

Edible Garden Initiative of Taipei City



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Socio-environmental Backdrop of Taipei City

Taipei City, with a population of 2.6 million, is Taiwan's capital and second largest city. While Taipei City's population has declined in recent years, it sits at the center of an expanding metropolitan region that includes New Taipei City (now Taiwan's largest city with over 4 million people), Taoyuan City (2.2 million), and Keelung City (371,000). This metropolitan area, sometimes referred to as the Greater Taipei Area, sprawls out along the Taipei Basin where the Tamsui, Xindian, and Keelung Rivers converge in the lowlands between the high, steep mountains of the Datun Volcano Group to the north, the Taoyuan Plateau to the west, and the Xueshan Range to the south.

Taipei City, situated to the east of the Taipei Basin, had an average population density of 9,473/km² in 2021. Because of the topographic features, whereby half of the city is located in the mountain region, the Urban Plan of Taipei classifies 47.6% of the city as "lands for development" and 52.4% of the city as "not for development". These "not for development" areas include a national park, conservation areas, wetlands, forestry, and agricultural lands, mostly located in the city outskirts. Development and population are therefore concentrated towards the lowland areas of the basin. In the central districts such as Da-an, Zhongshan, Songshan and Xinyi, the population density reaches as high as 20,000/



Facts & Figures

Population
2,592,878

Area
259 km²

Average Household Income
63,444.69 USD

Population Density
9,732 persons/km²

km². This leads to a highly unequal distribution of greenspaces across 12 districts. Therefore, although the average green resource per capita in the city, included both accessible and inaccessible natural, semi-natural, and artificial greenspace, amounts to an impressive figure of 53.37m², the per capita greenspaces, which are amenity parks and greenspaces designated in the urban plan, only reached 6.18m² in 2020, ranging from 2.05m² in Da-an District to 11.17m² in Wenshan District at the outskirts (Figure 1).

In the face of climate change, Taipei is also subjected to the risks for food, water, and energy security. Yet, the city's main challenges regarding these resources are mostly related to its large ecological footprints on rural and natural areas as well as the excess consumption and usage pattern. For example, food consumption habits have changed significantly as Taiwan developed rapidly in the second half of the twentieth century [2] and today it is among the most wasteful countries in Asia. Diets are now more rich in sweets and meat, while containing less fruits and vegetables [3]. Promoting better food options could help curb rising rates of obesity in Taiwan (which are already amongst the highest

in Asia) [4]. Similarly, the use of electricity and water consumption patterns could be improved. While Taipei's residential electricity use has decreased in recent years, making the city more efficient overall, energy prices in Taiwan (per kWh) remain much lower than in other developed countries in places like North America and Europe, which can contribute to wasteful behaviors. The same is true for water. As of 2019, Taipei residents consume an average of 329L of water per day [5]. This level of consumption made Taipei the eighth largest per-capita water consumer in 2016 according to an International Water Association study comparing 198 cities in 39 countries [6].

To address the scarcity of accessible greenspaces within densely developed areas of the city and wider socio-environmental challenges, such as aging society and climate change, Taipei government has begun to promote small-scale edible gardens in densely developed areas with consideration of ecological environments, food systems, and social connection. In this case study, we summarize the background of this greening initiative, innovative actions that are associated with food yield, water usage, and energy consumption, and wider governance enablers.

Taipei Garden City Program: an Urban Farming Initiative

Taipei Garden City program is an innovative urban farming policy launched by the Taipei City Government in 2015. This greening policy aims to provide more accessible greenspaces nearby residences and encourage sustainable approaches for food cultivation and the usage of water and energy on-site. To enable fast creation of urban farms in populated areas of the city, the ban of using publicly owned land was lifted to allow for temporary not-for-profit usage from citizen groups. A good public-private partnership was formed along with the program. Government, private sectors, and non-governmental organizations (NGOs) work together to promote more sustainable practices of food cultivation, water usage and energy consumption. The policy has five primary goals: enhancing social virtues, benefiting urban ecology, promoting health and wellbeing, and reducing climate impacts and environmental education.

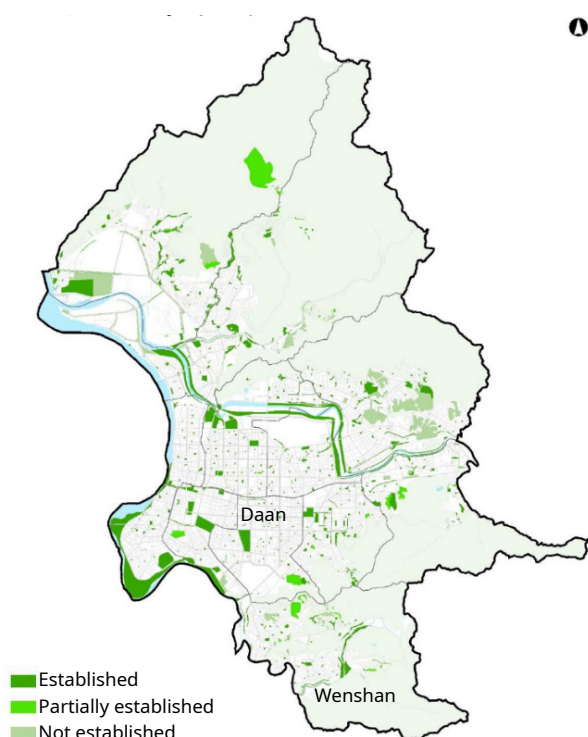


Figure 1 – Greenspace distribution in Taipei

Creating green landscapes, creating a low-energy 'sponge city'

In five years, the Taipei Garden City Program has grown to include over 740 edible gardens across Taipei City, contributing to more than 213,000m² of edible forms of urban green infrastructure. This includes four types of gardens: community gardens, school gardens, rooftop gardens, and allotment farms. The former three types of gardens are distributed towards densely developed areas across central districts, providing good accessibility to urban dwellers. One of the earlier enablers to this rapid establishment of accessible edible gardens is the release and inventorization of unused, public-owned land and buildings for temporary gardening by the public. Underutilized land, such as school grounds, institutional land, unused open lots, derelict land, as well as rooftops on public buildings, such as district centers, hospitals, and social housing, were encouraged to be converted into edible gardens by the scheme. Within these, citizens are given flexibility to generate their own garden plan and structure.

Resource demands and the socio-environmental benefits

While food production capacity in the Garden City program is low (on average 22kg per month), according to a questionnaire survey conducted by Shih in 2020, the extra greenspace created by this policy offers several ecosystem services beyond food production. Biodiversity enhancement and heat mitigation were the most perceived environmental benefits from the gardens. The Garden City Program also provides enormous opportunities for exercise,

social interaction, and environmental education, which is conducive to health and wellbeing. The city government developed close partnerships with private sector and NGO actors, who shared common interests in environmentally friendly approaches for food cultivation and wider sustainability issues. This ethos is reflected in policy making and implementation, which encourages sustainable and self-sufficient practices. For example, the program is framed as an extension of the "sponge city" scheme that aims to increase spaces for run-off reduction. Expanded greenspace and green roofs are argued to reduce energy requirements for cooling by reducing the Urban Heat Island effect, and in the case of rooftop gardens, offering insulating benefits. Rainwater harvesting is promoted with subsidies and grants and has been commonly implemented in gardens. Some gardens are also employing small solar panels, energy generators, and wind energy equipment, although little energy demand was reported in the survey conducted by Shih (2020). Finally, the government's Environmental Protection Bureau supplies gardens with compost-based fertilizer produced from municipal solid waste collection at no cost. Although equipment, scale and intensity varies greatly, many gardens also have their own composting systems in place. As gardens are required to be organic, energy savings are found (relative to conventional agriculture) by eliminating chemical fertilizers and pesticides.

Environmental education and training

Environmental education is one of the key objectives of the program. This shows in the wide intergration of gardening activities in the curriculum of elementary, junior high, and senior



Figure 2 – On-site composting
Photo credit: Wan-Yu Shih (left) and Erich Hellmer (right)





Figure 3 – Fujianli Community Garden
Photo credit: Wan-yu Shi

high schools. School gardens, which account for 73% of the overall gardens, are educational which involved teachers and students learning through cultivation and cooking activities.

For adult learning, several resources and training programs have been developed to educate citizens about knowledge and practices of environmentally friendly farming. This was developed through a close partnership with local practitioners, community universities, Farming Associations (civic organizations for farmers) and academics. Subsidies are available for gardens to apply for lecturers. Grants are also given to the National Association of Community Colleges, with branches located in each of Taipei's 12 districts, for offering adult learning courses. This existing lifelong learning system becomes an important source for learning about technology of gardening and wider sustainable environmental issues.



Figure 4 – Da-an Silver-hair rooftop garden rising vegetable beds for the elderly
Photo credit: Wan-yu Shi

In addition, consultations and courses are innovatively offered with physical, in-person and virtual formats via several channels such as the Community Garden Promotion Center, Agricultural Consulting Service Centers, Taipei E-University, and technique advisory groups. Online platforms, whether official or non-official webpages or social media platforms, are widely used with active interaction for knowledge sharing from different garden sites. These have provided important civic spaces for mutual community learning.

Community engagement and collaborative governance schemes

Community engagement and collaborative governance are key drivers of the fast implementation and popularity of the program. Taipei Garden City is rooted in a greenspace movement in the early 2010s when citizens came together at a regeneration program, allowing citizens to transform an empty lot into temporary greenspaces outside an urban land use plan. Several individuals got involved and gradually formed the Farming Urbanism Network (FUN), which used online platforms for discussion and initiating activities. FUN members collaboratively developed a policy appeal to candidates of the Taipei Mayoral election for promoting urban farming, which eventually turned into the Taipei Garden City Program. The initiators of FUN have remained active figures within the policy, having been invited to the advisory board for the program, and became the members of an expert group for evaluating the implementation of gardens. Furthermore, FUN and stakeholders regularly meet to share observations, discuss associated policies, and develop recommendations for



Figure 5 – Rainwater harvesting and energy generation.
Source: Eric Hellmer (left) and Wan-yu Shi (right)



Figure 6 – Community learning at the Community Garden Promotion Center
Photo credit: Community Garden Promotion Center



Figure 7 – Paddy field in primary school using harvested rainwater (tanks on the left)
Photo credit: Wan-yu Shi

the city government (Figure 8). This process enables dynamic and flexible interaction between public and private sectors, which forms collaborative decision making.

Cross-sectoral collaboration

Enhanced cooperation between different government sectors is another key driver and enabler of the program. Although the Parks and Streetlights Office has been designated as the principal authority for managing the project. More than ten governmental sectors such as education, economic development, urban development, environmental protection, and health within Taipei City government have worked together to support policy implementation. For example, the social sector is in charge of vegetable donation to social welfare institutes; the sanitation sector conducts regular tests on vegetables, and the urban regeneration sector facilitates the integration of gardens into new development projects. Regular policy meetings coordinated by the deputy mayor was key to facilitating cross-sectoral collaboration between departments. Indeed, the existence of champions in the government has played a key role in streamlining the process and increasing inter-departmental cooperation.

Enabling Factors

Table 1 summarized the enablers for the implementation of Taipei Garden City program into policy and institutional, social involvement, technique and knowledge sharing, and finance.

Active policy discussion, knowledge sharing, and information exchange between stakeholders are key components of the program. This was underpinned by long term citizen empowerment of public affairs in Taiwan in the past few decades. The institutional mechanism created to allow citizens to propose a policy appeal to governments and to influence decision making creates an enabling environment for public participation at an earlier stage of public affairs. It is also noteworthy that existing champions in the city government who bought in to the appeal and actively promoted the program have played an important role in facilitating the implementation.



Figure 8 – Farming Urbanism Network Workshop
Photo credit: Wan-yu Shi



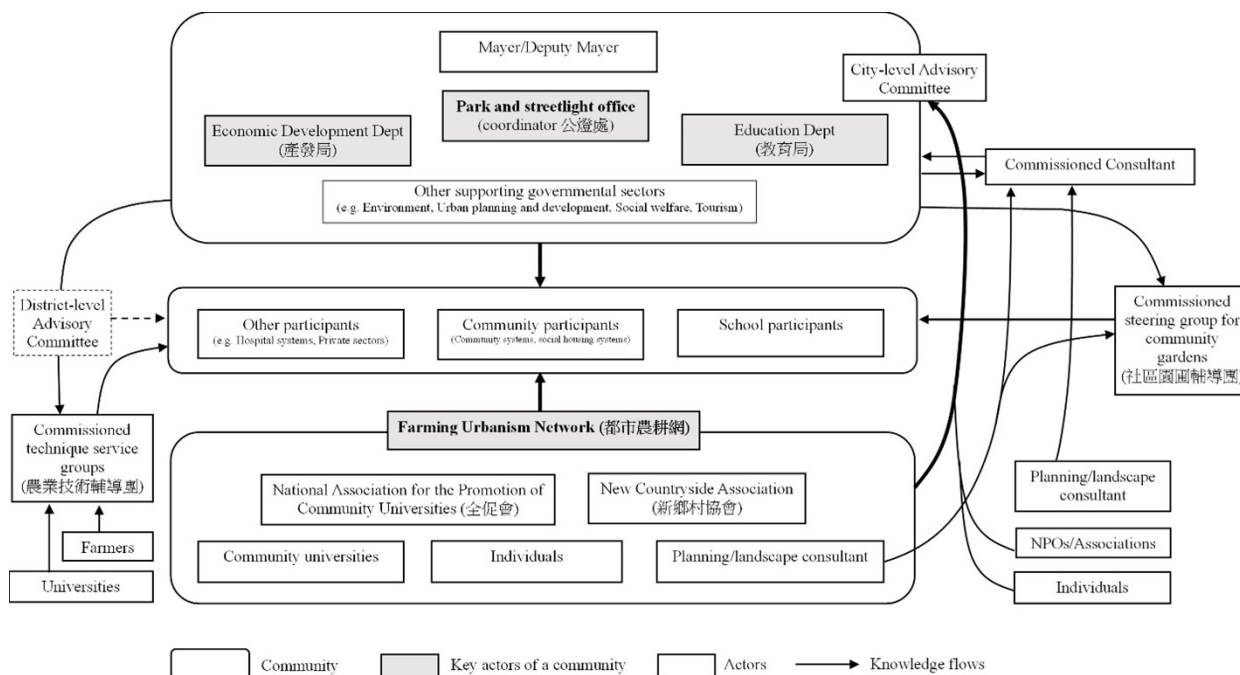


Figure 3 – Governance structure of Taipei Garden City Program (adapted from Mabon L. Shih, W-Y. Jou, S-C. forthcoming)

Another enabling factor for the implementation is the connection of wide social issues. For example, community gardens have been designed with the elderly in mind. Elderly people are encouraged to participate in farming, cooking, and sharing meals in the community center. Other innovative actions are developed around horticultural therapy for patients, vegetable donation to disadvantaged people, and a start-up fund for youth to live in social housing. This makes the program socially relevant and leads to increased community support.

Financially, the program has gained great popularity amongst citizens, and compared to other planning initiatives requires relatively little funding from the city government. The key reason for this was the decision to lift two land use bans on public-owned lands. As mentioned before, this instrument enables temporary use for not-for-profit activities. This not only saves government budgets from land acquisition, but also results in the introduction of gardens within the most populated districts.

Synthesis

Taipei Garden City is a notable greenspace policy that brought multiple socio-environmental benefits. Benefits associated with food, water and energy include food production nearer to consumers as it increases food security and reduces food mileage. In addition, the increase in urban green spaces leads to improved runoff management as the greenspace absorbs storm water and reduces summer heat through the cooling effect of gardens. This can have the knock-on effect of saving energy, and this is amplified by the use of organic agricultural practices that reduce the need for transportation of solid waste and fertilizer. However, these benefits are minimal in comparison to the social benefits such as offering door-step green spaces in the most populated areas of the city. This increased greenspace for recreation and exercise improves the health and wellbeing of urban dwellers and also encourages more social interaction.

More importantly, the program has raised awareness and a culture of sustainability among citizens. The public participation and collaborative governance exercised in the

process of the program also produced valuable social capital for the city.

Institutional	Social	Process	Finance
<p>Mechanism created for public participation in public affairs via proposing a policy appeal</p> <p>Government lifted ban on using publicly owned land, allowing temporary public use for gardening</p> <p>Existence of champions in city government facilitates cross-sectoral cooperation and implementation of the program.</p> <p>Multiple sectors of the city government have coordinated to promote the program</p>	<p>Impetus for the program was jointly driven by local communities and city government pushing for greener urban environments</p> <p>Encouragement of social interaction by engaging neighborhoods, schools, public hospitals, and social housing systems of the city to install gardens and build involvement in farming activities</p> <p>Connecting social issues with the program to engage more citizens, such as care for the aging population, horticultural therapy for patients, vegetable donation to disadvantaged people, and a start-up fund for youth</p>	<p>The program enables various forms of knowledge and expertise from practitioners, gardeners, NGOs, teachers, academics, politicians, and officials to contribute in the process of implementation</p> <p>Knowledge sharing, information exchange and policy discussion between stakeholders are key components of the program, driven by various online platforms and formal and informal learning opportunities</p> <p>Government established technique advisory groups to guide gardens</p>	<p>Two bans were lifted to allow temporary use of public owned land for gardening. This saves budgets from land acquisition and enables fast implementation</p> <p>Funds are initially provided by the city, but gardens are designed to become mostly self sufficient over time</p> <p>Subsidy for inviting lecturers and materials, such as compost and soil conditioner are available through application</p>

Table 1 – Summary of enablers for the Implementation Taipei Garden City Program

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Authors

Wan-Yu Shih
Erich Hellmer
Anina Hartung

Editor

Pourya Salehi

Design

Olga Tokareva

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Contact Us

Kaiser-Friedrich-Str. 7
53113 Bonn | Germany
Tel. +49-228 / 97 62 99-00

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