<i>Vivaistica Forestale - Prov Autonoma di Bolzano</i>	<i>KilometroVerdeParma</i>
<i>Centro Biodiversita Vegetale e Fuori Foresta - Montecchio Precalcino (VI) - Regione Veneto</i>	<i>Etifor</i>
Metropolitan Cities	<i>Treedom</i>
<i>Metropolitan City of Milano</i>	<i>Arbolia</i>
<i>Metropolitan City of Bologna</i>	<i>AzzeroCO2</i>
<i>Metropolitan City of Napoli</i>	<i>ZeroCO2</i>
<i>Metropolitan City of Reggio Calabria</i>	
<i>Metropolitan City of Messina</i>	
<i>Metropolitan City of Palermo</i>	
<i>Metropolitan City of Cagliari</i>	
<i>Metropolitan City of Catania</i>	
<i>Metropolitan City of Roma</i>	
<i>Metropolitan City of Bari</i>	
<i>Metropolitan City of Sassari</i>	
<i>Metropolitan City of Torino</i>	
Cities	
<i>Genova</i>	
<i>Prato</i>	
Public Universities	
<i>Università degli studi di Camerino</i>	

Table 5. Stakeholders contacted (including those who answered and those who haven't)



Map 36. Stakeholders Map

Public stakeholders:

- Italian administrative regions
- Metropolitan cities
- Cities

Nurseries:

- Private nurseries
- Public forest tree nurseries

A group of private stakeholders comprising AzzeroCO2, Arbolia, Treedom, Etifor, and KM Verde Parma shared information with the research group regarding the projects they have been involved in over the last ten years on afforestation. Regarding the public stakeholders, we contacted and, based on the availability of the respondents, we interviewed some Italian Metropolitan Cities that have been funded by the two so-called “Bandi Costa” (tenders signed by the former Minister Sergio Costa, financed by the MATTM in 2020 and by the MITE in 2021) and by the PNRR (for the years 2022, 2023 and 2024). Moreover, we developed a chart providing an entire perspective of public funded projects at a National level. This output is an efficient tool for understanding the overview of tree-planting activities nationally, how many trees are planted, and where and the budget division within the Italian territory. (See Table 6)

The following stakeholders have agreed to be interviewed:

- Municipality of Genova - Mr. Grignani (Head of the public green areas of Genoa; Planner and construction manager of a forestation project for PNRR)
- Metropolitan City of Florence - Arch. Franchi (head of Franchi + Associati, planner of one of the projects for Bando Costa)
- Metropolitan City of Turin - Mr. Bovo (Director of the Natural Systems Department for the Metropolitan City of Turin)
- Emilia Romagna Region - Mr. D'Ercoli (Protected Areas, Forests and Mountain Area Development Sector)
- ETIFOR - Mr. Pra (Forests Program Coordinator)

Moreover, the following stakeholders have shared via email the answers that we sent them:

- ETIFOR
- TREEDOM
- ARBOLIA
- KM Verde Parma
- AZZERO CO2
- Municipality of Prato

For each project, a large amount of information was collected, starting from a list of requests:

- Geolocalization of the area
- Context of the area
- Environmental characteristics of the area: classification (“land use” type) and naturalistic description
- Is it a public/private, public/public, or private/private intervention?
- What type of planting interventions are planned?
- What species have been chosen for the project?
- What is the total number of plants, and what percentage of trees and shrubs?
- Which professionals does the design team consist of?
- Who are the stakeholders?

Public Projects - Metropolitan Cities									
Tender	Year	Target	Effective Overall	Total num of Projects	Metropolitan Cities	# of Projects	Project Financing	Surface (ha)	# of Plants
Bando Costa	2020	15.000.000 €	14.827.001,01 €	34	Bari	3	unk.	unk.	unk.
					Bologna	2	unk.	unk.	unk.
					Cagliari	1	unk.	unk.	unk.
					Catania	1	unk.	unk.	unk.
					Firenze	3	unk.	unk.	unk.
					Genova	2	unk.	unk.	unk.
					Messina	1	unk.	unk.	unk.
					Milano	5	unk.	unk.	unk.
					Napoli	1	unk.	unk.	unk.
					Palermo	2	unk.	unk.	unk.
					Reggio Calabria	1	unk.	unk.	unk.
					Roma	3	unk.	unk.	unk.
					Torino	5	unk.	unk.	unk.
					Venezia	4	unk.	unk.	unk.
Bando Costa	2021	18.000.00 €	17.878.478,94 €	38	Bari	3	1.413.536,31 €	unk.	unk.
					Bologna	5	1.937.644,98 €	unk.	unk.
					Cagliari	2	1.000.000,00 €	unk.	unk.
					Catania	3	1.497.000,00 €	unk.	unk.
					Firenze	5	2.294.363,50 €	unk.	unk.
					Messina	1	500.000,00 €	unk.	unk.
					Milano	4	1.803.000,00 €	unk.	unk.
					Napoli	4	1.981.493,54 €	unk.	unk.
					Reggio Calabria	1	500.000,00 €	unk.	unk.
					Roma	4	1.998.082,69 €	unk.	unk.
					Torino	3	1.499.538,41 €	unk.	unk.
					Venezia	3	1.453.819,51 €	unk.	unk.
PNRR	2022	74.000.000 € 1.650.000 plants	83.255.422,00 € 2.201.680 plants	35	Bari	1	6.388.630,85 €	91,19	91.493
					Bologna	/	/	/	/
					Cagliari	6	7.540.968,71 €	220,1	338.000
					Catania	1	5.066.904,00 €	118	118.000
					Firenze	/	/	/	/
					Genova	2	3.020.038,72 €	70	70.000
					Milano	/	/	/	/
					Messina	8	15.862.966,13 €	447,61	447.612
					Napoli	5	10.467.308,23 €	237,77	240.804
					Palermo	2	6.249.142,14 €	216,88	217.000
					Reggio Calabria	2	7.887.716,00 €	184	184.050
					Roma	4	12.902.541,20 €	302	302.000
					Torino	3	6.520.507,00 €	157,87	161.340
					Venezia	1	1.348.699,00 €	31,35	31.381
PNRR	2023 - 2024	213.000.000 € 4.950.000 plants	203.744.577,50 € 4.738.246 plants	unk	Bari	unk.	16.133.205,67 €	375,19	375.191
					Bologna	unk.	11.834.985,88 €	275,23	275.232
					Cagliari	unk.	3.609.437,55 €	83,94	83.940
					Catania	unk.	15.774.853,00 €	366,85	366.857
					Firenze	unk.	11.815.675,05 €	274,78	274.783
					Genova	unk.	9.883.214,35 €	229,84	229.842
					Milano	unk.	17.135.139,91 €	398,49	398.492
					Messina	unk.	2.688.076,45 €	62,51	62.514
					Napoli	unk.	24.965.237,19 €	580,58	580.587
					Palermo	unk.	21.675.281,17 €	504,07	504.076
					Reggio Calabria	unk.	8.598.442,14 €	199,9	199.964
					Roma	unk.	23.067.029,14 €	536,44	536.443
					Torino	unk.	23.366.685,33 €	543,41	543.411
					Venezia	unk.	13.197.314,67 €	306,91	306.914

Table 6: Public Funded Projects of Forestry in Italy

- Which nurseries are involved? Are they private or public?
- Who is responsible for implementation of the project?
- Who is responsible for maintenance of the area once planted?
- Lesson learned: which were the main critical issues? What were the positive aspects of the process?

2.3.5 Results of the Online Interviews

**Metropolitan City Of Florence, Municipality Of Campi Bisenzio,
Arch. Gianfranco Franchi.
Landscape architect responsible for one of the projects of Decreto Clima
Bando Costa 2021**

Geolocation of the area
Municipality of Campi Bisenzio

Context of the area

It is one of the five selected municipalities in the Metropolitan City of Florence. The four areas of this intervention are all on the perimeter of Campi Bisenzio: Area Marinella, Area Lago Paradiso - Perfetti Ricasoli, Area Viale Paolieri e Area Selex - Ex Galileo. We finished the work 15 days ago (December 9th, 2022); a series of plantations were developed for about 7 hectares in the Municipality of Campi Bisenzio. It is not a single area because the Municipality did not have one available, and in order to participate in the tender, there was a minimum limit of hectares to be implemented. It was impossible to expropriate areas because it would have lengthened the time, and therefore the Municipality of Campi Bisenzio identified all the areas that were available and with no constraints. Therefore, these areas are not contiguous: there are six areas from 3,000 to 8,000 m² each. Some of them have been added to already existing green areas.

3. Environmental characteristics of the area: classification ("land use" type) and naturalistic description
n/a

4. Is it a public/private, public/public, or private/private intervention?

It is an intervention as part of the Bando Costa Tender, public/public with a total financing of €500,000.

What type of planting interventions are planned?

We have placed both small plants plus a minor number of relatively small-sized trees of 10/12/14 cm in diameter. The intervention on the territory changes based on the available area; for example, a large empty area in a park near "I Gigli" shopping center has been planted. In addition, rows of dead plants have been reconstituted and integrated.

What species have been chosen for the project?
n/a

What is the total number of plants, and what percentage of trees and shrubs?
1,000 trees

Which professionals do the design team consist of?

The team of Franchi+Associati Landscape and Urban Design firm took care of the design project. The team from DAGRI UniFI - Department of Agricultural, Food,

Environmental and Forestry Sciences and Technologies | University of Florence led by Prof. Ferrini from DAGRI did a study to select the tree species. The DAGRI team also calculated the CO₂ that will be saved in the coming years. The Unifi DAGRI will carry out a plant growth check to verify and evaluate the problems that could arise in the next seven years - they have an agreement already signed with the Municipality to be able to monitor the plants.

Who are the stakeholders?

n/a

Which nurseries are involved? Are they private or public?

The Distretto Vivaistico Pistoiese and a nursery from Arezzo.

Who is responsible for implementation of the project?

The Brasimone Cooperative from the province of Bologna won the contract to implement and maintain the plantations for the next seven years. The contract also allows up to 10% replacement of dead material by the company.

Who is responsible for maintenance of the area once planted?

The Brasimone Cooperative

Criticalities

The work was suspended until the end of September because the plants could no longer be planted with the high temperatures. If a summer like this year happens again, we will not know how to water the plants. We have a budget for these climatic emergencies, but we cannot give water every week; the money will run out soon. The water is given manually, plant by plant. The most critical years are the first and second; we were also thinking of modifying the 7-year plan, i.e., formally, seven years will be maintained, but concentrating the water more when needed. Another criticality that we encountered is that this tender had unrealistic timings; it has been written by people who do not know the subject of forestry. It is very bureaucratic. From a practical point of view, we found no great difficulty. Of course, if the Municipality had only one or two areas to intervene in, it would have been much easier to implement.

Also, the lack of available areas in the Municipality was an issue, and now we have saturated all public properties that could satisfy the request.

It is not easy to even establish agreements with private individuals on these topics because they take a long time, and funding instead has a very short time frame.

Currently, I do not see any other critical issues; nevertheless, I think there will be some related to the management and maintenance of all these plants in the future.

Municipality of Genoa,

Dr Grignani Genoa Parks and Public Spaces Department;

Designer of a forestation intervention for PNRR

Geolocalization of the area

The area is on the upper side of the Genoa Scarpino landfill

Shape files of the site perimeters (if available)

n/a

Description of the intervention's context-area

The area has been chosen because of its environmental and technical

characteristics that are good opportunities for plantation. It is divided by a public road from the Genova landfill. The message that the municipality of Genoa wants to communicate by choosing this area is that it is possible to oppose artificial environmental disasters by activating virtuous land management processes. The identified project area includes part of the “compresa forestale” of the Forest Management Plan, specifically sections 74 and 75 for a total of about 56 ha (the “compresa forestale” is the area where the fundamental principle of forest management durability is pursued, which presupposes constancy and perpetuity, both of the wood product and of the other functions of the forest). Of these 56 ha, about 21 ha are available for plantation.

Environmental characteristics of the area: classification (“land use” type) and naturalistic description

The area has environmental constraints: outcropping rocks, scree, green rocks, etc. In some parts of it, there are already woods with complete coverage, but there are also bare areas and areas in the initial colonization phase with more or less sparse shrubs.

Is it a public/private, public/public, or private/private intervention?
public/public

What type of planting interventions are planned?
n/a

What species have been chosen for the project and why (objectives)?

Trees: *Quercus ilex*, *Quercus pubescens*, *Ostrya carpinifolia*, *Fraxinus ornus*, *Prunus avium*, *Alnus glutinosa*, *Alnus cordata*, *Pinus pinaster*. *Ostrya carpinifolia* and *Fraxinus ornus* are used to create a base for Orno-hornbeam, typical of the Ligurian Apennine belt (mixed woods with ash and hornbeam). In addition, we have chosen secondary species such as wild cherry for fauna; consolidating species in the most washed out areas such as *Alnus glutinosa*; more present species for already more evolved forest stages, such as downy oak and holm oak.

Shrubs: *Erica arborea*, *Prunus spinosa*, *Rhamnus alaternus*, *Sorbus aria*, *Juniperus communis*, *Sorbus torminalis*, *Cistus salvifolius*, *Cytisus scoparius*.

We found everything available in the nurseries besides *Pinus pinaster* and *Sorbus aria*, so we increased the number of the other species.

What is the total number of plants, and what is the percentage of trees and shrubs?

The total is 30,000 plants, 70% trees, and 30% shrubs. Genoa chose to implement the maximum percentage of shrubs stipulated in the PNRR contract because it best fits the geographic reality of the identified areas.

Which professionals does the design team consist of?

As requested by the contract, we have a Forestry group leader, agronomic foresters, botanists, naturalists, and ecologists. The Genoa Public Green Office developed the project, which was subsequently approved and verified under the Public Contracts Code. It then went out to tender, which was awarded to the firm IMERA srl of Pieve Emanuele, Milan.

Who are the involved stakeholders?
n/a

Which nurseries are involved in the project? Are they private or public?

The Russo Nursery from Sicily transported the plants to the Lambo Nursery in

Lombardy. The Metropolitan City of Genoa decided to include a pre-contract with the nursery to guarantee the plants - they were perhaps the only one among the metropolitan cities to do so.

Who is responsible for implementation of the project?

IMERA srl di Pieve Emanuele, Milano

Who is responsible for maintenance once the area is planted?

IMERA srl di Pieve Emanuele, Milano

Lesson learned: which were the main critical issues? Which were the positive aspects of the process?

The first issue we can imagine for the future is the plant supply. We assumed for our site a 20% die-off per year. This means that next year we will need 6,000 new plants to replace. In the worst-case scenario, this means that at the end of 5 years, we will need 100% new plants if we calculate 20% failure per year. Can the Italian nursery system support this demand? Has this been taken into consideration? From our side, we have identified specific locations in the area for water tanks of 1 cubic meter for irrigation. Still, this procedure is incorrect from a forestry point of view – new plantations like this one shouldn't be watered because only the strongest plants should survive.

Another issue is that the contract defines 1,000 trees per ha, but this rule works for urban and peri-urban areas; in our case, the number of trees planted per ha should and could have been different.

Municipality of Prato, Arch. Antonella Perretta.

Environmental transition and urban resilience Area. Urban planning service, ecological transition and civil protection. Responsible for the Strategic Planning of Natural Heritage.

Geolocation of the area

Municipality of Prato

Context of the area

AD2020 Project – Another Declassata – from the Tuscany Carbon Neutral call. The area is an existing parking area located at the crossroads between Via Nenni and the Declassata (declassified) road (Viale Leonardo Da Vinci). The intervention aims at developing an urban forest to counter climate-changing emissions, de-pave the park-and-ride car park in favor of a reduced number of car parking spaces, and create a camper area with related services and an urban forest.

Environmental characteristics of the area: classification ("land use" type) and naturalistic description

The area is a parking area located on the high-speed road system. It is already the object of interest in terms of research into de-paving by the UNIFI-DAGRI. The area where the urban forest is planned has never been planted. The land test results have good characteristics.

Is it a public/private, public/public, or private/private intervention?

Public/public

What type of planting interventions are planned?

Trees and shrubs

What species have been chosen for the project?

Sixteen tree species have been selected including *Acer*, *Cercis*, *Fraxinus*, *Koeleria*, *Prunus*, and *Quercus*.

The choice of the species is based on the promotion of biodiversity and the experimentation of some species associations. Species have also been selected taking into consideration their capacity to absorb climate-changing emissions.

What is the total number of plants, and what percentage of trees and shrubs?

215 trees and 357 shrubs, for a total of 572 plants.

Which professionals does the design team consist of?

Arch. Michelangelo Pugliese and Ing. Massimo Perri.

Who are the stakeholders?

Municipality of Prato, CONSIAG Servizi Comuni.

Which nurseries are involved? Are they private or public?

Private nurseries from the Distretto Vivaistico Pistoiese.

Who is responsible for implementation of the project?

Municipality of Prato.

Who is responsible for maintenance of the area once planted?

CONSIAG Servizi Comuni.

Criticalities

In some cases, a project entrusted to an external subject is a positive feature but in some procedures, especially in response to tenders with reduced times, some elements escape control. The choice of some species, their planting layout, and the lack of accurate planning for the irrigation systems or other parts not considered have created difficulties for the public offices. Moreover, most companies this year are engaged in the Italian “super bonus” or similar, and are thus unavailable. On top of this particular situation, a variant of the project which the Public Administration wanted was implemented for constructing the camper area.

Regione Emilia Romagna,

Francesco D'Ercoli, project manager responsible for the forestry and urban forestry interventions, and for the regional forest nursery system.

Regione Emilia Romagna, with its campaign to plant 4.5 million more trees is proceeding with the following actions: free distribution of seedlings to citizens, bodies, and associations through the 22 currently accredited private nurseries; activation of two tenders (2021 and 2022) dedicated to lowland municipalities and one tender dedicated to companies. As a result of the experience they are having, these are the main critical points that have emerged:

- Scarcity of human resources and specific skills in the Public Administrations involved in forestry projects;
- Absence of large-scale and long-term intervention planning from the P.A. side and a poor perspective on the management of the plantations by the beneficiaries;
- Scarcity of interventions conceived as “experimental actions”, to be monitored over time;
- Projects are often fragmented, with small surfaces and with a minor number of plants, tending more towards the creation of urban areas with few trees

rather than effective urban forests;

- The practical possibility of using allochthonous ornamental plants, as per the Annex to the tenders;
- Difficulty finding available land, given the competition between urbanization and the agricultural sector.

Some positive notes were also underlined:

- Excellent response was given by the Municipalities in the Region, especially and surprisingly by the smaller ones with no internal competence;
- The campaign raised citizens' awareness, and participation in direct activities such as planting was noted.

Metropolitan City of Turin, Dr. Bovo, Manager of Natural Systems of Turin

During the interview Dr. Bovo discussed in more general terms the Decreto Clima and PNRR projects happening in the Metropolitan City of Turin, providing a general picture of the ongoing activities and criticalities.

General context

The Metropolitan city of Turin has developed projects for both Decreto Clima and PNRR.

Decreto Clima: projects in about 20 municipalities - for a total of about 105,000 plants, 101 hectares, and €2,499,000.

PNRR: 3 projects for about 190,000 plants spread over about 300 hectares and 30 different locations around Turin's urban area. The Metropolitan City of Turin is supposed to plant 670,000 total plants for the PNRR projects, but they already know that after the first 200,000, there will be no more land available. The issue of land availability is central, often in competition with agriculture. The municipalities grant the areas in concession to private individuals who pay a fee and then independently decide what to do with it. There should be public utility planning, and the public interest should prevail. In some cases, there have been attempts to involve farmers by giving maintenance assignments with which to try and collaborate. Mr Bovo believes that the agricultural associations should be involved at Ministerial level, and forestry chains should be established: planting, management and maintenance.

Ongoing projects

PNRR

In 2022 three projects have been submitted with the following numbers: 160,000 total plants, 160 hectares, and €6.5m.

1) In the areas affected by fires in Mompantero and Caselette, 73 hectares and 73,000 plants have been planted between 1300 and 1700 mamsl (metres above mean sea level). The total cost was €3m and the project was developed with the University of Turin. One of the goals was to remedy human disasters.

2) Regional park of la Mandria, within the royal parks of the Reggia di Venaria. The area was a former Fiat test track. The PNRR, unlike the Bando Clima, does not allow the use of funds for the demolition of the asphalt of the track; therefore they have planted 32,000 plants around it on a total of 32 hectares, for an amount of €1,250,000.

3) 55,000 plants have been planted along the Piedmont stretch of the River Po. In

this case, the Basin Authority and the Piedmontese Po Park are stakeholders, and the PNRR intervention amplifies the projects already made by the Po Park to create a shared forest.

Climate Decree

We have intervened in about 20 areas in municipalities near Turin as part of the Corona Verde project, a system project of the Piedmont region that has been active for more than 20 years, for the reconstruction of the green infrastructure around Turin (the green belt of Turin in continuation of the Turin City of Waters project). These projects will saturate some of the areas around Turin in the neighboring municipalities.

Which professionals does the design team consist of?

Foresters, naturalists, administrators, architects, biologists and geologists.

Who are the stakeholders?

For the Decreto Clima: Parco regionale La Mandria, Parco Regionale Po Piemontese, SAT Settimo Torinese, Comune Venaria Reale, Comune Torino, Seacoop. s.c.r.l, Studio Blanchard e Gallo, Studio Sintesi ingegneria e paesaggio.

Which nurseries are involved? Are they private or public?

Vivai Guagno Padua. They are private. They are the only ones who have guaranteed the supply and have taken steps to find plants and seeds quickly. One critical issue is the scarcity of available plants for the planned projects. Even with a substantial budget of €1.5 million for three years of work, they were the only ones participating in the open tender, which is deeply concerning.

Criticalities

To sum up the main criticalities encountered:

Decreto Clima 2020 – 2021 (750,000 plants of which 110,000 in Metropolitan City of Turin MCT)

- Ministry: lack of programming, organization and feedback to mct, lack of administrative and accountable simplifications, unrealistic timing
- Municipalities: lack of awareness, skills and support to mct
- Citizens: lack of awareness and culture
- MCT: poor awareness, personnel and internal organization
- Climate: negative conditions for the plants (drought, temperatures)
- ENTERPRISES: planting speed (100-120 plants/operator/day)

PNRR 2022-2024 (6,600,000 plants of which 670,000 in CMT)

- General failure to involve the community and communicate the importance of the measure.
- Ministry: unrealistic timing, lack of programming, absence of technical control room and organization and feedback to mct, lack of administrative and justifiable simplifications, lack of involvement
- Municipalities: agricultural organizations and local authorities lack of awareness, skills and collaboration
- CMT: lack of personnel and internal organization
- Climate: negative conditions for the plants (drought, temperatures)
- Enterprises: planting speed (100-120 plants/operator/day)

2.3.3 The forest and tree-nursery sector

The specific survey of the Italian forest nursery sector focused primarily on the public nurseries that play a significant role in providing plants for afforestation or reforestation purposes in Italy, including planting projects funded by the two so-called “Bandi Costa” (tenders signed by the former Minister Sergio Costa, financed by the MATTM in 2020 and by the MITE in 2021) and by PNRR (for the years 2022, 2023, 2024). The nurseries are managed by the Regional Administration (or by the Province in case of the two Autonomous Provinces of Trento and Bolzano). To gather relevant information, we conducted interviews with the managers of the forest nursery production in each Region, who oversees the activities of all regional forest nurseries.

The following questions were addressed to each contact:

- A: Is your nursery involved in the new programs of reforestation/afforestation funded by the EU? If yes, which one?
- B: What is the contribution requested by your administration?
- C: Can you provide plant species and the number of seedlings requested to the forest nurseries in your Region?
- D: Please detail your point of view about the strengths and weaknesses of the process.

Similar questions were also put to some selected private nurseries that operate at national and international levels, mostly for ornamental plant production. Below is a table listing the stakeholders we contacted within the nursery sector, which also includes the contacts that did not provide any answer.

In most cases, the responses from the public stakeholders in the nursery sector did not provide any crucial additional information. At the time of our survey (between Oct 2022 and Feb 2023), they were not involved in producing plants for PNRR or other reforestation projects funded by EU or national programs. The local calls related to such projects were still ongoing, and the nurseries were awaiting seedling orders in 2023. Many of the interviewed stakeholders expressed concerns about the lack of long-term planning, as they are unsure if they will be adequately equipped to meet the substantial increase in demand for national or local seed lots. One exception was the Sardegna Region, where the Metropolitan City of Cagliari had already completed the first phase, and the nurseries had already committed to producing approximately 250,000 seedlings of native plants for the PNRR projects.

Among the private nurseries that responded to our questions, most were not currently involved in the EU-funded projects we focused on, with the exception of a nursery in the Calabria Region, which has been selected to provide plants for the calls of the Metropolitan City of Reggio Calabria. The owner of this nursery also voiced concerns about the lack of planning and the limited time provided for the sector to grow the plants.

To address the pressing issue of the rapid rise in demand for seeds and seedlings, the Ministry of Agriculture has been taking action by promoting a reorganization of the structure of the public forest nursery supply chain. The AlberItalia foundation is actively collaborating in this process by advocating the VIVA-FOR Manifesto (see paragraph 2.5, box 1). A final workshop

was held on 15th December 2022, which involved representatives from the Government, Regional Administrations, and other stakeholders.

The proposed manifesto aims to enhance both the quality of the forest reproductive material and the efficiency of the supply chain. It also seeks to address regional differences that contribute to fragmentation and, to some extent, the lack of innovation in the Italian forest nursery supply chain. Before the workshop, the Manifesto had already been presented in three previous regional meetings to local Administration stakeholders in Northern, Central, and Southern regions of Italy. The final meeting incorporated proposals from the private sector, scientific researchers, as well as representatives from the newly established Ministry and Government. The objective is to deliver a final document to the Forest Division of the Ministry of Agriculture, which will pave the way for a new regulation to promote innovation across the entire supply chain.

2.3.3.1 Interviews

Enrico Allasia CEO Allasia Plant

(private nursery)

Località S. Isidoro, 97A, 12030 Cavallermaggiore CN

01/02/2023

- A. The nursery has been involved in some PNRR projects: Città Metropolitana di Torino (as contractor) and, as sub-contractor, Città Metropolitane di Firenze and Genova
- B. The required seedlings are as follows: Città Metropolitana di Torino 12,500 seedlings; they are still waiting for instructions from the contractor for Firenze and Genova
- C. The main complaint is the lack of time to properly plant the seedling production. In addition, they have noticed a general decrease in interest from public administrations, in contrast to what they experienced during 2022, when the Ministry published the PNRR calls.

Franco Fazio CEO Allasia Plant Magna Grecia

(private nursery)

Località, 88049 Santa Margherita CZ

15/12/2022

- A. The nursery has been involved in some PNRR projects: Città Metropolitana di Reggio Calabria (as contractor) and, as sub-contractor, Città Metropolitane di Roma, Napoli, Genova; they had a first negotiation contact with Città Metropolitana di Messina
- B. The required seedlings are as follows: Città Metropolitana di Reggio Calabria: 180,000 seedlings; Città Metropolitana di Roma: 175,000; Città Metropolitana di Napoli: 37,000 seedlings; Città Metropolitana di Genova: 12,000 seedlings (only shrubs).
- C. The main complaint is related to the fact that the seedlings are all ready to be delivered, but are still left in the nursery without being paid for (non-fulfillment of the contract), causing economic and logistical problems for the nursery. They also complain about the lack of time to properly plan seedling production.

Elisabetta Margheriti Sales Director Torsanloranzo Gruppo Florovivaistico

(private nursery)

Via Campo di Carne, 51, 00040 Ardea RM

2/12/2022

- A. The nursery has not been involved in the projects we mentioned so far

Francesco Mati CEO Piante Mati

(private nursery)

Via Bonellina, 49, 51100 Pistoia PT

28/11/2022

- A. The nursery has not been involved in the projects we mentioned so far
- C. Piante Mati raised the importance of increasing the national forest nursery seedling production and enlarging the contribution of the private sector

Employee Vivai Mola della Badia

(private nursery)

C.da Collenero 1/A 04010 Roccasecca dei Volsci, LT Italia

28/11/2022

- A. The nursery has not been involved in the projects we mentioned so far

Francesco Contu employee in Regione Abruzzo - Forest Nursery

Management office

(public nursery)

28/11/2022

- A. The Regione Abruzzo nurseries have not been involved in the required projects so far, just in other kinds of public-funded local reforestation projects

Salvatore Digilio employee in Regione Basilicata -Forest Nursery

Management office

(public nursery)

10/12/2022

- A. Regione Basilicata nurseries are involved in the seed collection for PNRR project in the following measure of the call: Measure M2CA.3 Investimento 3.1 "Protection and promotion of urban green areas" on behalf of Reparto Carabinieri Biodiversità (Italian Forest Ranger Corp – Section Biodiversity).

Francesco D'Ercoli employee in Regione Emilia-Romagna - Forest Nursery

Management office

(public nursery)

12/12/2022

- A. The Regione Emilia Romagna nurseries have not been involved in the required projects so far, only in other calls for public-funded local reforestation projects
- D. The main critical point is the general lack of human resources and specific skills in the public administrations involved in these projects, and the lack of long-term planning of large-scale interventions, especially with regard to medium and long-term monitoring of the projects. In addition, publicly

funded projects are often fragmented and limited in size in terms of number of plants and areas, and tend to create wooded areas rather than real urban forests. Another well-known criticality is the difficulty of finding suitable land, given the competition from urbanization and the profitable regional agricultural sector. On the other hand, the response of the municipalities is striking, especially the smaller ones and often without internal targeted competences. The objective, very difficult in the current conditions, is to relaunch - in the short to medium term - the regional public nursery activity, also in synergy with private nurseries, in order to overcome the thirty-year policy of selling off the existing structures and skills, which has led to the decline of the sector in many regions.

Damiano Penco employee in Regione Liguria - Forest Nursery Management office

(public nursery)

28/11/2022

- A. The Regione Liguria nurseries have not been involved in the required projects so far, just in other kinds of public-funded local reforestation projects
- D. The regional administration has progressively closed the forest nurseries, and now only two are active for local projects, so their production is not planned according to regional guidelines. Recent efforts by the administration to revive the nursery chain have not been effective.

Lorella Brandoni employee in Regione Marche Agency for the agro-food sector (including the Forest Nursery Management) - ASSAM Agenzia Servizi Settore Agroalimentare delle Marche

(public nursery)

28/11/2022

- A. The Regione Marche nurseries have not been involved in the required projects so far, just in other kinds of public-funded regional reforestation projects

Eva Malacarne employee in Regione Piemonte - Forest Nursery Management office

(public nursery)

20/11/2022

- A. Regione Piemonte nurseries are involved in a CLIMA Decree project for the Città Metropolitana di Torino (as sub-contractor)
- B. Up to the interview date, the number of requested seedlings has not been communicated to the nursery administration.
- C. The complaint is related to the lack of planning and the uncertainty of what will be required of the regional nurseries, which is likely to result in a major effort to try to meet all the requirements.

Antonio Masci employee in Regione Sardegna Agency for the forest sector (including the Forest Nursery Management office) - Forestas -

(public nursery)

05/12/2022

- A. Regione Sardegna nurseries are involved in a PNRR project with the Città Metropolitana di Cagliari (as contractor)

- B. The number of requested seedlings is the following: 220,000 seedlings, of which 160,000 were requested in 2022 and the remaining will be produced in 2023 and 2024
- C. The main complaint is related to the lack of planning; the plants requested for 2022 were retrieved from the available seedlings (planned in 2021, so the production plan did not include the necessary numbers for PNRR needs).

Lucio Taverna employee in Regione Friuli Venezia Giulia - Forest Nursery Management office

(public nursery)

05/12/2022

- A. A request for 5,000 seedlings (more than half of which are shrubs) arrived at their office for a project included in the PNRR calls. They do not know the name of the project or even the details.

Giorgio Cuaz employee in Regione Valle D'Aosta - Forest Nursery Management office

(public nursery)

29/11/2022

- A. The public nurseries of the Regione Valle D'Aosta are not involved in the mentioned projects but in other public-funded local reforestation projects

Matthias Zöschg employee in Provincia Autonoma di Bolzano - Forest Nursery Management office

(public nursery)

29/11/2022

- A. The Provincia Autonoma di Bolzano is not involved in the mentioned projects but in other public-funded local reforestation projects
- C. Matthias pointed out that the Northern Alpine Regions are not involved in such reforestation programs due to the already large forest areas; however, their nurseries usually meet the demand of other regional public administrations for funded reforestation projects (probably including COSTA and PNRR), but they do not record each specific project.

2.4 Recent afforestation projects in Italy (2013-2023).

The interviews, among other objectives, aim to overview and map the national forestry projects concluded and in progress, both public and private, in Italy. This activity's results provide a detailed map of Italy's afforestation projects. Moreover, the accessible information regarding the public afforestation projects, from EU's Tree Billion Tree Pledge to many other regional projects, going on in Italy were also included in the mapping. The result of the survey, interviews and data gathering is an archive of more than 400 projects geolocalized: Mapping of forestry interventions - Italy. The projects were mapped on a national scale (See Map 37, 38 and 39)

Some of the interviewed stakeholders, both private and public, agreed on sharing the perimeters of the forestry projects. Some of them are already planning to publish and distribute this data; Etifor, for example, managing the WOW Nature platform, is implementing a new mapping and geolocation system that will make



Map 37. Afforestation Projects in Italy



Map 38. Afforestation Projects in Italy - Private Stakeholders.



Map 39. Afforestation Projects in Italy - Public Stakeholders.

the perimeters of private projects visible on their website. Regione Emilia Romagna is willing to collect all the perimeters of the projects of their tenders, but they are understaffed and will probably be able to do this just in 2024. All the perimeters received have been incorporated into the map (see Map 37).

Numbers & figures (update July 2023):

N° of projects mapped: 409

Regions involved: 18/20 (We haven't included any project in Molise and Val d'Aosta until now)

N° of projects per region:

Abruzzo: 1

Basilicata: 6

Calabria: 2

Campania: 19

Emilia-Romagna: 52

Friuli Venezia Giulia: 10

Lazio: 39

Liguria: 8

Lombardia: 47

Marche: 5

Piemonte: 26

Puglia: 26

Sardegna: 4

Sicilia: 13

Toscana: 49

Trentino: 9

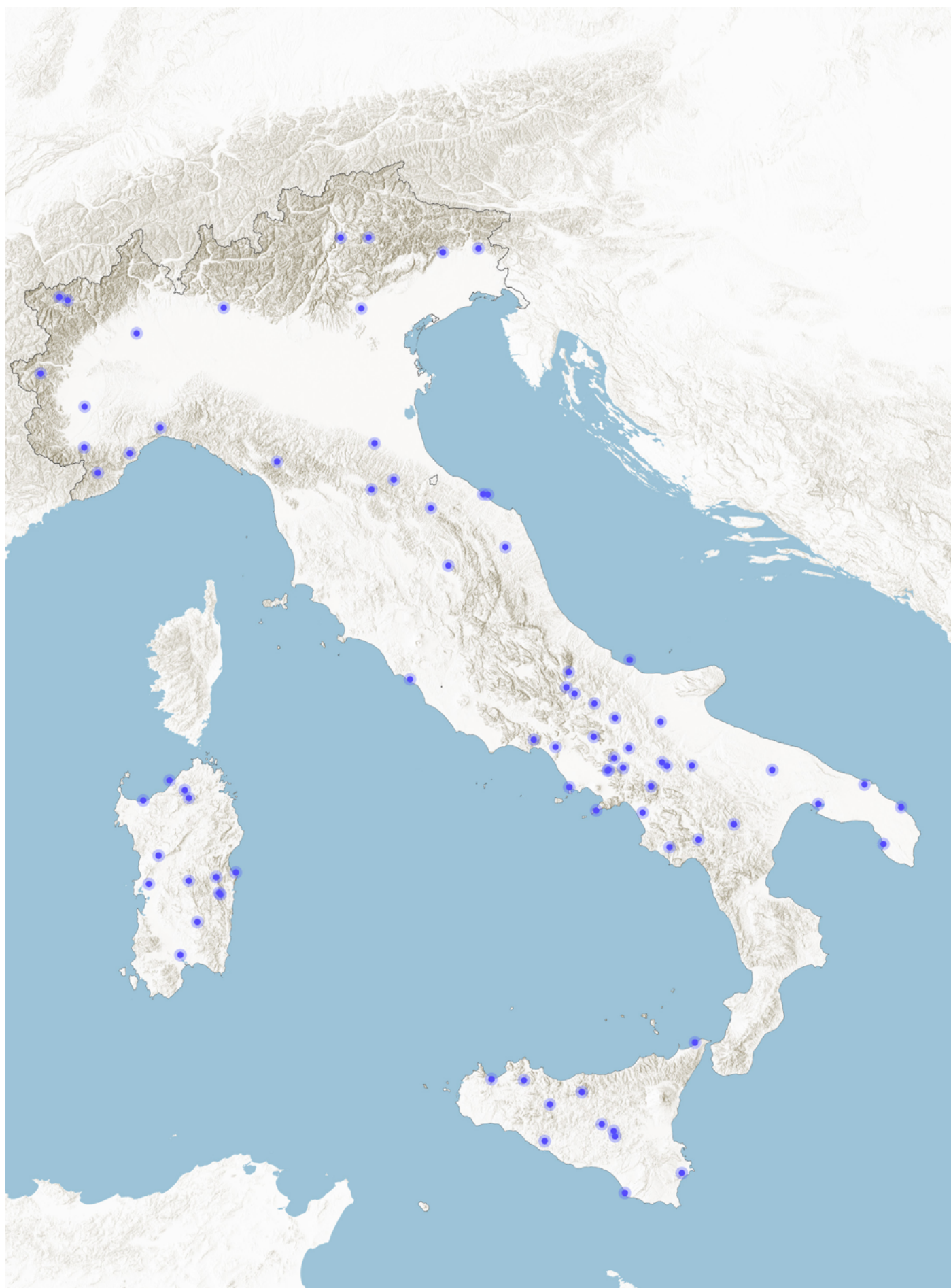
Umbria: 1

Veneto: 40

2.5 Italy's forest nursery system and supply chain. Challenges and opportunities.

Past experiences on a national scale, such as the extensive reforestation projects after World War II, the tree-farming plantations established in 1990, as well as international experiences in reforestation and forest restoration, have highlighted the key role of the quality of planting material as a decisive factor for planting success. This aspect has been not only generally neglected in communication and training activities, but also it has not fully been included as a crucial factor in many ongoing initiatives and projects. The characteristics and, consequently the quality of nursery seedlings are influenced by both genetic factors and nursery practices during cultivation. The concept of a "fit-for-purpose" seedling, also known as the Target Plant Concept (TPC; Dumroese et al. 2016, Davis and Pinto 2021), emphasizes the importance of the assessment of post-transplant establishment and growth based on the specific purpose of the planting project. Consequently, different environmental conditions, intervention types, and nursery cultural inputs result in unique "ideal" seedlings (targets) with varying genetic characteristics and nursery practices.

At the EU level, the trade in Forest Reproductive Material (FRM) among member states is regulated by a certification system that mainly considers genetic aspects (Community Directive 1999/105 / EC). In Italy, national legislation follows the European Directive with Legislative Decree 386/2003, supplemented by regional



Map 40. Forest Nurseries in Italy Map. Italy's public forest nurseries map (active and inactive).

regulations, although no specific rules for FRM exist in any region. Instead, references to this matter are typically included in forest regulations, guidelines or measures for biodiversity conservation.

The Italian forest nursery sector has been significantly shaped by the post-war forestry policy and, to a lesser extent, by the evolution of silviculture. Large-scale reforestation projects were government-funded, leading to the development of public nurseries. See Map 40, Public Nurseries localization in Italy. This map was produced using the data present on public administration websites (when available) and by doing specific searches on google and google maps; so it may not be exhaustive.)

However, the focus on supplying free nursery seedlings, primarily to public projects and later to private citizens on a smaller scale, has hindered research and innovation in both processes and products. As the administration of the forest sector shifted from the State to the Regions, many public forest nurseries were closed without adequate compensation from the private sector. Private nurseries shifted their focus to ornamental and horticultural plant production, which is now one of the most advanced sectors at the European level. Factors such as sporadic and unpredictable demand, coupled with lower profit margins compared to ornamental and fruit productions, have negatively impacted the entire forest nursery supply chain, particularly private entrepreneurship in the sector.

The Forest Genetic Resources (FGR) consist of the genetic material of forest shrub and tree species, and the material specifically used in the nursery supply chain to produce seedlings, cuttings and grafts (e.g., forest stands, seed orchards) is technically known as Basic Material¹ (BM) and is regulated by Legislative Decree 386/2003, which defines four BM categories (for details, see the captions of Fig. 6). The National Register of Basic Materials (NRMB) was established in 2020 (Ministerial Decree n. 9403879 on 30/12/2020) to provide an overview of available national Basic Materials (BM) according to species and Regions. The information is incorporated into the European Commission's Forest Reproductive Material Information System (FOREMATIS) database, which provides access to the data of the national registers, including the details of approved basic material including geographic location; therefore, FOREMATIS is a public search tool useful for forest stakeholders, such as breeders, nurserymen, and experts; it also acts as a repository linked to EU countries' data on planted forest tree species².

Currently, Italy has 2,230 registered BMs, with the majority (2,130) belonging to "forest stands" (i.e., forests or seed sources) included in the categories "identified at source" (IDS) and "selected" (SEL), making up 88% and 7% of the total, respectively (Figures 6 and 7). The remaining 5% consists of material for specific uses, such as "qualified" (QLF, 1%) materials derived from clones, seed orchards, mother plants, and clone mixtures, and "controlled" (CON, 4%) material. Figures 8, 9, 10, and 11 illustrate the distribution across Italy of BMs for four important species used in reforestation or forest restoration projects. These examples highlight the high variability of the distribution and the presence of officially registered species-specific FGR across the country, necessitating further efforts by the regional public administrations to revise and implement the national NRMB.

Until the early 2000s, the forest nursery sector's annual data was included in the official Agricultural and Forestry Statistics. After a significant gap of more than a decade without updated information at national level, the most recent data available was published in the "National Report on the State of Forests in Italy - RaF Italy 2017-2018" (RAF 2019), but it was characterized by its general

1. Council Directive 1999/105/EC of 22 December 1999 on the marketing of forest reproductive material, article 2(c)

2. https://ec.europa.eu/foremat/frm_map_adv_search.xhtml



Fig 6. Distribution of BMs across Italy according to the four categories identified by the Council Directive 1999/105/EC and the national D. Lgs 386/ 2003.. Source-identified: FRM derived from basic material which may be either a seed source or stand located within a single region of provenance and which meets the requirements set out in Annex II of the Directive

Selected: FRM derived from basic material which will be a stand located within a single region of provenance, which has been phenotypically selected at the population level and which meets the requirements set out in Annex III;

Qualified: FRM derived from basic material, which will be seed orchards, parents of families, clones or clonal mixtures, the components of which have been phenotypically selected at the individual level and which meet the requirements set out in Annex IV. Testing need not necessarily have been undertaken or completed;

Tested: FRM derived from basic material, which will consist of stands, seed orchards, parents of families, clones, or clonal mixtures. The superiority of the reproductive material must have been demonstrated by comparative testing or an estimate of the superiority of the reproductive material calculated from the genetic evaluation of the components of the basic material. The material will meet the requirements set out in Annex V of the directive.



Fig 7. Distribution of BMs across Italy according to the types identified by the Council Directive 1999/105/EC and the national D. Lgs 386/ 2003.

Seed source: trees within an area from which seed is collected; *Stand:* a delineated population of trees possessing sufficient uniformity in composition; *Seed orchard:* a plantation of selected clones or families which is isolated or managed so as to avoid or reduce pollination from outside sources, and managed to produce frequent, abundant and easily harvested crops of seed; *Parents of family:* trees used to obtain progeny by controlled or open pollination of one identified parent used as a female, with the pollen of one parent (full-sibling) or a number of identified or unidentified parents (half sibling); *Clone:* group of individuals (ramets) derived originally from a single individual (ortet) by vegetative propagation, for example by cuttings, micropropagation, grafts, layers or divisions; *Clonal mixture:* a mixture of identified clones in defined proportions.



Fig. 8. Distribution of BMs across Italy of the basic materials of *Quercus ilex*. Seed source: trees within an area from which seed is collected; Stand: a delineated population of trees possessing sufficient uniformity in composition (definitions according to Council Directive 1999/105/EC and the national D. Lgs 386/ 2003)



Fig. 9. Distribution of BMs across Italy of the basic materials of *Quercus robur*. Seed source: trees within an area from which seed is collected; Stand: a delineated population of trees possessing sufficient uniformity in composition (definitions according to Council Directive 1999/105/EC and the national D. Lgs 386/ 2003)



Fig. 10 Distribution of BMs across Italy of the basic materials of *Pinus pinea*. Seed source: trees within an area from which seed is collected; Stand: a delineated population of trees possessing sufficient uniformity in composition (definitions according to Council Directive 1999/105/EC and the national D. Lgs 386/ 2003)



Fig. 11 Distribution of BMs across Italy of the basic materials of *Ostrya carpinifolia* and *Carpinus betulus*

nature, fragmentation, and lack of uniformity among regions. A recent survey on the national forest public nursery system, based on questionnaires to Regional administrations (Martini et al. 2022), revealed that Italy has 71 public nurseries dedicated to the production of certified Forest Reproductive Material (FRM), with 31 of them exclusively focusing on forest nursery stock. In 2019, these public forest nurseries produced approximately 4.1 million seedlings of certified FRM. However, this figure is likely an underestimate, as not all regions were able to provide complete information. Mariotti et al. (2023) reported that the 2023 and 2024 Ministry projections are 9.44 M and 12.6 M of seedlings, respectively.

According to Martini et al. (2022), the three most produced species vary according to local demand in the different regions (Fig. 12 and 13). Although almost half of the national production is attributed to alpine conifers, there is a diversification in FRM production that reflects the ecological variability found across the national territory.



Fig. 12 - National summary chart of the number of seedlings produced by Regions or Autonomous Provinces (classes represented by a chromatic scale) and a list of the most produced species. The reference year is 2019; Regions in gray = data not available (figure from Martini et al. 2022).

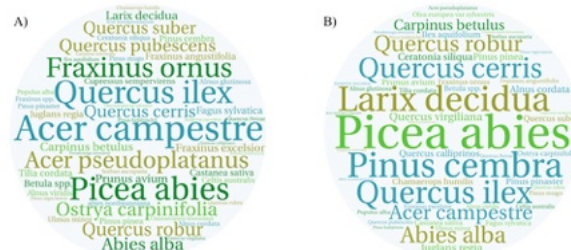


Fig. 13 - Graphical representation of the most produced tree species in 2019 in terms of (a) frequency of citation in the lists provided and (b) annual quantities produced. Character size corresponds to weight in the total; analysis derived from data provided by 14 respondents among Regions and Autonomous Provinces (figure from Martini et al. 2022).

To date, there is a general lack of computerized management of the production and sales data of FRMs, and, therefore, it is not possible to monitor the status of the supply chain with updated data. A centralized system could respond in real time to requests for materials for ongoing reforestation and forest restoration projects and connect supply and demand across regions more quickly. There is a growing urgency to rationalize this sector, as it affects the organization and planning of major projects, as well as the quality of data and analysis of the FRM market. The picture at national level is definitely fragmented from every point of view: availability of BMs, usability of available information, production capacity of FRM, rationalization, innovation of growing systems and computerization. In this scenario, there are few remarkable cases, such as Regions that are very well organized in the forest seedlings supply chain and which are inspiring models. Nevertheless, generally, the Italian forest nursery sector needs a profound revitalization in order to meet the increasing demand for target material, as emerged by the stakeholders interviews in the nursery sector.

In this context, the Alberitalia Foundation, together with the Italian Society of Silviculture and Forest Ecology (SISEF) and the National Association of Regional Forest Activities (ANARF), is currently promoting and presenting to the government and regional administrations a new manifesto as a proposal to reorganize the entire seedling supply chain. The proposal aims to improve both the quality of the FRM and the efficiency of the supply chain; at the same time, the objective is to level out the regional differences that are most responsible for the fragmentation and, in part, the lack of innovation. The main principles and contents of the manifesto for the revitalization of forest nurseries in Italy are described in Box 1.

Alberitalia Foundation has been inspired by the same principles and criteria to select the FRM for the pilot projects in Parco Italia and for all managed or established planting projects. However, the current legislative and operational framework of Italian forest nurseries requires action to define the best compromise between principles and reality.

As mentioned above, the quality of nursery seedlings is not an absolute concept, but is specifically related to the planting project, the characteristics of the site, the suitable species, the available genetic resources and the socio-economic context. Therefore, the FRM collection is an action that follows the identification of the planting sites and the definition of the local afforestation project. Therefore, we would like to report the following points describing the approach and the steps necessary to deliver the FRM to the Parco Italia pilot projects.

- Collection of information on site characteristics such as soil, climate, morphology, vegetation, site-specific environmental stresses and anthropic pressures. This phase consists of the collection of literature and thematic maps (implemented through the maps provided by the Parco Italia project) and an interview with the local project manager and the area manager (e.g. public administration, protected area managers, rangers and landowners).
- The selection of suitable species is a joint decision with the project manager and experts from the Alberitalia Foundation. Species selection takes into account not only the ecological needs and environmental constraints of the species, but also the objectives of the project (i.e. uses and ecosystem services);
- Identification of the best nursery seedling characteristics for each selected species. The most appropriate provenance is selected according to the available BM, taking into account local provenance or assisted migration where appropriate, depending on the species and project objectives.

- Seedling morphological characteristics and type of nursery management are selected to suit the site characteristics, project objectives and the role of the species/plant in the planting project. This step includes consultation of scientific and technical literature.
- Search for seedlings of the selected species with the desired characteristics in national public and private forest nurseries.

The Alberitalia Foundation's approach is fully in line with and respects the EU Guidelines for biodiversity-friendly afforestation, reforestation and tree planting³.

2.6 Findings

Findings from the WP2 research and activities with stakeholders indicate that Climate Change is a complex and inadequately understood issue, which is often not given the urgency it requires. There is a consensus among the stakeholders that political actions need significant transformation, with municipal administrations taking a more proactive role in addressing the problem. However, there is a general lack of preparedness and understanding regarding the significance of preserving our natural environment.

One prominent challenge identified during the planting campaigns is the scarcity of available areas for planting and the lack of proper coordination and technical management with the Municipalities. Stakeholders have expressed concerns about the insufficiency and occasionally counterproductive nature of collaborations between different parties. Additionally, the strict timeframes imposed by the Decreto Clima and PNRR (National Recovery and Resilience Plan) have emerged as major constraints on the successful implementation of projects. The need for more realistic timelines has been highlighted as crucial for the effective execution of these initiatives.

Bureaucratic processes associated with the Decreto Clima and PNRR have been found to hinder the efficient execution of projects. The relevant governing bodies, including regions, municipalities, and Superintendence, have been perceived as lacking adequate support or cooperation. The presence of administrators in these institutions, rather than professionals with technical expertise in forestry, has resulted in communication challenges and inadequate planning. Despite the PNRR being a national plan that demands comprehensive collaboration, the reality falls short of achieving this ideal.

To address these criticalities, the findings emphasize the necessity for collaborative efforts among all stakeholders, including political leaders, municipal administrations, and relevant technical experts. Stakeholders advocate for investments in adequate training and expertise within responsible institutions to facilitate smoother communication and effective project implementation. Furthermore, an increase in the availability of plants for the projects is seen as essential.

It was observed that many public stakeholders, including metropolitan cities, municipalities, nurseries etc., did not respond to our contacts, most likely due to the uncertainty surrounding the ongoing forestation projects and their reluctance to expose themselves in communicating difficult processes and struggles in the implementations.

3. https://environment.ec.europa.eu/publications/guidelines-biodiversity-friendly-afforestation-reforestation-and-tree-planting_en).

Salient points from the interviews - nursery sector

Regarding those directly involved in seedling production, in most cases the response of the public sector workers did not provide crucial additional information because, at the time of the interviews, they were not yet involved or in the early stages of negotiations and contracts to produce plants for PNRR or other nationally funded reforestation projects. Local tenders for such projects were generally still underway, and several nurseries were still waiting for seedling orders. Most of the stakeholders interviewed complained about the lack of long-term planning, as they were not sure whether they were adequately equipped to meet such a huge increase in demand in a relatively short period of time with national or local seed lots. Tenders for reforestation projects generally did not take into account the planning time required for a nursery to produce seedlings, which is at least two years including seed collection. The sector complained strongly about the lack of planning and precise communication; requests for seedlings arrived unannounced and many nurseries found themselves unprepared, so much so that many of the respondents were not direct suppliers but subcontractors of other nurseries who received direct orders.

Salient points from the Italy's forest nursery system and supply chain

The current state of the Italian forest nursery system is summarized in a few following points.

- The forest nursery sector in Italy is primarily managed by public administrations at the Regional scale, with limited involvement from the private sector.
- The current production of forest nursery stock is insufficient to meet the demand expected from upcoming afforestation programs. Italy urgently needs to prepare for future challenges. Although some notable cases exist, the sector as a whole requires significant revitalization to address the imminent increase in demand for target nursery material.
- The Italian nursery supply chain is fragmented in various aspects, including the availability of Basic Materials (BM), usability of information, production capacity of Forest Reproductive Material (FRM), rationalization, innovation of growing systems, and computerization.
- To address these challenges and revitalize the sector's crucial role, a new manifesto (Box 1) for its reorganization at a national level was published in July 2022 by the Alberitalia foundation in collaboration with the Italian Society of Silviculture and Forest Ecology (SISEF) and the National Association of Forest Regional Activities (ANARF).
- The manifesto's principles and criteria guide the actions to select the best FRM (i.e., seedlings) for the pilot projects of Parco Italia.
- The selection of species and seedlings for the pilot projects is a step that comes after the identification of the site and the definition of the planting project. Therefore, we have reported the main steps of the methodological approach to select suitable seedlings for Parco Italia.

Box 1

Manifesto to relaunch forest nursery activities in Italy: RI-VIVA-FOR

Global programs, European directives and national, regional and local strategies all call for the planting of trees, the creation of new forests, the care of new plants and the sustainable management of existing forests. In order to face these challenges, it is crucial to revitalize the Italian nursery sector and to promote new governance capable of fostering cooperation between regional institutions and integration between the public and private sectors. An in-depth knowledge of the nursery supply chain, the ecological and genetic definition of BM, the quality of FRM, and the care and management of plants are all part of the relaunch program for the sector. The RI-VIVA-FOR Manifesto is open to all interested parties as a reference document to raise awareness among decision-makers at national, regional and local levels as to the strategic importance of the forest nursery sector for the present and future of territories, communities and the environment.

The roadmap for the promotion of forest nurseries in Italy, according to the specific actions of the National Forest Strategy (NFS), is based on the following strategic lines:

Research and development

- To update and integrate the compendium of BM registered in the National Register.
- To improve and monitor the ecological, genetic, structural, and functional knowledge of forest stands registered in the National Register and make them accessible at National and European levels.
- To harmonize cultivation criteria and adopt the best cultivation techniques in accordance with the Ministry guidelines for planning the production and use of native species of forest interest.
- To include shrub and herbaceous species in current nursery production to promote the ecological diversification of the plants and provide a basic service for projects for the recovery and restoration of ecosystems, renaturalization, water resource management, and naturalistic engineering.
- To strengthen and expand the genetic characterization of forest stands with a view to an optimal knowledge (and use) of their genetic heritage and also for the systematization of the production of FRM.
- To define standardized methods and codified guidelines for the collection and conservation of seeds aimed at protecting biodiversity at individual, habitat, and population levels.

Governance

- To strengthen the adaptation of the national forest nursery quality assessment and certification system up to European standards and promote, within the European Commission, the revision and standardization of the forest nursery production chain.
- To harmonize information at national level and make it available in a single online platform.
- To create interregional centers for the collection and conservation of seeds

which, on the basis of the experiences of prestigious regional and provincial nurseries and with the support of the National Centers for the study and conservation of Forest Biodiversity, act in the collective interest of the protection of populations and genetic biodiversity.

- To identify planning and support measures for the control of the diffusion and commercialization of tree and shrub propagation material of native forest species.
- To set up policy briefs for each Strategic Line identified in this document in order to raise awareness among decision-makers on issues related to forest nurseries, their prospective meaning and the environmental, economic, and socio-cultural benefits that can derive from a rebirth of the sector

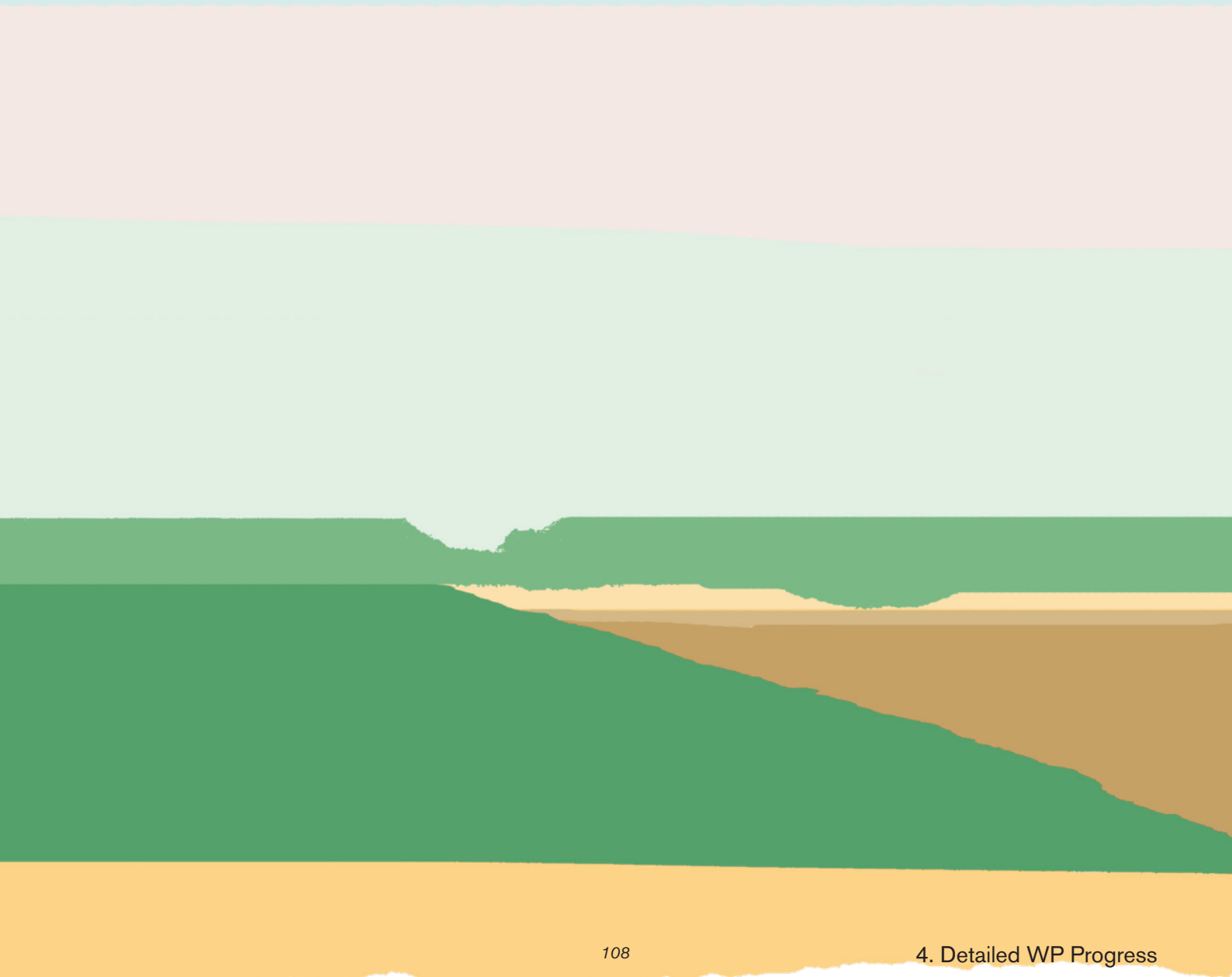
Active partnership

- To create partnership tools with the private nursery sector in order to optimize production processes.
- To consolidate areas of consultation between the public and private sectors and incentive measures for forest nurseries that include cultivation contracts and agreements.
- To spread and implement voluntary certification systems such as "Native Plant", - designed by the Veneto Region to encourage the use of forestry materials for the multiplication of native species within the regions of origin - to trace the material from the mother plant to the plantation
- To create a National Portal for the supply and availability of seeds and seedlings in order to make the supply chain more rational, efficient and able to support effective planning of planting actions.

Training and Communication

- To implement training programs for personnel and managers operating in all sections of the supply chain, involving companies from the public and private sectors.
- To create or consolidate high-level training courses in the context of university courses and programs of the second cycle of education (upper secondary schools; education and professional training courses of regional competence).
- To develop communication plans that promote greater awareness of the importance of the forest nursery sector and aim at the distribution of scientifically based and technically correct information on the various aspects concerning forest nursery production and planning, design, care, and management actions.
- To create partnership tools with the private nursery sector in order to optimize production processes.
- To consolidate areas of consultation between the public and private sectors and incentive measures for forest nurseries that include cultivation contracts and agreements.
- To distribute and encourage voluntary certification systems such as "Native Plant" - designed by Veneto Agriculture to encourage the use of forestry materials for the multiplication of native species within the regions of origin - to trace the material from the mother plant to the plantation
- To create a National Portal for the supply and availability of seeds and seedlings in order to make the supply chain more rational, efficient, and able to support effective planning of planting actions.

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3.1 Introduction

Why the guidelines?

The WP3 focused on the analysis of existing guidelines on forestry interventions (afforestation, reforestation, restoration interventions, and others) on a national and international scale, providing an important foundation for the development of the FAQs - Frequently Asked Questions - that we decided to put on the Parco Italia's website as a tool for the spreading of Parco Italia's purposes and for the engagement of stakeholders and citizens in the activities conducted until now and future activities.

This section set out to analyse a defined number of existing guidelines that can be found in Italy and across the world, set their main topics and the missing gaps, and frame the targeted audience.

Rather than targeting only professionals or technical experts (as shown by the analysis of the selected guidelines), the team finally decided to focus on the development of the FAQs, which are meant to raise awareness within a larger audience, share common knowledge for local development, create community engagement, and also generate an intersectoral/multidisciplinary network and partnerships at multiple scales.

What are the guidelines?

A guideline is a statement for determining a course of action. A guideline aims to streamline particular processes according to an established routine or good practice. The guidelines are a set of non-binding recommendations systematically developed on the basis of continuously updated and valid knowledge, drawn up with the aim of making it appropriate and with a high standard of quality, to facilitate the adoption of the desired behavior.

What are the sources for guidelines?

In recent years, tree and forest planting interventions have been largely used and integrated into the framework of Nature-based Solutions, particularly promoted by cities' administrations. Especially in urban and peri-urban contexts, there has been an abundant production of guidelines related to urban and peri-urban forestry and a constant and laborious selection and collection of best case studies at a National and International scale (i.e., See Oppla project <https://oppla.eu/>, or Urban Nature Atlas <https://una.city>). The topics covered are strictly intertwined with human beings' social and cultural values, and they are not only listing the benefits associated with trees (health and well-being, climate change mitigation, economics, food, energy security, etc.), and their relationship to other ecosystems (biodiversity, soil, and water systems, etc.), but they also identify enabling conditions, address key issues, and support planning and accompanying measures, such as

¹ The list of ten selected guidelines is the following:

1. FAO. 2016. *Guidelines on urban and peri-urban forestry*, by F. Salbitano, S. Borelli, M. Conigliaro and Y. Chen. FAO Forestry Paper No. 178. Rome, Food and Agriculture Organization of the United Nations. Retrieved on the web: <https://www.fao.org/forestry/urbanforestry/en/> <https://www.fao.org/3/i6210e/i6210e.pdf> ;
2. MITE-CSVP, *Linee guida per la gestione del Verde Urbano*. Retrieved on the web: https://www.mite.gov.it/sites/default/files/archivio/allegati/comitato%20verde%20pubblico/linee_guida_finale_25_maggio_17.pdf ;
3. ISPRA Comune di Roma, *Linee Guida di forestazione urbana sostenibile per Roma Capitale*, 2015. Retrieved on web: <https://www.isprambiente.gov.it/it/pubblicazioni/manuali-e-linee-guida/linee-guida-di-forestazione-urbana-sostenibile-per-roma-capitale> ;
4. Assessorato alla Sostenibilità Ambientale, Dipartimento Tutela Ambientale, *Linee Guida per il Regolamento del Verde e del Paesaggio di Roma Capitale*. Retrieved on the web: http://www.pubblicigiardini.it/wp-content/uploads/2017/05/Linee_Guida_per_il_Verde_Urbano.pdf ;
5. AISF - Accademia Italiana di Scienze Forestali, *Linee Guida per la realizzazione di interventi di imboscamento e forestazione nell'ambito del Parco Agricolo della Piana Fiorentina*. Retrieved on web;
6. EU, *Introducing the EU's Green City Tool*. Retrieved on the web: <https://webgate.ec.europa.eu/greencitytool/topic/nature/guidance> ;
7. Regione Emilia Romagna e Politecnico di Milano, *Rigenerare la città con la natura. Strumenti per la progettazione degli spazi pubblici tra mitigazione e adattamento ai cambiamenti climatici*. Retrieved on the web: <https://territorio.regione.emilia-romagna.it/paesaggio/pubblicazioni/rigenerare-la-citta-con-la-natura> ;
8. Soil4Life, *Linee guida volontarie per l'uso sostenibile del suolo per i professionisti dell'area tecnica*. Retrieved on the web: https://soil4life.eu/wp/wp-content/uploads/2020/09/FINAL_Soil4Life_Toolkit.pdf ;
9. World Bank, *Catalogue of Nature-Based Solutions for Urban Resilience*. Retrieved on the web: <https://openknowledge.worldbank.org/handle/10986/36507> ;
10. ASEJA, FEMP, *Guía de la infraestructura verde municipal*. Retrieved on the web: https://redbiodiversidad.es/sites/default/files/GUIA_Biodiversidad_CAPITULOS1_5.pdf

communication and awareness, community engagement and the development of alliances and partnerships.

3.2 Methodology.

We gathered, selected, and analysed ten relevant guidelines¹ from over twenty pre-selected guidelines at International, National, and Local levels. Starting from the first analysis of the twenty guidelines, we listed ten topics that were coming up as relevant and that could inform a wide range of audiences (from administrations to professionals to civic society): Mapping, Governance (including Policies and Legislation), Design and Planning (including Implementation), Promulgation, Management and Maintenance (including Risk Management), Communication, Participation, Network and Partnership, Education, and Research. These ten central themes can form the backbone of future guidelines and help define criteria for assessing existing guidelines and projects. We decided to evaluate each of the ten selected guidelines giving a score from 0 to 3 to each of the ten themes. The scoring system is the following:

- 0 - the topic is absent;
- 1 - cited or covered briefly;
- 2 - reported as a topic for reflection or to be developed, but there are no indications on how to carry out specific actions and practices are not systematically indicated;
- 3 - the topic is fully covered).

3.2.1 Assessment of existing guidelines.

Below are the graphs showing the evaluation criteria of the 10 selected guidelines. (For the sake of completeness we have reported all the evaluations of the 10 guidelines with our scoring system). See Fig 14.

We then also summarized the following information for each of the Guidelines assessed (see table 7): the audience to which each guideline is addressed, if there is a glossary or not, if there is a detailed bibliography and webliography, and if there is information on tree species and solutions. These pieces of information are relevant to understanding the level of detail of the guidelines and to whom they were addressed. Having a homogenized abacus of tree species selection and practical solutions can also be functional for cities' administrators and policymakers as they could more easily find ways to apply regulations or define actions.

Aspects to cover prior to the definition of the guidelines

From the study of the previous guidelines, prior to the definition of a guideline document, it is recommended to clarify the following aspects: a. definition of the target audience, and b. definition of topics and data to cover.

a.Target Audience

First of all, the definition of the Target Audience is essential, as it might change the tone of voice and the level of detail to add to the final product.

If the guidelines are addressed to a non-specialized audience:

- Type of language: simplified
- Definition of the guiding principles of the project



Evaluation criteria for the FAO "Guidelines on urban and peri-urban forestry" (FAO, 2016)



Evaluation criteria for the "Linee guida per la gestione del Verde Urbano". (MITE-CSVP, 2017)



Evaluation criteria for the "Linee Guida di forestazione urbana sostenibile per Roma Capitale", (ISPRA, Comune di Roma, 2015)



Evaluation criteria for the "Linee Guida per il Regolamento del Verde e del Paesaggio di Roma Capitale.", (Assessorato alla Sostenibilità Ambientale, Dipartimento Tutela Ambientale,)



Evaluation criteria for the "Linee Guida per la realizzazione di interventi di imboschimento e forestazione nell'ambito del Parco Agricolo della Piana Fiorentina.", (AISF - Accademia Italiana di Scienze Forestali, ...)



Evaluation criteria for the "EU, Introducing the EU's Green City Tool", (EU, ...)



Evaluation criteria for the "Rigenerare la città con la natura. Strumenti per la progettazione degli spazi pubblici tra mitigazione e adattamento ai cambiamenti climatici.", (Regione Emilia Romagna e Politecnico di Milano, ...)



Evaluation criteria for the "Linee guida volontarie per l'uso sostenibile del suolo per i professionisti dell'area tecnica.", (Soil4Life, ...)



Evaluation criteria for the "Catalogue of Nature-Based Solutions for Urban Resilience", (World Bank, ...)



Evaluation criteria for the "Guía de la infraestructura verde municipal.", (ASEJA, FEMP, ...)

Fig 14. Guidelines Evaluation

Guidelines	Target Audience	Glossary	Tree species selection and practical solutions
FAO - "Guidelines on urban and periurban forestry"	Administrators	Yes	No
MITE/CSVP - "Linee guida per la gestione del verde urbano"	Administrators, Scientific sector	Yes	No
ISPRA - "Linee Guida di forestazione urbana sostenibile per Roma Capitale"	Scientific sector	No	Yes
ASA, DTA ROMA - "Linee Guida per il Regolamento del Verde e del Paesaggio di Roma Capitale"	Administrators	No	No
AISF - "Linee Guida per la realizzazione di interventi di imboscamento e forestazione nell'ambito del Parco Agricolo della Piana Fiorentina"	Administrators	No	Yes
EU - "Introducing the EU's Green City Tool - Compendium"	Institution	Yes	Yes
Regione Emilia Romagna, Polimi - "Rigenerare la città con la natura. Strumenti per la progettazione degli spazi pubblici tra mitigazione e adattamento ai cambiamenti climatici."	Institutions	Yes	Yes
Soil4Life - "Linee guida volontarie per l'uso sostenibile del suolo per i professionisti dell'area tecnica"	Organization	Yes	Yes
World Bank - Catalogue of Nature-Based Solutions for Urban Resilience.	Organization	Yes	Yes
ASEJA, FEMP - "Guía de la infraestructura verde municipal"	Institution	Yes	Yes

Table 7. Guidelines assessed

- Definition of the goals: informative/ educational (awareness) or others
- May provide for the subsequent involvement of the public in the various stages of the project (not only for planting but also for care) - the target must be defined accordingly: schools, citizens, associations, private entities, small organizations, etc.;
- Direct monitoring by citizens can be provided (using online forms or apps)

If the guidelines are addressed to a specialized audience (technical or administrative):

- Type of language: technical
- Definition of the guiding principles of the project
- Definition of the goals: Governance/ policies; Design and planning; Realization and Maintenance and management, ect.;
- Definition of the phases and detailed plan for each phase to guide the planners or the administration technical representatives.

b. Topics and data collection

From an analysis of the existing guidelines, we also gathered the topics and data that the guidelines should try to cover in order to be effective and useful for both professionals and municipalities:

Preliminary Analysis, Evaluation and Design

- Define the boundaries for proper planning and design (data is needed for proper design) - Data on connectivity (closeness to natural habitats, climate/microclimate, Soil evaluation (soil compaction and permeability);
- Define the minimum requirements (i.e., site conditions, stakeholder analysis, project analysis, a list of interventions, etc.)
- Define the suitable species (list of species, definition of percentages per species, and a number of plants to be planted)
- Help identify possible nurseries that can manage and respond to the needs of the project(s)?
- Define the planting objectives and the best possible intervention for a given area. (What are the planting objectives that could be set for each type of intervention?)
- Mapping and definition of Ecosystem Services (air quality, reduction of fine particles, shading, and cooling, mitigation of rainfall, absorption of CO₂, etc)
- Strategic Environmental Assessment.
- Define the possible malfunctions and methods for managing exceptional events (Prevention)
- Define the potential impact assessment.
- Define the project realization phases (operational phases, types of installation, and execution) and the project management and subsequent care schedule.
- Define a possible economic framework (including not only analysis/ evaluation and design phases but also subsequent monitoring and care phases).

Monitoring/ Care/ Evaluation

- Define the principles for evaluating the project status.
- Define the monitoring phases and components to be evaluated (not only tree health: monitoring parasites and diseases, etc., but also biodiversity, etc.)

- Define the people involved in the tree maintenance and management methods (partnerships? Involvement of the population? Involvement of the administration?); must answer to WHO, HOW, WHEN, and defining who will manage in the long term, when and how they will be managed.
- Define the necessary type of maintenance and management methods according to the risks (to tackle issues such as fire prevention, etc.)

Communication

- Define communication phases with external parties for the involvement of interested subjects (public/private figures and entities)
- Define communication outputs and communication objectives (involvement, training, etc.)
- Activation of participatory pathways (both public/private)
- Activation of interdisciplinary training programs (addressed to technicians and professionals)
- Sharing good practices with the interested parties

Criticalities and potentialities

The missing factors and potentialities that we have pointed out from the analysis of the guidelines could be also summarized in the following considerations:

- The importance of defining macro-themes and typologies of interventions. Clarifying the macro thematic areas of a project will help to acknowledge an issue to be covered and define accordingly the types of intervention (i.e., the document produced by LIPU “Urban Greenery and Trees in Cities” first identifies emergencies and hazards and then provides criteria and guidelines for ecological design, outlining the areas of interest to be addressed, and their related types of intervention).
- Clarify the project objectives, especially for a nationwide project, is extremely relevant. For instance, it could be relevant to define the methodology by which to increase and improve the spatial continuity and ecological connectivity of various green and blue systems from the perspective of green infrastructure in Europe, as well as clarifying the possible ecological connections (in terms of area size, terms of relevance, etc.) and how these various types of interventions can actually increase connectivity between natural areas. Referring to an excerpt from the guidelines for managing urban greenery: “Identify possible ecological connections between different areas with naturalistic or agricultural value and between these and the urban context, including blue components (wetlands, rivers, etc.), providing prescriptions for mitigating gray infrastructures, productive settlements and planned transformation interventions; express operational planning, through which specific interventions for increasing/ enhancing green areas can be implemented whether they have “functional” value for humans or not.”- this factor is fundamental if one does not want to lose or dilute the concept of strengthening ecological connections at a national scale.
- Define the design criteria for planning and implementation phases. How to orient forest planning, design, implementation, and management considering the goals to be pursued for a project, but also the specific environmental framework characterizing the sites?
- Define the level of detail for the guideline. Defining the level of detail and minimum content of the guidelines is also relevant. Showing implementation

diagrams, material standards, and planting techniques that favor subsequent low-energy and low-impact maintenance could ensure the full success of the project, if the project is targeting professionals/ technicians.

- Define the economic and financing tools. Guidelines are often vague on this point, so it could be an area of investigation for future guidelines, relevant to administrations and investors.
- Define the regulations that the guideline will have to adopt and respect. Guidelines often have to deal with regional laws - but how to manage regulatory complexity?

The definition of the details listed above can help to select the right information and provide a comprehensive knowledge of the phases, issues, and data that need to be covered, particularly useful for those who are in charge of developing a guideline document. The list has been conducted through the study of the structures of the guidelines documents that have been selected and analysed. The missing factors and the potentialities are specific themes that we have seen missing from most of the guidelines and that administrations might find interesting to develop further in the future.

3.2.2 Results of the analysis of the existing Guidelines

We observed that most of the guidelines are addressed to administrations, policymakers and organizations, aiming to strengthen their vision and strategies to enhance green and blue systems and guide them toward the definition of goals and actions. Many of the guidelines we selected already include relevant information on how to implement the governance systems related to afforestation, and define technical and practical aspects related to tree planting design and planning methods (e.g., data collection prior to the design, or methods for tree species selection). The analysis that we developed, with the definition of the ten themes and the criteria for the guidelines' evaluation, shows the well-developed areas but also the gaps. Overall, the numerous guidelines on forestry and Nature-based solutions at the National level sufficiently cover most of the relevant topics.

However, we noticed a lack of information related to the methods used in mapping priority planting areas. Stakeholders' engagement strategies were also missing, as well as indications for communication strategies and education. On the other hand, after studying the websites of several afforestation and reforestation projects around the world, it appears that one of the most used tools by organizations, companies, and projects are FAQs - the frequently asked questions - most often published on websites, or on flyers/reports. The FAQs can be transversal with respect to the importance of distribution and participation, informing institutions, organizations, administrators, and citizens. The FAQs have great communication potential. Thanks to their simplified language, they can raise awareness, share common knowledge for local development, and create community engagement, but also generate an intersectoral/ multidisciplinary network and partnerships on numerous levels (International, National, Regional, and Local).

3.3 FAQs - Frequently Asked Questions.

We decided to implement FAQs as a “guidance” tool for distribution of information as well as for engagement. By drafting the FAQs, it is possible to clarify the intentions of the Parco Italia project, but also potentially implement future projects and bring a large part of civic society closer to the aims of the project through active engagement or through education. Here below, we listed the FAQs - Sections 1,2 and 3 that will be inserted into the Parco Italia website, in the FAQs page. (www.parcoitalia.it). The first two sections have been shared in the previous deliverable (April 4th).

Section 1. Questions on Italy's natural capital

- How many forests are there in Italy?
- What is the percentage of protected areas in Italy?
- How many national parks are there in Italy?
- What is silviculture?
- Why are trees and forests important?
- What are the benefits of afforestation?
- What is biodiversity?
- Why is biodiversity important? Why is biodiversity important in cities?
- How can biodiversity be improved?
- What is landscape fragmentation and how can connectivity between natural areas be achieved?
- Why is connectivity between natural areas important?

Section 2. Questions on the Parco Italia project

- How will Parco Italia achieve its goals?
- Who are the beneficiaries of the Parco Italia project?
- Who is behind the Parco Italia project?
- Who is investing in Parco Italia? What are their interests in the outcome?
- To whom is Parco Italia addressed?
- How is Parco Italia choosing the plants?
- Where do the plants come from?
- Who will be in charge of the new forests? What will happen after the planting?
- How are planted trees counted?
- How long will it take to complete the Parco Italia project?
- Why is Parco Italia also considering cities?
- How is Parco Italia dealing with the topic of land use and agricultural land?
- Are there any precedents to Parco Italia? What are the existing projects?
- How can a project like Parco Italia attract tourism?
- What is the Parco Italia project's ecological value? (Not published online)
- How can I contribute to the Parco Italia project? (Not published online)

Section 3. Questions on Design, Planning, Management and Maintenance for tree planting sites

- What are the criteria that Parco Italia is using to decide where to intervene?
- How is Parco Italia evaluating the climatic characteristics of a site?
- How is Parco Italia evaluating the soil characteristics prior to the design and planning of the intervention?
- How is Parco Italia choosing the right tree for the right place?
- How is Parco Italia designing and planning the spaces for trees in an urban context?
- How is Parco Italia designing and planning the spaces for trees in an extra-

urban context (agricultural/ hilly/ mountainous)?

- What are the Parco Italia tree modules and schemes?
- How is Parco Italia planning to diversify the tree species in an urban context?
- How is Parco Italia guaranteeing that the forest plants will be resilient to the effects of climate extremes?
- Which are the certificates and quality standards that Parco Italia requires from forest nurseries?
- How is Parco Italia designing and planning to increase the connectivity between the specific interventions and the surrounding areas?
- How is Parco Italia guaranteeing that the new forests and plants will maximize the ecosystem services and goods, and minimize disservices?
- What are the management and maintenance procedures that Parco Italia is planning to carry out to ensure that planted trees reach maturity?

Questions on Italy's natural capital



1

How many forests are there in Italy?

Italy contains around 11 million hectares of wooded areas, of which 9.1 million hectares are forests (where >10% of the soil is covered by trees), equivalent to around 35% of the national land mass. Forests represent the largest green infrastructure of the country.

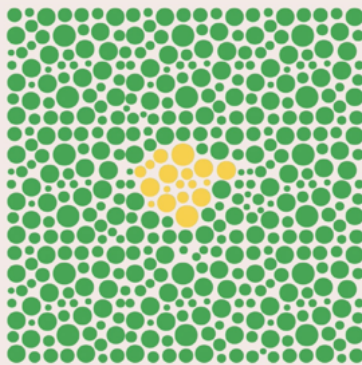
Source: RaFITALIA (2019), *Patrimonio Forestale RaFITALIA*, Maggio 2019, Direzione generale delle foreste - Mipaaf

2

What is the percentage of protected areas in Italy?

In Italy, 21.3% of the land is protected, while only 1.98% of marine waters are protected.

Source: Biodiversity Information System for Europe, EU Commission and European Environment Agency. Retrieved from: <https://biodiversity.europa.eu/countries/italy>



Protected land in Italy

3

How many national parks are there in Italy?

There are a total of 24 National Parks that cover around 1,5 million hectares of land and 71,000 of marine waters, and 871 Protected Areas, that consists of 3 million hectares of protected land areas and around 2,850,000 hectares of protected marine waters, and 658 km of protected coastline. ¹ In Italy there are 2,637 Natura 2000 sites—636 Special Protection Areas (under the Birds Directive) and 2,358 Sites of Community Importance (under the Habitat Directive). ²

Sources: 1. MASE - Ministero dell'Ambiente e della Sicurezza Energetica, *Aree protette*, retrieved on web: <https://www.mase.gov.it/aree-protette>; 2. Biodiversity Information System for Europe, EU Commission and European Environment Agency. Retrieved from: <https://biodiversity.europa.eu/countries/italy>

4

What is silviculture?

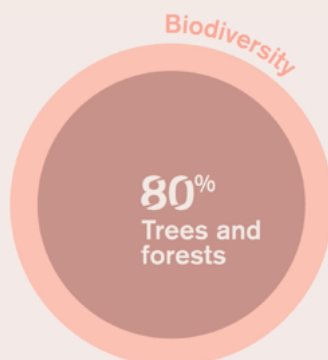
Silviculture is the science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Source: USDA Forest Service. 2004. *FSM 2400 – timber management; chapter 2470 – silvicultural practices. Amendment no. 2400-2004-6 (August 13, 2004)*. Washington, DC: USDA Forest Service, National Headquarters (WO). 51p.

5

Why are trees and forests important?

Trees and forests have inherent value as living components of the planet and habitat for 80% of land-based biodiversity, but they also provide much-needed benefits to society, such as protection from natural hazards; absorption of 30% of man-made atmospheric pollution; provision of clean and renewable materials and fuels; improvement of air, water, and soil quality; and human physical and mental wellbeing. In cities, trees are especially helpful in adaptation to climate extremes such as heat waves and intense rainfall.





6

What are the benefits of afforestation?

Increasing forest area through natural or assisted regeneration and restoring disturbed and degraded forests, and deforested lands in the long term can increase the supply of environment-regulating, productive and cultural ecosystem services provided to local and global communities, as long as the new forests are compatible with soil, climate, and biodiversity and do not harm local communities, their rights, and their current land use.

7

What is biodiversity?

The term biodiversity refers to the variety of life on Earth at all levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life. Humans and human cultural diversity are also part of biodiversity. The term “biocultural” describes the dynamic, continually evolving, and interconnected nature of people and place, and the notion that social and biological dimensions are interrelated.¹

The UN Convention on Biological Diversity defines genetic, species and ecosystem diversity.

Ecosystem diversity defines the number and abundance of habitats, populations and ecosystems within which different organisms live and evolve.

Species diversity includes species richness, measurable in terms of the number of the same species present in a given area, or species frequency, i.e. their rarity or abundance in a territory or habitat.

Genetic diversity defines the difference of genes within a given species; therefore, it corresponds to the totality of the genetic heritage to which all the organisms that populate the Earth contribute.²

Source: 1. American Museum of Natural History, What is Biodiversity?. Retrieved from: <https://www.amnh.org/research/center-for-biodiversity-conservation/what-is-biodiversity>; 2. ISPRA, What is Biodiversity, retrieved from: <https://www.isprambiente.gov.it/it/attivita/biodiversita/le-domande-piu-frequenti-sulla-biodiversita/cose-la-biodiversita>

8

Why is biodiversity important? Why is biodiversity important in cities?

Extensive scientific research shows that more diverse ecosystems have higher productivity and are more resistant and resilient to climatic stresses. The presence of more species and the relationships between species ensure that ecosystem processes run more efficiently and generate more stable benefits to society, including health protection, food and feed production, water cycle regulation, and options for economic diversification.¹

Protecting biodiversity in urban and peri-urban areas is equally important because the greater the diversity of tree species in the city, the greater the ecosystem services crucial to the health of humans and other animal and plant species. Species diversity ensures better air quality, better water quality and aquifer resources, better protection from phenomena such



as landslides and flooding, reduction in soil erosion, and minimisation of risks in extreme climate events.²

Source: 1. UNFCCC, *Why biodiversity matters*. Retrieved from: <https://unfccc.int/blog/why-biodiversity-matters>; 2. ICLEI, *10 reasons to promote urban biodiversity*. Retrieved from: <https://talkofthecities.iclei.org/10-reasons-to-promote-urban-biodiversity/#:~:text=Biodiversity%20can%20help%20improve%20air,respirat>

9

How can biodiversity be improved?

According to the UN International Panel on Biodiversity and Ecosystem Services (IPBES), nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide.¹ Reversing biodiversity loss may only be achieved through transformative changes across economic, social, political, and technological spheres. Different strategies can be applied on different scales, from the macro to the micro. At the largest scale, conservation cannot be separated from climate change mitigation, halting the destruction and pollution of ecosystems, and promoting social equity and economic justice. In the sector of land and urban planning, local to regional-scale solutions include: strengthening the connectivity between natural and semi natural areas, maintaining or improving habitats in protected and unprotected forests and woodlands, restoring degraded semi natural terrestrial areas and riverside ecosystems, promoting native species, and avoiding or opposing the spread of invasive ones. In order to achieve this aim, reforestation, afforestation, and renaturalization interventions—in association with a detailed management and maintenance plan—can be key solutions.²

Source: 1. IPBES *Global Assessment 2019, Summary for Policymakers*. Retrieved from: <https://zenodo.org/record/3553579#.ZAIRVOzMI-Q>; 2. American Museum of Natural History, *What is Biodiversity?*. Retrieved from: <https://www.amnh.org/research/center-for-biodiversity-conservation/what-is-biodiversity>

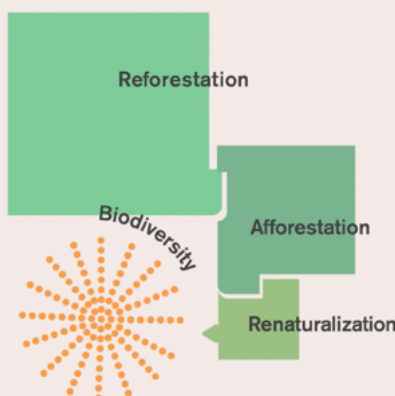


10

What is landscape fragmentation and how can connectivity between natural areas be achieved?

Landscape fragmentation is the breaking up of larger areas of the natural land cover into smaller, more isolated patches. The physical disintegration of continuous habitats can have various causes, but it is most often caused by urban or transport infrastructure expansion or environmental degradation.¹ In order to achieve connectivity between natural areas, it is important to protect, enlarge, manage, and restore natural areas and the semi-natural areas next to existing natural areas in anticipation of the future expansion of their borders and their ecological corridors (according to the EU Nature Directives).²

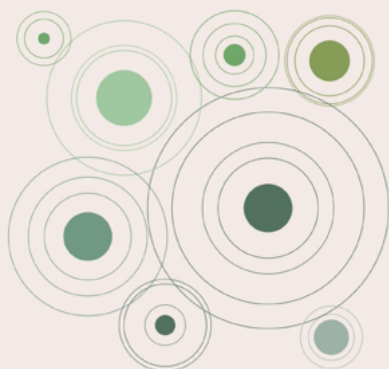
Source: 1. European Environmental Agency, *Landscape Fragmentation pressure in Europe*, June 2022. Retrieved from: <https://www.eea.europa.eu/ims/landscape-fragmentation-pressure-in-europe> ; 2. EU Commission, EEA - European Environment Agency, *Biodiversity Information System for Europe, Connectivity*. Retrieved from: <https://biodiversity.europa.eu/protected-areas/connectivity>



Why is connectivity between natural areas important?

Identifying, maintaining, and enhancing landscape connectivity—the degree to which the landscape facilitates the movement of individuals and species—is an important conservation tool that can reduce the negative effects of habitat loss and fragmentation. Connectivity has been shown to increase the movement of individuals, which contributes to dispersal, migration, and gene flow; promotes population recolonisation or establishment in unoccupied areas; and favours circulation and selection of genotypes better adapted to environmental challenges.¹ This has a wide range of environmental implications, especially for animal and plant species that inhabit and move in the territory.²

Source: 1. Zeller K.A., Lewison R., Fletcher R.J., Tulbure M.G., Jennings M.K. (2020), *Understanding the importance of dynamic landscape connectivity*. *Land* 9: 303. <https://doi.org/10.3390/land9090303> ; 2. European Environmental Agency, *Landscape Fragmentation pressure in Europe*, June 2022. Retrieved from: <https://www.eea.europa.eu/ims/landscape-fragmentation-pressure-in-europe>



Questions on the Parco Italia Project

1

How will Parco Italia achieve its goals?

In order to create new ecological corridors and strengthen existing ones, it is of fundamental importance to be able to plan and correctly manage forests and woods with a view to risk prevention, to protect new and existing forests and their ecosystems from natural disturbances* and climate extremes. Parco Italia carefully selects the right tree species for the right place, increasing biodiversity through strict and rigorous selection. Parco Italia is identifying areas with high potential (high-diversity landscape features), as well as areas that show high fragmentation and where intervention is urgent. Altogether Parco Italia is identifying those areas that have the potential to become ecological corridors or future designated protected areas (following the Directives of the EU Biodiversity Strategy 2030). To achieve its goals, Parco Italia involves a network of stakeholders across numerous sectors and levels, from public figures to tree nurseries, private companies, businesses, and organisations. Parco Italia wants to overcome individual profits and interests to create a shared vision for the future of biodiversity conservation in Italy.

** In ecology, a “disturbance” is defined as any event that causes a temporary change in environmental conditions that leads to a drastic change in the conditions of an ecosystem. Disturbances can include, for example: fires, parasitic infestations, hurricanes, droughts, floods, gusts of wind, landslides, and volcanic eruptions.¹ Climate-driven disturbances in forests, such as fires, windstorms, and pests (e.g. insects), are expected to rise drastically with global warming.² Nevertheless, to a certain extent natural disturbances are essential ecological processes, necessary at some level of intensity and periodicity for the long-term sustainability and productivity of most, if not all, ecosystems.³*



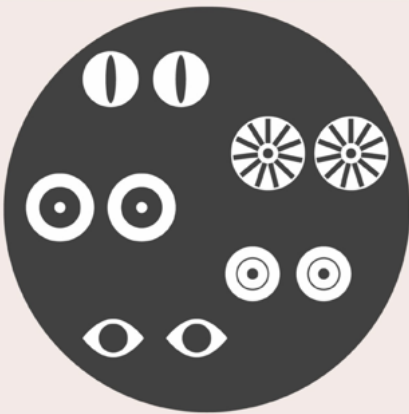
Sources: 1. Aldo Leopold Wilderness Research Institute, *Disturbances*. Retrieved from: <https://leopold.wilderness.net/our-science/research-agenda/environmental-change/natural-disturbances.php#:~:text=Natural%20disturbances%20include%20fires%2C%20insect,are%20fire%20and%20insect%20outbreaks.> ; 2. Forzieri G., Girardello M., Ceccherini G., Mauri A., Spinoni J., Beck P., Feyen L. and Cescatti A. *Vulnerability of European forests to natural disturbances*, EUR 29992 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-13884-6, doi:10.2760/736558, JRC118512. 3. Averill, Robert D.; Larson, Louise; Saveland, Jim; Wargo, Philip; Williams, Jerry; Bellinger, Melvin. 1994. *Disturbance processes and ecosystem management*. Washington, DC: U.S. Department of Agriculture, Forest Service. 19 p.



14

Who are the beneficiaries of the Parco Italia project?

The goal of Parco Italia is to improve the forest area and increase the environmental benefits of Italian territories by working on ecosystems that generate the most biodiversity, namely forests. All interventions are designed as part of a broader vision considering ecosystem services, climate mitigation and climate adaptation, and ecological connectivity over the entire national territory and beyond. The project's beneficiaries are those who will receive or use, directly or indirectly, the ecosystem services generated by the afforestation interventions on the Italian territory. Everyone can benefit from Parco Italia, and contribute to making Parco Italia a feasible project, starting with the places that need the most care.



16

Who is behind the Parco Italia project?

The project was conceived by Stefano Boeri, developed with the AlberItalia Foundation, and initiated thanks to the support of Amazon. Parco Italia was first discussed at the "World Forum on Urban Forests 2019 - Milano Calling," and it is continuously nurtured by collaborative transdisciplinary discourse between foresters, agronomists, urban planners, architects and researchers. In particular, the partnership between Stefano Boeri Architetti and AlberItalia represents the scientific foundation of the project.

Stefano Boeri Architetti ranges from designing urban visions to architecture, with a constant focus on the geopolitical and environmental implications of urban phenomena. The Research Department of Stefano Boeri Architetti works mainly on strategic urban planning projects, with a focus on sustainability, climate change resilience, urban forestry and nature-based solutions strategies, providing a scientific background to the various projects of the firm.

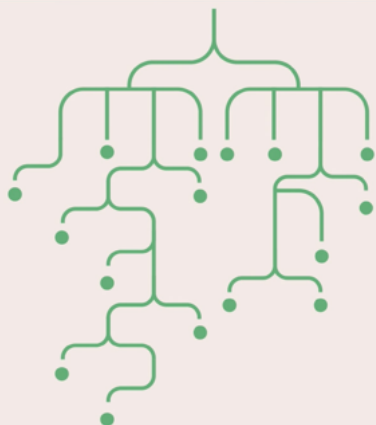
AlberItalia is a foundation whose main purpose is to tackle and mitigate the effects of anthropogenic climate change using nature-based solutions and providing civic and community services. AlberItalia is focusing on the following interventions: interventions and services aimed at safeguarding and improving environmental conditions and the rational use of natural resources, and interventions for the protection and enhancement of cultural heritage and the landscape, and scientific research of particular social interest.

17

Who is investing in Parco Italia? What are their interests in the outcome?

Amazon is funding the research and implementation project of Parco Italia for three years. Amazon has announced a €20 million allocation for nature-based solutions to improve environmental conditions in its communities across Europe, as part of its \$100 million Right Now Climate Fund, which aims to support nature-based projects across Europe working to enhance biodiversity and conserve, restore and improve nature in communities. The Parco Italia programme will receive €2 million, which will support the strategic planning of the programme and initial tree planting. As a first objective, Parco Italia aims to plant 70,000 trees as part of a reforestation, afforestation, and rewilding program led by the Fondazione AlberItalia and Stefano Boeri Architetti. The project will also help cities, whether metropolitan areas, mid-sized, or small cities, become more climate-change resilient, improving their air quality and urban cooling while promoting the connectivity between natural and semi-natural areas to enhance biodiversity within them and working on future ecological connections.

Source: Amazon. Retrieved from: <https://www.aboutamazon.co.uk/news/sustainability/amazon-invests-in-nature-based-solutions-to-tackle-climate-change-across-europe>



18

To whom is Parco Italia addressed?

Parco Italia is addressed to anyone interested in the protection and well-being of natural areas in Italy and those who care about the ecosystems that depend on forests for survival. Therefore, Parco Italia addresses citizens in order to bring the project to completion, but it is also addressed to all the already existing organisations willing to create a network of shared effort. The project, in order to be feasible, requires the support of all those stakeholders that see forest restoration and rewilding as tangible assets, as well as tools to tackle and limit the effects of climate change, particularly in at-risk territories. Finally, Parco Italia is addressed to all the associations, institutions, and research entities that can implement and complete the vision in the coming years.



19

How is Parco Italia choosing the plants?

The guiding criterion for selecting the trees to be planted is inspired by a very simple principle: the right tree must be planted in the right place.

The first aspect behind plant selection is the ecological compatibility of the species with the site and the availability of trees having a clear and certified origin in plant nurseries. A second fundamental step in choosing the right plants and the right site preparation processes to facilitate the establishment and growth of trees is the careful evaluation of the climatic characteristics of the planting site.

The third step in deciding which tree and shrub species are most suitable for the location is to acquire a robust knowledge of the soil characteristics of the site. To obtain the first indications, it is very useful to observe the surrounding area to determine which types of trees are already present, which are



developing well, and which are absent.

The aspects to consider for the selection of the most suitable species can be grouped into the following four categories: Suitability of the trees to the site: the type of area (e.g., urban, peri-urban, extra-urban), the type of planting (e.g., tree rows, peri-urban forest), the characteristics of the soil, the type of climate and microclimate, the space available with respect to buildings, road infrastructures, and other plant formations already present on site, the ecological requirements and resistance to disturbances.

Expected ecosystem services, including, for example, temperature regulation, mitigation and regulation of the microclimate, improvement in aesthetics, shading, ability to fix carbon dioxide, relationship with other individuals/populations of organisms (e.g., birds, insects).

Potential disservices. Some species, in addition to the benefits, could generate problems for the human community, such as, for example, a high production of pollen that can cause allergies, the production of fruits incompatible with the management of the destination area, roots lifting, and breaking the cover of sidewalks or the road surface, and production of unpleasant smells.

Resilience to climate change. In some contexts, choose species that, for example, are more tolerant of drought than others or resistant to frost, temporary flooding, high air temperatures, parasites, or other diseases may prove of primary importance.

The characteristics detected during the analysis of the planting site will guide the selection of the species suitable for that specific area. The range of species identified will then be further reduced according to the ability of each species to provide the expected benefits until reaching the species that best meet the site's needs.



20

Where do the plants come from?

After choosing the plant species to be used in relation to the location and characteristics of the planting site, we proceed with verifying the availability of native plants in high quality standard public or private nurseries, possibly near the planting area. Nurseries must comply with environmental and cultivation criteria of nursery production (according to EU regulation Dir. 105/2003) and be able to provide all the certification elements required by Italian law. The network of forest nurseries that have established relationships with the AlberItalia Foundation is of great support. As part of the certification of propagation material, information on the origin of the forest seeds used for cultivation is included in order to combine the ecological needs of planting sites with the adaptive characteristics developed by local tree populations.

21

Who will be in charge of the new forests? What will happen after the planting?

Before sowing the first seed or planting the first plant, we ask both ourselves and the owners (public or private) a series of questions whose answers inform us of the degree of attention and care needed for the new forest that will grow: Who will take care of this tree or this forest? What steps will be needed to ensure it stays healthy, and what needs to be done at the end of its life cycle? How much time and resources must be put in place to take care of it responsibly “from cradle to grave”?

Each planting intervention also provides for the definition of criteria and times for maintenance and management and detailed planning of these interventions for the first few years following the creation of the new forest. Within the agreement or contract between the AlberItalia Foundation and the owner and/or manager of the new forest facility, specific clauses are inserted that define the management plan, the actual responsibility for the care of the wood/forest that will develop, and the main criteria for care and maintenance.



22

How are planted trees counted?

The foremost indicator of planting success is the survival of planted trees, without which expected ecosystem services cannot be delivered. Tree plantations usually experience some mortality in the first years due to transplant damage, failure of root establishment, and unexpected disturbances such as drought or herbivory. We expect fewer than 5% of planted trees to die in the first three years. We will conduct field visits every six months to check tree health and survival status. Every tree will be geotagged and permanently recorded for long-term monitoring, including by citizen science approaches (mobile app). All seedlings that die within the first three years of monitoring will be replaced.



23

How long will it take to complete the Parco Italia project?

The ambition of Parco Italia lies in building a long-term vision that imagines planting a tree for each citizen of the 15 Italian metropolitan areas: 22 million trees planted by 2040.

The Parco Italia research and implementation phases have a total duration of three years and started in September 2021. The implementation phase of the Parco Italia project will commence with planting 70,000 trees and shrubs on selected sites in the territory, which the AlberItalia Foundation together with Stefano Boeri Architetti will complete by September 2024. Also significant for the project is the construction of a roadmap that outlines the governance and, at the same time, lays the quality standards, the foundations and defines the tools for the success of the interventions, and the project, in the years to come.



24 Why is Parco Italia also considering cities?

Italy can be considered a constellation of small towns, villages, and urban areas. The inhabited centres spread throughout the country could become focal points or nodes of a vast green infrastructure connected to the Apennine ridge and the Alpine system that runs down the entire peninsula. Only through the active involvement of metropolitan areas along with small and medium-sized cities will it be possible to create powerful new alliances, leading to new value chains, greener cities, and collective action against the effects of global warming. Urban areas, as well as the small villages of the inner areas*, could become centres for monitoring and managing natural and forest resources as well as natural parks and hydrological networks. Such widespread “outposts” throughout the territory would allow the monitoring and sustainable management of forests and enhancement of their capacity to mitigate the risks of natural disasters and climate change while also creating space for a circular economy based on the ecosystem services of the territory.

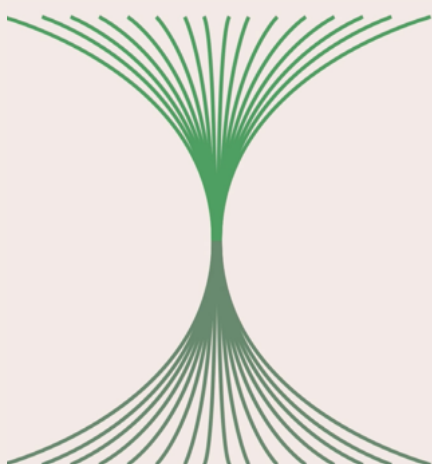


** Italy's Inner Areas are rural areas characterized by their distance from the main service centres (education, health, and mobility). According to the latest census, Inner Areas make up 53% of Italian municipalities, covering 60% of the national territory, and are home to 23% of the Italian population.¹*

Fonte: 1. SNAI - Strategia Nazionale Aree Interne. Retrieved from: <https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/>

25 Are there any precedents to Parco Italia? What are the existing projects?

Worldwide projects such as the World Park proposed by landscape architect Richard Weller, the environmentalist vision of The Half-Earth by biologist Edward O. Wilson, and continental-scale projects such as the Pan-European Ecological Network (PEEN) in Europe and the Great Green Wall in Africa have deeply inspired the vision of the Parco Italia project. Weller's World Park project stems from studying areas considered biodiversity hotspots, protected areas in over 230 countries, and overlapping routes that intersect UNESCO heritage sites, intertwining biodiversity conservation, slow mobility routes, and protection of natural areas. Weller's vision arises from the interpretive observation of the land reported in other studies conducted by international and prominent organizations such as the United Nations Convention on Biological Diversity (CBD) and the PEEN. The latter, in turn, was developed as a guide for a coherent vision of biodiversity conservation in Europe, resulting in the production of maps created by comparing and combining various national databases. Parco Italia fits into this global and continental context to provide a comprehensive representation of the natural capital and work on the unexplored potential for connectivity in Italy.





26

How is Parco Italia dealing with the topic of land use and agricultural land?

Parco Italia will take care of soil management both directly by adopting solutions that lead to dynamic development of the soil in order to favor the natural evolution of favourable physical, structural, chemical, and biological soil characteristics and indirectly by decreasing soil sealing potential and the degradation and depletion of soils. The theme of agricultural soils is tackled not necessarily in a transformative way (and therefore with their conversion into forest areas) as through the implementation of projects that can encourage the introduction of trees in agricultural contexts (for example, through agroforestry or formations of rows of trees and hedges) and food forests and the diversification of agro-ecosystems toward conditions of greater systemic sustainability and improvement of biodiversity. These interventions are also oriented toward the integrated enhancement of agricultural and agroforestry landscapes in urban, peri-urban, and rural environments.

27

How can a project like Parco Italia attract tourism?

“Biodiversity hikes,” or natural hiking and cycling paths in Italy, both existing ones (like those of the CAI—the Italian Alpine Club) and potential ones, if organised into a network, can provide support for the protection and growth of forest ecosystems, as well as strengthen weighted growth in areas that could represent future centres of development through the creation of new jobs related to ecotourism. With the establishment of new and systematised existing “biodiversity paths”—in parallel with the expansion of buffer zones around national parks and the inclusion of natural and semi-natural areas among protected areas— tourism and slow tourism can be revitalised. In this process, the small towns and villages that are affected by these paths have the potential to become central nodes of areas with high tourist development prospects. Alongside this potential economic driving force created by the protection of new areas, small towns and villages will need to meet the challenge of providing excellent regional and local services, which would allow the maintenance and coexistence of large segments of the population, including both older and younger generations.



The following two questions won't be published online:

What is the Parco Italia project's ecological value?

The overall ecological value of Parco Italia is to set, and start, a long term programme of ecological connectivity improvement at country scale. The research phase is very oriented to highlight the strengths and weaknesses, criticalities and potentialities of the current ecological system of the Italian natural capital. The programme of implementation is based on the above mentioned knowledge facing the socio-ecological conditions, opportunities, and constraints of the Italian territories. The short term value is given by fulfilling the expectations determined by Parco Italia environmental objectives, i.e.: first 70,000 trees that will be planted: at least 70 hectares of new forests created; effective canopy cover in plantation areas >5% in the first three years and >20% after year 10;1 6 tons of CO₂ sequestered per hectare in the first 10 years, and 11–15 tons of CO₂ per hectare removed annually after 10 years;2 15 kg PM₁₀ removed annually by each hectare of the forest after 10 years;3 0.5–2.0°C cooling on average across the year within 100 m from the forest edge relative to nonforested areas after 10 years.4

Source: 1. Own hypothesis (20% is the minimum threshold for forest land use, D.Lgs. 34/2018); 2. Magnani et al. 2005, <https://doi.org/10.3832/efor0320-0020333>, Fig. 7: range of overall CO₂ sequestration modeled for mixed hardwood afforestation in the Po Plains, age 0-30; 3. Bottalico et al., 2016. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S2210784316300997>, Table 2: removal of PM₁₀ in deciduous broadleaf urban afforestation in Italian cities is 15.2 kg per hectare; 4. Abdi et al., 2020. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S221067072030072X>

How can I contribute to the Parco Italia project?

The contribution to Parco Italia project can be addressed according to three lines: 1. spreading the word and sharing the project; 2. contributing directly by reporting: a. potential land to be planted or restored; b. sound initiatives fitting with the goals of Parco Italia; c. specific local needs in socio-ecological terms to be included in the incremental steps of the project; 3. asking to be involved in implementation and management activities. We value your support in promoting and sharing the Parco Italia project and inspiring more people to get involved. Please let us know if you are interested in participating in the project; describe who you are, your role and sector, and how you would like to be involved. We will be happy to get back to you shortly.

Questions on Design, Planning, Management and Maintenance for tree planting sites

1

What are the criteria that Parco Italia is using to decide where to intervene?

Italy is covered by forests on almost 40% of its territory. Potentially, another 30% of the land is available to host forests. Not all this land is available, e.g. for concurrent land use (agricultural, urban), but still the choice of the best areas for new tree and forest planting can be a daunting task. Parco Italia chooses available locations using the following criteria:

1. Priorities for ecological connectivity in rural areas, and for the provision of regulatory ecosystem services in urban areas. The Parco Italia team is using a set of 10 criteria to quantify environmental challenges that forest plantations may contribute to address, both in cities (focused on services such as air temperature cooling, mitigation of air pollution, and recreational potential) and in semi-natural areas (focused e.g., on improving ecological connectivity, mitigating hydrogeologic hazards, or restoring riparian corridors). For every location in Italy, each criterion has been quantified and scored, with the sum of all scores providing a first indicator of the places with the most urgent needs for tree planting. The scoring system can be used both at a regional scale by policymakers and national planners, and at the local scale to decide the actual best location for each project - provided that an additional assessment of environmental conditions favorable to tree growth is carried out at any potential planting site.

2. The feasibility of tree plantation projects also takes into account social, economic, legislative, or stakeholder-related constraints. For example, public land is prioritized over private lots, while the absence of actually available land (due to non-favorable stakeholder preferences), the existence of normative limitations (e.g., in protected areas), or high costs of collateral operations (e.g. desealing of soil, protection from herbivores, pollution remediation, or buying land rights) may exclude potentially suitable areas from the projects.

3. Finally, a bottom-up approach is used to complete the top-down assessment, by taking into account and trying to reconcile the needs and preferences of all local stakeholders - for example, in terms of recreation, traditional uses, and cultural significance of the landscape, coexistence with agricultural or other economic activities, or other.

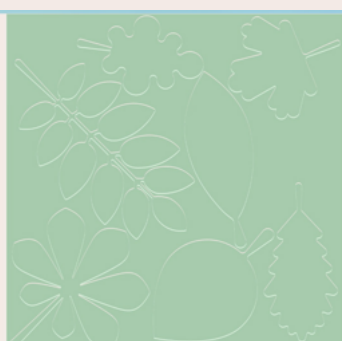


2

How is Parco Italia evaluating the climatic characteristics of a site?

Parco Italia conducts a careful assessment of the climatic characteristics of the planting site before tree planting. Investigating the macroclimate is in fact very useful for better selecting the tree species to be used. For example, tree species that suffer from prolonged water shortages will not be suitable for sites where there is (or will be) a recurrence of droughts - a phenomenon that has particularly strengthened in Northern Italy in recent years. Likewise, trees that suffer from late frosts will not adapt well to low-lying sites and cities subject to atmospheric inversion, where it is easier for these conditions to occur. Parco Italia therefore conducts an accurate analysis of the temperature, precipitation, wind, and moisture at each plantation site, considering both average and extreme values in current climatologies and under future scenarios of climate change. Future climate projections until 2050 have been extrapolated from downscaled regional climate models, such as COSMO-CLM maintained by the Euro-Mediterranean Center for Climate Change or Euro-CORDEX, considering both a moderate (RCP2.6) and an intense warming (RCP4.5), and accessed via publicly available web portals such as Climate4Impact¹ or Climate Explorer².

Source: 1. Climate4Impact. Retrieved from: <https://www.climate4impact.eu/c4i-frontend/> ; 2. Climate Explorer. Retrieved from: <https://climexp.knmi.nl>



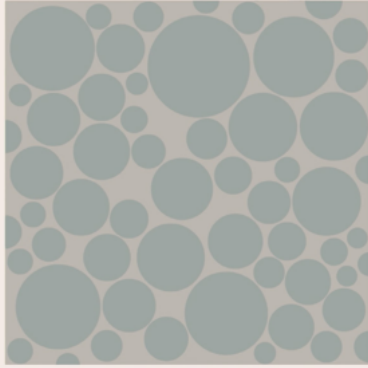
3

How is Parco Italia evaluating the soil characteristics prior to the design and planning of the intervention?

When planting a tree, and especially when implementing reforestation, it is necessary to ensure that the conditions are suitable to meet the ecophysiological needs of the trees that will eventually develop into a forest. This entails conducting a thorough assessment of the soil characteristics. The soil component is crucial for fulfilling the tree's physiological requirements, including sufficient water and nutrient availability, adequate root system aeration, soil penetrability (avoiding excessive compaction), and appropriate sunlight levels for the species (e.g., accommodating heavily shaded sites for heliophilous species).

Before making any design decisions, it is crucial to perform an analytical description of the soil. The Guidelines for Soil Description by FAO (2006) can be followed for this purpose. In the case of forest plantations carried out or planned within the Parco Italia project, comprehensive soil descriptions and analyses were conducted only in the presence or presumption of soil issues and dysfunctions. Instead, designers were advised to perform a self-assessment of soil characteristics using simple tools, following the "Soil self-assessment Manual" developed in 2018 by Giuseppe Celano and collaborators within the LIFE CarbOnFarm project ².

Soil preparation activities should be appropriate for the type of nursery trees being used, taking into account the characteristics of their root systems (bare root, clod, container)



and the size of the plants. A simple activity could involve ensuring that the hole prepared for planting is large enough to accommodate the tree's roots, with some surrounding space (maximum 15-20 cm) to be filled with a substrate that meets the nutritional needs of the trees and shrubs to be planted. This operation will facilitate the initial development of small, fine fibrous roots, which are crucial for root establishment. Regardless of the type of pedological analysis requested by professional forest designers, the pre-planting phase of the Parco Italia project always requires a textural speed assessment of the soils. This assessment helps estimate the clayey, silty, and sandy percentage of the soils in which the trees will be planted. When the soil has a significant clay component, the preparation process, in addition to digging an appropriately sized hole, may involve making incisions (or scarifications) on the sides of the pit (but not at the base). This facilitates exploration of the surrounding soil by young roots and prevents them from solely exploring the pit without being able to extend beyond it.

Sources: 1. FAO, 2006. *Guidelines for soil description*. FAO, Rome. Retrieved on the web: <https://www.fao.org/3/a0541e/a0541e.pdf> ; 2. LIFE, CarbOnFarm project. Retrieved on web: https://www.mase.gov.it/sites/default/files/archivio/allegati/life/LifeCarbOnFarm_Manuale_autovalutazione_suolo.pdf

4 How is Parco Italia choosing the right tree for the right place?

There are more than 73,000 tree species in the world. The choice of species is crucial for the success of afforestation projects; their effectiveness in performing the functions for which they are designed depends mainly on the ecological characteristics of the species. A wrong choice can generate problems ranging from not achieving the initial objectives, to the failure of the intervention, high costs of management and maintenance, or even ecosystem disservices.

In the selection of species to be planted in afforestation projects in semi-natural environments, native species must be preferred; on the other hand, projects in urban and peri-urban areas might enlarge the pool of species to choose from also including non-native trees, provided they have a low invasive potential and their use does not suffer from legislative (e.g., black lists) or other limitations.

The main aspects to be considered in the choice of species are:

- Adaptability to current and future expected climate, both mean and extreme
- Growth rate, which is important in particular for the capture of CO₂
- Resistance to water stress
- Resistance to pollution and soil compaction, if in urban settings
- Root architecture (especially important for interventions next to roads)
- Size and architecture of crown and leaves (height,



shape of the crown)

- Persistence of the leaves (deciduous versus evergreen), a feature of particular interest in relation to the mitigation of air pollution, winter runoff, and noise
- Characteristics of flowering and fruiting, important to increase biodiversity, but also for safety and recreation uses (for example in the case of tree lined roads)
- Quality of wood and non-wood forest products, in case of plantations with a positive economic outcome
- Resistance of the wood fiber and the propensity to breakage (both branches of the whole plant) or uprooting
- Resistance to pathogens and plant parasites
- Toxicity (leaves, fruits, sap)
- Intensity of required maintenance (for example species with particular needs for water resources), which affects the costs of management
- Longevity, especially in urban areas where the stressors may increase the rate of mortality of individuals
- Aesthetic value

5

How is Parco Italia designing and planning the spaces for trees in an urban context?

Planning and design processes should turn a “space” into a “place”: designing new urban forests in the Parco Italia project assumes this statement as a guiding criterion. The Parco Italia team conceives design as the art of creating sustainable living places that are good for both people and nature. A good urban forest or other green space and ecological connection will create a sense of well-being in a community and respond to its needs and demands while enhancing the sustainability and environmental quality of the space.

Forest design is not restricted to the creation of new forests: it may also involve the redesign of existing forests; interventions aimed at improving existing green spaces to provide new services and facilities and enhance their sustainability; and even the rethinking and redesign of the wider urban landscape. By rethinking urban design, architecture, transport and planning, it is possible to turn cities and urban landscapes into “urban ecosystems” that, among other things, contribute to climate change mitigation and adaptation.

The effective planning and design of spaces in Parco Italia forest plantations involves creating synergies among the social, biological and physical aspects of urban forests. Green spaces will attract local people most effectively when they are integrated with the wider urban landscape. Each green space, therefore, should be an integrated part of a city's green infrastructure, providing, in combination, a range of environments and experiences for the community and a complementary setting for its built elements. The design of quiet, safe, clean and green urban spaces can greatly improve the quality of life of a city's citizens.

Designing forest plantations: what and how?



All urban forest design processes start with the identification of suitable spaces. The concept of the right place for the right forest is essential in Parco Italia's planning and design issues. We select spaces that are highly significant for the community and the environment. A multi-stakeholders engagement approach is key to a successful design. The community should be consulted during the design and planning of urban forests so that they fully reflect people's needs, requirements and demands; the design process should be sufficiently flexible to accommodate the outcomes of the consultation process. It is also crucial to ensure that any new forest design implemented along the Parco Italia project (FAO, 2016):

- promotes the social well-being of users by meeting the needs of the community;
- is compatible with the specific ecological characteristics of the site;
- creates places in which trees can thrive and deliver their full range of benefits without causing a nuisance;
- helps meet the SDGs for multiple ecosystem services, and healthy ecosystems.

The character of urban forest design.

The right tree in the right place is a simple but effective rule for any urban forest design as well as the right place for the right forest. A healthy forest plantation begins with a clear understanding of the environmental (e.g., climate, soil, biology and ecology), infrastructural (e.g. relationships with natural and artificial infrastructure), and sociocultural (e.g., community preferences, perceptions, needs and attitudes) characteristics of the site.

Designing urban forests and other green spaces requires injecting technical knowledge and skills (e.g., in applied ecology, landscape architecture, sociology and economics) into a creative process in which the main objects of design are living organisms that change over time. The creative process translates urban forest planning into reality and lays the groundwork for sustainable management over the long term. In the Parco Italia experience, planning and design are closely linked to adaptive management:

- Planning for the long-term maintenance of urban forests. Time is a crucial aspect of planning. Urban plans generally span several years, but trees (and forests) may live for centuries. Integrating urban forests in city planning requires the adoption of a long-term perspective on their management, maintenance and conservation (FAO, 2016).
- Taking an adaptive management approach to urban forest resources. Until recently, urban planning was mostly carried out in a top-down manner, leading to the development of rigid documents and norms. As a result, the actual application of plans required continuous exceptions, causing delays in implementation and creating conflicts. An adaptive management approach, including regular monitoring and evaluation, will ensure

that urban plans respond rapidly and appropriately to the evolving needs of urban communities (FAO, 2016)¹.

Designing for Biodiversity conservation and improvement

- Include biodiversity conservation as a key objective in urban forest planning and forest care programs and incorporate landscape ecology approaches in the planning and management of urban forests and other green infrastructure.
- In designing a city's green infrastructure, take into account the role of urban forests as biodiversity hotspots, as buffer zones protecting natural ecosystems (especially in peri-urban areas) from disruptive external influences and threats, and as green corridors increasing the connectivity and functionality of the green infrastructure.
- Promote the planting of endangered native species, including those that provide habitats for birds and other local native species, and aim to create highly diverse forests.
- Collect seeds from locally grown native plants and use these as a basis for local ecosystem restoration initiatives.
- Implement strategies aimed at eradicating non-native invasive plant and animal species or, where eradication is not feasible, minimizing the adverse impacts of such species.

Designing for Health and wellbeing

- Adopt design styles of urban forests encouraging physical activities and improving mental health.
- Optimize the availability, accessibility, proximity, permeability and security of forests to promote the use of such resources by all citizens.
- Forest plantations must meet the need to maximize thermal comfort, pollution removal, and noise reduction.
- Develop plantations along itineraries, greenways, and open spaces to increase alternative mobility (e.g. bicycles) as a way of promoting physical and mental health and reducing pollution.

Designing for mitigating climate change effects

- Ensure that carbon sequestration and climate-change mitigation and adaptation are adequately considered in urban forest cost–benefit analyses as part of the planning design process.
- Adjust urban forest management plans and other planning tools to accommodate climate change adaptation and mitigation measures and incorporate the knowledge gained through assessments of climate-change vulnerability, risks, and mitigation options.
- Actively manage forest plantations to ensure structural heterogeneity and a range of age classes through diversified silvicultural interventions. Promote a diversity of native species to create multilayered canopies that

can increase the carbon sequestration capacity of urban forests.

- Consider the likely impacts of climate change on tree and forest growth when determining sites and selecting species for the establishment of urban forests.

Designing for risk management

- Select wind-resistant tree species for planting and optimize planting design, taking into account dominant winds.
- Develop an early-warning system for detecting forest fires, and design adequate forest fire prevention and response mechanisms.
- Adaptive management: Correct hazardous tree defects such as decayed wood, cracks, problem roots, weak branch unions, cankers, poor tree architecture, and dead trees, tops, and branches.
- Prioritize identified tree-related risks and initiate timely corrective treatment.
- Proactively transfer risk, for example by purchasing insurance.

Design for preventing land degradation and soil erosion

- Retain native trees and vegetation to increase land and soil protection, especially in peri-urban areas.
- Develop greenbelts to protect peri-urban and urban soils from winds and adverse climatic events, especially in arid and semi-arid environments.
- Maintain natural vegetation cover to limit environmental damage and soil degradation in construction and urban development interventions.

Addressing land restoration and soil remediation

- Assess and monitor the extent and severity of land and soil degradation processes such as desertification, salinization, compaction, contamination and erosion in urban and peri-urban environments.
- Assess opportunities for forest or tree-based landscape restoration interventions in degraded urban and peri-urban degraded lands.
- Select the most suitable species for a given site and implement UPF interventions to restore degraded land in urban and peri-urban areas.
- Strip, stockpile, conserve and re-use existing topsoil on-site in urban and peri-urban developments.
- Focus interventions on depleted peri-urban forest areas (afforestation); impoverished peri-urban rural lands (agroforestry); degraded and eroded peri-urban slopes (afforestation/tree planting); contaminated urban and peri-urban soils (selected trees/vegetation planting); and urban and peri-urban brownfields (trees/vegetation planting).

Forest plantations for water supply and water quality, and to reduce flooding

- Use proactive planning approaches to reduce soil erosion and control sediment flows. For example, consider the effects of upstream urban and agricultural developments on the flow of water and sediments into reservoirs, irrigation systems, floodplains and urban areas.
- Conduct field assessments of existing forests in watersheds, including forest fragments and protected and unprotected forests, and identify potential restoration opportunities.
- Adopt adaptive silvicultural approaches aimed at maintaining and improving water quality, especially for drinking.
- Establish riparian forest buffer zones to protect streams, lakes and other wetlands from disturbances and encroachment.
- Use innovative tree-based approaches (such as the use of tree/shrub species with dense, evergreen foliage, cluster planting, microforest interventions, and multilayered dense planting schemes), to help reduce water loss, improve water quality, and recycle wastewater in urban and peri-urban environments.
- Assess as part of the planning and design process flooding and stormwater runoff (e.g., the frequency, volume, and damage caused) in urban and peri-urban areas and design monitoring programs for future adaptive management.
- Increase the percentage of permeable surfaces and tree cover, especially in urban areas most affected by flooding and stormwater runoff events.
- Apply, as appropriate, green infrastructure approaches such as forested bioswales, permeable pavements, green roofs, green streets, wooded wetlands, rain gardens, bioretention, bioinfiltration, forested filter strips, and linear stormwater tree pits to mitigate the impacts of stormwater runoff.

Emphasizing cultural ecosystem services

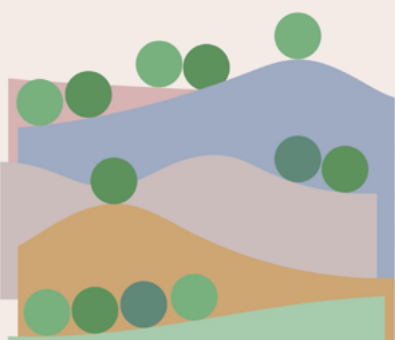
- Design for promoting the potential contribution of urban forests and other green infrastructures to the food and nutritional security of residents, and incorporate urban food forestry and agroforestry (e.g., in community gardens and orchards) into municipal plans.
- Encourage the use of public lands such as parks, schools, vacant lots, and streets for the production of urban food through the creation of food forests and community gardens, including the use of tree species that produce edible fruits, nuts, syrups, honey, and edible leaves.
- Promote the branding and marketing of local food products obtained through UPF and urban and peri-urban agriculture and agroforestry.

- Ensure that urban greening projects are designed (including through tree species selection) according to the architectural and aesthetic standards of local communities, considering geographical, cultural, and socioeconomic gradients. This is particularly important in cities with a high influx of migrants with different ethnic or religious backgrounds.
- Design multifunctional green spaces for use by the entire community, with suitable amenities and sociocultural services to make them attractive and improve social interaction and inclusion.
- Support the transition and cultural continuity of migrants moving from rural areas to urban neighborhoods by promoting the collaborative design and management of green spaces and related infrastructure (e.g., barbecues, secluded areas for families, benches, and iconic trees).
- Create forests and green spaces around public buildings (e.g., schools, hospitals, and municipal buildings), religious buildings (e.g., churches, mosques, synagogues, and temples) and cemeteries.

Source: 1. FAO, *Guidelines on urban and peri-urban forestry*, 2016. By F. Salbitano, S. Borelli, M. Conigliaro and Y. Chen. FAO Forestry Paper No.178. Rome, Food and Agriculture Organization of the United Nations.

6

How is Parco Italia designing and planning the spaces for trees in an extra-urban context (agricultural/ hilly/ mountainous)?

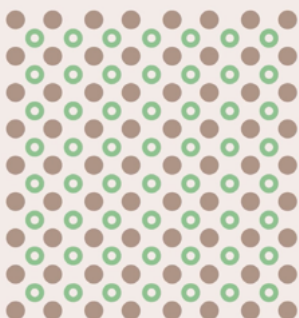


- Designing and planning tree spaces in non-urban contexts, such as agricultural, hilly, or mountainous areas, requires careful consideration of several factors. There are no one-size-fits-all solutions because strategies must be adapted. Here are some general guidelines for achieving proper design and planning:
- Before reforestation, consider the possibility of facilitating natural forest recolonization dynamics, if feasible in the site of interest (depending on the distance from seed-bearing trees and soil disturbance conditions), potentially supporting them with actions to mitigate limiting factors (e.g., management of wild ungulates, fire protection).
- Site analysis: Conduct a thorough analysis of the site where the trees will be planted before starting the project. Consider the climate, soil type, exposure, hydrology, and other environmental factors. This information will be crucial for selecting tree species suitable for the site in the years to come.
- Species selection: Choose tree species based on the current and future site conditions and the project goals (e.g., timber production, biodiversity, hydrogeological protection, carbon sequestration, adaptation to the climate crisis, tourism or recreational purposes), as well as growth rate, water requirements, and compatibility with the surrounding ecosystem. Prefer a mix of native

species to promote biodiversity.

- **Density and arrangement:** Determine the planting density based on the project goals and the characteristics of the selected species, considering their space requirements at full growth and ensuring sufficient space for root expansion and tree canopy. In agricultural contexts, consider planning rows or small groves for more efficient management and to support ecological connectivity. In high-altitude areas, planting should be done in multi-species groups, taking advantage of favorable microstations. In plains and hills, it is possible to associate shrubs with trees to protect them from high temperatures and maintain high levels of humidity and biodiversity.
- **Support structures:** In some cases, it may be necessary to provide support structures for the trees, especially in hilly or mountainous areas prone to heavy ungulate pressure or avalanche risks. These structures can include fences, stakes, or protective nets and should be carefully considered in terms of cost-benefit analysis.
- **Water sustainability:** Carefully evaluate the water supply for the trees, especially in the first 3-7 years of their life and in rural or mountainous areas where resources may be limited. It is advisable to plan for proper tree maintenance, including irrigation and subsequent management (thinning and pruning) based on the project goals.
- **Consider other ecosystem components,** including the presence and abundance of animal populations (seed dispersers, herbivores, carriers of harmful pests), soil health and its microorganisms (fungi and bacteria), and the biodiversity of the herbaceous layer, which can be enhanced through targeted introductions in case of widespread presence of invasive exotic species.
- **Engagement of stakeholders:** Involve farmers, local residents, communities, or other stakeholders in the design and planning process. Collaboration and community support can contribute to the success and long-term sustainability of the project.

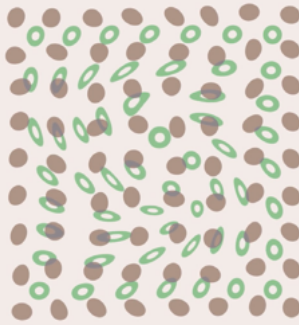
It is always advisable to consult local experts, such as agronomists, foresters, or the technical offices of the relevant authorities, in order to obtain specific and tailored advice for the geographical area of interest.



7

What are the Parco Italia tree planting scheme typologies?

The distances between trees constituting the new forest plantation created within the Parco Italia project, and therefore the choice of the most suitable plant module, are assessed by the urban forest designer on the basis of the characteristics of the tree/shrub species themselves; in relation to the environmental parameters of the site, and in accordance with the objectives and functions of the afforestation programme. The scheme proposed by the designer is then discussed with



the scientific-technical staff of the AlberItalia Foundation. The trees are arranged in geometrically regular rows or in irregular groups with various types of specific mixes, taking care to leave a suitable distance for easy crown growth of the adult trees. In general, the numerical reference is to consider planting layouts with average distances of 3-4 mt. from tree to tree.

Shrubs can be inserted into the tree scheme in various ways:

- within a row planting module, between one tree and another;
- within a row planting module, for rows of shrubs only;
- within a row planting module, for groups of shrubs only;
- in an irregular planting in groups, in groups of shrubs only

As a rule, the high density recommended for the planting of new woods means that the distances between rows are rather limited. The width of 3 meters is the minimum so that the mowing of the grass during the very first years of the system's life can be done with the use of a tractor. Smaller distances imply the need to use other means: however, bear in mind that the denser the plant is, the less it is necessary to proceed with mowing.

Without any prejudice to what has been said above, the planting schemes are highly dependent on the main function the urban forest has to fulfill. In this sense, the final schemes adopted were inspired by the functional modules reported in Calamini et al. (2013)¹.

Source:

1. Calamini, G., Colangelo, G., Giovannini, G., Laforzezza, R., Maetke, F., Mariotti, B., Nocentini, S., Salbitano, F., Sanesi, G., Tani, A. 2013, *L'impianto, la gestione e la valorizzazione multifunzionale dei boschi periurbani. Interventi forestali non produttivi per la valorizzazione dei boschi. Supporti tecnici alla Legge Regionale Forestale della Toscana 9. Regione Toscana, Firenze. Pp. 178. Retrieved on web: https://www.regione.toscana.it/documents/10180/13328713/1_impianto,%20la+gestione+e+la+valorizzazione.pdf/c97d564e-b358-4be8-9bb5-f3d57f20b977*

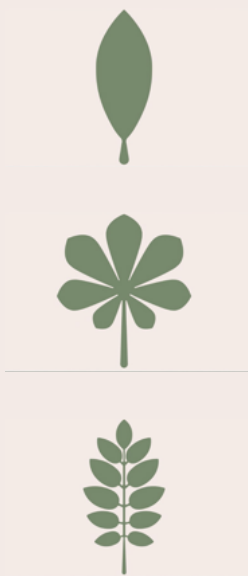
8

How is Parco Italia planning to diversify the tree species in an urban context?

Evolving Santamour's 10–20–30 guideline for urban tree diversity*, we are adopting and testing a rule of 20-40-25-25: no more than 20% of the same tree species and no more than 40% of the same genus; planting at least 25% of shrubs, of which no more than 25% of the same species. The design of forest plantations in any Parco Italia project responds to the goal of increasing biodiversity, which considers, wherever possible, a cluster planting associating trees and shrubs as starting modules for future habitats and the program for future adaptive management considers maintaining this threshold of tree/shrub species diversity as long as possible.

**a city's urban forest composition should not have more than 10% of the same tree species, no more than 20% of a single tree genus and should not exceed 30% of the same family (Santamour, 1990)*

Source: 1. Santamour F., *Trees for urban planting: diversity, uniformity and common sense*, (1990). In: *Proceedings of the 7th Conference of the Metropolitan Tree Improvement Alliance* 7: 57–65.



How is Parco Italia guaranteeing that the planted trees will be resilient to the effects of climate extremes?

As a climate crisis hotspot, Italy presents severe challenges for the survival of trees and effective provision of ecosystem services by new afforestation projects. Strategies are needed to minimize the consequences of warming and intensification of extreme events (drought, forest fire, extreme precipitation) and their indirect effects (pressure by invasive species and tree pests, changes in soil properties) on the performance of newly planted forests.



- **Selection of resilient species:** Select tree species or their provenances, if known, that are resistant to the impacts of extreme climate events. Consider species that are adapted to the local climate and possess characteristics such as drought resistance, high humidity tolerance, storm resilience, or fire resistance. A useful tool for this purpose is “Seed for Forests” (<https://www.seed4forest.org/>), an online mapping application that shows the vulnerability of European tree species to future climate change and recommends the best seed sources for reforestation and afforestation.
- **Species diversity:** Species diversity in forest planting can increase the overall resilience of the forest ecosystem. Different species may have varying tolerances to extreme climate events, and a balanced combination can reduce the risk of large-scale negative impacts (the “insurance hypothesis”).
- **Landscape planning:** Heterogeneity is beneficial on a landscape scale for the creation of a resilient forest structure. This involves creating areas of different ages and compositions, planning ecological connectivity corridors, and dividing the area into smaller manageable units. These strategies can help reduce the spread of fires, diseases, and tree loss in the event of extreme events.
- **Adaptive forest management:** Adopt an adaptive forest management approach that considers ongoing climate change. Monitor the impacts of climate change on forests carefully and implement climate-smart forestry practices. This may include modifications to timber harvesting plans, strategies for fire and wind damage prevention, or the introduction of ecological restoration techniques.
- **Soil and water conservation:** Pay special attention to soil and water conservation in forest planting. Maintain continuous soil cover, use mulching techniques, and promote water conservation to reduce the negative effects of extreme climate events such as soil erosion or water scarcity.
- **Continuous monitoring and evaluation:** Implement a long-term monitoring system to assess the effectiveness of the measures taken and make necessary improvements. Monitor forest resilience indicators, such

as tree vitality, species diversity, regeneration capacity, and response to extreme events, both in the field and remotely, in order to continuously adapt management practices.

10 Which are the certificates and quality standards that Parco Italia requires from forest nurseries?

European and National legislation (Legislative Decree 386/2003) for Forest Reproductive Material (FRM) defines the only certification required for forest nurseries. However, the law defines minimum qualitative morphological criteria for seedling evaluation of the tree species listed in the annex to the decree. Therefore, for Parco Italia pilot projects, additional aspects are used to evaluate the quality of the seedlings planted.

An important first step, once the suitable species for the planting site has been determined, is to select the most appropriate geographic provenance for the specific goals of the project and the nurseries where it may be grown. If available, provenances from seed stands - which are all included in the National Register of Seed Forests, RNBS - from the "selected" category will be considered, i.e. stands selected for specific criteria on the basis of their functionality for a successful project (e.g. growth, stem quality, adaptation to specific environments, disease resistance, etc.). Where provenances from different geographical areas or different regions of provenance are available (in accordance with national regulations), southern provenances or areas more naturally adapted to drought conditions in response to climate change will be evaluated. Conversely, if one of the guiding aspects of the planting project is to preserve the genetic biodiversity specific to the planting site, local provenances will be preferred.

Once the provenance and the nursery where it is available have been identified, aspects related to phytosanitary and morphological conditions are evaluated on a seedlings sample of each species. The evaluation is species-specific, but in general, it covers, in relation to seedling age, growth, apical dominance, above-ground biomass, below-ground biomass, their ratio, and root-system structure. Containerized FRM is generally preferred. Therefore, morphological aspects are evaluated in relation to the volume of the container, its depth and width, and the structure useful to avoid root system defects.

11 How is Parco Italia designing and planning to increase the connectivity between the specific interventions and the surrounding areas?

Parco Italia always takes into consideration the location and distance from the closest natural areas, parks, or other neighboring natural or semi-natural areas, both in urban areas and in peri-urban or extra-urban contexts. Especially in an urban context, Parco Italia will consider factors related to the





distribution of urban green areas to plan, in the long term, green networks that run through the entire city or territory, guaranteeing equity of access to green areas, trying to avoid the concentration of interventions in one or a few sectors only. At the same time, Parco Italia promises to strengthen, intervention after intervention, a green network that is well interconnected so as to promote the conservation of biodiversity: linking balanced and resistant mini-ecosystems to each other.¹ The planner/urban forester or the administrations can use already existing free software tools for the assessment of connectivity and of the “nodes” where this is lacking, such as Guido’s Toolbox of the JRC² or the software Conefor³ or directly access the mapping conducted by Parco Italia throughout the whole of Italy, which identifies the areas with high priority.

Sources: 1. *Vademecum AlberItalia*. Retrieved from <https://www.alberitalia.it/filevari/Alberitalia.it-vademecum/alberitalia.it-vademecum.html> ; 2. *Joint Research Center, Guidos Toolbox*. Retrieved from: <https://forest.jrc.ec.europa.eu/en/activities/lpa/gtbl/> ; 3. *Conefor*. Retrieved from: <http://www.conefor.org/>

12

How is Parco Italia guaranteeing that the new forests and plants will maximize the ecosystem services and goods, and minimize disservices?

Parco Italia will maximize services and minimize disruptions by developing six complementary strategies.

Participatory design

Designing a new forest in the city, planting trees, and caring for them, are actions that affect the whole community. While not everyone is an expert in these matters, considering trees and urban forests as a common good necessitates the involvement of the community, both indirectly and directly. This involvement refers to working together with groups of people who share a place, common interests, and care about trees’ well-being and quality of life. Successful public parks and accessible open spaces are central to people’s lives and wellbeing. The contribution of urban trees and forests to the quality of a place and life is closely tied to the level of engagement between decision-makers, technicians (e.g., planners, managers, designers, researchers, and educators), and communities. This approach enables the identification of the community’s priority needs prior to the design process. Tree plantings can be designed to maximize communities’ satisfaction by evaluating the needs and their relevance to the community during the participation stage.



Selecting species suitable for meeting the needs of the local community and aligning with the overall purposes of tree and shrub planting.

Starting from the needs set out during the participation phase, appropriate tree and shrub species will be selected. The species’ selection process will also take into account the potential disruptions they might cause, ensuring that those

most prone to disruption in a specific context will either not be used or will be employed in areas where the risk of disruption is minimal. For example:

- Plant species with high-pollen allergenicity will be avoided in urban settings;
- Plants that produce excessive fruits will not be placed near roads and sidewalks to prevent accidents and falls.
- Plants susceptible to aphid infestation will be placed away from parking lots and areas frequently used by users of green areas;
- Tree species with invasive root systems that can damage asphalt, pavement, roads, sidewalks, and buildings will be positioned at a safe distance from such infrastructure.

Proper implementation of plantations.

Once a well-designed plan is in place, the operational implementation of each plantation is the first guarantee of success and satisfaction of the demand for services by the citizens involved in participation. The following operations will be carried out for each planting:

- Digging holes of appropriate size to accommodate the root system;
- Installing planting aids capable of mechanically stabilizing the plants;
- Controlling and reducing competition from tall grasses;
- Protecting the plants from domestic and/or wild animals;
- Adopting irrigation systems capable of reducing leakages during drought periods.
- By performing these operations, not only will plant establishment be facilitated, but the subsequent monitoring and management will be made easier. This will lead to shortening the time in which it will be possible to obtain the maximum expected services.

Periodic monitoring of the tree and shrub stock in the urban and peri-urban areas.

The activation of a tree monitoring program will provide an early signal regarding the presence of pests, diseases, and threats, which can then be managed early on and minimize tree and shrub-related disruptions. The preparation of periodic monitoring plans as part of tree safety programs will be encouraged. Citizens could also assume a role in monitoring, reporting any disruptions that have escaped Parco Italia's periodic monitoring or occurred between one monitoring and the next one.

Timely administration of treatments.

The administration of plant treatments will be closely linked to the monitoring of the plant development conditions and the occurrence of any disruptions. The containment or complete elimination of disruptions will also be shared with the local population in advance. Field activities will be carried out

to highlight the occurrence of disruptions and informative communication materials will be developed to inform individuals of all ages. Through these periodic and preventive activities, it will be possible to act promptly by reducing or anticipating inefficiencies and disruptions, without running the risk of encountering uninformed dissent from the citizens.

Shared replacement of disruptive plants.

Trees are biological entities that, if not managed in harmony with the built environment, can originate coexistence problems related to safety, especially in urban settings. Nevertheless, trees are perceived as a common good by many citizens, and that is why involving the community and making shared choices can improve the perception of both routine and extraordinary management activities. Although a general information campaign will be implemented for the management of the tree stock and to replace some plants that have become a risk to the safety of people or infrastructures, there might be specific cases where the removal of one or more trees could cause alarmism within the population. For this reason, it is beneficial to activate participatory processes in advance, that could take into account citizens' opinions and aim to minimize the loss, both from a psychological and environmental standpoint.

13

What are the management and maintenance procedures that Parco Italia is planning to carry out to ensure that planted trees reach maturity?

Urban forests are composed of a diversity of trees and other vegetation, perhaps dispersed as interconnected patches within the broader landscape. Some parts of the forest may need more intensive management than others, depending on the specific combination of such characteristics. The more informal the initial design and naturalness of the forests, the less intensive the management is likely to be.

In order to get proper management options after planting to achieve tree maturity, Parco Italia has set the following checklist for urban forest and trees management, revised from FAO (2016) ¹.

- Sharing a vision; stakeholder mapping; problems/ solutions analysis
- Defining scope and needs of the tree care and maintenance interventions
- Setting the expected achievements and ranking priorities
- Defining and sharing management responsibilities
- Identifying sources of budget and support
- Defining the scale, duration and type of management procedures
- Ensuring adequate baseline data, professional guidance, time, funding and the collaboration of multiple stakeholders
- Setting the organization in the time, space, capacities and priorities of management actions



- Defining the administrative and legal framework in reference to the existing norms (e.g. Municipal Green Regulations; tree ordinances; Landscape Conservation constraints)
- Performing a cost–benefit analysis and budget assessment
- Defining an emergency budget to intervene in the event of extraordinary tree care events that cannot be foreseen during the formulation of the management plan.
- Preparing a framework for action and a general work plan with timeline, activities and responsible persons or positions
- Programming outreach and public education activities, including safety aspects
- Consolidating the community involvement process in forest and tree management
- Preparing and following detailed operational work plans
- Clarifying and counter-checking agreements on the respective responsibilities
- Testing and readjusting the outcomes of tree ordinances, regulations, and overall policies
- Making the necessary financial resources available
- Hiring tree-care professionals and planning community management programs
- Site and soil preparation; selection of regeneration processes; species selection; planting operations; tree and forest nurseries; and early care of tree plantings
- Conducting actions regarding tree maintenance, silvicultural/arboricultural treatments (tending, thinning and pruning), tree and forest health management, risk management, and tree removal and forest harvesting
- Activating medium- to long-term monitoring programs
- Monitoring and evaluating the establishment, growth, composition, health and quality of forests and trees, the provision of ecosystem services.

After planting trees and shrubs, it is necessary to program and implement maintenance interventions aimed at guaranteeing correct and lasting root adaptation to the soil by newly planted trees. The entire set of interventions are fundamental for achieving the expected benefits and services following the planning and design phases.

The management of new forest plantations in Parco Italia concerns four major actions: Tree care; Tree maintenance; Silvicultural treatments, pest and diseases control

Early forest plantations tree care

Irrigation.

One of the first causes of plantation failure is the desiccation of roots and, subsequently, of the plant. The failure risk determined by water stress in trees depends highly upon the ecological characteristic of planted species and the size and structure of planted trees. Most tree species used in Parco Italia forest plantations are well adapted to summer drought as found in the Mediterranean climate. We also tend to use

seedlings of small size (max above-ground height at planting time not exceeding 100 cm): in this case the risk of water stress in the initial seasons after planting is reduced thanks to the more rapid adaptation of the root system to the planting site. However, at least for the first few years, it is fundamental to plan a systemic and/or emergency irrigation system. It is key to monitor the vegetative state of plants during dry and hot periods, so as to early identify emerging suffering events due to lack of water and intervening when necessary. Generally, in the absence of heavy rain, it is advisable to irrigate every 10/15 days with at least 50/100 liters for plants in emergency irrigation programs. Localized watering with drop systems can be planned exceptionally, or subirrigation, in order to reduce water consumption. It is crucial to also assess the soil texture and water capacity.

Weeding.

In certain circumstances, with the aim of mitigating water stress during prolonged drought events, it is planned to proceed with soil weeding. In the case of most forest plantations in Parco Italia planting campaigns, weeding has also an effect on optimizing tree growth by controlling competition for light between trees and weeds.

Support system.

After laying the support pole, and depending on species growth, it is necessary to periodically verify the fixing system of the poles (preferably in vegetal fiber) to avoid constriction events.

Superficial soil processing.

For species that are less competitive and long growing, it is a good practice to reduce competition with other species through the periodical weeding of the surrounding vegetation.

Forest and trees management

Plant replacement.

In the event of a high recurrence of tree failure due to desiccation, it is essential to replace them, if necessary, with more suitable species. Before the plant's replacement it is necessary to identify the cause of death. This analysis allows programs of pest and disease control whenever tree health is affected by severe plant pathologies.

Manuring.

When the forestry intervention has been established in a degraded area characterized by highly altered soils, it could be necessary to add additional manures, apart from those added before planting. However, manuring is not provided in protected areas, where it is never carried out .

Pruning.

During the first few years, especially for fast-growing trees, it is necessary to carry out an accurate control of their stability,

in order to intervene with appropriate pruning, if necessary. A young tree needs all the nutrition it can get from its leaves to develop strong roots, so during the first year after planting, only broken or dead branches should be pruned. For species susceptible to pruning, this intervention should always be carried out so as to avoid fungal infections or other parasitic diseases. To facilitate a fast-growing trunk, for some species, it would be necessary also to remove suckers.

Never top your trees. Topping is the indiscriminate removal of a tree's branches to stubs and is perhaps the most harmful tree pruning practice known; yet, topped trees are still a common sight. Not only does topping result in tree stress, decay, hazard and sunburn; but it's also ugly and expensive. Once you top a tree, you resign yourself forever to a maintenance treadmill as your tree rapidly declines and becomes increasingly costly to care for.

Finally it is necessary to always consult and hire certified arborists.

Silvicultural treatments

The goal of forest thinning is to control the amount and distribution of available growing space. By altering stand density, foresters can influence the growth, quality, and health of residual trees.

Thinning greatly influences the ecology and micro-meteorology of the stand, lowering the inter-tree competition for water. The removal of any tree from a stand has repercussions on the remaining trees both above-ground and below. Silvicultural thinning is a powerful tool that can be used to influence stand development, stand stability, and the characteristics of harvestable products.

Tending and thinning will be used in Parco Italia future forest stands wherever it will be necessary to reduce forest density in order to have the following effects on the forest stand: optimized health and growth of forest trees up to maturity; low risk in the case of vulnerability to wildfires; optimized stability of mature trees; selection of trees not interfering with human health (e.g., removal of allergenic species; removal of VOC inducing tree species)

Pest and disease control

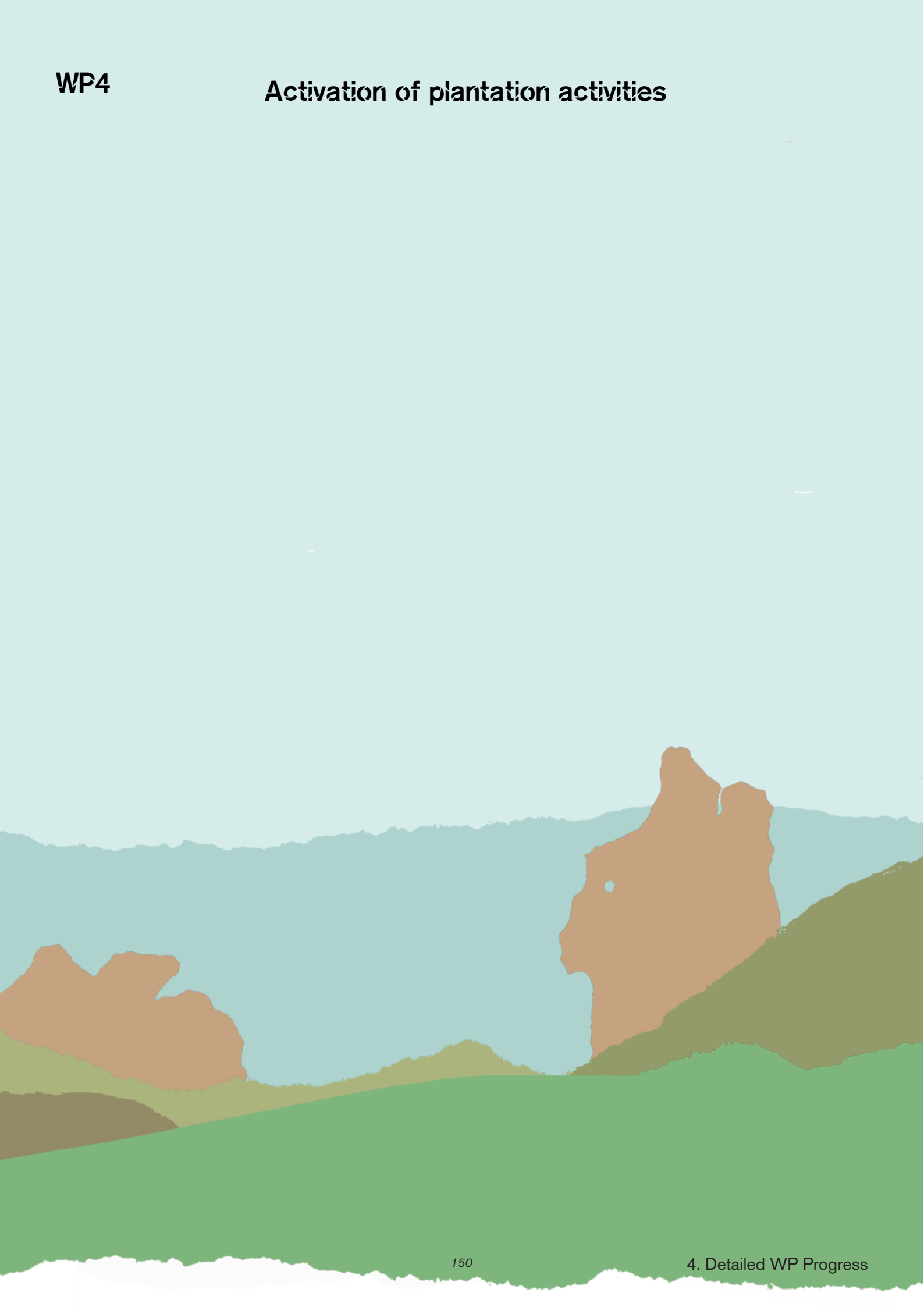
Significant numbers and varieties of insects, fungi, bacteria, and viruses occur in forests and are adapted to living on or around trees. Many of these are beneficial, and even the populations of destructive ones are usually controlled by their natural enemies or an unfavourable environment. Every part of a growing tree—root, trunk, bark, leaf, flowers, and seeds—is potentially subject to some harmful insect or fungus.

Insect and disease organisms accidentally introduced to forests from other parts of the world, known as invasive species, often develop serious epidemic conditions because of the lack of any natural control.

Generally, the healthier the forest, the more resistant it is to widespread pest attacks. Overmature, weak, wind-thrown, and lightning- or fire-killed trees have little or no defense against infestation and are a factor in the buildup of pest populations. Selective cutting of susceptible trees, thinning that accelerates growth, and other similar forest management practices are methods for indirect control of pests and diseases. It is key to monitor the presence of severely damaging pests and diseases continuously. This is facilitated by the Regional Plant Health centers that in almost all the regions of Italy produce up-to-date information and alert bulletins on the recurrence and consistency of tree/forest pests and diseases, here including current measures of pest and disease control.

Source: 1. FAO, Guidelines on urban and peri-urban forestry, 2016. By F. Salbitano, S. Borelli, M. Conigliaro and Y. Chen. FAO Forestry Paper No. 178. Rome, Food and Agriculture Organization of the United Nations.

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4.1 Introduction.

The Purpose of WP4 is to consider the potential of certain areas for the implementation of the Parco Italia pilot projects. In this WP, the strategies to identify and select pilot projects' areas and the approach to defining the sites are established. Furthermore, the criteria for the selection of potential areas for afforestation, the reasons behind the selection, the stakeholders involved, and the scenario of the plantation typology will be explained.

4.2 Methodology.

One of the key aspects of Parco Italia is to assist local institutions in identifying areas for planting and promote a “right tree, right location, and right time” culture. We aim to help this by implementing pilot projects throughout Italy for the planting of 70,000 trees.

Identifying suitable areas for new forests in urban and peri-urban areas in Italy is an important challenge due to free land scarcity and the extent of private property. Yet, to meet the overall Parco Italia project target it is important to develop a strategy of a new kind of cooperation between citizens, civic society, private and public figures, science, and local government.

In order to define and select pilot projects, we adopted a multi-criteria approach. As a first step, we analyze the landscape matrix. For each metropolitan area, we obtain the land cover map and classify the different types of use (e.g., residential, agricultural). From this first dataset, we can exclude the unsuitable areas. On a landscape scale, we also identify areas of ecological value, i.e. those areas in which habitats and species of relevant importance are preserved. Overlapping the two layers, we get a draft of the trajectory of a potential ecological network among natural patches, urban and peri-urban forests, and design its spatial distribution and ecological functions. We obtain a further level of information by analyzing the open data derived from the census of trees and green infrastructures across urban environments and produced by local administrations. Since urban trees and green spaces are unequally distributed across cities, one of the criteria used (wherever possible) to identify potentially suitable areas is to ensure fairer access to urban forests by the entire city population. Through socioeconomic indicators and measures of accessibility of urban green spaces (proximity of publicly accessible spaces, number of trees), the team identifies the most economically disadvantaged areas, and we try to involve the decision makers in developing our project within them.

By combining the landscape, ecological, land cover, and social data, the first phase allows the selection of a set of potential areas. The next step is to cross-reference

this information with the actual availability of land that Parco Italia obtained through an intensive and extensive consultation phase with public administrations and private owners. The result of this phase is a database (“the bank of tree places”) that contains all available areas, grouped by environmental characteristics, ownership, and geographical location. The database includes only those areas that have been included in the network of contacts established through the project and for which we have verified the feasibility. The database is constantly updated thanks to a progressive engagement of stakeholders that are reporting and indicating available land for implementing afforestation and ecosystem restoration projects.

4.2.1 Criteria for selection. Planting sites and Afforestation priority.

The team identified sites for planting trees by cross-referencing the information obtained from the first-level analysis described in the previous section with the “bank of tree places”, trying to include priority areas as well. These areas derived from a multicriteria analysis (see x. y.z) with the aim of comprehensively assessing and comparing the potential advantages of afforestation and prioritizing the most pressing needs. This analysis considered a wide range of both natural and societal challenges that afforestation can help address.

The final criterion for identifying planting sites was feasibility: a feasible tree planting project is one that is both technically and economically viable, considers ecological and community factors, and has a realistic plan for execution and long-term sustainability. It ensures that the goals of the project can be achieved within the available resources and constraints. Aspect to consider including:

- **Available Resources:** The project has access to the necessary financial, human, and material resources required for tree planting, maintenance, and ongoing care.
- **Site Suitability:** The selected planting locations are appropriate for the chosen tree species, considering factors like soil type, drainage, sunlight, and climate conditions.
- **Technical Expertise:** The project team possesses the knowledge and expertise needed to execute the planting, care, and management of the trees effectively.
- **Regulatory Compliance:** The project adheres to all relevant laws, regulations, and permits associated with tree planting and land use.
- **Environmental Impact:** The project minimizes negative environmental impacts and promotes biodiversity, sustainability, and ecosystem health.
- **Long-Term Commitment:** There is a plan for the ongoing maintenance and stewardship of the trees beyond the initial planting phase.
- **Funding:** Adequate funding is available not only for the initial planting but also for the long-term care and management of the trees.

4.2.2 Maintenance and Stewardship Plans

Creating a maintenance and management plan is critical to ensure the long-term health and growth of planted trees and ensure the provision of ecosystem services into the future. The success of the project depends not only on the proper execution of the planting steps, but also on the ongoing commitment and active involvement of the community and stakeholders. Parco Italia therefore attaches the utmost importance to the post-planting stages, especially through three-year agreements with landowners, firms, or local associations. In these agreements, the frequency and type of elimination of weeds (which can compete for environmental resources with young seedlings) and relief irrigation that can result in tree death

and planting failure are established. Beyond three years, Parco Italia seeks to promote a sense of responsibility and ownership of the plantation by encouraging the involvement of local communities and public administrations in management. The three-year plan is formulated on:

- Project purpose and objectives (e.g., increased biodiversity, carbon sequestration, habitat restoration).
- Site assessment (based on soil type, drainage, existing vegetation etc.)
- Irrigation schedule (considering seasonal weather patterns and site characteristics)
- Elimination of weeds (to reduce competition)
- Management of common pests and diseases
- Monitoring of health status and rooting rates (at least 90% at the end of three years)

The maintenance plan also identifies financial resources and those responsible for carrying out the various activities, who periodically produce progress reports.

4.3 Database - plantation activities in public and private sectors.

Following the agreement with landowners, forestry engineers and firms, the tree planting project proceeds through a series of critical steps that span the initial three years of the project. These steps are meticulously planned and executed to ensure the project's success and the long-term health of the planted trees:

1. Executive Design and Three-Year Timeline. This document serves as a roadmap, detailing the project's goals, objectives, and key milestones. It also includes a clear schedule for project activities, ensuring that every phase is completed efficiently.
2. Preparation of soil
3. Planting. Attention is given to proper spacing, planting depth, and alignment to ensure optimal conditions for root establishment and growth.
4. First Irrigation: The first irrigation is a critical step, providing the newly planted trees with the hydration they need. This step is closely monitored to prevent overwatering or underwatering, striking the right balance for healthy growth.
5. Monitoring: this involves regular inspections to assess the health and progress of the planted trees. It includes evaluating growth rates, checking for signs of stress or disease, and addressing any issues promptly.

These steps represent a holistic approach to tree planting, emphasizing not only the initial establishment but also the long-term stewardship. Through careful planning, execution, and ongoing care, the project aims to create a thriving and resilient ecosystem. The Parco Italia planting activities, whether completed or planned, are referred to as the "agronomic season", that is the specific time frame for carrying out agricultural operations within a particular geographical area. The timing of this season depends on a range of factors, including climate conditions, geographical location, and elevation. While the second agronomic season related to the project is still in progress, we have successfully initiated 11 projects, resulting in the planting of approximately 35,000 trees. Looking ahead, we anticipate planting an additional estimated 17,000 trees by the end of this reporting period.

The following table (8) highlights the number of trees per site and reference year.

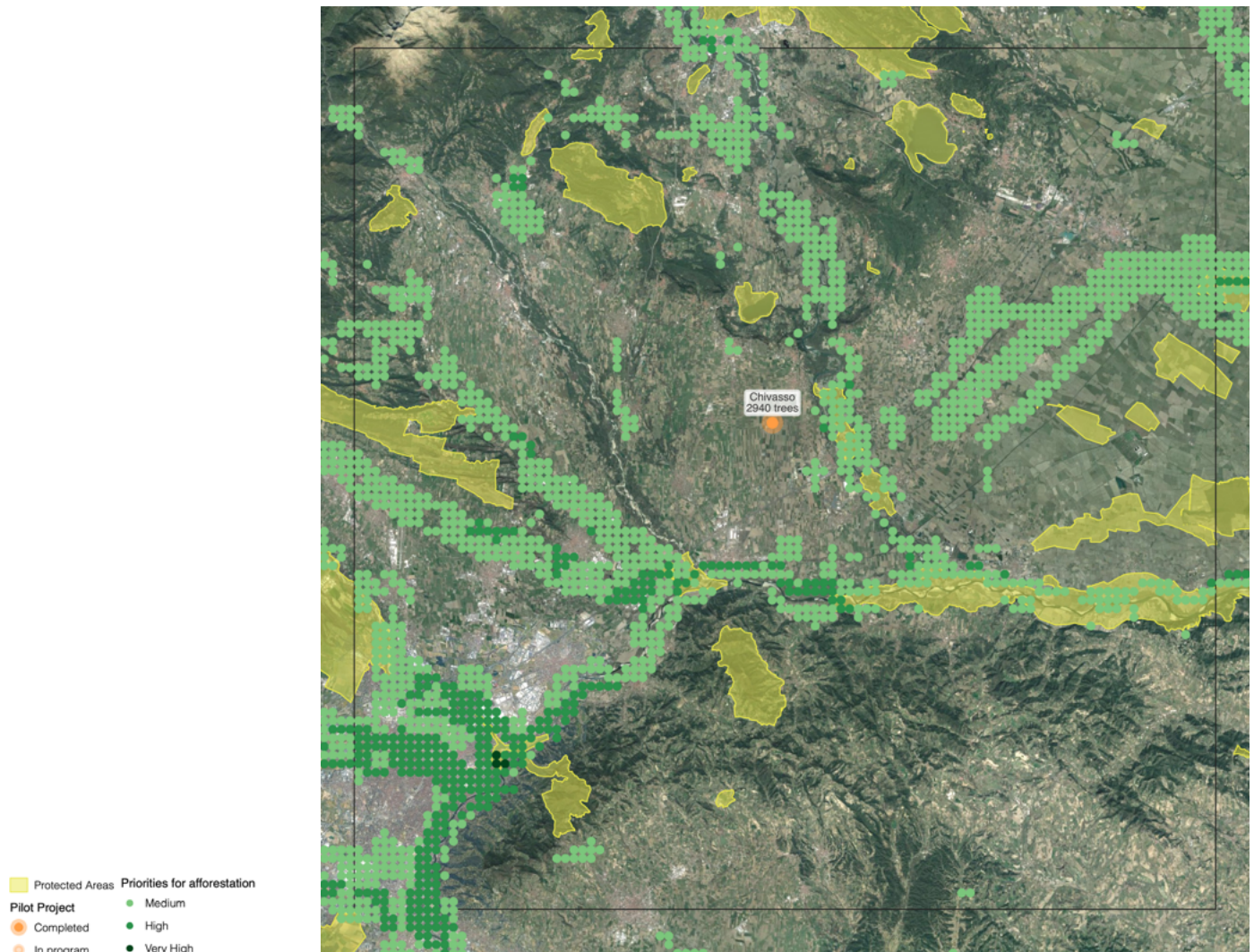
<i>Location</i>	<i>Province</i>	<i>Region</i>	<i>Type of Property</i>	<i>Status</i>	<i>Area (m2)</i>	<i>Planting Prevision</i>	<i>Number of trees</i>
<i>Chivasso</i>	<i>Torino</i>	<i>Piemonte</i>	<i>Private</i>	<i>Completed</i>	<i>40,250</i>	<i>October 2022</i>	<i>2.940</i>
<i>Giulianova</i>	<i>Teramo</i>	<i>Abruzzo</i>	<i>Public</i>	<i>Completed</i>	<i>45,000</i>	<i>January 2023</i>	<i>3.600</i>
<i>Loreto Aprutino</i>	<i>Pescara</i>	<i>Abruzzo</i>	<i>Private</i>	<i>Completed</i>	<i>12,500</i>	<i>January 2023</i>	<i>1.004</i>
<i>Torrevecchia teatina</i>	<i>Chieti</i>	<i>Abruzzo</i>	<i>Public</i>	<i>Completed</i>	<i>10,000</i>	<i>January 2023</i>	<i>1.004</i>
<i>Torre del Greco</i>	<i>Napoli</i>	<i>Campania</i>	<i>Private</i>	<i>Completed</i>	<i>49,000</i>	<i>March 2023</i>	<i>2.250</i>
<i>Motteggiana</i>	<i>Mantova</i>	<i>Lombardia</i>	<i>Public</i>	<i>Completed</i>	<i>32,000</i>	<i>April 2023</i>	<i>4.265</i>
<i>Bari</i>	<i>Bari</i>	<i>Puglia</i>	<i>Public</i>	<i>Ongoing</i>	<i>12,000</i>	<i>Autumn 2023</i>	<i>1.400</i>
<i>Nemoli</i>	<i>Potenza</i>	<i>Basilicata</i>	<i>Public</i>	<i>Ongoing</i>	<i>20,000</i>	<i>Autumn 2023</i>	<i>1.250</i>
<i>Camisano Vicentino</i>	<i>Vicenza</i>	<i>Veneto</i>	<i>Public</i>	<i>Ongoingd</i>	<i>28,000</i>	<i>Autumn 2023</i>	<i>3.858</i>
<i>Bonisiolo</i>	<i>Treviso</i>	<i>Veneto</i>	<i>Public</i>	<i>Ongoing</i>	<i>71,700</i>	<i>Autumn 2023</i>	<i>7.920</i>
<i>Monterotondo</i>	<i>Roma</i>	<i>Lazio</i>	<i>Public</i>	<i>Ongoing</i>	<i>40,000</i>	<i>Autumn 2023</i>	<i>3.000</i>

Table 8. The following tabs summarize the main information on planting sites for both the areas already planted and those planned for 2023.



4.3.1 Cross-referencing Priorities for afforestation and Parco Italia pilot projects.

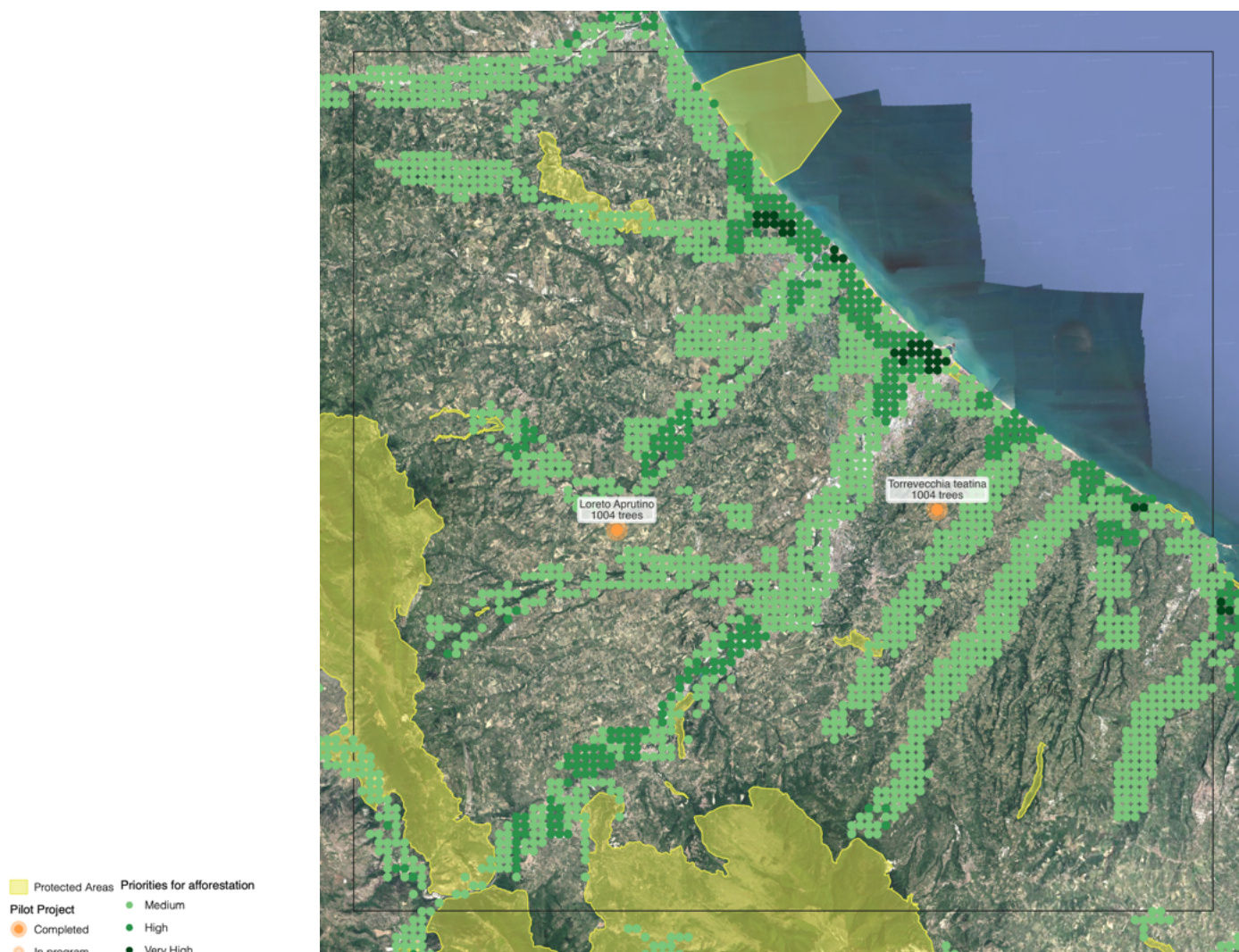
This overlapping mapping activity provides an overall evaluation and assessment of the relevance and potential of the planting activities planned by the team. In the future, these pieces of information could provide a direction to different stakeholders to accurately select locations for afforestation activities.



Chivasso, Piedmont

Number of trees planted: 2,940

Species: *Quercus robur*, *Populus alba*, *Tilia cordata*, *Salix spp.*, *Prunus avium*, *Alnus glutinosa*, *Viburnum opulus*, *Malus sylvestris*, *Ligustrum vulgare*, *Cornus mas*, *Mespilus germanica*, *Morus alba*



Loreto Aprutino, Abruzzo

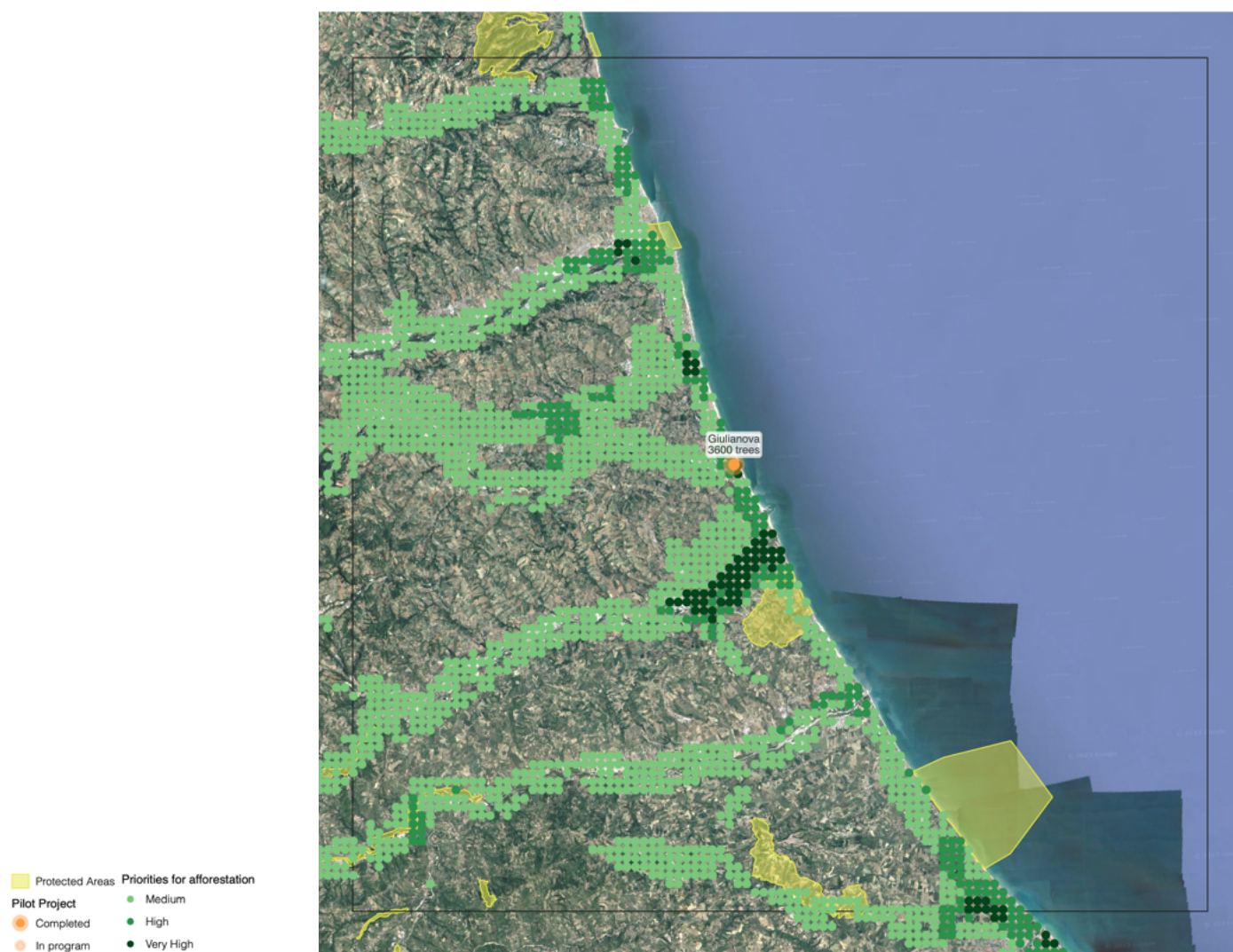
Number of trees planted: 1,004

Species: *Quercus robur*, *Quercus petraea*, *Quercus pubescens*, *Acer campestre*, *Ostrya carpinifolia*, *Carpinus betulus*, *Fraxinus angustifolia*, *Tilia platyphyllos*, *Tilia cordata*, *Sorbus domestica*, *Sorbus torminalis*, *Alnus glutinosa*, *Populus alba*, *Salix alba*, *Prunus avium*, *Malus sylvestris*, *Prunus avium*, *Pyrus pyraister*, *Crataegus monogyna*

Torrevecchia Teatina, Abruzzo

Number of trees planted: 1,004

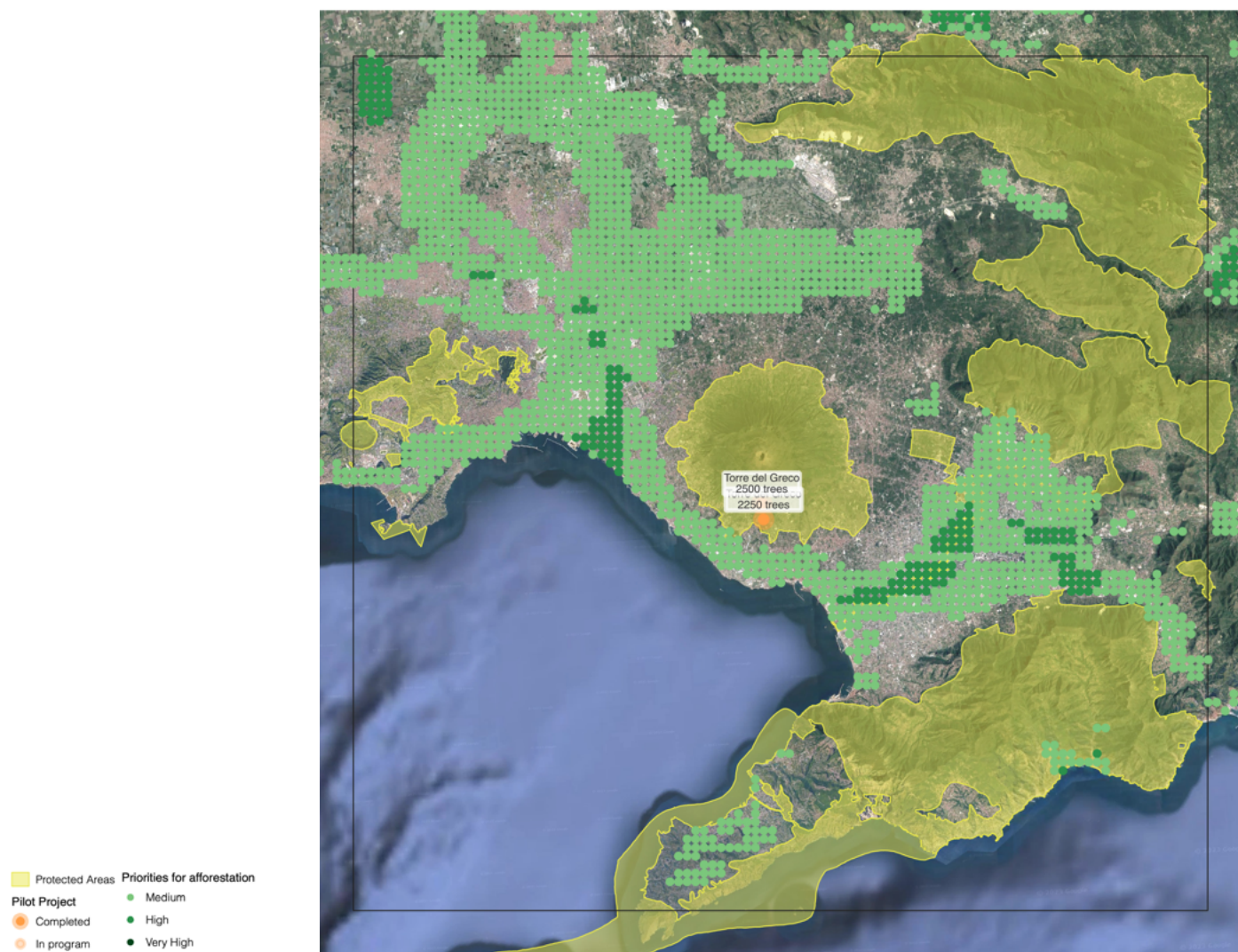
Species: *Quercus robur*, *Quercus petraea*, *Quercus pubescens*, *Acer campestre*, *Fraxinus angustifolia* Vahl., *Ostrya carpinifolia*, *Fraxinus ornus*, *Tilia cordata*, *Tilia platyphyllos*, *Sorbus domestica*, *Sorbus torminalis*, *Viburnum tinus*, *Pyracantha coccinea*, *Malus sylvestris*, *Prunus avium*, *Rosa canina*



Giulianova, Abruzzo

Number of trees planted: 3,600

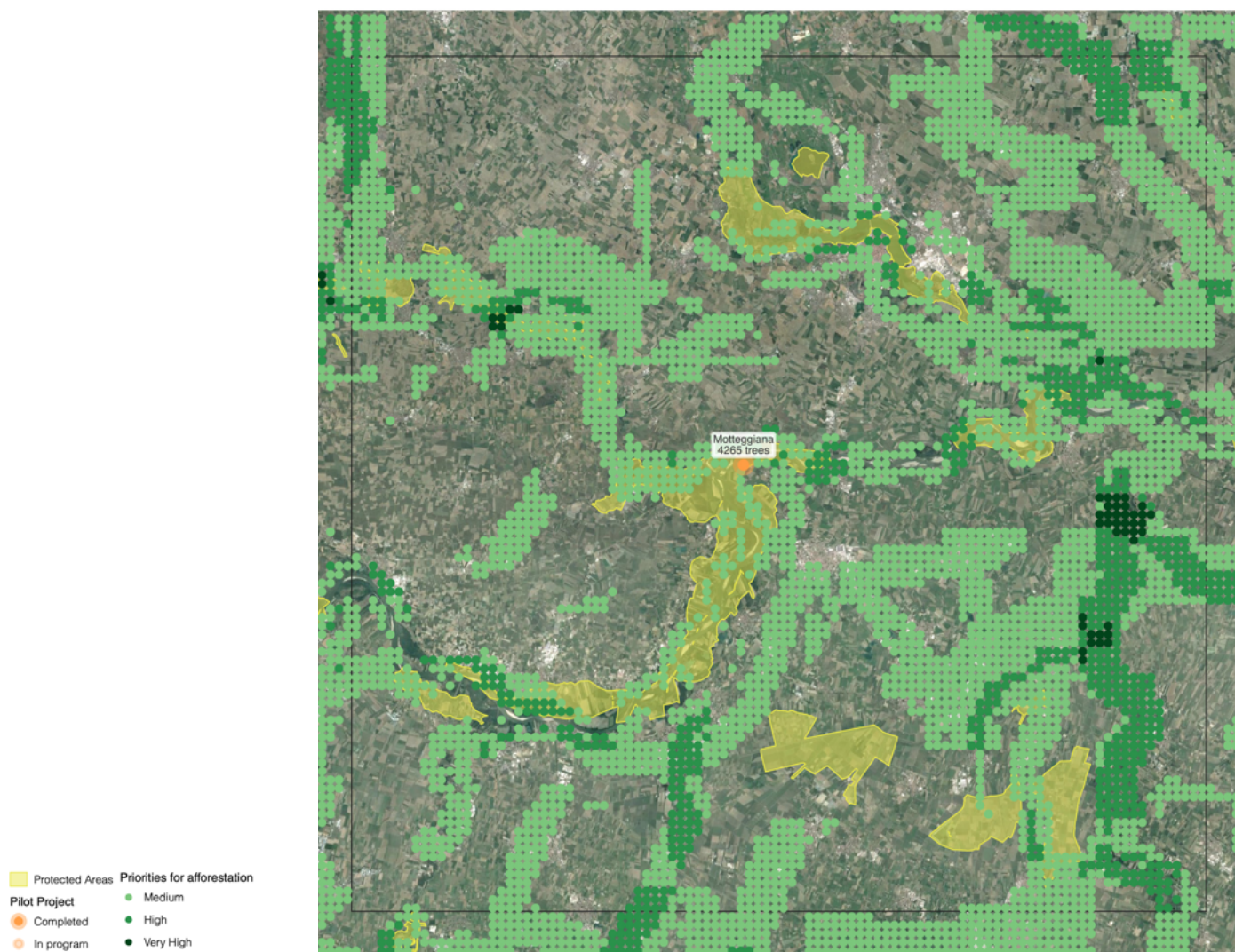
Species: *Quercus petraea*, *Quercus pubescens*, *Ostrya carpinifolia*, *Fraxinus ornus*, *Sorbus domestica*, *Alnus glutinosa*, *Pinus halepensis*, *Pyrus pyraster*, *Mespilus germanica*, *Tilia cordata*, *Quercus robur*, *Acer campestre*, *Carpinus betulus*, *Fraxinus angustifolia*, *Tilia platyphyllos*, *Sorbus torminalis*, *Populus alba*, *Malus sylvestris*, *Prunus avium*



Torre del Greco, Campania

Number of trees planted: 2,250

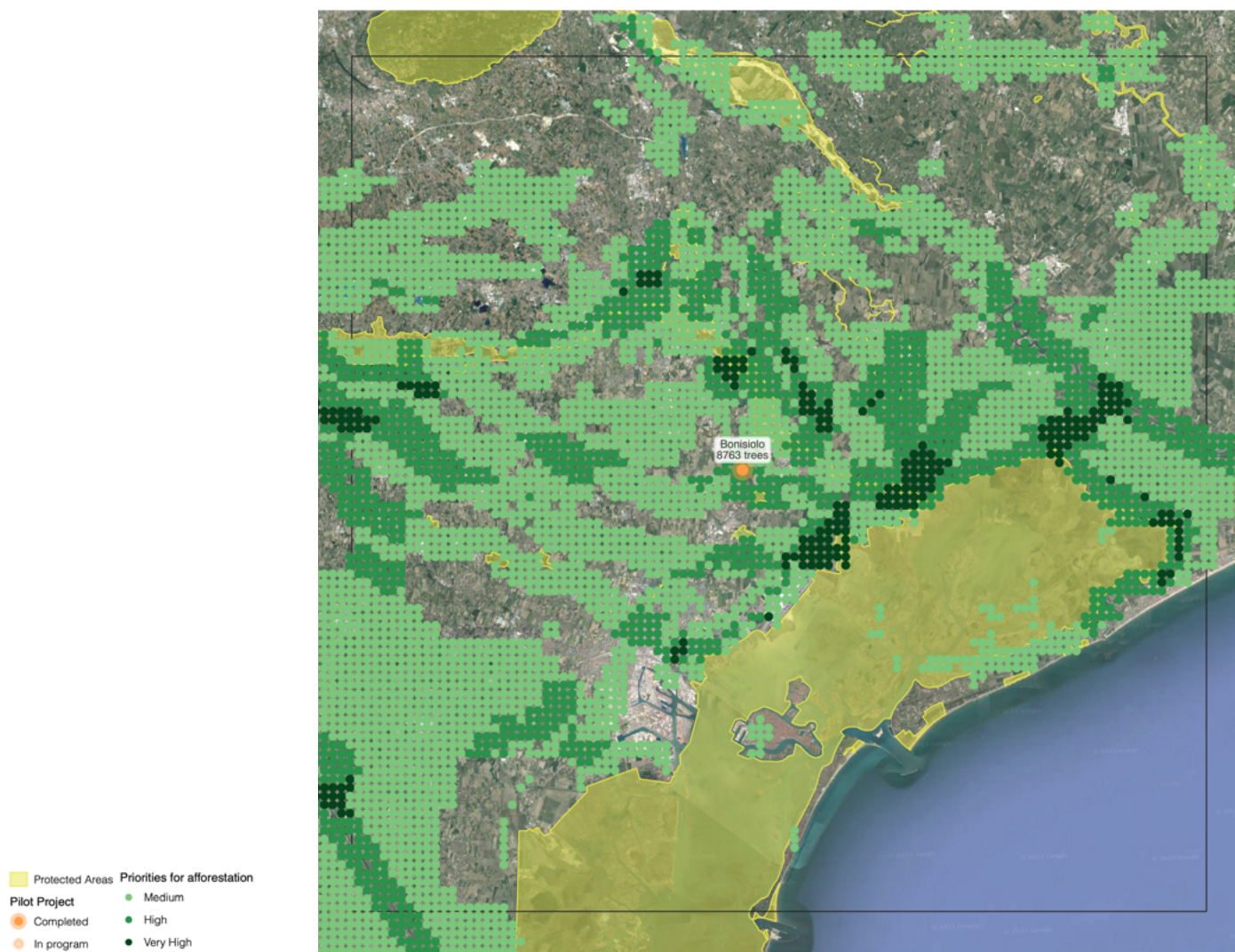
Species: *Quercus ilex*, *Quercus suber*, *Quercus pubescens*, *Fraxinus ornus*, *Pinus pinea*, *Arbutus unedo*



Motteggiana, Lombardia

Number of trees planted: 4,265

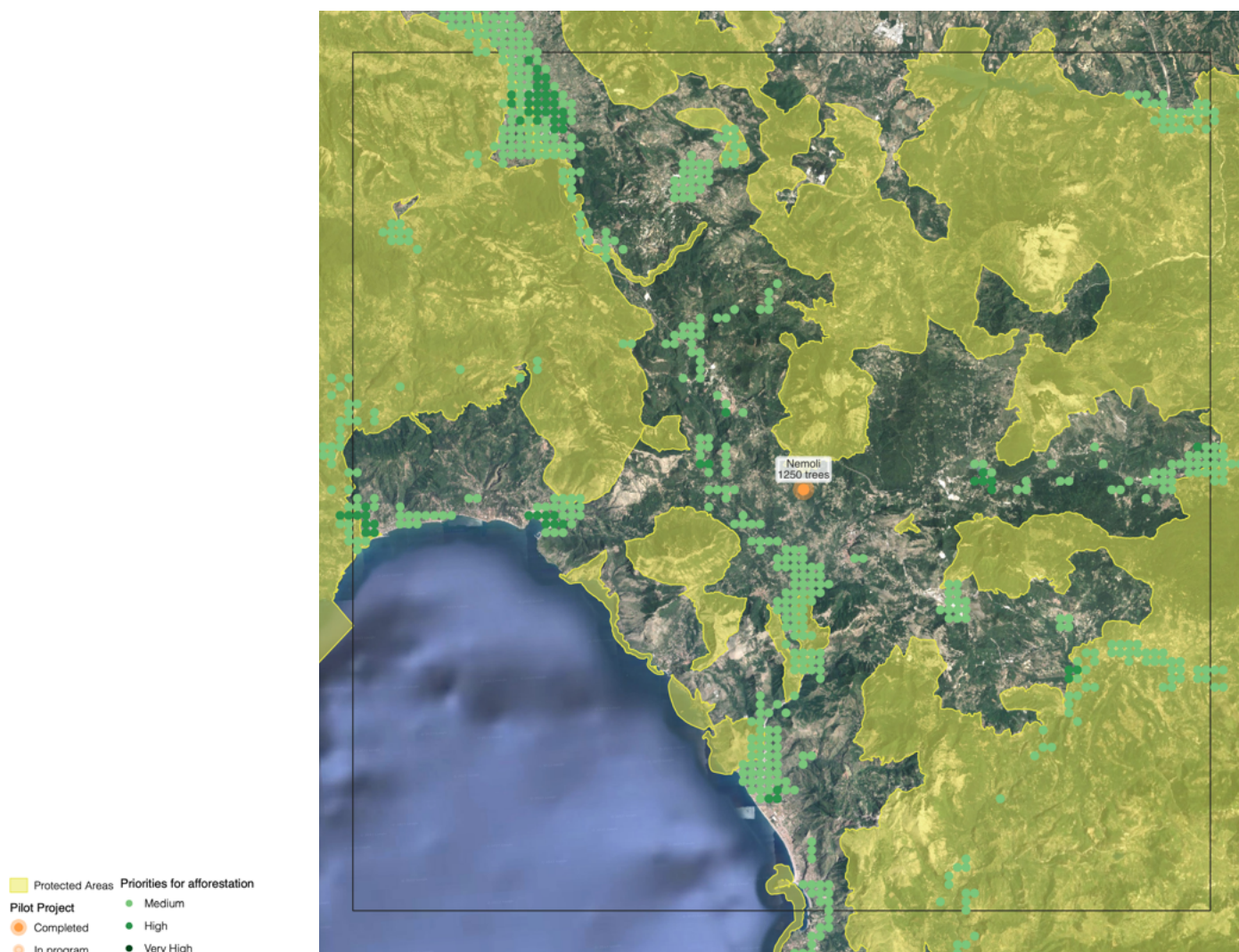
Species: *Quercus robur*, *Populus alba*, *Fraxinus angustifolia*, *Acer campestre*, *Alnus glutinosa*, *Sambucus nigra*, *Corylus avellana*



Bonisiolo, Veneto

Number of trees planted: 8,763

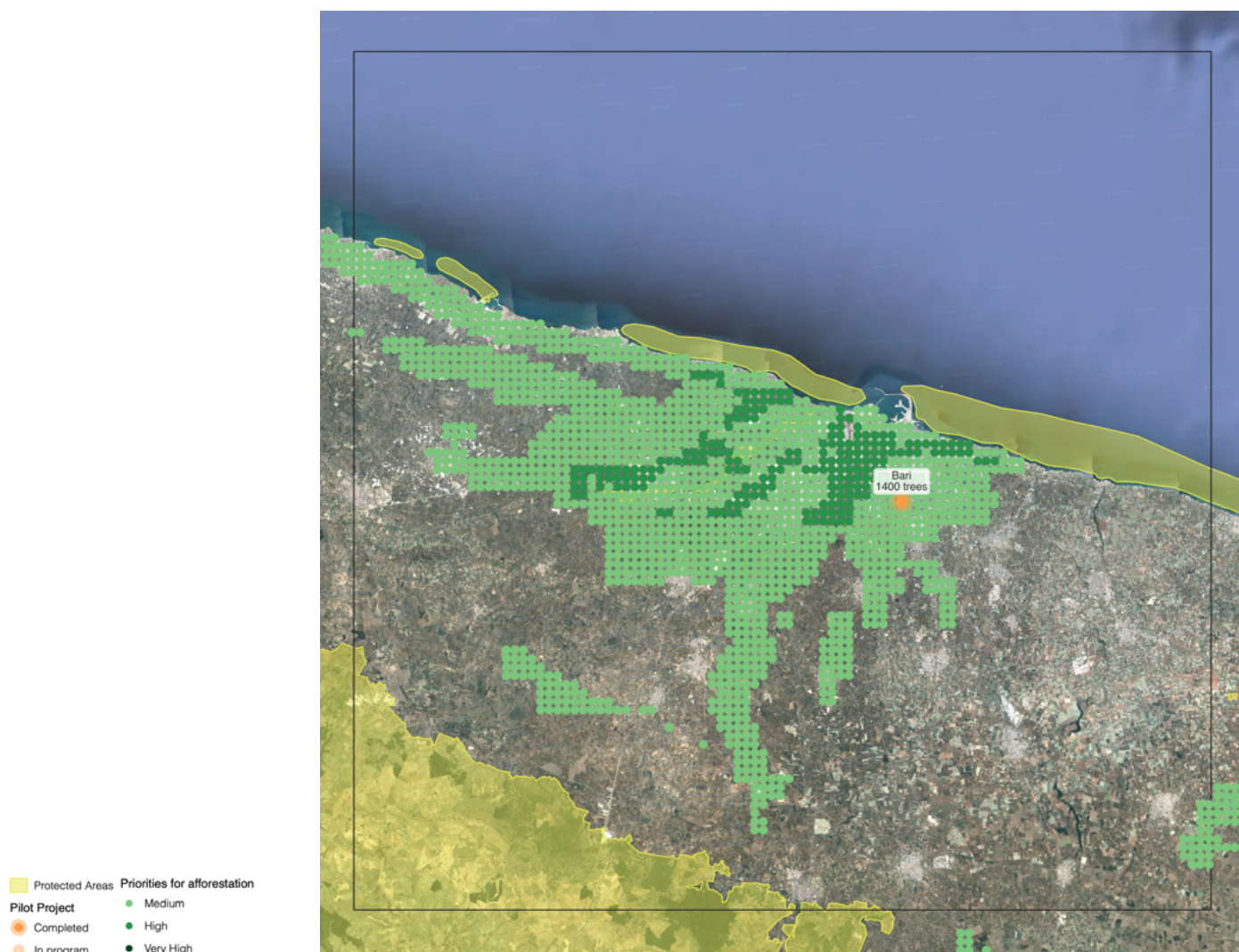
Species: *Quercus robur*, *Populus alba*, *Tilia cordata*, *Acer campestre*, *Carpinus betulus*, *Fraxinus ornus*, *Ulmus minor*, *Cornus mas*, *Corylus avellana*, *Elaeagnus umbellata*, *Euonymus europaeus*, *Frangula alnus*, *Ligustrum vulgare*, *Prunus spinosa*, *Pyrus pyraster*, *Rhamnus cathartica*, *Viburnum lantana*, *Viburnum opulus*



Nemoli, Basilicata

Number of trees planted: 1,250

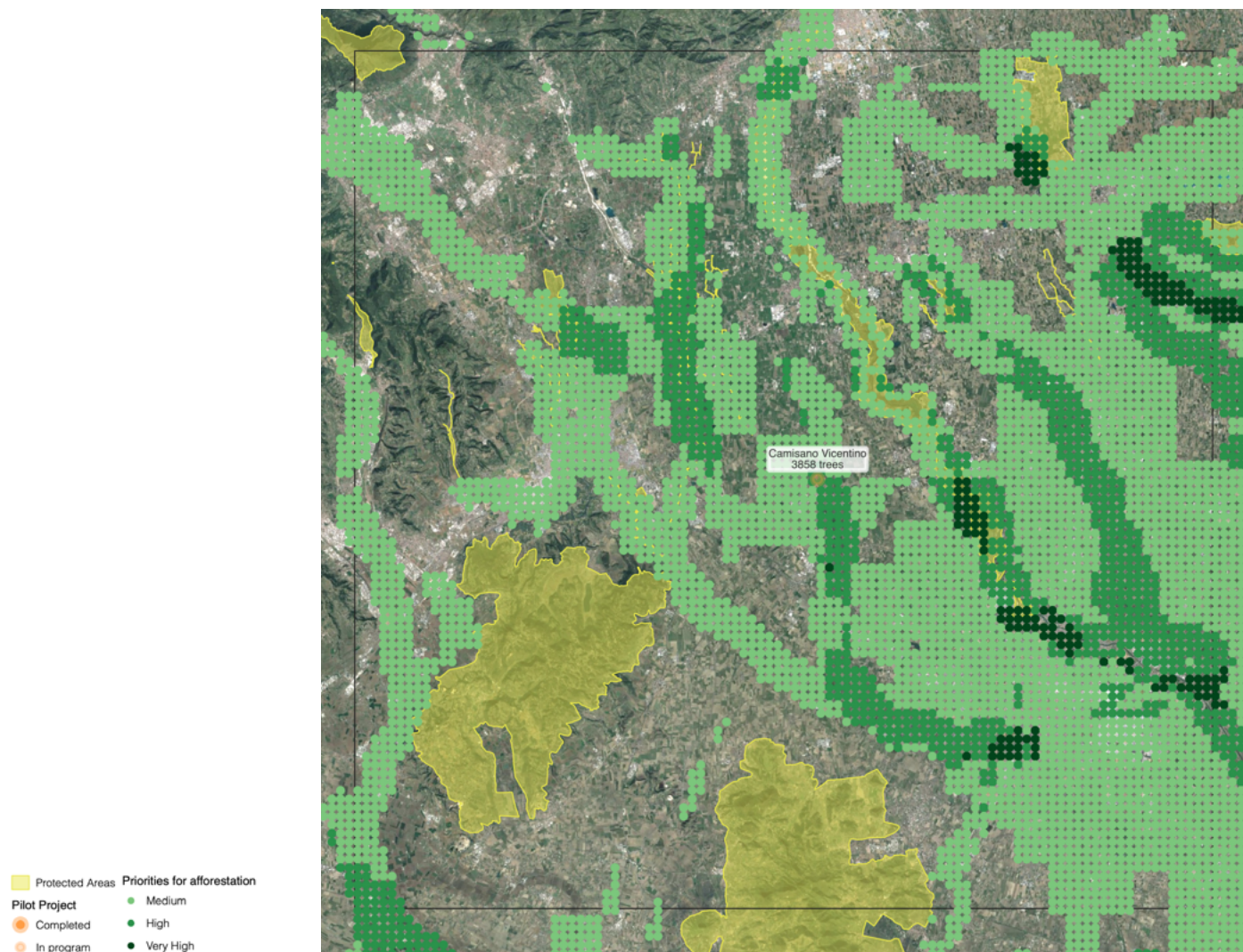
Species: *Acer pseudoplatuanus*, *Castanea sativa*, *Corylus avellana*, *Fraxinus ornus*, *Juglans regia*, *Populus nigra*, *Pyrus pyraister*, *Quercus ilex*, *Sorbus domestica*, *Sorbus torminalis*, *Tilia cordata*, *Tilia platyphyllos*, *Arbutus unedo*, *Crataegus monogyna*, *Rosa canina*



Bari, Puglia

Number of trees planted: 1,400

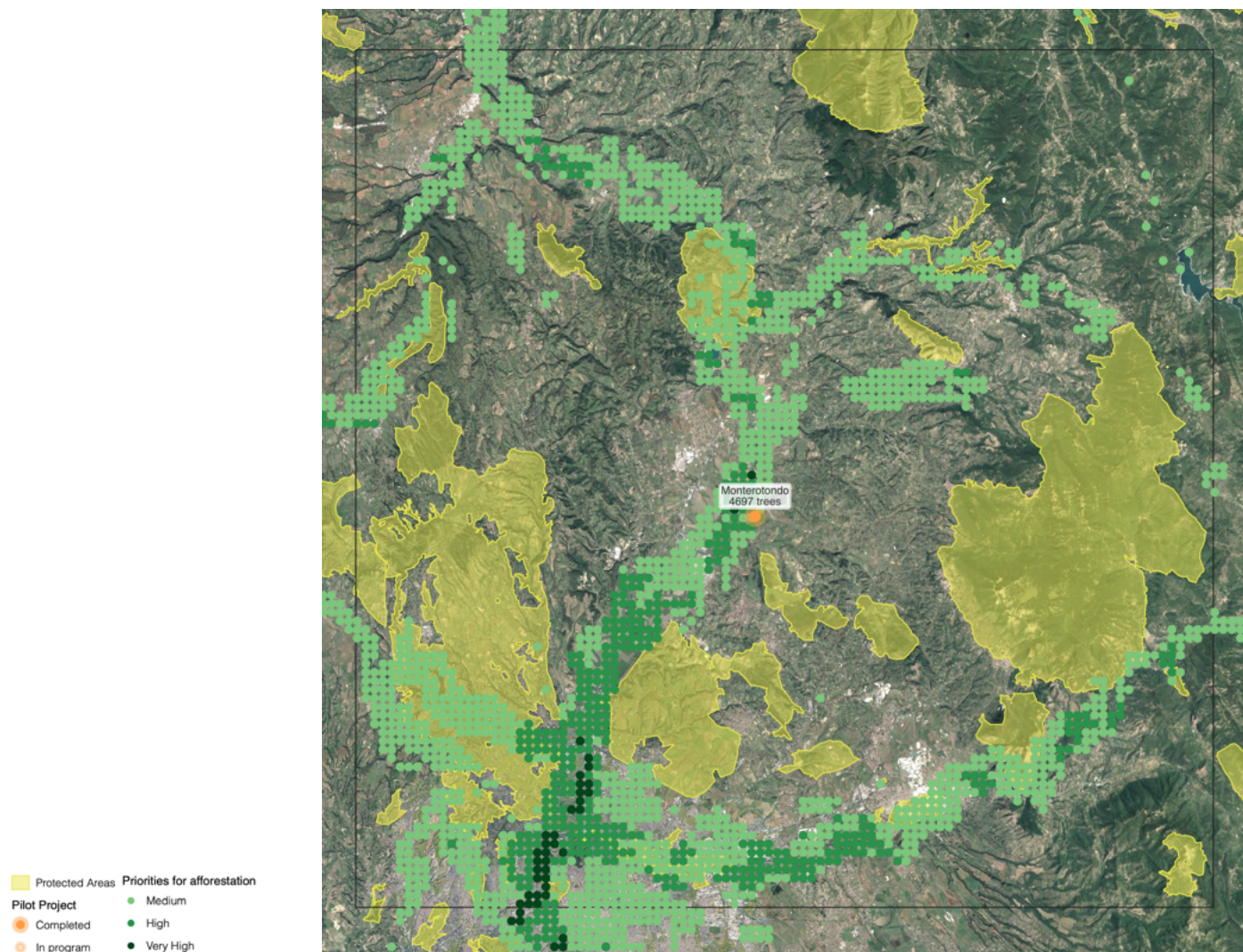
Species: *Celtis australis*, *Ceratonia siliqua*, *Quercus ilex*, *Quercus suber*, *Myrtus communis*, *Pistacia lentiscus*, *Quercus coccifera*, *Rhamnus alaternus*



Camisano Vicentino, Veneto

Number of trees planted: 3,858

Species: *Acer campestre*, *Acer platanoides*, *Alnus glutinosa*, *Carpinus betulus*, *Castanea sativa*, *Celtis australis*, *Crataegus azarolus*, *Eleagnus angustifolia*, *Fraxinus angustifolia*, *Fraxinus excelsior*, *Fraxinus ornus*, *Juglans regia*, *Malus sylvestris*, *Mespilus germanica*, *Morus alba*, *Morus nigra*, *Ostrya carpinifolia*, *Platanus acerifolia*, *Populus alba*, *Populus nigra italica*, *Prunus avium*, *Prunus mahaleb*, *Prunus padus*, *Pyrus pyraister*, *Quercus robur*, *Quercus pubescens*, *Amelanchier ovalis*, *Buxus sempervirens*, *Cornus mas*, *Cornus sanguinea*, *Cercis siliquastrum*, *Corylus avellana*, *Crataegus monogyna*, *Euonimus europaeus*, *Frangula alnus*, *Hippophae rhamnoides*, *Ilex aquifolium*, *Laburnum anagyroides*, *Ligustrum vulgare*, *Laurus nobilis*, *Lonicera xylosteum*, *Malus sylvestris*, *Paliurus spina Christi*, *Prunus mahaleb*, *Prunus spinosa*, *Pyrus pyraister*, *Quercus ilex*, *Rhamnus cathartica*, *Rosa canina*, *Salix caprea*, *Salix purpurea*, *Salix viminalis*, *Sambucus nigra*, *Cornus sanguinea*



Monterotondo, Lazio

Number of trees planted: 3,766

Species: *Populus alba*, *Acer campestre*, *Quercus ilex*, *Fraxinus ornus*, *Celtis australis*, *Ostrya carpinifolia*, *Quercus pubescens*, *Quercus suber*, *Arbutus unedo*, *Spartium junceum*, *Cornus mas*, *Crataegus monogyna*, *Mespilus germanica*, *Viburnum tinus*

4.4 Bank of Tree Places

In our pursuit of monitoring and systematically evaluating suitable land for tree planting, we have developed an extensive database known as the 'Bank of Tree Places.' This database is structured to categorize lands based on region, typology and ownership, creating a comprehensive inventory of potential tree planting sites.

- **Scope and Coverage.** The 'Bank of Tree Places' currently comprises a rich repository of land data, totaling approximately 500 hectares of available land across diverse regions. These lands encompass both private and public ownership, with most of the identified areas situated in northern Italy.
- **Functionalities and Objectives:** The primary objective of this database is to streamline the process of identifying, assessing, and selecting appropriate sites for tree planting initiatives. By grouping lands based on geographic region, land type and ownership status, we gain valuable insights into the landscape's suitability for various tree species and afforestation goals. The database serves as a dynamic tool for environmental planning, affording us the ability to make data-informed decisions regarding afforestation and reforestation projects.
- **Benefits and Future Expansion:** The 'Bank of Tree Places' provides numerous advantages, including the efficient allocation of resources, improved project planning and the ability to prioritize locations for tree planting based on environmental considerations, community engagement and overall project objectives. As we continue to expand our reach and partnerships, we anticipate the continued growth of this database, encompassing a wider geographic range and an even more diverse array of land typologies.
- **Regional Focus:** While a substantial portion of the identified land is currently concentrated in northern Italy, our efforts are ongoing and we remain committed to extending our reach to other regions, ensuring a comprehensive overview of potential tree planting sites throughout Italy.
- **Community Engagement:** Furthermore, this database serves as a valuable tool for engaging with local communities, landowners and stakeholders, fostering collaboration and participation in our tree planting endeavours. It opens doors to dialogue and cooperative efforts aimed at enhancing biodiversity, carbon sequestration and ecological resilience in the regions we serve.

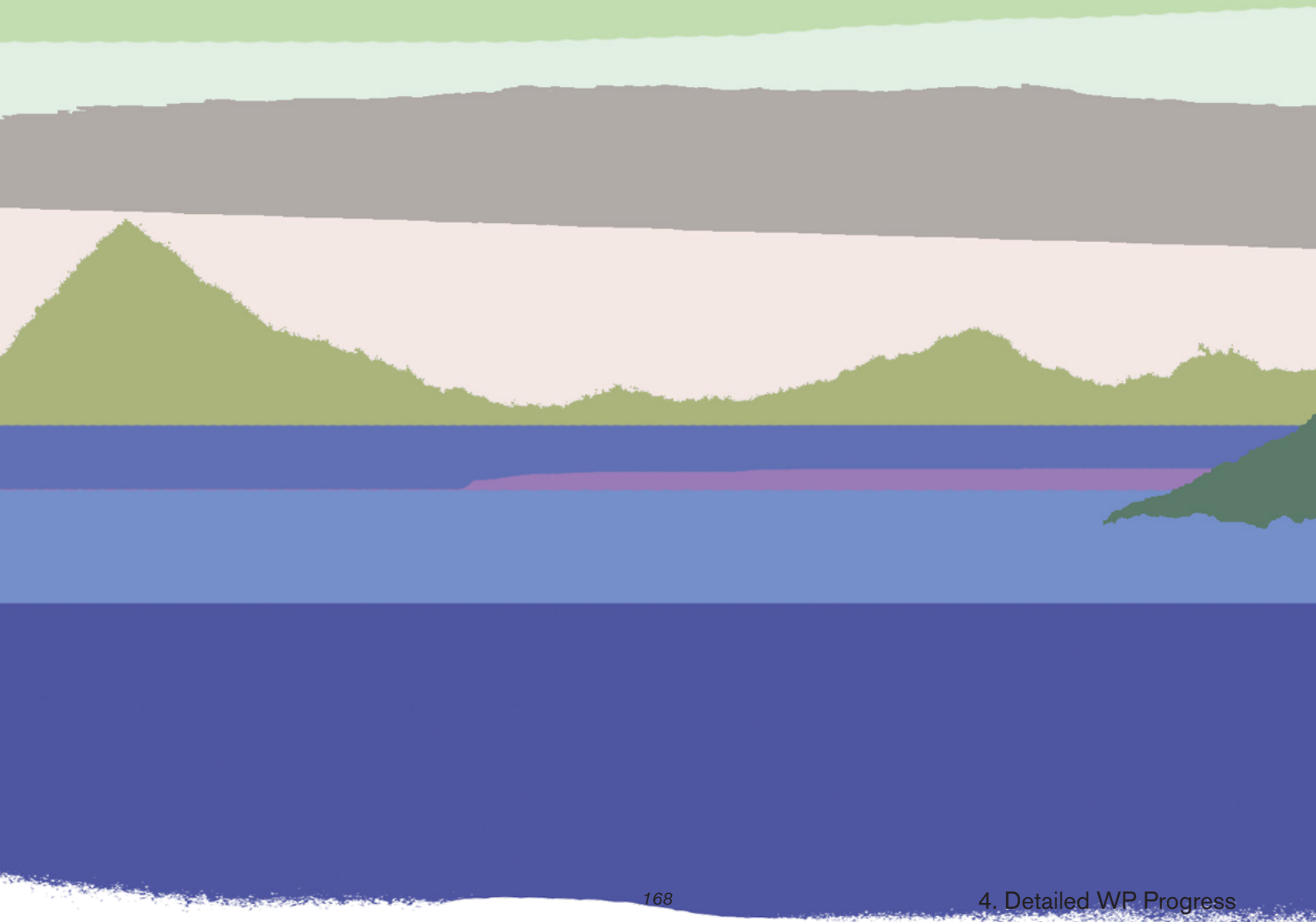
Sensitive information related to land ownership, property details and geographical coordinates is inherently confidential. Grouping records by region allows us to compartmentalize this data, limiting access to authorized personnel only. Hence, to address these concerns we have chosen to present the data in an aggregated format, visually represented in figures (Map 42) categorized by region. The database excludes those areas in which we are already implementing reforestation and afforestation projects.



Map 42. Bank of tree places

WP5

Definition of goals related to ecosystem services (ESS) and construction of indicators to assess the impact of implemented strategies



5.1 Introduction.

The purpose of WP5 is the selection of indicators for climate and environmental regulation, biodiversity, cultural services and social benefits provided by urban forests. These indicators have been collected and reviewed from the scientific literature and existing policy documents. They have been used to define the ESS and KPI that Parco Italia wants to address for evaluating the benefits and goals of the single interventions and, subsequently, of the whole project. Furthermore, the first shortlist of indicators for assessing the impact of pilot plantations has been drafted together with expected thresholds for success.

5.2 Definition of urban and peri-urban afforestation benefits (ESS), construction of Key Performance Indicators (KPI) for the planting interventions' impact assessment.

We expect to reach the following environmental objectives from the 70,000 trees that will be planted:

- At least 70 hectares of prospective new forests created, the definition of Forests according to Italian Legislative Decree 34/2018 regards >20% canopy cover, >2,000 square meters in area, >20 mts in width, in the first three years, assuming a survival rate of at least 1,000 trees per hectare (average tree density in Italian forests is 1,383 trees per hectare, source: Italian Forest Inventory 2005)
- Effective canopy cover after three years in plantation areas >5% in the first three years, >20% after year 10. Assumption: we expect growth of tree crowns up to a mean lateral of >40 cm in three years and >80 cm in 10 years¹. Mean tree height : >2 mts after three years, >6 mts after 10 years²
- CO₂ sequestration: 6 ton CO₂ per hectare in the first 10 years, and a 11-15 ton CO₂ per hectare removed annually after 10 years²
- Air pollution removal: 15 kg PM₁₀ removed annually by each hectares of the forest after 10 years³ Thermal comfort: 0.5-2.0 °C cooling on average across the year within 100 mts from the forest edge relative to non forested areas after 10 years⁴.

Social benefits provided by Parco Italia from the pilot plantations (70,000 trees) will include:

- Jobs directly created for planting and tending: 3.500 man-hr (two full-time units) in the first three years (source: assuming 50 man-hours per hectare of plantation, including site preparation, planting, and tending in the first three years)
- Recreational use of planted sites: 11,000-22,000 annual accesses from year 10 (source: assuming 500-1,000 visits per year in an average-sized 3-ha forest plantation lot).

1. Criteria for the legal definition of forests. Italian D.Lgs. 34/2018 "Testo Unico sulle Foreste e Filiere Forestali)

2. Magnani et al. 2005, <https://doi.org/10.3832/efor0320-0020333>, Fig. 7: observed height of different tree species in mixed hardwood afforestation in the Po Plains, age 0-30)

3. Bottalico et al. 2016, <https://www.sciencedirect.com/science/article/pii/S2210784316300997>, Table 2: removal of PM₁₀ in deciduous broadleaf urban afforestation in Italian cities is 15.2 kg per hectare).

4. Abdi et al. 2020, <https://www.sciencedirect.com/science/article/pii/S221067072030072X>

5.3 Findings.

The array of ecosystem services to be monitored in new forests planted by Parco Italia reveals an extensive and comprehensive set of indicators targeting key areas such as climate and environmental regulation, biodiversity, cultural services and social benefits. The projected establishment of at least 25,000 of prospective new forests in the full project implementation will lead to significant outcomes, including effective canopy cover growth, considerable CO₂ sequestration, air pollution removal, enhanced thermal comfort, job creation and recreational use.

The Economics of Ecosystems and Biodiversity (TEEB) classifies ecosystem services into three main categories: Provisioning, Regulating and Cultural. Let's consider how the indicators and objectives of the Parco Italia project align with these categories:

- **Provisioning Services:** While the primary focus of the Parco Italia initiative is on regulating and cultural services, the project indirectly contributes to provisioning services. The planned growth and effective management of the forests could foster biodiversity, support soil fertility, and enhance water quality.
- **Regulating Services:** The Parco Italia project emphasizes several key regulating services, including CO₂ sequestration, air pollution removal and thermal comfort regulation. These aspects align well with the TEEB framework, showcasing a commitment to leveraging urban forests for climate and environmental regulation. The quantitative targets set for these services, based on well-researched sources, signify a well-informed approach to achieving and monitoring these critical regulating functions.
- **Cultural Services:** The initiative also includes indicators related to cultural services, particularly the recreational use of planted sites. The expectation of 11,000 - 22,000 annual accesses from year 10 underlines the social and cultural importance of urban forests. Furthermore, the job creation aspect, although primarily economic, can also contribute to social cohesion and community engagement, reinforcing the cultural services dimension.

The selection of indicators aligns well with current scientific literature and policy documents, encompassing a range of both environmental and social parameters, balancing a robust methodological design with practical feasibility at both local and national scales. The inclusion of provisioning services might not be as explicit or central to the project's design, but the broader implications of forest growth and management indirectly address this category. To sum up, the project illustrates a strong commitment to multifaceted monitoring and presents a promising model that could serve as a reference for similar urban forest initiatives worldwide.

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Monitoring and testing activities of indicators and ecosystem services (ESS) through sensor technology and mapping on representative pilot projects

6.1 Introduction.

To date, most tree-planting projects in Italy have not had robust ways of monitoring their success and measuring their outcomes. We want to take a best-in-class approach to ensure all trees planted as part of Parco Italia are successful, and their positive environmental and social outcomes are fully realised.

6.2 Methodologies for monitoring planting success and ecosystem services in the field

Tree survival, planting area and health status: the foremost indicator of plantation success is the survival of planted trees, without which expected ecosystem services can not be delivered. Tree plantations usually experience some mortality in the first years due to transplant damage, failure of root establishment, and unexpected disturbances such as drought or herbivory. We expect mortality to affect <5% of planted trees in pilot areas¹ and <10% in the whole Parco Italia project. To monitor tree survival, we will carry out field visits every 6 months to check tree health and survival status. Mortality is expected to be <5% in the first three years; all dead seedlings will be replaced.

Following successful establishment, tree growth must be ensured in order for the plantation to deliver expected ecosystem services at maturity. Growth is monitored by measuring dimensional tree characteristics (average and statistical distribution), such as stem diameter at breast height, total tree height, and crown radius. The sum of all tree crown areas in the plantation, divided by available land area, produces an estimate of percent canopy cover². Crown area and tree height will be measured by field visits every 6 months on a representative sample of trees in each plantation lot. Canopy cover will be computed from field measurements of crown area.

Two of the most relevant ecosystem services for environmental regulation in urban and periurban areas are CO₂ sequestration and air pollution removal. CO₂ effectively sequestered (individual tree aboveground and belowground net primary productivity, NPP) will be calculated yearly from field measurements of tree diameter at breast height and stem height, using species-specific allometric equations, biomass expansion factors, wood density, and carbon density coefficients, sourced from available databases (e.g., at the national level: Vitullo and Federici 2007³), consistently with methods from the IPCC Guidelines for GHG accounting in agricultural, forests and other land uses⁴.

The first six-month monitoring will be carried out before the end of June 2023 in the sites of Chivasso, Giulianova, Loreto Aprutino and Torrevecchia Teatina by recording the survival status of all planted trees and health and size of a sample of 10% trees per site.

1. Stanganelli 2014, <http://www.ogliosud.it/pdf/2014.FERRE.Suolo.produz.biomassa.latifoglie.pdf>, Tables 7-12: mortality in mixed broadleaf plantations in the Po Plain between 0 and 5% in the first 10 years)

2. Terzuolo et al. 2016, *Sherwood* 222: 7-10, <https://iris.unito.it/handle/2318/1614163>)

3. Vitullo and Federici 2007, https://www.researchgate.net/publication/292413958_La_contabilita_del_carbonio_contenuto_nelle_foreste_italiane_National_carbon_account_in_Italian_forests

4. <https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4>

Measure	Monitoring technique (Basic)	Monitoring technique (Advance)	Target Parco Italia	Target for 70,000 trees planted	Reference
# Of trees planted	field tree count after plantation	-	22 million	70,000	own hypothesis
Hectares planted	field area measurement after plantation	-	25,000 to 40,000	70	own hypothesis
Tree survival rate	field tree count every 6 months	-	90% after three years	95% after three years	Stanganelli 2014 - Mortality in mixed broadleaf plantations in the Po Plain between 0 and 5% in the first 10 years
Tree health	visual assessment of 10% of trees every 6-months	satellite-based estimates of infrared reflectance (NDVI, NDWI) at 3 and 10 mts resolution (yearly, at peak of growing season)	no decline in tree health metric over the first ten years	no decline in tree health metric over the first ten years	own hypothesis
Tree growth	height measurement on 10% trees every 12 months		mean tree height: >2mt after three years, >6mt after 10 years	mean tree height: >2mt after three years, >6mt after 10 years	Magnani et al. 2005. Observed height of different tree species in mixed hardwood afforestation in the po plants, age 0 - 30
Canopy cover	crown radius measurement on 10% trees every 12 months	satellite-based leaf area index at 3 and 10 mt resolutions (yearly, at peak of growing season)	canopy cover>5% after 3 years, >20% after 10 years	canopy cover>5% after 3 years, >20% after 10 years	own hypothesis (20% in the minimum threshold for forest land use D.Lgs 34/2018)
CO ₂ sequestration	allometric equations based on tree height, every 12 months		6 ton CO ₂ per ha in the first 10 years, and 11-15 ton CO ₂ per hectare removed annually after 10 years	6 ton CO ₂ per ha in the first 10 years, and 11-15 ton CO ₂ per hectare removed annually after 10 years	Magnani et al. 2005. Range of overall CO ₂ sequestration modeled for mixed hardwood afforestation in the Po Planis age 0-30
PM ₁₀ removal		AirTREE model, based on tree height (developed by National Research Council CNR), at month 12	15 kg PM ₁₀ removed annually by each hectare of the forest after 10 years	15 kg PM ₁₀ removed annually by each hectare of the forest after 10 years	Bottalico et al 2016. Removal of PM ₁₀ in deciduous broadleaf urban afforestation in Italian cities is 15.2 kg per ha
Thermal cooling	satellite-based land surface temperature at 30 and 100 mt resolution	on-site continuous thermal sensors	0.5 - 2.0°C cooling within 100 mt from each forest after 10 years	0.5 - 2.0°C cooling within 100 mt from each forest after 10 years	Abdi et al. 2020
Habitat quality	change in landscape connectivity measured by spatial analysis software	number and type of available tree microhabitats	5% increase in forest connectivity nationwide	5% increase in forest connectivity for larger landscapes	Own hypothesis
Working man-hours	survey to planting and tending companies	-	1.25 - 2 million man hours created in the first three years	4.000 - 6.000 man hours created in the first three years	assuming 50 man-hours per hectare of plantation, including site preparation, planting, and tending in the first three years
Recreational use	survey to local communities	-	3.0 - 6.0 M visits annually in al sites from year 10	10.000 - 20.000 annual accesses from year 10	assuming 500 - 1.000 visits per year in an average-sized 3ha forest plantation lot

Table 9. Monitoring methods and target values for the pilot phase of Parco Italia

6.3 First results from monitoring pilot sites planted in 2022-23

Between June 24th and 29th, we monitored survival, tree growth and tree health (on a sample of 10% of the trees) in eight plantations after the first semester since establishment. The plantation included 4,695 trees in total. In Giulianova, Torrevecchia and Loreto Aprutino tree survival was higher than 98%, and average tree health was between 4.4 and 4.8 on a scale of 0 (dead tree) to 5 (full vigor).

Among species with a sufficient sample size, only *Crataegus* showed limited vigor (3.7) in the site of Torrevecchia. Average tree height varied widely depending on the species, ranging from 18 (*Quercus pubescens*) to 110 cm (*Populus alba*), but no criticalities were detected. On the other hand, the plantation in Chivasso exhibited a lower survival rate (41%) and tree vigor (average score: 3 on a scale of 0 to 5). Particularly concerning were the mortality rates of *Malus sylvestris*, *Alnus glutinosa*, *Salix*, *Prunus avium* and *Mespilus germanica*, all above 50%. On the other hand, *Cornus mas* and *Morus alba* showed a high survival rate (95%). Most species had a health score lower than 4, with the exception of *Tilia cordata* and *Cornus mas*. The likely reason for the worse performance of this plantation was the prolonged and severe drought that hit northwestern Italy, and Piedmont in particular, during 2022-2023. This exceptional event was described as having a 200 to 500 year return interval; despite irrigation and post-planting care, tree health and survival was heavily impacted in the first months of 2023. Dead trees will be replaced with newly planted seedlings, choosing the species according to their performance in face of heavy drought.

No results are yet available on tree growth, canopy cover, and CO₂ sequestration, as the first monitoring is scheduled 12 months after plantation.

The climate crisis is prolonging the severity and duration of drought, especially in European Mediterranean countries including Italy. Young trees are particularly sensitive to drought due to their still underdeveloped root systems. Water-stressed trees may incur carbon starvation, hydraulic failure, attack by secondary pathogens, and ultimately death. Future scenarios of drought for the Mediterranean basin and Italy in particular, indicate a worrisome trend of increasing aridity and water scarcity.

Climate projections suggest a rise in temperatures and a decline in summer rainfall, exacerbating the frequency and severity of drought events during the plant growing season. These prolonged and intensified droughts pose significant challenges to forests, leading to reduced tree growth, increased mortality rates, and heightened vulnerability to pests and diseases. Plans for new afforestation planting may face setbacks as the survival and establishment of young trees become more challenging under harsher climatic conditions.

To improve the resilience of new forests to the expected increase in drought duration, frequency and severity, Parco Italia is exploring several potential actions to be implemented. These include selecting drought-tolerant tree species and provenances that are better adapted to the changing climate, based on state-of-the-art science⁵ and ongoing monitoring of species-specific performance in pilot plantations, reinforcing the need for efficient irrigation during the establishment phase in planting contracts to ensure proper root development and survival, modifying requirements for mowing and vegetation control during summer seasons (higher grass might actually mitigate high temperatures and evaporative stress on young tree seedlings), and experimentation of drought alleviation technologies such as the use of hydrogel in planting sites. Additionally, adopting mixed-species afforestation projects can enhance the ecosystem's capacity to withstand

5. <https://www.seed4forest.org/>)

drought impacts, based on positive tree-to-tree facilitation and ecological trait complementarity. Promoting soil conservation practices, such as mulching and reduced soil disturbance during plantation establishment, will also help retain moisture and improve overall soil health, further enhancing forest resilience to water stress.

Furthermore, fostering community engagement and awareness in forest management and conservation can create a sense of ownership and responsibility, leading to more effective monitoring and adaptation strategies in the face of future drought challenges.

6.4 Outlook on advanced monitoring and testing of KPI and ESS provided by Parco Italia (sensor technology and mapping)

After the first year, advanced monitoring by sensor technologies and remote sensing will be implemented at all plantation sites, according to the following methodologies:

- Tree health (e.g., response to drought) will be monitored by yearly satellite imagery (at the peak of the growing season) at 3 and 10 mts resolution by checking the trend in infrared-based reflectance indices NDVI (Normalized Difference Vegetation Index) and NDWI (Normalized Difference Water Index) to detect early signals of physiological stress⁶
- Canopy cover will be also quantified by Leaf Area Index from satellite-based optical sensors at yearly frequency (at the peak of the growing season) with 3 and 10 mts resolution.
- Pollution removal will be modelled for each plantation at the individual tree level at month 12 using the AIRtree computer model⁷ in collaboration with CNR and GeoLab, University of Florence.
- Forests also have the ability to cool down air temperatures within a certain distance from their growing site, thanks to shading effects that filter the overheating solar radiation and enriching the phyllosphere with water vapour thanks to the evapotranspiration fluxes that additionally cause micro-turbulences in the atmosphere close to the canopy and in this way provoke a substantial turnover of warmer air. Thermal cooling in plantation lots will be monitored by analysis of yearly satellite-based estimates of land surface temperature (LST) at 30 and 100 mts resolution for within- and outside-plantation representative sites.
- Improvements for biodiversity will be assessed by calculating before- and after-plantation degree of forest connectivity in and around the plantation sites. Connectivity metrics, derived from this process, offer quantifiable measures of how areas within a landscape are linked. These include metrics for structural connectivity, like the size, number and distribution of patches or corridors, and functional connectivity, which considers species' movement behavior and habitat preferences. Improved forest connectivity means enhanced potential for species movement, gene flow, and ecosystem resilience, all critical in urban forestry scenarios. Using high-resolution pre- and post-plantation satellite imagery, we will segment and classify the landscape into distinct features, such as forested areas, potential corridors and barriers by using Morphological Spatial Pattern Analysis (MSPA). Comparisons of pre- and post-plantation MSPA outputs will quantify connectivity changes, helping visualize the plantations' impact.
- Jobs and working man-hours will be recorded in collaboration with companies in charge of planting and tending at different sites. Recreational

6. Marusig et al. 2020, <https://www.mdpi.com/1999-4907/11/1/77>

7. Fares et al. 2019, <https://pubmed.ncbi.nlm.nih.gov/31129537/>

use will be monitored by direct measurement of accesses during multiple sampling periods across the year and complemented by surveys carried out among the local population regarding the access and type of use of the newly created forest, developed in collaboration with local institutions.

Results of the monitoring by June 2023

Chivasso Pilot Project

Species	Planted	Survival	Mean height (m)	Health (0-5)
<i>Quercus robur</i>	18	72%	0,45	2,00
<i>Morus alba</i>	42	95%	1,21	3,00
<i>Malus sylvestris</i>	36	56%	1,35	3,00
<i>Alnus glutinosa</i>	60	50%	1,17	3,67
<i>Ligustrum vulgare</i>	86	73%	0,53	3,17
<i>Cornus mas</i>	60	95%	0,68	4,00
<i>Viburnum opulus</i>	202	74%	0,48	3,47
<i>Populus alba</i>	156	73%	1,74	3,36
<i>Prunus avium</i>	40	50%	1,30	3,00
<i>Salix spp.</i>	2152	32%	1,17	2,77
<i>Tilia cordata</i>	20	60%	0,80	4,00
<i>Mespilus germanica</i>	28	4%	n.d.	n.d.
Total	2900	41%	1,08	3,03

Torrevecchia Pilot Project

Species	Planted	Survival	Mean height (m)	Health (0-5)
<i>Acer campestre</i>	30	100%	0,52	5,00
<i>Carpinus betulus</i>	30	100%	0,75	5,00
<i>Crataegus spp.</i>	50	100%	0,40	3,68
<i>Morus alba</i>	10	100%	0,60	5,00
<i>Ostrya carpinifolia</i>	30	100%	0,51	4,80
<i>Quercus petraea</i>	130	95%	0,52	4,42
<i>Quercus robur</i>	130	96%	0,54	4,43
<i>Sorbus domestica</i>	30	100%	0,83	4,50
<i>Sorbus torminalis</i>	30	100%	0,70	5,00
<i>Tilia cordata</i>	30	100%	0,50	4,50
<i>Tilia platyphyllos</i>	30	100%	0,50	5,00
Total	530	98%	0,54	4,39

Loreto Aprutino Pilot Project

Species	Planted	Survival	Mean height (m)	Health (0-5)
<i>Acer campestre</i>	38	100%	0,45	5,00
<i>Alnus glutinosa</i>	25	100%	0,55	5,00
<i>Carpinus betulus</i>	38	100%	0,65	4,75
<i>Crataegus spp.</i>	6	100%	0,85	5,00
<i>Fraxinus angustifolia</i>	38	100%	0,40	4,67
<i>Fraxinus ornus</i>	31	100%	0,50	5,00
<i>Populus alba</i>	25	100%	0,73	5,00
<i>Prunus avium</i>	6	100%	0,40	5,00
<i>Quercus petraea</i>	188	100%	0,51	4,73
<i>Quercus pubescens</i>	188	100%	0,18	4,75
<i>Quercus robur</i>	188	100%	0,35	4,85
<i>Salix alba</i>	25	100%	0,83	5,00
<i>Sorbus torminalis</i>	38	100%	0,36	5,00
<i>Tilia cordata</i>	38	100%	0,26	4,45
<i>Tilia platyphyllos</i>	38	100%	0,39	4,43
Total	910	100%	0,39	4,77

Giulianova Pilot Project

Species	Planted	Survival	Mean height (m)	Health (0-5)
<i>Parco cerulli</i>				
<i>Fraxinus angustifolia</i>	25	100%	0,67	4,72
<i>Sorbus domestica</i>	25	100%	0,66	4,64
<i>Total</i>	50	100%	0,67	4,68
<i>via chieti</i>				
<i>Pyracantha coccinea</i>	50	100%	0,80	4,68
<i>Total</i>	50	100%	0,80	4,68
<i>santuario</i>				
<i>Acer campestre</i>	15	100%	0,61	4,80
<i>Alnus glutinosa</i>	2	100%	0,55	4,50
<i>Fraxinus ornus</i>	5	100%	0,66	4,60
<i>Fraxinus angustifolia</i>	8	100%	0,74	4,50
<i>Malus spp.</i>	4	100%	0,40	2,50
<i>Ostrya carpinifolia</i>	10	100%	0,39	4,70
<i>Populus alba</i>	1	100%	1,10	5,00
<i>Pyrus spp.</i>	3	100%	0,30	3,33
<i>Quercus petraea</i>	27	100%	0,65	4,48
<i>Quercus pubescens</i>	39	100%	0,21	4,87
<i>Quercus robur</i>	17	100%	0,44	4,29
<i>Sorbus domestica</i>	8	100%	0,88	4,50
<i>Sorbus torminalis</i>	9	100%	0,62	3,00
<i>Tilia cordata</i>	7	100%	0,43	4,29
<i>Tilia plathyphyllos</i>	2	100%	0,30	4,50
<i>Total</i>	157	100%	0,49	4,51
<i>Giulianova - Salinello</i>				
<i>Alnus glutinosa</i>	5	100%	0,64	4,80
<i>Carpinus betulus</i>	11	91%	0,61	4,36
<i>Fraxinus angustifolia</i>	8	100%	0,99	5,00
<i>Ostrya carpinifolia</i>	3	100%	0,37	4,33
<i>Pinus halepensis</i>	19	100%	0,28	4,47
<i>Populus alba</i>	5	100%	1,04	4,80
<i>Quercus petraea</i>	13	100%	0,65	4,54
<i>Quercus robur</i>	31	100%	0,57	4,58
<i>Sorbus domestica</i>	1	100%	1,00	5,00
<i>Tilia plathyphyllos</i>	2	100%	0,30	4,50
<i>Total</i>	98	99%	0,59	4,58

6.5. Documentation of pilot projects

Pilot Project Chivasso, TO, Piedmont







Pilot Project Motteggiana, MN, Lombardy







Pilot Project Torre del Greco, NA, Campania







Pilot Project Torrevecchia teatina, CH, Abruzzo







Pilot Project Loreto Aprutini, PE, Abruzzo



Pilot Project Giulianova, TE, Abruzzo











**Communication and participation strategies
for the enhancement and extension of green
areas and green systems**



7.1 Introduction.

A vital element of the Parco Italia afforestation project is to build effective publicity and communication strategies to position the project's research findings and knowledge advancements internationally in the scientific sectors and engage a broader audience. Chapter 7 describes the communication and valorization process developed explicitly for the Parco Italia project and lists all the publications, international conferences, and events where the project has been successfully narrated and released.

7.2 The communication plan.

Communication will play a decisive role in the success of the Parco Italia Project, above all concerning its ambitions and potential on a national scale.

Parco Italia is a nationwide project that needs a coherent narrative involving all stakeholders and helping establish solid territorial and environmental awareness. Parco Italia is a project that looks at the long term. It will probably see its full realization in the coming decades, stimulating change in the Italian urban and extra-urban forest landscape. The communication and promotion of such an ambitious project have necessarily had to follow from its initial phase to its evolution and enhancement; the Project itself will continue to improve and constantly evolve. It will be an essential legacy for projects and generations to come.

Communication and promotion strategies dedicated to the Parco Italia project were, therefore, mainly divided into two areas:

- The first area concerns the spreading and advancement in knowledge within the sectors of urban planning, urban forestry and governance.
- The second regards the popularising of, awareness of, participation and engagement with the Project by a broader audience (citizens, institutions, public and private companies) to stimulate the cultural shift toward a greener and more biodiverse environment.

Objectives of the Parco Italia Communication Plan:

- Involve all stakeholders in the plantation projects throughout Italy.
- Become the leading Italian advocacy project for the country's environmental values, climate and sustainability challenges, building an ambitious plan also thanks to the network of Media Partnerships.
- Become an international best practice to share knowledge and experience on urban and peri-urban forestry, positioning Italy as a country with high biodiversity standards.

- Stimulate private-public partnerships on afforestation activities and management.
- Raise awareness of the scientific knowledge and principles underlying Parco Italia.
- Generate an active community close to the project's topics and raise awareness and participation.

Outputs and core activities of the Parco Italia Communication Plan:

- New Parco Italia Website
- Production of Parco Italia Brochures, Flyers, and Gadgets for the public dissemination of the project
- Project preview: Parco Italia corner, within Swing (Stefano Boeri Interiors installation at FuoriSalone, in Università degli Studi di Milano Statale during Milan Design Week 2023). The preview of Parco Italia within a context of extreme media and public visibility such as Milan Design Week - FuoriSalone, helped to give weight to the project, which was also taken up by international publications. The installation provided both an opportunity for a preview of the contents and the launch of the website, thus beginning to strengthen the knowledge base related to the project online and offline.
- Press conferences and press activity: Together with the media support during the first project phase, a press conference can take place on the occasion of the project's kick-off. During the whole project, interviews and articles about the Project are encouraged and supported, also in terms of content monitoring.
- Events: Tree Planting campaigns and Territorial Storytelling: Planting events involving local administrations and the local community (involving schools, universities or agricultural institutes) - for a total of 7 tree planting areas. These stories of local territories are part of the overall Communication Plan through videos of planting events, pictures, interviews, etc.;
- Parco Italia Biodiversity Walks: The Biodiversity walks are a program (consisting of three videos, duration: 15 min each; and the Parco Italia trailer, duration: 2 min max) conceived as a tool for the promotion of the territories, their biodiversity (flora and fauna), and spreading awareness of the Parco Italia project. The Biodiversity walks are dialogues between experts on various topics related to the unique features and issues of the different landscapes and territories covered by the paths. The Parco Italia team identified three walking sites for their unique characteristics (1. Cratere degli Astroni Natural Reserve, Naples, Campania; 2. Montes Forest, Orgosolo, Sardinia; 3. Bosco della Mesola and Po Delta Park, Ferrara, Emilia Romagna) where, for each location, a guest expert is in dialogue with a representative of Stefano Boeri Architetti or AlberItalia Foundation.
- Social Media Channels coverage (Instagram, Twitter, Facebook, website) - with defined media coverage depending on the project phases and the events. The project has been posted on the social channels of Stefano Boeri Architetti with the aim of enhancing the project within an already established and strong community attentive to the issues of environmental sustainability and urban forestry.
- "Parco Italia" specific social media accounts, which will share the same contents as partners' social media accounts (starting from the kick-off event), have been created to work as a social media archive and provide an overview of the project on social platforms.
- Scientific Distribution - International Conferences
- among which: WFUF Event - World Forum on Urban Forests 2023 in

Washington DC, USA.

- Presentation of the complete Research of Parco Italia (2021-2023) to an international and high-level audience, broadening the awareness of the project and the research behind it.
- Other events: Parco Italia will be presented to the audience within international conferences, public meetings and presentations aimed at providing global awareness about the project's goals, tools and future perspectives. The events will be selected based on audience, topics of interest and resonance throughout the scientific world as well as in the media, with the goal of engaging audiences new to the project and broadening the base of involvement and participation.

7.3 Parco Italia's Website.

One of the core activities of the Communication Plan for Parco Italia includes the creation of a specific Parco Italia webpage (www.parcoitalia.it). The website aims to bring together the vision of the Parco Italia project, information on research goals and updates, the mapping of Italy's natural capital and ongoing forestry projects, tree planting and awareness raising events, the tree planting campaign materials (with videos/ pictures of tree planting and tree monitoring, etc.), a collection of Parco Italia's press release and the FAQs - the frequently asked questions. In the first release of contents, the first section of contents related to the project was released on 17th April 2023. In the next release, planned to happen concurrently with the WFUF event, the contents of the Research will be published, showing the work that has been done up to today, showing the phases of the project, the activities, the mapping, the stakeholders network and the Biodiversity walks.

Website's structure (with deadlines for future updates):

- Home
 - About
 - The project (Online from 17th April 2023)
 - The goals (Online from 17th April 2023)
 - Promoters (Online from 17th April 2023)
 - FAQs (Online from the end of July 2023)
 - Research (Release: 16th October 2023)
 - Activities and phases (Release: 16th October 2023)
 - Mapping (Release: 16th October 2023)
 - Stakeholders network (Release: 16th October 2023)
 - Pilot projects (Release: 14th November 2023)
 - Biodiversity Walks and Interviews (Trailer and Interviews Release: 16th October 2023; Biodiversity walks videos release: 14th November 2023, on the occasion of the project kick-off event)
 - Get involved (Deadline TBD with Amazon)
 - Events
 - Educational material for school
 - AlberItalia Foundation
 - Press review (Release: 16th October 2023)
 - Contacts (Online from 17th April 2023)

The Parco Italia project website is the result of a collaborative process and the work carried out by Parco Studio for the project's visual identity and website development, while the graphics are the outcome of meticulous work by Graphic Designer Lorenzo Mazzali.

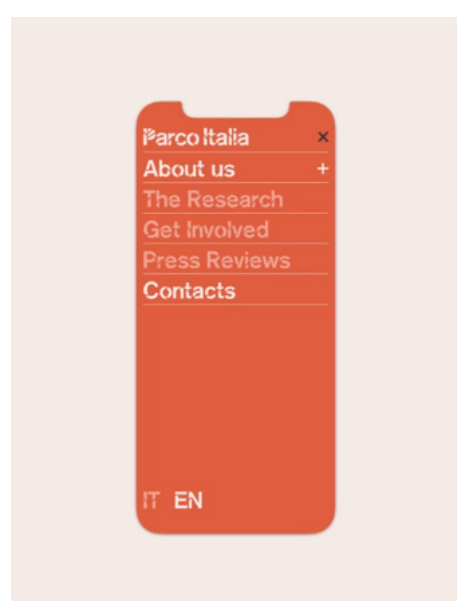


Fig. 15. Parco Italia Website from a device. Web design by Parco Studio

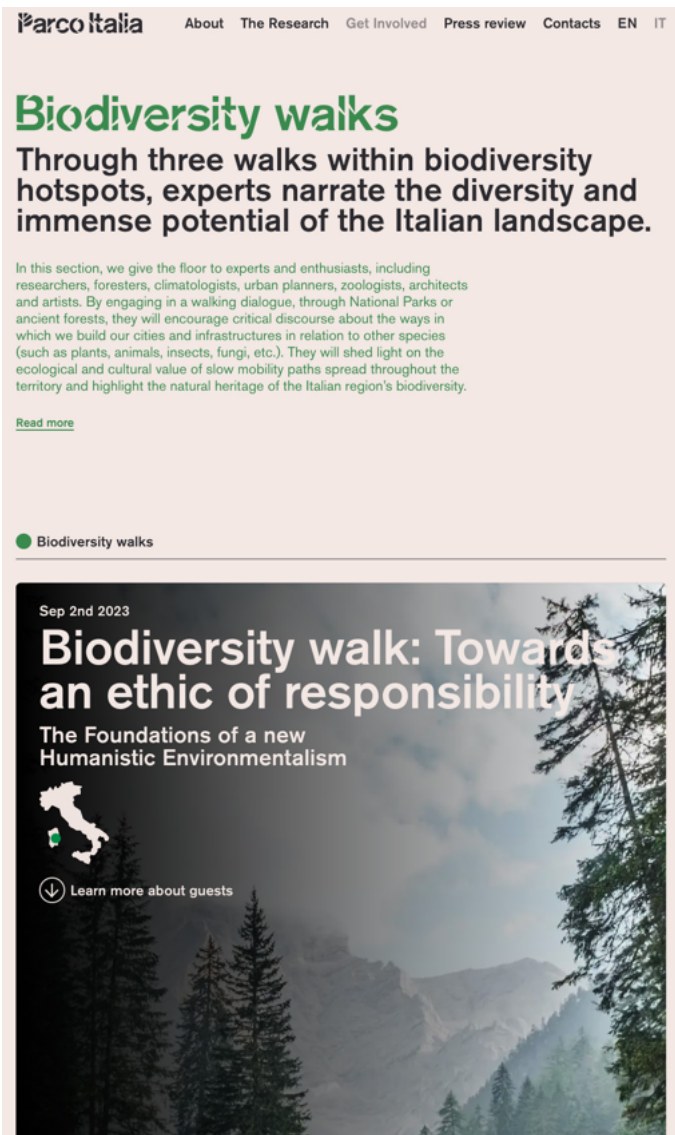


Fig. 17. Parco Italia Website desktop version. Web Design by Parco Studio.
The Biodiversity Walks videos will be released on the occasion of the Parco Italia Kick-off event, November 14th, 2023.

7.4 Plantations and activities storytelling.

To document the plantations and the current status of Parco Italia's interventions, site visits were conducted - between July and September - in all the Parco Italia plantations that have been established so far. The result of these visits is a photographic and video reportage. This visual material of the plantations will narrate the work carried out until now, thus forming an archive that will constitute an important part of the website's content in the section dedicated to pilot projects (which will be published in November on the occasion of the kick-off event). The video showcasing the plantations, with a maximum duration of 2 minutes, will be used for promoting the project at a local level, engaging with stakeholders and local administrations, as well as promoting the project on a regional and national level. (see 6.5. Documentation of pilot projects)

7.5 Biodiversity Walks.

Through three walks within Italian biodiversity hotspots, experts (including researchers, foresters, climatologists, zoologists, architects and urban planners) explain the diversity and immense potential of the National landscape. The "Biodiversity Walks" are a programme by Parco Italia aimed at promoting local territories and their biodiversity. The walks aim to popularise the Parco Italia project and raise public awareness about the importance of managing and protecting the existing natural heritage in a sustainable and caring way, minimising risks such as landscape fragmentation and hydrogeological risks, while increasing ecological and cultural connectivity. These dialogues cover various topics related to the unique features and challenges of different landscapes and territories encountered along the walks, as well as subjects of major interest related to climate change, cities, forests and biodiversity. By engaging in a walking dialogue through National Parks or ancient forests, the experts will encourage critical discourse on the ecological and cultural value of slow mobility paths spread throughout the territory and highlight the natural heritage of the Italian region's biodiversity.

The walks have been filmed as short documentaries (15 minutes each), and a short teaser (of a few minutes). The Biodiversity walks have been filmed in different locations and they cover different topics. The Parco Italia team has been supported by Blinkfish, specialized in Video marketing. The videos will be used and shared for awareness-raising purposes on Parco Italia's website and other social media.

Biodiversity Walk 1. "Cratere degli Astroni" Natural Reserve WWF Oasis, Naples, Campania

- Date: 12/07/2023
- Location: "Cratere degli Astroni" Natural Reserve WWF Oasis, Naples, Campania
- Title of the video: Biodiversity Walk 1. The Basis for Coexistence.
- Subtitle: Biodiversity and Ecological Connectivity in Urban and Periurban contexts.
- Abstract: Located in the Municipality of Pozzuoli, Campania, and just 8 kilometers away from the city of Naples, the "Cratere degli Astroni" Natural Reserve is an ancient volcanic crater characterized by a dense and flourishing forest covering 250 hectares that is hundreds of years old. Mia

Canestrini and Maria Chiara Pastore take us on a journey to discover this Reserve, highlighting the importance of establishing the foundations for a new coexistence between humans, animals, and the plant kingdom that surrounds us.

- Experts: Mia Canestrini and Maria Chiara Pastore;
- Expert 1: Mia Canestrini
- Profession: Zoologist, Science Communicator, Author
- Biography: Zoologist specialized in animal biodiversity conservation, she has been dedicated to wolf conservation for over fifteen years. She has been featured in various TV and radio programs and she is an author and a scientific communicator.
- Expert 2: Maria Chiara Pastore
- Profession: Researcher, Architect, and Urban planner
- Biography: Associate Professor at the Politecnico di Milano, and Head of Research Department at Stefano Boeri Architetti. Her work includes research such as Forestami, a forestry project for the Metropolitan Area of Milan.

Biodiversity Walk 2. Montes Forest, Orgosolo, Sardinia

- Date: 02/09/2023
- Location: “Montes” State Forest, Orgosolo, Sardinia
- Title of the video: Biodiversity walk 2. Towards an Ethic of Responsibility.
- Subtitle: The Foundations of a New Humanistic Environmentalism.
- Abstract: The Montes State Forest is located within the municipal territory of Orgosolo (Nuoro), in Sardinia. Montes Forest is characterized by holm oak with centuries-old specimens and is considered one of the largest of its kind in the Mediterranean basin. In this dialogue, Stefano Boeri and Telmo Pievani explore the most pressing challenges of our era, embarking on a journey to discover new ways of thinking about the role of human beings on Earth.
- Experts: Stefano Boeri and Telmo Pievani;
- Expert 1: Stefano Boeri
- Profession: Architect and Urban planner, Founder of Stefano Boeri Architetti
- Biography: Architect and urban planner, Boeri is Full Professor at Politecnico di Milano and Chairman of Forestami. Architect of the Bosco Verticale (Milan 2014), he is among the main opinion leaders in the environmental debate in sustainable development.
- Expert 2: Telmo Pievani
- Profession: Philosopher, Professor, Author
- Biography: Full Professor at the Department of Biology, University of Padua, where he also holds the first Italian chair of Philosophy of Biological Sciences. He also teaches Bioethics and Science Communication.

Biodiversity Walk 3. “Bosco della Mesola” State Natural Reserve, Mesola, Emilia Romagna; and the Po Delta Park: Argine degli Angeli, Punte Alberete

- Date: 02/09/2023
- Location: “Bosco della Mesola” State Natural Reserve, Mesola, Emilia Romagna; and Po Delta Park: Argine degli Angeli, Punte Alberete.
- Title of the video: Biodiversity Walk 3. Climate and Forests.
- Subtitle: Extreme Climate Events and the Role of Forests.
- Abstract: Characterized by various natural coastal settings, including ancient dunes with woodlands, marshes and clearings, the “Bosco della Mesola” State Natural Reserve and the Po Delta Park represent one of the best-preserved wetland areas with remnants of ancient forests along the

Adriatic coast. These areas are marked by the presence of numerous water bodies, thus creating ideal habitats for flora and fauna. Serena Giacomini and Giorgio Vacchiano identify, in this journey, the risks and opportunities associated with the presence of water in territories more susceptible to climate extremes.

- Experts: Serena Giacomini and Giorgio Vacchiano;
- Expert 1: Serena Giacomini
- Profession: Physicist, Climatologist
- Biography: Physicist specialized in Atmospheric Physics, a recognized climatologist, and a professional meteorologist accredited by the World Meteorological Organization (WMO). She is also the President of the Italian Climate Network.
- Expert 2: Giorgio Vacchiano
- Profession: Researcher, AlberItalia
- Biography: Associate Professor in Forest Management and Planning at the University of Milan. He is involved in developing simulation models to support sustainable forest management, as well as mitigation and adaptation to climate change.
- The trailer of the Biodiversity Walk will be published on the occasion of WFUF 2023, the World Forum on Urban Forests 2023, that will be held in Washington on October 16th.
- The trailer of the Biodiversity Walks (1 video x 1 min), the Biodiversity Walks short documentaries (Three videos x 15 min each) and the interviews (10 x 5 min each) will be available on the Parco Italia website and other social media accounts (Stefano Boeri Architetti and AlberItalia Foundation websites, etc.).

Testimonials and Interviews: starting from the Walks and Tree planting campaigns, videos and interviews with high-level experts will be involved in the project awareness-raising phase. Interviews will also involve the main stakeholders of the project, including Stefano Boeri. Until now, the interviewers are the following:

- Mia Canestrini, Zoologist, Science Communicator, Author
- Maria Chiara Pastore, Researcher, Head of Research Department at SBA
- Fabrizio Canonico, Director of “Cratere degli Astroni” State Natural Reserve
- Stefano Boeri, Architect and urban planner
- Telmo Pievani, Philosopher, Science Communicator and Author
- Antonio Casula, General Director of Forestas
- Giorgio Vacchiano, Researcher, AlberItalia
- Serena Giacomini, Physicist, Climatologist and Meteorologist
- Aida Morelli, President Po Delta Park
- Massimiliano Costa, Director Po Delta Park

Biographies:

- Mia Canestrini - Zoologist specialized in animal biodiversity conservation, she has been dedicated to wolf conservation for over fifteen years. She has been featured in various TV and radio programs and she is an author and a scientific communicator.
- Maria Chiara Pastore - Associate Professor at the Politecnico di Milano, and Head of Research Department at Stefano Boeri Architetti. Her work includes research such as Forestami, a forestry project for the Metropolitan Area of Milan.
- Fabrizio Canonico - Director of the “Cratere degli Astroni” State Natural Reserve. He coordinates the educational and biodiversity protection activities in accordance with the guidelines of WWF Italy and he is responsible for the

communication and scientific activities of the natural reserve.

- Stefano Boeri - Architect and urban planner, Boeri is Full Professor at the Politecnico di Milano and Chairman of Forestami. The architect behind the Bosco Verticale (Milan 2014), he is among the main opinion leaders in the environmental debate in sustainable development.
- Telmo Pievani - Full Professor at the Department of Biology, University of Padua, where he covers the first Italian chair of Philosophy of Biological Sciences. He also teaches Bioethics and Science Communication.
- Antonio Casula - General Director of Forestas, the agency responsible for managing the forest heritage in Sardinia. He is a technical expert and administrator in forest system management, he has served as the Head of the “Corpo Forestale” and now works as the President of ANARF. He is coordinator of National and European projects, and author of several research papers and publications.
- Giorgio Vacchiano - Associate professor in Forest Management and Planning at the University of Milan. He is involved in developing simulation models to support sustainable forest management, as well as mitigation and adaptation to climate change.
- Serena Giacomini - Physicist specialized in Atmospheric Physics, a recognized climatologist, and a professional meteorologist accredited by the World Meteorological Organization (WMO). She is also the President of the Italian Climate Network.
- Aida Morelli - Architect, she has been actively involved in environmental issues and landscape enhancement for years. She has actively participated in the LIPU, the Italian League for Bird Protection, working on environmental conservation projects.
- Massimiliano Costa - Biologist and ornithologist, he has contributed to the establishment of the protected areas system and the creation of the Natura 2000 network in the Emilia-Romagna Region. Costa is a member of the IUCN Protected Areas Committee and has published over 100 publications.

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Biodiversity Walk 1. Natural Reserve WWF Oasis Cratere degli Astroni.
Naples, Campania.













Biodiversity Walk 2. Montes State Forest. Orgosolo, Sardinia.













Biodiversity Walk 3. Bosco della Mesola State Natural Reserve.
Ferrara, Emilia Romagna.













7.6 Events

NATIONAL PREVIEW

During Milan Design Week 2023, from 17th to 26th April, Parco Italia project is introduced within the SWING installation, designed by Stefano Boeri Interiors, for the Pharmacy Courtyard of the Università degli Studi di Milano Statale.

As part of the musical program held within SWING, Stefano Boeri introduces the first concert with an introduction to the Parco Italia project on Tuesday 18th April, at 5:30 p.m.

INTERNATIONAL PREVIEW (Washington D.C., October)

After the 2018 experience in Mantua, where the basis for urban forestry planning was proposed and drafted, the second WFUF - World Forum on Urban Forests, will be held in Washington from 16th to 20th October 2023.

Organised through the collaboration of FAO, Arbor Day Foundation, the United States Forest Service (USFS), the Smithsonian Institution, the Politecnico di Milano, the Italian Society of Silviculture and Forest Ecology (SISEF) and the International Society of Arboriculture (ISA), WFUF 2023 has as its main theme Greener, Healthier and Happier Cities for All, to underline the importance of building inclusive cities where the goods and services of urban forests and trees are equitably and equally available to all urban dwellers.

Parco Italia will be presented by Stefano Boeri in his keynote presentation (Tuesday 17th October, at 9.30 am EDT)

NATIONAL LAUNCH (Rome, November)

Kick-off event

The two institutional and tree planting kick-off events initially planned for this year's winter season (February-March 2023) in Fiumicino, Lazio and Bari, Puglia were postponed due to technical reasons identified on the ground. A new institutional Parco Italia kick-off event has been scheduled for the start of the next tree planting season in Autumn (September-October 2023) in Rome, Lazio.

As already anticipated, Parco Italia's Pilot projects organization will count on the following activities and engagement strategies:

- 1) the organization of an institutional kick-off involving national and local governments, Partners, Universities, and national stakeholders (November 2023).
- 2) the production of a workshop/ seminar with national experts from different scientific fields. These experts will give their own perspective on the territory where the Parco Italia Kick-off event will take place.
- 3) the promotion of a feeling of care for the planted trees that will be the future forest. To achieve this, we promote collaboration with schools, local environmental associations, and citizens (such as cyclists, birdwatchers, etc.) (date TBC).

Articles, publications and press release - General Public

- L'impatto economico di Amazon in Italia: i progressi del "Piano Italia" nel 2021, Amazon Italia: <https://www.aboutamazon.it/notizie/creazione-di-posti-di-lavoro-e-investimenti/limpatto-economico-di-amazon-in-italia-i-progressi-del-piano-italia-nel-2021>
- Stefano Boeri Interiors con Amazon: Swing, internimagazine: <https://www.internimagazine.it/interni-design-re-evolution-fuorisalone-2023/stefano-boeri-interiors-con-amazon-swing/>
- Al FuoriSalone 'Swing', l'altalena da 36 posti di Amazon, Ansa: https://www.ansa.it/canale_lifestyle/notizie/ansacom/Amazon/2023/04/17/al-

fuorisalone-swing-laltalena-da-36-posti-di-amazon_4cc56ce2-9169-46bd-bc47-bd2f95795c8e.html

- FuoriSalone 2023: inaugurato "The Amazing Playground", protagonisti Amazon e Stefano Boeri, Agendaviaggi: <https://www.agendaviaggi.com/fuorisalone-2023-inaugurato-the-amazing-playground-protagonisti-amazon-e-stefano-boeri/>
- Fuori Salone: Amazon e Stefano Boeri Interiors inaugurano "The Amazing Playground", Domanipress: <https://www.domanipress.it/fuori-salone-amazon-e-stefano-boeri-interiors-inaugurano-the-amazing-playground/>
- FuoriSalone 2023, Interni presenta la mostra-evento "Design Re-Evolution": design come evoluzione, rivoluzione, contaminazione e sostenibilità, Gruppo Mondadori: <https://www.gruppomondadori.it/media/news-comunicati-stampa-e-social/2023/fuorisalone-2023-interni-presenta-la-mostra-evento-design-re-evolution-design-come-evoluzione-rivoluzione-contaminazione-e-sostenibilita>
- L'altalena gigante di Amazon creata dall'archistar Boeri per il Fuorisalone 2023, milanotoday: <https://www.milanotoday.it/video/fuorisalone-altalena-gigante-amazon.html>
- Milano Design Week, l'altalena di Amazon e Boeri per dondolare tra i canti di 40 specie di uccelli, Il piccolo: <https://video.ilpiccolo.gelocal.it/tecnologia/tech/milano-design-week-l-altalena-di-amazon-e-boeri-per-dondolare-tra-i-canti-di-40-specie-di-uccelli/167084/167736>
- Milano Design Week, l'altalena di Amazon e Boeri per dondolare tra i canti di 40 specie di uccelli, Repubblica: <https://video.repubblica.it/tecnologia/tech/milano-design-week-l-altalena-di-amazon-e-boeri-per-dondolare-tra-i-canti-di-40-specie-di-uccelli/442735/443697>
- SWING, a special collective swing at the University of Milan, Archello: <https://archello.com/project/swing-2>
- Ultimi sprazzi di Fuori Salone: il progetto Re-Evolution alla Statale di Milano, Exibart: <https://www.exibart.com/design/ultimi-sprazzi-di-fuori-salone-il-progetto-re-evolution-alla-statale-di-milano/>
- Milan Design Week, le swing d'Amazon et Boeri pour se balancer parmi les chants de 40 espèces d'oiseaux, Nouvelles-du-monde: <https://www.nouvelles-du-monde.com/milan-design-week-le-swing-damazon-et-boeri-pour-se-balancer-parmi-les-chants-de-40-especes-doiseaux/>
- Milano Fuorisalone, tutti gli allestimenti dell'Università degli Studi, il giornale: <https://www.ilgiornale.it/news/design/ultimo-giorno-fuorisalone-installazioni-presso-luniversit-39880.html>
- FuoriSalone 2023: Amazon and Stefano Boeri Interiors participate an the exhibition event Interni Design Re-Evolution in Milan, Amazon EU: <https://www.aboutamazon.eu/news/sustainability/fuorisalone-2023-amazon-and-stefano-boeri-interiors-participate-an-the-exhibition-event-interni-design-re-evolution-in-milan>
- Swing: la mega Altalena Amazon per il Fuorisalone 2023, Coolinmilan: <https://www.coolinmilan.it/swing-amazon-fuorisalone-2023/>
- Amazon e Stefano Boeri Interiors partecipano all'evento espositivo Interni Design Re-Evolution a Milano, Nbarevolution: <https://www.nbarevolution.com/amazon-e-stefano-boeri-interiors-partecipano-allevento-espositivo-interni-design-re-evolution-a-milano/>
- Un Boeri en Amazon, Pergaminovirtual: <https://www.pergaminovirtual.com.ar/dg/?p=16441>
- Amazon celebra il tempo libero con "SWING": l'altalena circolare del Fuori Salone 2023!, 105.net: <https://www.105.net/news/105-consiglia/1349444/amazon-celebra-lo-svago-e-il-tempo-libero-con-swing-l-altalena-speciale-del-fuori-salone-2023.html>





Parco Italia corner, within “Swing” (Stefano Boeri Interiors installation at FuoriSalone, in Università degli Studi di Milano Statale during the Milan Design Week, 2023)



- L'altalena di Amazon, Mag1861: https://www.mag1861.it/it/news/articolo/altalena_amazon-21062588
- Amazon al Fuori Salone 2023 con "SWING": un'altalena circolare per celebrare la biodiversità e il tempo libero, Radiomontecarlo: <https://www.radiomontecarlo.net/news/rmc-consiglia/1349450/amazon-italia-al-fuori-salone-2023-con-swing-un-altalena-circolare-per-celebrare-la-biodiversita-e-il-design.html>
- Stefano Boeri Interiors: "Un'esperienza per tornare bambini e riscoprire il valore del tempo", Wisesociety: <https://wisesociety.it/video/stefano-boeri-interiors-con-swing-torniamo-bambini-e-riscopriamo-il-valore-del-tempo/>
- Un Boeri en Amazon, Norteenlinea: <https://www.norteenlinea.com/noticias/notas-de-opinion/un-boeri-en-amazon>
- Al Fuori Salone 2023 È Arrivata "Swing", L'altalena Circolare Di Amazon E Stefano Boeri Interiors, r101: <https://www.r101.it/news/r101-consiglia/1349453/al-fuori-salone-2023-e-arrivata-swing-l-altalena-circolare-di-amazon-italia-e-stefano-boeri-interiors.html>
- Milano Design Week, l'altalena di Amazon e Boeri per dondolare tra i canti di 40 specie di uccelli, Ecomy: <https://www.ecomy.it/news/milano-design-week-l-altalena-di-amazon-e-boeri-per-dondolare-tra-i-canti-di-40-specie-di-uccelli-209765.html>
- Stefano Boeri Interiors E Amazon Per Fuorisalone Con "The Amazing Playground", Artemagazine: <https://artemagazine.it/2023/04/19/stefano-boeri-interiors-e-amazon-per-fuorisalone-con-the-amazing-playground/>
- Milano Design Week 2023, il popolo del Fuorisalone tra altalene, specchi e case «intelligenti», Milano.corriere: https://milano.corriere.it/notizie/cronaca/23_aprile_19/milano-design-week-2023-il-popolo-del-fuorisalone-tra-altalene-specchi-e-case-intelligenti-322b06f4-1950-48ce-9fb1-2509d24e8xk.shtml
- Milano Design Week è anche musica, Settenews: <https://www.settenews.it/milano-design-week-e-anche-moda-musica-arte/>
- Swing | Stefano Boeri Interiors, Archilovers: <https://www.archilovers.com/projects/313288/swing.html>
- Al Fuorisalone di Milano la creatività bresciana non smette di stupire, Bresciaoggi: <https://www.bresciaoggi.it/argomenti/cultura/fuorisalone-milano-creativita-e-sorprese-1.10014595>
- Milano Design Week, l'altalena di Amazon e Boeri per dondolare tra i canti di 40 specie di uccelli, Corrierealpi: <https://video.corrierealpi.gelocal.it/tecnologia/tech/milano-design-week-l-altalena-di-amazon-e-boeri-per-dondolare-tra-i-canti-di-40-specie-di-uccelli/164980/165677>
- Milano Design Week: concerti all'Università degli Studi (Statale), Eventiatmilano: <https://www.eventiatmilano.it/2023/04/milano-design-week-concerti-gratuiti-statale/>
- Milano Design Week, l'altalena di Amazon e Boeri per dondolare tra i canti di 40 specie di uccelli, La stampa: <https://video.lastampa.it/tecnologia/tech/milano-design-week-l-altalena-di-amazon-e-boeri-per-dondolare-tra-i-canti-di-40-specie-di-uccelli/166683/166931>
- Milano Design Week, l'altalena di Amazon e Boeri per dondolare tra i canti di 40 specie di uccelli, Repubblica: <https://video.repubblica.it/tecnologia/tech/milano-design-week-l-altalena-di-amazon-e-boeri-per-dondolare-tra-i-canti-di-40-specie-di-uccelli/442735/443697>
- FuoriSalone 2023: Amazon e Stefano Boeri Interiors inaugurano "The Amazing Playground", Il progressonline: <https://ilprogressonline.it/arte/mostre/fuorisalone-2023-amazon-e-stefano-boeri-interiors-inaugurano-the-amazing-playground/>
- FuoriSalone, alla Statale tutte le installazioni da non perdere, Milanopavia:

<https://www.milanopavia.news/news-milano/fuori-salone-alla-statale-tutte-le-installazioni-da-non-perdere/>

- Stefano Boeri: Il gioco è una cosa seria, Panorama: <https://www.panorama.it/lifestyle/stefano-boeri-amazon-installazione-fuorisalone>
- Al FuoriSalone 'Swing', l'altalena da 36 posti di Amazon, Attivo.tv: <https://attivo.tv/al-fuorisalone-swing-l-altalena-da-36-posti-di-amazon/>
- Alla Statale di Milano arriva l'altalena gigante di Stefano Boeri per la Design Week, Finestresullarte: <https://www.finestresullarte.info/design/swing-altalena-gigante-stefano-boeri-statale-milano>
- Al FuoriSalone 'Swing', l'altalena da 36 posti di Amazon, Gds: <https://gds.it/speciali/life-style/2023/04/17/al-fuorisalone-swing-l-altalena-da-36-posti-di-amazon-f15e3372-3e4a-47e0-a4f7-efff39e6bc80/>
- I Pomeriggi Musicali ospiti dell'installazione Swing di Stefano Boeri Interiors per la Milano Design Week, Ipomeriggi: <https://www.ipomeriggi.it/2023/04/17/i-pomeriggi-musicali-ospiti-dellinstallazione-swing-di-stefano-boeri-interiors-per-la-milano-design-week/>
- Amazon presenta Swing, un'altalena circolare ludica e sostenibile, Goldenbackstage: <https://www.goldenbackstage.com/2023/04/amazon-presenta-swing-unaltalena.html>
- FuoriSalone 2023: Amazon, in collaborazione con Stefano Boeri Interiors, partecipa alla mostra-evento Interni Design Re-Evolution, Mi-lorenteggio: <https://www.mi-lorenteggio.com/2023/04/16/fuorisalone-2023-amazon-in-collaborazione-con-stefano-boeri-interiors-partecipa-alla-mostra-evento-interni-design-re-evolution-2/>

Scientific Publications

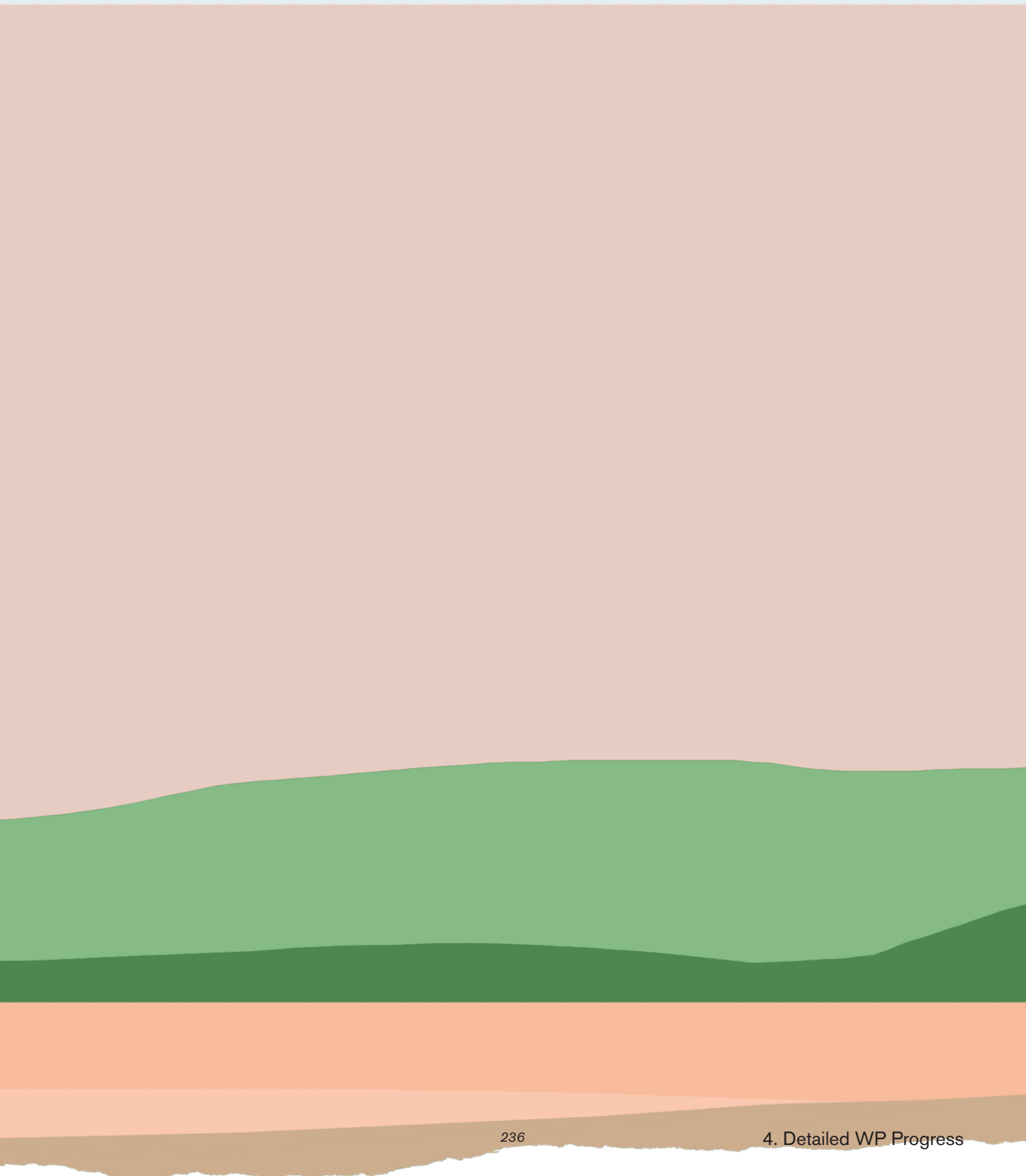
- AAVV, Green Obsession: Trees Towards Cities, Humans Towards Forests, 2021 (Actar)
- Stefano Boeri, Urbania, 2021 (Laterza)

Scientific Awareness-raising Events

Stefano Boeri, International Conferences

- Lecture at Italian Embassy, Brussels, Belgium (September 29th, 2021)
- Istituto Italiano di Cultura, Los Angeles, USA (October 5th, 2022)
- Smart and sustainable cities, Italian Embassy in Australia (November 17th, 2021)
- IAAC Lecture Series, Institute for Advanced Architecture of Catalonia (January 28th, 2022)
- Çankaya University lecture, Turkey (February 4th, 2021)
- Live talk about Green Obsession on Dezeen (February 11th, 2022)
- Italian design day | architettura e città verdi, Italian Institute of Culture of Rio de Janeiro (March 23rd, 2022)
- Siemens Home Appliances Design Award. Award Ceremony, Munchen, Germany (March 15th, 2022)
- Externa Expo Bari 2022 (April 23rd, 2022)
- The Nature of Cities TNOC. Online session: Parco Italia. Towards a National Park (March 29th, 2022)
- Parco Italia - Accepted abstract at the international conference in Leuven, Belgium (June 29th, 2022)
- Green Obsession at the Cigognola Castle (Moratti), Cigognola, Italy (September 09th, 2022)
- "Un albero per ogni cittadino" Horti Aperti event, part of the Festival del Verde, Pavia (September 16th, 2022)

- Green Obsession Book presentation at the United Nations Framework Convention on Climate Change (COP27), COP27 Blue Zone Italian Pavilion, Sharm El-Sheikh, Egypt (November 7th, 2022)
- “Progettare il futuro”, 30th Anniversary of CARIPT (Cassa di Risparmio di Pistoia e Pescia) Foundation, Pistoia (November 19th, 2022)
- Future of cities, pre-opening event by the FOC Climate and Innovation HUB, Little Haiti, Miami, USA (November 30th, 2022)
- Lecture at the Miami Beach Urban Studios Design Gallery, organized by Florida International University (FIU), Miami, USA (December 01st, 2022)
- “Architettura innovativa e sostenibile”, Diplomazia, January 24th, 2023
- “Green Obsession”, lectio magistralis, Università Politecnico di Bari, February 6th 2023
- Honorary doctorate awarding ceremony for Stefano Boeri, Università degli Studi di Milano Bicocca (February 7th, 2023)
- Madrid Design Festival, lectio magistralis, Madrid, February 17th 2023
- “International Conference on Smart Cities”, New Administrative Capital, Egypt (February 27th, 2023)
- “Governare la globalizzazione, governare il capitale, governare il futuro”, Il Foglio, Milan (March 25th, 2023)
- “Garden Futures”, Vitra Design Museum, Weil-am-Rhein (March 30th, 2023)
- Externa, lectio magistralis, Bari (April 1st, 2023)
- Parco Italia preview, Milan, Università degli Studi di Milano Statale (April 18th, 2023)
- Dialogue between Stefano Boeri and Emanuela Rosa-Clot, Floracult Rome (April 22nd, 2023)
- Stefano Boeri Lecture, CA23 – Campania Architettura, Salerno, Italy (April 27th, 2023)
- “Biocities. Gli Ambienti Urbani del Futuro. Nelle Città. Oltre le Città”, Università degli Studi di Sassari, Sassari, Italy (May 3rd, 2023)
- Moby Dick Festival, Noli (SV), Italy (May 13th, 2023)
- Lucrezia De Marco Lecture, Green Future Conference, Split, Croatia (June 1st, 2023)
- “Cooling Cities - Solutions for Urban Climate Adaptation”, Politecnico di Milano, Milan, Italy (June 19th, 2023)
- Stefano Boeri Lecture, Towards climate neutrality - organized by the Spanish Foundation for Science and Technology (FECYT), Barcelona, Spain (July 12th, 2023)
- Maria Chiara Pastore Lecture, Finalist Engagement Programme, UN SDG Action Awards, Rome, Italy (July 21st, 2023)
- The 2023 “Rooftop Pioneers”, Jerusalem, Israel (September 12th, 2023)
- Banco BPM per gli operatori di real estate, Milan, Italy (September 20th, 2023)
- Dialogue between Stefano Boeri and Giacomo Salizzoni, Internazionale a Ferrara, Ferrara, Italy (September 29th, 2023)



8.1 Introduction.

The WP gives guidance on the next steps of the research and implementation to achieve the 22 million trees goal. Until now the review of the national research and international projects that can complement Parco Italia has been investigated; furthermore investigations have been carried out into the potential of additional discussions with the different Ministries of the ongoing activities that can be connected with Parco Italia (MIMS; MASE; MASAF in particular)

The road map of the Parco Italia Project has been written taking the following assumptions into account:

- The trend of urban forestry projects that are taking place all around Italy, both by PNRR funds, particularly in the metropolitan areas, but also by all the other stakeholders who are working on urban forestry, green infrastructures, restoration plans and compensation plans are increasing nature both in terms of quantity and quality but also, they are increasing knowledge of biodiversity, urban forestry and generally speaking the well-known importance of nature in our lives;
- The biodiversity strategy under development that will guide Italy to 2030, currently in the phase of awareness-raising and public consultation of the consolidated draft will support the development of strategic plans towards the increase of biodiversity through planting (to expand) and taking care (to preserve), spurring resources, and needed actions that will continuously shape the ongoing Parco Italia project;
- The national forest strategy operational phase, i.e. Action plan, funding, and breakdown of specific and supporting activities, included support for the forest nursery sector, are expanding the capacity of the chain, and building up the future of new jobs, and the infrastructure of the green system as regards provision and demand;
- The rapid change in perceptions that citizens have about green systems and how to channel this change are seminal in starting and increasing processes of city engagement;
- Mapping the different funds, both public and private, at different levels (from international to local streams to crowdfunding initiatives), together with mapping the potential of afforestation are key components for engaging with the technical and political parties of the country;
- Continuous and incremental stakeholders mapping and evaluation processes to identify the potential alliances and partnerships as well as the community and private sector engagement, nurturing a target understanding and ranking areas of interest in terms of needs, support, and implementation capacity;
- Establishing and/or strengthening long term and robust partnerships

with key-stakeholders in the scientific world (e.G biocity facility of the european forest institute; european joint research center), in public institutions (namely masaf, mase; regions; municipalities); in national and european agencies (e.G. Ispra, european space agency), private sector, sme and service providers is an ongoing process to spur on both the technical, scientific and economic viability of the project.

The project in the next 12 months will:

1. Assess, map, support, and assist the state of Italy's tree nurseries (ongoing, incremental). The recently approved RI.VIVA.FOR strategy will be the responsibility of Alberitalia Foundation and a specific road map to achieve the targets of quality and quantity in plant production that is being put in place and will be concluded hopefully in 2023. An open platform with the official ministerial State-Regions conference has been activated and the road ahead will be dedicated to establishing specific regional programs to support forest nursery sectors through technical training workshops and regional incentives schemes. The survey and monitoring of forest monitoring will stress the work already implemented by MASAF in collaboration with the University of Florence, in accordance with Alberitalia Foundation, and ANARF (the Italian Association of Forest Regional Activities). Thanks to the agreement already established between AI and the above-mentioned institutions, the data are already available. The implementation will be conducted by recompiling the existing list and finalizing interviews with the managers of public/private nurseries. A sequence of strategic multi-regional workshops has been planned up to the end of 2024.

2. Provide a progressive inventory of suitable sites for implementing tree plantation activities. The inventory, already established, will be further developed on the basis of agreements with the local administrations also referring to existing databases (as for the Piedmont Region and the Municipality of Florence). Some agreements have already been signed [MH1] [MCP2]. Some others need to be drawn up and signed. The aim is to constitute a "Bank of Tree Places" so as to have continuous monitoring and screening of available land for planting implementation purposes.

3. Set and adjust the requirements in terms of design quality and sustainable management of forest plantations and Forest/Nature-based Solutions in order to drive, support and evaluate the designers and managers.

4. Define and design Pilot projects. The designing staff will prepare the masterplans and guiding documents for drawing up the definitive design processes. The design work will be implemented by a co-design approach involving the metropolitan cities' staff, associations and schools, accompanied by teams of local professionals.

The definitive design phase will be implemented by design contracts with highly reputed professionals, assisted by AI and Metropolitan cities' staff.

5. Plant trees, forests and implement NBS for ecological connections. Thanks to the already established agreements with private companies, AI will prepare public calls for implementing the planting works according to qualitative, financial and time indicators open to certified enterprises and companies. This approach will guarantee high performance, transparency and accurately drawn-up agreements with the developers.

Concrete opportunities for demonstration areas and pilot projects are under negotiation in the context of the development of city-specific strategies on green infrastructure, the functional ecology of urban green spaces, ecosystem services and integrated urban planning.

6. Monitor and test the results of tree plantations. This phase will be conducted by using some tools already developed by AI and particularly the guiding reference “piantalberi” (“treeplanting”) and the module “contalberi” (“treecounter”). A specific implementation module on tree care is in the development phase and will be ready by March 2023 while the “contacarbonio” (quantifying carbon sequestration) reference model is under construction.

7. Implement and maintain a network of interactive sensor technology (tree talkers). The last component of the implementation phase will be developed together with the research partners. A nation-wide “Tree Talkers Italy” project was recently activated and a follow up will be explored to also include trees and forests neighbouring the newly planted forest.

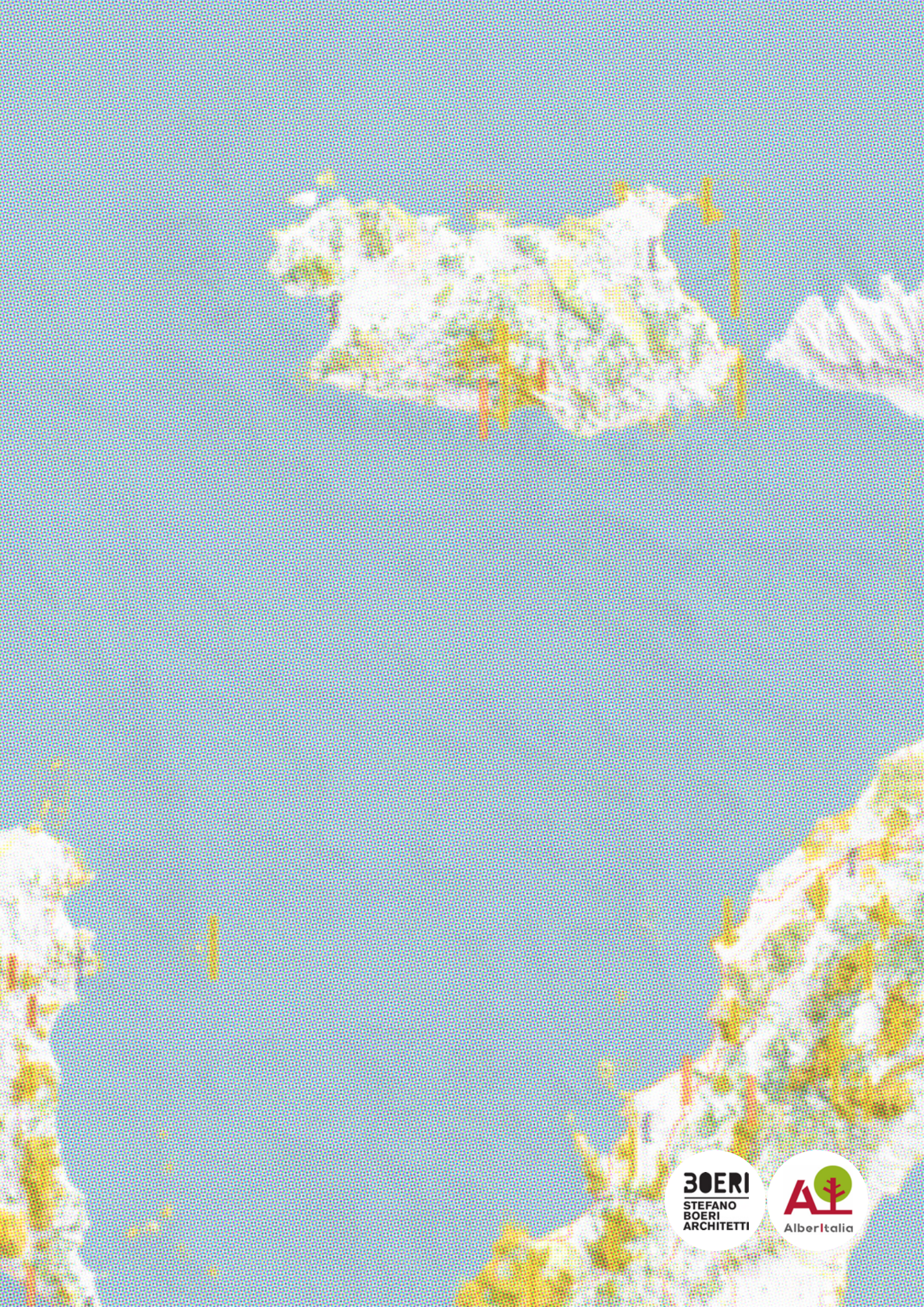
8.2 Feasibility

The project will be based on Public Private Partnerships. Alberitalia will continuously work towards new and strategic private partnerships in order to plant trees and shrubs in line with the main objectives of Parco Italia. At the same time, SBA and Alberitalia, are in ongoing consultations with MASAF and the heads of the Italian Regions to test Parco Italia Strategies towards pilot sites directly by the regions. It is expected that the prioritization strategy, together with the monitoring strategy, will be the guide for this negotiation process.

8.3 Communication strategy

Parco Italia will be launched on the 14th November 2023 mainly discussing the project, the plantations concluded, the Biodiversity Walks and the launch of the Website.

It is desirable that the continuous narration of this part will continue during 2024 in order to increase knowledge of the project and the engagement of multiple stakeholders. This will happen at local level through the plantations, at regional level through the engagement of the regions; at national level through the website and the Biodiversity walks (also promoted in newspapers) and at international level through continuous interaction with other experts and scientific networks already aware of the project (FAO; Tree Cities of the World, Arbor Day Foundation, C40). The vertical process is accompanied by horizontal activities carried out through research and implementation.



BOERI
STEFANO
BOERI
ARCHITETTI



Parco Italia

annex 1

Pilot Projects



1. Chivasso, TO, Piedmont

Completed

Geographical Coordinates

45.265023, 7.922168

Place

Chivasso

Metropolitan area

Turin, Piedmont

Landscape matrix

The landscape is strongly characterized by intensive farming and a significant presence of infrastructures and residential and industrial buildings. Rows of trees and patches of forests are present in areas not suitable for agriculture.

Environmental characteristics of the planting site

High anthropogenic pressure has caused loss of biodiversity and disappearance of natural ecosystems mainly located along rivers.

Size (ha)

4 ha

Type of ownership

Private - Azienda Agricola la Piemontesina

General outline of the planting work

The project aims to promote a combined agricultural and forestry system through the formation of buffer zones around the agricultural fields to increase biodiversity and promote local circular bioeconomy.

Number of trees planted

2,940

Trees and shrubs species planted

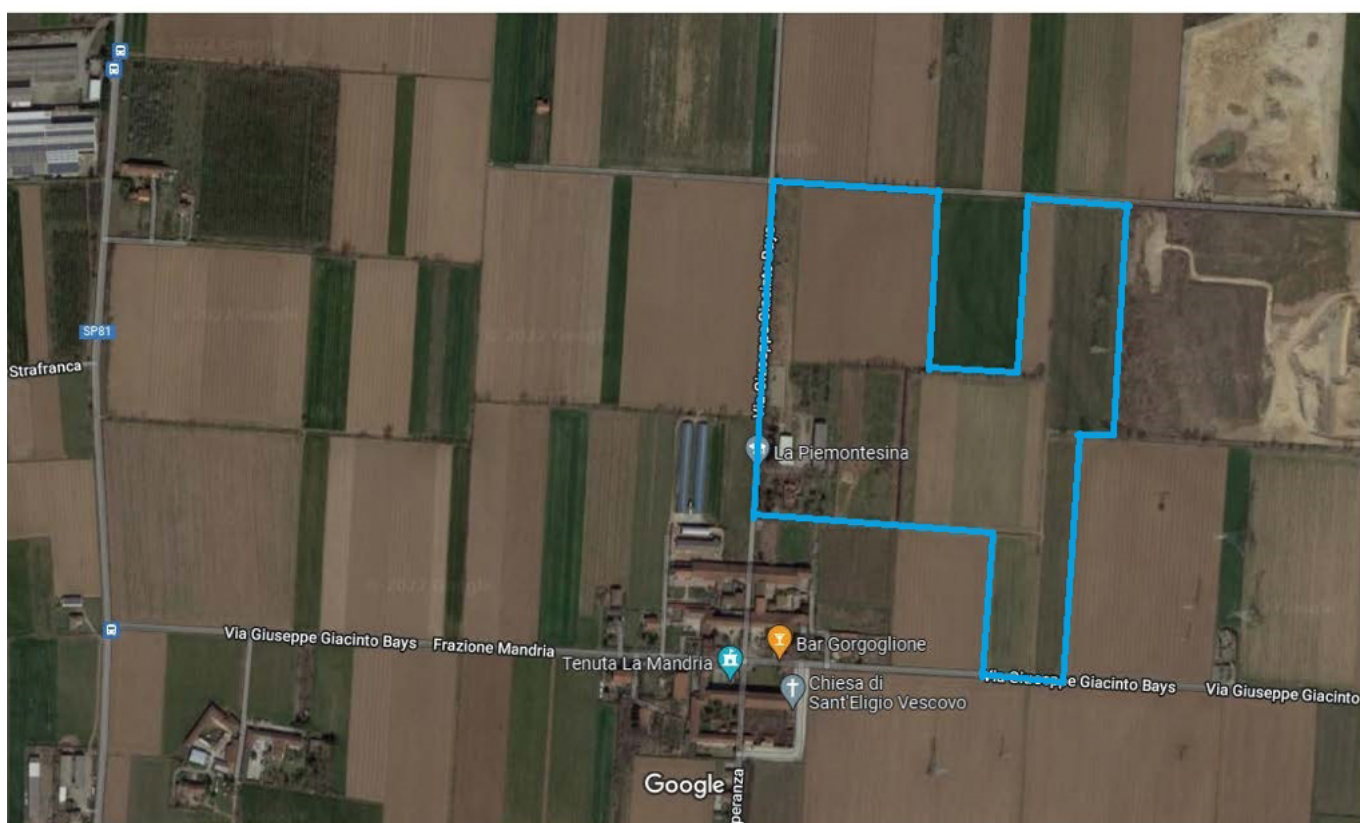
Quercus robur, *Populus alba*, *Tilia cordata*, *Salix spp.*, *Prunus avium*, *Alnus glutinosa*, *Viburnum opalus*, *Malus sylvestris*, *Ligustrum volgare*, *Cornus mas*, *Mespilus germanica*, *Morus alba*

Engaged Stakeholders

Local schools

Annotations

The project is important not only to increase forest cover but also to promote inclusion activities for disadvantaged children



Aerial photo with site localization



Current status of the area



2. Giulianova, TE, Abruzzo

Completed

Geographical Coordinates

42.758234, 13.951732; 42.761270, 13.962716; 42.757336, 13.951379; 42.724332, 13.940433; 42.780399, 13.949357

Place

Giulianova

Metropolitan area

-

Landscape matrix

Urban area in a matrix of coastal pine forests, fields, residential buildings and tourist accommodation facilities and touristic attractions.

Environmental characteristics of the planting site

Fauna and vegetation are strongly affected by anthropization and residues from agricultural activities also in the areas near the river mouth.

Size (ha)

4,5 ha

Type of ownership

Public

General outline of the planting work

Within the same urban area, there will be different planting schemes depending on the zone and type of target. Increasing forest cover to enhance areas of naturalistic (river mouth), cultural (religious sanctuary) and recreational (urban park) importance.

Number of trees planted

3,600

Trees and shrubs species planted

Quercus petraea, *Q. robur*, *Q. pubescens*, *Acer campestre*, *Ostrya carpinifolia*, *Carpinus betulus*, *Fraxinus ornus*, *Fraxinus angustifolia*, *Tilia cordata*, *Tilia platyphyllos*, *Sorbus domestica*, *Sorbus torminalis*, *Alnus glutinosa*, *Populus alba*, *Pinus halepensis*, *Malus sylvestris*, *Pyrus pyraeaster*, *Prunus avium*, *Mespilus germanica*

Engaged Stakeholders

-

Annotations

-



Aerial photo with site localization



Aerial photo with site localization



Aerial photo with site localization



Aerial photo with site localization



Aerial photo with site localization



Current status of the area



Current status of the area



Current status of the area



3. Loreto Aprutino, PE, Abruzzo

Completed

Geographical Coordinates

42.38302078, 13.98880363

Place

Giulianova

Metropolitan area

-

Landscape matrix

On a landscape scale, the matrix is agricultural, olive groves and vineyards are widespread while the presence of trees is rare, with the exception of linear systems and small woodlands.

Environmental characteristics of the planting site

The site is a farm producing mainly wine, there are no particular elements of value or degradation

Size (ha)

1,25 ha

Type of ownership

Private

General outline of the planting work

The project involves the planting of trees along the edges of the farm's fields and service roads and strips of trees along an impluvium.

Number of trees planted

1,004

Trees and shrubs species planted

Quercus petraea, *Quercus robur*, *Quercus pubescens*, *Acer campestre*, *Ostrya carpinifolia*, *Carpinus betulus*, *Fraxinus ornus*, *Fraxinus angustifolia*, *Tilia cordata*, *Tilia platyphyllos*, *Sorbus domestica*, *Sorbus torminalis*, *Alnus glutinosa*, *Populus alba*, *Salix alba*, *Malus sylvestris*, *Pyrus pyraeaster*, *Prunus avium*, *Crataegus monogyna*, *Mespilus germanica*

Engaged Stakeholders

-

Annotations

Part of this project aims to support pollinators; relevant trees species were chosen because they provide pollen for honey production



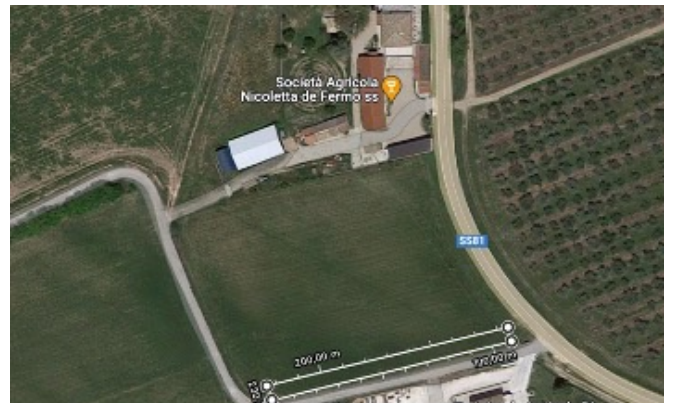
Aerial photo with site localization - tot area: 573 sqm



Aerial photo with site localization - tot area: 4143 sqm



Aerial photo with site localization - tot area: 4600 sqm



Aerial photo with site localization - tot area: 230 sqm



Aerial photo with site localization - tot area: 3035 sqm



4. Torrevecchia Teatina, CH, Abruzzo

Completed

Geographical Coordinates

42.408169, 14.25483; 42.389656, 14.225845

Place

Torrevecchia Teatina

Metropolitan area

-

Landscape matrix

A small city in a landscape composed of discontinuous urban settlements, comprising residential and rural areas. Forests are small and fragmented.

Environmental characteristics of the planting site

There are no particular environmental issues, the forests are reduced to a few patches arranged mainly in parallel belts.

Size (ha)

1 ha

Type of ownership

Public

General outline of the planting work

The project involves the requalification of some areas within the city: sports centers, urban parks and streets.

Number of trees planted

1,000

Trees and shrubs species planted

Quercus petraea, *Quercus robur*, *Quercus pubescens*, *Acer campestre*, *Ostrya carpinifolia*, *Carpinus betulus*, *Fraxinus ornus*, *Fraxinus angustifolia*, *Tilia cordata*, *Tilia platyphyllos*, *Sorbus domestica*, *Sorbus torminalis*, *Viburnum tinus*, *Rosa Canina*, *Rosmarinus officinalis*, *L. prostratus*, *Crataegus monogyna*, *Pyracantha coccinea*, *Lavandula spica*, *Malus sylvestris*, *Pyrus pyraeaster*, *Prunus avium*, *Mespilus germanica*

Engaged Stakeholders

Sports club

Annotations

-



Aerial photo with site localization



Aerial photo with site localization



5. Torre del Greco, NA, Campania

Completed

Geographical Coordinates

40.787825, 14.425540

Place

Torre del Greco (NA)

Metropolitan area

Napoli

Landscape matrix

The site is located on the slopes of Vesuvius, in the peri-urban area of the city of Torre del Greco. Areas mainly occupied by dwellings and lands of National Park of Vesuvius.

Environmental characteristics of the planting site

The site of a pine forest of artificial origin is heavily degraded due to a forest-fire.

Size (ha)

4,9 ha

Type of ownership

Public

General outline of the planting work

The aim is to promote the conversion of artificial pine forests into mixed deciduous forests. Trees will be planted in small scattered groups also to facilitate natural expansion.

Number of trees planted

2,250

Trees and shrubs species planted

Quercus ilex, *Q. suber*, *Q. pubescens*, *Fraxinus ornus*, *Pinus pinea*, *arbutus unedo*

Engaged Stakeholders

Local environmental associations and the natural protected area.

Annotations

-



Aerial photo with site localization



Current status of the area



6. Motteggiana, MN, Lombardia

Completed

Geographical Coordinates

45.042617, 10.689960

Place

Motteggiana (MN)

Metropolitan area

-

Landscape matrix

This area is a high-priority corridor in the Regional Ecological Network, characterized by poplar plantations and agricultural crops along the Po River

Environmental characteristics of the planting site

The area has a notable ecological importance as it is in the drainage area of the main Italian river.

Size (ha)

3,2 ha

Type of ownership

Public

General outline of the planting work

The project aims to reduce the artificiality of the area, restore the ecological corridor of the floodplain, and promote biodiversity in the riparian zones.

Number of trees planted

4,265

Trees and shrubs species planted

Quercus robur, *Populus alba*, *Fraxinus angustifolia*, *Acer campestre*, *Alnus glutinosa*, *Sambucus nigra*, *Corylus avellana*

Engaged Stakeholders

The Wood and environment forestry consortium (LEA)

Annotations

-



Aerial photo with site localization



Current status of the area



7. Monterotondo, RM, Lazio

In progress

Geographical Coordinates

42.101517, 12.63239

Place

Monterotondo (RM)

Metropolitan area

Roma

Landscape matrix

Matrix of fields cultivated lands and scattered pastures. A few small fragmented forests are present.

Environmental characteristics of the planting site

Although the site is located close to a busy provincial road and train station, the environmental conditions are quite favorable. A part of the area is subject to surface erosion which caused frequent flooding of the provincial road and the railway line.

Size (ha)

4 ha

Type of ownership

Public

General outline of the planting work

The project has a strong trait of hydrogeological protection, trees will be planted to counter surface erosion and to promote forest habitats suitable for fauna.

Number of trees planted

3,766

Trees and shrubs species planted

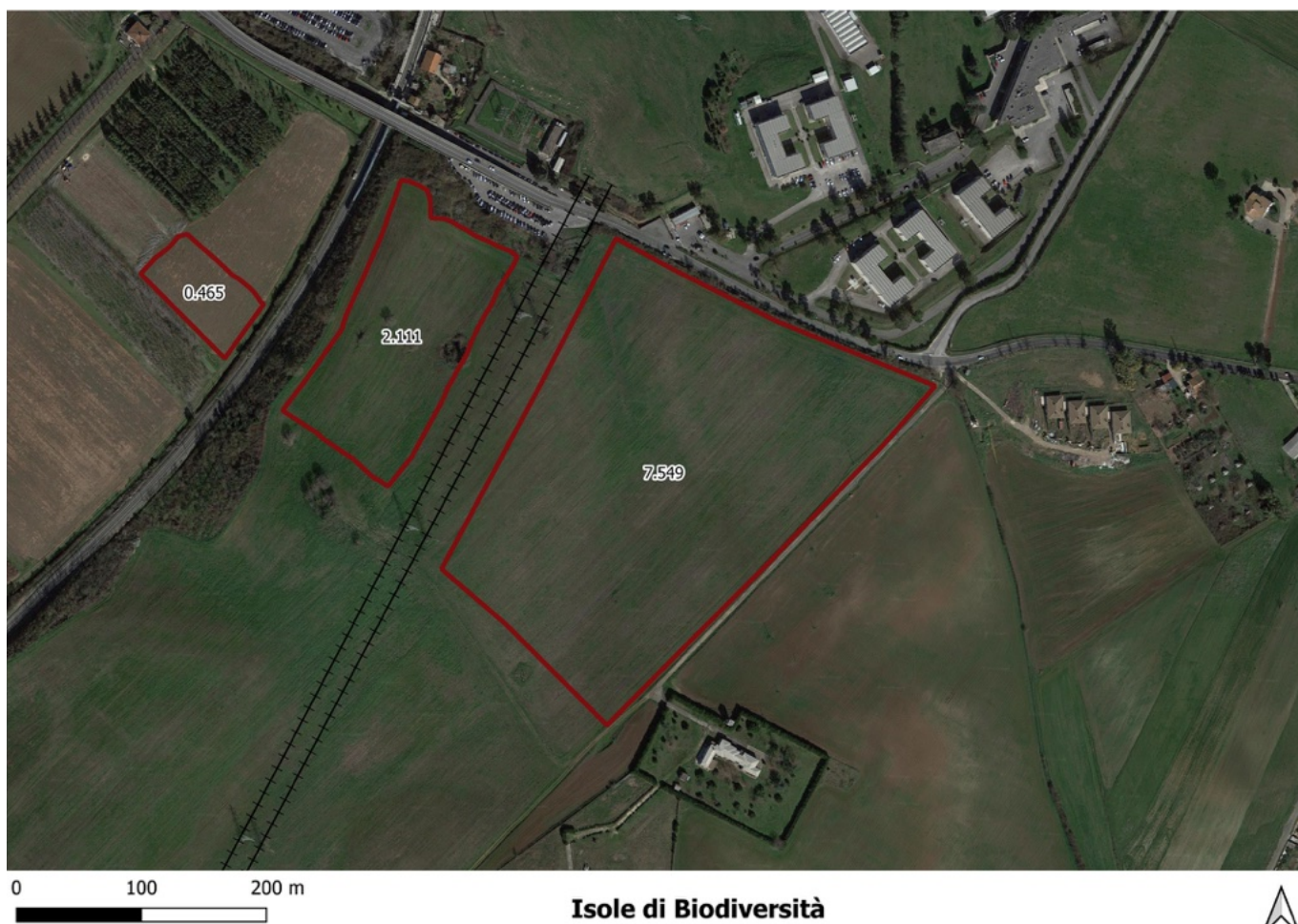
Populus alba, *Acer campestre*, *Quercus ilex*, *Fraxinus ornus*, *Celtis australis*, *Ostrya carpinifolia*, *Quercus pubescens*, *Quercus suber*, *Arbutus unedo*, *Spartium junceum*, *Cornus mas*, *Crataegus monogyna*, *Mespilus germanica*, *Viburnum tinus*

Engaged Stakeholders

The project is designed in collaboration with Italy's leading research organization (CREA).

Annotations

-



Aerial photo with site localization



Current status of the area



8. Bari, Apulia

In progress

Geographical Coordinates

41.0883884, 16.8610017

Place

Quartiere Poggiofranco - Municipio II, next to Via Generale Carlo Alberto Dalla Chiesa and to SS16

Metropolitan area

Bari, Apulia

Landscape matrix

The site is in the suburbs of Bari, in the border area between cities and agricultural areas with sparse vegetation of shrubs. Part of the land is covered by structures and the transport network, building, roads and artificially surfaced areas.

Environmental characteristics of the planting site

The areas show clear signs of neglect. Due to human activities the ecosystem has lost capacity to provide services to people and nature.

Size (ha)

1.20 ha

Type of ownership

Public

General outline of the planting work

The plantation is part of a larger project managed by the University of Bari with the aim of creating areas dedicated to people's well-being and outdoor activities, recover degraded habitat and to promote biodiversity.

Number of trees planted

1,400

Trees and shrubs species planted

Celtis australis, *Ceratonia siliqua*, *Quercus ilex*, *Quercus suber*, *Myrtus communis*, *Pistacia lentiscus*, *Quercus coccifera*, *Rhamnus alaternus*

Engaged Stakeholders

Università degli Studi di Bari "Aldo Moro" - Dipartimento di Scienze del Suolo, della Pianta e degli Alimenti (Di.S.S.P.A.) and Municipality of Bari

Annotations

-



Current status of the area



Aerial photo (2019) with the site localization in red



Land use and site localization



Urbanized areas and site localization



9. Mogliano Veneto, TV, Veneto

In progress

Geographical Coordinates

45,575551; 12,317783

Place

Bonisiolo (TV)

Metropolitan area

-

Landscape matrix

The area is characterized by mixed small parcels of diverse annual crops, pastures, and/or permanent crops, and is associated with a motorway and street network

Environmental characteristics of the planting site

The site is characterized by bare land with no vegetation and is located very close to an important motorway (Turin-Venice)

Size (ha)

7.17

Type of ownership

Public

General outline of the planting work

The project aims to implement water management and phytoremediation strategies and to increase biodiversity.

Number of trees planted

8,763

Trees and shrubs species planted

Quercus robur, *Populus alba*, *Tilia cordata*, *Acer campestre*, *Carpinus betulus*, *Fraxinus ornus*, *Ulmus minor*, *Cornus mas*, *Corylus avellana*, *Elaeagnus umbellata*, *Euonymus europaeus*, *Frangula alnus*, *Ligustrum vulgare*, *Prunus spinosa*, *Pyrus pyraister*, *Rhamnus cathartica*, *Viburnum lantana*, *Viburnum opulus*

Engaged Stakeholders

"Veneto Agricoltura" (regional agency for support in sustainability policies)

Annotations

-



Aerial photo with site localization



Current status of the area



10. Carnisano Vicentino, Vi, Veneto

In progress

Geographical Coordinates

45,528987; 11, 717618

Place

Camisano Vicentino (VI)

Metropolitan area

-

Landscape matrix

Most of the land is covered by agricultural crops, and the area is characterized by a network of streets and transportation infrastructures that facilitate road traffic to large cities.

Environmental characteristics of the planting site

The site is in good condition with scattered vegetation and olive groves.

Size (ha)

3 ha

Type of ownership

Public

General outline of the planting work

The main objective of the project is to create a green area that promotes well-being for people, and serves as therapy for people with dementia problems.

Number of trees planted

3,858

Trees and shrubs species planted

Acer campestre, Acer platanoides, Alnus glutinosa, Carpinus betulus, Castanea sativa, Celtis australis, Crataegus azarolus, Eleagnus angustifolia, Fraxinus angustifolia, Fraxinus excelsior, Fraxinus ornus, Juglans regia, Malus sylvestris, Mespilus germanica, Morus alba, Morus nigra, Ostrya carpinifolia, Platanus acerifolia, Populus alba, Populus nigra italica. Prunus avium, Prunus mahaleb, Prunus padus, Pyrus pyraister, Quercus robur, Quercus pubescens, Amelanchier ovalis, Buxus sempervirens, Cornus mas, Cornus sanguinea, Cercis siliquastrum, Corylus avellana, Crataegus monogyna, Euonymus europaeus, Frangula alnus, Hippophae rhamnoides, Ilex aquifolium, Laburnum anagyroides, Ligustrum volgare, Laurus nobilis, Lonicera xylosteum, Malus sylvestris, Paliurus spina Christi, Prunus mahaleb, Prunus spinosa, Pyrus pyraister, Quercus ilex, Rhamnus cathartica, Rosa canina, Salix caprea, Salix purpurea, Salix viminalis, Sambucus nigra, Cornus sanguinea,

Engaged Stakeholders

Local environmental association

Annotations

-



Aerial photo with site localization



Current status of the area



11. Nemoli, PZ, Basilicata

In progress

Geographical Coordinates

40,07804935; 15,8101753

Place

Nemoli (PZ)

Metropolitan area

-

Landscape matrix

The area is primarily occupied by agriculture, interspersed with significant natural areas and mixed forests

Environmental characteristics of the planting site

The natural areas in the region have been degraded, particularly in abandoned meadows and pastures or due to various other reasons.

Size (ha)

2 ha

Type of ownership

Public

General outline of the planting work

One of the main goals of the project is to promote an important ecosystem service, such as pollination, through the choice of honey-plants and the creation of an apiary. Additionally, the future forest will play an important role in tourism and outdoor recreation, thanks to the presence of cycling and hiking trails that promote well-being.

Number of trees planted

1,400

Trees and shrubs species planted

Acer pseudoplatanus, *Castanea sativa*, *Corylus avellana*, *Fraxinus ornus*, *Juglans regia*, *Populus nigra*, *Pyrus pyraister*, *Quercus ilex*, *Sorbus domestica*, *Sorbus torminalis*, *Tilia cordata*, *Tilia platyphyllos*, *Arbutus unedo*, *Crataegus monogyna*, *Rosa canina*

Engaged Stakeholders

ALSIA (Agenzia Lucana di Sviluppo e Innovazione in Agricoltura)

Annotations

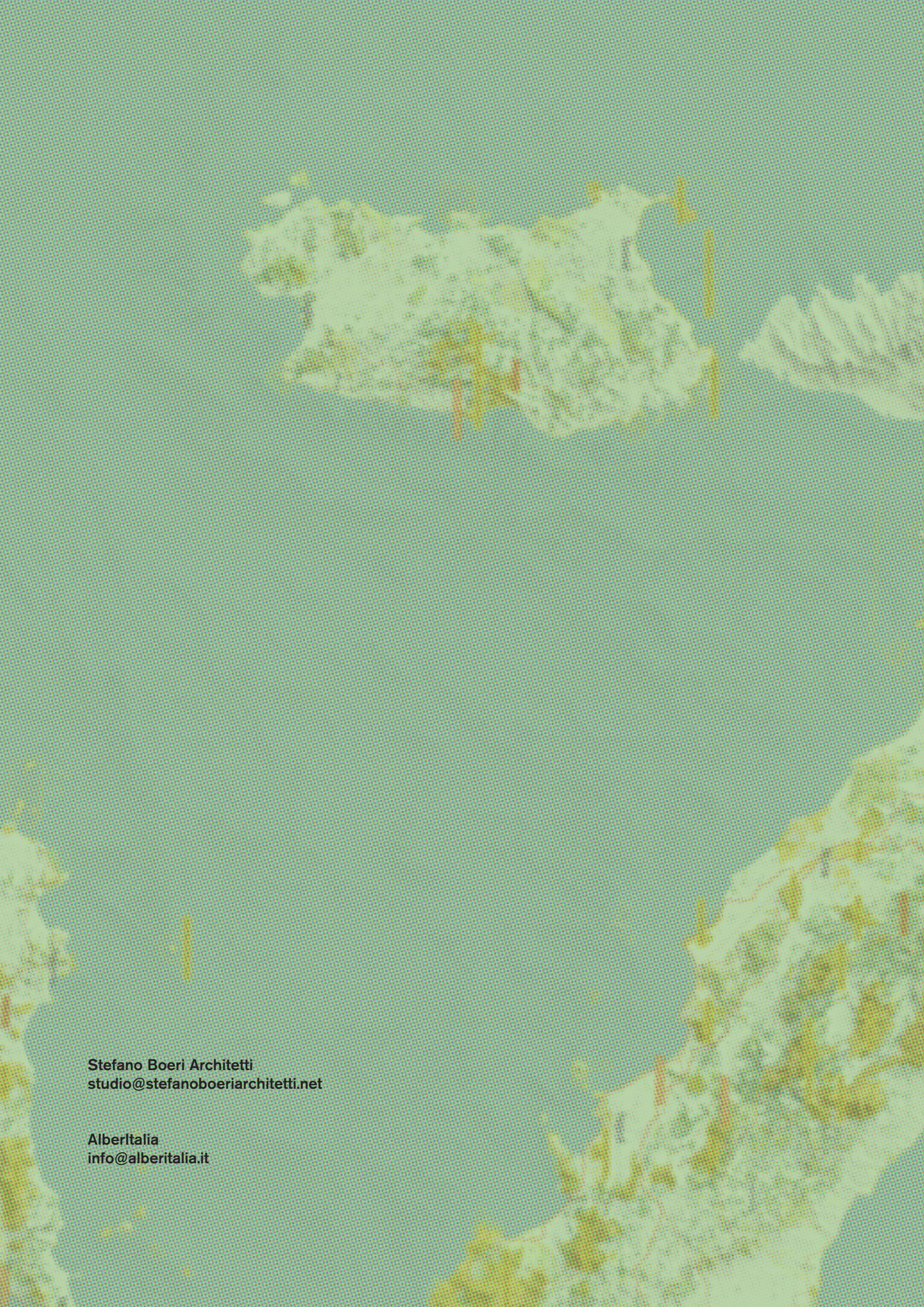
The apiary will have an important didactic role through the involvement of schools and through the development of a web monitoring platform.



Aerial photo with site localization



Current status of the area

An aerial photograph of a snowy mountain landscape. Several yellow and red survey poles are visible, marking points on the terrain. The snow is bright white, and the background is a clear blue sky.

Stefano Boeri Architetti
studio@stefano-boeri-architetti.net

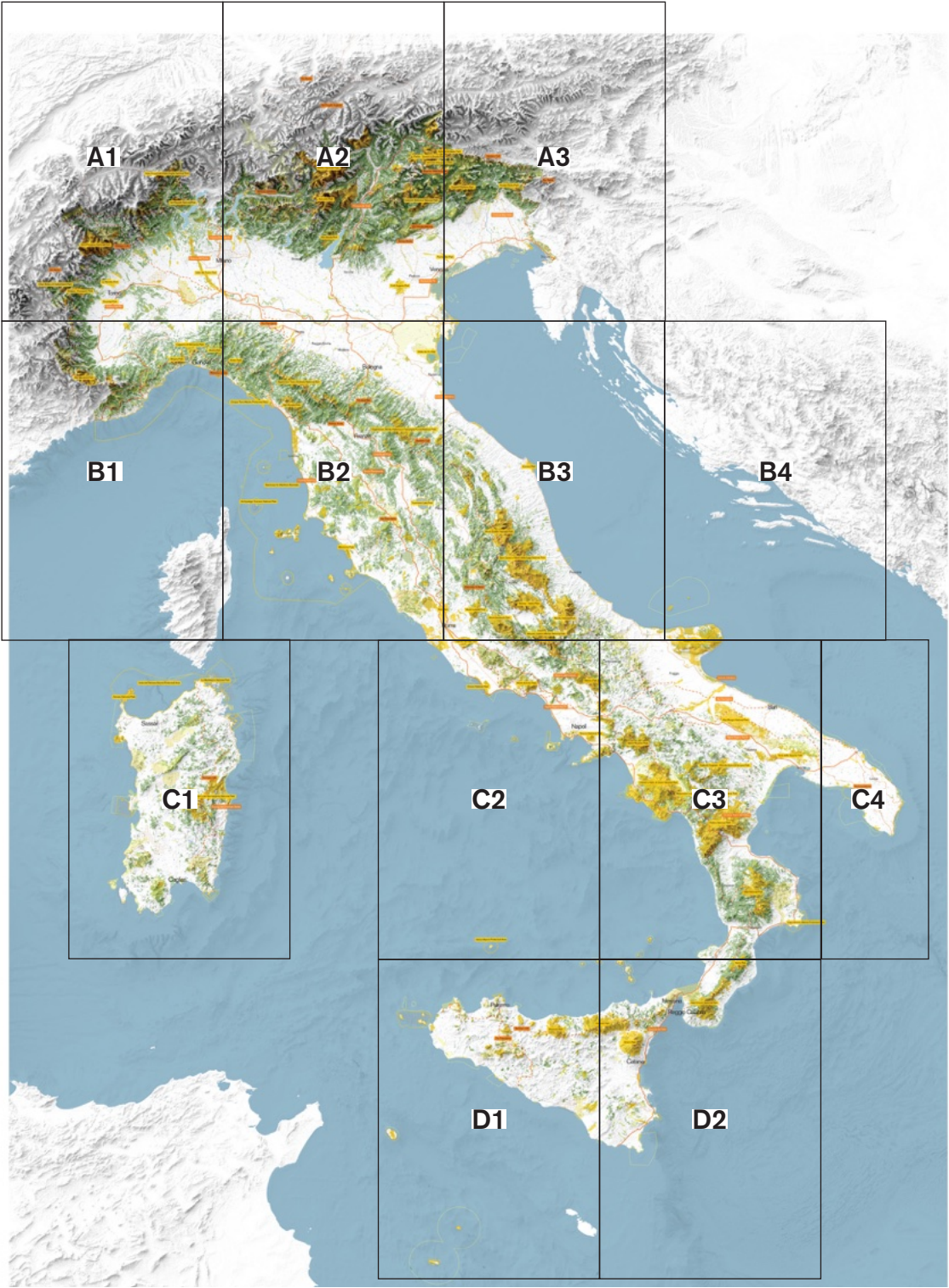
AlberItalia
info@alberitalia.it

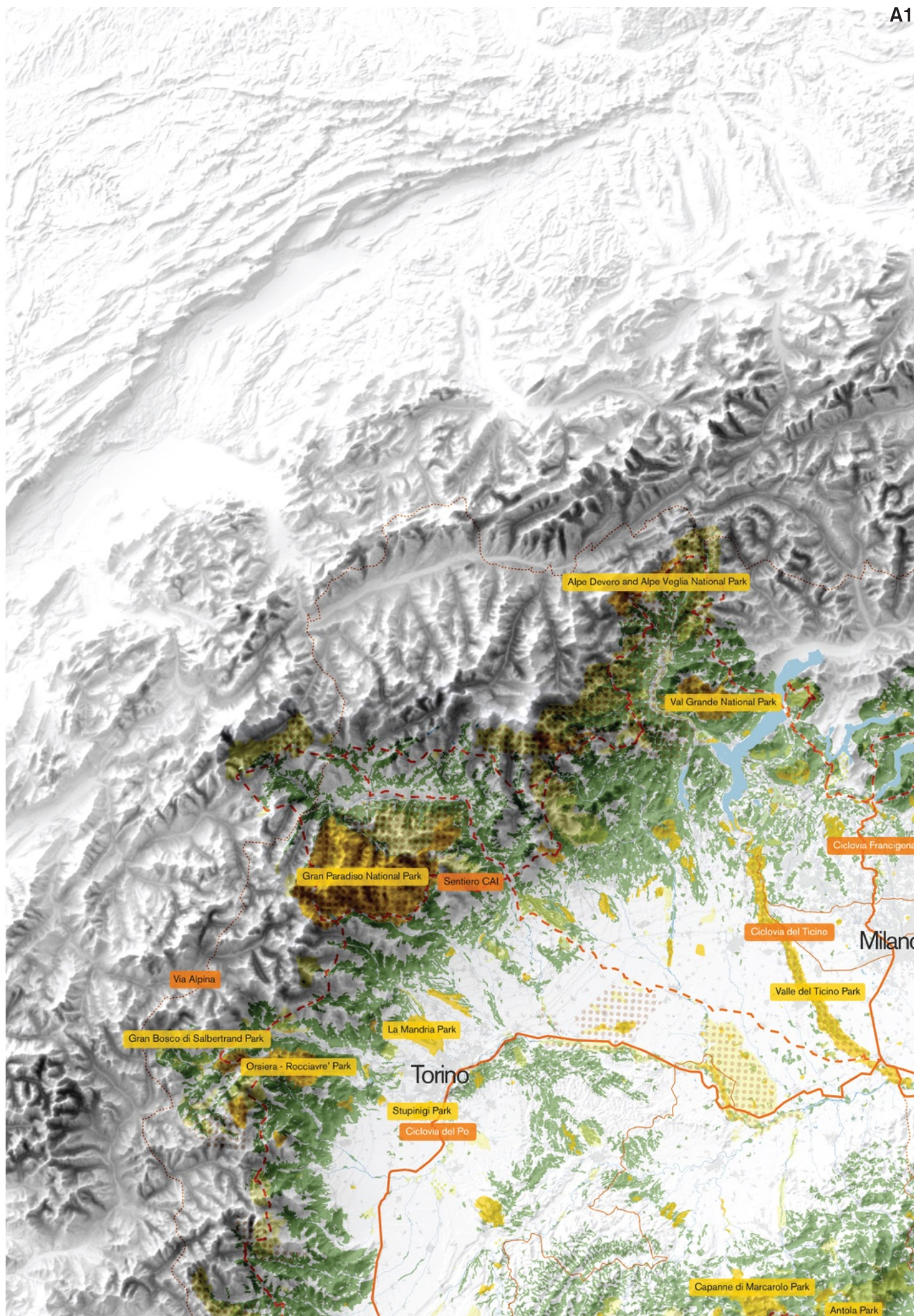
Parco Italia

annex 2

Maps

NATURAL CAPITAL MAP











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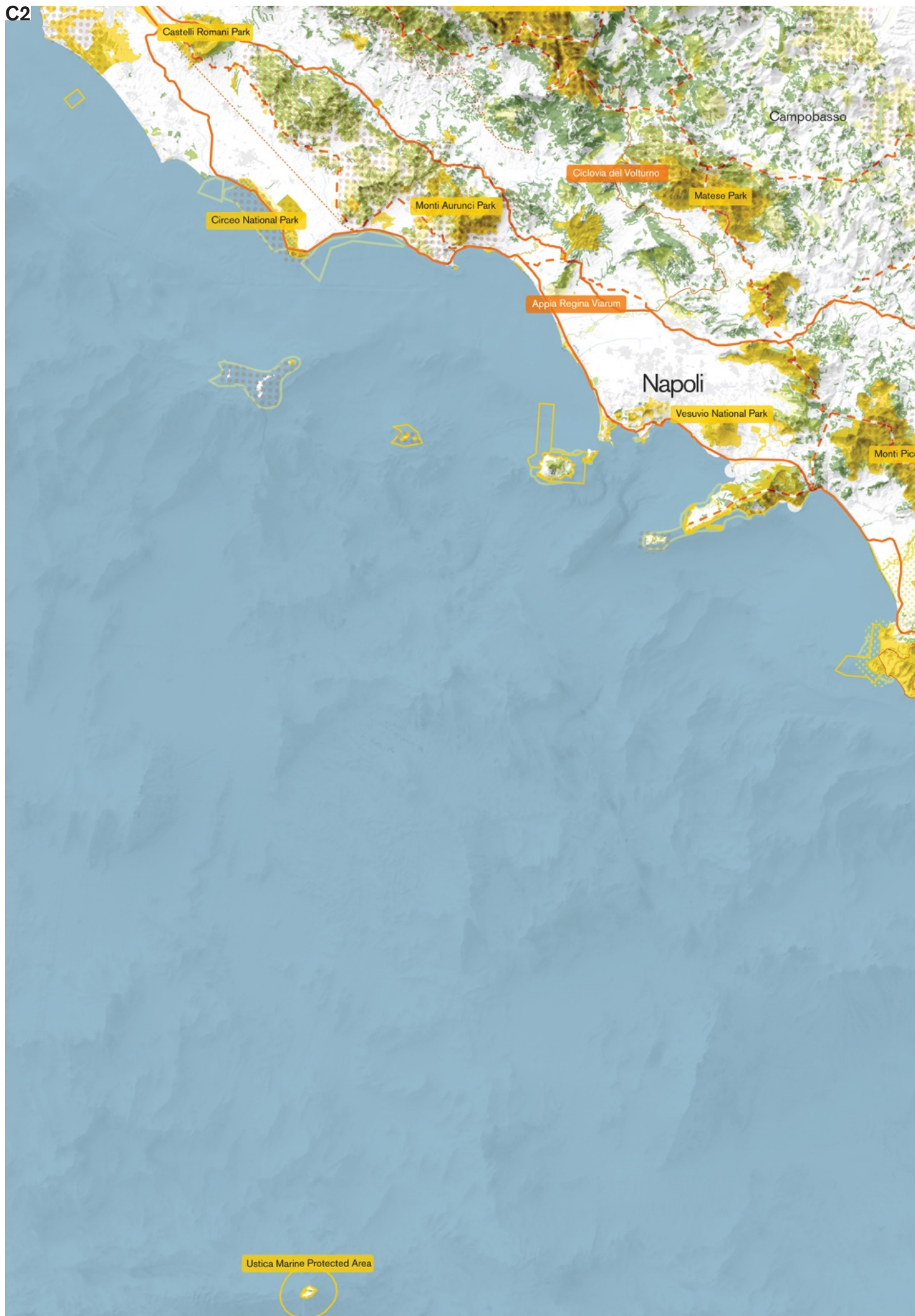


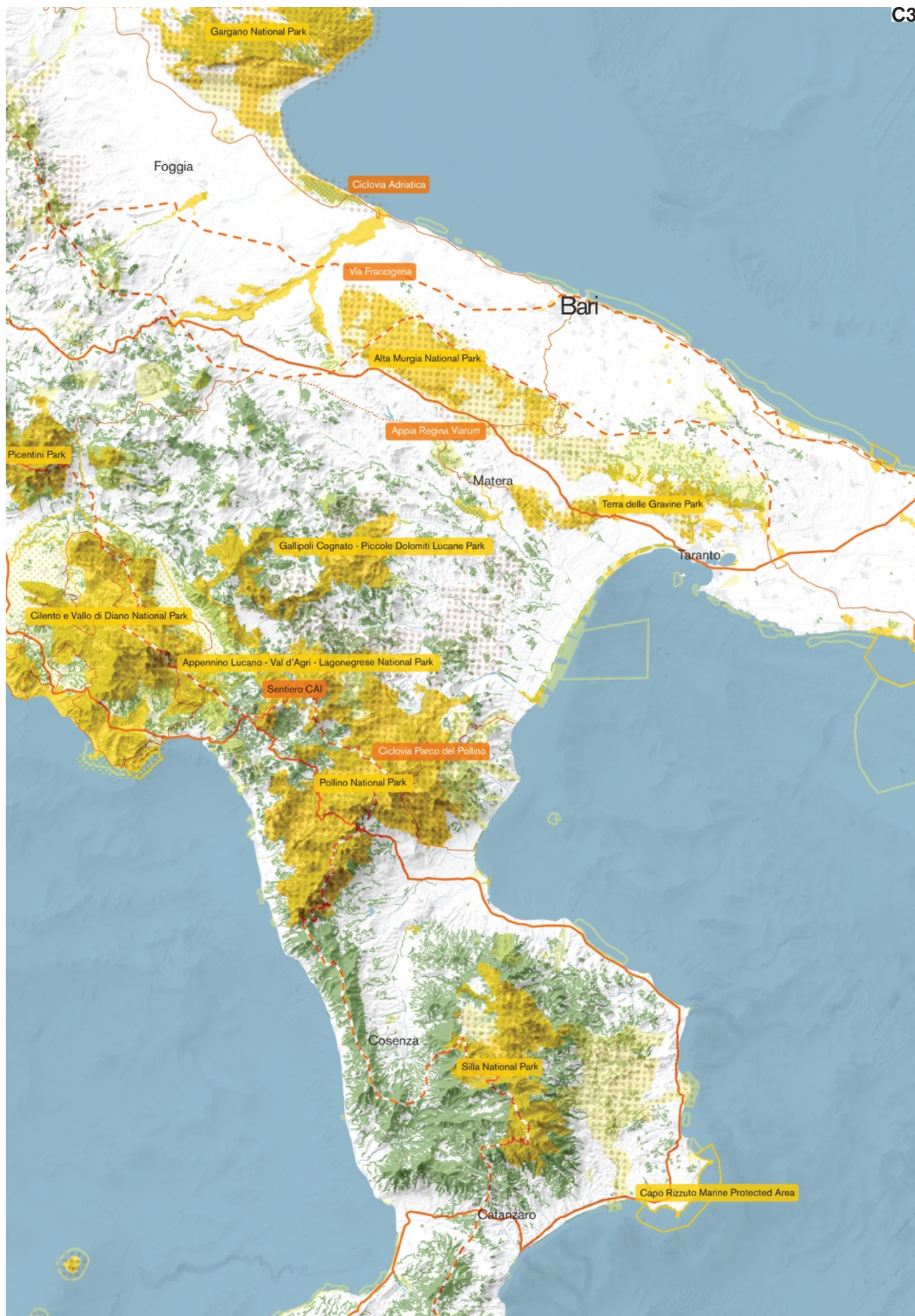
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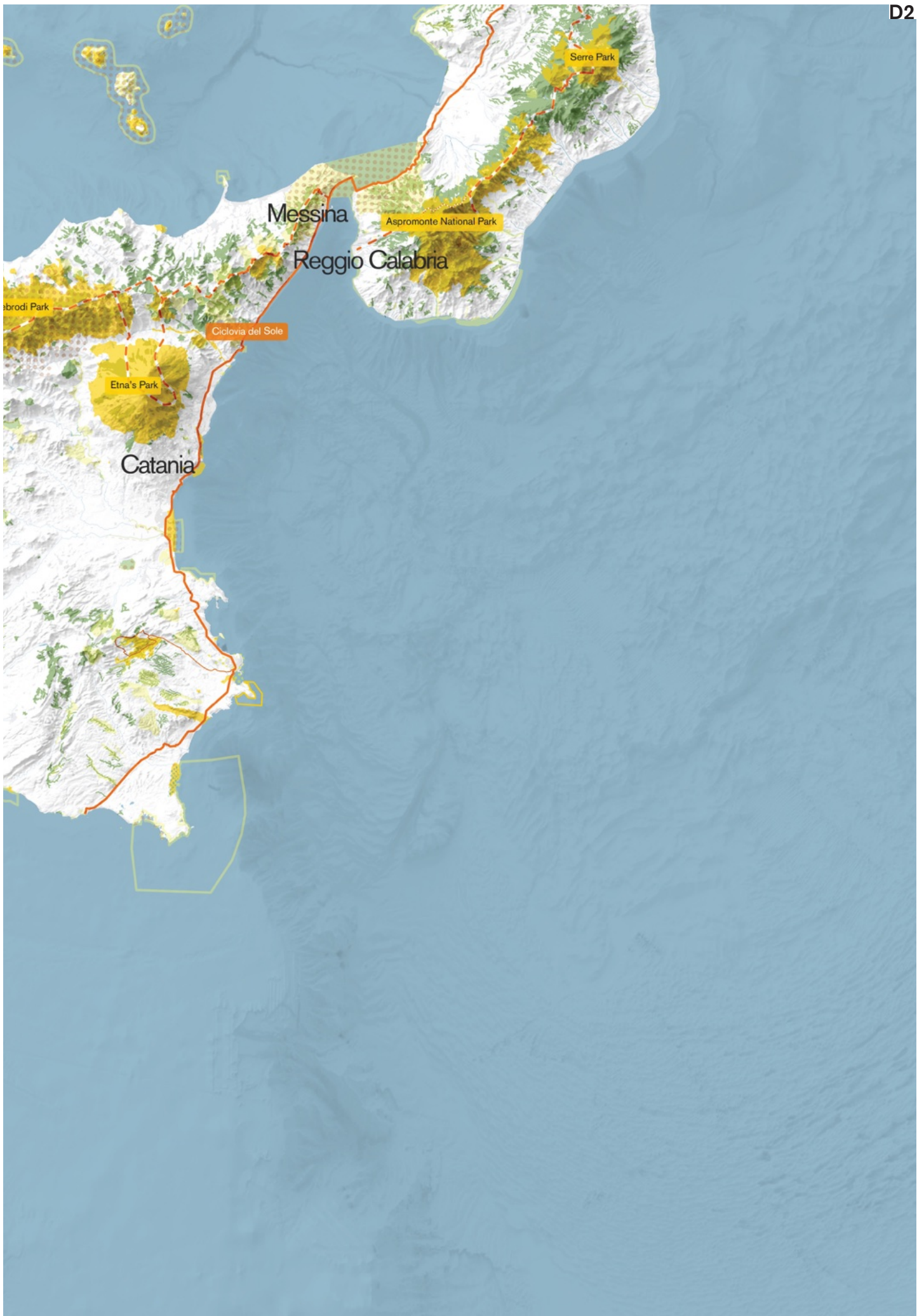






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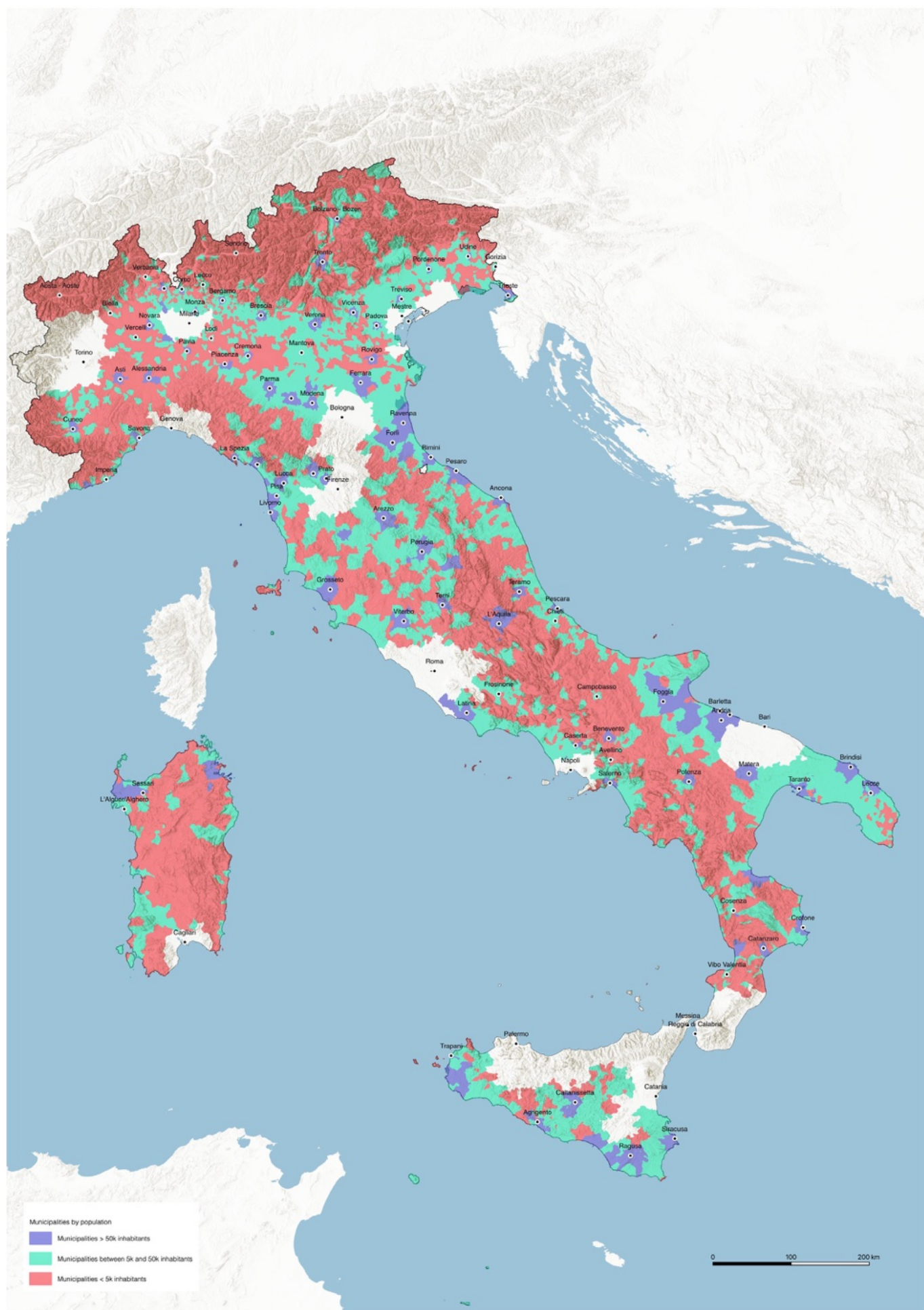




THEMATIC MAPS



Map 02. Metropolitan areas



Map 03. Municipalities by population



Map 04. Inner areas



Map 05. Ecoregions



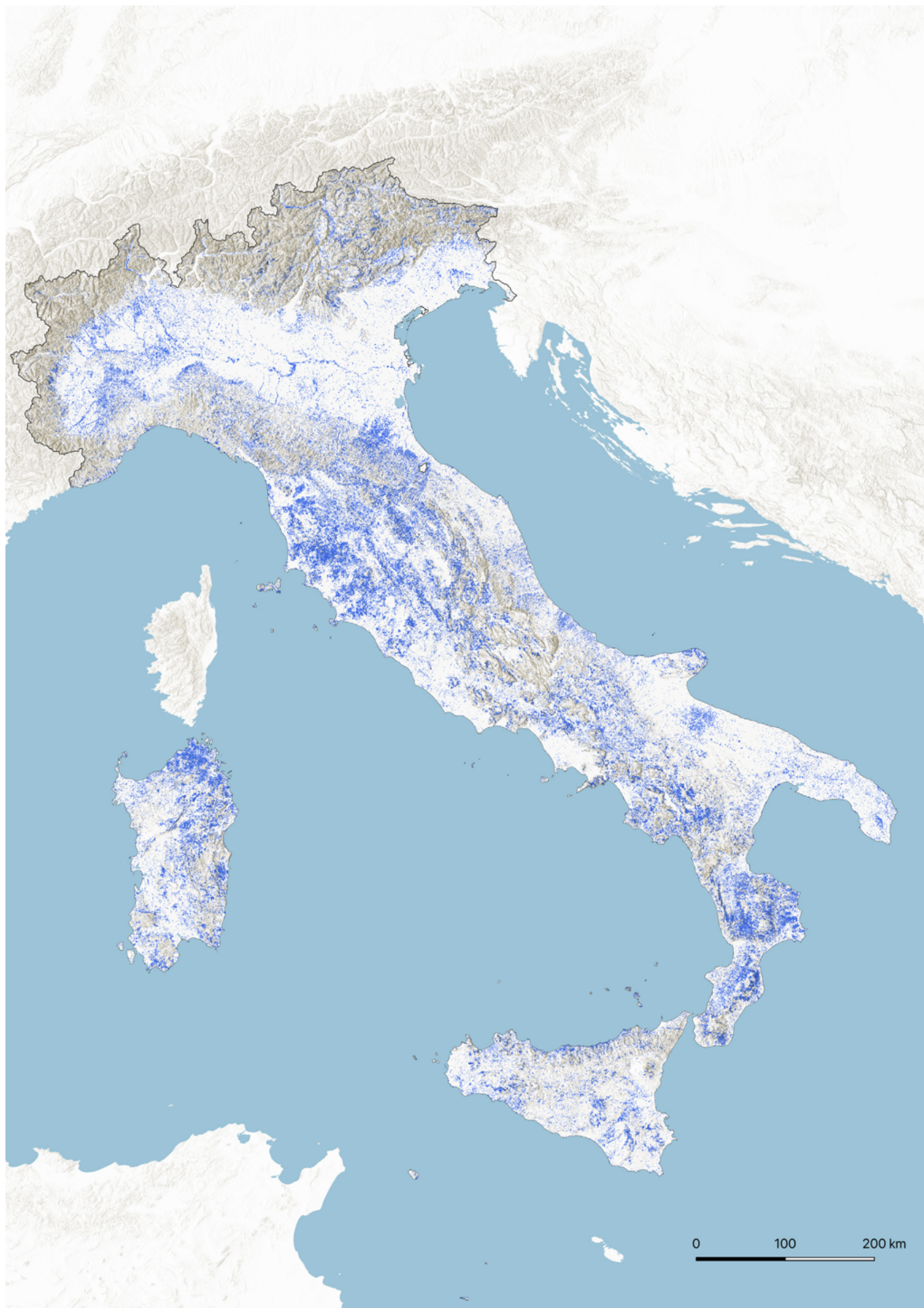
Map 06. Forests



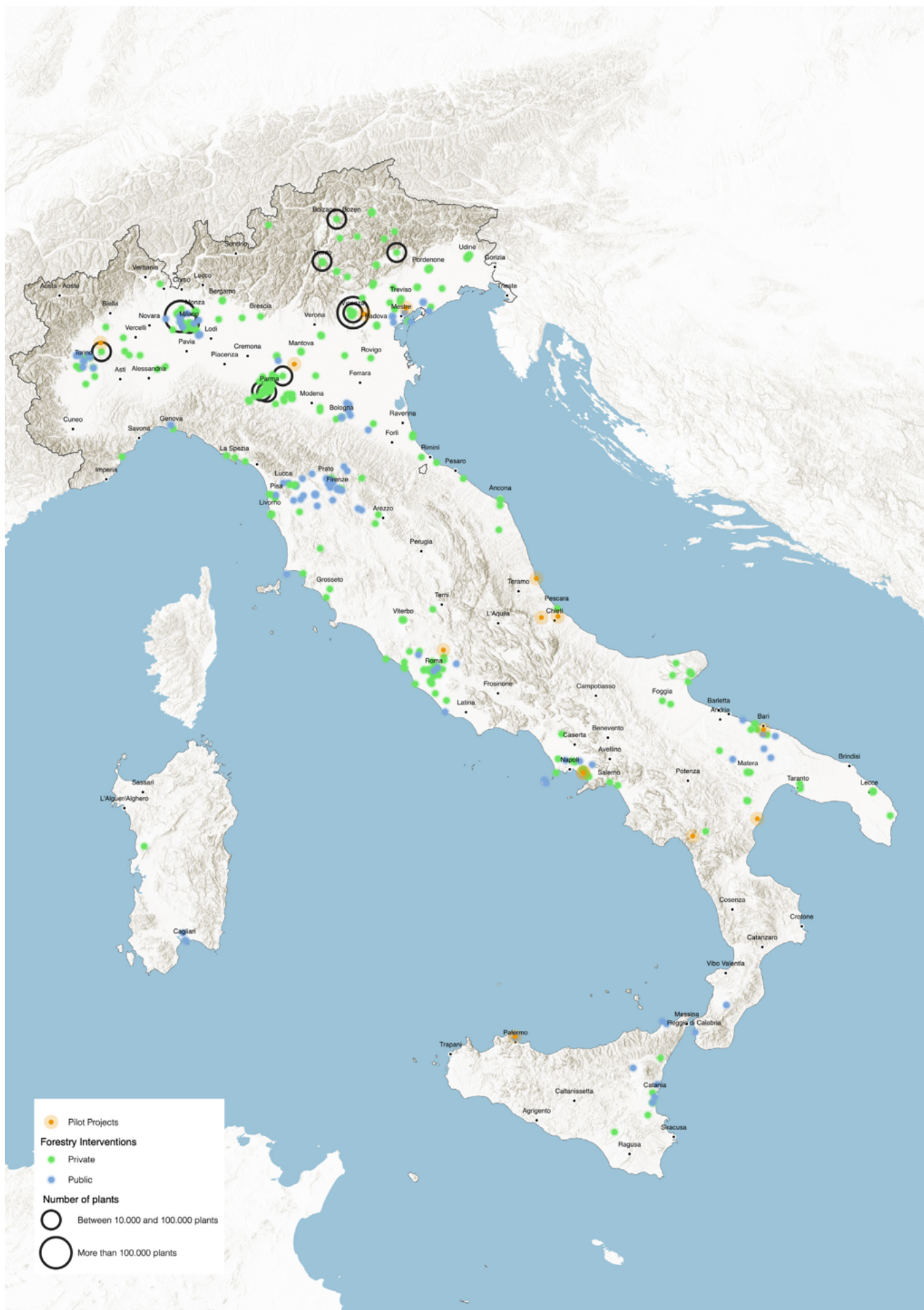
Map 07. Protected areas (Natura 2000 + National Protected Areas)



Map 08. Protected areas (IBA + RAMSAR + UNESCO Heritage sites)



Map 09. Tree Cover Gain



Map 10. Afforestation projects



Map 11. Hiking trails



Map 12. Biking trails



Map 13. Grey Infrastructures (Motorways, Primary roads, and Railways)



Map 14. Wildfires (2008-2022)



Map 15. Tree cover lost (2000-2020)



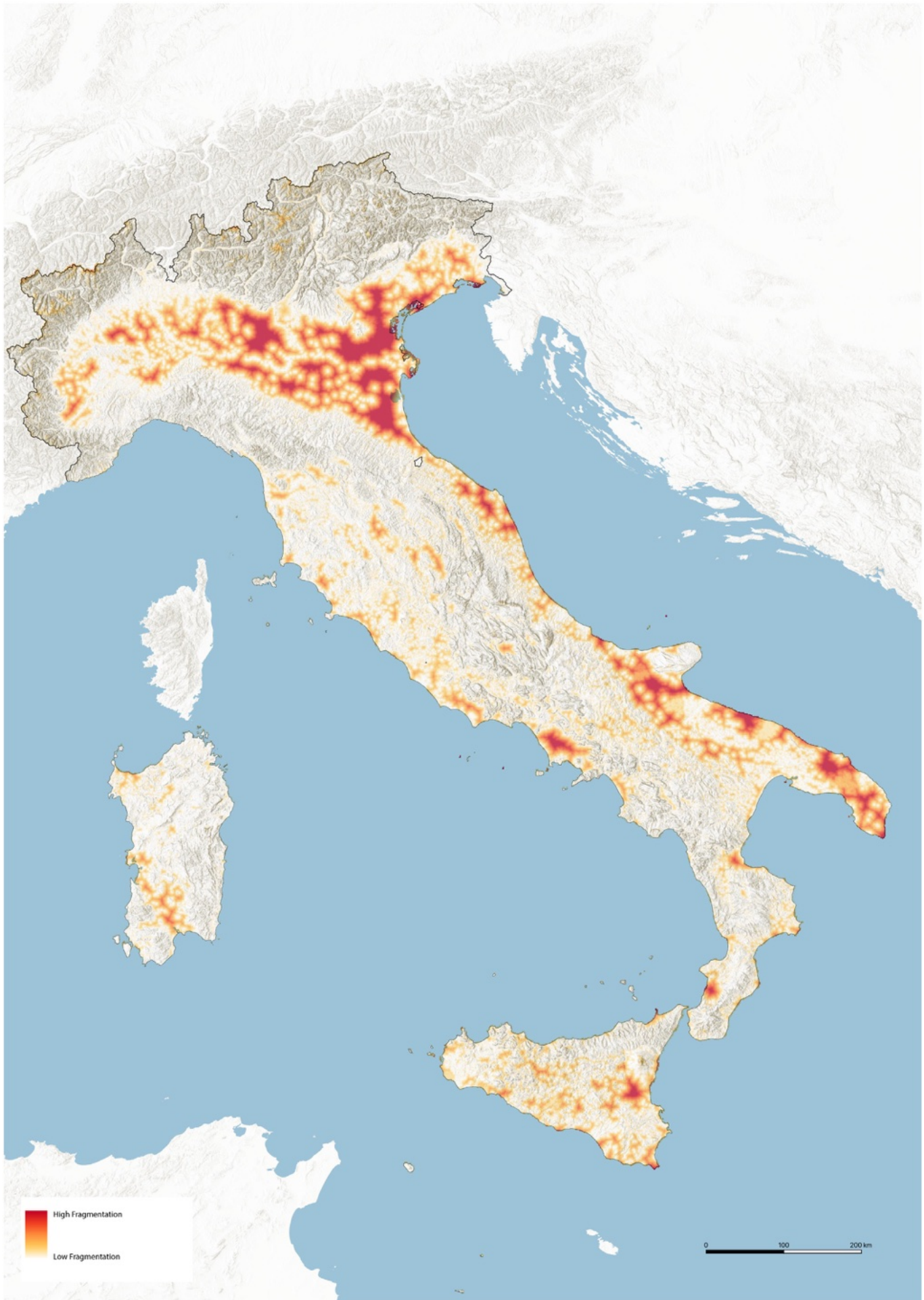
Map 16. Hydrogeological hazard



Map 17. Landslide hazard



Map 18. Temperature trends



Map 19. Forest fragmentation



Parco Italia

annex 3

Stakeholders network

29.09.23



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Companies and Organizations

Institutions and administrations

ADMINISTRATIONS			
Institution	Description	Reference person	
MASAF (ex MIPAAF) - Ministero dell'agricoltura, della sovranità alimentare e delle foreste		Alessandra Stefani	Gen eco dell
MiTE - Ministero della Transizione Ecologica		Dott.ssa Maria Carmela Giarratano	Cap gen nat
		Maria Carmela Giarratano	Ma
		Roberto Morassut	Un
CUFA – Comando Unità forestali ambientali e agroalimentari dell'Arma dei Carabinieri	il CUFA riceva tutte le informazioni dal MiTE pertinenti per l'esecuzione dei compiti previsti e per l'attuazione delle operazioni, in particolare, le istruzioni necessarie relative alle modalità per la corretta gestione, verifica e rendicontazione delle spese e per l'utilizzo del sistema di registrazione e conservazione informatizzata dei dati. conseguimento, entro la data del 15 novembre di ogni anno relativo al triennio 2022-2024, del seguente contributo del progetto: “la piena disponibilità, per ciascuna annualità, dei quantitativi di seme necessari e sufficienti per la realizzazione di 2.000.000 di piantine ai vivai regionali successivamente individuati” nonché, entro il 5 dicembre di ogni anno del triennio 2022-2024, “la semina, per ciascuna annualità, presso i vivai gestiti dal CUFA, di 250.000 unità di postime da consegnare alle Città metropolitane per la definitiva messa a dimora”		
ANCI Associazione Nazionale Comuni Italiani		Antonio Decaro	Pre

Role	Website	Address
General direction of the mountain economy and forests (Direzione generale l'economia montana e delle foreste)		
po Dipartimento amministrazione generale pianificazione e patrimonio rurale	Avviso per i progetti di forestazione nelle città metropolitane Ministero dell'Ambiente e della Sicurezza Energetica	
nager		
dersecretary		
	PNRR: Accordo di Cooperazione - MiTE e CUFA	
resident	https://www.anci.it/	

ADMINISTRATIONS			
Institution	Description	Reference person	
Mettiamo radici per il futuro		Stefano Bonaccini	Pre
ERSAF Ente Regionale per i Servizi all'Agricoltura e alle Foreste		Alessandro Fede Pellone	Pre
		Gianluca Mañoni	Co pla agr
		Paolo Nastasio	
Comune di Prato		Valerio Barberis	Co
		Antonella Perretta	Res the
UNCEM Unione Nazionale Comuni Comunità Enti Montani		Marco Bussone	Pre
Comune di Firenze		Cecilia Del Re	Co env
Federparchi		Giampiero Sammuri	Pre
Comune di Torino		Gabriele Bovo	
CM Milano		Maria Pia Sparla	
CM Bari	comune Conversano - ha schede progetti	Leonardo Lorusso	
		Giovanni Sanesi	
		Maddalena Scalera	Ph
CM Firenze		Francesco Ferrini	
CM Bologna		Elena Soverini	
CM Venezia		Alex Pra di Etifor	
CM Palermo		Ing. Michele Lo Biondo	
CM Genova	Responsabile del verde pubblico a GE e Progettista PNRR GE	Pier Paolo Grignani	
CM Roma	Socio studio forestale molto noto e Progettista PNRR area Roma - Studio RDM Firenze	Remo Bertani	
CM Cagliari	Carlo Poddi progettista (contatto Fabio); Isabella Ligia responsabile CM CA, contatto fornito a Barbara da Vivaista Sardegna	Ing. Isabella Ligia	
CM Messina			
CM Catania			

ADMINISTRATIONS

Institution	Description	Reference person	
CM Reggio Calabria	agronomo forestale della CM Reggio Calabria responsabile PNRR in Calabria. 2 lotti, per 2 comuni	Nino Siclari	
CM Napoli		Anna Assumma	

Role	Website	Address

Nurseries

NURSERIES			
Name		Website	Typology
Associazione Vivaisti Italiani			
Società Italiana di Arboricoltura			
AssoPoro			
Vivai Guagno		https://vivaiguagno.com/	Private nursery
Allasia		http://www.allasiaplant.com/	Private nursery
Allasia Plant Magna Grecia		https://allasiaplantmg.it/	Private nursery
Vivai Torsanlorenzo		http://www.vivaitorsanlorenzo.it/index.htm	Private nursery
Vivai Mola della Badia		http://www.vivaimdb.it/	Private nursery
Vannucci Pianta		https://www.vannuccipianta.it/	Private nursery (only ornamental)
Piante Mati		https://www.piantemati.com/	Private nursery (only ornamental)
Vivaistica Forestale - Regione Abruzzo		https://www.regione.abruzzo.it/categorie-macroaree/vivai-forestali	Regional Administration
Vivaistica Forestale - Regione Basilicata			Regional Administration
Vivaistica Forestale - Regione Calabria		https://www.calabriaverde.net/2021/02/03/outdoor-adventure/	Regional Administration
Vivaistica Forestale - Regione Campania		http://www.agricoltura.regione.campania.it/foreste/vivai.htm	Regional Administration
Vivaistica Forestale - Regione Emilia-Romagna		https://ambiente.regione.emilia-romagna.it/it/parchi-natura2000/foreste/gestione-forestale/boschi-da-selve-e-vivai/vivai-forestali	Regional Administration

	Location / Address	Reference person	Role
		Luca Magazzini	President
		Carmelo Fruscione	President
		Nada Forbici	President
	Via S. Francesco, 19/A 35010 Santa Giustina in Colle (PD)		
	Loc. S. Isidoro, 97 12030 Cavallermaggiore (CN)	Enrico Allasia	Owner and manager
	Loc. S. Margherita di Calabria 88049 Soveria Mannelli (Cz)	Franco Fazio	Owner and manager
	Via Campo di Carne 51 00040, Tor San Lorenzo - Ardea (RM)	Elisabetta Margheriti	
	C.da Collenero 1/A 04010 Roccasecca dei Volsci, LT		
	Via Moreno Vannucci (già Via della Dogaia) 51039 Quarrata (Loc. Piuveca) Pistoia	Andrea Massaini	Marketing
	via Bonellina 49 – 51100 Pistoia (PT)	Francesco Mati	Gestore e proprietario
		Giulio Innocente; Francesco Contu	Regional representative 2021
		Salvatore Digilio	Regional representative 2021
		Demetrio Crupi	Regional representative 2021
		Salavatore Apuzzo	Regional representative 2021
			Settore Aree Protette, Foreste e Sviluppo Zone Montane

	Location / Address	Reference person	Role
		Nadia Da Ros	Regional representative 2021
		Damiano Penco	Regional representative 2021
		Guido Frattola	Representative regional nursery ERSAF
		Lorella Brandoni	Representative ASSAM, Marche regional agency 2021
		Salvatore Ciocca	Regional representative 2021
		Eva malacarne	Representative regional nurseries 2022
		Antonio Masci	Regional representative 2021
		Salvatore Piazza	Regional representative 2021
		Massimo Zanieri	Regional representative 2021
		Giorgio Cuaz	Regional representative 2021
		Luisa Marchionni	Regional representative 2021
		Andrea Carbonari	Representative of the forest nurseries for the BZ province
		Matthias Zöschg	Representative of the forest nurseries for the TN province

NURSERIES			
Name		Website	Typology
UMBRAFLO - Azienda Vivaistica Regionale	ACCORDO con MiTE: svolgimento delle attività di supporto tecnico – operativo per la localizzazione degli spazi e la messa a dimora dei semi (planting) secondo le quantità e le specie fornite dal CUFA	PNRR: Accordo di Cooperazione - MiTE e UmbraFlor	Public forest nursery
Centro Biodiversità Vegetale e Fuori Foresta – Montecchio Precalcino (VI) Veneto Agricoltura		https://www.venetoagricoltura.org/2007/01/sedi/centro-vivaistico-e-per-le-attivita-fuori-foresta-montecchio-precacino-vi/	Public forest nursery
Vivai Russo Vincenzo	hanno fatto pre contratti con CM Genova per progetti PNR - garantiscono 300000 piante: 70% alberi 30% arbusti	https://vivairussovincenzo.com/	
Lambo Vivai	Le piantine sono state portate dai Vivai Russo a qua per la CM di Genova. Vivaio Lambo è stato acquisito da Vivai Russo.	https://www.lambo.it/	

	Location / Address	Reference person	Role
	Via Castellaccio, 6 - 06038 Spello (PG)	Ra $\square$ aele Corvi	Sales manager
	Via Bonin-Longare, 36030 Montecchio Precalcino (VI)	Roberto Fiorentin	Representative nursery

Leaders network

LEADERS NETWORK		
Reference person / or contact	Name of the Institution	Role
Qu Dongyu	FAO	Director-General
Sebastien Maire	Resilient Cities	CRO Paris
Patrick Krista	Greater Manchester Combined Authority	Natural Capital Co-ordinator
Adam Freed	Bloomberg Associates NYC	Principal in Sustainability Practice
Jerzy Bogdan	Agriculture EU-Commission	Director-General
Daniel Calleja Crespo	Environment EU-Commission	Director-General
Marc Palahi	EFI	
Michele Bozzano	EFI Mediterranean / EUFORGEN	
Rik de Vreese	EFI	
Georg Winkel	EFI	
Mohanna Chadi	Silva Mediterranea	
Catherine Rivoal	Ministry of Agriculture and Agrifood, France	International forest affairs officer
Giovanbattista De Dato	Silva Mediterranea	Secretariat
Cecil Konijnendijk	NBSI	Founder
Clive Davis	EFUF	
Ed Ikin	Kew Gardens	
Dan Lambe	Arbor Day Foundation	
John Rob-Pool	WRI/Cities4Forests	
Laura Petrella	UN Habitat	
Scott Francisco	Cities4Forests	
Sarah Wilson	Cities4Forests	
Wang Cheng	Chinese Urban Forestry Research Centre	
Timothy Blatch	Urban Development ICLEI	Professional Officer
Paul Johnson	International Society of Arboriculture	
Sandra Luque	IRSTEA; IUFRO DIV. 8	
Barbara Vinceti	Bioversity	
Tom Crowther	Crowther Lab	
Stefano Ciafani	LEGAMBIENTE Italia	President
Simone Borelli	FAO	Urban Forestry Officer FAO
Gianfranco Bologna	WWF Italia	

Associations

ASSOCIATIONS			
Name	Reference person	Role	Website
AIEL Associazione Italiana Energie Agroforestali	Domenico Brugnoli	President	https://www.aielenergia.it/
Federazione Italiana Parchi e Riserve Naturali	Giampiero Sammuri	President	http://www.federparchi.it/
LIPU	Marco Dinetti	Urban ecology delegate	www.lipu.it
Giant Tree Foundation	Andrea Maroe	President	https://www.gianttrees.org/
Pro Silva Italia	Mauro Frattegiani	President	https://www.prosilva.it/
ANARF Associazione Nazionale Attività Regionali Forestali	Giustino Mezzalana	President	http://www.anarf.org/
Slow Food Italia	Gabriele Locatelli	delegate for forests and forestry	
SISEF	Fabio Salbitano	Urban Forestry coordinator	
Legambiente	Antonio Nicoletti		
WWF	Antonio Pollutri		
iForest / Forest@	Marco Borghetti	editor in chief	
Accademia Italiana di Scienze Forestali	Susanna Nocentini, Piemaria Corona		
Società Botanica Italiana			
Centro Interuniversitario "Biodiversità, Servizi Ecosistemici e Sostenibilità"	Carlo Blasi		

Acadernia

EXPERTS - ACADEMIA				
Name	Institution / Company	Role	Expertise	Scientific paper / other info
Matilda van den Bosch	UBC and Barcelona Institute of Global Health, ISGlobal		physical and mental well-being	
Carlo Blasi	Comitato per lo sviluppo del verde pubblico, CIRBIS			
Giovanni Sanesi	SISEF			
Paolo Semenzato	SISEF			
Francesco Ferrini	Unife			
Carlo Calafietra	IRET CNR	Director IRET		
Elena Paoletti	CNR			
Piermaria Corona	Centro di ricerca Foreste e Legno del Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA)	Director		
Silvano Fares	CREA			
Raoul Romano	CREA			
Alessio Fini	UNIMI Dipartimento di Scienze Agrarie e Ambientali - Produzione, Territorio, Agroenergia			
Tessa Matteini	UNISCAPE	Director		
Dott.ssa Gabriella Negrini	CED-PPN - EUROPEAN DOCUMENTATION CENTRE ON NATURE PARK PLANNING			
Rita Baraldi	IBIMET - CNR			
prof. Giovanni Sanesi	University of Bari, Dipartimento di Scienze Agro Ambientali e Territoriali			
prof. Giorgio Vacchiano	State University of Milan			

EXPERTS - ACADEMIA				
Name	Institution / Company	Role	Expertise	Scientific paper / other info
prof. Federico Magnani	University of Bologna			
prof. Marco Marchetti	University of Molise			
prof. Federico Maetzke	University of Palermo (retired)			
Dr. Arch. Maria Chiara Pastore	Politecnico di Milano			
Fabio Salbitano	Centro Nazionale per lo studio e la conservazione della biodiversità di Firenze, ☐ DAGRI-UNIFI	Professor		
Renzo Motta	Centro Nazionale per lo studio e la conservazione della Biodiversità - Centro regionale di castanicoltura, Piemonte	Professor and President of Italian Society of Silviculture and Ecology		
Prof. Roberto Tognetti	University of Molise (e partner progetto SUPERB, responsabile di una unità di progetto)	Professor		
Prof. Alberto Maltoni	Università di Firenze (e membro della commissione tecnica della legge 386 - relativa al MFM)	Professor and member of the Ministry Commission for forest nursery reproductive materials		
Dott. Alessio Giovannelli	CNR IRET (spoke 4 PNRR con Calfapietra)	Responsible for forestation program in Italian PNRR		
Rosalba D'Onofrio		https://www.lifeagreenet.eu/site/the-project/		

Professionals

PROFESSIONALS						
Name		Name of the Institution / Association	Contact	Website	Specialty (arborists, certifiers, technicians, etc.)	other info
Sabrina Diamanti	Presidente	Consiglio Ordine Nazionale Dottori Agronomi e Dottori Forestali	presidente@conaf.it			
Guido Scaccabarozzi	studio forestale di Milano	Demetra soc. coop.	scaccabarozzi@demetra.net			
Marco Allocco	grande studio forestale di Torino, interesse per servizi ecosistemici	SEACOOOP s.r.l.	allocco@seacoop.com			
Carlo Poddi	Progettista PNRR area Cagliari					
Remo Bertani	Socio studio forestale molto noto e Progettista PNRR area Roma	Studio RDM Firenze				
Pier Paolo Grignani	Responsabile del verde pubblico a GE e Progettista PNRR GE	Comune di Genova	verdepubblico@comune.genova.it			
Marco Miozzo	uno tra i più grossi studi forestali (è una coop); progetti, progettazione su fondi UE (LIFE, ecc) e formazione	DREAM Italia	miozzo@dream-italia.it	http://www.dream-italia.it/		
Paolo Mori	professionista e comunicatore (direttore di Sherwood)	Compagnia delle foreste	paolomori@compagniadelleforeste.it	https://www.compagniadelleforeste.it/		
Luigi Torregiani	comunicazione settore forestale	Compagnia delle foreste		https://www.compagniadelleforeste.it/		

Schools

SPECIALIZATION and PROFESSIONAL SCHOOLS					
Name	Website	Typology	Location / Address	Reference person	Contact
Scuola Agraria del Parco di Monza	https://www.monzaDora.it/it-IT/scuola-agraria-del-parco-di-monza/	professional school	Viale Cavriga 3 - 20900 Monza (MB)	https://www.monzaDora.it/it-IT/come-contattarci/come-contattarci/	https://www.monzaDora.it/it-IT/come-contattarci/come-contattarci/
Istituto d'Istruzione Superiore Federico Meneghini	https://www.istitutomeneghini.edu.it/	forestry professional school	Via Alessandro Morino, 5, 25048 Edolo BS		bsis007008@istruzione.it

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