

URBAN AGRICULTURE AS A CATALYST FOR HEALTHIER, SOCIAL & SELF-SUFFICIENT POST-WAR NEIGHBOURHOODS

Dost Şahingöz

Faculty of Architecture & the Built Environment, Delft University of Technology
Julianalaan 134, 2628BL Delft

ABSTRACT

This research paper explores the potential of urban agriculture as a transformative tool for post-war neighbourhoods, focusing on the Netherlands. It examines how urban agriculture can contribute to healthier, more socially interactive, and self-sufficient communities in areas recovering from the impacts of war. The paper employs a mixed-method approach, including a comprehensive literature review and detailed case studies. It discusses various types of urban agriculture and assesses their benefits in terms of health, social interaction, and self-sufficiency. The findings provide insights into the practical implementation of urban agriculture offering design guidelines and strategies for revitalizing post-war neighbourhoods through sustainable and community-focused agricultural practices.

KEYWORDS: *Urban Agriculture, post-war, health, social interaction, self-sufficiency*

I. INTRODUCTION

In the contemporary world, the escalating wave of urbanization has significantly intensified the risks of climate change and disease outbreaks (Pelling, 2021). These developments have called for urgent innovation in urban sustainability, predominantly including nature-based solutions such as greening cities (Rao et al., 2022). Urban agriculture in particular could provide meaningful solutions that also hold the potential to address socio-economic challenges related to sustainable and resilient food supply systems. Evidence shows that during periods of pandemics such as the COVID-19 crisis (Dietrich et al., 2021), and in times of conflict, as witnessed in the case of Russia and Ukraine (Abay et al., 2023), the supply of essential resources faces disruptions, leading to a substantial increase in food insecurity in urban areas (Dasgupta & Robinson, 2022). In the Netherlands, the implementations of urban agriculture can already be found back in the 1940s, where a lack of food supplies during the second world war led to fields of rye and brown beans on the Coolsingel and Botersloot in Rotterdam (*Urban Agriculture During the War Years*, n.d.).

Nowadays, the challenges related to food resilience are particularly pronounced in lower-income neighbourhoods, which are often located in the post-war neighbourhoods in Netherlands (CBS, 2017). The pressing need for transformation in these neighbourhoods is underscored by the low density of built structures, separation of public facilities, poor energy efficiency and the overall health and well-being of their inhabitants (KAW, 2022). On the neighbourhood scale, problems arise from abrupt shifts between public and private domains, underutilized green spaces, limited diversity of flora and fauna, and a lack of social safety. As demonstrated in research from Van Velze et al. (2020), the quality of the living environment has a significant impact on the physical and mental well-being of the residents. Besides, these neighbourhoods show the highest percentages of residents adopting unhealthy lifestyles, which mostly include physical inactivity, unhealthy diets and smoking (Van Velze et al., 2020). As prices of food have increased with more than 10% in one year (CBS, 2023), the consumption behaviour of these people has been effected, forcing them to go for cheaper and unhealthier alternatives (EenVandaag, 2022).

Urban agriculture has often been addressed as a valuable solution for creating healthy neighbourhoods and cities (Iida et al., 2023). Additionally, the community engaging capabilities, such as strengthening social ties and bridging cultural gaps (Santo et al., 2016), as well as its potential to increase resilience and self-sufficiency among its users (Yuan et al., 2022) are very promising. Various studies have also reported a positive influence on health, especially in deprived neighbourhoods where the majority of the population suffers from health issues (Audate et al., 2021). However, there is a gap in current research when exploring the potential of urban agriculture in post-war neighbourhoods. Despite the significant growth in research about urban agriculture in the last decade (Yan et al., 2022), the implementation and integration in post-war neighbourhoods in the Netherlands remains unexplored. With approximately 1.6 million dwellings in the Dutch housing stock, revitalizing these areas has now become a top priority (KAW, 2022). Therefore, this research paper aims to explore the potential of urban agriculture as a catalyst for healthier post-war neighbourhoods, as well as contributing to community engagement and self-sufficiency. On a broader level, this research also contributes to the broader discourse on sustainable urban development and self-sufficiency.

II. METHODOLOGY

In conducting this research on the role of urban agriculture as a catalyst for promoting healthier post-war neighbourhoods in the Netherlands, a methodology will be employed which combines literature and case studies. As demonstrated in figure 1, the primary objective is to investigate the impact of urban agriculture on key aspects such as health, social interaction and self-sufficiency. Firstly, in order to commence the study, a brief review of relevant literature will be undertaken to identify and define various types of urban agriculture. This step is crucial for establishing a comprehensive understanding of the diverse approaches and practices encompassed by urban agriculture.

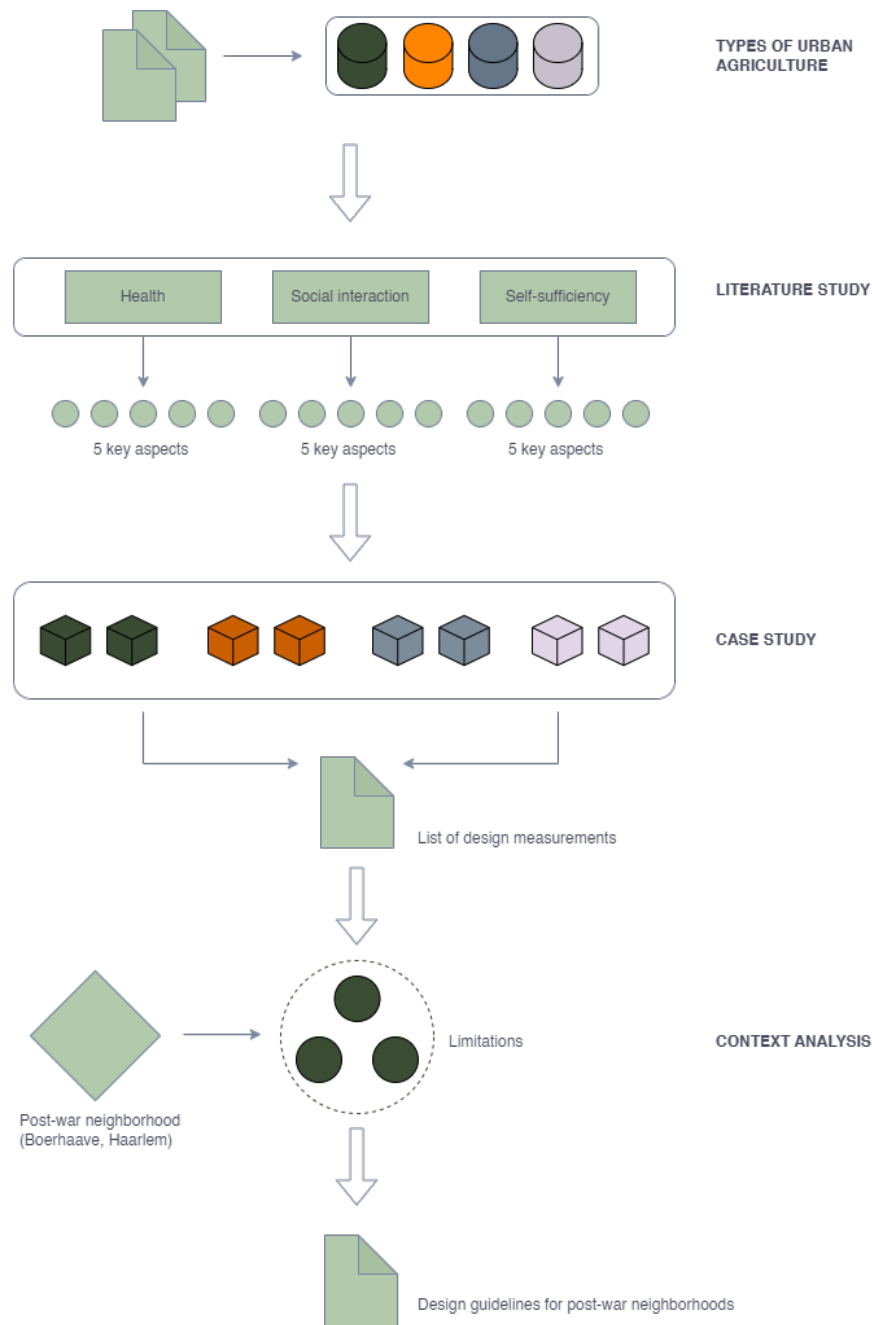


Figure 1: Methodology.

Secondly, each of the three key topics will be explored; mental and physical health; social interaction, and self-sufficiency. At the conclusion of each chapter, five key aspects will be determined that contribute to the topic of health, social interaction or self-sufficiency. Thirdly, to enhance the contextual relevance and applicability of the research, a case study review will be conducted. The main purpose of the case study analysis is to determine the spatial and architectural aspects that underly the urban agricultural purpose of the project. Subsequently, a plus-minus rating system will be developed and used, which will serve to demonstrate the performance of specific urban agriculture types concerning mental and physical health, social interaction, and self-sufficiency. The case studies were chosen based on several criteria such as function, type of urban agriculture and its location in the building, gross size and relevant design aspects (see appendix). Then, the most significant design aspects from the case studies will be listed. Consequently, based on literature about the transformation of post-war

neighbourhoods in the Netherlands by Lörzing et al. (2013), the limiting and promoting factors will be obtained. This will finally result in potential design measurements that could be implemented in post-war neighbourhoods.

III. URBAN AGRICULTURE TYPES

In the realm of urban agriculture there exist different implementations and use cases. For this research the categorization by Goldstein et al. (2016) is used as a framework to assess the physical boundaries of an urban agricultural system. Illustrated in figure 2, their research identified four types of urban agriculture; unconditioned building integrated (a); conditioned building-integrated (b); unconditioned ground-based (c); conditioned ground-based (d). Unconditioned ground-based systems can be described as traditional gardens such as allotment gardens. However, the conditioned ground-based systems are rather related to indoor farming activities, such as green houses. The same applies for building-integrated systems, where the non-conditioned type suggests an outdoor farming facility such as a rooftop garden, while the conditioned systems rather demonstrate indoor systems such as vertical farms or rooftop greenhouses.



Figure 2: Typologies of urban agriculture.

The difference between conditioned and unconditioned systems is important to address. Generally, conditioned systems are active systems, meaning that they rely on controlled environments where factors such as light, humidity and temperature are artificially controlled. Generally, this results in a higher and more consistent annual yield compared to unconditioned systems (Goldstein et al., 2016). On the other hand, these systems also acquire more energy to keep running, which increases the total costs. Another important difference between conditioned and unconditioned systems is the use of soil, where conditioned systems often make use of hydroponic, aeroponic or aquaponic harvesting techniques, unconditioned systems often rely on soil-based harvesting. This also relates to the contribution to local biodiversity, where unconditioned systems can significantly enhance biodiversity in the area compared to conditioned systems that are more isolated from nature. Overall, both the building-integrated as well as ground-based conditioned typologies share a lot of similar aspects.

However, the differences can be noticed within these categories when we look at the unconditioned and conditioned types, especially when it comes to waste cycles. The integration of conditioned systems such as vertical farms in buildings reduces reliance on external sources for energy, water, and nutrients (Blom et al., 2023).

IV. THE HEALTH BENEFITS OF URBAN AGRICULTURE

HOW CAN URBAN AGRICULTURE STIMULATE AND IMPROVE PHYSICAL AND MENTAL HEALTH?

The practice of agriculture has been as old as our early ancestors, from harvesting corn and reed to fruits and vegetables. In our current society, the connection between people and the food we eat has drastically changed, where picture perfect packaged foods in supermarkets have become our standard and small imperfections are quickly classified as 'bad'. In fact, the consumption behaviour of the modern society is directly linked to the use of pesticides used on the crops, vegetables and fruits we consume, increasing the risk for diseases like Parkinson, Alzheimer and MS (Rajawat et al., 2022).

4.1. Physical & mental health benefits

Decentralizing food production with strategies such as urban agriculture has been opted as a solution for better food security (Liu & Liang, 2023), efficient urban waste water management (Magwaza et al., 2020), but most importantly for having a significantly positive effect on people's physical and mental health. As an illustration, Audate et al. (2019) highlighted in their literature review that engagement in urban agriculture was found to influence nutritional status positively, leading to a significantly higher intake of fruits and vegetables as well as greater food diversity. Comparably, Garcia et al. (2018) noted in their literature review that involvement in urban gardening contributes to an increased consumption of fruits and vegetables, facilitates improved access to healthy food options, elevates the appreciation of cooking, promotes the availability of appropriate and nutritious foods, and underscores the significance of organic production.

Yuan et al. (2022) demonstrates that on a global level, urban agriculture is recognized as a prevalent characteristic of cities in less economically developed nations. Specifically, in more economically developed regions, there has been a resurgence of urban agriculture in recent times, and this resurgence is linked to various socioeconomic advantages, encompassing, among others, improvements in food security, social equity, environmental well-being, and public health.

In the case of New York, research by Ackerman et al. (2014) demonstrated that urban agriculture has great potential to help mitigate critical public health and environmental problems. The city suffers from higher than average rates of obesity and diabetes, which are correlated to inadequate access to fresh, healthy food retail. This is relevant to the issue of urban agriculture because the communities that suffer the most from diet-related disease and inadequate access to healthy foods are also the areas where much of the city's vacant land is located, which also seems to be the case for post-war neighbourhoods in the Netherlands (KAW, 2022).

Considering mental health, a study on the characteristics and motivations of urban agriculture practitioners in deprived neighbourhoods by Audate et al. (2021) was conducted. The outcome demonstrated that many of the agricultural practitioners had a concerted perception that urban agricultural activities positively influence their mental health. Some of them greatly valued the role of UA activities such as watering the plants, caring for the plot, and harvesting the produce as stress and anxiety reducers. For others, urban agriculture brings another meaning to their life. When in their garden, they feel refreshed, and they engage their mind in a different way while putting behind their daily concerns. Generally, the majority of the gardeners considered the health benefits of their healthy diet to be greatly influenced by the urban agricultural activities.

Research by Schram-Bijkerk et al. (2015) reviewed healthy urban gardening in the Netherlands. Here, the focus was mainly on soil-based gardening, which for this research could both be classified as

unconditioned ground-based as well as unconditioned building-integrated practice. While the available evidence was constrained, the 18 peer-reviewed articles indicated that urban agriculture could have positive impacts on health. These potential benefits include stress reduction, heightened physical activity, greater intake of fruits and vegetables, and increased social interactions, especially among the elderly. Stress reduction was also noticed by Hawkins et al. (2011). In this research allotment gardeners reported significantly less perceived stress than participants of indoor exercise classes, as a result of being in a green environment. However, since stress reduction levels were measured based on perceived stress rather than cortisol levels, an appropriate experimental setting in contrast to monitoring programs that use indicators, could enhance the evidence (Schram-Bijkerk et al., 2015).

4.2. Potential risks

Besides the potential benefits, urban agriculture is also related to several health risks, especially in the case of soil-based systems. Health risks with urban agriculture are often related to polluted soil, containing high levels of harmful metals such as lead. In the Netherlands, two-thirds of the vegetables from gardens within less than 10 meters of a busy road exceed European lead standards (Voedingscentrum, 2023). Contaminants present in the soil can permeate plants via the roots and leaf stomata, accumulating in the parts that are consumed (Elert et al., 2011). This raises concerns about potential adverse effects on human health when consuming these vegetables. Furthermore, urban gardeners face potential exposure not only through the consumption of vegetables but also through the ingestion of soil particles, such as through hand-to-mouth contact (Schram-Bijkerk et al., 2015).

To conclude, the five main health improving factors of UA are mostly related to being in a green environment (1), physical activity (2), increased vegetable and fruit intake (3), reduced stress levels (4) and social contacts (5). However, polluted soils may result in health risks and must be given careful attention.

V. THE SOCIAL BENEFITS OF URBAN AGRICULTURE

HOW CAN URBAN AGRICULTURE STIMULATE SOCIAL INTERACTION?

Social interaction in post-war neighbourhoods is a commonly occurring topic that is mainly restrained by the urban and architectural design of the environment (KAW, 2020). The spatial design of the dwellings and the relation to the collective public spaces, especially on the ground floor, have caused barriers between residents (Ministerie van Onderwijs, Cultuur en Wetenschap, 2004). Despite the spatial limitations, the residents often seek for social interaction in external spaces such as local tea houses or neighbourhood centres. Simultaneously, there has been an increased sense of loneliness, especially among the elderly, which was amplified during the COVID-19 pandemic (Berends, 2022). In order to address this, urban agriculture will be explored as a tool to gather communities and stimulate socializing among residents.

5.1. Social benefits

During the early stages of the COVID-19 pandemic, gardening emerged as a constructive and secure environment fostering social interaction, knowledge acquisition, and creativity. Engaging in gardening activities led individuals to participate in personal, social, and environmental dynamics, fostering heightened civic involvement and mitigating stress. A shared theme was the recognition of gardening's societal significance during this period, offering individuals, families, and communities a constructive focal point amid challenging circumstances (Kingsley et al., 2023).

Santo et al. (2016) demonstrate in their research how various research studies have highlighted the positive impact of community gardens on social capital within neighbourhoods. These gardens contribute to the strengthening of social ties and networks among residents, fostering connections between individuals from diverse backgrounds and different positions of influence. The relationships formed, characterized by mutual trust and reciprocity, become crucial sources of support during crises

and enable communities to access additional resources, funding, and favourable policies from external entities and government bodies. Additionally, community gardens play a role in bridging divides, easing tensions, and promoting social cohesion by bringing together people of varied races/ethnicities, cultures, religions, socioeconomic statuses, genders, ages, and educational backgrounds. Through shared activities centred around a common purpose, these gardens facilitate interactions that foster unity. The cultural significance of food cultivation, preparation, and sharing further enhances the gardens' role as social connectors, helping communities preserve and celebrate their cultural traditions related to food.

Additionally, a study by Ilieva et al. (2022) measured the social benefits of urban agriculture by systematically reviewing 272 peer-reviewed publications, encompassing insights from urban agriculture sites across 57 countries. The analysis highlighted a growing body of research, predominantly focused on community cohesion and increased access to fruits and vegetables, associated with improved health and reduced food insecurity. However, in order to better understand the social and cultural benefits of urban agriculture, future research has to include larger groups, study on different countries, and use methods like randomized control trials to measure the effects of participating in urban farming activities more accurately.

Urban agriculture, as highlighted by Ackerman et al. (2014), van Averbek (2007), and Mees and Stone (2012), is recognized as a means of fostering community empowerment, providing a common social and cultural identity, and addressing social justice issues. Audate et al. (2021) note that immigrants in Montreal view gardens as places for cultural connections and improving language skills.

The studies by Walsh (2011), Alaimo et al. (2010), Teig et al. (2009), and Hale et al. (2011) underscore the social aspects of community gardening, emphasizing interactions, learning, trust-building, and positive health-related behaviours. Additionally, Wakefield et al. (2007) and Levidow (2018) point to the broader community benefits of community gardens and food initiatives, including improved relationships, community pride, and systemic changes through cultural transformation in food practices.

5.2. Potential risks

A few of studies have clearly highlighted the potential risks for community engagement as a result of urban agricultural interventions. One of those studies by Audate et al. (2021) for example highlighted the importance of regular maintenance which became a problem in the case of a collective garden in Montreal, Canada. The organizational structure of these community gardens fostered individualism, with each member having their own plot. Limited participation in offered integration activities further contributes to this trend. While many view the gardens as a stress-relieving hobby, not all actively seek social interaction (Audate et al., 2021). In the case of the US, urban agriculture initiatives driven by lower-income communities and people of colour have faced inequalities in accessing land, government funding, and political backing in contrast to those led by white and middle-class groups. Moreover, predominantly young, white non-residents have taken the lead in urban agriculture initiatives in predominantly black and/or Latino neighbourhoods, unintentionally marginalizing people of colour from engagement and the associated advantages (Santo et al., 2016). Therefore it is crucial to stimulate inclusiveness and equality in urban agricultural settlements.

In conclusion, the five main factors that impact social interactions in urban agriculture are mostly related to social relations (1), community empowerment (2), bridging cultures (3), collective gardening (4) and learning from each other (5). Additionally, it is important to pay attention to the degrees of social interaction as well as the organizational structure of the community gardens. Lastly, inclusiveness should be promoted in order to minimize marginalization.

VI. THE SELF-SUFFICIENCY BENEFITS OF URBAN AGRICULTURE

HOW CAN URBAN AGRICULTURE FOSTER SELF-SUFFICIENCY?

Challenges associated with conventional agricultural practices, broadly categorized as related to the depletion of wildlife habitats for expanding cultivable areas and stemming from the intensified use of land (Lubowski et al., 2006), have prompted the adoption of urban agriculture as a means to reduce dependence on traditional farming methods. Simultaneously, pandemics, wars and crisis have continuously obstructed the supply of essential resources including wheat, oil and other foods. As a result, the prices of these products have peaked, amplifying the extra financial stress on people in lower-income groups. Localizing food production through urban gardening not only holds the potential to improve health and social relations, it also opens the opportunity for self-sufficiency and resilience during times of war and pandemic.

6.1. Self-sufficiency benefits

According to Ackerman et al. (2014), food insecurity can be temporary or chronic and is associated with a variety of problems in adolescents, who are at higher risk than young children. A perceived or actual need to improve food security and a lack of ability to rely on food from rural areas can result in the use of urban agriculture, which has been shown to improve the quantity and quality of food available to low income urban households under a variety of conditions.

At the household level, economic benefits and costs involved in agricultural production such as self-employment, exchange of products, income from sales, savings on food and health expenditures are directly incurred by the urban households (Yuan et al., 2022). On the other hand, research by Glavan et al. (2018) demonstrated that most urban gardeners were not motivated mainly by profit, but of other factors such as safe and healthy food production, source of relaxation, environmental impact, and as a means of socializing. Albeit profit being of second importance, economic productivity of urban gardens can be compared to market production by a substantial amount.

Another study by Hume et al. (2021) in Adelaide, Australia, used remote sensing to analyse residential lawn space for urban agriculture, finding that high-yield, soil-based vegetable production could achieve household self-sufficiency. Their model indicated that 72% of lawn space was needed for recommended vegetable intake under a medium yield, dropping to 23% under a high yield. Factors like labour, nutrients, and water were discussed as potential limitations. Achieving self-sufficiency, as outlined in this research, relies on achieving high yields, effective nutrient management, and optimizing the efficiency of gardeners.

6.2. Potential risks

Santo et al. (2016) described several potential problems regarding self-sufficiency. Urban agriculture is unlikely to generate a substantial number of jobs with liveable wages. Initiatives aiming to provide opportunities for individuals considered as the "least employable" demand additional expertise beyond farming skills, potentially leading to increased staff time and labour costs. Besides, the absence of secure long-term land tenure may expose urban agricultural projects to the risk of redevelopment or competition with alternative land/building uses. Financial and political support are often crucial for the survival of UA projects, as most cannot rely solely on profits from produce, especially when pursuing additional social missions.

Altogether, there are many aspects that are capable of fostering self-sufficiency for users of urban agriculture. The five main contributing factors are mostly related self-employment and opportunity for education or self-employment (1), food security (2), profit from sales (3), proper nutrient management (4) and funding (5). On the other hand it is important to pay attention to the financial feasibility and expertise needed for developing the project.

VII. CASE STUDY ANALYSIS

For the case study analysis, eight residential and public projects were selected for evaluation based on their design, integration of urban agriculture, and relevance to health, social interaction, and self-sufficiency. The data utilized encompassed architect descriptions, architect drawings (if available), media publications, and interviews with residents or users. To comprehend the spatial and architectural design decisions influencing urban agriculture, compiled lists of five aspects per category served as an assessment tool. Employing a plus-minus rating system, each topic could gain or lose a maximum of two points. Finally, to illustrate the utilized design strategies, each case study is accompanied by a schematic principle illustration elucidating the design's purpose.

7.1. Results

In the category of unconditioned building-integrated projects, two case studies, Via Verde by Grimshaw and Dattner Architects, and 60 Richmond Housing Cooperative by Teeple Architects were assessed (figure 3). Via Verde was scored well particularly in the categories 'health' and 'social interaction'. The design of the routing through the urban agricultural facilities in combination with the amount of communal facilities, which were able to host social as well as educational events, contributed to the overall performance. To compare, 60 Richmond Housing Cooperative performed more or less equally in the category of health, but really differentiated itself in the category of social interaction where it scored a 9. This was mostly due to the community style of living and the empowerment of the residents through the self-owned restaurant. The locally harvested foods, used in the restaurant for preparing meals which were sold to the public, also significantly contributed to this.

The second category, conditioned building-integrated, was assessed through looking at Pasona HQ by Kono Designs and The Greenhouse by Cepezed (figure 4). To begin, Pasona HQ demonstrated a high level of self-sufficiency due to an innovative integrated approach which contained several layers of urban agriculture, including actively controlled systems as well as soil based systems. This was further enhanced by positive scores in both health and social interaction, facilitated by the consumption of freshly harvested greens during lunch and the opportunity for all employees to take breaks for harvesting. Additionally, the building is also used to accommodate public events specifically designed to highlight the possibilities of integrated agriculture within an urban setting.

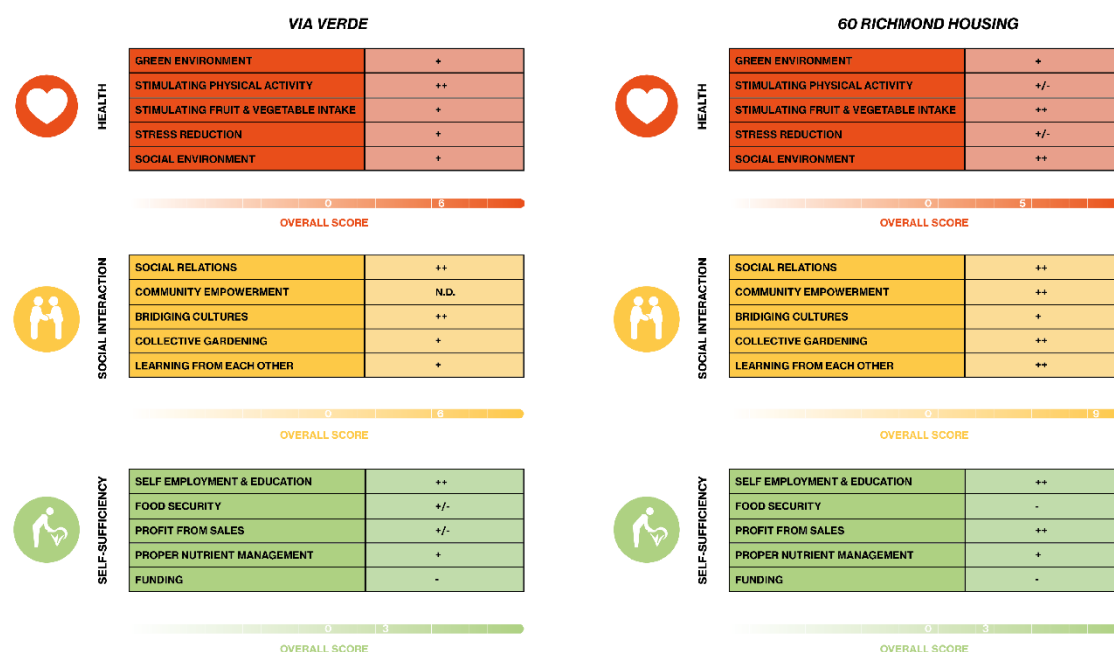


Figure 3: Ratings in the category unconditioned building-integrated.

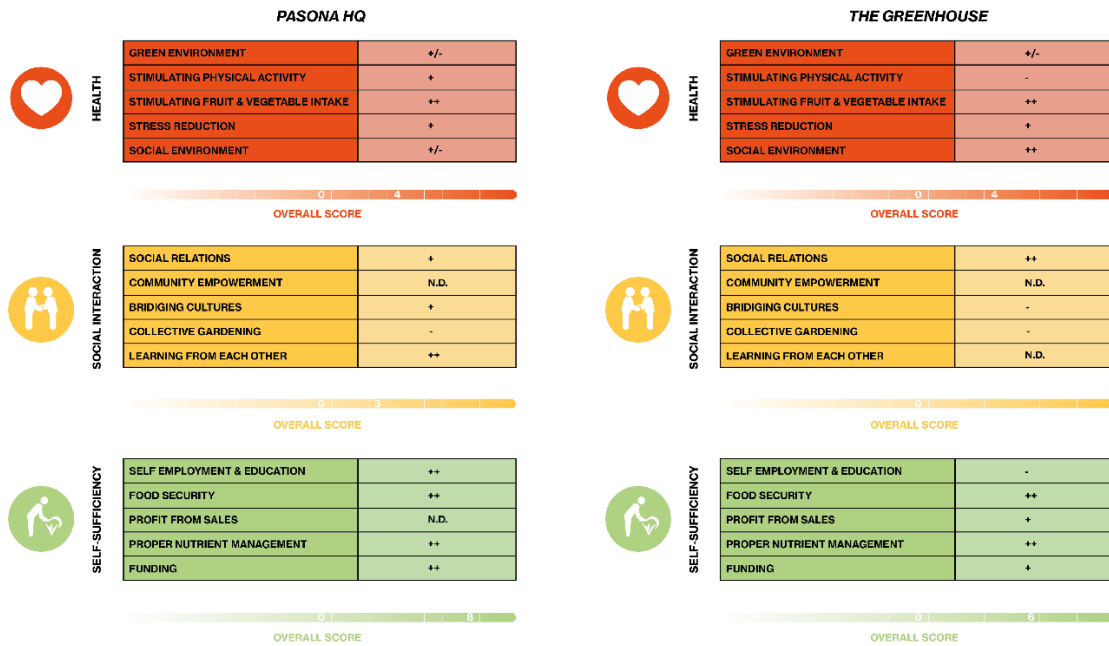


Figure 4: Ratings in the category conditioned building-integrated.

Subsequently, the third category was assessed using Urby Staten Island and Tuinen van BRET as case studies for the unconditioned soil-based category (figure 5). The results show that Urby Staten Island scores particularly high in the health category, which can be related back to the high quality of the green environment with regards to the orientation of the collective spaces. Since the communal kitchen is directly connected to the outdoor farm which is part of the courtyard, a visual connection arises. Additionally, the communal space is often used by residents to learn from each other in for example self-taught workshops or events. On the other side of the world, The Tuinen van BRET is located near Station Sloterdijk in Amsterdam. Similar to Urby Staten Island, this case study particularly excelled in health stimulation despite the lack of data for the fruit and vegetable intake parameter. As the name suggests, the ‘gardens’ van Bret demonstrate a green open environment that is accessible to the public. Besides, it also hosts wine making seminars to the public, made from locally grown grapes and harvested grapes.

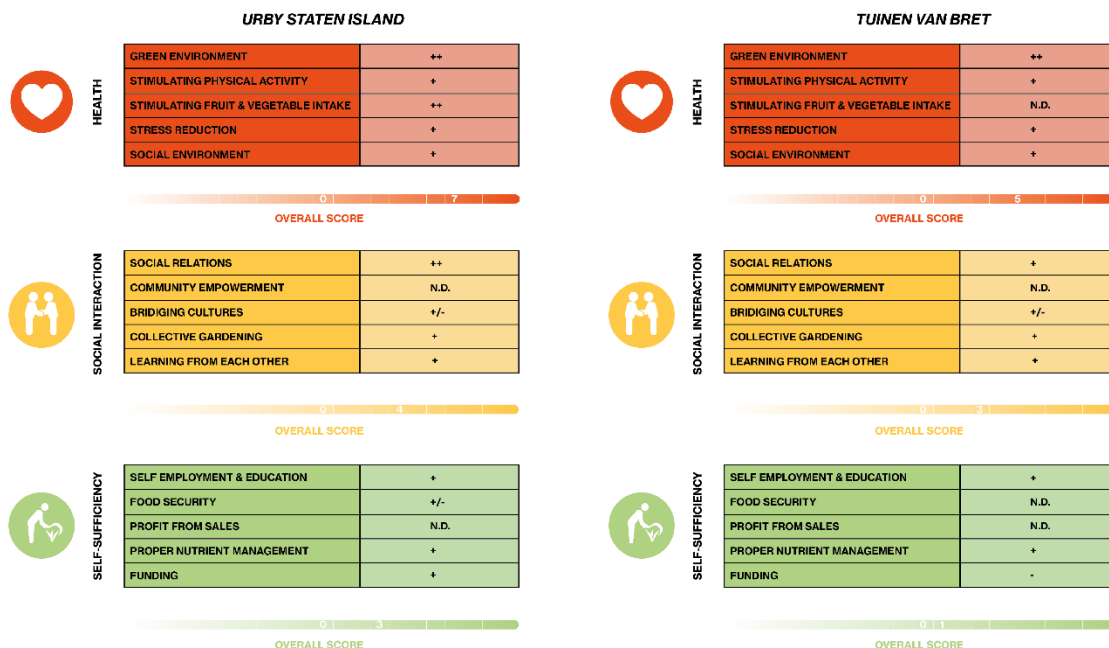


Figure 5: Ratings in the category unconditioned soil-based.

The last category, conditioned soil-based, was assessed by looking at Taisugar Circular Village and K-Farm (figure 6). Taisugar Circular Village by Bio-architecture Formosana demonstrated the highest total ranking of all case studies. This was due to a respectively high score in the category health and social interaction, which was achieved because of the central courtyard that contained all agricultural functions. Because of its strong collective value and profitable yield, residents were keen to participate in agricultural practices. Additionally, due to a circular system and the integration of many community focused facilities, the level of self-sufficiency was also mentionable. In the case of K-Farm, it received a high rating in the health and social interaction categories and outscored all other case studies in terms of self-sufficiency. The public program attracted diverse target groups, promoting participation and learning as well as stimulating people to walk and wander through the landscape.

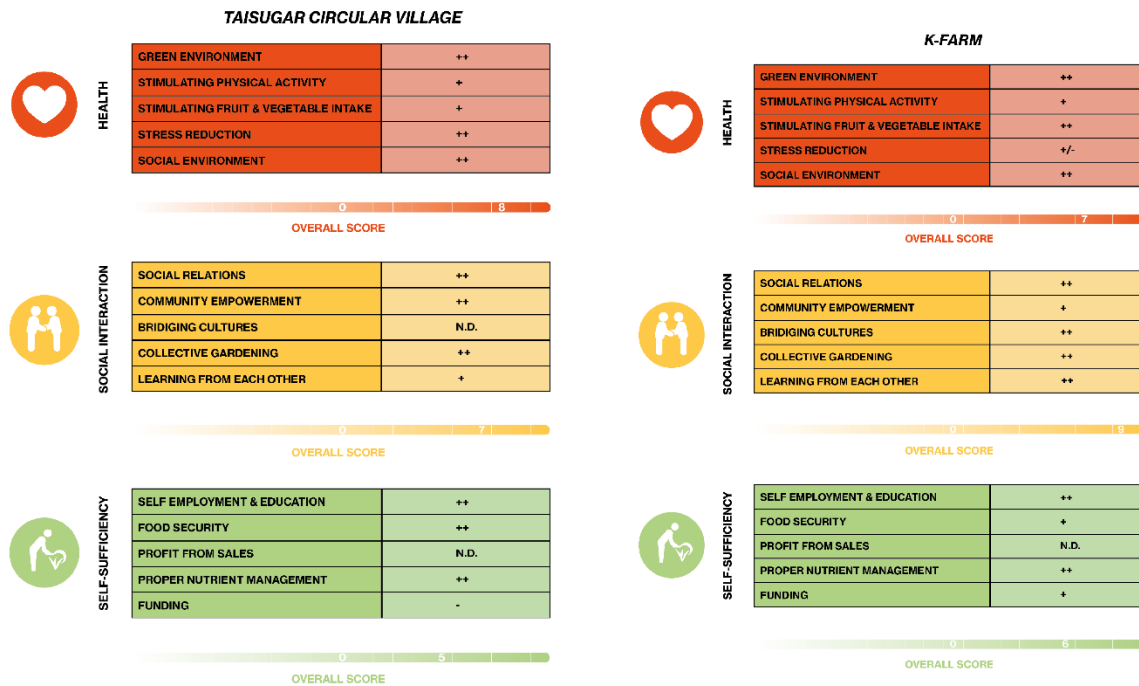


Figure 6: Ratings in the category conditioned soil-based.

7.2. Urban Agriculture in Post-War Neighbourhoods

The research on urban agriculture aligns with the context of post-war neighbourhoods, as they share common challenges and issues. Post-war neighbourhoods, contributing more than one million houses to the Dutch housing stock, are often characterized by a high percentage of corporation owned dwellings, amount of individuals who are under the age of 45, people that rely on social assistance, low-income households and high amount of residents from non-western origin (CBS, 2017). From an architectural perspective, these garden city inspired neighbourhoods demonstrate a low density, a lack in variety of dwelling typologies that match current society and an inactive programme in the plinths of the buildings (Lörzing et al., 2013). Furthermore, the neighbourhoods adhere to a rigorous division of functions. The functionalists of the time strongly advocated for the segregation of residential, occupational, traffic, and recreational activities. Ultimately as society kept developing, these aspects caused several problems in these neighbourhoods. In the case of Boerhaavewijk, Haarlem (figure 7), according to the RIVM (2023), 53% of residents aged 18 to 65 in the Boerhaavewijk neighbourhood have a moderate or high risk of anxiety or depression. Additionally, 55% of residents aged 65 or older feel lonely and 61% of residents aged 65 or older are overweight. Stimulating physical activity in a green environment and socializing is crucial in order to improve the living quality of the neighbourhood. With regards to education, one-third of the inhabitants is considered 'low-educated'.

characterized as having low educational attainment, this underscores the importance of implementing such strategies.

7. The integration of small startups in Tuinen van BRET stimulated the growth of the area, while also attracting the general public to agricultural practices in an urban environment. This measure could be effective in terms of self-sufficiency.

Altogether these design measures could contribute to improving factors such as health, social interaction and self-sufficiency in post-war neighbourhoods in the Netherlands.

VIII. DISCUSSION AND CONCLUSION

The case study analysis provides a nuanced understanding of the role of urban agriculture in post-war neighbourhoods. The diverse typologies of urban agriculture, ranging from unconditioned building-integrated to conditioned ground-based systems, showcase a spectrum of approaches. The results emphasize the importance of context-specific design strategies, as evidenced by variations in health, social interaction, and self-sufficiency across different projects. On the other hand, the diversity among project types and contexts poses challenges for direct comparisons. Subjectivity introduced by self-reported measures from residents adds nuances to the findings. A more standardized evaluation framework would enhance the robustness of the analysis.

The health benefits of urban agriculture, particularly in reducing stress, increasing physical activity, and promoting healthier diets, align with existing literature. Socially, the positive impact on community cohesion and bridging cultural divides echoes findings from various studies. The self-sufficiency benefits, including economic advantages and reduced dependence on traditional farming, further underscore the potential of urban agriculture in fostering resilient communities.

The research question regarding the potential of urban agriculture as a catalyst for healthier post-war neighbourhoods is answered affirmatively. The case studies demonstrate that well-designed urban agricultural interventions have the capacity to address health disparities, enhance social interactions, and contribute to self-sufficiency in these neighbourhoods. Besides, the results signify that urban agriculture, when strategically implemented, can act as a multifaceted solution to the challenges faced by post-war neighbourhoods. While the results suggest that well-designed urban agriculture can bring positive change, it's crucial to acknowledge the complexity of urban challenges. Urban agriculture should be seen as part of a broader set of interventions. The meaning lies in its potential contribution, but the broader urban context should not be overshadowed.

Considering the used methodology, the combination of literature review and case studies is an appropriate method for exploring the impact of urban agriculture in post-war neighbourhoods. However, the method has its limitations. The reliance on case studies, while providing in-depth insights, may limit the generalizability of findings. The method could be further strengthened by incorporating a broader range of neighbourhoods and diverse geographical contexts. Even though many post-war neighbourhoods have a similar structure and cope with similar problems, this will make the research more applicable,

IX. REFERENCES

10.1. Literature

1. Abay, K. A., Breisinger, C., Glauber, J. W., Kurdi, S., Laborde, D., & Siddig, K. (2023). The Russia-Ukraine war: Implications for global and regional food security and potential policy responses. *Global Food Security*, 36, 100675. <https://doi.org/10.1016/j.gfs.2023.100675>

2. Ackerman, K., Conard, M., & Culligan, P. J. (2014). Sustainable Food Systems for Future Cities: The Potential of Urban Agriculture*. *The Economic and Social Review*, 45(2), 189–206.
3. Alaimo, K., Reischl, T. M., & Allen, J. O. (2010). Community gardening, neighborhood meetings, and social capital. *Journal of Community Psychology*, 38(4), 497–514. <https://doi.org/10.1002/jcop.20378>
4. Audate, P. P., Cloutier, G., & Lebel, A. (2021). The motivations of urban agriculture practitioners in deprived neighborhoods: A comparative study of Montreal and Quito. *Urban Forestry & Urban Greening*, 62, 127171. <https://doi.org/10.1016/j.ufug.2021.127171>
5. Audate, P. P., Fernandez, M. A., Cloutier, G., & Lebel, A. (2019). Scoping review of the impacts of urban agriculture on the determinants of health. *BMC Public Health*, 19(1). <https://doi.org/10.1186/s12889-019-6885-z>
6. Berends, N. (2022). Eenzaamheid onder ouderen. *TvV Tijdschrift Voor Verzorgenden*, 54(1), 14–18. <https://doi.org/10.1007/s41183-021-0724-x>
7. Bisiani, T., Basso, S., Martolana, P., & Venudo, A. (2023). Vertical Farm: from Agriculture to a New City Architecture. *FORUM a+P Interdisciplinary Journal of Architecture and Built Environment*, 25, 70–82. <https://doi.org/10.37199/f410020015>
8. Blom, A., Jansen, B., & Van Der Heiden, M. (2004). De typologie van de vroeg-naoorlogse woonwijken. In *Rijksdienst Voor Het Cultureel Erfgoed*. Ministerie van Onderwijs, Cultuur en Wetenschap. <https://www.cultureelerfgoed.nl/publicaties/publicaties/2014/01/01/de-typologie-van-de-vroeg-naoorlogse-woonwijken>
9. Blom, T., Jenkins, A., & Van Den Dobbelsteen, A. (2023). Synergetic integration of vertical farms and buildings: reducing the use of energy, water, and nutrients. *Frontiers in Sustainable Food Systems*, 7. <https://doi.org/10.3389/fsufs.2023.1227672>
10. Centraal Bureau voor de Statistiek. (2017, November 17). Veel naoorlogse stadswijken sociaaleconomisch zwak. *Centraal Bureau Voor De Statistiek*. <https://www.cbs.nl/nl-nl/nieuws/2017/46/veel-naoorlogse-stadswijken-sociaaleconomisch-zwak>
11. Choubchilangroudi, A., & Zarei, A. (2022). Investigation the effectiveness of light reflectors in transmitting sunlight into the vertical farm depth to reduce electricity consumption. *Cleaner Engineering and Technology*, 7, 100421. <https://doi.org/10.1016/j.clet.2022.100421>
12. Dasgupta, S., & Robinson, E. (2022). Impact of COVID-19 on food insecurity using multiple waves of high frequency household surveys. *Scientific Reports*, 12(1). <https://doi.org/10.1038/s41598-022-05664-3>
13. Dietrich, S., Giuffrida, M. V., Martorano, B., & Schmerzeck, G. (2021). COVID-19 policy responses, mobility, and food prices. *American Journal of Agricultural Economics*, 104(2), 569–588. <https://doi.org/10.1111/ajae.12278>
14. Elert, M., Bonnard, M., Jones, C., Schoof, R. A., & Swartjes, F. A. (2011). *Dealing with Contaminated Sites: From Theory towards Practical Application*. Springer Science & Business Media.
15. Garcia, M. T., Ribeiro, S. M., Germani, A. C. C. G., & Bógus, C. M. (2017). The impact of urban gardens on adequate and healthy food: a systematic review. *Public Health Nutrition*, 21(2), 416–425. <https://doi.org/10.1017/s1368980017002944>
16. Goldstein, B., Hauschild, M. Z., Fernández, J., & Birkved, M. (2016). Urban versus conventional agriculture, taxonomy of resource profiles: a review. *Agronomy for Sustainable Development*, 36(1). <https://doi.org/10.1007/s13593-015-0348-4>
17. Hale, J., Knapp, C. N., Bardwell, L., Buchenau, M., Marshall, J. A., Sancar, F. H., & Litt, J. (2011). Connecting food environments and health through the relational nature of aesthetics: Gaining insight through the community gardening experience. *Social Science & Medicine*, 72(11), 1853–1863. <https://doi.org/10.1016/j.socscimed.2011.03.044>
18. Houweling, B., Bakker, S., Brinkers, M., & Hart, B. (2023). Onbewerkte plantaardige voeding belangrijk voor mensen met DM2. *Huisarts En Wetenschap*, 66(9), 36–38. <https://doi.org/10.1007/s12445-023-2313-9>

19. Hume, I., Summers, D., & Cavagnaro, T. R. (2021). Self-sufficiency through urban agriculture: Nice idea or plausible reality? *Sustainable Cities and Society*, 68, 102770. <https://doi.org/10.1016/j.scs.2021.102770>
20. Iida, A., Yamazaki, T., Hino, K., & Yokohari, M. (2023). Urban agriculture in walkable neighborhoods bore fruit for health and food system resilience during the COVID-19 pandemic. *Npj Urban Sustainability*, 3(1). <https://doi.org/10.1038/s42949-023-00083-3>
21. Ilieva, R. T., Cohen, N., Israel, M., Specht, K., Fox-Kämper, R., Fargue-Lelièvre, A., Ponižy, L., Schoen, V., Caputo, S., Kirby, C. K., Goldstein, B., Newell, J. P., & Blythe, C. (2022a). The Socio-Cultural Benefits of Urban Agriculture: A Review of the Literature. *Land*, 11(5), 622. <https://doi.org/10.3390/land11050622>
22. Jenkins, A. (2018). *Building Integrated Technical Food Systems* [Doctoral Thesis]. Queen's University Belfast.
23. KAW. (2020). Onderzoek Ruimte Zat. In KAW. KAW Research and Development. <https://www.kaw.nl/projecten/onderzoek-ruimte-zat-corporatievastgoed/>
24. Kingsley, J., Donati, K., Litt, J., Shimp, N., Blythe, C., Vávra, J., Caputo, S., Milbourne, P., Diekmann, L., Rose, N., Fox-Kämper, R., Van Den Berg, A., Metson, G. S., Ossola, A., Feng, X., Astell-Burt, T., Baker, A., Lin, B. B., Egerer, M., . . . Byrne, J. (2023). Pandemic gardening: A narrative review, vignettes and implications for future research. *Urban Forestry & Urban Greening*, 87, 128062. <https://doi.org/10.1016/j.ufug.2023.128062>
25. Krikser, T., Piore, A., Berges, R., & Opitz, I. (2016). Urban Agriculture Oriented towards Self-Supply, Social and Commercial Purpose: A Typology. *Land*, 5(3), 28. <https://doi.org/10.3390/land5030028>
26. Kubey, K. (2017, September 14). Via Verde. *Domus*. <https://www.domusweb.it/en/architecture/2012/06/14/via-verde.html>
27. Levidow, L. (2018). London's Urban Agriculture: Building Community through Social Innovation. *International Journal of the Sociology of Agriculture and Food*, 24(3). <https://doi.org/10.48416/ijf.v24i3.10>
28. Liu, W., & Liang, J. (2023). Decentralization and Food Safety: Evidence from China. *Social Science Research Network*. <https://doi.org/10.2139/ssrn.4559511>
29. Lörzing, H., Harbers, A., & Schluchter, S. (2013). Krachtwijken met karakter. In *Planbureau Voor De Leefomgeving*. NAI Uitgevers. <https://www.pbl.nl/publicaties/krachtwijken-met-karakter>
30. Magwaza, S. T., Magwaza, L. S., Odindo, A., & Mditshwa, A. (2020). Hydroponic technology as decentralised system for domestic wastewater treatment and vegetable production in urban agriculture: A review. *Science of the Total Environment*, 698, 134154. <https://doi.org/10.1016/j.scitotenv.2019.134154>
31. Martin, M., Weidner, T., & Gullström, C. (2022). Estimating the potential of building integration and regional synergies to improve the environmental performance of urban vertical farming. *Frontiers in Sustainable Food Systems*, 6. <https://doi.org/10.3389/fsufs.2022.849304>
32. Mees, C., & Stone, E. (2012). Zoned Out: The Potential of Urban Agriculture Planning to Turn Against its Roots. *Cities and the Environment*, 5(1), 1–14. <https://doi.org/10.15365/cate.5172012>
33. Nowysz, A., & Trocka-Leszczynska, E. (2001). Typology of urban agriculture architecture. *Acta Scientiarum Polonorum*, 20(3), 63–71. <https://doi.org/10.22630/aspa.2021.20.3.27>
34. Pelling, M. (2021). A climate resilience research renewal agenda: learning lessons from the COVID-19 pandemic for urban climate resilience. *Climate and Development*, 14(7), 617–624. <https://doi.org/10.1080/17565529.2021.1956411>
35. Rajawat, N. K., Bhardwaj, K., & Mathur, N. (2022). Risk of Parkinson disease associated with pesticide exposure and protection by probiotics. *Materials Today: Proceedings*, 69, A1–A11. <https://doi.org/10.1016/j.matpr.2022.12.153>
36. Rao, N., Patil, S., Singh, C., Roy, P., Pryor, C., Poonacha, P., & Genes, M. (2022). Cultivating sustainable and healthy cities: A systematic literature review of the outcomes of urban and peri-urban agriculture. *Sustainable Cities and Society*, 85, 104063. <https://doi.org/10.1016/j.scs.2022.104063>

37. Reijneveld, S. A., Koene, M., Tuinstra, J., Van Der Spek, S., Broekhuis, M., & Wagenaar, C. (2023). Making post-war urban neighbourhoods healthier: involving residents' perspectives in selecting locations for health promoting urban redesign interventions. *Cities & Health*, 1–9. <https://doi.org/10.1080/23748834.2023.2197165>
38. RIVM. (2023a). Eenzaamheid [Dataset]. In *Gezondheidsmonitor Boerhaavewijk*. <https://allecijfers.nl/wijk/boerhaavewijk-haarlem/#eenzaamheid>
39. RIVM. (2023b). Gewicht [Dataset]. In *Gezondheidsmonitor Boerhaavewijk*. <https://allecijfers.nl/wijk/boerhaavewijk-haarlem/#gewicht>
40. RIVM. (2023c). Psychische gezondheid [Dataset]. In *Gezondheidsmonitor Boerhaavewijk*. https://allecijfers.nl/wijk/boerhaavewijk-haarlem/#psychische_gezondheid
41. RIVM. (2023c). Opleidingsniveau [Dataset]. In *Gezondheidsmonitor Boerhaavewijk*. https://allecijfers.nl/wijk/boerhaavewijk-haarlem/#psychische_gezondheid
42. Santo, R., Palmer, A., & Kim, B. (2016). *VACANT LOTS TO VIBRANT PLOTS: A REVIEW OF THE BENEFITS AND LIMITATIONS OF URBAN AGRICULTURE*. John Hopkins Center for a Liveable Future. <https://clf.jhsph.edu/publications/vacant-lots-vibrant-plots-review-benefits-and-limitations-urban-agriculture>
43. Sayigh, A., & Trombadore, A. (2021). *The importance of greenery in sustainable buildings*. Springer Nature.
44. Schram-Bijkerk, D., Van Dirven Breemen, & Otte. (2015). *Healthy Urban Gardening* (No. 2015–0172). National Institute for Public Health and the Environment. Retrieved December 16, 2023, from <https://www.rivm.nl/publicaties/healthy-urban-gardening>
45. Specht, K., Siebert, R., Hartmann, I., Freisinger, U. B., Sawicka, M., Werner, A., Thomaier, S., Henckel, D., Walk, H., & Dierich, A. (2013). Urban agriculture of the future: an overview of sustainability aspects of food production in and on buildings. *Agriculture and Human Values*, 31(1), 33–51. <https://doi.org/10.1007/s10460-013-9448-4>
46. Teig, E., Amulya, J., Bardwell, L., Buchenau, M., Marshall, J. A., & Litt, J. (2009). Collective efficacy in Denver, Colorado: Strengthening neighborhoods and health through community gardens. *Health & Place*, 15(4), 1115–1122. <https://doi.org/10.1016/j.healthplace.2009.06.003>
47. Van Velze, K., Pieterse, N., Martens, A., Breedijk, M., & De Hollander, G. (2020). Verdeling van gezondheid en leefomgevingskwaliteit over buurten. In *Planbureau Voor De Leefomgeving* (No. 2198). Het Planbureau voor de Leefomgeving.
48. Verlaan, T., & Hochstenbach, C. (2022). Gentrification through the ages. *City*, 26(2–3), 439–449. <https://doi.org/10.1080/13604813.2022.2058820>
49. Wakefield, S., Yeudall, F., Taron, C., Reynolds, J., & Skinner, A. (2007). Growing urban health: Community gardening in South-East Toronto. *Health Promotion International*, 22(2), 92–101. <https://doi.org/10.1093/heapro/dam001>
50. Walsh, C. C. (2011). *Gardening Together: Social Capital and the Cultivation of Urban Community* [PhD]. CASE_{SEP} WESTERN_{SEP} RESERVE_{SEP} UNIVERSITY.
51. Yan, D., Liu, L., Liu, X., & Zhang, M. (2022). Global Trends in Urban Agriculture Research: A Pathway toward Urban Resilience and Sustainability. *Land*, 11(1), 117. <https://doi.org/10.3390/land11010117>
52. Yuan, G. N., Marquez, G. P. B., Deng, H., Iu, A., Fabella, M., Salonga, R. B., Ashardiono, F., & Cartagena, J. A. (2022). A review on urban agriculture: technology, socio-economy, and policy. *Heliyon*, 8(11), e11583. <https://doi.org/10.1016/j.heliyon.2022.e11583>
53. Zutter, C., & Stoltz, A. (2023). Community gardens and urban agriculture: Healthy environment/healthy citizens. *International Journal of Mental Health Nursing*, 32(6), 1452–1461. <https://doi.org/10.1111/inm.13149>

10.2. Websites

1. 60 Richmond Street East Housing Co-Op. (2020, October 8). Teeple Architects. <http://www.teeplearch.com/portfolio/60-richmond-east-housing-development/>

2. Architects, G. (n.d.). *Via Verde – The Green Way: Case Study / GRIMSHAW*. <https://grimshaw.global/sustainability/via-verde-the-green-way-case-study/>
3. Avoid Obvious Architects. (2021, June 11). *K-farm : Smart Urban Farming - Avoid Obvious Architects*. <https://aoarchitect.us/projects/k-farm-smart-urban-farming/>
4. CBS. (2023, September 8). *Hoeveel duurder werd eten? - Nederland in cijfers 2023*. Hoeveel Duurder Werd Eten? - Nederland in Cijfers 2023 | CBS. <https://longreads.cbs.nl/nederland-in-cijfers-2023/hoeveel-duurder-werd-eten/>
5. concrete. (n.d.). <https://concreteamsterdam.nl/staten-island-urby>
6. Corporation T. S. (n.d.). *Welcome to Circular Economy of Taiwan Sugar Corporation-Taisugar Circular Village in Shalun, Tainan*. Welcome to Circular Economy of Taiwan Sugar Corporation-Taisugar Circular Village in Shalun, Tainan. <https://www.taisugar.com.tw/circular/english/CP2.aspx?n=12428>
7. *De armen worden de stad uitgedrukt, en dat is zorgelijk (column)*. (2019, October 14). RTL Nieuws. <https://www.rtlnieuws.nl/economie/column/4883251/woningmarkt-gentrificatie-rijk-arm-amsterdam-randstad-huizenprijzen>
8. EenVandaag. (2022, October 3). *Lage inkomens het meest de dupe van stijgende voedselprijzen, hoogleraar is bang dat zij ongezonder gaan eten*. <https://eenvandaag.avrotros.nl/item/lage-inkomens-het-meest-de-dupe-van-stijgende-voedselprijzen-hoogleraar-is-bang-dat-zij-ongezonder-gaan-eten/>
9. *Hoogste tijd voor Rijksprogramma Stedelijke Verdichting*. (n.d.). Gebiedsontwikkeling.nu. <https://www.gebiedsontwikkeling.nu/artikelen/hoogste-tijd-voor-rijksprogramma-stedelijke-verdichting/>
10. Ministerie van Infrastructuur en Waterstaat. (2023, January 26). *Nederlandse biodiversiteit verhogen met een micro-innovatie*. Nieuwsbericht | InnovatieX. <https://www.innovatiex.nl/nieuws/nieuws/2023/01/26/nederlandse-biodiversiteit-verhogen-met-een-micro-innovatie#:~:text=85%25%20van%20de%20biodiversiteit%20in,bij%20het%20uitwisselen%20van%20zaden.>
11. NAK Design Strategies. (2022, February 13). *60 Richmond Street Housing Co-operative - NAK*. NAK. <https://www.nakdesignstrategies.com/projects/60-richmond-street-housing-co-operative/>
12. Pasona H.Q. | *Kono Designs* | Archello. (n.d.). Archello. <https://archello.com/project/pasona-hq>
13. *Restaurant de Kas*. (n.d.). Restaurant De Kas. <https://restaurantdekas.com/>
14. Sánchez, D. (2023, March 21). *Via Verde / Grimshaw + Dattner Architects*. ArchDaily. <https://www.archdaily.com/468660/via-verde-dattner-architects-grimshaw-architects>
15. *Taisugar Circular Village | Bio-architecture Formosana* | AWRD. (2021, October 5). AWRD. <https://awrd.com/creatives/detail/11742637>
16. *The Green House* | cepezed. (n.d.). Cepezed. <https://www.cepezed.nl/nl/project/the-green-house/22172/>
17. *Tuin van BRET - Tuin van Bret*. (2023, June 23). Tuin Van Bret. <https://www.tuinvanbret.nl/>
18. *Tuinen van BRET — Arcam*. (2021, June 18). Arcam. <https://arcam.nl/architectuur-gids/tuinen-van-bret/>
19. *Urban agriculture during the war years*. (n.d.). Post-war Reconstruction Community Rotterdam. <https://wederopbouwrotterdam.nl/en/articles/urban-agriculture-during-the-war-years>
20. Voedingscentrum. (2023). *Stadslandbouw (urban farming)*. <https://www.voedingscentrum.nl/encyclopedie/stadslandbouw-urban-farming-.aspx>
21. *Wijk Boerhaavewijk (gemeente Haarlem) in cijfers en grafieken*. (2024, January 16). AlleCijfers.nl. <https://allecijfers.nl/wijk/boerhaavewijk-haarlem/>

Via Verde | Dattner + Grimshaw



<https://www.domusweb.it/en/architecture/2012/06/14/via-verde.html>

General information

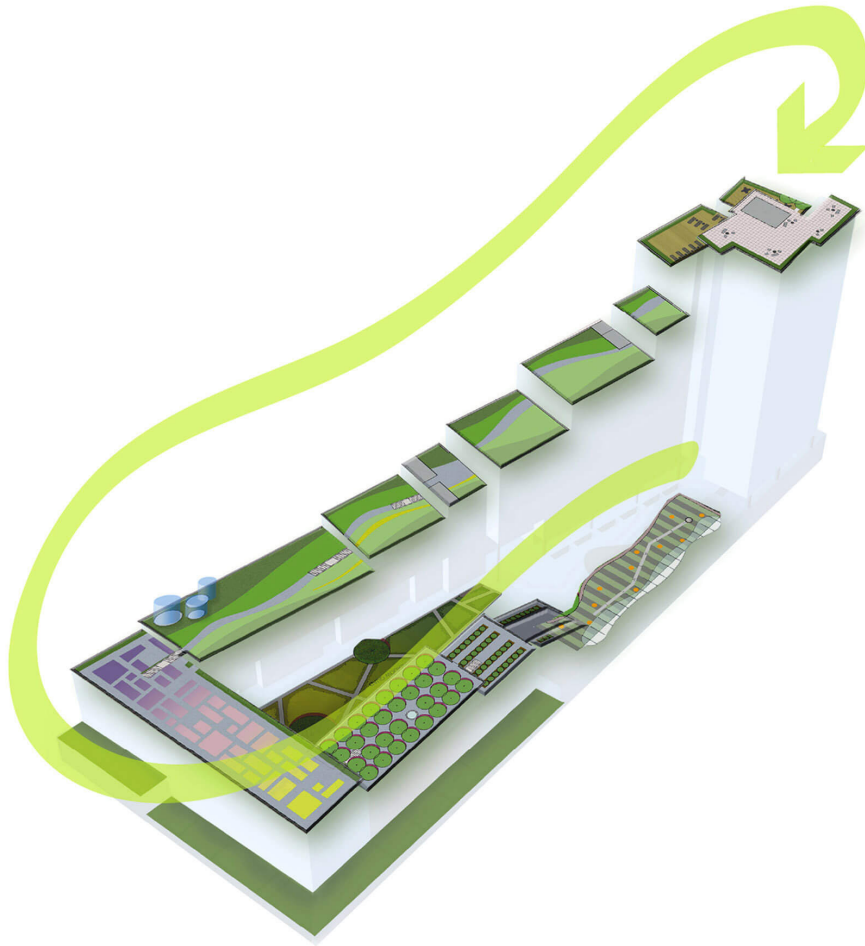
Location: New York
Function: Residential
Environment: Urban

Type of urban agriculture: Unconditioned building-integrated
Location in building: Rooftop
Design aspect: Routing

Description from the architect(s):

Via Verde, an award-winning residential development in downtown New York, comprises 222 apartments across three building types: a 20-story tower, a mid-rise duplex apartment component, and townhouses. The project, the victor of the international New Housing New York Legacy Competition, reflects a commitment to advancing social housing and fostering sustainable living. Organized around a dynamic garden, the complex integrates south-facing roof gardens, providing a multifunctional space for gardening, recreation, and social interactions. The building's "tendrils" form emphasizes a connection to nature, creating a unique urban ecosystem.

Featuring a ground-floor wellness center operated by Montefiore Medical Center, Via Verde prioritizes health and community well-being. The design incorporates easily accessible stairwells with natural light, promoting physical activity, while cross-ventilation and photovoltaic panels enhance sustainability. The project sets new benchmarks for sustainable affordable housing, earning LEED NC Gold certification and offering residents a 'Living Green Guide' for energy optimization and green living practices (Sánchez, 2023)



<https://grimshaw.global/projects/living/via-verde-the-green-way/>

Notes

Health

- not really a green environment, especially compared to parks or gardens
- staircase forms a public route along the UA facilities, residents are encouraged to participate in sports classes and seminars that are being organized in communal spaces.
- The gardens are situated along a public/collective route making social interactions more likely to occur. Besides the building contains many communal functions for the residents

Social interaction

- community focused living experience, demonstrated through various collective social spaces.
- the residents are empowered
- according to the architects: "The primary goal of the project was to provide a mix of rental and homeownership opportunities for people at a range of income levels to create a truly mixed-income community."
- residents can participate in collective gardening classes
- residents organize workshops

Self-sufficiency

- farming and gardening classes with residents and kids
- limited amount of food production in relation to the amount of residents, so food 'security' is not significant enough.
- foods are meant to be consumed by the residents
- nutrient management by gardener
- the project is (partially) funded

60 Richmond Housing Cooperative | Teeple Architects



<http://www.teeplearch.com/portfolio/60-richmond-east-housing-development/>

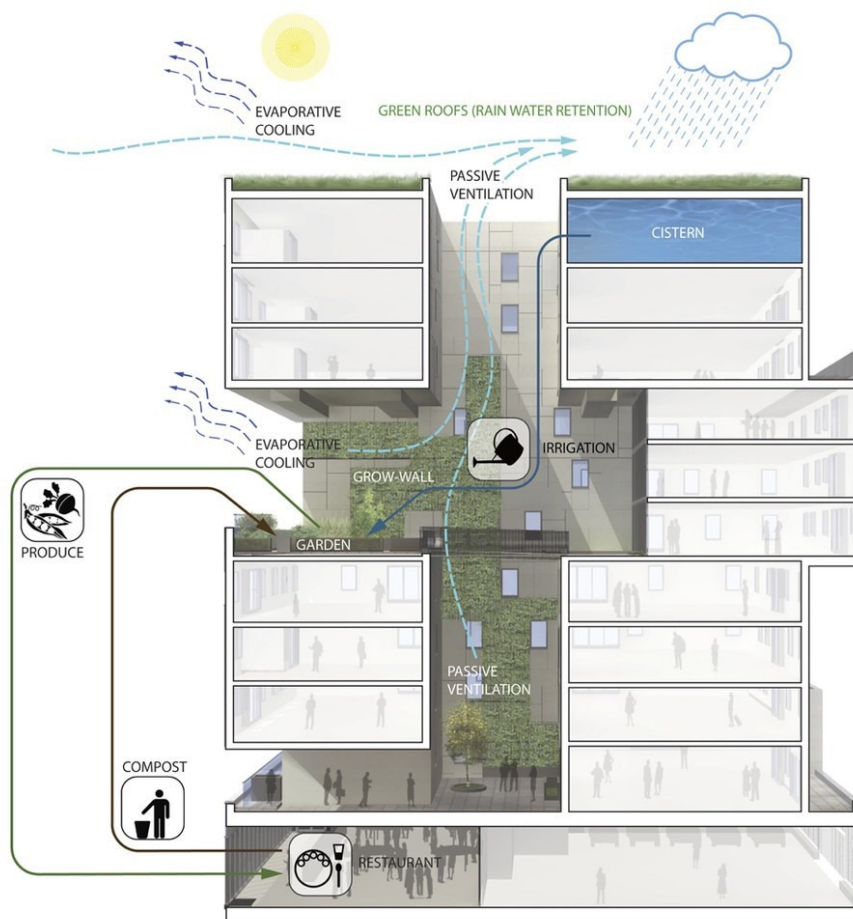
General information

Location: Toronto
Function: Residential
Environment: Urban

Type of urban agriculture: Unconditioned building-integrated
Location in building: Communal balcony/terrace
Design aspect: Restaurant

Description from the architect(s):

60 Richmond East, Toronto's initial housing cooperative in two decades, embodies an urban in-fill initiative with a dynamic building program and LEED initiatives. The structure's interlocking volumes and voids, creating a sculptural and spatial composition, contribute to the liveliness of the streetscape. Primarily accommodating displaced hospitality-industry workers and their families due to the Regent Park redevelopment, a significant social housing renewal project, the building includes a resident-operated restaurant and training kitchen. This setup not only generates extra income but also offers valuable experience for the residents. Furthermore, a community garden on the sixth-floor terrace supplies the restaurant with fresh produce, using kitchen-generated organic waste as compost, establishing a self-sustaining condition of 'urban permaculture' (Teeple Architects, 2020).



<https://www.nakdesignstrategies.com/ideas/how-sustainable-urban-design-is-done-at-60-richmond-street-east/>

Notes

Health

- green environment, all the way up the facades
- no specific measures were taken to encourage physical activity besides gardening
- the garden grows vegetables which are consumed in the restaurant and by the residents to share.
- The community garden on the sixth-floor terrace helps residents engage with each other and build skills and a sense of community. The combination of UA and restaurant demonstrates a clear intent of community style living.

Social interaction

- community living where social relations are at the core of the concept. "With an affordable, socially responsible model of renting and building management, the co-op residents are part of a community where neighbours look out for one another and make collective decisions that benefit all residents" (NAK Design Strategies, 2020)
- residents own a restaurant
- selling and preparing food together is a great way to bridge cultures
- residents harvest the green collectively and use them collectively
- there is a training kitchen where residents can learn to cook from each other

Self-sufficiency

- the resident-run restaurant and training kitchen on the ground floor provide supplementary income and additional experience for the residents
- residents can benefit from yield
- residents sell the foods in the restaurant
- nutrient management is done by a gardener
- no funding

Pasona HQ | Kono Designs



<https://archello.com/project/pasona-hq>

General information

Location:	Tokyo
Function:	Office and public
Environment:	Urban
Type of urban agriculture:	Conditioned building-integrated
Location in building:	Indoors
Design aspect:	Advanced systems & public function

Description from the architect(s):

Situated in the heart of Tokyo, Pasona HQ is a nine-story, 215,000-square-foot corporate office for the Japanese recruitment firm Pasona Group. Renovated from an existing 50-year-old building, it features a distinctive double-skinned green facade, offices, an auditorium, cafeteria, and a rooftop garden. Notably, the building incorporates extensive urban farming facilities, totaling over 43,000 square feet. This innovative approach makes it the largest farm-to-table operation within an office building in Japan, cultivating over 200 species, including fruits, vegetables, and rice. The double-skinned louvered facade, adorned with balconies, serves as a dynamic living green wall, creating depth and identity. Pasona prioritized a clean and hygienic environment, implementing measures, such as antibiotics, to ensure the well-being of their employees. Despite the reduction in net rentable area, the company values the benefits of urban farming and green spaces, contributing to an engaging workplace with shaded interiors, operable windows, and improved air quality. The facade is further enhanced with a deep grid of fins, adding depth and volume to the organic green wall (KONODESIGNS, n.d.).



<https://archello.com/project/pasona-hq>

Notes

Health

- Very green indoor environment that also continues in the working spaces, however it doesn't resemble the green that can be seen in nature. The environment is clearly artificial
- The employees are all asked to participate in harvesting greens.
- The healthy harvested foods are prepared and served to all co workers during work, being in a green environment and working with your hand together with fellow colleagues has been addressed as relaxing.
- While workers can socialize during the harvesting process, the environment doesn't show a clear design intend that is focused on creating a social environment.

Social interaction

- Pasona offers public seminars, lectures and internship programs.
- The holistic beliefs behind the design support and promote the empowerment of future urban agricultural communities
- The mixed-use program of the building attracts different target groups such as students in combination with employees.
- No collective gardening
- The educational program in combination with the office program benefits both students and workers as they can learn from each other and create social relations

Self-sufficiency

- Pasona focuses on educating and cultivating next generation of farmers by offering public seminars, lectures and internship programs (archello, 2011)
- A significant amount of food is yielded thanks to the advanced systems that are used
- Instead of providing a traditional lunch, Pasona offers their workers with locally grown and cooked foods. There will be a return of investment after a couple of years.
- The majority of the plants are automatically monitored and the others are taken care of by staff
- no funding

The Greenhouse | cepezed



<https://www.cepezed.nl/nl/project/the-green-house/22172/>

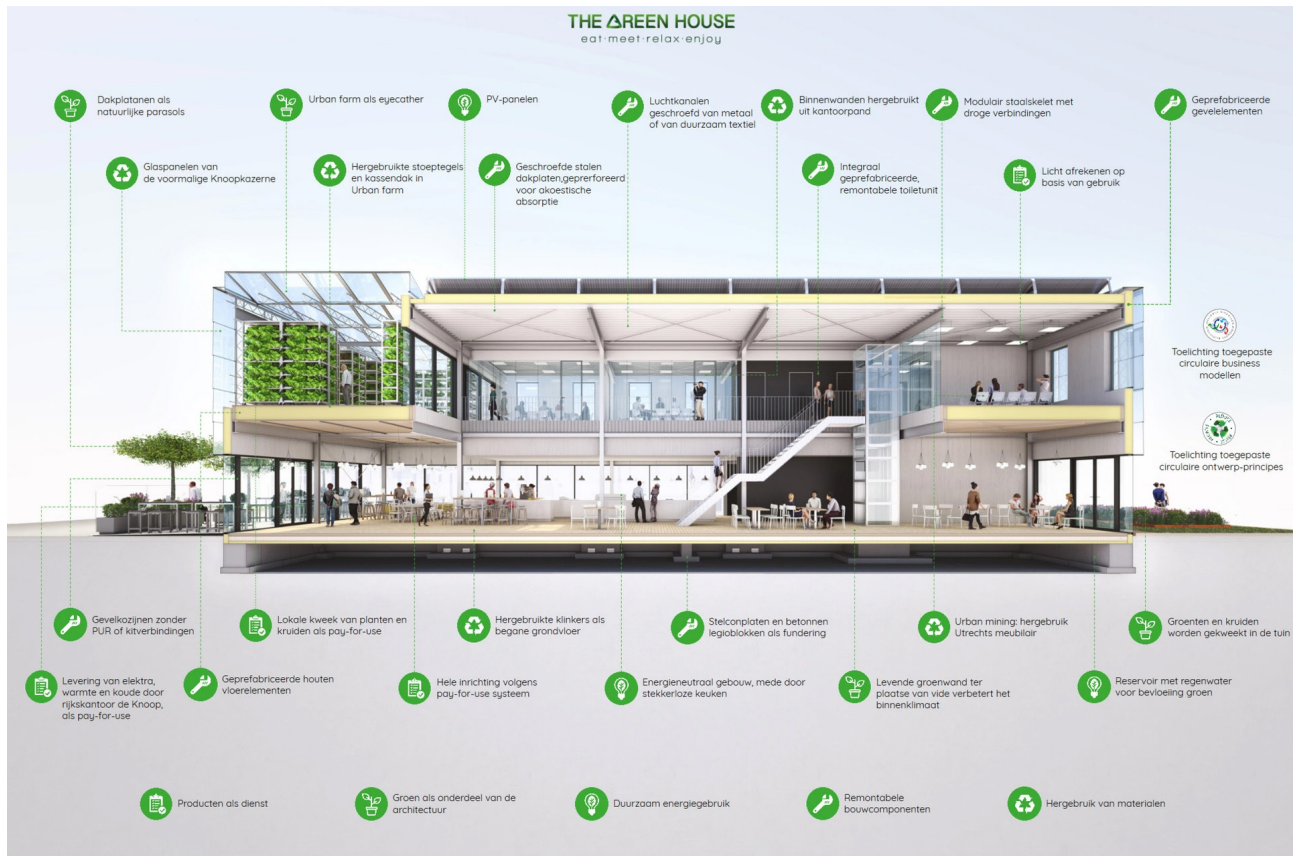
General information

Location: Utrecht
Function: Hospitality
Environment: Urban

Type of urban agriculture: Conditioned building-integrated
Location in building: Rooftop
Design aspect: Cafe & restaurant

Description from the architect(s):

cepezed was tasked in 2014 with transforming the former Knoopkazerne on Croeselaan in Utrecht into a contemporary government office. Additionally, they were asked by the Central Government Real Estate Company to devise a temporary solution for the space between Knoopkazerne and Rabobank's adjacent head office, as its definitive purpose would be determined in fifteen years. cepezed's circular design, named The Green House, serves as a vibrant interim solution, hosting a circular restaurant and meeting facilities. Adhering to circular principles, the building is entirely demountable and constructed with reusable materials. The pavilion features a removable steel frame, recycled glass panels, and a greenhouse for vertical farming. The floor materials were chosen thoughtfully, with reclaimed street clinkers from Tiel used for the ground floor and prefabricated wooden elements for the first floor. The transparent plinth, timber frame panels, and a green wall contribute to the aesthetic and sustainable aspects of The Green House. Solar panels on the roof, an AC-plug-free kitchen, and recycled furniture from urban mining further enhance the eco-friendly features of the building (Cepezed, n.d.).



<https://www.cepezed.nl/nl/project/the-green-house/22172/>

Notes

Health

- green is incorporated in the design and made visible. However, the artificial approach differs from a natural design
- physical activity is neither stimulated nor suppressed
- because the restaurant cooks with locally grown vegetables which is at the very core of the concept
- leisure focused programmes are related to stress reduction
- hospitality function

Social interaction

- the building has a public function and is open to everyone. This includes the restaurant, meeting rooms and the cafe
- the restaurant is run by staff
- hospitality is a great tool to engage cultural mixing
- the gardening is only done by staff
- no specific educational purpose

Self-sufficiency

- the greenhouse has no educational function
- the pavilion demonstrates the possibilities of urban agriculture and symbolizes a new solution for food security
- the restaurant and cafe are almost fully self-sufficient
- nutrient management in a high tech vertical farm
- the project is not funded since it has a commercial program

Urby Staten Island | concrete



https://www.archdaily.com/792772/urby-staten-island-concrete?ad_source=search&ad_medium=projects_tab

General information

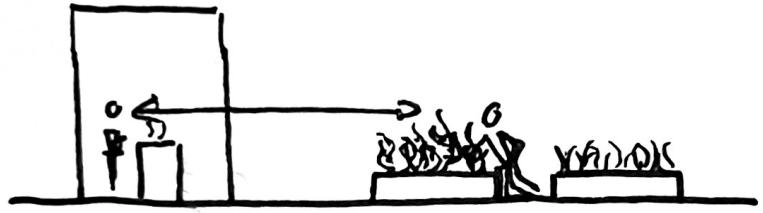
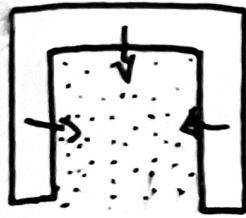
Location: Staten Island
Function: Residential
Environment: Urban

Type of urban agriculture: Unconditioned soil-based
Location in building: Rooftop
Design aspect: Communal kitchen and courtyard

Description from the architect(s):

Urby the brand Built from the ground up with the needs of contemporary urban citizens in mind, Urby is a unique residential concept that offers unprecedented value for money and a truly connected living experience.

Staten Island Urby is the first realised Urby project and consists of more than 900 rental apartments. The buildings are set up as two large U-shaped structures, opening up unobstructed views of Manhattan, Brooklyn and the impressive Verrazano Bridge from most of the apartments. The space between the U-shaped building serves as a landscaped communal courtyard. The Zebra - a pedestrian crossing type of pattern painted on the street and paved in the courtyard flooring - draws a straight line over the full length of the property, connecting all public and communal spaces. This essentially symbolises what Urby is all about: connecting communities and residents (Concrete, n.d.).



<https://concreteamsterdam.nl/staten-island-urby>

Notes

Health

- the outdoor garden is situated in a well designed green landscape
- physical activity is promoted through outdoor gardening
- the vegetable gardens are located in sight of the communal restaurant, stimulating the use of harvested greens in the communal kitchen
- outdoor gardens are related to stress reduction
- the combination of communal restaurant and outdoor garden create a very pleasant and social environment

Social interaction

- Very social environment, the people and staff organize workshops, classes and social events
- The target group of the project is already empowered to a certain extend
- No specific measure to bridge cultures, the activities are also only meant for residents, making is less public.
- Collective gardening seminars are organized weekly
- Residents are free to organize workshops, seminars and share and teach their skills to each other.

Self-sufficiency

- gardening classes and seminars are organized every week
- the amount of food that is produced is not significant enough to provide for all the residents
- nutrient mangement by gardener
- no funding

Tuinen van BRET | DOOR Architecten + SMARTLAND Landscape architects



<https://arcam.nl/architectuur-gids/tuinen-van-bret/>

General information

Location: Amsterdam
Function: Public
Environment: (Sub) Urban

Type of urban agriculture: Unconditioned soil-based
Location in building: Rooftop
Design aspect: Landscape

Description from the architect(s):

The concept for the creation of the BRET Garden emerged in 2012 when Studio Valkenier envisioned a green plaza for Sloterdijk station featuring the iconic red restaurant BRET. Constructed entirely from repurposed materials such as sea containers from the harbor, glass, insulation from a housing association, and wood sourced from a station platform and nearby nature reserve “De Bretten,” BRET stands as a sustainable architectural project. In 2017, the Garden of BRET was established across the road. Restaurant BRET, constructed from cross-stacked containers from the Amsterdam harbor, serves as the centerpiece of the new village and its accompanying garden. Architect Wouter Valkenier adopted a unique approach, creating a building with a central aisle and side aisles for meetings or work. Opposite, DOOR Architects designed a three-story container building with an open top floor housing a greenhouse for vegetable cultivation. The standout structure in the village is the ‘church,’ providing accommodation for young entrepreneurs. This building includes two floors and an elegant tall lookout tower. All structures within the Garden of BRET serve practical functions. Studio Valkenier, housed in a two-story container building, utilizes an open ground floor for receptions and workshops. The garden features a vineyard where individuals can ‘rent’ grapevines, and they are allowed to take home the resulting wine (Arcam, 2021).



<https://doorarchitecten.nl>

Notes

Health

- very green, landscape-like outdoor environment
- outdoor gardening promotes physical activity
- outdoor gardening and being in nature contributes to stress relief

Social interaction

- tuinen van BRET is a place for entrepreneurs with a passion for sustainability and circularity, it is designed to bring people together.
- collective gardening seminars are given where people pick grapes and make their own wine
- the programme of the building is largely focused on learning and building skills.

Self-sufficiency

- The workshops that are given focus on wine making, teaching users how to brew their own wine
- Limited data

Taisugar Circular Village | Bio-architecture Formosana



https://www.archdaily.com/974658/taisugar-circular-village-bio-architecture-formosana?ad_source=search&ad_medium=projects_tab

General information

Location:	Tapei
Function:	Residential
Environment:	Urban
Type of urban agriculture:	Conditioned soil-based
Location in building:	Rooftop
Design aspect:	Courtyard & communal facilities

Description from the architect(s):

TaiSugar Circular Village (TCV) is situated in the Shalun Smart Green Energy Science City, Tainan, representing Taiwan's pioneering residential project centered on the circular economy concept. Initiated by Taiwan Sugar Corporation (TSC) as part of the government's 2016 masterplan, TCV aligns with the vision of developing a smart ecosystem city in harmony with nature. Aligned with Taiwan's sustainable economy goals and the "Five plus two innovative industries policy," the circular economy is prioritized to enhance energy security, foster a green economy, and promote environmental sustainability.

Located 10 minutes from Tainan High-Speed Rail station on a 13,994.07 square meter site, TCV comprises three identical housing blocks, a Circular Demo House (C-House), and an Eco-House (E-House), offering a total of 429 rental units. The village includes three Circular Blocks housing living quarters, a Circular Field with a C-House (living room), an E-House (kitchen), and a C-Farm (garden for food production). The project incorporates circularity across various aspects, including Circular Concept, Circular Management, Circular Resources, Circular Living, and Circular Policy, fostering innovative solutions in circular architecture (AWRD, 2021).



<https://www.taisugar.com.tw/circular/english/CP2.aspx?n=12428>

Notes

Health

- The project has paid a lot of attention to designing the landscape, complimenting the functions of the buildings. The landscape resembles a natural green environment.
- Physical activity is stimulated through the courtyard and the implementation of soil-based and aquaponic agriculture.
- Locally harvested foods are consumed by the residents
- The collective realm is carefully designed and contributes to a social environment

Social interaction

- The community focused design encourages social relations to occur. This is particularly visible in the way the galleries are designed and how the courtyard is designed.
- Residents are given full responsibility of the agricultural facilities and are responsible for each other
- Collective gardening
- The workshop allows residents to learn from each other

Self-sufficiency

- The project enables residents to educate themselves in the workshop and circular house.
- The various types of agricultural systems that are implemented contribute to food security by spreading risk.
- Nutrient management is carefully and thoughtfully applied and uses natural circular loops
- The project is partially funded

K-Farm | Avoid Obvious Architects



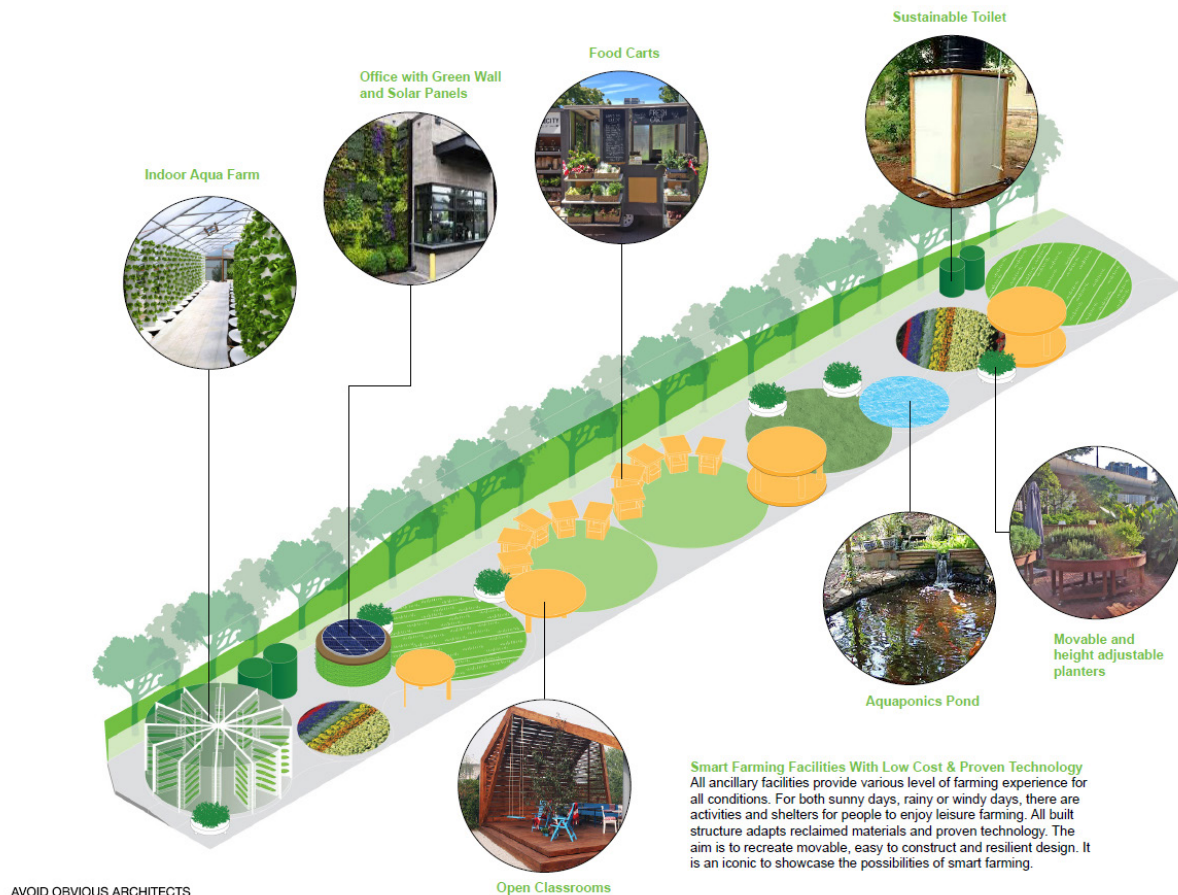
<https://www.archdaily.com/963591/k-farm-avoid-obvious-architects>

General information

Location:	Hong Kong
Function:	Public
Environment:	Urban
Type of urban agriculture:	Conditioned soil-based
Location in building:	Rooftop
Design aspect:	Public programme

Description from the architect(s):

Inspired by the community in 2018, our masterplan for the Central and Western district features circular geometries symbolizing unity, plants, and pier elements. The iconic design aims to showcase the essence of the area, with farming facilities connected to Belcher Bay Area, open 24/7 spaces like lawns and rain shelters, and an inclusive approach for people of all abilities. The farm incorporates eco-friendly practices such as rainwater collection, solar panels, and smart sensor controls. It has transformed an industrial site with no greenery into a biodiverse waterfront attraction, using materials sourced within 800km of Hong Kong. The modular assembly allows for flexibility in building relocation, and strategic lighting enhances safety without physical barriers at night (Avoid Obvious Architects, 2021).



<https://aoarchitect.us/projects/k-farm-smart-urban-farming/>

Notes

Health

- Green infrastructure in a densely populated city
- For the public, farming garden is fully accessible, the amount of physical labour needed is cut down by the integration of chairs.
- Harvested foods can be consumed by the users

Social interaction

- Since this project permeates the public realm and is accessible to the public, it contributes to the idea of creating social relations
- Relating to the previous point, this also encourages the bridging of cultures
- Collective gardening is at the very core of the concept
- The open classrooms allow everyone to learn about urban agriculture

Self-sufficiency

- Users can indulge themselves in a learning process focused on different levels of agriculture
- Fresh food supply in a densely populated area
- Clever nutrient management using closed loops