

Article Type (Article, Review, etc.)

# Study on Participatory Community Vegetable Garden Landscape Design from a Micro-Renewal Perspective

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**Received:** Jan 30, 2023; **Revised:** Feb 15, 2023; **Accepted:** Mar 1, 2023; **Published:** Mar 30, 2023

**Abstract:** With accelerating social development, cities experience "incremental expansion" for "stock improvement" development, making "urban micro-renewal" a fundamental aspect of community transformation. The epidemic of COVID-19 resulted in a two-month-long lock-up and endangered residents' access to daily necessities. Therefore, participatory community gardening theory and practices were explored this article utilizes an old community as an example to find ways to grow community gardens for residents. With urban renewal, a reference was provided for establishing community gardens and exploring sustainable methods.

**Keywords:** Participatory community vegetable gardens, Edible landscapes, Micro renovation, Old communities

## 1. Introduction

With the growing demand for an improved quality of life in major cities where a renewal-dominated development is required, the design focus has gradually shifted from large-scale modern space renovation with a single goal and narrow content to sustainable community development with complex goals and richer content. In comparison to new communities, old communities need micro-renewal to enhance the residents' living quality as they still have unused or poorly used small green spaces. Being crucial in improving people's quality of life, this type of space highlights the necessity for micro-renewal design in old communities. The current micro-renovation of old urban communities has renovated local living spaces but there are still three significant challenges. Firstly, early planning and design commonly failed to meet the evolving needs of residents. Secondly, unified management in these old communities often was absent with a lack of property management. Additionally, the weak awareness among residents regarding self-maintenance resulted in an underutilization of space. Thirdly, while past renovations were successful, top-down approaches frequently overlooked the needs of residents. Unfortunately, poor communication between leaders and grassroots stakeholders often results in unsatisfactory outcomes.

In December 2021, the State Council's Department of Housing and Construction announced the transformation of old communities to solve these issues. The notice explicitly called for consensus-building among residents before the commencement of any renovation project. This approach has created a new model of multi-party cooperation and joint construction. Overall, it is clear that there are still significant issues that need to be addressed in the renovation of old communities. The "participatory community garden micro-renovation" has had a significant impact on improving the quality of the community environment, promoting public participation, and stimulating community vitality. Prior to the renovation, the "micro gardens" used to be small green spaces with limited foundations. Through residents' participatory design and joint construction, the quality of the space has been improved, and the issues in the renovation of old communities have been solved.

A community garden is a public garden managed by a group of residents in a community in the city. It is designed to improve the living environment and provide residents with the freedom to grow their vegetables while enhancing community interaction and enabling children to receive nature education anytime and anywhere. Additionally, it offers office workers a place to relax during breaks and even reduces their living expenses to some extent. Furthermore, the elderly can relax and enjoy their leisure time, and get a sense of familiarity from participating in plant management.

Overall, the "participatory community garden micro-renovation" has been successful in improving the quality of life for residents in old communities. It provides a green oasis in urban areas, stimulates community engagement, and provides numerous benefits for various groups of individuals.

## 2. Materials and Methods

A literature review was performed in this study. The terms "Edible Landscape" and "Urban Edible Landscape" were used as full phrase searches in the Web of Science and Google Scholar databases. The search was conducted in the search category as Topic and setting the time to 'all years'. Also, articles related to the concept of edible landscapes, such as allotment gardens, rooftop gardens, edible gardens, edible campuses, edible parks, community gardens, and urban agriculture, were included in the search [1] (Table 1).

**Table 1.** Literature collation

Time	Nation	Research Content
1978	Australia	Ecologist Bill Mollison and David Holmgren wrote the book <i>PermacultureOne</i> , which pioneered Permen's idea of sustainable design.
1978	Canada	In the face of the growing demand for food, the Food action plan is proposed to integrate edible plants and urban Spaces into different types of green Spaces to support local food supply.
1982	Germany	In his Book <i>The Complete Book of Edible Landscaping</i> published by landscape designer Robert Kourik, he combines landscape design with agricultural production and puts forward a new concept of "edible landscape".
2000	Canada	Desbobier first proposed the concept of "vertical farms", recycling urban waste to grow fruits and vegetables in vacant fields, and improving the urban environment through ecological construction.
2004	Canada	Architecture professor Burhart, under the auspices of Canada's International Development Research Centre, has embarked on a three-year "Creating Edible Landscapes" project to integrate agriculture into residential areas and practice edible landscapes in developing countries.
2007	Britain	The book "Coherent Productive Urban Landscape" by Andre Wiewen of the University of Brighton, which proposes the integration of continuous productive landscapes into existing and future cities, initiated the study of the integration of agricultural farming activities into urban landscape design systems.
2009	America	Architecture professors Wagner and Jason Grimm propose a model of "food urbanism" to solve the problem of food scarcity, from the production, processing and consumption of food in the city, to activate urban self-sufficiency.

2009	America	The Guidelines for Urban Design of the New Urbanism in the United States was written by Andres Duany, who proposed a "theory of agricultural urbanism" to alleviate the ecological problems faced by cities at the time.
2013	America	April Philips is an expert in landscape architecture and urban ecology who studies how edible landscapes can be used to enhance the living environment in urban areas. The Complete Guide to Edible Landscape Planning, Design, Construction, Maintenance and Management summarizes more than 30 cases of edible landscape design in different countries, providing effective reference for other researchers.

### 2.1 Literature Review

At present, the transformation of a "participatory community garden" has been researched for theoretical practices. The earlier "garden city" model proposed by Howard is traced back to 1898 as an early conception of urban agriculture after the emergence of modern cities [2]. It was not until the 1980s that Robert Cook, a landscape architect, proposed the concept of "edible landscape", meaning that edible plants needed to replace ornamental garden plants in garden design and achieve certain landscape effects [3]. Portman Sustainable Eco-Design was proposed in 1974 by Bill Morrison and David Hongren of Australia. Portman design was an ecological design approach that originally referred to "sustainable agriculture" and later developed into "sustainable agriculture". "Coherent Productive landscape" was proposed by Trin Bohl and Andre Wongwei in 2009, who believed that urban agriculture could be combined with urban spatial planning as a part of urban green infrastructure, and American architecture Wagner and Jason Grimm at the same time proposed "food urbanism theory" and created "food urbanism model". All these provide basic theoretical guidance for "participatory community garden micro-transformation", and many excellent projects have been launched in the theoretical guidance and practice in the development direction of contemporary community garden transformation design. In this study, these practical projects were combined from the two aspects of design mode and design main body to explore the reformation of old community gardens.

## 3. Results

### 3.1 Diverse Design Patterns

Community gardens have various forms based on cultivation methods and planting structures. Commonly used design patterns in community gardens are as follows [2].

The concept of the "One-Meter Garden" was proposed by Mel Bartholomew from the United States nearly 40 years ago. This design was proposed to overcome the challenges of managing traditional single-row planting, which was time-consuming and inefficient. The "One-Meter Garden" required a 1 × 1 m planting space and employed a specific gardening method developed by Bartholomew. Compared to traditional gardens of the same area, the "One-Meter Garden" yielded higher productivity. It produced five times more harvest than a traditional garden occupying the same space. In this design, a bottomless wooden box was used as the planting bed with a grid inside. Each grid cell contained an appropriate amount of soil, and different vegetables were planted in each cell. The number of plants per cell depended on their size and growth habits, ranging from 1 to 16 plants per cell. To support climbing plants, trellises made of wooden bars and ropes were constructed. The main purpose of the "One-Meter Garden" was to make efficient use of limited space in urban environments [2], whether placed collectively in a community area or used in small areas similar to home balconies. It offered convenience and ease of use.

A rooftop garden is an effective way to mitigate the urban heat island effect and a significant measure towards building low-carbon cities [2]. The "Hanging Gardens of Babylon" was widely recognized as the earliest rooftop garden in history, while countries such as Germany and Japan made rapid advancements in rooftop greening technologies and developed comprehensive techniques. In China, the installation of rooftop gardens is traced back to the early 1960s. The "Nanyuan Green Cloud" project in Shenzhen was proposed as an implementation plan for rooftop greening, introducing a new model that was simple, cost-effective, aesthetically pleasing, and functional. This model was easily replicated and applied to more rooftops. The design incorporated the concept of basic units, using prefabricated plastic logistics containers as planting units, and combining 708 units to create a landscape,

transforming a passive gray space into an active and engaging environment. Rooftop greening primarily required the use of herbaceous plants, shrubs, and other shallow-rooted vegetation. Therefore, an assembly-oriented and landscaped design technique was employed, replacing traditional ornamental plants with suitable agricultural plants and allowing urban residents to enjoy a pastoral leisure experience without leaving their homes [2].

By combining edible plants with elements such as topography, buildings, water systems, and roads, a landscape environment that integrates aesthetics, leisure, cultivation, and relaxation can be created. The primary goal is to artistically incorporate agricultural landscapes into the landscape planning of residential areas. Baicaoyuan, located in Yangpu District, Shanghai, is a self-governed community garden. The site was originally a densely populated residential area from the 1960s with a majority of elderly and children as the active population. This project was funded by the local street office, jointly designed with Tongji University, and involved active participation from residents, achieving true community collaboration and sharing [4]. In terms of landscape design, fitness equipment, and leisure seating were set up nearby, allowing parents to rest and engage in physical exercise while taking care of their children. A "seed relay station" made from recycled wood was created to facilitate sharing among residents. The Baicaoyuan was designed as a space for daily rest, communication, interactive activities for families, and natural education.

### 3.2 Diversification of Design Entities

With the development and improvement of the country's economic level to be a well-off society in all respects, people pursue spiritual fulfillment more than before. Landscape design becomes community-oriented with participatory trends, and more voices from residents are reflected in design projects. Community gardens have become an easier way for people to participate in urban renewal recently. Through artistic means or public activities, community gardens assist in enhancing communication and interaction among neighbors. Such small-scale landscape transformations help the community improve. The key is not the garden itself, but the community [5]. The public integrates the landscape environment with residents' leisure, socializing, and daily life, enhancing their sense of belonging to the community. People develop a stronger affinity for their community in their everyday lives, which increases community vitality and fosters harmonious neighborly relationships. As Liu Yuelai said, "Based on the lives of neighbors and integrating pastoral nature into urban communities, improving public spaces promotes residents' self-completeness and productivity [6]." For example, in the design of Baicaoyuan in Yangpu District, Shanghai, many design ideas from residents were collected, including drawings from children that depicted their vision of Baicaoyuan. This project connected the top administration to the bottom community, making them work together for urban renewal [7].

### 3.3. Design Principle

Based on the collation and summarization of the literature, the following five design principles were summarized in community layoffs.

#### 3.3.1 Interactivity

Art is an inherent aspect of life, and landscape design embodies this artistry through its representation of the natural world. Therefore, landscape designs must be rooted in the practical needs of people and their communities. A well-designed landscape actively involves its users by offering a rich sensory experience, skillful spatial arrangements, and a variety of interactive activities. This changes a passive observer to an active participant and fosters community engagement and a sense of place. A successful landscape design must be aesthetically pleasing and improve the overall quality of life for residents. Participatory landscape design supports this objective by providing opportunities for community members to engage in creative activities including planting, learning about edible plants, and fostering communal communication and interaction. Through collaboration between community members and designers, the resulting design becomes an evolved landscape that is fully integrated into daily life. In summary, landscape design is not solely about creating a visually pleasing environment but about enhancing the quality of life and identity within a community. A participatory approach ensures that the outcome corresponds to the desires and needs of the people while encouraging involvement in its creation. Ultimately, landscape design can serve as a positive force, bringing people together within a beautified and functional communal space.

#### 3.3.2 Aesthetics

Community vegetable gardens still prioritize aesthetics, even though the focus is on practicality. It is important to choose crops that are suitable for the local conditions by considering the different forms, colors, fruits, and growth cycles of the plants for the garden. By skillfully matching and planning, designers can create an attractive and staggered scene that adds visual interest to the space. Moreover, educating residents about the various forms and colors of plants helps them appreciate and enjoy the garden more.

By selecting plants that complement each other and creating a cohesive design, designers can enhance the beauty and appeal of the garden. This connection with nature can foster a sense of community and well-being among residents. In summary, a successful community vegetable garden needs to balance practicality and aesthetics. Designers must choose crops suitable for the local environment and use thoughtful planning to create an attractive and appealing design. Educating residents about the plants in the garden can deepen their appreciation and enjoyment of the space [2]. Ultimately, a beautiful and functional community garden can improve the quality of life and bring people together within a shared green space [2].

### 3.3.3 Science

Community vegetable gardens are distinctive from other community landscapes and rural areas with large plantings. Designers must thoughtfully consider the scientific and rational allocation of plants to create a visually appealing landscape that is also practical for growing vegetables. A successful design combines aesthetics with sustainable design principles, such as those used in Parkgate. For instance, designers consider the percolation and water storage capacity of edible plants, their root depth, and their relationship with the surrounding environment when planning the garden. By incorporating sustainability principles, designers create a garden that is both beautiful and functional. This requires careful selection and placement of plants, as well as the use of eco-friendly materials for construction. In summary, designing a community vegetable garden requires a creative and logical approach that balances aesthetics with practicality. A sustainable design concept similar to Parkgate can help designers solve the problems of vegetable gardens, including plant allocation, percolation, and water storage. With careful planning and selection of plants, designers can create a visually stunning and functional garden that serves the needs of the community.

### 3.3.4 Education

Community gardens have significant educational value. Not only do they provide an enjoyable outdoor space, but they also allow children to learn while having fun, which is different from traditional methods of rote learning. By interacting with nature, children can gain knowledge about the environment and effectively improve their understanding of the natural world. The strategic use of landscape and green plants in community gardens provides an engaging and stimulating environment for children to play and learn simultaneously. The combination of edible plants and aesthetical landscapes creates a space that is both colorful and fragrant, making children sense them and have a lasting impression. Overall, community gardens are an excellent tool for educating children and improving their connection to nature. By providing a fun and interactive environment, children are allowed to learn through hands-on experience, leading to deeper and more meaningful connections with the environment.

### 3.3.5 Convenience

An important advantage of such landscapes compared to other ornamental landscapes is their convenience. Edible plants are productive and can be directly consumed by residents as pollution-free and safe ingredients that people can eat safely. Community gardens are self-sufficient on a small scale, making them especially useful during times of the epidemic. They offer a local source of fresh products, reducing the need for the logistics of food and providing a solution to the problem of limited access to vegetables during the epidemic. The widespread use of such gardens in communities has many benefits, providing increased food security and reduced greenhouse gas emissions associated with long-distance transportation of food. Community members can enjoy growing and harvesting their vegetables in a more sustainable way of life. Overall, the convenience and practical benefit of the gardens make them an excellent choice for community gardens. As well as providing a source of healthy, fresh produce, they offer a valuable lesson in self-sufficiency and a more sustainable way of living.

## 4. Conclusion

Although the concept of edible landscapes is not new, the idea of planning community gardens that incorporate this design principle is still relatively uncommon in China with only a recent emergence in big cities such as Beijing and Shanghai. However, farming culture has long been a tradition in China, and many residents have previously planted vegetables in their local communities according to their needs, indicating a deep-seated love for idyllic landscapes among the population. Participatory community garden design is a community planning for people's needs. By integrating healthy and ecological food into residents' lives, community gardens allow a harmonious community with a healthy environment. They also offer an excellent way to create a more vibrant landscape within the confines of a limited community space, involving community residents in the design process and promoting communication, ultimately improving community vitality. The research on community gardens from a micro-renewal perspective is to establish and deepen residents' emotional connection to the community using a different design model and a pluralistic, co-governing design body. In the future, community-based vegetable gardening is expected to form a city-wide network of

interconnected edible ecological landscapes, a green infrastructure that integrates education, beauty, production, and leisure, and an effective practice for urban reconstruction.

**Funding:** This research did not receive external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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