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Article

Landscape and Agriculture 4.0: A Deep Farm in Italy in the Underground of a Public Historical Garden

Marco Devecchi [1,*], Adriana Ghersi [2], Andrea Pilo [3] and Silvana Nicola [1,*]

1 Department of Agricultural, Forest and Food Sciences, DISAFA, Horticulture, University of Turin, UNITO, Via Leonardo da Vinci, 44-Largo Paolo Braccini 2, 10095 Grugliasco (TO), Italy
2 Department of Architecture and Design, DAD, University of Genoa, Stradone S. Agostino 37, 16123 Genova (GE), Italy
3 Landscape Architect, Via Gioachino Rossini 8, 21040 Jerago (VA), Italy
* Correspondence: marco.devecchi@unito.it (M.D.); silvana.nicola@unito.it (S.N.)

Abstract: Each landscape is the result of an encounter with the culture of a community and the physical features of a territory. The conservation of the historical, artistic, and cultural heritage represents a priority for any society that wishes to draw on references for its civil progress. The aim of the present research is to combine the richness of the historical–cultural heritage with innovative forms of agriculture. It focuses on the recovery, in productive terms, of an air-raid shelter used during the Second World War, located in the center of Varese beneath the Estensi Historical Gardens. The project involves the construction of an underground Vertical Farm (Deep Farm) with the aim of restoring a place of memory, making it more accessible than it is today, and raising public awareness about a new cultivation model. A Deep Farm was designed with a cultivation area in the middle, an educational room, and two hygiene rooms, one at each end of the tunnel. A Vertical Farm was conceived to be shared with local stakeholders to produce vegetables and to foresee an innovative reality in the field of education and tourism. This project has the ambition of representing a model that could be used for similar Italian realities and enhancing meeting places between landscape and modern culture diversities.

Keywords: landscape; historical and artistic heritage; Vertical Farm; indoor farm; air-raid shelters

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1. Introduction

The term "Smart Ccities" first appeared in the 1990s, and it was used to identify a new concept of a city in which services and networks are made more productive and efficient thanks to digital technologies [1]. Over the last few years, the need to design urban spaces in a sustainable way has prompted many studies both on new buildings and on the renovation of existing or even abandoned ones. The possibility of producing food within cities has been explored to evaluate both agronomic and economic aspects [2,3]. The use of technologies within cities is not exclusively aimed at better management of resources and lower emissions but also at a sequence of improvements in urban transport, waste disposal, the design of buildings capable of having sophisticated low consumption, emission lighting and heating systems, and in enhanced water systems [4]. Agriculture is part of any Smart City plan [5]. The reason agriculture is included is to shorten the food supply chains so that the products can be healthy and obtained under the Zero-mile concept. "Zero-mile" foods, also defined by the more technical term "short chain", are local products that are sold or administered in the vicinity of the place of production. At the economic level, these experiences facilitate the construction and sustainability of economic circuits which favor local production and consumption of seasonal, fresh, traditional, and often organic products [6].

Through this idea, an attempt is made to reduce the gap between the city center and the outermost areas, creating a system that is capable of involving the different realities and favoring the development of a micro-economy attentive to waste and respectful of the environment [7]. The areas adjacent to large cities are often characterized by major changes, the management of which becomes increasingly complex and articulated. It is here that agriculture has been trying to survive for decades by reacting to the continuous expansion of cities, which, finding no more space inside, develop in the surrounding areas.

Often, the agricultural land present in the peripheral areas is considered a free space on which to build. Urban agriculture is a phenomenon that has grown sharply in recent decades [8]. The city can no longer be seen as an entity solely aimed at consumption and should also begin to produce [9]. Moreover, urban horticulture can be understood as a means of changing that rigid paradigm that sees production concentrated in peri-urban/agricultural areas and consumption condensed in the city [10]. From a territorial point of view, urban gardens, urban agriculture, and greenery, in general, are the driving force behind the regeneration processes in peripheral urban abandoned areas [11] that allow the recovery of areas with no intended use. In this perspective, urban horticulture should be conceived through a multidisciplinary, productive, cultural, civic, and economic approach [8]. One of the challenges of the future will be the necessary increase in food production while being aware of not having any other available land in addition to what is already being used. However, several possibilities can be taken into consideration: from the green roofs of houses and the so-called roof gardens to abandoned buildings and the underground infrastructures present in many large European cities. Vertical Farms, which are characterized by vertical plant cultivation techniques, described for the first time in 1915 in a publication by Gilbert Ellis Bailey [12], an American geologist, are part of this perspective. In recent years, various statements have been drawn up in terms of vertical agriculture [13–16], including that of Matteo Benvenuti [17], who defined it as "mainly vertical greenhouse buildings that house the entire agri-food chain". These production facilities can be divided into two categories: On the one hand, those in which the cultivation of plants takes place outside, thereby performing both the thermoregulatory and production functions of a building; on the other hand, those in which cultivation takes place in closed and controlled environments (indoor farm), albeit always vertically. Regardless of the type of crop, there may be productions in a closed and controlled environment that are not affected by seasonal data, thus with an appreciable reduction in water consumption, which is usually high in traditional agriculture [18].

The new frontier of agriculture is therefore represented by the indoor farm, which in recent years has undergone important innovations, managing to generate crops without natural light, without soil, and above all with greater productivity in terms of quantity of the obtained food than traditional agriculture [15,19–22]. However, for an indoor farm to be truly competitive with traditional agriculture practices, it is essential to find solutions to reduce energy costs [23]. The real possibility of using natural sunlight in lighting systems inside buildings has been demonstrated through the use of optic fiber technology, whereby light can be efficiently conveyed down to a depth of 40 m underground [24]. Light-Emitting Diodes (LEDs) represent a great opportunity that has allowed indoor farms to develop and progress. Thanks to this new, low-consumption technology, it is possible to place LED lamps close to crops without causing damage to them due to thermal excesses. The challenge is now in the direction of renewable energy, which can be generated thanks to solar panels or wind turbines.

There are extensive reviews describing the types of indoor and Vertical Farms after the work of pioneer scientists, such as Despommier [7] and Kozai [18,25]. During recent decades, the design and development of several indoor farms took place in several countries, in urban as well as in peri-urban locations. Artificial intelligence, combined with LED technology, represents the new frontier of indoor farms [26]. Agriculture 4.0 is using technology not simply for innovation but to enhance the needs of consumers and reengineer the value food chain. The new technologies and solutions for the Agriculture 4.0 are based on different productions using new techniques (e.g., hydroponics); using new technologies to bring food production to consumers, increasing efficiencies in the food chain (e.g., vertical and urban farming); and integrating technologies and applications (e.g., drone technologies, data analytics, precision agriculture) [27]. Agriculture 4.0 has also been frequently called "Smart Agriculture" or "Digital Farming" [28]. The availability of "smart devices", such as sensors, actuators, and communication technologies, makes "Smart Agriculture" applicable and reliable to the indoor farm, leading to great sustainability of these systems [29].

From the indoor farm perspective, the urban subsoil represents a very interesting and mostly underestimated space that could be returned to the community as well as made productive. Underground cultivation, where the temperature levels and humidity are constant, is gaining ground in many international situations, thus proving it can represent a means of redeveloping degraded areas, giving them a new appearance, and above all, creating new jobs [30,31]. The underground space ensures sustainable food production systems by using hydroponics or aquaponics as well as is independent of climate change, extreme weather, earthquakes, flooding, and other geohazards, thus maintaining a suitable ecosystem [32]. An analysis of already-executed or designed projects of underground cultivation (Deep Farming) has been conducted by searching the literature. Investigations on already-realized Deep Farms in Europe [33] and Italy showed the existence of an underground project in Naples, Italy, where, inter alia, an example of a vegetable garden was designed in 2015 (Orti Ipogei) [34], and an experimental site was created just before the International Expo 2015 where herbs were grown in pots under artificial lighting. Moreover, there is a disused World War II (WWII) air-raid shelter beneath the street of Clapham, London (UK), that was converted to a subterranean urban farm and has been under operation since 2015, where microgreens and baby leaves are grown and sold to the U.K.'s major retailers, plus hotels and restaurants [35]. The company organizes tours to Deep Farms for educational purposes. Another project, at the moment at the hypothetical study level, is the 'Floating Deep farm' [36]. Researchers at Nottingham University have developed the concept of Floating Deep Farms, which consists of using large vertical shafts or containers submerged under seawater near coastal areas. Further studies by the same university have involved exploring the potential of using the numerous redundant coal mines in the U.K. (1500) or abandoned mines in China (12,000) [37]. In Paris (France), a dismissed underground silos parking garage has been partially converted into an indoor underground farm (La Caverne, lacaverne.co). Other underground farms are under study in Canada and the USA (e.g., GreenForges Inc., Val Des Monts, QC, Canada) [38].

The aim of the present work is to present a project that has been proposed for the recovery, in productive horticultural terms, of a WWII air-raid shelter located in the center of the city of Varese, under the Estensi gardens, with a view of combining the richness of the historical–cultural heritage of the country with innovative forms of agricultural cultivation.

2. Materials and Methods

2.1. Methodology and Analyses

This project was designed to realize an indoor farm within an urban area where underground tunnels, mines, or air-raid shelters were available and usable, and a potential ecosystem service could be integrated for the local community or for visitors. Italy is characterized by many urban areas of great value from a historical/monumental point of view. This specificity requires an innovative approach also in urban agriculture choices, including a Deep Farm. The studied site has been analyzed from several different perspectives and space and time dimensions. First, a geographical and historical characterization of the context was conducted by means of cartographies, orthophotography, and historical representations, accessing the informative layers of the regional geoportal and other interesting reports [39]. The aim was to understand the changes and developments of the urban area that have taken place, the significance of the historical remnant locations, and the perception of the people of the importance of the memories of ancient or of the more recent past [40]. The soil use of the area was then considered by means of land use maps to understand the role of the Estensi Gardens in the existing green urban system. An additional analysis was conducted on the commuting situation in the area and in the vicinity in order to understand whether a Deep Farm could be easily reached by workers, suppliers, buyers, and any other stakeholder, including the general public, during touristic visits. Public transportation lines and official statistical mobility data were considered. Information on the specific underground site, i.e., the air-raid shelter, was obtained from public domains. The aim was to understand the new functions that the requalified bunker could achieve and to link them to the existing agricultural and socio-ecological system. A final SWOT analysis (focusing on the main Strengths, Weaknesses, Opportunities, and Threads) was used as a planning tool to ascertain the feasibility of the project [41]. A questionnaire to help this (Table S1) was proposed to various stakeholders, administrators, farmers, citizens, and in particular, garden users, to be able to understand the interest but also the limits of the Vertical Farm in Varese [42]. A detailed survey of the bunker was used together with the punctual reconnaissance of the external access spaces.

2.2. The Project

The idea of a Vertical Farm inside the WWII bunker was developed, starting from a wider context in which the bunker is located, comprising the preparation of the surrounding area and the inclusion of the access paths. After site visits and a search for technical surveys of the bunker, the concept was detailed with graphical representations of a Deep Farm. A hydroponic growing culture of several species, including baby leaves and microgreens, was considered as the farming system [43]. The realization of the project included a promotion plan that included a selling campaign for the produce, sustainable delivery systems, and the tourist attraction of the area.

3. Results and Discussion

3.1. Analyses

3.1.1. Location and Historical Characterization

The city of Varese is located in a characteristic position, at the foot of the "Sacro Monte di Varese" (in the Varese Pre-Alps). The characteristic given name of "garden city" derives from the numerous parks and gardens found within the municipality of Varese, mostly belonging to villas built there between the 18th century and the beginning of the 20th century, first by noble families and more recently by intrapreneurs and representatives of the upper middle class, mainly originating from Milan. Of particular historical-artistic interest is the "Sacro Monte di Varese" or "Fabbrica del Rosario", an important complex conceived in the late-sixteenth century by Giovanni Battista Aguggiari as an arrangement of the pre-existing pedestrian path for the sanctuary of "Santa Maria del Monte".

The project involves the construction of an indoor farm in a Second World War air-raid shelter in the center of the city of Varese (Figure 1), seizing the opportunity to enhance a historic underground element and adding the possibility of a Vertical Farm with productive and educational purposes. Because of the location of the production structure in the urban subsoil, the use of the "Deep Farm" term appears appropriate. The selected refuge is located beneath the Estensi Gardens, the tourist destination par excellence of the city of Varese, and it is, therefore, a strong point of the project itself (Figure 2). The Estensi Gardens, together with the Palazzo Estense (which was created as a summer residence by architect Giuseppe Antonio Bianchi at the behest of Francesco III d'Este, lord of Varese as well as the Duke of Modena), date back to 1766. Bianchi was an architect at the Habsburg Royal Court who worked at the Royal Palace of Milan between 1755 and 1762. He was also the architect of Villa Craven in Seyssel d'Aix in Varese, a few hundred meters from Palazzo Estense, which was built in 1770 and is surrounded by the largest private park in the city. Completed only later, in 1786, the Estensi Gardens became one of the most beautiful Italian public parks [44], and they were inspired by the Schönbrunn gardens in Vienna, with a more formal part in front of the palace and a pathway up the existing hill to reach a panoramic viewpoint. It was transformed to a great extent in the XIX century, according to the romantic taste of the "English" garden, with the addition of significant specimens of exotic species. The water basin used for irrigation purposes was changed into a swan pond with waterfalls and caves [45]. In 1882, Palazzo Estense started to become the town hall headquarters of Varese. The public park now constitutes an important green lung in the center of the city, as well as an important element of its historical and cultural heritage. The presence of the hill from which the belvedere takes its origin, and which hundreds of workers helped to shape to build the formal garden so as to host lavish celebrations in the XVIII century, is equally important.

Figure 1. Location of the air-raid shelter: country, region, province, and city representations (in orange) by A. Pilo.

Figure 2. View of the Estensi Gardens. The red line represents the location of the air-raid shelter beneath the hill of the Estensi Gardens (http://maps.google.com, accessed on 29 December 2022).

3.1.2. The Air-Raid Shelter Analysis

The construction of the shelters dates back to the winter of 1944 when the city of Varese began to suffer from attacks by British and American air forces. In order to avert the danger, the administration decided to build seven shelters near the city. Currently, out of the seven shelters present in the area, the only one that is accessible and perfectly preserved is the one under the Estensi Gardens (Figure 3). The bunker is of considerable dimensions, with an overall length of 150 m and a width of ca 2.5 m (Figure 4). At present, the structure is unused, except for during special events in which the refuge is open to the public, and guided tours are organized (Figure 5).

Figure 3. View of the air-raid shelter beneath the Estensi Gardens (http://www.ilvaresotto.it/Citta/Varese_centro_rifugio.htm, accessed on 29 December 2022).

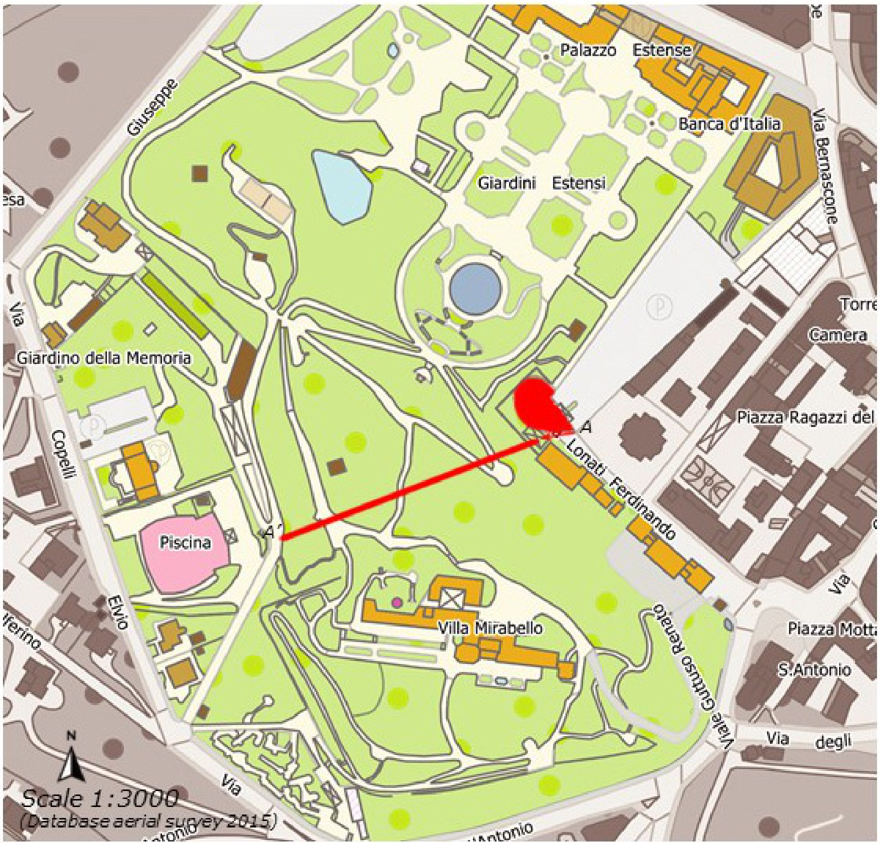

Figure 4. Map of the area of the Estensi Gardens (red line: the air-raid shelter; and red area: parking area). Elaboration by A. Pilo.

Figure 5. Views of the various entrances to the bunker. Photos by A. Pilo.

3.1.3. Land Use

The landscape in Italy appears to be more and more an essential element of sustainable economic development linked to particular environmental features and food excellence. The landscapes—which still today represent an element of strong characterization of the single territorial realities—denote a balanced intervention of humans with the natural elements; they offer evidence of historical signs and legible links between structure and land use. The land use of the Varese area is mixed, ranging from residential areas to the presence of factories, meadows, parks, and gardens (Figure 6). The surface of the Estensi Gardens is extensive: it plays an important ecologic role in the urban green system, together with the park around the Villa Mirabello, and is very close to the dense residential area. The bunker under the hill can be easily reached from the historic center and is connected to a sports facility (swimming pool) area. The reuse of the bunker could be strengthened by a linkage to different mobility systems.

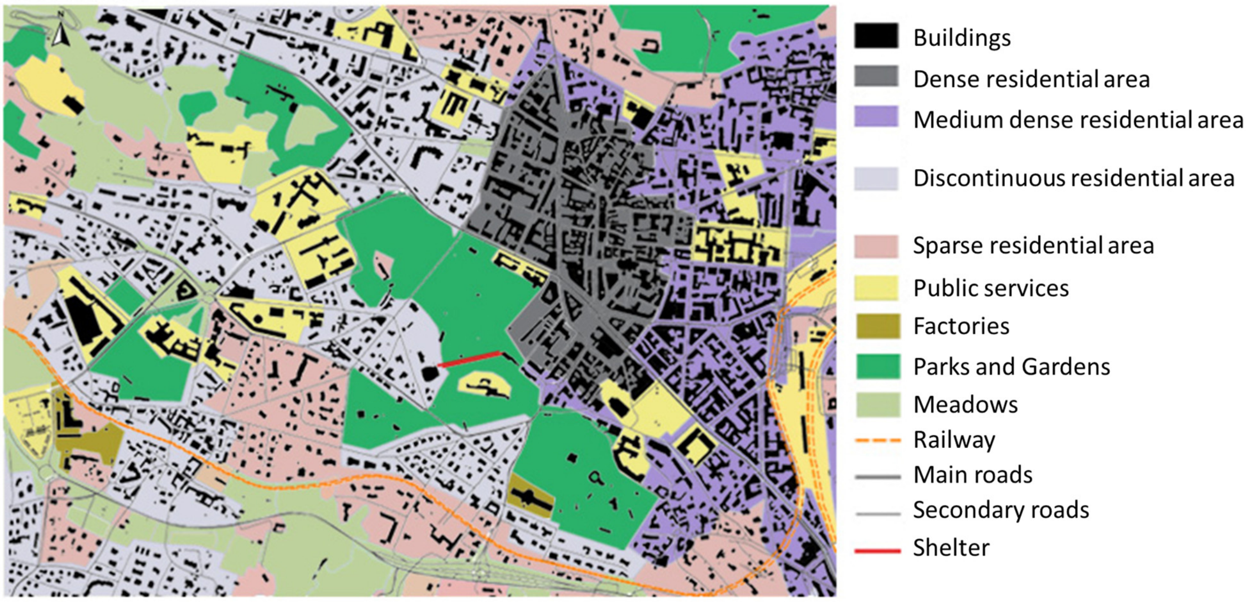

Figure 6. Visualization of land use of the area where the air-raid shelter is located. Elaboration by A. Pilo.

3.1.4. Community Mobility Analysis

The refuge is located in an area that can be reached by car along several roads and streets, by public transportation, and by bicycle, either private or from a sharing station located nearby (Figure 7). According to the latest available official national statistical data [46], mobility in the city of Varese involves 57% private cars, 23% bicycles or on foot, and 15% public transportation. However, mobility by bicycle or by other individual transport systems (e.g., scooter, kick scooter, e-bike) has probably increased since the COVID-19 pandemic, mainly related to the increasing demand by citizens for the development of sustainable mobility and an improvement in urban quality of life [47–49]. In fact, some local governments are implementing a series of strategies in agreement with transport service companies to ensure an increase in sustainable mobility and a reduction of private vehicles with potential damage to the environment due to transport congestion [50].

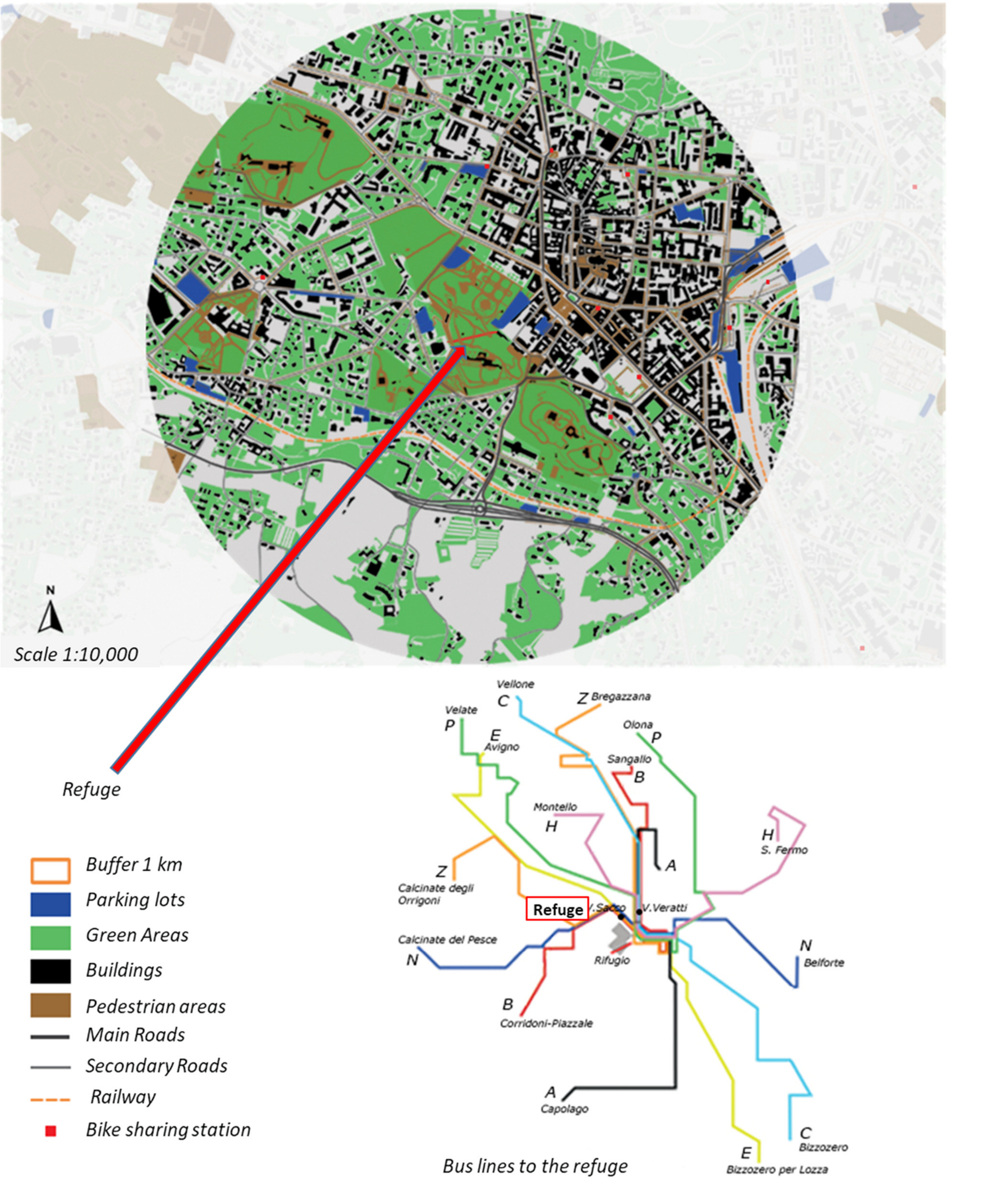

Figure 7. Representation of the area where the air-raid shelter is located with visualization of the points of access to bike-sharing stations, available roads, and the public transportation system. Elaboration by A. Pilo.

3.1.5. SWOT Analysis

The SWOT analysis (Table 1) conducted before the preparation of the project of a Deep Farm first identified the site location of the above-ground area for the Palazzo Estensi and the Estensi Gardens as points of strength, evidencing the natural environment surrounding; it then indicated the location of the bunker in the central position in the city, thus drawing attention to the importance of the project and the future exploitation of the area. Conversely, the fact that the location is a memorial site has been considered a potential weakness, and the modern activity of a Deep Farm could be considered out of context. In addition, the dimension of the refuge, being an air-raid shelter, would need efficient planning of the internal spaces, as well as of the costs of the implementation of the project. Nevertheless, the analyzed opportunities have pointed out the feasibility of the project. In fact, rescuing a cultural and historical site as well as creating an increase in ecosystem services for the community have been considered of high value, despite the risks, such as the possibility of decontextualization of the site and of the lack of promotional success.

Table 1. SWOT analysis of the feasibility study.

Strengths Site location Natural environment surroundings Central position in the city	**Weaknesses** Historical site (memorial site) Air-raid shelter dimensions Cost of the implementation
Opportunities Rescuing a cultural and historical site (memorial site) Increase in ecosystem services	**Threats** Risk of decontextualization of the site Lack of promotional success

3.2. The Project

3.2.1. The Different Functions

The project to transform the Palazzo Estense's air-raid shelter into a Deep Farm has a dual purpose: on the one hand, to restore a place of memory to the town, making it usable and more accessible than it currently is, and on the other hand, to raise public awareness of a new model of agriculture.

The first part of the shelter will be dedicated to the necessary change of clothes for users of the Deep Farm, where they will be supplied with coats, masks, and shoe covers that should be put on before entering the cultivation area to avoid contamination by external pathogens that could cause potential damage to the crops.

The second area is intended for educational purposes, that is, teaching activities for the visitors (school children and students, adults, the elderly, and the general public) with explanations of the concept of indoor farms and, consequently, on the cultivation techniques and types of vegetables produced in the shelter. This step plays an important role as one of the objectives of the structure is, in fact, that of raising public awareness of indoor agriculture. An accurate and detailed explanation of the production cycle could contribute toward positively influencing the decision-making choices of local consumers.

The third area is intended for the cultivation of vegetables under controlled environment agriculture (CEA) conditions, where the more technical aspects of the structure are involved.

The fourth area will be the changing room located just before the exit.

The project is aimed at integrating a Deep Farm in the Estensi Gardens with the introduction of a garden with trees, plants, resting areas, and paths to reach the entrance to the Deep Farm (Figure 8). English oak (*Quercus robur* L.) was chosen for the trees as it is a native species of great ornamental value and longevity. Laurel (*Laurus nobilis* L.) was chosen as the shrub as it is an evergreen species that is greatly appreciated in historic gardens.

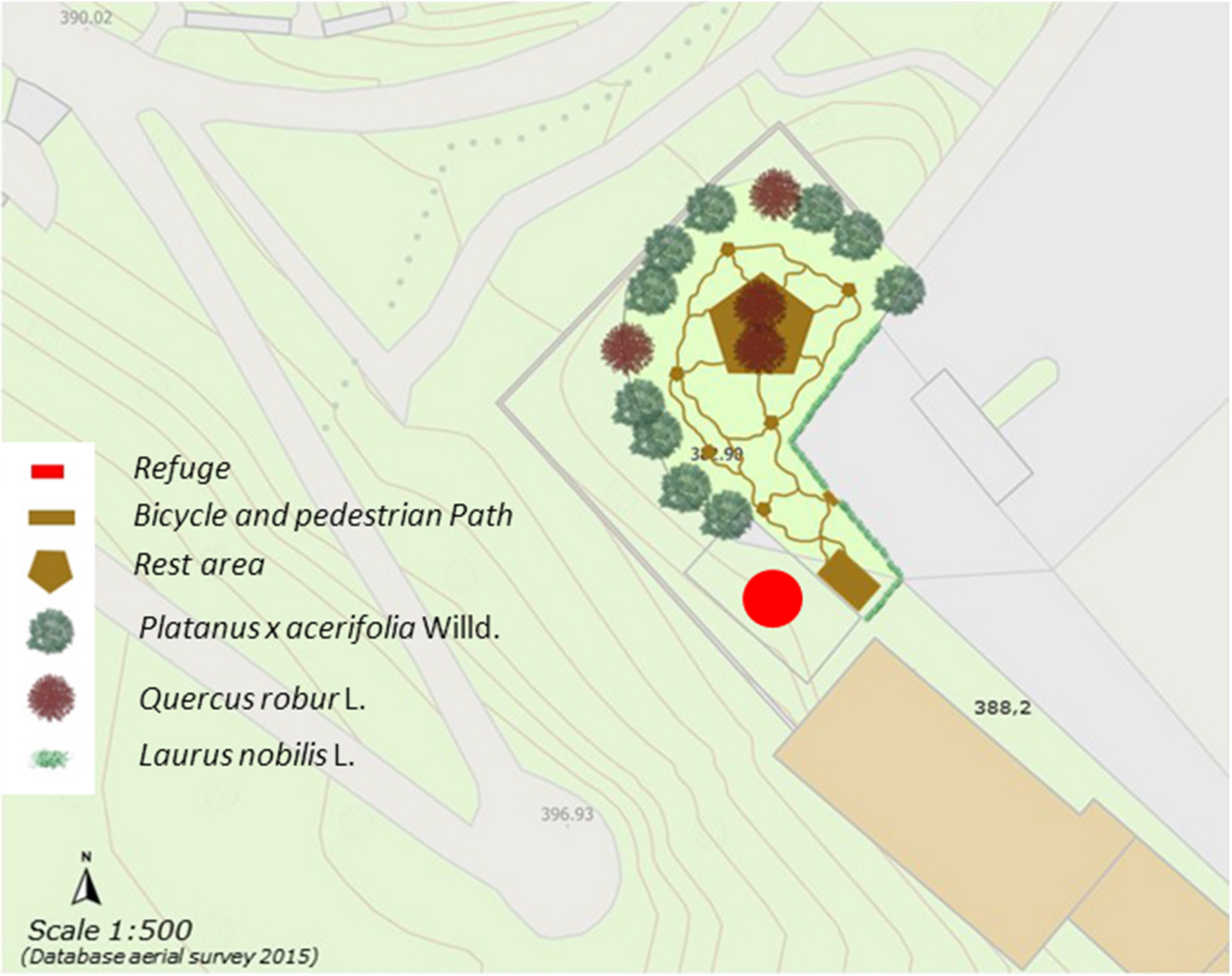

Figure 8. Representation of the area with the introduction of a garden with trees, plants, resting areas, and paths to reach the entrance to the Deep Farm. Elaboration by A. Pilo.

Informative panels placed throughout the garden, at the entrance, and at the exit of the Deep Farm will give the visitors of the palace and the Estensi Gardens information about the Deep Farm and promote its visit.

3.2.2. The Concept

The visitors' path inside the shelter will only be in one direction. The tunnel was divided into four areas to achieve this objective, which was also designed to satisfy the expectations and needs of the visitors without compromising the production efficiency of the indoor farm (Figure 9). A hygienic room will be located at the entrance for the visitors and workforce. An educational room has been designed to welcome students and visitors on one side of the tunnel. The growing area, which will be in the middle of the tunnel, will be divided into sections for different cultivation purposes. The entrance to the hygienic room at the end of the tunnel will allow the visitors to remove the disposable coats, masks, and shoe covers before exiting the tunnel. The current regulations regarding accessibility, fire prevention, and safety in use in the shelter are followed as the refuge is regularly open to the public for visits.

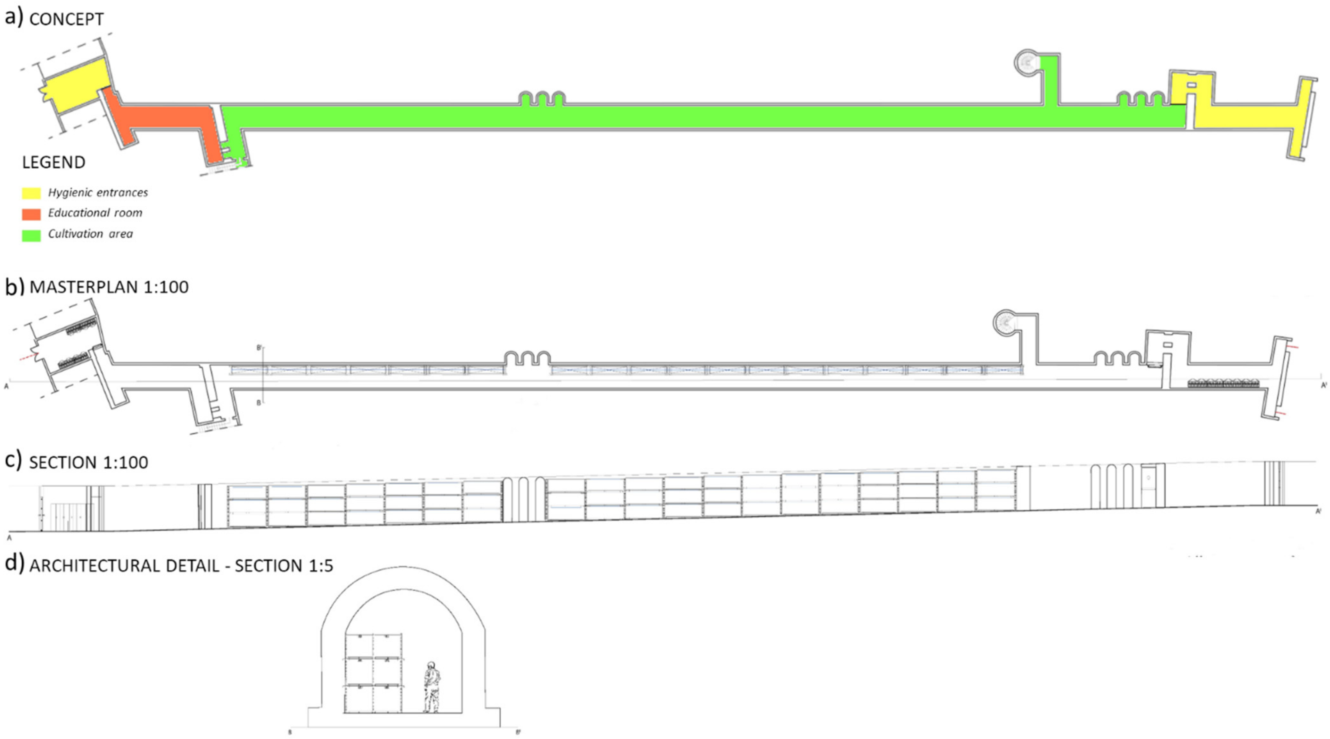

Figure 9. Representation of the division of the tunnel into four sections: (**a**) the concept, (**b**) the master plan, (**c**) the section view, and (**d**) an architectural detail of the tunnel with the representation of a multilayer rack system.

3.2.3. The Farming System

The cultivation area has been organized into two distinct parts (Figure 10): the first part is for the cultivation of microgreens, vegetables harvested at the stage of development immediately following the formation of the sprout, and the second part for vegetables that undergo normal crop development. An important aspect of microgreens is their very short growth cycle, which lasts 1–3 weeks. They are gaining increasing interest as potential functional foods and popularity due to their varying and attractive colors, textures, and flavors [51]. In this type of cultivation, it is usual to use seeds that are capable of germinating quickly. The following microgreens have been proposed to initiate a Deep Farm as representative of several types of microgreens available: (1) *Ocimum basilicum* L. (sweet basil), harvested at the height of about 10 cm, with a slightly spicy flavor; (2) *Beta vulgaris* L. (beet), harvested at 5–6 cm (baby leaf stage); (3) *Helianthus annuus* L. (sunflower) collected at 2–3 cm (microgreen stage); and (4) *Eruca vesicaria* L. Cav. (rocket salad) collected at 5–6 cm. The cultivation of vegetables harvested at the baby leaf or teen leaf stage will take place in the second part of the cultivation area. Baby and teen leaf greens are moving from open fields to greenhouse cultivation [52] and are gaining interest in indoor farms. The following species have been proposed to initiate a Deep Farm as representative of several types of baby or teen leaf vegetables available: *Ocimum basilicum* L., *Eruca vesicaria* L. Cav. (rocket), *Allium tuberosum* Rottler ex Spreng. (garlic chives), *Lepidium sativum* L. (cress), *Coriandrum sativum* L. (coriander), and *Lactuca sativa* L. (lettuce). Baby leaf vegetables have a crop cycle of 3–4 weeks, and teen leaf vegetables of 4–6 weeks, depending on the species.

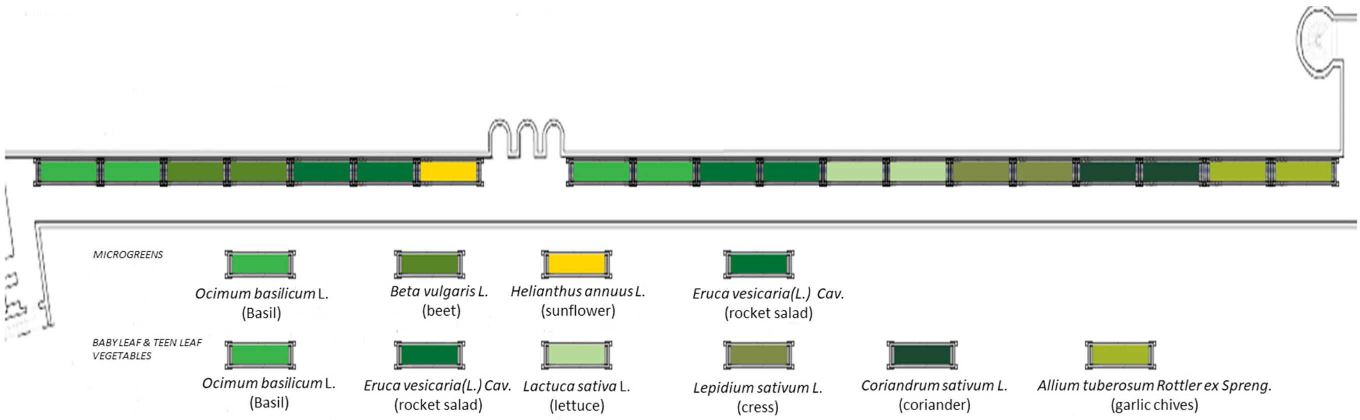

Figure 10. Outline of the cultivation by type of vegetables. Elaboration by A. Pilo.

The NFT (Nutrient Film Technique) cultivation system was envisaged for microgreens. NFT is a cultivation system in which the nutrient solution is conveyed by means of pumps [53]. The plants are placed in gutters in which the nutrient solution flows. The system is in closed-loop, or recirculation of the nutrient solution, to facilitate the return of the unused solution to the initial tank. With this technique, the roots of the plants are not totally immersed in the nutrient solution present in the channels in order to have the upper part dry and in contact with the air. The Ebb and Flow cultivation system, which is also called Flood and Drain, has been envisaged for vegetables harvested at the baby leaf or teen leaf stage. It is one of the most popular hydroponic systems, and it is widely used, cheap to build, and easy to manage, but at the same time, very productive [54]. The nutrient solution is placed inside a container below the crops. The operation involves two phases: in the first, the solution is brought, through pumps, to the containers, which are slowly filled several times during the day, thanks to the use of a timer, up to the roots, and it then moves on to the second phase in which the containers are emptied by gravity and, consequently, the root system can then be adequately ventilated. The constant flooding and the related drainage allow a fast and optimal growth of the plants. The system is closed-loop. Coconut fiber (Coir), which has good water retention, an efficient air circulation capacity, and allows radical oxygenation, was chosen as the growing medium. Coir can also be used for 2–3 cycles, thus guaranteeing good savings in economic terms.

The cultivation area will be organized as a multilayer rack system from three to five layers depending on the grown species, that is, five layers for microgreens and three for baby leaf and teen leaf vegetables. Each layer will be provided with full-spectra LED lamps. Groundwater will be used as the irrigation water, while a direct air carbon capturing system will be implemented to ensure high levels of CO_2 for faster plant growth. The expected yield is a minimum of 300 g wk^{-1} m^{-2} in the case of microgreens, as reported in the literature [55], up from 1 to 3 kg m^{-2} per crop cycle, depending on the species [56,57]. Expected revenues are from 50 to 90 EUR kg^{-2}, as reported in the literature [58]. The expected yield for baby and teen leaf greens ranges from 0.9 to 4.5 kg m^{-2} per crop cycle, depending on the species in the Ebb and Flow or Floatation systems [59]. The expected revenues are from 8 to 12 EUR kg^{-2}, as reported in the literature [60].

3.2.4. The Promotion

The Deep Farm will be a place where vegetables are produced in addition to being an educational and touristic site. After analyzing the place where the indoor farm will be located, it was decided to develop a strategy to market the products. A logo has been created, and a remote consulting and ordering app has been planned along with a QR code system for instant information reading (Figure 11). In order to respect the principles behind the indoor farm and, therefore, to respect the environment, the products will be almost "Zero-mile" and will be distributed in three local shop chains, all within a radius of 1.5 km from the structure. Furthermore, the delivery will take place immediately after collection, exclusively by means of electric transport. This will make it possible to reduce transport consumption and lower the environmental impact of the project. Furthermore, the times from the moment of harvesting to consumption will be reduced, and the produced vegetables will not undergo long journeys and will be supplied fresh. Another relevant aspect will be the management of the indoor farm, which will be entrusted to Ortomio, a long-standing reality in Varese, which offers "Zero-mile" products 365 days a year. It represents and summarizes the key principles behind the concept of the indoor farm: the Zero-mile concept.

Figure 11. The logo and app created for the promotion of a Deep Farm by A. Pilo.

3.2.5. Integration into the Landscape/Ecosystem Services

The multi-scale approach has been used as there is a need to integrate the proposed project into the Varese landscape and its community. This study case outlines an integrated vision of the use of a historical element inside a public historical garden. It suggests how to develop the educational use of a Deep Farm by sharing productive and restoring strategies. These actions are related to a small tassel that could be included in a wider Green City concept, adding a new interpretation of reuse and re-activation. From the Ecosystem Services point of view, an underground Deep Farm could be used to spare water for the production of microgreens and baby leaves, which in turn could be used to feed the community, thereby producing supporting, provisioning, and regulating services. If a Deep Farm can be a sustainable activity to give new life to an abandoned bunker, thereby proposing an enrichment of the proposed activities inside the Estensi Historical Gardens, as in the examined situation in Varese, then the cultural aspect could also be explored.

4. Conclusions

Underground farming is not new for some specific productions, such as mushrooms, often using old mines [61]. For photosynthetic species, conversely, research studies are scarce. Until now, the number of research projects is small, but there is potential for more future research [62]. The concept of a Vertical Farm for the bunker is an interesting application to a real study case. This project is an academic theoretical study aimed at verifying the possibility of redevelopment in a site of historical/architectural interest in conditions of degradation in a productive agricultural reality for the benefit of the community of Varese. The technical aspects concerning cultivation in a Deep Farm are reliable and widely used internationally. Sound economic evaluations will be needed in relation to energy costs. For the economic aspects, security norms, and energy needs, a detailed evaluation will be carried out after the acceptance of the proposal by the local public administration. Nevertheless, the Deep Farm proposal, which was designed to be shared with the local stakeholders, can represent an opportunity to enhance an existing hidden resource. It would not only be a place where vegetables are produced, but it would also be an innovative reality in the field of education and tourism. This project shows a vision and deliberately looks to the future and has the ambition of representing a model of innovation for a variety of other similar realities in our country and of improvement of meeting paths between landscape diversity and modern cultural diversity.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/horticulturae9040417/s1, Table S1: Online questionnaire. SWOT ANALYSIS.

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