

The role of landscape design in promoting agroecological systems in peri-urban farms

A vision for Cascina Sant'Alberto

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to the future,
which relies on the quality of our choices

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Abstract

- EN -


In a crucial period of collective and unique awakening of consciousness, we now ask how landscape design can contribute to delineating places of positive synergy between man and nature. In particular, we focus on those places of transition and connection: peri-urban areas, located between city and countryside. Starting from 10 peri-urban farms observed as virtuous case studies, this research defines design guidelines for the creation of agroecological systems that can produce ecosystem benefits and contribute to the rediscovery of a model of systemic, inclusive and holistic agriculture. The landscape design tools identified are then applied to one of the case studies, Cascina Sant'Alberto. In the project's vision, the Cascina is a place for agroecological experimentation, a learning centre and a space for innovative production. Cascina Sant'Alberto has thus regained its identity as a dynamic centre of life and community, in the guise of an Agroecological Hub.

Abstract

- ITA -

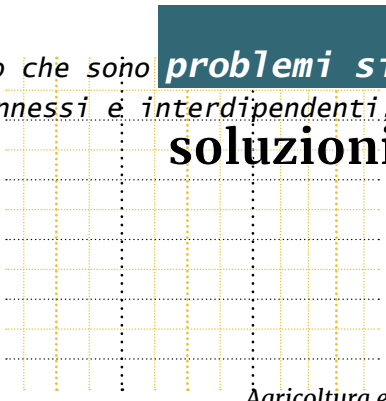
In un periodo cruciale di risveglio collettivo e unico delle coscienze, ci chiediamo oggi come la progettazione del paesaggio possa contribuire a delineare luoghi di sinergia positiva tra uomo e natura. In particolare, ci concentriamo su quei luoghi di transizione e connessione: le aree periurbane, situate tra città e campagna. Partendo da 10 aziende agricole periurbane osservate come casi studio virtuosi, il seguente lavoro di tesi definisce le linee guida di design per la creazione di sistemi agroecologici che possano produrre benefici ecosistemici e contribuire alla riscoperta di un modello di agricoltura sistemica, inclusiva e olistica. Gli strumenti di progettazione del paesaggio individuati vengono poi applicati a uno dei casi studio, Cascina Sant'Alberto. Nella visione di progetto Cascina Sant'Alberto è luogo di sperimentazione agroecologica, spazio di apprendimento e luogo di produzione innovativa. La Cascina torna così a riscoprire la sua identità di nucleo dinamico di vita e di condivisione, nelle vesti di Agroecological Hub.

Introduction



— “Oggi è sempre più evidente che le **maggiori sfide del nostro tempo** non possono essere comprese se considerate da sole.

Dato che sono **problemi sistematici**, e quindi interconnessi e interdipendenti, richiedono egualmente **soluzioni sistematiche”**



– Fritjof Capra
Agricoltura e cambiamento climatico

The thesis work proposed is to be contextualised within a research project “**The Role of Design in Promoting Cultural Ecosystem services and Long-term Sustainability in Urban Agroecological Systems**”, of which **Stephanie Hurley** is the principal investigator (Plant & Soil Science Associate Professor at the University of Vermont) and in which **Catherine Dezio** participated as collaborator (Postdoctoral Fellow and Adjunct Professor Department of Architecture and Urban Studies, Politecnico di Milano). The research project, winner of the Catalyst Award Proposal 2019 of the Gund Institute of Environment of the University of Vermont (USA), aims to investigate the sustainability of urban agroecological systems and the Ecosystem services they offer through the disciplinary lens of landscape design. Italy has been identified as a place where the exploration of historical relationships between cities and agriculture can reveal models and principles of Urban and periurban Agroecology (UPAE). In particular, **the research aims to recognise and analyse the landscape design tools used by some Italian peri-urban farms that already adopt agroecological principles.**

The opportunity to collaborate in the research during the data collection phase, the selection of the farms and the conduct of the interviews made it possible to understand the heterogeneity and richness of the planning models adopted by the realities observed and, subsequently, was the key to the development of the design toolbox. In addition, the exchange of knowledge between researchers and interviewees (observed case studies) greatly enriched the development of the thesis project, generating awareness of the topic of agroecology.

The thesis work was carried out in parallel with the research project. The final **target** of the thesis work is to **demonstrate the potential of landscape design in the construction of agroecological systems in peri-urban farms, which can contribute to the well-being of nature and humans through the production of ecosystem services.**

This thesis work takes place at a historic moment of **ecological transition** and a ferment of environmental and agricultural policies, starting with the European Green Deal (and the new Farm to Fork strategy)¹ and ending at a national level with the National Recovery and Resilience Plan (PNRR)² and the New Common Agricultural Policy (CAP)³. The landscape, already conceived as a “key element of individual and social well-being” in the European Landscape Convention⁴, is now configured as a platform through which to implement actions for the production of Ecosystem Services, capable of bringing benefits in support of sustainable development.

The approach adopted in this work draws on the school of **research-by-design**: “a type of academic investigation of the architecture field (in particular, landscape architecture and urban design), through which design is explored as a method of inquiry”⁵. With the support of C. Dezio, as supervisor, and S. Hurley, as co-supervisor, a re-elaboration of the data collected from the interviews was carried out, from which a toolbox of the agroecological tools was derived. An evaluation of the ecosystem services produced was undertaken and, finally, a pilot project was implemented on one of the interviewed case studies: Cascina Sant’Alberto.

¹ Un Green Deal europeo. (2021). Retrieved July 5, 2021, from European Commission website

² Mipaaf - PNRR - Piano Nazionale di Ripresa e Resilienza. (2021). Retrieved December 5, 2021, from Politicheagricole.it website

³ Obiettivi strategici chiave della nuova PAC. (2021). Retrieved July 5, 2021, from European Commission website

⁴ Convenzione Europea del Paesaggio - Home. (2021). Retrieved December 5, 2021, from Beniculturali.it website

⁵ Dezio, C., Zhang, C., Zhang, Y., & Marino, D. (2021). The Role of Landscape Design in Cultural Rural Areas. A Didactic Exercise to Experiment a Research-by-Design Process Applied to an Italian UNESCO Wine Site. *Architecture*, 1(2), 117–139. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/architecture1020010>

The thesis is therefore structured as follows:

1. **The first chapter** is the introduction tool to the research and project themes; in the three paragraphs presented, the themes of industrial agriculture, agroecology and peri-urban territories are discussed. Here the project themes are addressed and the role of landscape design in the construction of agroecological systems that can produce ecosystem services is introduced.
2. **The second chapter** concerns the observation of the case studies and the construction of the model for the comparative analysis of the cases. The 10 case studies that took part in the research from which this thesis work starts are then presented. In order to compare the data obtained from the study, a comparative model is constructed through a review of the literature on Agroecology as a design practice. The chapter closes with the construction of a design toolbox based on agroecological principles and the analysis of the ecosystem services produced by the design tools.
3. **The third chapter**, the final product of the adoption of the research-by-design method, sees design experimentation through the construction of a project for one of the case studies of the research, Cascina Sant'Alberto. The work involves the elaboration of a masterplan with the implementation of the agroecological model of the farm. In addition, two focus designs are developed from the masterplan of the project area.

Agroecology for peri-urban landscape

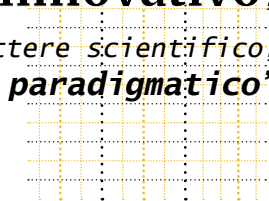
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—“L’agricoltura è in **crisi**

*e dalla crisi non può uscire se
non attraverso un reale e profondo*

processo innovativo,

*Non solo di carattere scientifico,
ma **paradigmatico**”*



— Stefano Bocchi
Agroecologia per nuovi paradigmi distrettuali integrati

1.1 Why should we talk about agroecology?

The planet is facing multiple inter-related crises: economic, financial, energy, ecological and social.

Climate change represents only one dimension of the ecological crisis. These crises do not involve randomly but are a result of a dominant and exploitative capitalist system that promotes economic growth at the expense of people, nature and planet. We cannot continue with the same approach, as nature has her own tipping points and boundaries and if these are breached, the whole world is threatened.

Agriculture is the artificialization or simplification of nature.

When we have monocultures, we need to start to apply external inputs and increase management intensity, because monoculture lack biological diversity, which plays key ecological roles. Unfortunately, 90 per cent of the world's 1.5 billion hectares under agriculture is dominated by industrial monocultures, that are highly dependent on external inputs and energy. The world largely depend on only 12 type of grains and 23 species of vegetables¹.

The advance of industrial agriculture arose with the Green Revolution in the 1960s, through which the global north has set up research centres to teach farmers in tropical areas how to grow and farm. Science became a tool of the people in power who, for political reasons, set up projects that fit a particular agenda by promoting so-called high-yielding varieties at the expense of local crop varieties. **The Green Revolution** took place in Mexico and then in India, and then in other regions of the world. The technologies were not scale-neutral; on the contrary, they favoured increasing the size of

¹Third World Network and SOCLA (2015). Agroecology, key Concepts, Principles and Practices

farms and decreasing the number of farms. **The spread of industrial agriculture has led to major unsustainable impacts.** By way of non-exhaustive illustration, impacts include the following

- Loss of plant and animal genetic diversity, in particular due to deforestation, standardisation of farming systems or the elimination of beneficial organisms resulting from the use of synthetic pesticides
- Soil degradation, resulting for example from over-exploitation and the use of synthetic inputs;
- Water pollution and depletion of water resources, e.g. due to contamination of water by nitrates in inorganic fertilisers, and excessive groundwater withdrawal due to inappropriate irrigation techniques, such as deep well irrigation;
- Increased vulnerability to pest and disease outbreaks and associated economic losses;
- Negative impacts on farmers' and/or consumers' health, due to the intrinsic toxicity of pesticides, combined with unsafe conditions of use (lack of adequate protective equipment and/or unsafe storage conditions), and/or excessive concentration of their residues in food products
- Increased indebtedness induced by various factors, including farmers' rising expenses related to the use of pesticides (in particular due to the use of their increased quantities as a result of the development of pest resistance)
- Significant contribution to climate change and increased vulnerability to its impacts.

The time has come to rethink the way we do agriculture.

² Capra, F., Lappé, A. (2016). Agricoltura e cambiamento climatico. Aboca

The first necessary step is to understand (and be able to communicate!) the economic and social potential of nature, which is no longer antagonistic to growth and development but the driving force behind a transition towards agroecological systems that generate tangible benefits². Over the last twenty years, the term agroecology has been used as a concept that unifies all those agricultural practices based on ecological principles, putting into practice a veritable mimesis of natural ecosystems to maximise yields, control pests and improve soil fertility. **In terms of agricultural practices or farming systems, agroecology is rather a holistic approach consisting in realizing key principles through the context-specific design of strategies and techniques.** But agroecology is not only an agricultural approach. It is also referred to as a science and a social movement. **Agroecology generates measurable environmental, social, economic and political benefits.**

³ CIDSE (2018). I principi dell'agroecologia

In terms of the environmental dimension, agroecology contributes to building more complex agro-systems, increases resilience and the capacity to adapt and mitigate climate change (building healthy soils and restoring depleted ones, reducing direct and indirect energy use)³.

It also builds and maintains soil life to ensure favourable conditions for plant growth, seeks to optimise and close resource cycles by recycling existing nutrients and biomass within agricultural systems, optimises and maintains surface and subsurface biodiversity over time and space, and counteracts desertification and subsequent soil drought.

Biodiversity improves water use, nutrient uptake and disease resistance of crops. The cultivation of

different species decreases the risk of pests, which are only attracted to certain crops.

Agroecology is linked to the knowledge, culture, identity and tradition of local communities.

Agriculture remains the most widespread occupation and the sector presents the best opportunities for inclusive development to reverse the trend of migration to cities and the ageing of populations in so-called inland areas.

Knowledge of agroecological practices can increase the autonomy of local societies and make them aware of their value and identity.

Controlling the supply chain and the processing of resources allows the local market to be enhanced and promotes trust and solidarity in the producer-consumer relationship.

Last but not least, agroecology helps to create pleasant, sustainable, usable landscapes by returning to a forgotten nature.

And landscapes create jobs: 1.3 million of the 9.6 million jobs in the agricultural sector in Europe are directly or indirectly linked to the Natura 2000 network⁴.

Multi-functionality is a criterion that is almost always included in the logic of agroecological farms: the opening up to the public of spaces for sharing and meeting, the opening up of direct sales outlets, the opening up of agri-tourism establishments, the creation of recreational-didactic routes for environmental training.

The return to sustainable rural tourism in recent years is a trend that should not be underestimated for the development of agricultural territories: in Italy the rate of holiday tourism in nature and inland agricultural areas has increased by +10.44% from

⁴ The business case for biodiversity, The European Green Deal. (2021). Retrieved July 4, 2021, from European Commission - European Commission website: https://ec.europa.eu/commission/presscorner/detail/en/fs_20_907

⁵ Quarto Rapporto sullo Stato del Capitale naturale, le criticità in Italia - Fondazione Sviluppo Sostenibile. (2021, May 4). Retrieved December 4, 2021, from Fondazione Sviluppo Sostenibile website: <https://www.fondazionevilupposostenibile.org>

2012 to 2017⁵.

From an economic point of view, agroecology helps to boost local economies through the use of local resources and by supplying food to local and regional markets. Agroecological approaches have lower costs as they reduce external inputs (such as fertiliser use) and increase crop yields in a sustainable way. Small farmers in particular benefit from agroecology, as they can sustainably increase their crop yields, improve their produce and nutritional security, and increase their incomes. By decreasing the distance between producer and consumer, agroecology reduces storage, refrigeration and transport costs, takes full account of externalities for society and the environment, minimising waste and negative health impacts, and supporting positive externalities such as ecological health, resilience and regeneration. Last but not least, **through its political dimension**, agroecology shifts the centre of power in food systems from the interests of a small number of large agro-industrial entities to the direct producers, i.e. the small-scale food producers who provide most of the world's food.²³ It seeks a solution to the injustices caused by the overwhelming power of the big agro-industries. Solution to the injustices caused by the overwhelming power of large industries in current food systems. When part of an approach related to food sovereignty, agroecology represents a democratic transition of food systems, ensuring that their their voices are heard by politicians at all levels, from small community levels, from small communities to national and international levels.

1.2 Peri-urban farms as innovative laboratories

In **agroecology**, the farm is studied as a biological, living, co-evolving hyper-complex system with the surrounding territory with which it interacts and with the community of reference. This approach presupposes interdisciplinarity and transdisciplinarity: **the farm is understood as a system involving different actors, different sectors of development and production.** Connections, flows and feedback loops in geographical, socio-economic and cultural contexts are studied. **Broadening our view of producer-consumer connections means being able to interpret in an integrated and organic way the problems concerning the demand and supply of ecosystem service**⁶. As far as agriculture is concerned, ecosystem services are now grouped into four categories⁷: product provisioning services, regulatory services (on air quality, climate, the water cycle and soil), cultural services (which concern non-material benefits obtained through cognitive, spiritual, recreational and aesthetic activities), and support services (necessary for the production of goods such as the formation of agricultural land). **With the Green Revolution the farm has been confined within the production and supply dimension, but today it is called upon to seek forms of horizontal and vertical integration along the production,** through innovation and cooperation, which can then be studied through the perspective of ecosystem services. **The farm, with the agroecological approach, can therefore play an important role in the territorial sphere** (if considered as a complex system that co-

⁶ Bocchi, S. (2018). Agroecologia per nuovi paradigmi distrettuali integrati, SCIENZE DEL TERRITORIO. ISSN 2284-242X. n. 6 LE ECONOMIE DEL TERRITORIO BENE COMUNE, pp. 77-84, DOI: 10.13128/Scienze_Territorio-243690

⁷ Millennium Ecosystem Assessment (2005), Ecosystems and human well-being, Synthesis, Island Press, Washington, <<http://www.millenniumassessment.org/documents/document.356.aspx.pdf>>. Morin E. (1993), Introduzione al pensiero complesso, Sperling & Kupfer, Milano

evolves with the territory) and take on an important role in the **redevelopment of the landscape-environment and in the recomposition of social relationships between the countryside and the city**⁸, as well as in the production of ecosystem services capable of providing benefits that affect the entire territory. In recent decades, agriculture in Italy has suffered serious losses: the reduction of the utilised agricultural area, the fragmentation of the sipei and row systems, the loss of agro-biodiversity, the reduction of agronomic knowledge and the individual and social ability to interpret the signals coming from the land. Agriculture has shifted from a capillary, widespread and direct approach to the territory to a more concentrated and specialised one, ready to exploit only certain territorial areas (fertile and irrigated plains) to the detriment of others (mountains, **peri-urban areas**) that are **unsuited to the codes of the Green revolution**. If, therefore, on the one hand these marginal territories have not been fertile grounds for the development of industrial agriculture, **they are certainly suitable for agroecological experimentation**, as the distance between producer and consumer is reduced thanks to the physical proximity between city and farm. The peri-urban space, in the last decades - starting from the theoretical work of Pierre Donadieu "Campagnes urbains"⁹ - has been defined as spatial situations that are the result of multiple processes, linked both to the growth of urban sprawl and of the built fringes in the densest conurbations, and to the practices of urban agriculture and cultivation for food production, as well as to forms of design and planning for the production of food. The peri-urban space is a space that is the result

⁸ Bocchi, S., & Borasio, M. (2014). Politiche di sviluppo place-based e distrettualità in agricoltura. Il caso lombardo. *Scienze Del Territorio*, 1, 319-322. https://doi.org/10.13128/Scienze_Territorio-14284

⁹ Donadieu, P. (2005). *Campagne urbaine: una nuova proposta di paesaggio della città*. Donzelli

of many processes, linked both to the growth of urban space and built-up fringes in the densest conurbations, and to urban farming practices and cultivation for food production, as well as to forms of individual and collective planning, linked to small and incremental modifications of living spaces. **The peri-urban space is a new form of city, investigated in the forms of the built environment as well as in those of the landscape, lifestyles, social relations and the economy**¹⁰. Conditions of peri-urbanity therefore exist where the urban and agricultural-rural dimensions are placed in contact in a **relationship of strong reciprocity and exchange**; it is a borderline condition. It is estimated that peri-urban areas in Europe are growing at almost four times the rate of urban areas (between 1.4% and 2.5% per year)¹¹. **From this continuous synergy and exchange city-countryside, the peri-urban space appears as an ideal place for experimenting innovative projects** that can bring benefits both to the productive agricultural reality and to the city. In which it is also possible to assess the production of ecosystem services. In this sense, **urban and peri-urban agriculture (UPA)** assumes a decisively multifunctional role. UPA intersects food security, public health (physical and mental), helps community growth, the development and reconstitution of degraded areas, increases economic opportunities through neighbourhood micro-enterprises and reinforces the human-nature connection by enriching it with meaning¹².

¹⁰ Secchi B., 2008, Le forme della città, testo della conferenza inaugurale del Festival della città e del territorio, Ferrara, 17 aprile 2008, Retrieved December 4, 2021, from <https://elearning2.uniroma1.it>

¹¹ Data taken from PLU-REL research, Peri-urban Land Use Relationships - Strategies and sustainability assessment tools for urban-rural linkages, 2007-2011 - CORDIS | European Commission. (2021). Retrieved 5 October 2021, from Europa.eu website: <https://cordis.europa.eu/project>

¹² Lovell, S.T. (2010). Multifunctional Urban Agriculture for Sustainable Land Use Planning in the United States. *Sustainability* 2(8): 2499

1.3 From agroecological principles to landscape design

Agroecology, as a movement and discipline applied to periurban areas, is recognised as **Urban and Periurban Agroecology (UPAE)**. Urban and Periurban agroecology has emerged as a multifunctional land use that can provide ecosystem benefits to human communities. **Compared to urban agriculture, agroecology takes a holistic and systemic view**, through the production of food but also the promotion of environmental knowledge, community empowerment and the production of ecosystem services¹³. Although UPAE is increasingly being studied, **the role of design in structuring the functions of these systems has seldom been considered in the academic literature**. Yet, without intentional design, many of the broad and conceptual principles of agroecology cannot easily be made visible on the ground. It exhibits multifunctionality; in addition to producing food, feed and fiber, myriad other functions and/or benefits are expressed.

The role of landscape design thus takes on a central role in the recognition of agroecological design tools and their application.

The fields of landscape architecture, design and planning offer a wide array of spatial and cultural analytical tools that are seldom explored in the context of agroecology¹⁴.

Often, these **agroecological design tools emerge from practice more than from literature**: from the experience of urban and peri-urban farms that, thanks to a cultural background in agricultural and environmental planning, build farm management **models perfectly based on agroecological**

¹³Caswell, Martha & Méndez et al (2020). Agroecological Transformations in Urban Contexts: Transdisciplinary Research Frameworks and Participatory Approaches in Burlington, Vermont. 10.1201/9780429290992-14.

¹⁴ Ibidem

principles.

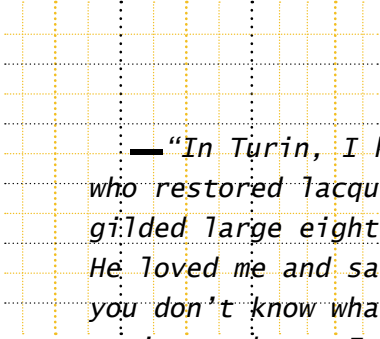
This is the context of the research **“The Role of Design in Promoting Cultural Ecosystem services and Long-term Sustainability in Urban Agroecological Systems”**, from which the thesis work develops. The research project, winner of the Catalyst Award Proposal 2019 of the Gund Institute of Environment of the University of Vermont (USA), aims to investigate the sustainability of urban agroecological systems and the Ecosystem services they offer through the disciplinary lens of landscape design. Italy has been identified as a place where the exploration of historical relationships between cities and agriculture can reveal models and principles of UPAE. In particular, the research aims to recognise and analyse the landscape design tools used by some Italian peri-urban farms that already adopt agro-ecological principles. **This type of integrated approach between agroecology, landscape design and the production of ecosystem services**, already adopted and found to be fruitful in other studies¹⁵, aims to lead to **the definition of replicable, usable landscape design tools**. A set of distinct actions that can support landscape projects in peri-urban farms.

¹⁵ Ibidem

The aim of this thesis is therefore to demonstrate how agroecology can underpin landscape design through the observation of virtuous case studies.

Learning from observing

2




—“In Turin, I knew an old craftsman who restored lacquered wardrobes and gilded large eighteenth-century frames. He loved me and said: “Architect. When you don’t know what to do any more, put a mirror there. It’s always good.””

I used to smile

Now, more or less fifty years later, I say to myself: ‘Ettore. When you don’t know what to do, **plant a tree.** **It’s always good.**”

– Ettore Sottsass
Photos from a car window



2.1 Research structure and framework

With the purpose of understanding how Italian peri-urban farms can support the development of agroecological systems in relation to their territorial and social context, a thorough analysis of 10 study case, located in the metropolitan area of the cities of Rome and Milan, was carried out. The cases were selected on the basis of evidence obtained during the research study “**The Role of Design in Promoting Cultural Ecosystem services and Long-term Sustainability in Urban Agroecological Systems**”¹, of which Stephanie Hurley is the principal investigator (Plant & Soil Science Associate Professor at the University of Vermont) and in which Catherine Dezio participated as collaborator (Postdoctoral Fellow and Adjunct Professor Department of Architecture and Urban Studies, Politecnico di Milano). The opportunity to collaborate in the research during the data collection phase, the selection of the farms and the conduct of the interviews made it possible to understand the heterogeneity and richness of the planning models adopted by the realities observed and, subsequently, was the key to the development of the design toolbox. It is necessary to clarify that, for the purpose of the research, **urban and peri-urban farms identified in different legal forms were considered**. The database therefore includes, under the category “peri-urban farms”: simple partnerships, cooperative and limited liability companies.

The research phases were organised as follows:

1. A first phase involved the collection of data through the categorisation of peri-urban farms in a **comprehensive database**. The cities observed were chosen according to the criterion of the

¹ The research, funded by the European Commission, aims to investigate the sustainability of urban agroecological systems and the CSE they offer through the disciplinary lens of landscape design. Italy has been identified as a place where the exploration of historical relationships between cities and agriculture can reveal models and principles of UPAE.

Next page: *Figure 1*- Location of urban and periurban farms selected for the research

Research structure



² Città italiane con più di 60.000 abitanti - elenco per popolazione. (2021). Retrieved July 15, 2021, from Tuttitalia.it website: <https://www.tuttitalia.it/citta/popolazione/>

³CIDSE (2018). The Principles of Agroecology

number of residents. This choice made it possible to select cities heterogeneously scattered throughout Italy, with different territorial and social patterns. From the observation of 10 cities (Rome, Milan, Naples, Turin, Palermo, Genoa, Bologna, Florence, Bari, Catania²) 118 farms were found to have agro-ecological principles within the farm planning model. For the choice of farms, agro-ecological criteria were first studied, mainly by consulting the guidance document produced by CIDSE³. Taking these criteria into account, farms were selected that presented some of these principles and, in general, organic farming and social farming practices. For each farm, the following items were observed: a) location; b) telephone and e-mail contacts; c) websites; d) social communication pages (such as instagram, facebook, twitter).

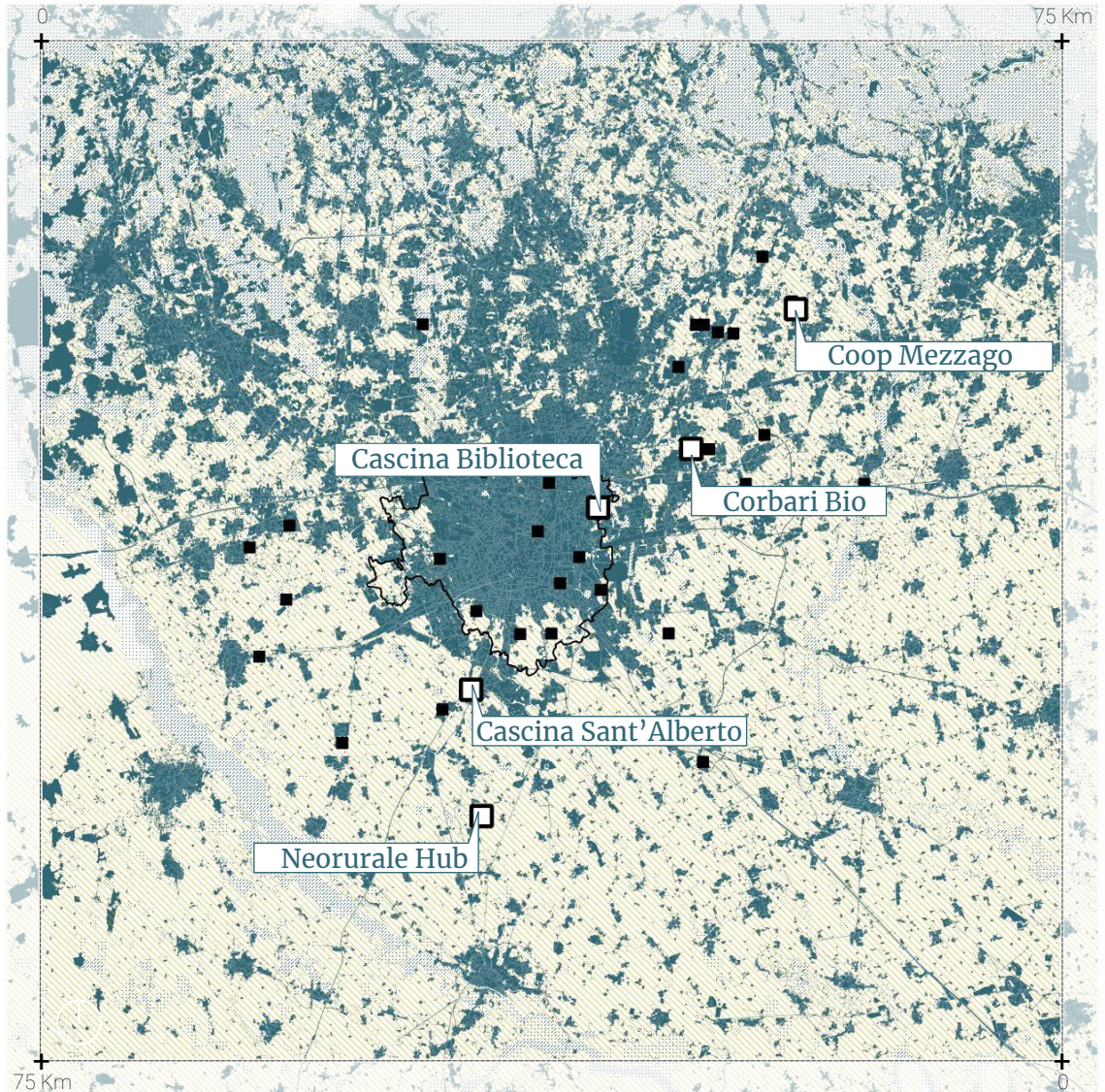
2. The second research phase involved the **selection of 10 case studies to be studied closely**, located in the peri-urban areas of the metropolitan cities of Milan and Rome. The selection criteria for the 10 study case were the following: a) the location within the metropolitan territory, which would guarantee their geographical, social and cultural belonging to the category of marginal landscapes; b) the presence of agro-ecological principles adopted in the farm planning model with particular reference to: organic production; presence of educational and/or inclusive activities; presence of ecological reconstruction interventions; presence of public spaces and features for visitors; c) availability of the farms to participate in the interview.
3. A **pre-interview** was sent to the 10 farms by

e-mail to collect the necessary data for an initial analysis of the farms (e.g. territorial location, crops, complementary activities to production, farm composition, objectives of the farm model, etc.); in this way it was possible to understand in the first instance the heterogeneity of the data and the agroecological principles adopted. Simultaneously, supporting iconographic materials were collected from websites and social channels.

4. Subsequently, the 10 farms were contacted for a **semi-structured interview** through a video call, held online due to the still ongoing pandemic, which aimed to collect in-depth opinions and identify issues and perspectives. The interviews, in particular, lasted about an hour and 15 minutes on average each, were conducted by the research team in such a way as to structure the interview in 5 parts, of about 15 minutes each: the first part concerned the introductory presentation of the farm how it was born and its geographical location; the second part concerned agricultural production and supplementary activities; the third part dealt with analyzing the management model and the human resources involved; the fourth part moved to google earth and identified the spatial composition of the farm and the territories connected to it; the fifth and last part concerned the discussion about the agroecological principles adopted.
5. The data were then systematised through a **model analysis** and a **design toolbox** and ecosystem services assesment were developed.

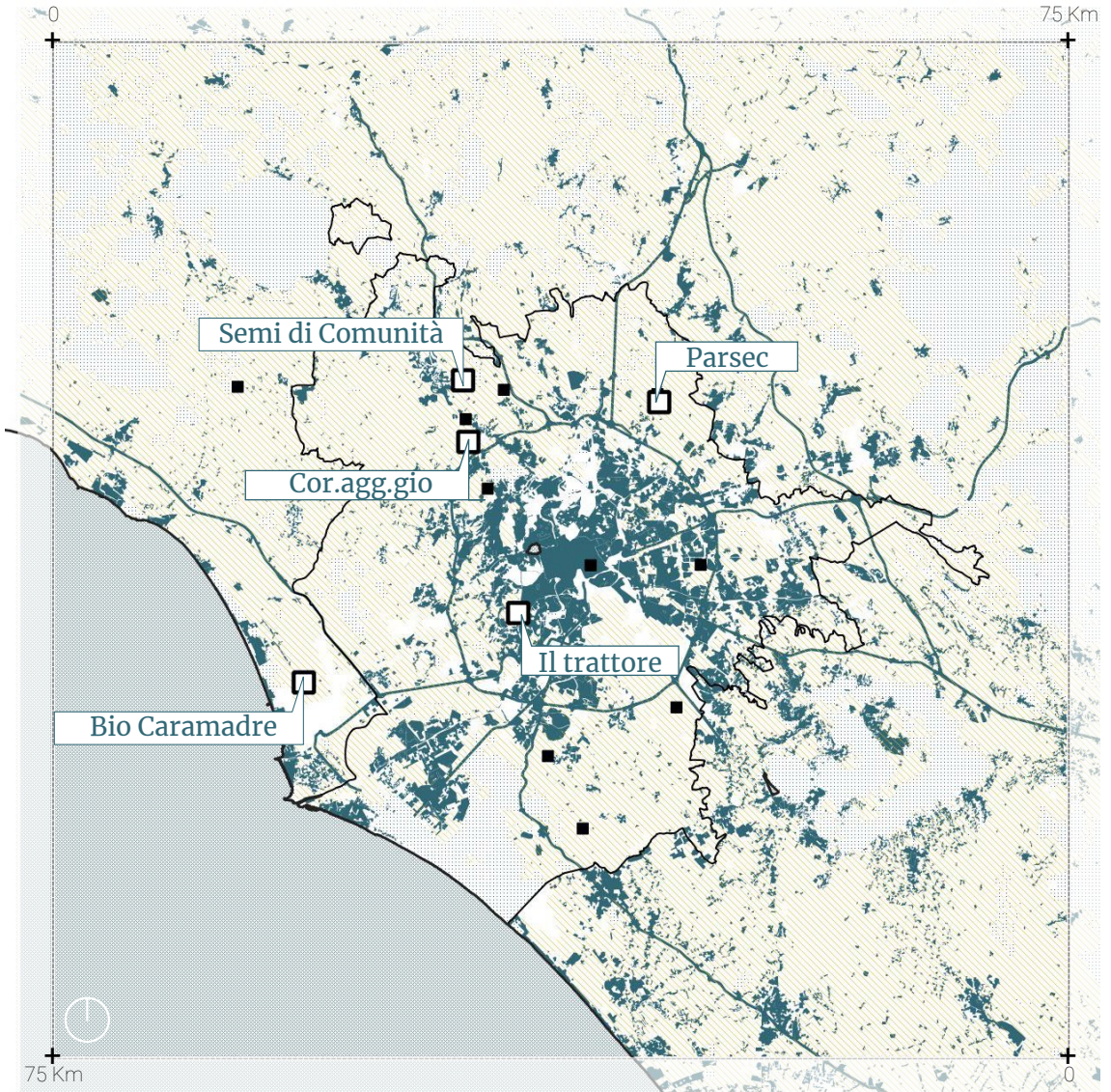
Next page: *Figure 2 on the left, Figure 3 on the right* - Location of the urbana and periurban farms in Milan and Rome selected for the interviews

Milan



- Anthropised areas
- ▨ Agricultural areas
- ▤ Semi-natural areas and forests, wetlands and water bodies
- Periurban farms selected as case studies
- Other periurban farms selected for the research

Rome



- Anthropised areas
- Agricultural areas
- Semi-natural areas and forests, wetlands and water bodies
- Periurban farms selected as case studies
- Other periurban companies that have been selected for the research

Territorial framework of the metropolitan area of Milan

A brief analysis of the landscape of the metropolitan areas of Milan and Rome and a mention of their Food Policies is useful to understand the case studies observed. As regards Milan, **the farms analysed are heterogeneously located in a territory that is nowadays in the shape of a polycentric and continuous conurbation** including a plurality of municipalities in the peripheral area, particularly in the north of the city where the perception of a uniform and weakly differentiated urban landscape prevails, interrupted by fragile open spaces and residual land. **A case study is located in this dense fabric, Cascina Biblioteca**, in a marginal agricultural area that has remained intact despite continuous and widespread urbanisation (one of the last productive agricultural spaces in the east of Milan).

On the edge of the denser city, which was configured until the first half of the twentieth century, a landscape has been structured where the density of settlements and relations that are no longer only centripetal give rise to a territorial system that is as weakly hierarchical as it is densely and uniformly urbanised. In this area of continuous urbanisation there are **two case studies analysed: Coop Mezzago**, located in the north-east of Milan in the municipality of Mezzago and **Corbari Bio**, located in the municipality of Cernusco sul Naviglio to the east of Milan.

Only along the southern arc of the city, thanks above all to the resistance of a more structured and motivating agrarian economy and to less favourable environmental and infrastructural conditions, **there are agrarian spaces of discreet extension preserved**, open towards the continuity

of the agricultural territory that still characterises the horizons of the lower Lombardy plain. In the same way, the open spaces of the agricultural territory are marked not only by the presence of historical rural nuclei, but also by a dense network of patterns and geographical signs (watercourses and irrigation networks, country roads, hedges and rows of vines) which preserve and hand down the forms of a spatial and functional organisation of the land which is still at the basis of current agricultural management.

This part of the territory, also called **“springs plain”**, **is extraordinarily rich in surface and groundwater**, which, together with the presence of springs, makes it one of the most fertile areas in Europe. The springs are an incomparable feature of the landscape. The particular geological conditions that characterise the subsoil of the plain lead to the emergence of groundwater. Coming from the subsoil, the water has a constant temperature all year round (10°-14°C) and is used to irrigate the fields thanks to the dense network of ditches and canals typical of the area. On the edges of the springs are natural oases rich in reeds, white and black poplars, willows and black alders. Moreover, the **rotten meadows** have characterised the landscape of the plain for centuries, and their presence has allowed several generations of farmers to feed their livestock with fresh grasses even during the winter season. The water from the resurgences flows over the surface of the meadow using a succession of slightly inclined planes, thus preventing the ground from freezing.

The preservation of the agricultural territories south of the Milan area has been made possible by the establishment of the **Parco Agricolo Sud di Milano (South Milan Agricultural Park)** as a regional

⁴ Piano Territoriale di Coordinamento. (2020). Retrieved October 15, 2021, from Piano Territoriale di Coordinamento website: https://www.cittametropolitana.mi.it/parco_agricolo_sud_milano/territorio_e_pianificazione/piano_territoriale_di_coordinamento.html

Territorial framework of the metropolitan area of Rome

agricultural park of the metropolitan belt by Regional Law n. 24 of 1990, on the basis of the contents of the “General Plan of Protected Regional Areas”, as per Regional Law n. 86 of 1983⁴.

The South Milan Agricultural Park has a **total extension of about 47,000 hectares and represents about 30% of the total surface area of the Metropolitan City of Milan**, involving 60 of the 134 municipalities, including the Municipality of Milan. To date, the planning tool for the management of the park is the Territorial Coordination Plan of the South Milan Agricultural Park, approved on 3 August 2000 with D.G.R. 7/818 of 3 August 2000 (N.T.A.). **There are two case studies analysed in this area: Cascina Sant’Alberto**, located in the municipality of Rozzano and **Neorurale Hub**, located in the municipality of Gussago.

Roman agriculture is, on the other hand, a complex reality characterised by the changing balance of the age-old relationship between the city and the countryside. **In Rome, the weight and influence of history has a special relevance for the morphology and identity of the territory.** Of the large formations that once covered the **Agro Romano**, today there remain small strips distributed in a scattered way, not affected by grazing nor used for cultivation. In the irrigated plain of the Tiber, the large expanses of woodland are still visible towards the Riserva del **Litorale Romano**, where there is a case study farm: Bio Caramadre. As for the peri-urban areas to the north and north-east of Rome, these are fragments of cork oaks, laurels and holm oaks, often mixed. From the point of view of land use, it can be observed that the rural area just outside

the dense urban fabric of Rome is almost entirely given over to arable crops and the landscape of these areas is typical of the Roman countryside: large fields planted with wheat or fodder interrupted by strips of natural vegetation on the steepest slopes. Just outside the central area, however, the agricultural landscape becomes more complex and articulated, with a great variety of cultivated areas alternating with elements of natural vegetation of considerable size. It is within these two bands that the other four case studies are located: Parsec, Semi di comunità, Il Trattore and Coop Cor.ag.gio. In particular, Il Trattore is located in a more central area within the **Valle dei Casali**, a green corridor within an urban area extending from Villa Pamphili in the north to the banks of the Tiber in the south. The Reserve is characterised by a plateau that reaches 80 metres and then slopes down to the river level with a pattern of small hills. The vegetation is the result of the predominantly agricultural use of the land, the presence of a dense network of ditches, the river Tiber and the adjacency to urbanised areas of the city. The Valley insinuates itself into the urban fabric from the southwest, representing a wedge of greenery that connects the extensive coastal alluvial plains with the city centre⁵. Further north, Semi di Comunità and Coop Cor.ag.gio are located in the Parco di Veio, which extends north of Rome between the Via Flaminia and the Via Cassia and includes the so-called **Agro Veientano**, in an area where the naturalistic and historical-cultural components merge into a landscape of particular value. This is an agrarian landscape whose origins date back to antiquity: grazing, the production of grain, wine and oil, and the management of the

⁵ Ente Regionale RomaNatura - Riserva Naturale della Valle dei Casali. (2021). Retrieved November 30, 2021, from Parchilazio.it website: <https://www.parchilazio.it/valledeicasali>

⁶ Ente Regionale Parco di Veio. (2013). Retrieved November 30, 2021, from Ente Regionale Parco di Veio website: <https://parcodiveio.it/>

woods are linked to systems that are almost a thousand years old. Historical events have led to a territory organised with a wide farm network⁶. Further west of the city we find Parsec, located in the **Marcigliana Reserve**. With its 4,696 hectares, the Reserve has a predominantly agricultural vocation (75% of the surface area); a portion of the Roman countryside of inestimable value that encompasses naturalistic, historical, socio-cultural and productive realities of considerable importance. The Marcigliana Park is a typical example of the landscape known as **Campagna Romana**, characterised by pastures, scrubland, tuffaceous shelves with characteristic deep incisions formed by steep slopes bordering narrow, flat valley floors, and gentle valleys crossed by streams, at the head of which it is easy to find waterfalls and small waterfalls, and by numerous ditches, all rich in water, also known as 'forre'.

Milan food policy

In order to understand peri-urban agriculture, in addition to a morphological reading, the need emerged for a **interpretation of the food policies that regulate the relationships between food production and consumption**. Starting from the recognition of the rural landscape system as an identity to be carried by the Milanese territory and with the aim of facilitating the consolidation of all the components and activities necessary to articulate a sustainable food system and to promote the production and local consumption of fresh, seasonal and quality food, in 2014, the Municipality of Milan and Fondazione Cariplo began to develop the **Milan Food Policy**⁷. Indeed, in 2014, Milan opened an international dialogue between 30 cities to define and share common ground for urban food initiatives. The result

⁷ BCFN, MUFPP (2018). Food and Cities. Il ruolo delle città nel raggiungimento degli Obiettivi di Sviluppo Sostenibile. from www.barillacfn.com.

of this dialogue was the Milan Urban Food Policy Pact (MUFPP), signed on 15 October 2015 in Milan by more than 100 cities and presented the following day to UN Secretary-General Ban Ki-Moon during the celebration of World Food Day. The Covenant is one of the most important legacies of EXPO 2015. After 2015, many cities started working on the sustainability of their food systems. Today, the food policy for the city of Milan - **Milan Food Policy 2030** - is managed by an integrated governance framework that includes political commitment, a steering committee for strategic communications between the Municipality of Milan and the Fondazione Cariplo, interdepartmental meetings and a technical office for food policy responsible for its implementation. The Food Policy 2030, recently awarded the Guangzhou Prize⁸ (known as the Oscar for Innovative Urban Policies) aims to guide the choices that directly or indirectly concern food and water within the framework of its institutional prerogatives and in the activities of its investee companies, in order to improve people's quality of life and the quality of its territory and to play an innovative role at national and international level. **The Food Policy is a project for the whole city:** therefore the Municipality also assumes the role of supporting, stimulating and facilitating all forms of social, technological and organisational innovation that respond to the principles set out in the Food Policy itself and that can contribute to the implementation of the guidelines contained therein. In this sense, **territorial and resource planning plays a fundamental role** in pursuing the objective of food sustainability by shortening the production chain, promoting environmental sustainability through the implementation of agro-ecological and biodiversity

⁸ Milano vince il Premio di Guangzhou – Food Policy di Milano. (2019). Retrieved October 15, 2021, from Foodpolicymilano.org website: <https://foodpolicymilano.org/guangzhou/>

systems and, in general, low environmental impact cultivation techniques, and promoting participatory initiatives to create a 'culture of consumption'.

Within the food policy, **attention is given to the agro-ecosystem**. In particular, it highlights the need for strategic interventions that cover vast areas and not punctual interventions that in recent times have affected minute elements (springs, rotten areas, river areas). The change in the balance between productive and natural factors has generated significant changes in the rate of biodiversity in the Milan area. A concise indicator of these changes is the extension of hedges: from the 1950s until today there has been a decrease of more than 50% in their consistency, which is due to the combined change in cultivation techniques and in the hedgerows themselves. combined change in cultivation techniques and production itself ⁹.

In 2018, the studies led to the publication of a Report, which is an integral part of the activities of the Milan Food Policy and is the basis of the Monitoring System provided for in the "Guidelines for the Milan Food Policy 2015-2020".

Rome food policy

The city of Rome signed the Milan Urban Food Policy Pact in 2015¹⁰, providing itself with guidelines for urban resilience by joining the international "1° Resilient Cities programme (of which Milan is also a member). Despite a vibrant debate around food and agriculture issues, **the start of an open and inclusive process aimed at structuring a real policy for metropolitan Rome came late**, in 2019^x. Only with the Resolution N. 38 of 27 April 2021 was given the the approval of actions and instruments for the implementation of a Food Policy for Roma Capitale given by resolution. The proposal for a Food

⁹ MUFPP (2014). Le dieci questioni della food policy. Estratto dall'analisi per la Consultazione Pubblica from <https://assesta.it/pubblicazioni/>

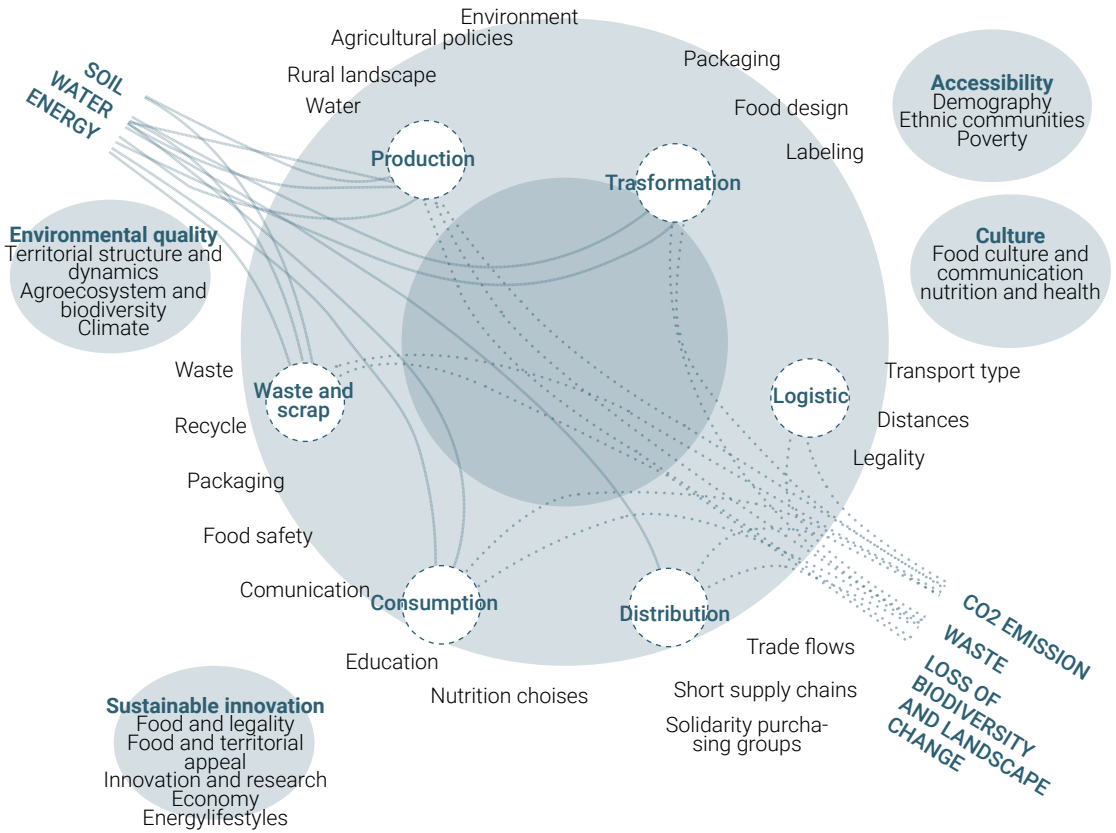
¹⁰ Terra! Onlus, Lands Onlus (2019). Una Food Policy per Roma. Perché alla Capitale d'Italia serve una Politica del Cibo

Policy is based on the assumption of **three factors**: Rome is characterised by many experiences related to sustainable food. However, at the political level there is still no defined vision and strategic direction; there is an interesting mix of bottom-up initiatives and sectoral institutional tools/incentives/actions. However, these two worlds are often disconnected and lack connections, spaces for debate and policy coordination; an agricultural mosaic of considerable value but not adequately supported. Among the most pressing challenges are the fragmentation of the agricultural landscape and the fragility of urban markets. The discussion of the food policy for Rome aims to strengthen and support the small and medium-sized enterprises that populate the primary sector in Rome along all stages of the supply chain, from production to marketing and post-consumer stages. It intends to strengthen economic and social ties with rural areas and close to the metropolis and to encourage generational change in agriculture, foster food education and local food networks by reducing waste. **In line with what was done in Milan at the start of the debate in 2015, ten main objectives were developed.**

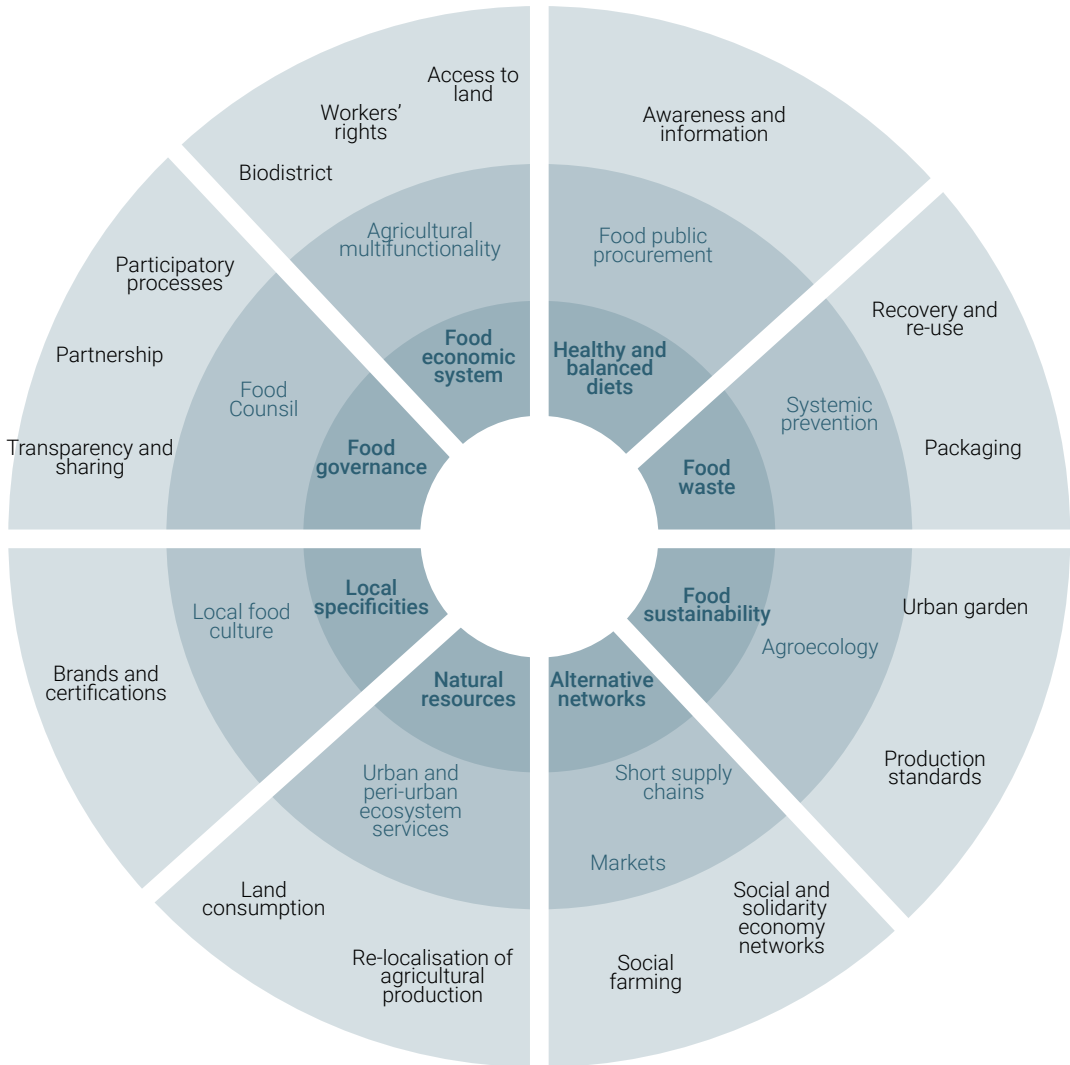
In both food policies the landscape is conceived as a plateau where food sustainability goals can be realised. Agroecology (or agroecosystem as far as the Milan policy is concerned) is a tool through which an environmental standard can be achieved. However, the objectives are not transformed into project actions: they remain goals to which spatial strategies and landscape projects must refer.

Next page: *Figure 4 on the left, Figure 5 on the right* - Graphic re-elaboration of Milan and Rome Food Policy principles and priorities

Milan – Urban Food system



Rome – Principles and priorities of a Food Policy



2.2 Model building

Once the territorial and socio-political context of the metropolitan cities of Rome and Milan had been understood, an analysis model was elaborated in order to compare the information obtained through the study of the 10 case studies.

In this regard, it is useful to clarify that **the goals of the model is to propose itself as a tool for reading the agroecological system of the farms and their design tools.**

Today, the question of agricultural production has evolved from a purely technical one to a more complex one characterized by social, cultural, political and economic dimensions. In this sense, the model assumes as a fact that agroecology can be identified as a scientific discipline that defines, classifies and studies agricultural systems from an ecological and socio-economic perspective¹¹.

Landscape design thus becomes a tool for action to translate principles - derived from the observation of the ecological and socio-economic components of agroecology - into project actions, guidelines to support the creation of agri-environmental systems.

The aim was to find out how to catalogue and create a model that would allow the case studies to be compared and, with certainty, would demonstrate that the design tools used by the farms are indeed based on agroecological principles and can contribute to the definition of a set of guidelines that can guide the landscape design of peri-urban farms.

For this reason, a methodology was constructed based on the literature review structured as follows:

¹¹ Altieri, M.A. (1987).
Agroecology: the scientific
basis of alternative
agriculture. Boulder:
Westview Press

1. Literature review:

the first step in creating the model involved a literature review using the large academic publication database Scopus, through a key word search.

The search method was observed with reference to the incredible work by Zachary T. Brym and Jennifer R. Reeve in which they analyse the different use of the term agroecology in the literature¹².

The literature tracked down through the search was then filtered in order to analyse only those papers in which agroecology is understood as a practice of design of agricultural territories operating on small to medium-sized areas corresponding to farms, following the work outlined above.

¹²Brym, Z.T., Reeve, J.R. (2016). Agroecological Principles from a Bibliographic Analysis of the Term Agroecology. In: Lichtfouse E. (eds) Sustainable Agriculture Reviews, vol 19. Springer, Cham.

2. Identification of design tools for agro-ecological systems:

For each article, planning tools have been selected which, through theoretical studies or exemplary practice, are described as elements of agroecological system planning.

3. Definition of design fields base on agroecological principles:

- Land management (soil and water)
- Equipped public spaces design
- Community empowerment
- Networking

The fields of design were defined from the discovery of similar objectives and intentions in design tools drawn from literature and with the help of the work “The Principles of Agroecology” BY Coopération Internationale pour le Développement et la Solidarité” (CIDSE)¹³, an international work collecting definitions of the principles of agroecology categorised in the

¹³CIDSE (2018). The Principles of Agroecology

economic, political, environmental and socio-cultural fields. For each macro field a definition was therefore given that could clarify its targets:

- **Land management:** design tools optimise and maintain surface and underground biodiversity (the wide range of species and varieties, locally adapted genetic resources, varieties and breeding animals, locally adapted) in time and space (at the level of the farm and landscape).
- **Equipped public spaces design:** design tools that, through the use of dedicated spaces, make the area accessible and visitable, thus encouraging participation and communication of knowledge, integration and in situ experience.
- **Community empowerment:** design tools that aim to promote horizontal exchanges (from farmer to farmer) for sharing knowledge, skills and innovations, while encouraging vertical exchanges (between farmers and the general public, research institutions, local associations). These design tools are based on participatory projects, socio-cultural initiatives and aim to build up a strong community that considers the farm as a core hub.
- **Networking:** design tools that aim to structure the company through criteria of inclusiveness, systematicity and forms of social organisation necessary for decentralised governance. In this sense, network policy tools also help promote short (km0) and fair distribution chains instead of linear distribution chains, and to build a transparent network of relationships (often not visible in the traditional economy) between producers and consumers.

The use of the model implemented therefore involved the following steps:

1. Analysis of material from interviews, interviews and iconographic material of study case
2. Identification of design tools for agro-ecological systems
3. Tracing of design tools to areas of design: land management, equipped public spaces design, community empowerment, networking.
4. Identification of all design tools used by the farms and processing of the data by building a design toolbox.
5. Evaluation of ecosystem services.

It was decided not to include the Networking category in the design toolbox and in the assessment of ecosystem services as there were difficulties in translating the tools into spatial/urban planning actions. We therefore consider, within this work, networking as a variable set of design tools that can still be a support for the construction of a comprehensive and inclusive farm model, but which is difficult to generalise and abstract in order to provide repeatable actions.

Next Page: *Figure 6* - Agroecological model of farming systems used to analyses the study cases

Agroecological model of farming system

Based on agroecological principles.
Main reference:
CIDSE (2018). The Principles of Agroecology



Land management

Landscape design tools optimise and maintain surface and underground **biodiversity** (the wide range of species and varieties, locally adapted genetic resources, varieties and breeding animals, locally adapted) **in time and space** (at the level of the farm and landscape)



Equipped public spaces design

Landscape design tools that, through the use of dedicated spaces, make the area accessible and visitable, thus encouraging **participation and communication** of knowledge, integration and in situ experience



Community empowerment

Policy design tools that aim to promote **horizontal exchanges (from farmer to farmer)** for sharing knowledge, skills and innovations, while encouraging **vertical exchanges (between farmers and the general public, research institutions, local associations)**



Networking

Policy design tools that aim to structure the company through criteria of **inclusiveness, systematicity and forms of social organisation** necessary for **decentralised governance**

2.3 Case study analysis

Cascina Biblioteca

Cascina Biblioteca is located in the north-east of Milan, between Via Palmanova and Segrate (Milan 2 and San Raffaele Hospital), close to Lambro Park and the agricultural areas east of the ring road. The cooperative works in a rented area of 8 hectares. Given its location, it identifies perfectly as a peri-urban reality. Cascina Biblioteca was established as a social cooperative in 2013 from the merger of two cooperative initiatives for the support of disabled and vulnerable people (Fontanile and Viridalia). There are 110 members /workers and volunteers) and half of them are disadvantaged people. It is a cooperative open to the territory that provides services according to the needs of the people who come to the Cascina, pursuing a mission of solidarity and care for people and the territory. **A territory understood as physical, social and cultural.** The idea of belonging is reflected in the devotion and care of the Cascina's natural ecosystem and the surrounding area. The Cascina offers services of a cultural nature with initiatives in collaboration with organisations, schools and consortia, and services for the local area such as the maintenance of the gardens and the production of vegetables, preserves, honey and eggs. On the farm there is both cultivation and breeding, with direct sales outlets. Fruits, vegetables, cheese and cereals, preserves, pickled vegetables, jams, honey. The type of market it's local or regional. They have the organic certification and there's a high integration of flora and fauna: bees, horses, donkeys, hinnies, goats and farmyard animals are present.

Next pages: *Figure 7 - Agroecological model of farming system of Cascina Biblioteca and design tools photos.*
Pictures sources: Cascina Biblioteca Cooperativa official facebook page

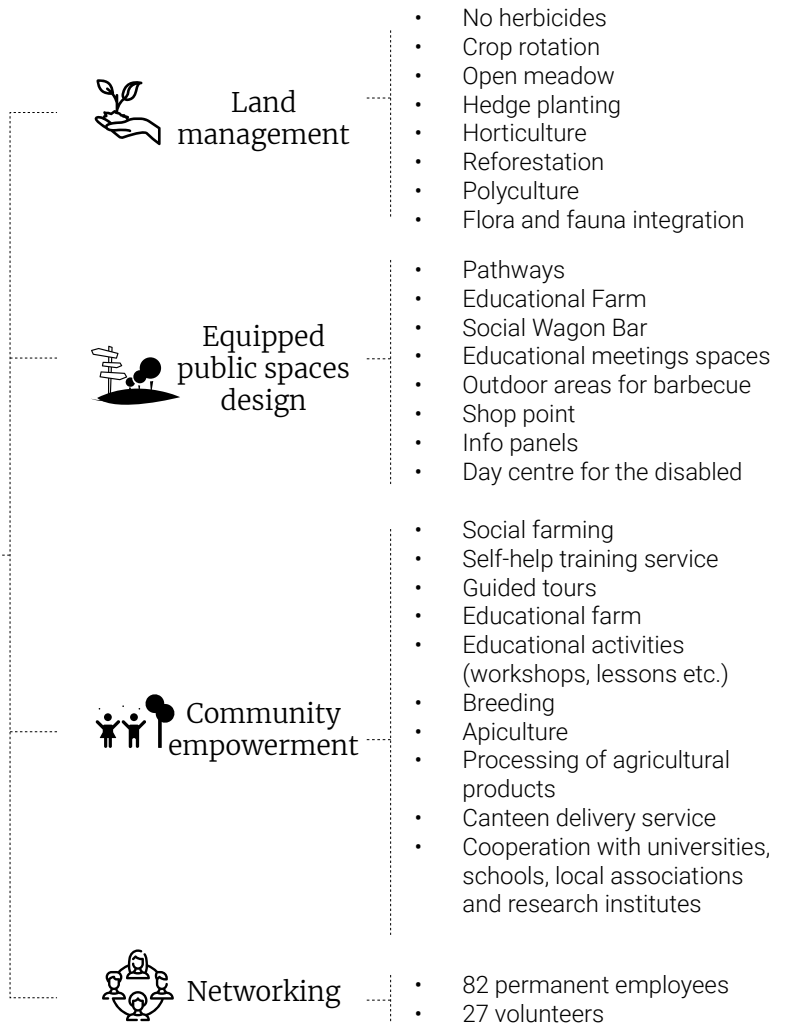
0 km

1,8 km



1,8 km

0 km





Social wagon Bar - Indoor



Social wagon Bar - Outdoor



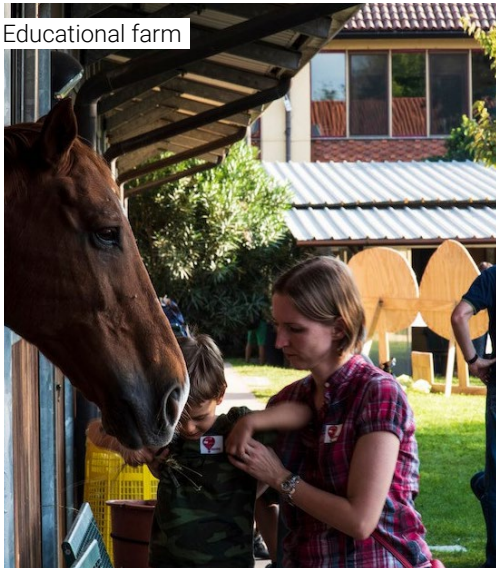
Guided tours



Shop Point



Educational activities



Educational farm

Cascina Sant'Alberto

Cascina Sant'Alberto is a farm of 130 hectares located close to the Parco Agricolo Sud di Milano, between Milan and Pavia. It is the territory of the springs (irrigated area) characterised by a fragmented but still visible natural system. The area is located between highways. The VenTo cycle route passes next to it. Metro and bus stops can be reached in 5 minutes by walking. The springs haven't been used for a long time, now they are degraded. The area has been extensively renaturalised since a project in 1999. Attention has been paid to reconstituting the ancient agricultural landscape, retracing the pattern of the fields through the planting of hedges and plurispecific tree corridors. There are stable relationships with universities and research centres. There are pathways in the areas, so a lot of visitors come and cross the property but there are not properly equipped public spaces. There are spaces for educational activities: 1 hectare have been granted to the cooperative Madre Terra for social gardens (for fragile people); 300 square meters are managed for biodynamics courses for children and adults. A small portion of land includes 150 hives. The absolutely most innovative aspect of the farm is the integration of the natural system and production spaces, which over time has led to the production of quality products and an exceptional increase in biodiversity. The renaturalisation process has seen poplar trees grow up to 25 metres and bring various benefits: CO2 absorption, wind shelter, increased biodiversity, increased soil nutrition.

Next pages: *Figure 8 -*
Agroecological model
of farming system of
Cascina Sant'Alberto
and design tools photos.
Pictures sources: Cascina
Sant'Alberto website and
Cooperative Madre Terra
facebook page

0 km

3 km



3 km

0 km

Agroecological model of



Land management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Polyspecific tree rows
- Reforestation
- Polyculture
- Horticulture
- Experimental crops



Equipped public spaces design

- Pathways
- Info panels



Community empowerment

- Social farming
- Guided tours
- Apiculture
- Educational activities (workshops, lessons etc.)
- E-commerce sale
- Processing of agricultural products
- Canteen delivery service
- Cooperation with universities, schools, research institutes, local associations, cooperatives



Networking

- 1 permanent employee
- 2 external collaborators
- Volunteers
- Employees in bread production
- Cooperative Madre Terra



Experimental crops - Madre Terra cooperative



Social farming - Madre Terra cooperative



Reforestation



Educational activities - byodynamic agriculture



Polyspecific tree rows + open meadows

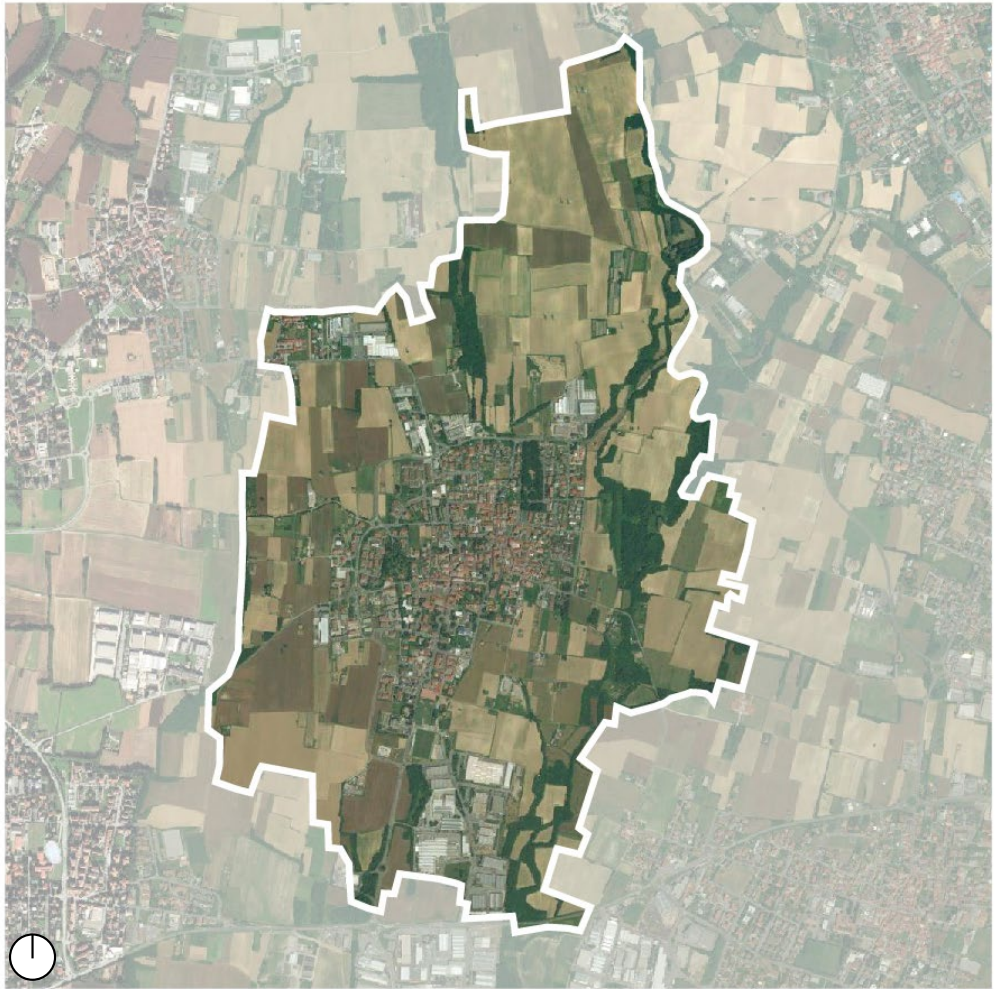
Coop Mezzago

The Mezzago cooperative is a community-based organisation with which the following are associated several farms are associated with the cooperative, which functions as a central hub. The central hub, identified with the shop and the Palazzo Acchinti in the centre of the municipality of Mezzago, is the meeting and exchange point for the associated farmers. Coop Mezzago stands out from the other case studies because it is the co-operative that functions as the central hub. In this sense, the agro-ecological practices analysed and identified refer to several farmsteads. The main hub is public, the fields of the farmers part of the cooperative are private, public or rented. The type of products are: Cereal and asparagus (pink version) and experiences of growing edible flowers and micro vegetables (experimental crops). The type of market is local, regional and national because of the type of asparagus. The soil is predominantly clayey, which is a problem because it is not suitable for asparagus (they need sandy soil). The production of the asparagus (the result) is different because of the soil, it tends towards pink (it is something unique). The taste is also more bitter. The cooperative has a strong link with the city of Mezzago. All companies sell directly and bring their products to the city's in-house sales point. Many events and educational activities are organised in the community centre (building in the centre of the town) and on the farms' fields. The farms are all located around the town of Mezzago, which lies between Monza and Bergamo

Next pages: *Figure 9* -
Agroecological model
of farming system of
Cooperative Mezzago
and design tools photos.
Pictures sources:
Cooperative Mezzago
facebook page

0 km

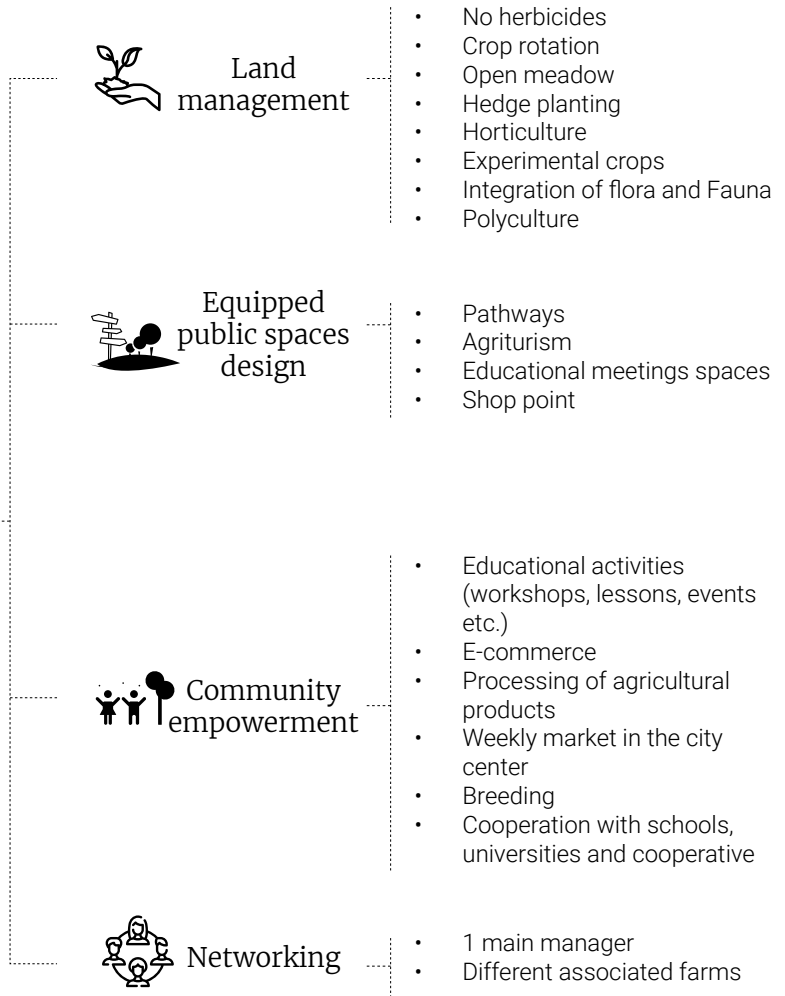
8 km



8 km

0 km

Agroecological
model of



Palazzo Archinti



Educational Activities



Central shop point



Asparagus harvest



Pink asparagus



Corbari

Società agricola Corbari is a simple company located in Milan on a rented area of 7 hectares. It produces fruit and vegetables and has organic certification. The contextual landscape has a horticultural vocation and has not been affected by industrialisation processes. The farm is located in one of the few constrained agricultural zones on the border with Carugate, another minor ruby centre east of Milan. The soil is rich and drains well because it's the territory of springs (irrigated area) with the presence of important historic canals (Martesana and Villoresi). The territory preserve its rural nature. There are other farms in the proximity that produce vegetables (with young farmers) and the Ortomercato (large horticultural sales outlet). Corbari is located closed to Cascina Biblioteca. The farm relates to Milan for sale to Restaurateurs, production chains and markets, buying groups, catering services. Products are also sold locally. The cooperative does Collaboration with several cooperatives and schools. and with other farms (exchanges of products). During the pandemic, nearby residents rediscovered the value of buying zero-km products.

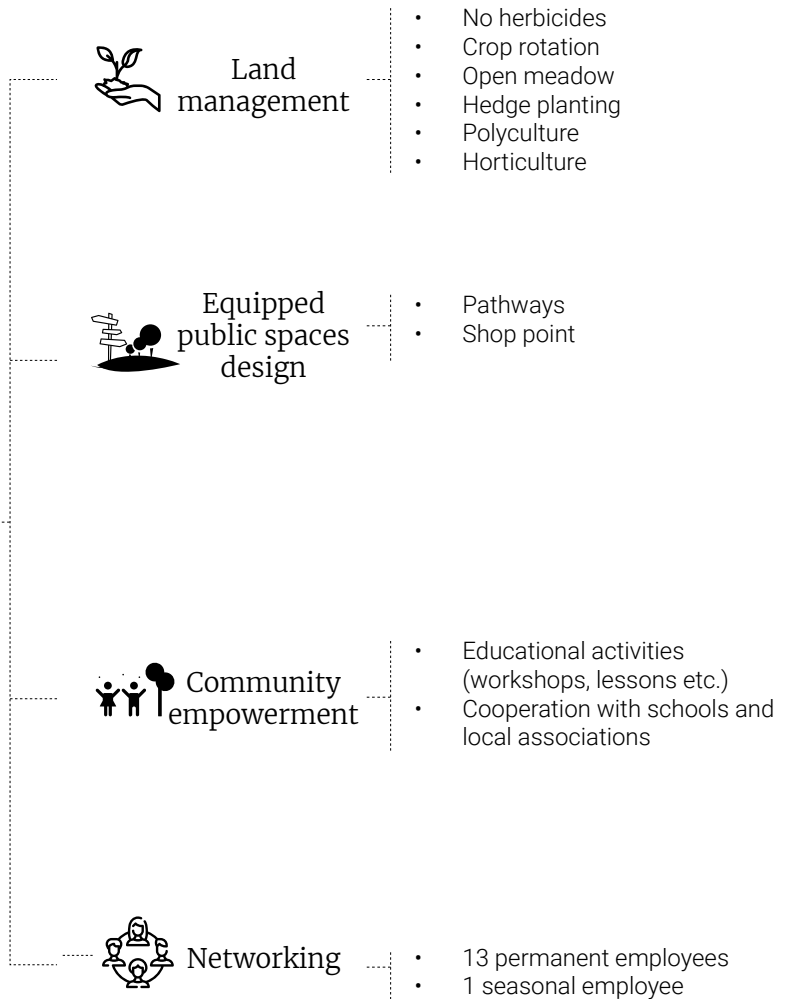
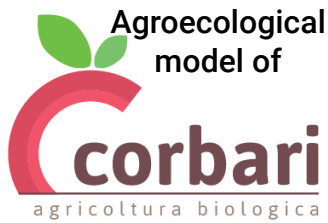
The company has 14 members: 13 permanent employees, 1 seasonal employes of which 3 Women and 11 men. The employes are very young (between 22-42 years old). There's a high cultural/racial diversity: operators come from Pakistan, Morocco, Malaysia, Romania and Italy.

Next pages: *Figure 10*
- Agroecological model
of farming system of
Società Agricola Corbari
and design tools photos.
Pictures sources: Società
agricola Corbari official
website

400 m



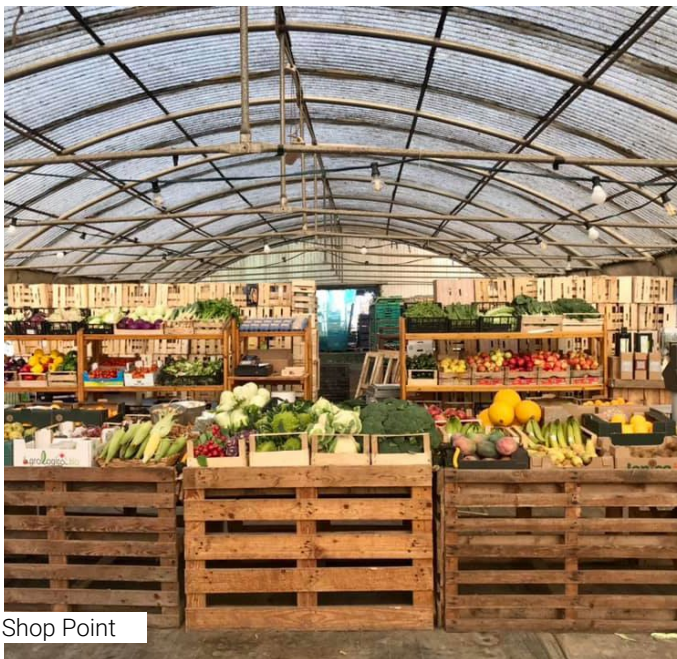
400 m



Shop point sign



Educational Activities



Shop Point



Greenhouses

Educational Activities



Greenhouses



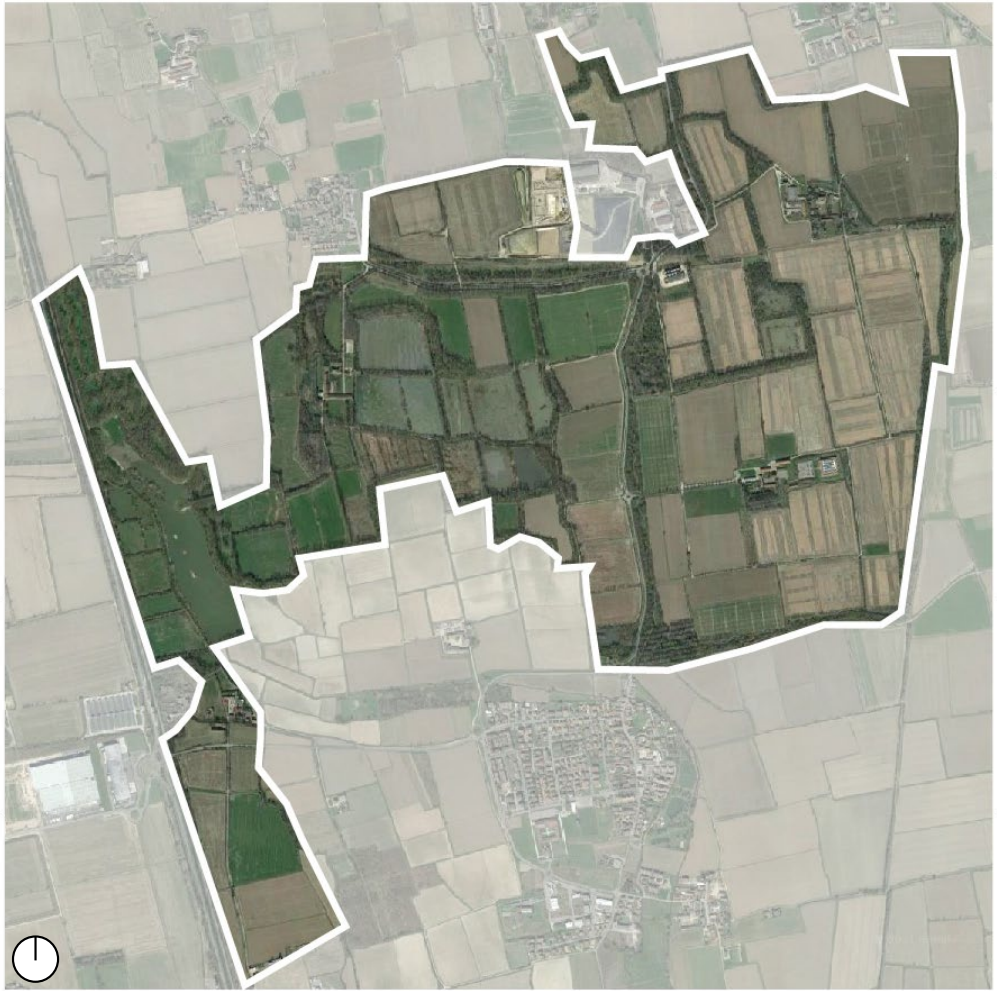
Neorurale Hub

Neorurale Hub is a limited liability company located in a municipality south of Milan, in Cernusco sul Naviglio. It is organised as a consortium involving 7 different farms with a total of 1000 hectares of cultivated and renaturated areas. It cultivates cereals and legumes on private, rented and public areas and has organic certification. The products are sold online. The Neorurale Hub experience (which is configured as an innovation central hub to which different farms interface) stems from a renaturation experiment started in 1996 that drastically increased biodiversity levels to the same level as in the year 1000. Springs area. The peri-urban area is characterised by many farmsteads surrounded by fields. The innovation centre overlooks a naturalistic area which is the result of an experiment of environmental restoration started in 1996. NeoruraleHub provides solutions to recreate a living, thriving ecosystem rich in biodiversity to improve the quality of life in peri-urban agricultural areas. They become not just food producers, but environmental production hubs that also provide services for neighbouring cities. There's a rail link to Certosa di Pavia 2 km far. The VenTo cycle route passes next to it. Soil management is based on the integration of the agricultural and natural ecosystem to form a synergistic agri-environmental system that can cope with climate change. Focus on the use of technology to assess changes in air, water, soil. Biodiversity is the same as in the year 1000, the land has been made fertile by +153% in 20 years.

Next pages: *Figure 11*
- Agroecological model
of farming system of
Neorurale hub and design
tools photos. Pictures
sources: Neorurale hub
official website

0 km

9 km



9 km

0 km

Agroecological model of



Land management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Polyculture
- Polyspecific tree rows
- Reforestation
- Wetlands
- Phytoremediation
- Flora and fauna integration



Equipped public spaces design

- Pathways
- Research center



Community empowerment

- Guided tours
- Birdwatching
- Cooperation with schools
- Remote sensing
- Internships
- E-commerce
- Processing of agricultural products (rice)
- Cooperation with universities, schools, local associations and research institutes



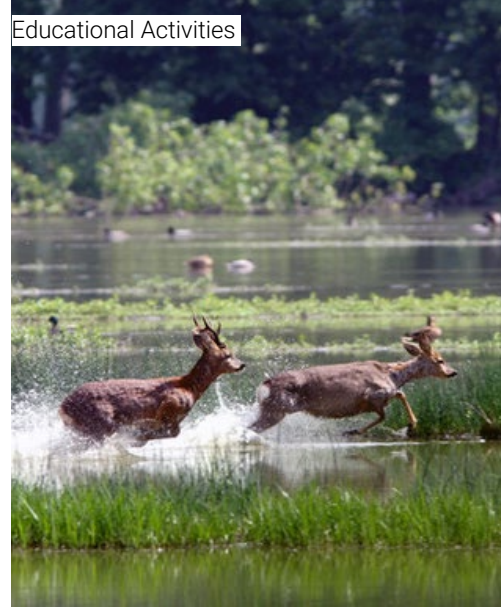
Networking

- 80 permanent employees for the innovation center (professionist in various work fields)
- 7 farms part of the consortium

Innovation center



Educational Activities



Corridor planting and open meadows



Wetlands



Hedge planting and pathways



Bio Caramadre

The cooperative is located in Rome and covers an area of 7,5 hectares in rented land. There are 16 members, of which: 8 permanent, 8 seasonal. Mostly men, only 2 women. The cooperative has the organic certification and it sells fruit and vegetable at a local market in the city center twice a week. The cooperative is located in the heart of the 'Litorale Romano' State Nature Reserve, near the WWF Oasis of Macchia Grande, where GMOs (Genetically Modified Organisms) and any chemically synthesised products are banned from cultivation. Sandy soil is over 80%, and the territory has leveled coastal dunes. It is in a reclamation areas. There are stable relationships with universities and research centres, schools and buying groups. The area is open to the public, so a lot of visitors come and buy directly on the spot. The area is located close to Fiumicino airport and is easily accessible by car from the centre of Rome (no public transport close by). The farm is open to the public and can be visited. There are spaces for training courses, paths and sessions. There is no agriturismo. There's a shop point. The cooperative provides sporadic initiatives and training activities with an agricultural technical institute (4/6 young people come every day for an internship) and with the University of Tuscia; it collaborates with the CNR (National Research Council), the University of Pisa and the National Food Institute. There's the possibility to go directly to the farm, attending lessons and collecting products and they also do deliveries and supply of school canteens in Rome.

Next pages: *Figure 12* -
Agroecological model of
farming system of Bio
Caramadre and design
tools photos.Pictures
sources: Bio Caramadre
official website

0 m

600 m



600 m

0 m

Agroecological model of



Land management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Reforestation
- Polyculture
- Horticulture
- Agroforestry



Equipped public spaces design

- Pathways
- Educational meetings spaces
- Shop point



Community empowerment

- Guided tours
- Educational activities (workshops, lessons etc.)
- Training for farmers
- Interships
- Canteen delivery service
- Product picking up by visitors
- Weekly market in the city center
- Cooperation with universities, schools, local associations and research institutes



Networking

- 8 permanent employees
- 8 seasonal employees



Organic fruits



Greenhouses for vegetables



Guided tour by the main manager C. Caramadre



Organic fruits



Canals and riparian vegetation



Main Building

Cor.agg.gio

The cooperative, located in Rome, covers an area of 22 hectares in rented land. There are 3 main managers and external collaborators, half of them are women and half men. The average age is 45 years old. The cooperative deals with the cultivation and processing of products and in the sales outlet it is possible to buy fruits and vegetables, rare or experimental cereals including spelt, durum wheat and sorghum, pulses, canned vegetables, pasta and durum wheat flours, wildflower and acacia honey. The cooperative has organic certification and in the area. Animals are present in the area (beekeeping). The area of the cooperativa is an historically agricultural land with the presence of archaeological elements. The area is located in a valley with hills nearby in the Veio Park and closed by the urbanized area of the city (densely populated). There's the ancient "Via Francigena" close by (cycle path/route, roman origins) and there are also buildings to be recovered (ruins). The natural pattern of the division of the fields (hedges, trees) can still be clearly seen. There's the possibility to access the area by bus or by foot (it's 1 km far from Giustiniano metro station). By car it's also easy, there's a parking lot. A great scarcity of water has been noted. Aridoculture techniques are applied: 250 trees (elms, oaks) were planted for direct action on climate change (CO₂ absorption, soil fertility, shade). There is also the idea of putting laying hens in mobile boxes to be moved around the orchards to fertilise, maintain the meadows and enrich the soil with nutrients.

Next pages: *Figure 13-*
Agroecological model
of farming system of
Cooperative Cor.agg.
gio and design tools
photos. Pictures sources:
Cooperative Cor.agg.gio
official website

0 km

1 km



1 km

0 km



Agroecological model of

*Cooperativa agricola
Co.r.ag.gio.*



Land management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Reforestation
- Polyculture
- Rainwater tanks
- Horticulture
- Mobile laying hen box
- Flora and fauna integration
- Polyspecific tree rows



Equipped public spaces design

- Pathways
- Educational Farm
- Agri-restaurant
- Educational meetings spaces
- Outdoor pic-nic areas
- Shop point
- Info panels



Community empowerment

- Social farming
- Educational activities (workshops, lessons etc.)
- Guided tours
- Educational farm
- Training courses for farmers
- Breeding
- Apiculture
- Processing of agricultural products
- Weekly market in the city center
- Cooperation with universities and research institutes



Networking

- 3 permanent employees
- 4 external collaborators
- 1 former unemployed trainee
- 1 immigrant trainee
- Volunteers

Social farming



Agri-turism



Guided tours



Pic-nic area



Playground



Reforestation and open meadow



Il Trattore

The cooperative, located in Rome, covers an area of 5 hectares in a rented land. The cooperative has a strong social vocation, which is largely reflected in the spatial organisation of the territory. It produces fruit, vegetables, jams, preserves and honey and resells products from other companies. It has organic certification. The farm is located within the 'Valle dei Casali' nature reserve. The reserve is characterised by a plateau that reaches 80 metres in height and slopes down to the level of the Tiber with a series of small hills. The valley represent a wedge of green that connects the coastal plains with the city centre through the Gianicolo and Villa Pamphili. From a historical point of view, the main interest of the area lies in the preservation of an articulated system of villas and farmhouses. The vegetation reflects the predominantly agricultural use of the land, set in a semi-natural context where various species of spontaneous arboreal and shrub flora can be found, in particular oaks, maples, broom and duckweed. Studies have shown that in the surrounding area, despite being a rich area in economic terms, there is a lack of community spaces. It is a place of transition between the city and nature. There are spaces (benches, covered structures) where the cooperative organize events and where takes place the environmental education. There are routes through different spaces: vegetable gardens, open fields, wooded areas, the 'butterfly garden', the bee area. The routes are well connected. There are 22 employess, a part made up of frail people.

Next pages: *Figure 14-*
Agroecological model
of farming system of Il
Trattore and design tools
photos. Pictures sources:
Il Trattore facebook page

0 m

500 m



500 m

0 m

Agroecological
model of
il Trattore



Land
management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Reforestation
- Polyculture
- Rainwater tanks
- Horticulture
- Floriculture
- Intercropping
- Agroforestry
- Reuse of organic materials



Equipped
public spaces
design

- Pathways
- Outdoor covered structures
- Butterfly garden
- Bees garden
- Shop point
- Info panels



Community
empowerment

- Social farming
- Educational activities (workshops, lessons etc.)
- Therapeutic gardening courses
- Guided tours
- Educational farm
- Training for immigrants and farmers
- Plant nursery
- Weekly market in the city center
- Apiculture
- Processing of agricultural products
- Internships
- Canteen delivery service
- Product picking up by visitors
- Cooperation with universities, schools, local associations



Networking

- 22 permanent employees
- Volunteers

Socio-cultural event



Outdoor covered structures



Intercropping



Agroforestry



Reuse of Bamboo



Bees garden



Parsec Agri Cultura

Parsec Agri Cultura is a cooperative of 5 hectares located in Rome in a private land. The land managed by the Cooperative is located in the Marcigliana Nature Reserve, in the part of the reserve where CRUSTUMERIUM (Crustumeria, Crustumium) stood in ancient times. - An ancient city of Latium, located North of Rome, along the course of the Tiber. There is an ancient fountain located near the area (there are plans to arrange the area around it for opening to the public). The company counts on the support of the neighbourhood for “farmer markets” organised by local producers; for the creation of processing workshops for agricultural products grown near the processing sites and for weekly markets. In addition, the co-operative operates in the social sector through worker integration and help for disadvantaged people. The closest public transport stop is 1.8 km far. By car from the city center of Rome is fast. The cooperative has 11 employees of which 5 are permanent and 2 are seasonal. There are 4 frail people and 3 training trainees. There are also people doing civil service. 30% are women, 70% men. Most of the workers are over 40 years old. The farm is intended as a service unit or otherwise open for use by the population, in this sense it is public. There isn't an agritourism. There's a shop point. The Cascina is also involved in supporting the creation of processing laboratories for agricultural products grown near the processing sites, supporting the commercial dissemination of these products. The farm is very active on the political level.

Next pages: *Figure 15-*
Agroecological model of
farming system of Parsec
Agri Cultura and design
tools photos. Pictures
sources: Parsec Agri
Cultura facebook page

0 m

500 m



500 m

0 m

Agroecological model of



Land management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Polyculture
- Horticulture
- Experimental crops
- Intercropping
- Agroforestry



Equipped public spaces design

- Pathways
- Outdoor covered structures
- Shop point
- Info panels
- Plant nursery



Community empowerment

- Social farming
- Educational activities (workshops, lessons etc.)
- Therapeutic gardening courses
- Guided tours
- Training courses for farmers
- Internships
- Breeding
- Weekly market in the city center
- Canteen delivery service
- Product picking up by visitors
- Processing of agricultural products
- Cooperation with universities, schools, local associations and research institutes



Networking

- 9 permanent employees
- 2 external collaborators
- 3 trainees
- Volunteers
- Volunteers Civilian services

Social Farming



Intercropping and hedge planting



Agroforestry



Breeding



Plant nursery



Shop point



Semi di comunità

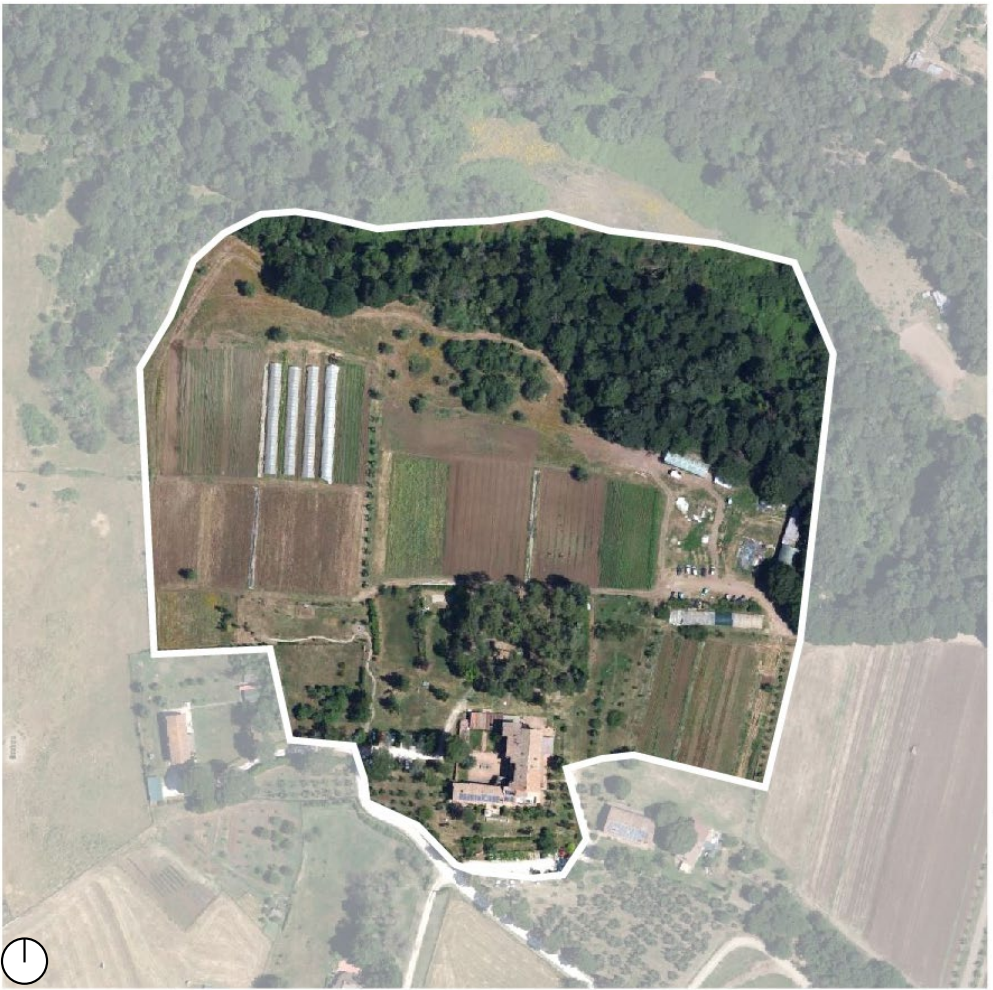
Semi di Comunità is a collective farm in a cooperative form, the first CSA (Community Supporting Agriculture) in Rome. The cooperative is located in a They are in a protected area, the Veio Park. Next to it there are other lands cultivated by other farmers. Interesting are the woodland formations surrounding the area (some of which are managed by the Cooperative itself), half of the area itself. They protect the farm from the wind. The cooperativerelies on the community members and non-members. It is based on a community of people who frequently visit the area, cultivate and use products for self-consumption. As the area is open to the members, it is possible to stop by. There are weekly sales outlets located in the city as well. There's a private parking lot. No public transport near by but by car from the center of the city it takes 30 minutes maximum.

The cooperative works as a resilient community huddling around the farmer who is supported in his weakness. There's a shared water well. Irrigation is carried out by means of pipes and micro-perforated hoses that bring water to the plants on time, avoiding waste. The cooperative is in a rented area of 5 hectares and produce fruits and vegetable. There aren't animals in the areas and the products are not sold, they are distributed among the members of the community. The community has more then 100 members (128 families) between salaried working members (3), voluntary partners and user members.

Next pages: *Figure 16-*
Agroecological model
of farming system of
Semi di comunità and
design tools photos.
Pictures sources:
Pictures sources: Semi di
comunità facebook page

0 m

500 m



500 m

0 m

Agroecological
model of



Land
management

- No herbicides
- Crop rotation
- Open meadow
- Hedge planting
- Polyculture
- Horticulture
- Flower meadows
- Intercropping
- Agroforestry



Equipped
public spaces
design

- Pathways
- Outdoor covered structures
- Info panels
- Plant nursery



Community
empowerment

- Social farming
- Educational activities (workshops, lessons etc.)
- therapeutic gardening courses
- Guided tours
- Weekly market in the city center
- Product picking up by community members
- Processing of agricultural products



Networking

- 3 permanent employees
- 128 associated families
- Volunteers



Guided tours



Social farming



Japanese peach on a layer of daisies



Apiculture



Leisure areas covered



Plant nursery

2.4 Implementation of an UPAE design toolbox

The analysis of the case studies showed that urban and peri-urban farms are often found to have adopted the same design tools that, in general, aim to improve the resilience and sustainability of agricultural and food systems while preserving the social integrity of the farm. Thus, while the focus is on land management in time and space, there is a propensity in all case studies to adopt design tools aimed at the social component. Clearly, the agro-ecological principles adopted are adapted to the territorial context of reference and are applied, in this sense, in a diversified manner depending on the area of the farms, the economic capacity, the materials available, the agricultural techniques used, the staff and the philosophy of the farms itself. The analysis and comparison identified **19 design tools focused on land management**. With respect to these 19 tools, all farms present the adoption of field rotation, the abolition of pesticides, the presence of free fields and reforested hedges. 9 cases adopted reforestation as project tools, while in 7 we find the use of polyculture and the integration of flora and fauna. Horticulture is used by 6 farms and 4 farms use agroforestry. Other less widespread strategies such as flowering fields, plurispecific trees rows, experimental crops, intercropping, floriculture, phytoremediation and wetlands, reuse of organisational materials and mobile laying hen boxes were also found. The latter design tools are only adopted by between 1 and 3 case studies. In general, it can be said that all farms heterogeneously adopt an average of 8 design tools for land management. The case studies

Land Management agroecological design tools

with the most attention paid to land management were Cascina Sant'Albero (Milan) and Il Trattore (Rome) with 11 agroecological design tools adopted. With regard to design tools aimed at **empowering the community, 17 different agroecological design tools were identified**. On average, companies adopted 7 design tools. In particular, 7 out of 10 companies practice the processing of their own agricultural products and maintain relations with research bodies, universities, local authorities. Many farms practice a weekly market in the city, where they meet the community (6 out of 10 farms). 6 farms have social farming practices (integration of vulnerable people such as immigrants or disabled people, integration into the labour market, civil service, internships). Many farms, 6, prepare products for local canteens and make efforts to activate horizontal training courses (farmer to farmer). There are also practices adopted more rarely (between 1 and 3 farms) such as therapeutic gardening, birdwatching, the use of remote sensing, training courses with the educational farm, and apiculture). In general, almost all farms provide cultural activities and 8 farms also provide guided tours where, in some cases, visitors can take the products home. Breeding is practised by only 4 farms (for production purposes). As far as community building is concerned, the two companies that are best equipped are again Il Trattore and Coop Cor.agg.gio, which are distinguished by a marked sensitivity towards the social dimension of agriculture. As far as equipped public spaces are concerned, it was noted that landscape planning tools are present in smaller quantities than in the other categories: among the **12 tools identified**, all the farms have paths that

Community empowerment agroecological design tools

Equipped public spaces agroecological design tools

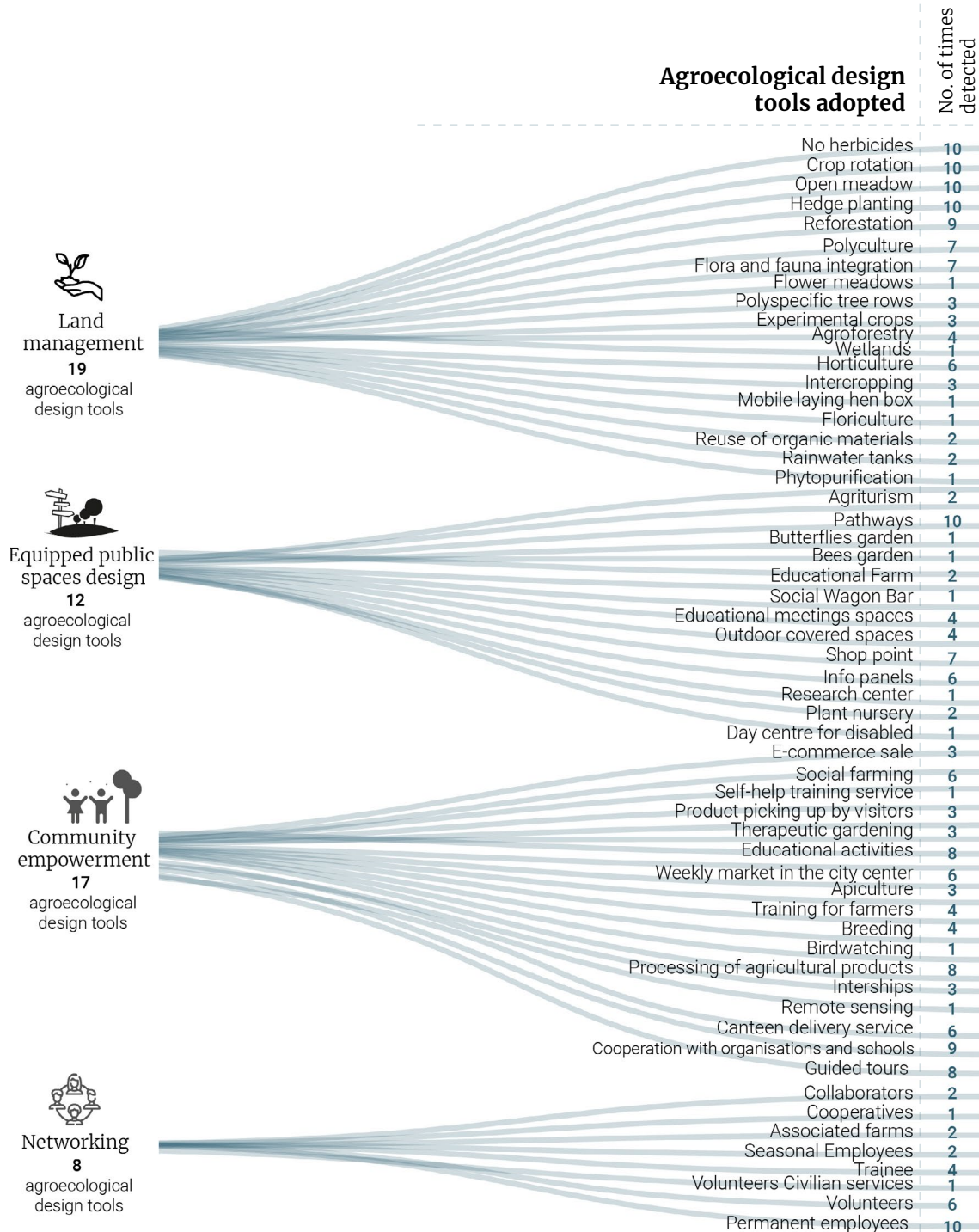
Networking agroecological design tools

cross the area, a large number (7) have a direct sales point and 6 farmsteads have signs that help visitors to find their way around the area. 4 farms have spaces for educational activities and covered open spaces for recreation and gathering. For the rest of the tools, the frequency of adoption is much lower: from 1 to 2 farms have slightly more articulated spaces: butterfly and bees gardens, bars, research centres, plant nurseries, centre for disabled people. Surprisingly, only two farms have an educational farm and 3 have agriturisms. In terms of the distribution of tools for the design of public spaces, Cascina Biblioteca and Coop Cor. agg.gio stand out for the number of tools used (8 and 7 respectively). On average, 4 tools are used. As regard the **networking** of the farms is concerned, **8 agroecological design tools** have been identified. As far as these planning tools are concerned, the analysis is a bit more complex because it depends a lot on the structure of the farm itself and it was often difficult to understand how to "categorise" the relevant actors. As a general analysis, we can say that all the farms have, in different numbers, permanent workers on whom the farms itself is structured. With different distribution we find volunteers and trainees (between 4 and 6 companies). There are also figures such as civil volunteers, seasonal employees, co-operators, associated farms that collaborate in the management, maintenance and operation of the farmstead. Considering that the number of members of the farms community varies according to the area and the activities, it is not logical to "decree" one farmstead as having more design tools than another. On the other hand, we can say that, generally speaking, all the farms involve different figures in

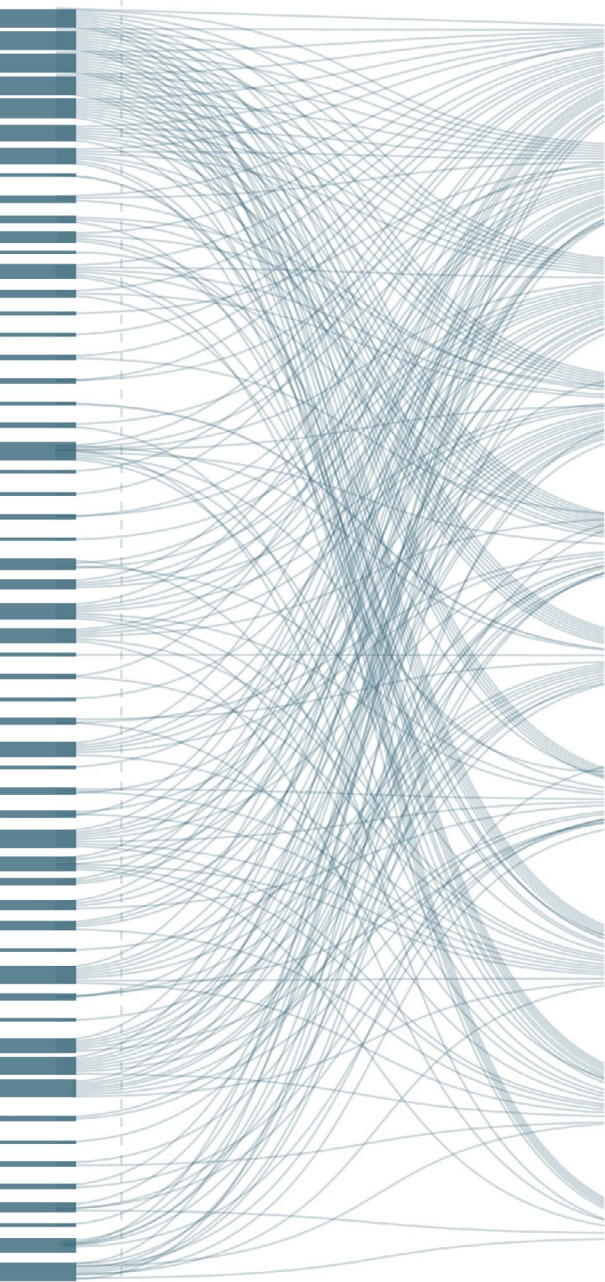
their organisation chart. In some cases they are stable figures, in others mobile figures (volunteers, trainees). Concluding the data processing, we can say that the average of the adopted design tools is 21 design tools. Among the average, the cooperative Il Trattore stands out with 34 adopted design tools. After analysing the data it was decided to represent the tools through **typological axonometries that could be useful from the point of view of communication and that could also be useful for reading the ecosystems involved in each tools**. The colour blue and green was chosen to represent the elements that refer mainly to the natural ecosystem (vegetation), while yellow was adopted to represent the agricultural ecosystem (production). Where the two colours meet, the synergy between the natural and agricultural ecosystems is well understood. In the Toolbox, **it was decided not to represent (excluding it from the evaluation of ES) the fourth category of design toolbox analysed, networking, for two main reasons:**

- Networking does not have a direct impact on the land use of the farmstead itself. Or rather, it certainly has a bearing on the management of activities which, in turn, affect land use. however, it is more difficult to recognise the direct fallout of these design tools on urban-territorial planning.
- Assuming the first point, difficulties have been encountered in assessing the ecosystem services provided (since the assessment methodology is based on a spatially approach, as we will see later). **Newtorking can in this sense be regarded as the category of design tools which depends on the others and on which the other categories depend** (mutually influencing each other).

Next pages: *Figure 17*- Summary diagram of the agro-ecological design tools used by the 10 farms interviewed + Graphic representation of the identified design tools divided into the 3 macro design categories



Number of agroecological design tools applied by each farm



Il Trattore 34

Co.r.ag.gio 31

Cascina Biblioteca 28

Parec Agri Cultura 28

Cascina Sant'Alberto 24

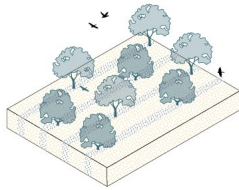
Neorurale Hub 20

Caramadre Bio 20

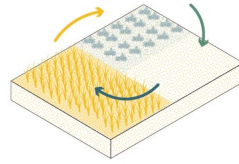
Semi di comunità 20

Coop Mezzago 19

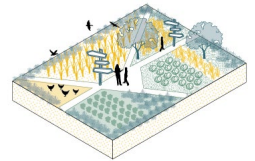
Corbari 10



Agroforestry



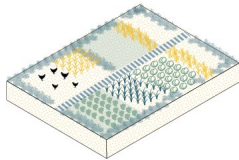
Crop rotation



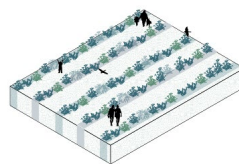
Experimental crops



Land
management
19
agroecological
design tools



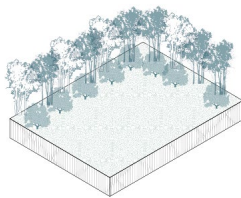
Horticulture



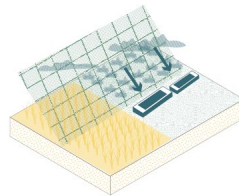
Intercropping



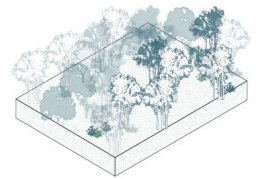
Mobile laying hen box



Polyspecific tree rows



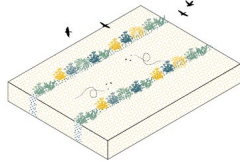
Rainwater tanks



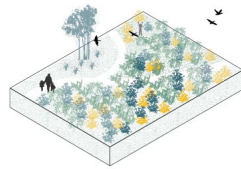
Reforestation



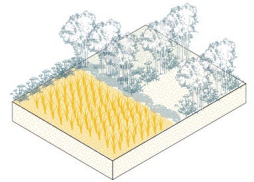
Flora and fauna integration



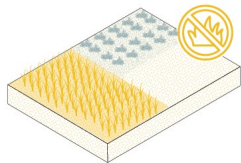
Floriculture



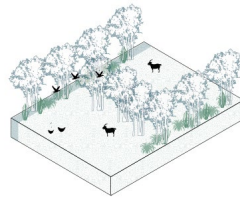
Flower meadows



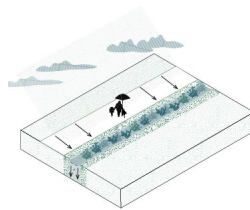
Hedge planting



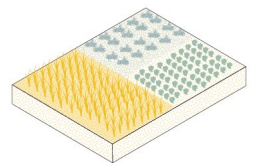
No herbicides



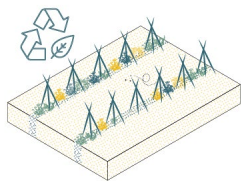
Open meadow



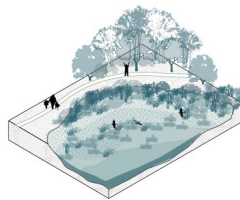
Phytoremediation



Polyculture



Reuse of organic materials



Wetlands



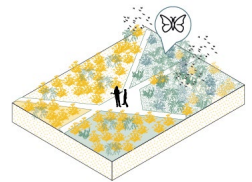
Equipped public
spaces design
12
agroecological
design tools



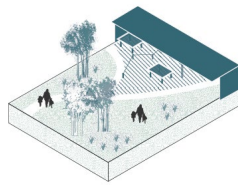
Agritourism



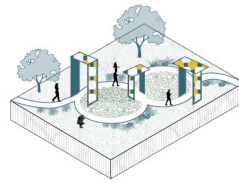
Bees garden



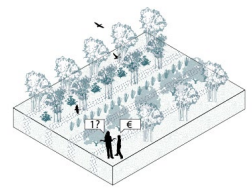
Butterflies garden



**Outdoor covered
spaces**



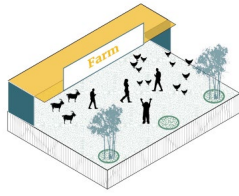
Pathways



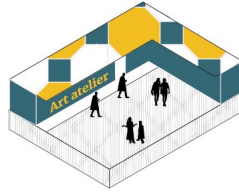
Plant nursery



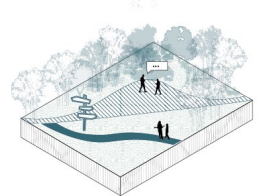
Day centre for the disabled people



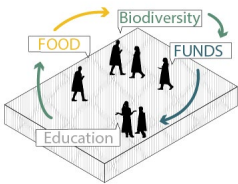
Educational Farm



Educational meetings spaces



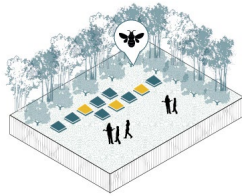
Info panels



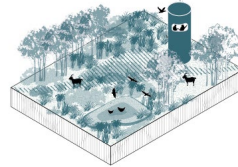
Research center



Shop point



Apiculture

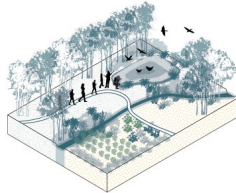


Birdwatching

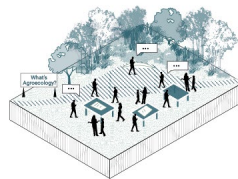


Breeding

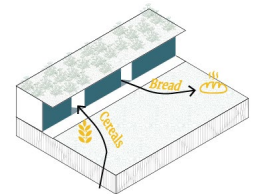
Community empowerment
17
agroecological design tools



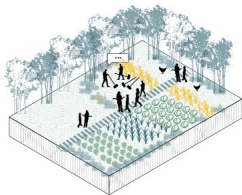
Guided tours



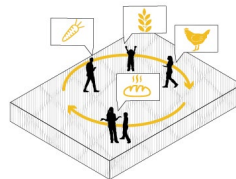
Internships



Processing of agricultural products



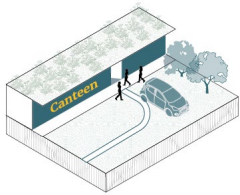
Therapeutic gardening



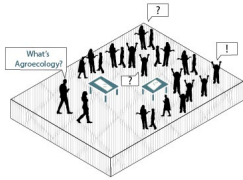
Training for farmers



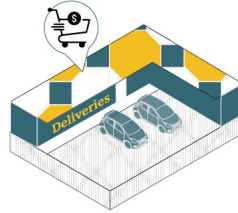
Weekly market in the city center



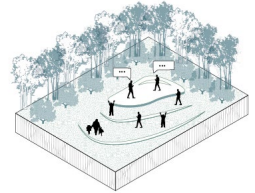
Canteen delivery service



Cooperation with universities, schools, local associations and research institutes



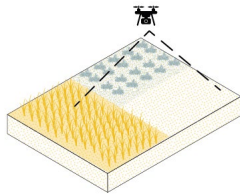
E-commerce sale



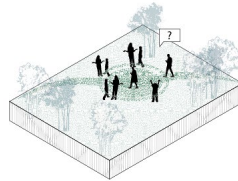
Educational activities



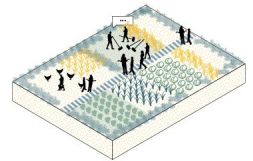
Product picking up by visitors



Remote sensing



Self-help training service



Social farming

¹⁴Burkhard, B., Kandziora, M., Hou, Y., & Maller, F. (2014). Ecosystem service potentials, flows and demands-concepts for spatial localisation, indication and quantification. *Landscape Online*, 34, 132. doi:10.3097/lo.201434

¹⁵Burkhard, B.; Kroll, F.; Müller, F. & W. Windhorst 2009. Landscapes' capacities to provide ecosystem services – a concept for land-cover based assessments. *Landscape Online* 15, 1–22

The valuation of the ecosystem services produced was done through the method proposed by Benjamin Burkhard, Marion Kandziora, Ying Hou and Felix Muller in **"Ecosystem Service Potentials, Flows and Demands - Concepts for Spatial Localisation, Indication and Quantification"**¹⁴, which can be interpreted as a deepening and continuation of the first publication of the ecosystem service 'matrix', which links land cover types to ecosystem service supply capacities¹⁵. The method involves the analysis of regulatory, provisioning and cultural ecosystem services through the definition of supply potential. The final product of the work involved the development of three matrices. **The ecosystem service matrices** consist of ecosystem services (currently 11 regulating, 14 provisioning and 6 cultural services) on the x-axis and geobiophysical spatial units (e.g. the 44 CORINE8 land cover types used here) on the y-axis. At the intersections the different spatial units' ecosystem service potentials flows or demands were assessed on a scale from 0 (no relevant supply or demand) to 5 (maximum relevant supply or demand) for a hypothetical 'normal' European landscape at one time point in summer before harvest.

The matrices refer to the regional spatial scale (administrative units, watersheds and landscapes) and consider a short-term, seasonal, annual, medium-term and long-term temporal assesment.

The matrix used as a reference for the thesis work was the **"Exemplary ecosystem service potential matrix"** (Figure 18), which, by definition, **considers the hypothetical maximum yield of the selected ecosystem services**¹⁶.

This method was first developed in 2009 and has

¹⁶ Ibidem

Next pages: *Figure 18* - "Exemplary ecosystem service potential matrix"

	Regulating services														Provisioning services										Cultural services									
	Global climate regulation	Local climate regulation	Air quality regulation	Water flow regulation	Water purification	Nutrient regulation	Erosion regulation	Natural hazard regulation	Pollination	Pest and disease control	Regulation of waste	Crops	Biomass for energy	Fodder	Livestock (domestic)	Fibre	Timber	Wood fuel	Fish, seafood & edible algae	Aquaculture	Wild foods & resources	Bioclimates & medicine	Freshwater	Mineral resources*	Abiotic energy sources*	Recreation & tourism	Landscape aesthetics & inspiration	Knowledge systems	Religious & spiritual experience	Cultural heritage & cultural diversity	Natural heritage & natural diversity			
Continuous urban fabric	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Discontinuous urban fabric	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3	3	3	3	0		
Industrial or commercial units	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
Road and rail networks	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Port areas	0	0	0	0	0	0	3	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0		
Airports	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mineral extraction sites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	0	0	0	0	0	0	
Dump sites	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Construction sites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Green urban areas	2	1	2	2	2	2	2	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0	2	1		
Sport and leisure facilities	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	1	0		
Non-irrigated arable land	1	1	1	0	0	1	0	1	1	2	2	5	5	5	0	5	0	0	0	0	1	3	0	0	0	2	1	1	2	0	3	0		
Permanently irrigated land	1	3	1	1	0	1	0	1	1	2	2	5	1	3	0	4	0	0	0	0	1	3	0	0	1	1	1	2	0	3	0	0		
Ricefields	0	1	1	1	0	1	0	0	1	1	2	5	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	3	0		
Vineyards	1	1	1	0	1	1	0	1	1	1	1	4	1	0	0	0	1	1	0	0	0	0	0	0	0	3	3	3	0	5	0	0		
Fruit trees and berries	2	2	2	1	2	2	2	5	3	2	4	1	0	0	0	2	2	0	0	0	2	0	0	0	0	3	2	2	0	4	1	0		
Olive groves	1	1	1	1	1	1	1	0	1	2	2	4	1	0	0	0	2	2	0	0	0	0	0	0	0	0	2	2	2	0	4	0	0	
Pastures	2	1	0	1	0	1	1	0	0	4	0	1	5	5	0	0	0	0	0	0	2	0	0	0	5	2	2	2	0	3	1	0		
Annual and permanent crops	1	1	1	0	1	2	1	1	2	2	4	2	4	1	5	0	0	0	0	1	1	0	0	2	1	1	2	0	3	0	0	0		
Complex cultivation patterns	1	1	1	1	0	1	1	1	2	3	2	4	2	2	1	4	0	1	0	0	1	2	0	0	1	2	2	2	0	3	0	0		
Agriculture & natural vegetation	2	3	3	2	2	2	2	1	3	3	2	3	3	2	4	1	1	0	0	2	1	0	0	1	2	2	3	1	3	3	0	0		
Agro-forestry areas	2	1	2	2	2	2	3	1	3	3	3	2	3	2	3	3	0	0	2	1	0	0	0	0	2	2	2	0	3	3	0	0		
Broad-leaved forest	5	5	5	3	5	5	5	4	4	4	4	0	1	1	0	1	5	5	0	0	5	3	0	0	0	5	5	5	3	4	5	0		
Coniferous forest	5	5	3	5	5	5	5	4	4	4	0	0	1	1	0	1	5	5	0	0	5	3	0	0	0	5	5	5	3	4	4	0		
Mixed forest	5	5	5	3	5	5	5	4	4	5	5	0	1	1	0	2	5	5	0	0	5	3	0	0	0	5	5	5	3	4	5	0		
Natural grassland	5	0	0	1	3	4	5	1	1	1	2	0	1	2	3	0	0	0	0	0	5	1	0	0	2	3	4	5	1	3	3	0		
Moors and heathland	3	4	0	0	3	3	3	2	2	3	3	0	1	1	1	0	0	0	0	2	0	0	0	0	0	4	4	5	1	2	4	0		
Sclerophyllous vegetation	2	1	1	1	2	1	1	1	2	2	3	0	1	1	1	1	2	2	0	0	1	3	0	0	1	2	3	4	1	2	4	0		
Transitional woodland shrub	2	2	1	1	1	2	1	1	2	2	3	0	2	1	1	1	2	0	0	0	1	3	0	0	1	2	3	4	1	2	3	0		
Beaches, dunes and sand plains	0	0	0	1	1	1	0	5	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	4	4	1	3	3	0		
Bare rock	0	0	0	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	3	2	1	0	
Sparsely vegetated areas	0	1	0	1	1	1	1	1	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	2	1	1	3	0	2	1	0		
Burnt areas	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Glaciers and perpetual snow	3	4	0	5	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5	4	0	0	1	0	0	
Inland marshes	2	0	0	3	3	4	1	4	1	2	3	0	0	4	2	0	0	0	0	0	1	0	0	0	0	1	2	3	0	3	3	0	0	
Peatbogs	5	4	0	4	4	4	3	3	3	3	4	0	2	0	0	0	0	0	0	0	1	2	1	0	0	3	2	3	0	2	4	0	0	
Salt marshes	1	1	0	1	1	2	1	4	1	2	2	0	0	2	2	0	0	0	0	0	1	0	0	0	0	3	2	3	0	2	3	0	0	
Salines	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	0	4	0	0	0	
Intertidal flats	1	1	0	1	1	1	1	5	0	2	3	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	4	2	3	0	2	3	0	0
Water courses	0	1	0	3	3	3	0	3	0	3	5	0	2	0	0	0	0	0	3	0	4	0	5	0	3	4	4	4	0	3	3	0	0	
Water bodies	1	0	0	2	3	0	3	0	3	5	0	1	0	0	0	0	0	0	4	5	4	0	5	0	1	5	4	4	0	3	3	0	0	
Coastal lagoons	1	1	0	4	2	3	0	4	0	3	5	0	1	0	0	0	0	0	4	5	4	1	0	0	0	3	4	4	0	2	3	0	0	
Estuaries	1	0	0	3	3	3	0	3	0	3	5	0	2	0	0	0	0	0	4	5	4	1	0	0	1	3	4	4	0	2	3	0	0	
Sea and ocean	3	3	0	1	2	3	0	0	3	5	0	4	3	0	0	0	0	0	5	5	4	3	0	1	3	4	5	5	0	3	3	0	0	

been very successful due to its application to a number of case studies and its use in the study and mapping of ES. The attractiveness of the matrix approach derives from its flexibility regarding details and levels of abstraction from rather simple to very complex. Its potential to integrate all types of data, from expert scores to statistics, interview data, measurements or high-level model results, makes it applicable in both data-poor and data-rich environments. Last but not least, the results based on the flexible **0-5 classification system** and the linkage to geobiophysical spatial units (e.g. land cover, biotope, vegetation or soil types) in ecosystem service maps provide a wide range of applications in science and, hopefully as in the case of building agro-ecological management models for peri-urban farms, in decision-making.

What was decided to do in this thesis work, in order to pursue the aim of understanding which ecosystem services could be produced by agroecological systems in peri-urban farmsteads, was to produce a **matrix in which the design agroecological tools were linked to the ecosystem services of regulation, provisioning and culture.**

The analysis of the ecosystem services produced was then structured as follows:

1. In order to understand which ecosystem services were produced by each tool, **the direct impact on the land use of the farms was considered.** For each tool, a land use was identified that could be linked to the matrix in the reference literature (Figure 18 - Exemplary ecosystem service potential matrix). In some cases it was more straightforward, in other

cases a process of interpretation was carried out. For example, in the case of community empowerment tools, it was decided to consider “discontinuous urbanised land” or “sports and leisure facilities” or commercial units as land use. This interpretation work included the study of the classification made during the research work used as a reference and the CORINE land cover legend¹⁷.

2. After having identified the link between agroecological tools and land use, a new matrix was structured consisting of ecosystem services (currently 11 regulating, 14 provisioning and 6 cultural services) on the x-axis and agroecological design tools on the y-axis (divided into the 3 main design field categories: 19 land management tools, 12 equipped public spaces tools, 17 community empowerment tools).
3. The final result is a matrix in which, at the intersections, the box in the case of the potential presence of production of the ecosystem service has been filled in (always referring to the direct impact on land use and using the reference table - figure 8). It was decided not to give a quantitative assessment using the range 0-5 as this would be too approximate. Rather, **it was decided to understand the presence or absence of the ecosystem service produced.** In this sense, if we find a value between 1-5 in the reference matrix, then the ecosystem service has been considered “potentially produced” for the project matrix. If the value assigned to the intersection is 0, then the ecosystem service has been considered “not produced”.

The final result is illustrated on the following pages.

¹⁷CORINE land cover nomenclature illustrated guide. (n.d.). Retrieved October 6, 2021, from <https://land.copernicus.eu/user-corner/technical-library/Nomenclature.pdf>

Next pages: *Figure 19-* Assessment of the ecosystem services produced within the agroecological design tools adopted by the 10 farms interviewed

	Timber	Wood Fuel	Fish, seafood & edible algae	Aquaculture	Wild foods & resources	Biochemicals & medicine	Freshwater	Mineral resources	Abiotic energy sources	Recreation & tourism	Landscape aesthetics & inspiration	Knowledge systems	Religious & spiritual experience	Cultural heritage & cultural diversity	Natural heritage	
Provisioning services																
Cultural services																
																Agroforestry
																Crop rotation
																Experimental crops
																Flora and fauna integration
																Floriculture
																Flower meadows
																Hedge planting
																Horticulture
																Intercropping
																Mobile laying hen box
																No herbicides
																Open meadow
																Phytopurification
																Polyculture
																Polyspecific tree rows
																Rainwater tanks
																Reforestation
																Reuse of organic materials
																Wetlands
																Agriturism
																Bees garden
																Butterflies garden
																Day centre for the disabled
																Educational Farm
																Educational meetings spaces
																Info panels
																Outdoor covered spaces
																Pathways
																Plant nursery
																Research center
																Shop point
																Apiculture
																Birdwatching
																Breeding
																Canteen delivery service
																Cooperation with universities, schools, local associations and research institutes
																E-commerce sale
																Educational activities
																Guided tours
																Internships
																Processing of agricultural products
																Product picking up by visitors
																Remote sensing
																Self-help training service
																Social farming
																Therapeutic gardening
																Training for farmers
																Weekly market in the city center

*A vision for Cascina
Sant'Alberto*

3

- *“Quando penso che un uomo solo, ridotto alle proprie semplici risorse fisiche e morali, è bastato a far uscire dal deserto quel paese di Canaan, trovo che, malgrado tutto, la condizione umana sia ammirevole.*

Ma, se metto in conto quanto c'è voluto di costanza nella generosità per ottenere questo risultato,

l'anima mi si riempie d'un enorme rispetto per quel vecchio contadino”

— Jean Giono
L'uomo che piantava gli alberi

3.1 Territorial Framework

The final result of the data analysis and processing, the agroecological design toolbox, was subsequently used to implement the design of one of the case studies: Cascina Sant'Alberto.

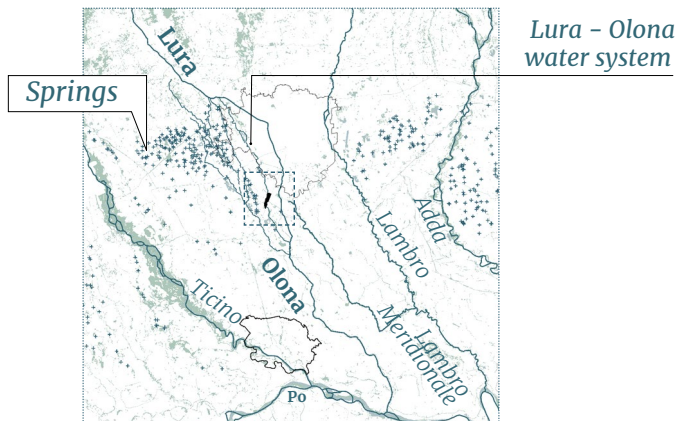
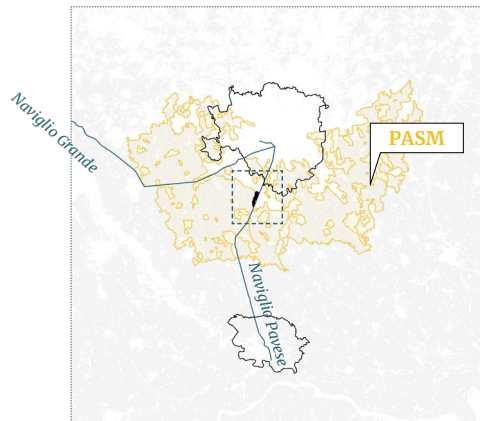
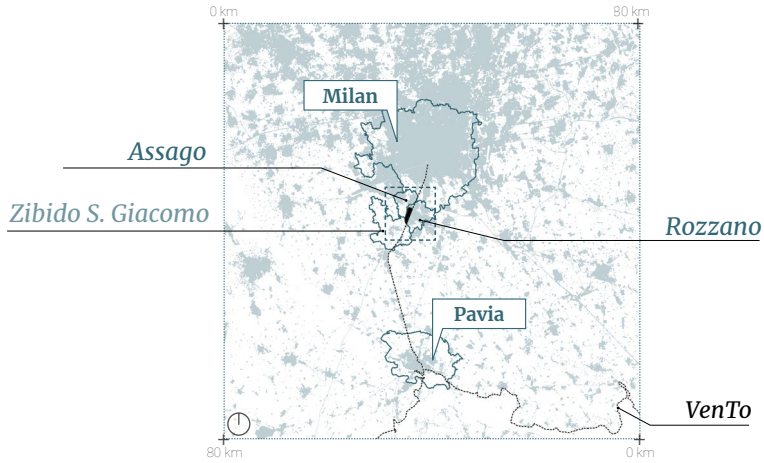
The following paragraphs will attempt to explain the reasons for the choice of the case study, understanding the criticalities and potential of the study area. Cascina Sant'Alberto is located in the municipality of Rozzano, bordering two other municipalities: Assago and Zibido San Giacomo. These are towns bordering Milan, located in the transition area between the dense urban landscape and the rural landscape.

The location of the farms is strategic: in fact, it is perfectly situated on the VenTo Cycle Route Axis: a cycle infrastructure of more than 700 km that runs along the banks of the river Po from Venice to Turin¹. As far as the project area is concerned, it is interesting because it is the only existing route which, through the Parco Agricolo Sud, reaches Pavia directly along the Naviglio Pavese. The area is in fact located in the Parco Agricolo Sud which, as already mentioned in the description of the case study, is a regional agricultural park of the metropolitan belt by Regional Law n. 24 of 1990, on the basis of the contents of the "General Plan of Protected Regional Areas", as per Regional Law n. 86 of 1983². Cascina Sant'Alberto is also located in the middle of the irrigated plain, characterised by the presence of **springs and the branching off of important watercourses that flow into the Po'**: in particular, the system of the waters of the Lura and Olona crosses the area in ditches and cables. The bodies of water constitute important ecological corridors.

¹ Cos'è VENTO - Vento. (2021, March 19). Retrieved October 8, 2021, from Vento website: <https://www.>

² Piano Territoriale di Coordinamento. (2020). Retrieved October 15, 2021, from Piano Territoriale di Coordinamento website: https://www.cittametropolitana.mi.it/parco_agricolo_sud_milano/territorio_e_pianificazione/piano_territoriale_di_coordinamento.html

Next page: *Figures*
1- Cascina Sant'Alberto observed within the macro systems - The system of urbanisation, agriculture and nature on a regional scale

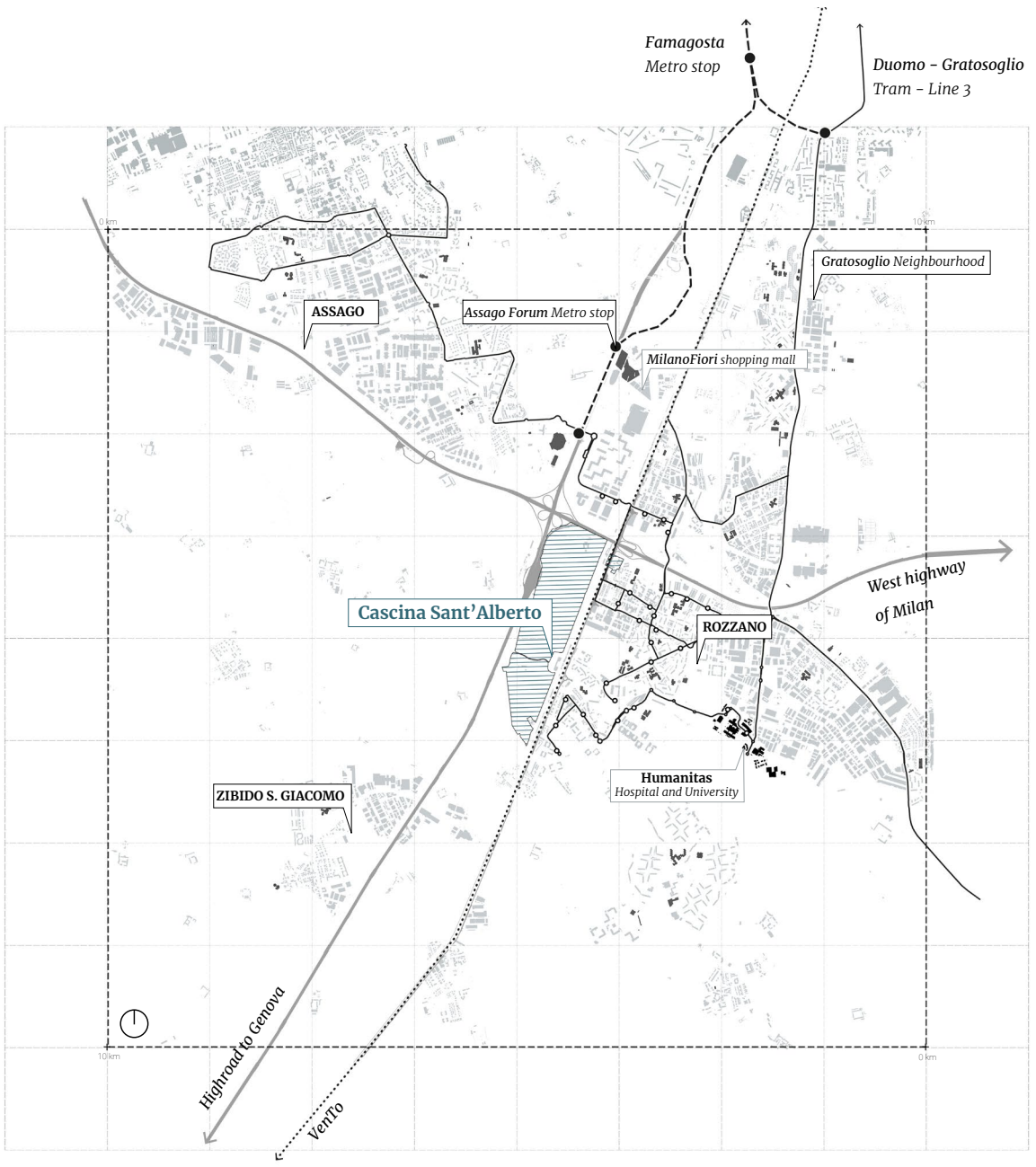


The urban system

Looking more closely at the study area, on a supra-municipal scale, the concept of peri-urban is widely revealed. Starting from the built system, **it is clear how the area is located at the margins of an averagely dense fabric, the result of continuous and unrestrained urbanisation**. The municipalities of Rozzano and Assago are the last municipalities still “anchored” to the urban continuity of Milan, also thanks to the presence of many public transport infrastructures: the underground, the tram and the autobus. Still talking about infrastructures, the area is limited to the east by the State Road that runs along the Naviglio Pavese and is the structuring axis of the VenTo cycle route. To the west is the Giovi motorway towards Genoa. To the north, another important infrastructure (the western Milan ring road) closes the area like a rectangle open to the south. The area touches the agricultural landscape to the west, but at the same time is very limited. Nearby are many public recreational services and the Humanitas hospital, a landmark of Rozzano. All around small scattered rural settlements and farmsteads, some active others abandoned.

Next page: *Figure 2* - Cascina Sant'Alberto: a central node of the periurban transition: the urban system







-  Project area
-  Metro route and stops
-  Surface public transport route and stops (30 minutes far by walking from Cascina Sant Alberto)
-  VenTo (Venice-Turin cycle path)
-  Main infrastructures
-  Recreational, cultural and social services
-  Health services

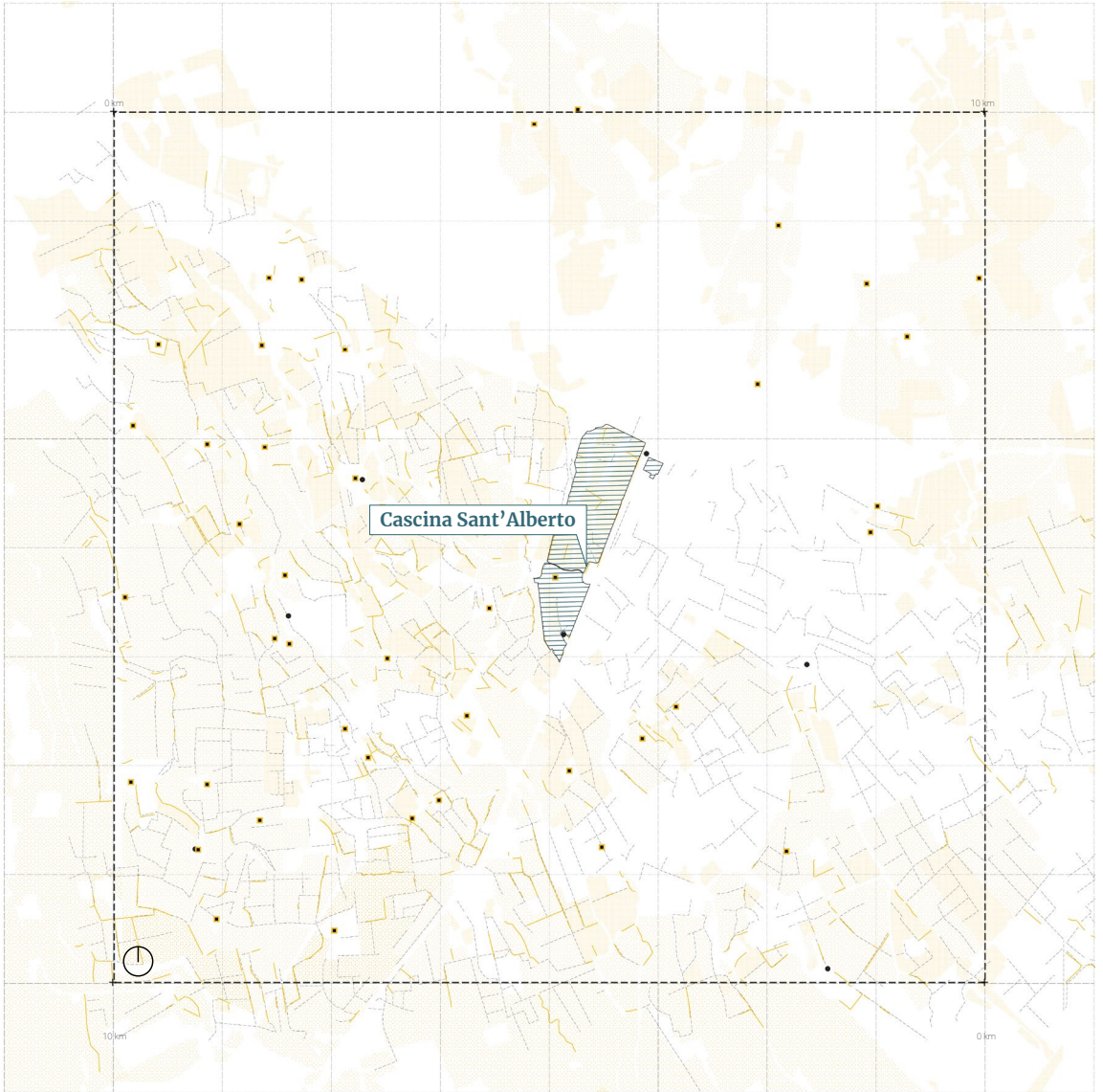


The agricultural system

The rural landscape to the south of Milan begins to take shape starting from the study area and outside the western ring road (with the exception of some areas to the north of the ring road). In this area, thanks to the presence of the springs, the cultivation of rice fields is more facilitated and, for this reason, some rice fields can be seen starting from this part of the territory. For the purpose of this work, hedges have been highlighted at two thresholds of different years: 1954, 2018. **It is possible to notice an over-simplification of the rural landscape, which today is homogeneous and poor in biodiversity.** The farmsteads, partly active in tourism, partly inhabited and partly abandoned, are located more and more densely towards the south. Cascina Sant'Alberto is in fact located in an area rich in agricultural networks that periodically participate in initiatives of the Parco Agricolo Sud.

Next page: *Figure 3-*
Cascina Sant'Alberto:
a central node of the
periurban transition: the
agricultural system

-  Project area
-  Cascine
-  Hedges (Dusaf 2018)
-  Hedges (Dusaf 1954)
-  Agricultural areas with arable land
-  Agricultural areas with rice fields









The natural system

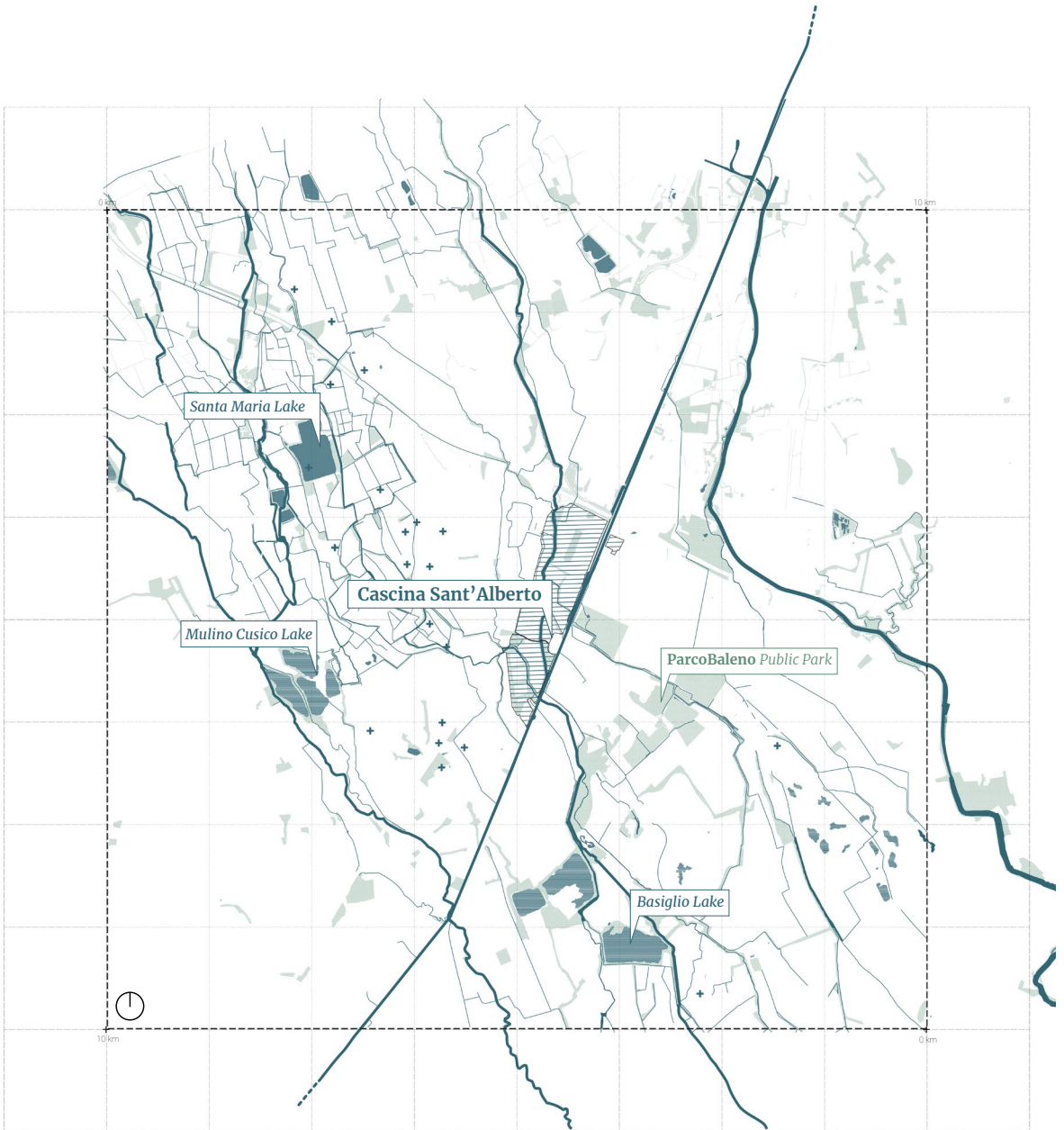
The transition between the purely urban landscape and the agricultural landscape is interspersed with a rich **natural system that refers to the water system of the Luna and Olona rivers (later the Southern Lambro). Like a cut from north-west to south-east**, the watercourses cross Cascina Sant'Alberto: ditches, cables and irrigation canals are interspersed, building micro ecological corridors in a homogeneous and banal territory.

All around it, a number of quarries have been renaturalised and turned into lakes for swimming: Muliso Cusico's Basiglio lake.

It is interesting to note that the city of Rozzano itself has many public green spaces, including the large Baleno Park located near the study area.

Next page: *Figure 4 - Cascina Sant'Alberto: a central node of the periurban transition: the natural system*

-  Project area
-  Active springs
-  Watercourses
-  Lakes
-  Renaturalised quarries
-  Wooded and semi-natural environments



3.2 Existing situation of the project area

Looking more closely at the study area from a historical map dating back to the first half of the 1800s, we notice that **this synergistic system between nature and agriculture is part of the history of Cascina Sant'Alberto**: in fact, historically an agricultural area, in 1800 it was still untouched by any dense urbanisation system (which would involve it from the following century onwards) and the **Roggia Coria and Cavo Borromeo** (from the Lura-Olona water system) are still clearly visible. The farmstead is already clearly visible, as is the main road along the Naviglio Pavese. Rozzano, still only formed by its historic centre, appears tiny compared to the study area today. **The project area consists of a portion of land of approximately 133 hectares and an abandoned area including a disused historic villa to the north-east**, across the naviglio Pavese (clearly visible in this historic map). Both areas are now owned by the Brioschi Group. Cascina Sant'Alberto is managed by Walter Melese, managing director, who has been dealing for 20 years with the 133 hectares portion (15% of the municipality of Rozzano) on which a partial transformation is foreseen by the PGT of Rozzano (observable in the table ATO- Tavola generale sintesi delle trasformazioni)³. The Brioschi group is involved in the design, as is Walter Meles, with the aim of planning the development of an area with a dual vocation, agricultural and building⁴. The philosophy of the farm is to renaturalise the area by planting trees and producing bread. The historical natural system has been taken over by Waalter in order to reconstitute the natural setting and restore biodiversity.

³ PGT - Comune di Rozzano. (2021). Retrieved October 15, <https://www.comune.rozzano.mi.it/piano-regolatore-generale-prg/>

⁴ Il dialogo con le comunità locali per il PGT di Rozzano. (2021). Retrieved October 15, 2021, from <https://www.brioschi.it/it/244/>

Next page: *Figures 5 - Lombardy, Venice, Parma, Modena (1818–1829) - Second military survey of the Habsburg Empire* Source: (2021). Retrieved October 8, 2021, from Arcanum.com website: <https://maps.arcanum.com>

Renaturalisation process of Cascina Sant'Alberto

2002



2008



0 km 2 km

Figures 6 - The renaturalisation process of the Cascina over 20 years

2014



2021



0 km

2 km

Cascina Sant'Alberto

- Experimental crops
- Biodinamic educational classes
- Cooperative MadreTerra
- Municipality shared garden

- Abandoned Farm
- Hill made by debris
- Cavo Borromeo
- Roggia Coria
- Abandoned Villa

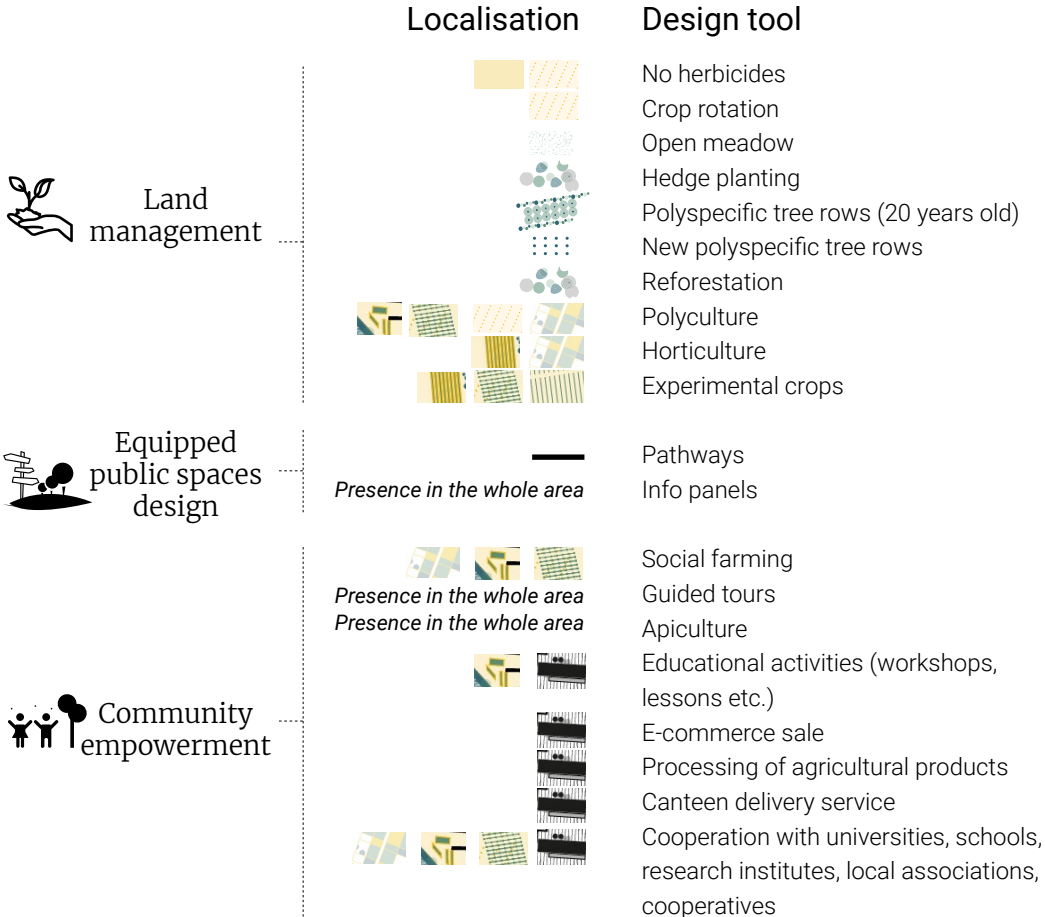
Legend

- Project area (Cascina Sant'Alberto - Brioschi Company property)
- Project area (Abandoned villa - Brioschi Company property)
- Access
- Cascina Sant'alberto
- Abandoned buildings
- Buildings service area
- Canals (ditches and artificial canals)

0 km

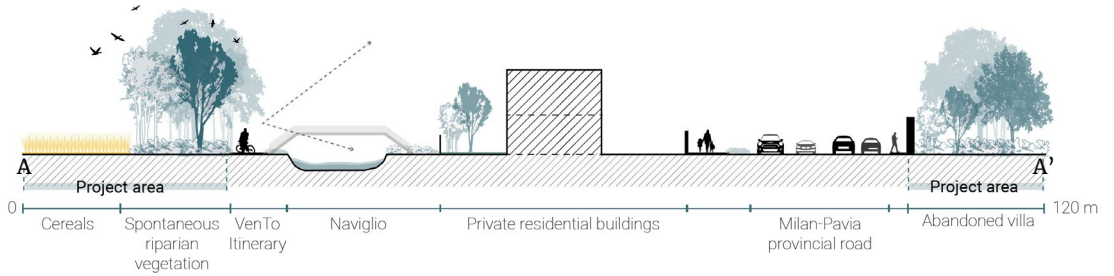
2 km

Existing agroecological model of farming system of Cascina Sant'Alberto



Figures 7 - Existing agroecological model of Cascina Sant'Alberto and localisation of design tools

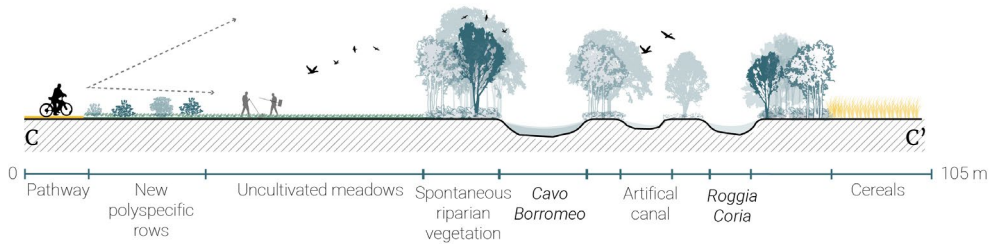
The eastern border and the relationship with the Naviglio cycle path and the abandoned villa



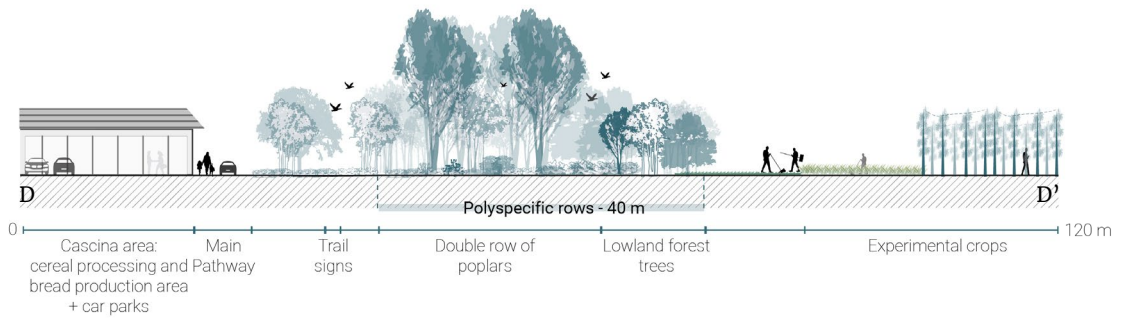
The western edge and the relationship with the Giovi highway



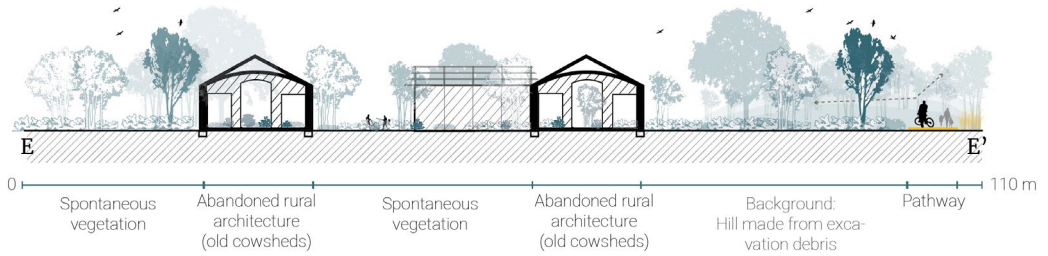
Areas of new forestation with plurispecific rows and natural and artificial watercourses



Cascina Sant'Alberto and the agroecological experimental areas



Abandoned rural farm and animal shed and natural areas



Figures 8 - Sections of the existing situation
 Next Page: Figures 9 - Photos of the area
 taken by the author

Polyspecific rows and open meadows



Cornfields and abandoned silos



Trail in the wood



Abandoned rural architecture

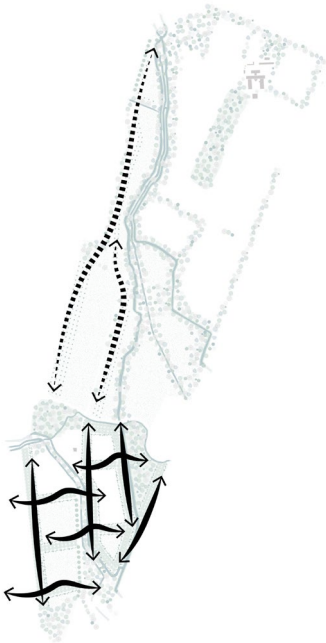


From the observation of the arcological model, **three relevant themes emerged**. Firstly, the great potential of the project site concerns the already marked **attention to the natural system**: in fact, the renaturalisation process that has taken place in recent years has led to the planting of 20,000 trees on 21 hectares (oaks, ash trees, maples, alders, wild cherry trees, lime trees) and bushes (including hawthorn, wild apple trees, dog roses, blackthorn, wild pear trees). **It is therefore the application of a design tool through a vision and not by uncoordinated individual actions**. The forest planting is functional to the improvement of the ecosystem through the creation of a network of biotic corridors that favour the reproduction of fauna. Hunting has been prohibited since 2005. **Over the years, this attention to the natural ecosystem has led to the development of participatory agroecological activities** such as biodynamic farming courses, cultivation of experimental species, collaborations with cooperatives (MadreTerra) and the municipality of Milan for social farming. To the north, cereal fields (7 types of maize) are used for bread production. In the area, **a main pathway connects the above-mentioned spaces until we reach the north**, where we find an abandoned farmstead and, dubiously after the border, another property belonging to the Brioschi group which has been abandoned. The projects are mainly concentrated in the south of the area, where the vision of Cascina Sant'alber in alberto seems quite consolidated. In the north, projects remain fragile and hinted at. **The vision for the Cascina is based on these 3 assumptions**

Next page *Figures*
10 - Strengths and
weaknesses of the
project area

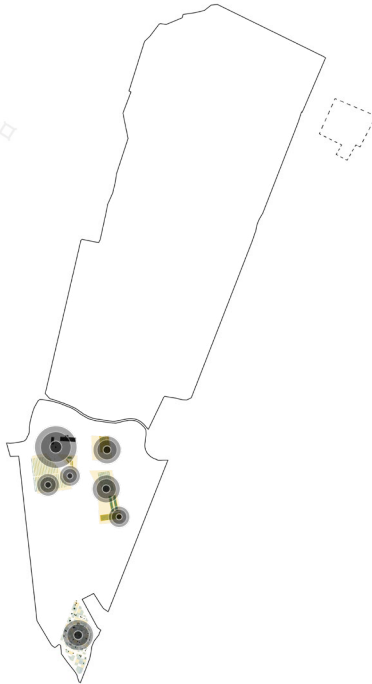
01.

Attention to ecological corridors planting: well-established corridors in the south and growing ones in the north



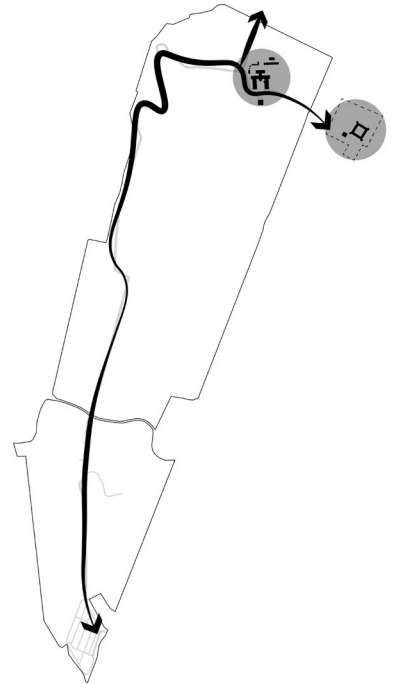
02.

Good quantity of participation activities, services and public spaces but concentrated just in the south



03.

Possibility of crossing the area but only with one main path + abandoned buildings



3.3 Agroecology Hub Sant'Alberto: the masterplan

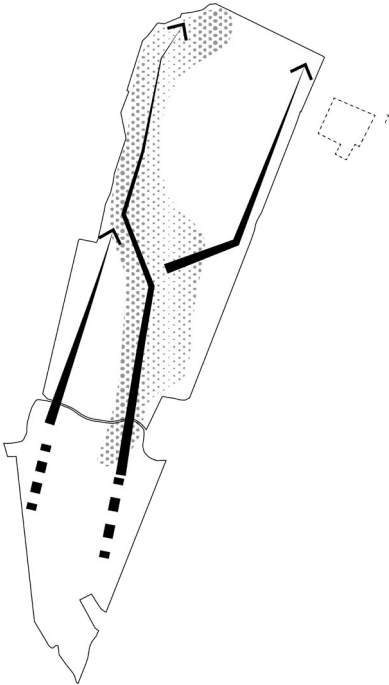
The Cascina Sant'Alberto project is articulated in **3 main design principles:**

1. Firstly, the will and need to **continue the process of renaturation and ecological reconnection by insisting on existing corridors** (areas of new reforestation already planted) and strengthening the natural ecological corridors along the Roggia Coria and Cavo Borromeo. In this way the ecological connections can continue to the north of the area. The connections are limited to the area with major obstacles at the borders (road and motorway infrastructures) but since the area is under a hunting ban, the area itself is a safe place for fauna.
2. Secondly, **two new areas for experimenting with agroecology are identified**. One, linked to production in the north, which embraces a new agroecology hub for Milan: the Food Research Hub and Agri-market. A second area in the centre is dedicated to learning agroecology and is therefore located near Cascina Sant'Alberto, a new Educational Hub with adjoining farmhouse.
3. Other micro-functions are then positioned in the area that can produce ecosystem benefits and, at the same time, enrich the holistic vision for Sant'Alberto: a wetland park, a birdwatching tower in the woodland area, some micro-spots for learning agroecology with information panels. **The whole area is therefore connected with a main route** (which follows the traces of the existing one) and secondary routes that intercept other projects.

Next pages: *Figures 11* -
Masterplan's design
principles.
Figures 12 -
Masterplan and
implementation of the
agroecological model of
farming system

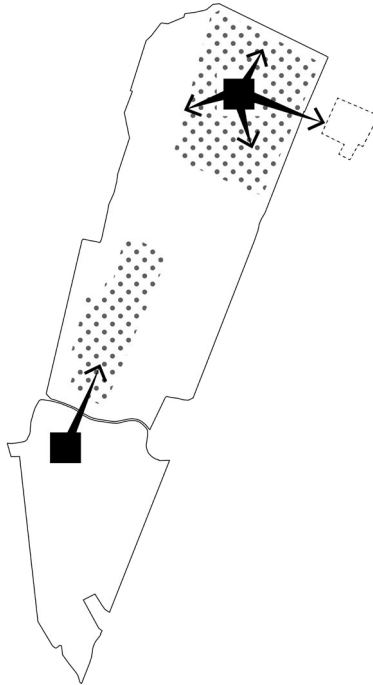
01.

Leave nature its space
implementing existing
ecological corridors



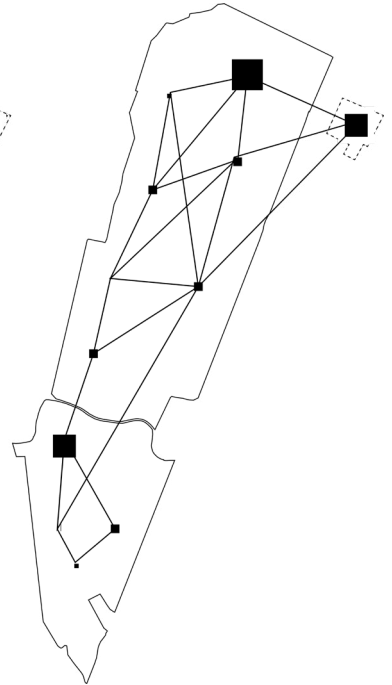
02.

Identifying new areas to
discover agroecology, to
produce food and learn



03.

Identifying well-
connected observation
spots and research and
knowledge-sharing hubs





Land management

Localisation

Design tool

			Agroforestry
			<u>Crop rotation</u>
			<u>Experimental crops</u>
			Flora and fauna integration
			Flower meadows
			<u>Hedge planting</u>
			<u>Horticulture</u>
			<u>Intercropping</u>
			Mobile laying hen box
			<u>No herbicides</u>
			<u>Open meadow</u>
			<u>Polyculture</u>
			<u>Polyspecific tree rows</u>
			<u>Reforestation</u>
			Wetlands



Equipped public spaces design

<i>Educational Hub</i>			Agriturism
			Bees garden
			Butterflies garden
<i>Educational Hub</i>			Educational meetings spaces
<i>Educational Hub, Agri Market</i>			<u>Info panels</u>
			Outdoor covered spaces
			<u>Pathways</u>
			Plant nursery
<i>Food research lab</i>			Research center
<i>Educational Hub</i>			Shop point
			Apiculture
			Birdwatching



Community empowerment

<i>Educational Hub</i>			Breeding
<i>Educational Hub, Hostel,</i>			<u>Canteen delivery service</u>
<i>Food Research Lab, Agri Market</i>			<u>Cooperation with universities, schools, local associations and research institutes</u>
<i>Educational Hub</i>			<u>E-commerce sale</u>
<i>Educational Hub</i>			<u>Educational activities</u>
			<u>Guided tours</u>
<i>Food research lab</i>			Internships
<i>Educational Hub</i>			<u>Processing of agricultural products</u>
			Product picking up by visitors
			<u>Social farming</u>
			Therapeutic gardening
<i>Food research lab</i>			Training for farmers



Agroforestry

The Agri Market and Food research lab

The wetland park

Flower meadow

The new Hostel

The oak glade

Tree nursery

The belvedere

The birdwatching tower

The discovery garden

Reforestation

Educational hub

The observation spots

The trail in the wood



A comparison with the existing situation was then done, by means of colour representations (for the project) and black and white representations (for the existing).

With regard to point 1, it is noted that the implementation of the planned ecological corridors through plurispecific rows was advanced from the new reforestations already in the project, adding corridors to the north. The decision to transform agricultural areas into open fields follows the philosophy of the farm itself.

Regarding point 2, The two poles of agroecology have similar appearance but **different functions**: the discovery garden is a learning space, with many paths and therefore with a more important attendance and penetration of the area. To the north, on the other hand, the areas are used for production and research purposes: with floriculture, agroforestry, the presence of a nursery with 9,000 estimated trees, intercropping where maize will continue to be grown and bread will be produced.



Finally, the existing path is taken up and puts into system's the new and old polarities, to which two new poles are added: **the hostel**, located in the old abandoned villa in the north-east and the **Agroecological Research Hub and the Agri-market** in the north, in the old abandoned farm and stables. These spaces figure as the farmsteads of the future, in the hope of rediscovering a rural landscape long abandoned. They figure as places of encounter, knowledge, landscape attention and landscape design.

Next page: *Figures 13* -
Comparison of existing
and project vision

01.

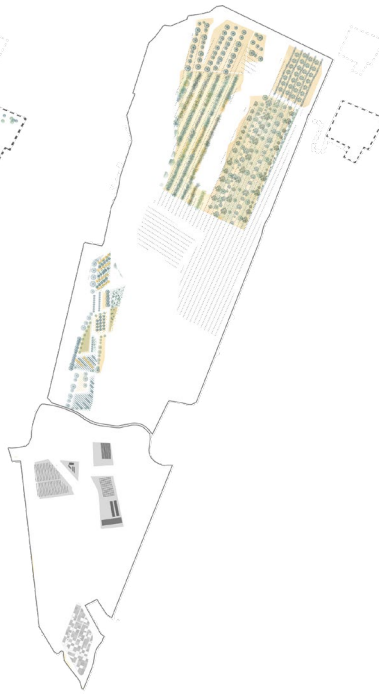
Leave nature its space
implementing existing
ecological corridors





-  Existing
-  Project

02.

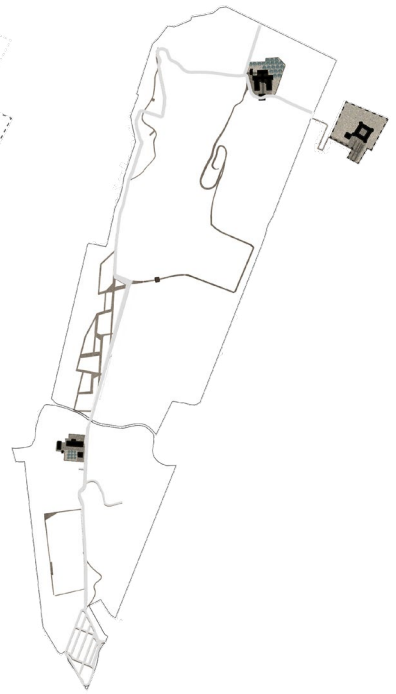
Identifying new areas to
discover agroecology, to
produce food and learn



-  Existing
-  Project

03.

Identifying well-
connected observation
spots and research and
knowledge-sharing hubs



-  Existing
-  Project

3.4 Design focus

From the development of the master plan it was decided to deepen the project through the design of two places that can be exemplary: design focus 1 concerns the **Agroecological Garden of Discovery, which mainly supports the ecological and social dimension of agroecology.** On the other hand, design focus 2 concerns a space related to the **political and economic dimension of agroecology (while also supporting ecology and sociality): the Agroecological Research Hub and the new agri market.**

The Agroecological Garden of Discovery sees itself as a place for meeting, learning and discovering agroecology. For this reason it is located near the existing and active Cascina Sant'Alberto, around which community-building activities have been implemented over the years: biodynamic agriculture, cooperation with Terramadre cooperative. **The garden sees itself as a garden of diversity: biodiversity, diversity of spaces and diversity of cultures.** A place where diversification is synonymous with growth, learning, generation. The segments generated by the orthogonal secondary paths host flower fields, shared vegetable gardens, intercropping and agroforestry. Young volunteers can participate in the maintenance of the area, which can be partially rented to external managers. The renaturation process is carried out on the east side through multi-species rows of trees and on the west side through a forest barrier against noise pollution from the motorway and wind. Some fields are left open for grazing and play. Man and nature find in the

garden of discovery a meeting place that generates positive synergies.

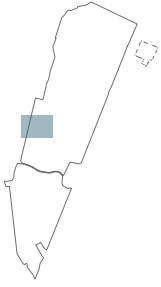
the Agroecological Research Hub and the new agri market are spaces dedicated to food research, production and sales. Following the lines of Milan's Food Policy, this area aims to become a food research hub for the city and help the company expand its network: in the near future the centre could host university researchers, young workers, trainees from universities of landscape architecture, gastronomy, forestry, agronomy and biology. **A dynamic, innovative, exchange centre. And a production centre:** the entire surrounding area is dedicated to production and sales: agroforestry with fruit trees and maize (to continue producing bread, but increasingly of high quality), a nursery with 9000 trees for the sale of plants, floriculture for the sale of flowers. **It is a place of production but also a place to meet, to sell, to exchange between farmers** who make the centre their meeting place for the construction of a solidarity network.

is a centre where small farmers can bring their problems to light and be heard.

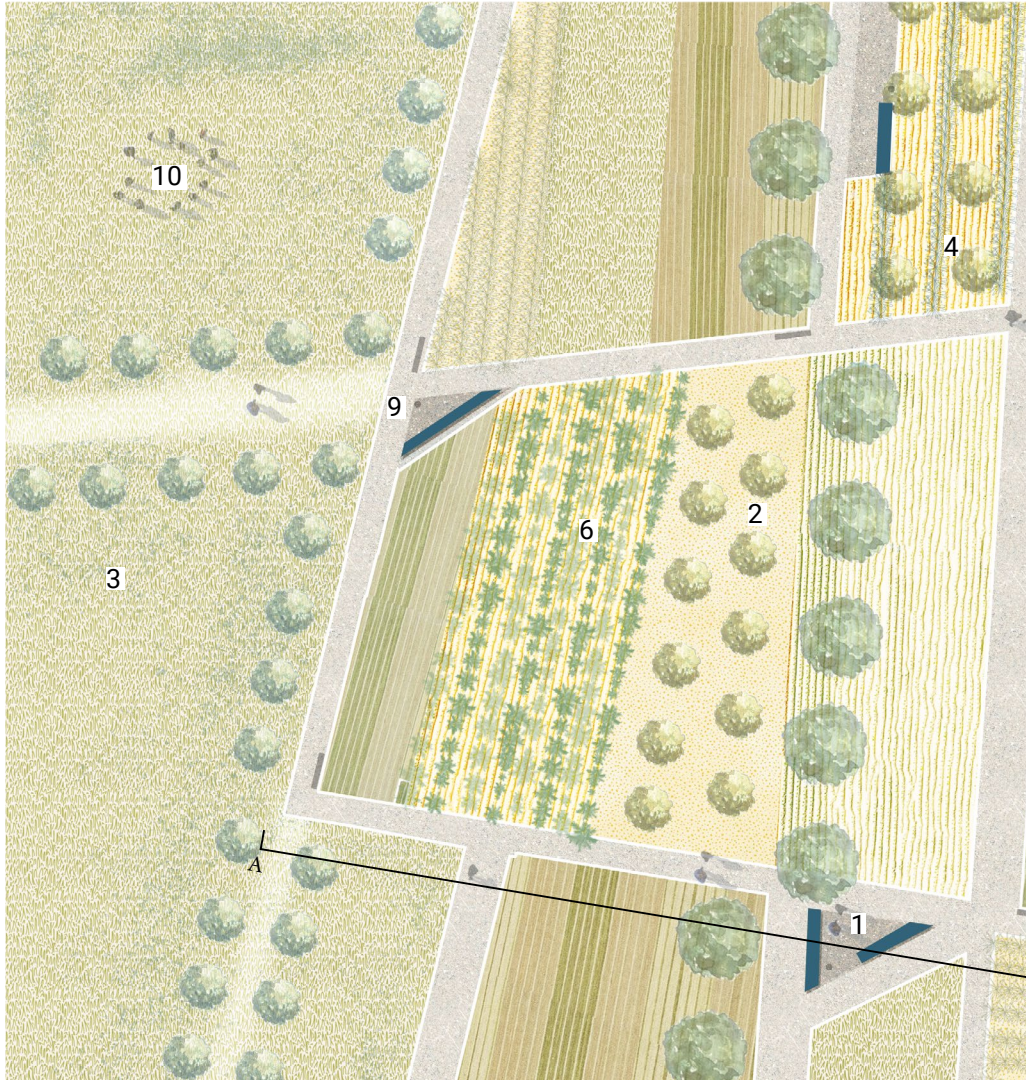
From the design point of view, the abandoned farmstead is recovered and a new market square is set up inside the two shoulders of the former stable: in this way, the old courtyard of the farmst, a place for living and sharing, is reactivated to give people the chance to discuss **the Italian agricultural landscape of the future. it is a place that attracts tourists, who can stay in the hostel, and attracts European funds for landscape projects.**

The two design focuses are then illustrated through a plan, an explanatory section and a view.

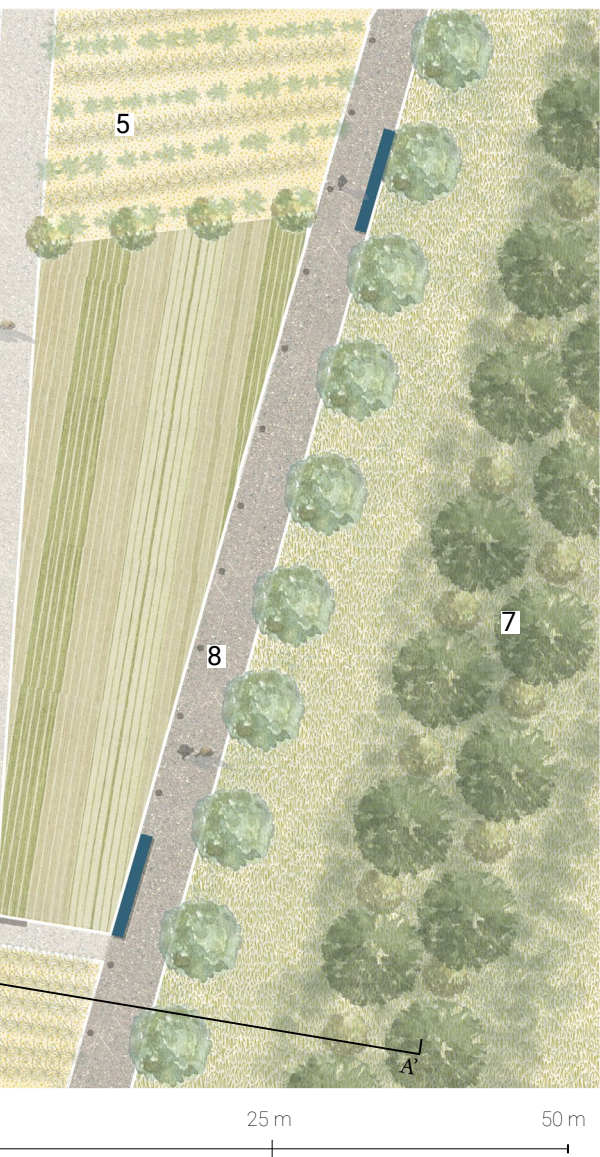
Next pages: *Figures 14* - Design focus 1: the agroecological discovery garde. Plan, section, view. *Figures 15* - Design focus 2: the agroecological discovery garde. Plan, section, view.














Design focus 1 - The agroecological discovery garden








0



Land management

-  Agroforestry
-  Crop rotation
-  Experimental crops
-  Flora and fauna integration
-  Hedge planting
-  Horticulture
-  Intercropping
-  Mobile laying hen box
-  No herbicides
-  Open meadow
-  Polyspecific tree rows

Equipped public spaces design

-  Bees garden
-  Butterflies garden
-  Info panels
-  Pathways
-  Apiculture
-  Outdoor equipped spaces

Community empowerment

-  Cooperation with universities, schools, local associations and research institutes
-  Educational activities
-  Guided tours
-  Social farming
-  Product picking up by visitors
-  Therapeutic gardening
-  Training for farmers

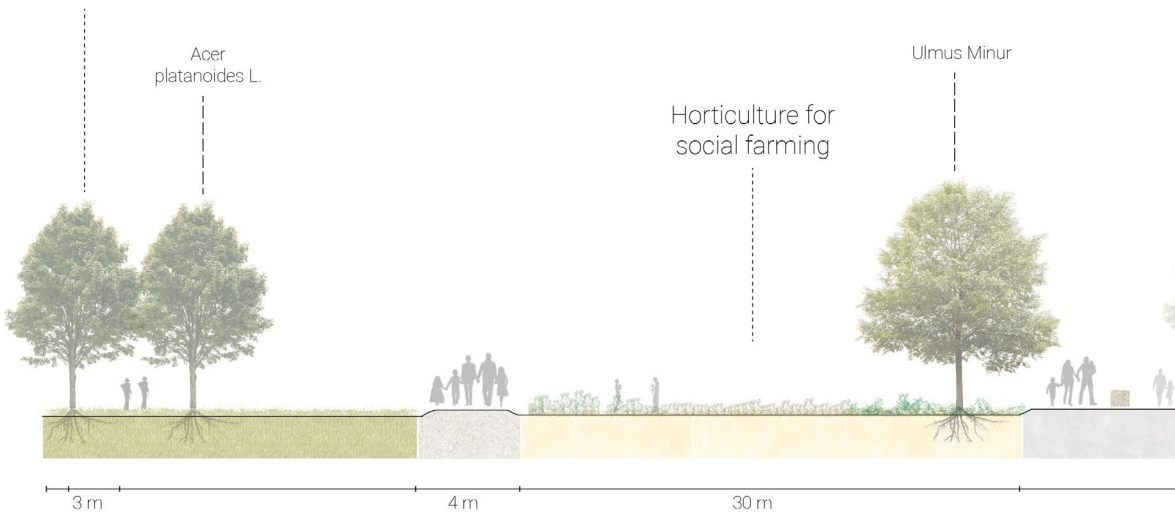
Section A-A': The composition of the garden

Open fields and path
in the lawn

Acer
platanoides L.

Horticulture for
social farming

Ulmus Minor



Outdoor equipped spaces for educational activities and leisure



25m

Flower meadows

Papaver rhoeas L.



15m

Main path that cross all the area



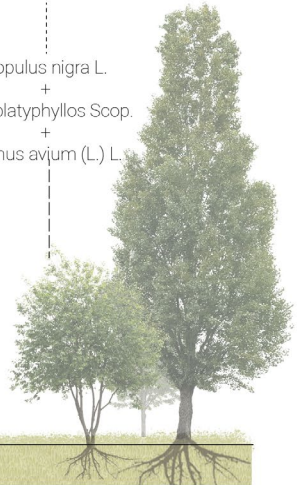
5m

Ulmus Minor



Polyspecific tree rows

Populus nigra L.
+
Tilia platyphyllos Scop.
+
Prunus avium (L.) L.



20m



Birdwatching
Farm
Bees garden
Market

Child running

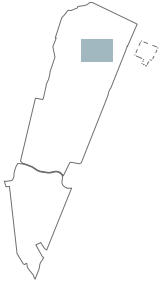
People playing soccer

Goats

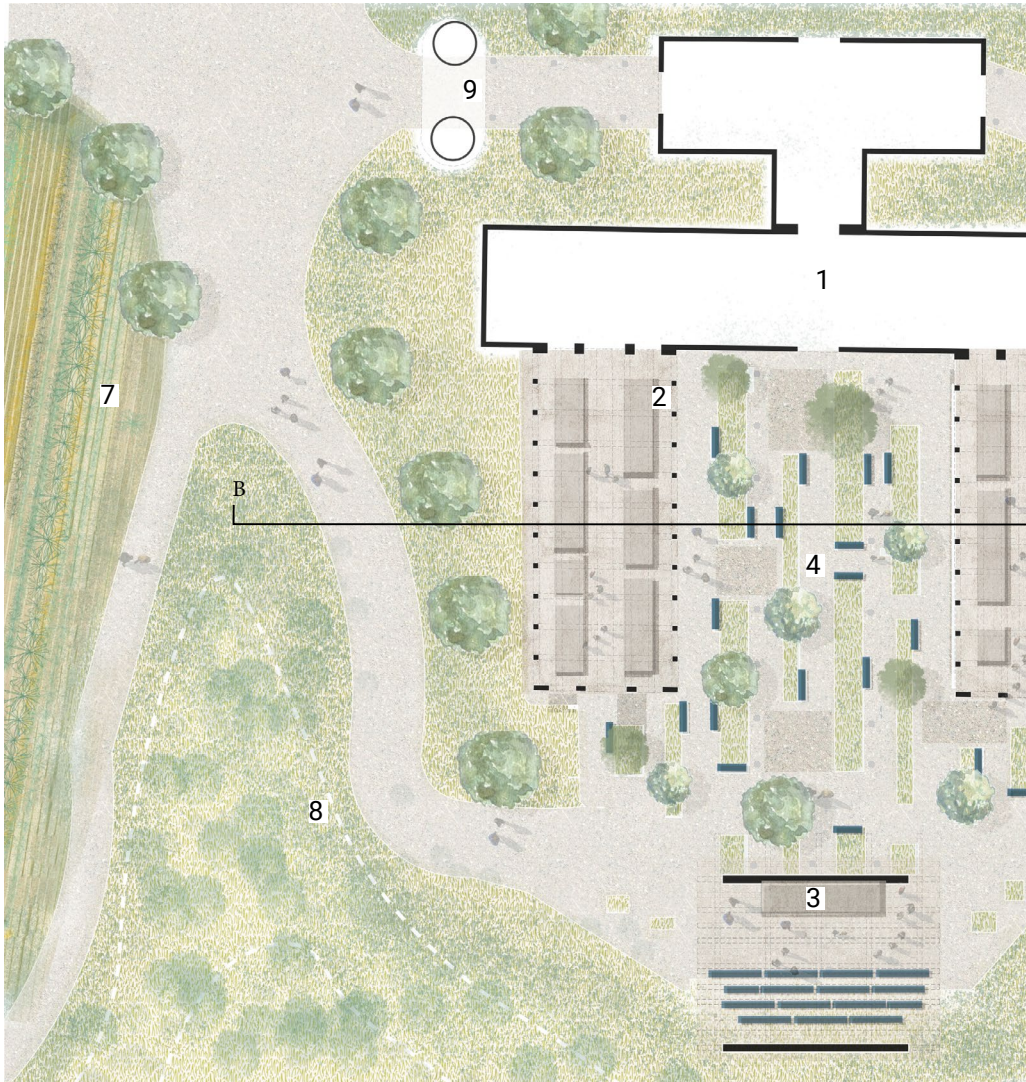
Kite



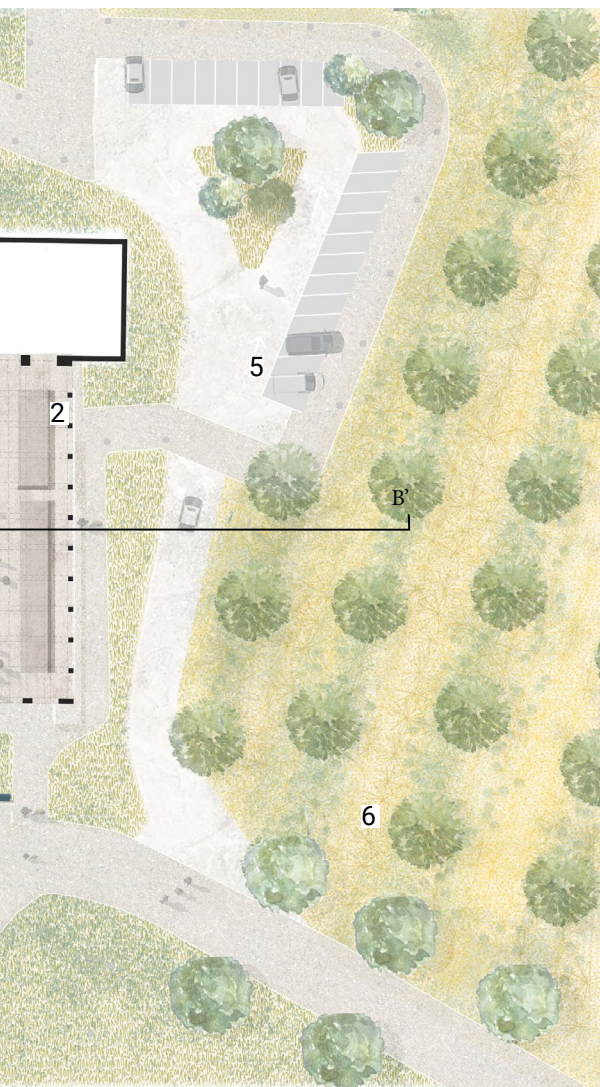
View produced by the author



Design focus 2 - The agry-market and research hub



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


25 m

50 m





Land management

-  Agroforestry
-  Crop rotation
-  Flower meadows
-  Hedge planting
-  No herbicides
-  Open meadow
-  Polyculture

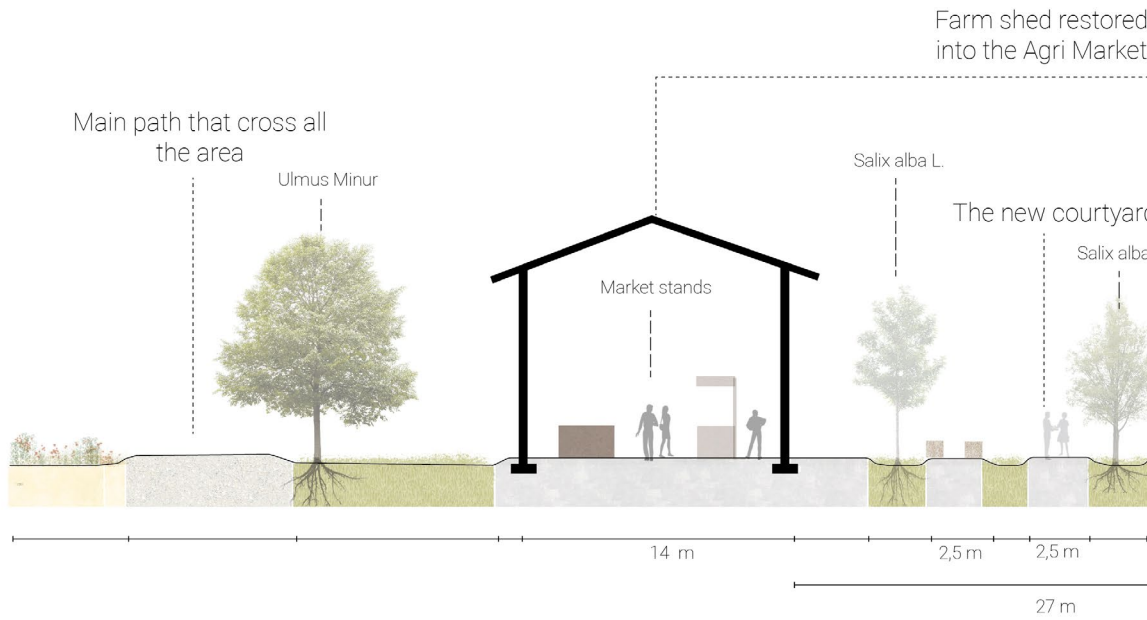
Equipped public spaces design

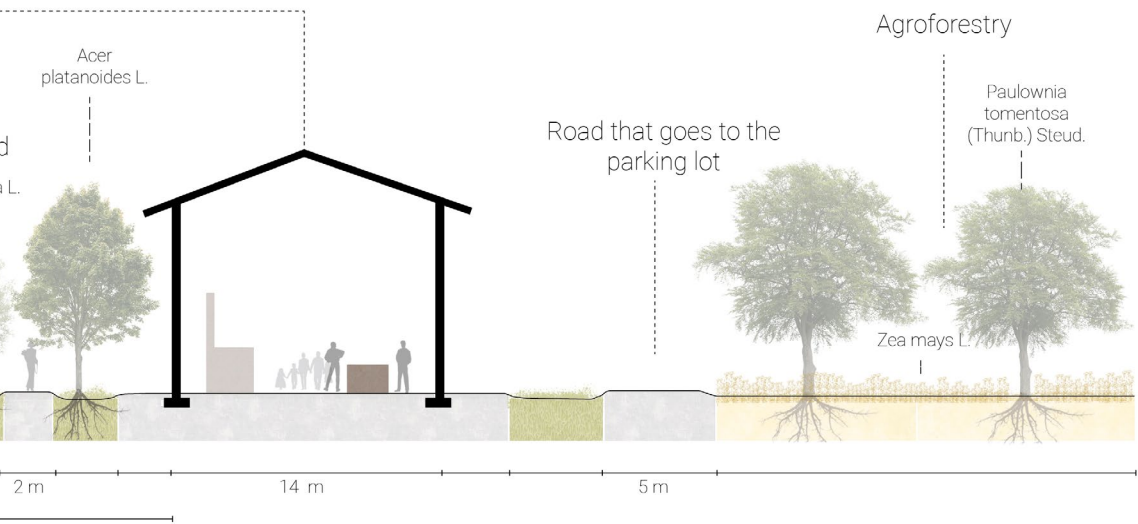
-  Educational meetings spaces
-  Outdoor covered spaces
-  Pathways
-  Research center

Community empowerment

-  Cooperation with universities, schools, local associations and research institutes
-  Educational activities
-  Internships
-  Training for farmers

Section B-B': The new courtyard







Agri-market



View produced by the author

Conclusions

I would like to close this work of research and experimentation with some food for thought that I believe is necessary to rethink a complex system such as agriculture, particularly in peri-urban areas and in Italy.

A change of perspective is certainly necessary: it is not just a question of reconsidering the ways and methods of farming, but of reconsidering the role of agriculture and its change within modern society. The need for modern agriculture is not satisfied by the industrial agriculture of the Green Revolution. Food and landscape policies make it clear: there is a need for an inclusive, participatory, sustainable agriculture, in synergy with the receptive sector, in parallel with landscape planning. Agroecology, through its environmental, social, political and economic dimensions, tries to respond to this need by paying attention to human needs but also to the needs of nature.

In the face of climate change, poverty, world hunger, loss of biodiversity and extinction of species, unbridled consumerism... we ask ourselves today:

What is the future we want?

What legacy do we want to leave on this earth?

The agriculture of the future is agroecology.

The interaction between the natural ecosystem and the agricultural ecosystem enables the generation of the ecosystem benefits that are so much in question today. But these benefits must be tangible, observable and quantifiable. Landscape design, in

this sense, is an incredibly suitable tool for putting into practice what are basically abstract principles. Italy has the extraordinary wealth of protecting a centuries-old culture of integration between natural and agricultural systems - what we call agroecology. The analysis of the case studies is proof of this. Farmers who care about their land, fertility and only secondarily about profit (or at least a profit from sustainable practices) are often farmers who are not familiar with the term Agroecology. Yet, without a doubt, they use design tools that are perfectly attuned to Agroecology. The work of bibliographic analysis of the term agroecology has helped to identify some writings reporting on agroecology design practices, but again it has been difficult at times to analyse the discipline in terms of design science in the literature. There are many practical examples (in particular I remember the incredible work of Medez et al. in this regard) that have allowed the construction of a comparative model between case studies, but very few methodological reflections.

Where can I start an agroecological landscape project?

The construction of the design toolbox was aimed precisely at trying, at least, to define repeatable, replicable design tools that would concretely manifest and support ecosystem services. It was useful to analyse and re-elaborate the data, but above all to implement the project for one of the case studies, Cascina Sant'Alberto. Agroecology, by its very nature, is systemic.

The design toolbox and the agroecological farming model on which it is based aim to support the systematic nature of agroecology by providing individual design tools that always refer to a holistic vision of farming.

In the case of Cascina Sant'Alberto, the agroecological model is already well structured. We did not deliberately start from a situation that is completely unrelated to agroecology, but rather tried to implement an existing agroecological system.

The area was also chosen because it presented major projects, but they were mainly structured in a portion of the territory, leaving the possibility of experimentation free in the part not yet planned.

The masterplan is therefore intended to be the instrument for a landscape design that clarifies and gives concrete form to the agroecological principles analyzed.

It is a landscape design that reflects the holistic vision of agroecology and brings together many tools for the creation of a synergistic, systematic model. Design focuses, on the other to understand the master plan's attachment to the soil and to give an idea and dimension to the project spaces. The Cascina, through the implemented model, returns to be a place of life in a new guise: an Agroecological hub with heterogeneous spaces that welcome people, experimental agricultural practices, nature and animal space. The project for Cascina Sant'Alberto is intended to be an example for a new rural landscape in which nature and man do not fight a battle, but ally themselves synergistically for an **agricultural landscape of the future, which produces ecosystem benefits.**

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