

# Ecovillages and friendly city, a new alliance for a better green future

Marco Sala<sup>1</sup>, Chiara Casazza<sup>2</sup>

<sup>1</sup>ABITA Research Centre Director, Full Professor University of Florence, Department of Architecture

<sup>2</sup>PhD University of Florence, Abita Research Centre

Email: marco.sala@unifi.it

**Abstract.** Urban agriculture is thus nowadays a core theme in the debate about urban sustainability, as considered a strategy toward urban requalification as it carries widely recognized environmental, social and economical benefits. Therefore it is considered a viable strategy in order to trigger a new green productive infrastructure, while activating a network of social, commercial and recreational activities, in addition to environmental benefits due to urban greening and sustainable resources' management. Obviously it couldn't be able to provide for an entire city food needs, just like the present economical model wouldn't be replaced, but it might become the core element of a new approach oriented to sustainability and relationships between food and city.

## 1. Introduction

The urban agriculture involves urban and architectural design at different scales, from planning to new types of public space design, to design the integration between harvesting and built space through devices such as green roofs or greenhouses, and the design of technological components. Therefore agriculture in urban contexts becomes a new element, a new type of space and use with specific performances and effects on the urban environment. Through an analysis of the state of the art and international experiences numerous examples can be identified. It was immediately clear how urban agriculture could be integrated in the city at different scales (in open, spaces such as gardens, residual area and parks, and in the built environment such as on green roofs or facades) and with different aims, taking advantage of different technologies. Some of the main examples are listed below. [1]

Community Gardens are vegetable gardens usually created in existing urban spaces by citizens themselves or by no profit groups, which usually become shared green places enhancing socialization conviviality, loisir and social inclusion. Some examples are those of NY, San Francisco and Chicago and the Jardins Partagées in Paris.

Social vegetable gardens consists of urban green spaces rented at low prices or lend under free concession to weak social categories (retired ones, elder people, low income people). The aim is crating new models and solutions to social problems such as poverty and exclusion, enhancing health and social help.

Backyard vegetable gardens consists of private vegetable gardens growing in private or pertinence space for hobby farming and self-sufficiency. They are usually set in private home spaces (balconies, terraces, gardens) or shared condominiums' spaces (court, garden, flat roof) becoming and interesting element enhancing wellbeing, health, social relations, sharing, space quality.





**Figure 1.**

With the expression Entrepreneurial Urban Agriculture are identified actual enterprises which produce and sell vegetables at urban level and develop commercial business in the field of urban farming. We can cite North American case studies such as Lufa Farms, Gotham Greens and BrighFarms which installed hydroponic urban greenhouses on top of existing buildings and sell their products to a local network of Km0 markets and supermarkets, or Brooklyn Grange, a green roof hosting an agricultural enterprise, or furthermore Bell Book and Candles restaurant which produces and serves its own vegetables taking advantage of its flat roof equipped with hydroponic towers.

Urban Educational Farms are projects aiming to create a urban place hosting education toward agriculture, environment, diet and health. The Science Barge for example consists of a floating (on the Hudson river) hydroponic greenhouse which recycles rainwater for irrigation, urban wastes to create biomass, and takes advantage of renewable energy fonts (wind and sun). The Science Barge's aim is hosting research activities and didactic activities. School vegetable gardens are interesting experiences and projects pursued in order to integrate food production in scholar and educational activities enhancing education toward food, diet, environment and benefits of consuming local and fresh products. While describing urban agriculture it is impossible not to cite the projects, sometimes visionary, of the vertical farms. The term points actual buildings which volumes host a cultivation, usually multilayer, of vegetables, using hydroponic technologies, but also other facilities such as packaging, selling and serving. This projects aim to create urban km0 food poles.

Other interesting experiences are those where urban agriculture is used as a strategy toward urban requalification and urban greening, while integrating vegetable gardens pocket parks in urban residual areas. It's necessary to underline how crop production it's only the first issue concerning Urban Agriculture, as it implies also: food selling, preparing and serving, alimentary education, recreational activities, therapeutic activities, city waste management. Therefore restaurants, retail stores, supermarket, hospitals, canteens, schools could introduce food production different aims, or could be linked in an urban local food chain.

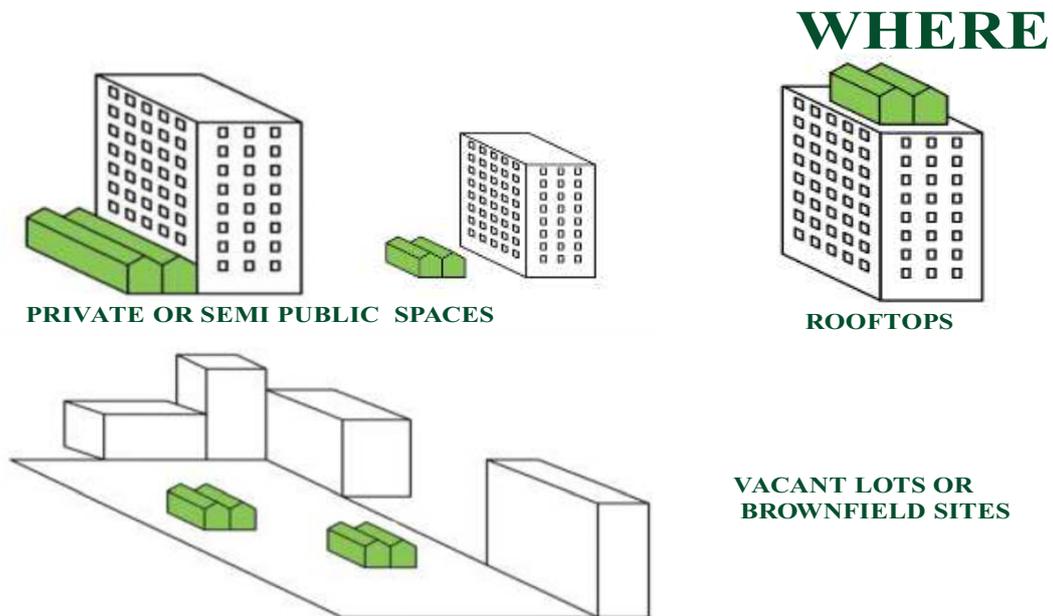


Figure 2.

## 2. Method

Different technologies are investigated or adapted (and transferred) from agriculture to architecture (greenhouses, hydroponic growing systems, containerised growing) in order to make the above mentioned spaces suitable for crop production. In particular designers can take advantage of traditional growing systems devices (in ground, in vase, raised beds, greenhouse, green roof, vertical green) and hydroponic (or soil-less/soil simulant) growing systems devices (greenhouse, growth- cell, hydroponic vase, hydroponic tower, vertical farm, vertical green and living wall) . [2]

These last ones are especially suitable in case of artificial surfaces and when lightness, productivity and crops protection are highly required. The term “hydroponic” describes those cultivation systems realized without the use of soil as substratum and that take advantage of water as a vehicle to bring nutritive substances. The management is relied on automatic systems, controlling microclimate, transpiration, irrigation and the food plant supply.

In all the existing hydroponics systems the water is the element that constantly brings nutrients to the plants, making up for the lack of soil that in the traditional cultivations is storage for nutritive elements as well as a physical support for the plant itself.

The main advantages of the techniques of cultivation out of soil are: high productivity in small spaces (the system is from 3 to 10 times more productive compared to the traditional one in 10-20 times less space and time), product quality improvement thanks to the management system, water saving (till 90% water saving in closed cycle systems). Urban Agriculture as a strategy for the requalification of brownfield sites and unused urban spaces. As aforesaid urban agriculture is a

viable strategy in order to reach the sustainability of contemporary towns. An interesting opportunity is given by the possibility of using food production in order to regenerate unused areas, pocket spaces or brownfield sites. Our towns are indeed often characterized by vacant lots, unused spaces, marginal areas “forgotten” by urban planning and design, which usually remain abandoned carrying architectural, social and environmental decay. If sometimes this spaces are destined to new construction projects, the delay of projects approval and building leaves the abovementioned spaces unused for a long time.

### 3. The project U.R.C.A. Urban (Con)temporary Agriculture



Figure 3.

Ur.C.A. is an in progress research project, an innovative solution for the regeneration of urban unused spaces, funded by Tuscany Region, and develop by ABITA Interuniversity Research Centre and the DISPAA Agricultural Department of the University of Florence, in partnership with two local enterprises: Azienda Agricola Cammelli and Azienda Agricola Artemisia, and supported by the Florence municipality Public Administration.

The project investigates the possibilities and the potential of integrating agriculture especially in transitional areas, as brownfield sites and marginal areas, taking advantage of hydroponic technologies in order to pursue an environmental, architectural and social requalification and re-functionalization of these urban spaces.

Ur.C.A specific objective is to identify an innovative, while food producer, temporary and off grid, system in order to regenerate urban unused spaces though urban agriculture as a booster giving a new role and function to marginal and degraded areas. The Ur.C.A temporary urban agriculture system is actually based on an innovative, as temporary and potentially itinerant and agricultural, use of unused spaces of contemporary towns. The research focused on the following steps:

1) identification of space typologies that might host and take advantage of Ur.C.A. temporary urban agriculture system installation.

2) Design of the main components of Ur.C.A. system, identified and designed according to the requirements of: provisional nature, reversibility, lightness, sustainability, independence, usability, flexibility, security, architectural and environmental quality . The system consists of: a common area hosting the temporary community garden , a productive area hosting innovative hydroponics of grid

greenhouses producing vegetables for a commercial purpose, a recreational common area hosting social activities such as relax, interaction.

3) Ur.C.A. especially involves the design (and the next first prototype installation in the city of Florence) of an innovative urban green house that, taking advantage of hydroponics technologies, allows a safe, sustainable, reversible and soil-independent crops production, bypassing urban and land use regulation. The greenhouse can be easily installed in unused urban areas, without modifying the place's conditions, and later on disassembled and moved to the next area. The Ur.C.A. growth cell, conceived as light, transportable, modular, nearly zero environmentally impacting, and energy efficient, can become a device useful to quickly, but also temporary, regenerating the mentioned areas.

4) Ur.C.A. system scheme able to guide the design and the application of an urban temporary agriculture intervention.

5) Ur.C.A. management guidelines in order to orient the administrative and regulatory procedure that makes it possible to use and manage public or private unused area for urban agricultural activities. It ranges from an urban level to a commercial one.



**Figure 4.**

The abovementioned unused or dismissed areas can find a new life through Ur.C.A. innovative temporary urban agriculture use. Indeed the integration of food production in blank spaces can create a new pole of attraction giving them new functions, and it can enhance social innovation, citizens

awareness toward environment, health, and diet, social participation, and furthermore can stimulate an urban km<sup>0</sup> production and consequentially new small scale local economies and green jobs.

Unused areas will therefore host a small crop production for local distribution, (also involving local cooperatives and enterprises) through high tech hydroponic greenhouses, and shared community vegetable gardens, aiming to self sufficiency and social inclusion, through low tech (also soil less) raised beds.

#### 4. Conclusions

Today it's clear how urban agriculture might be fully considered a strategy, a tool, for urban renewal. Indeed it doesn't only allow a km<sup>0</sup> capillary micro production at urban level, but furthermore enhances a recovery of those social values and cultures connected to agricultural activities, strengthens urban attractiveness and creates a network of social education. It is important to highlight how the strength of the phenomena doesn't lie in an isolated project, but in the possibility and potential of integrating food production in a green urban network and infrastructure for the city, especially making it possible to include it in an alimentary local and urban policy (Urban Food System). In fact it might be considered as a strategy, as a booster to achieve several aims such as urban greening, citizens awareness toward food, participation, social help, health, new local and alternative markets, education all linked in a sustainable resources management.

Designers and public administrations will be able therefore to give new function and role to existing urban spaces and buildings, taking advantages of innovative growing technologies, acquiring "renewed" design skills that allow the integration of food production at different scales.



Figure 5.



Figure 6.

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