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Re-design an Open Space Through the *Urban Farming*

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To intervene on urban development, with the aim of finding an alternative model that has emerged in the last century, a sustainable approach is necessary so as to establish the territory as a pattern in which it is not possible to detect the boundaries between the natural and artificial environments and in which each process is controlled so that its impact and, consequently, the irreversible degradation induced is the minimum possible in relation to the constraints of the process itself. The urban context should be seen as an organism with a dynamic balance achieved through the technological control of complex functions. With the aim of achieving these objectives, the role of open urban spaces is particularly important, since they constitute nodal elements capable of performing the delicate function of linking the urban systems with the surrounding natural ones, while assuming a strategic role in the transformation of anthropized areas. In this context urban farming can make a valuable contribution as an effective instrument for the renewal of urban open space because offers significant possibilities from an environmental, economic and social perspective (Franchino, 2015).
The drawing of a territory offers a contribution into the phases of a local context analysis and architectural design communication. In the specific field of urban farming and about the project introduced in this abstract, the study of the area has been the preparatory analysis phase for the knowledge of the local resources, founding premise of a proper planning process. The analysis of the agricultural vocation of the area emerged also through the map comparative study, both diachronic and synchronic. This study, simultaneous to the study of urban farming models, has allowed the development of the project idea. The representation and communication of the project took place through different methods and tools. The articulation of the interior and open spaces occurred through plan and front views, the communication of the project is rather occurred through render views that illustrated both changes through day and night views, but also the landscape modifies through the evolution and the alternations of crops over the seasons.
In order to obtain an applicative definition of these concepts, is presented a structured case study related to the requalification of a degraded urban area in the South of Italy.

KEYWORDS: environmental design, urban regeneration, urban farming, land representation.

Introduction

In order to structure correct and sustainable assumptions of transforming and rebalancing the urban environment, the environmental requalification of open spaces is a particularly important issue, with them being identified as either non-built-up areas or bordering urbanized areas. The renewal of these open spaces, which are a major link between urban areas and the surrounding natural landscape, assumes a strategic importance for the quality of life of the residents who often live in areas subjected to increasing urbanization as well as for the aspects related to the improvement of environmental conditions as a whole. This transformation process assume a significant role of major especially when these open spaces are in highly compromised ecological-environmental conditions since their regeneration corresponds to a renewal of the urban context. In order

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to set the redevelopment interventions of urbanized areas within an eco-oriented perspective, this work focuses on the contribution of natural resources with the aim of using the principles of nature as a model of sustainable management by stimulating the intrinsic natural potential of these resources.

In addition, this work is also presents a case-study of a redevelopment intervention of an open space through the use of urban farming that results a strategic tool not only for the environmental quality but also for the economic and social development of the territory as a whole. These considerations have been at the basis of the study and analysis of the territory's agricultural vocation, also through the comparative study - diachronic and synchronic – of landscape variations. Starting interventions of landscape protection and enhancement is a fundamental activity of local resources of the territory as founding elements of the modification processes during the time. An investigation, parallel to the study of urban farming models, has allowed the development of the project idea.

This area, located in the municipality of Succivo in the Campania region (Italy), due to the peculiarity of being located in a densely anthropized area, with poor ecological and environmental quality is, therefore, an application context of particular importance of the previously mentioned issues.

Method

Land evaluation through map analysis

The disciplines of drawing and representation of the territory offer a contribution to the analysis phase of the local context and the communication of architectural project. Specifically for the redevelopment of a degraded area through an intervention of urban farming, the subject of this paper, the study of the area has been the analysis phase. This activity is a preparatory time to the knowledge of the local resources, founding premise of proper planning process. The analysis of territorial variations is founded on the integration between the current mapping and the innovative systems for the representation of the territory, a perfect combination for useful analysis of land phenomena which over time are implemented. Georeferencing an historical maps, for example, allows a territorial analysis of morphological and time variations, similar to how you can operate on contemporary maps (Knowles, 2002). The geoprocessing tools can be employed in a similar manner for the study of the changes and for prediction of development scenarios. The capitalization of resources becomes an essential element for each action you want to take in a territory, in the awareness that every human activity is traceable and expression of a specific historical moment. Therefore operating in degraded environments, but strongly stratified by human action and natural, is the representation of a cognitive process of the site itself (Fig. 1).

The geometric principle of map analysis, however, becomes the basis of the representation of the territory itself and remains even today when the survey systems and those of representation allow results of high accuracy in a very short time. As Farinelli reminds us of the principle of construction of the first modern map, coeval with the French Revolution, it is based on the principle of triangulation which is the only one capable of ensuring the accuracy and geometric accuracy of the drawing. The Euclidean geometric model still chairs the design of the territory but not only because of its description as the same model was used to build it and to set it up, defining what is the purpose of mapping. The triangle is not only geometric shape that governs the cartographic principles, but it is a model of the production process as well as the triangulation shows (Farinelli, 2003).

The ancient Egyptians already known triangulation process, who founded the geometry to solve problems of geography. It is theorized around 1445 by Leon Battista Alberti in the "Ludi matematici" where he describes the operation based on the basic laws of plane trigonometry. A geometric principle that applies to the knowledge of the area at the same time guarantees high precision and economy, with the possibility of acquiring measures otherwise unreachable. It came to be

on Earth's surface an immaterial network, but from the depth metric content. The principle, unchanged in projective foundations, was used in the seventeenth century for the measurement of larger portions of the Earth, no more sighting objects on the same surface, but through observation of stars and planets. The reference system became the heavenly bodies, ensuring greater precision and especially their communion in a whole hemisphere made them suitable for the measurement of large portions of land. As the calculation of the past ephemeris it was employed for the determination of astronomic magnitudes and positions of the stars, also aimed to measure terrestrial, today the ephemerides of the satellites of the GPS/GNSS constellations are used for the purpose of location on the Earth's surface with measurements high precision and the distances between points on the Earth itself, always using the same geometric principle. The same satellites are more and more accurately in photographing the Earth and giving back true image with an high accuracy (Wood, Fels, 2008).

The importance of triangulation and geometric figure from which it derives is not limited to the construction in the distant past and today the production of the image mapping of the area, but as a constructive process. Just like the perspective, from which it is derived, it was also an extremely powerful model of knowledge, the effects of which still hold after so many millennia the priority of human thought and its relationship with the world.

The space represented in a sealed map itself the knowledge and expresses many things at once: it is the place of memory, identified through physical and natural elements, tangible and intangible, of the cultural layers. It is a destination for exploration, cognitive and amending purposes. It is the expression of the will of the conquest and the transmission of knowledge of man and society.

The cognitive approach of geometry seals the bond between man and the land it inhabits, declaring the ancient and deep roots. Witness the foundation rites of the city, which from Greece to Rome to the Eastern civilization, imprinted a sacred meaning to the choice of the site in which to live, organizing space in harmony with the universe observation. To understand the profound vocation of a territory, knowledge of only one language of geometry is no longer enough; in the same way in which in the knowledge of an individual to medical investigations were complemented by psychological ones to penetrate the deeper nature; in the study of an area we should be backed measures of the geometric shape further investigation, that will bring to light the signs and traces of the past, aspects of perception and identity.

Drawing the complexity: new tools for land and architectural representation

Digital technology offers us a great support in the activity of knowledge that, through it takes on the characteristics of dynamism as continuously manages to discretize and measure the territory while maintaining ancient principles, but, at the same time, the approach biological knowledge can regenerate the territory while maintaining its identity characteristics.

The complexity that characterizes the landscape and the territory requires forms of investigation and representation, but also the analysis of the place, of hypothesis of modification, intended to meet the size characterizing the complexity of the site itself.

The representation of the complexity of the landscape and its environmental components is crucial to be able to understand and analyse the complex relationships between the constituent elements trying to identify, through knowledge, the topological relationships of the changes that have affected the landscape.

Environmental studies, in particular the disciplines that belong to earth sciences and biological sciences, allow you to get a deep and comprehensive knowledge of the environmental factors. This approach determines the right conditions to the development of life, for the environmental factors of the complex system and the living community, as the place in which was born and developed.

The different skills influence the anthropic landscape and its evolution: the numerous and complex phenomena and problems, natural and cultural, linked to the organization of the territory. As for example these events can be summarised in the management of natural resources and cultural heritage, the birth and the development of settlements and residential clusters, the scattered buildings, roads, crops, the social organization and the technical knowledge of the various communities and local groups, the ways to use resources available in various places, in addition to examining the ecological systems for the modification and the sustainable management of landscapes.

In this context is part of the research and design presented in this paper and inherent in the modification of a rural area strongly compromised and degraded for which the recovery of its foundational value, updated according to criteria, technologies and needs of contemporaneity (Pisacane, 2014).

In the face of increasingly apparent disasters produced by the absolute drift occurred urban project in Italy, even the most strenuous and careful observers of the "news" that emerged in the 80's - 90's by the landscapes of the so-called "urban sprawl" now seem to turn more carefully the considerable problems posed by it and the need to reallocate a central value of structural and symbolic to the semi-urban agricultural land. The processes of soil consumption, combined with the increasing fragmentation of agricultural land, pose with compelling evidence the need for a recovery of some basic design rules for urban redefinition in close relation with the most broader context agro forestry in which the settlement fits.

This change of perspective has been consolidated and expressed in the growing awareness of the need to move from an 'urban center' model external to the city to a 'government land' one, where the agro forestry area, and in particular the suburban, plays a regulatory role of structural and foundation of the *'forma urbis'*, a role with respect to which cross different skills and disciplines, as well as various forms and sectors of public policies.

The case study for which the issue of agriculture and rural development is relevant and foundational is the opportunity for a reflection to the design act, applicable to a large number of areas cultivated in the suburbs that maintain the original rural vocation of the city.

Results and discussion

The regeneration of the open spaces: the use of *urban farming*

In many areas, there is the need for citizens to re-appropriate the old relationship with agriculture that urban growth has unfortunately changed over time. This is so as to find a solution to issues related to the economic crisis which have led to the search for less expensive solutions than those offered by industrialization agriculture, but also to respond to needs related to the safety and quality of food that moves towards finding solutions in cultivating urban areas that can be more easily "controlled".

This need, however, is in contrast with the model of urbanization that has emerged over the last hundred years and kept agriculture outside the urban environment, giving it a role only in the context of remote rural areas.

A renewed environmental consciousness has led to reclaiming wasteland by "urban farmers", along with the diffusion of social experiences such as vegetable gardens, small crops in greenhouses, on the balconies and roofs of the buildings, colliding with an urban structure that, in most cases, unfortunately, is not prepared to receive them (De Martino et al., 2015).

Alongside these initiatives, especially related to individual or small communities, considerably more important, sometimes only as projects, have been created, but in many cases as experiences already activated and implemented within the metropolis.

Among the numerous cases, it is worth mentioning the experience of China, with an urbanization characterized by a depopulation of the countryside and a very rapid and disorganised urban growth. For example, in the Jiangbei District that belongs to the metropolis of Chongqing in south-central China, extended urban crop fields can be found at the foot of skyscrapers (http://www.architetturaecosostenibile.it).

The challenge is therefore the following: can cities become capable of self-regulation in environmental, social and economic terms?

Consequently, the contribution from the conversion of urban open spaces is particularly important, since they constitute nodal elements capable of performing the delicate function of linking the urban systems with the surrounding natural ones, while assuming a strategic role in the transformation of anthropized areas.

In this context *urban farming* can make a valuable contribution as an effective instrument for the renewal of urban open space because offers significant possibilities from an environmental, economic and social perspective.

Urban farming offers significant possibilities since it allows for the improvement of the environmental quality of these spaces, the achievement of both social benefits, with its responding to the needs of aggregation, thus implying a collective use of the land by the inhabitants, as well as economic ones, with its being configured as an innovative business model (the self-production of food products at km 0), which can be easily extended to other related activities such as catering.

Urban farming, through the valorisation of agricultural areas, can also represent an interesting opportunity in both retrieving and restoring degraded urban areas as well as improving them from an ecological point of view. Obviously these areas, once suitably upgraded, can be networked with the green spaces in the city so as to achieve an ecological connection with the rural and natural peripheral areas.

Case study: a hypothesis of urban farm in Succivo (Italy)

Succivo is a municipality that covers an area of approximately 7.21 km^2 and has about 8,400 inhabitants, located in the Campania region in Italy. It is characterized by mass and disorderly urbanization. It is also part of an area that, in some cases, is marked by a compromised environmental quality of the soil and therefore requires redevelopment and renewal interventions. The intervention area presented in Fig. 1 covers about 8,000 m^2 and is adjacent to the road axis that connects the municipality of Succivo with that of Gricignano of Aversa. It is located in a densely urbanized area. It is an open space degraded with one stone building, dilapidated and partially free of any form of cover.

The redevelopment intervention focused on the use of urban farming as a redevelopment tool through the use of eco-oriented technology strategies. The existing building was partially restored and incorporated into a new structure, with a cultivated wall (Fig. 5) and the roof was used to create a vegetable garden with a reused pellets modular system (Fig. 4). A synergistic cultivation structure also affected the entire adjacent open space (Fig. 3).

Case study: drawing the landscape change

The synergic vegetable garden is based on the concept of synergy between different plants in it are planted and grown. The one cooperates to the welfare of the other, in a perfect state of balance and harmony. This principle of interrelation between the parties allows you to develop agriculture without the use of chemical fertilizers. All that it needs the land for the growth of the plants is from the roots and activities carried out by micro-organisms and other insects and animals (Fig. 2).

Fig. 1
Territorial overview

Fig. 2
General masterplan

The synergistic orchard nature value therefore requires careful programming of the provision of crops in function of their seasonality, their growth and the size and height of the plants, as well as the type of cultivation.

The project presented here, taking into account such factors predicted plan organization and a trim design of the crops according to sectors and circular rings that identify homogeneous areas of crops that work together without negative interference of one over the plant (**Fig. 6, 7, 8**) (Moretti, 2005).

Fig. 3

Synergistic agriculture scheme

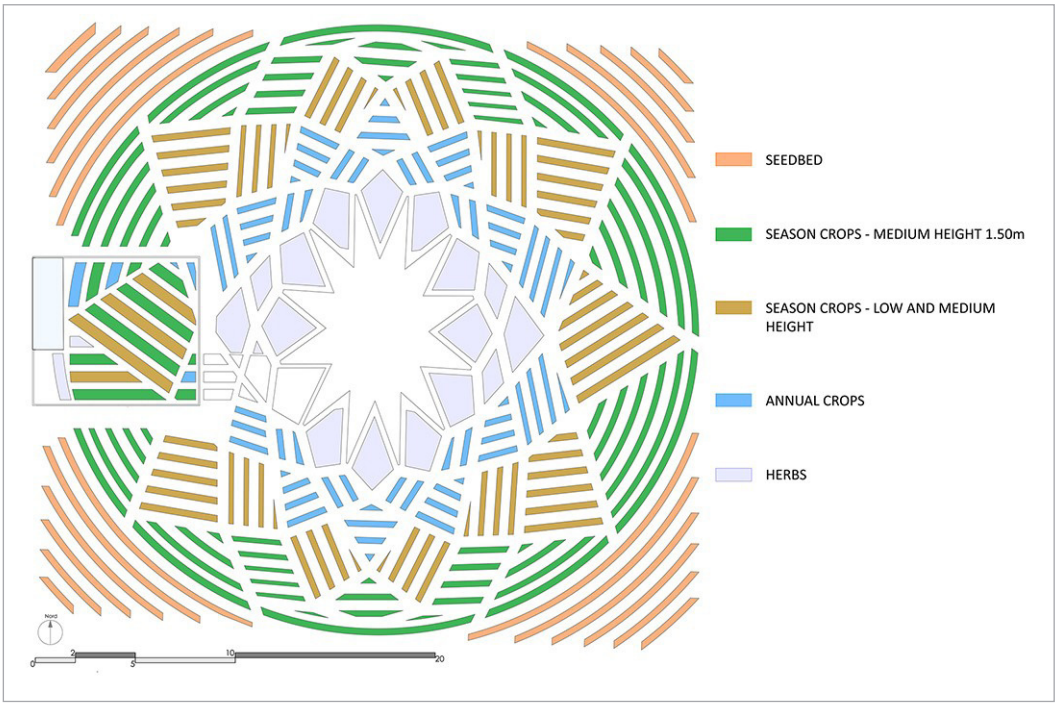

Fig. 4

Building roof

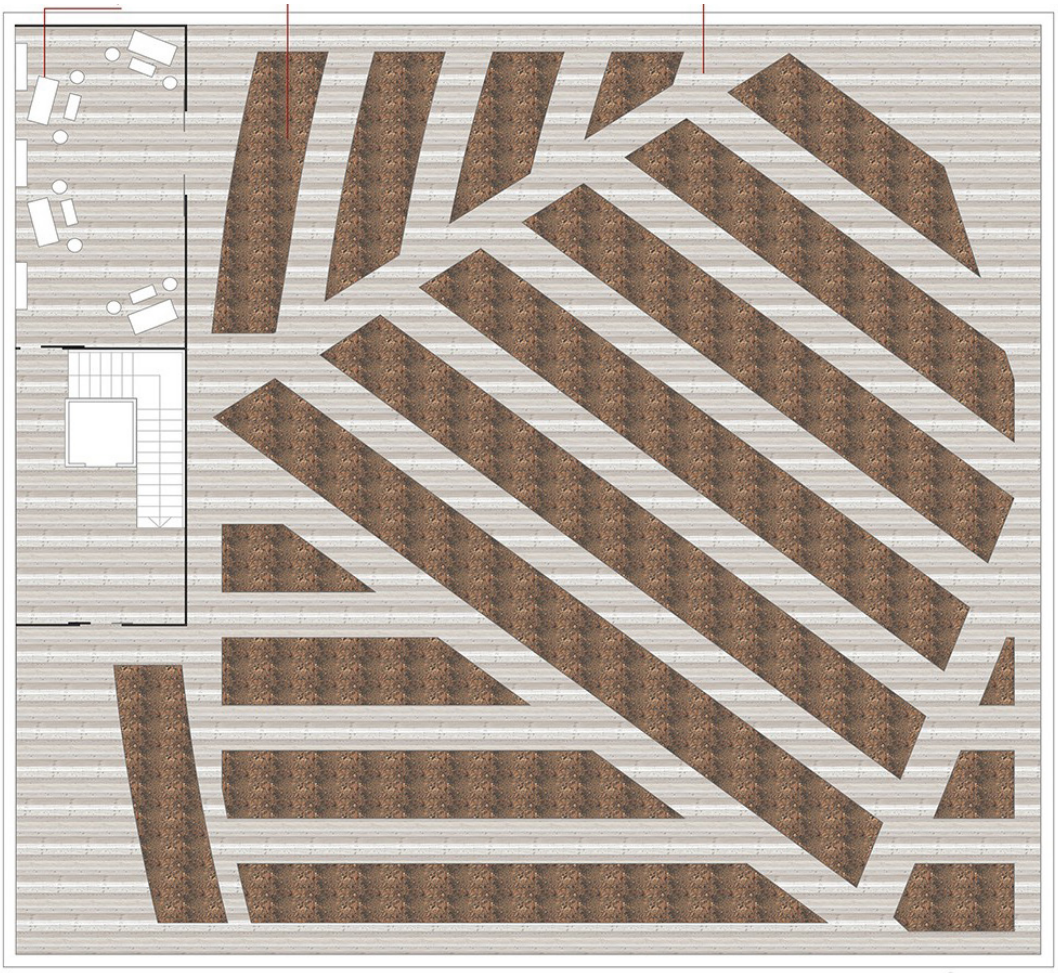

Fig. 5

Farmed vertical wall

Fig. 6

General rendering of the area

Fig. 7

General rendering of the area

Fig. 8

General rendering of the area by night

Conclusions

This work studied the requalification of open spaces through urban farming and highlighted the significant environmental advantages of using natural principles as an urban renewal management model. The requalification process assumes an important role, especially when the ecological and environmental conditions of the open spaces are significantly affected by their transformation, thus corresponding to a renewal of the urban context.

Through the application to a suitably structured case study, it also highlighted how important is it not only to return nature into urban areas, but also to use eco-oriented technologies so as to activate those processes that use the principles of nature as a model of sustainable management and stimulate the intrinsic natural and undeveloped potential of natural resources due to mass anthropisation.

Using the ability of nature to control the negative effects of urban transformation and focusing on rebalancing is, among other things, not only environmentally convenient, but is also from economic and social viewpoints as previously highlighted. It creates, in fact, significant opportunities for the improvement of the environmental quality of these spaces, but at the same time also allows for self-produced food at 0 km, thus responding to the needs of social gatherings.

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