



university of
 groningen

faculty of spatial sciences

Gardening the Gaps: A Case Study of Participative Urban Greening in Paris

Antoine Lenweiter

S4946235

Bachelor Thesis

14.06.2024

Supervised by Dr. C.W. Lamker

Word Count : 6404

Table of Contents

• Summary	3
• Introduction	4
• Theoretical Framework	6
◦ Urban challenges	6
◦ Environmental benefits of vegetation in cities	6
◦ Social benefits of participative greening	7
◦ Participative greening practices	7
• Methodology	9
◦ Data Collection	9
▪ Semi-structured Interviews	9
▪ Field Observations	10
◦ Data Analysis	12
▪ Qualitative Data Analysis	12
▪ Quantitative Data Analysis	12
▪ Discussion and Compilation of Qualitative and Quantitative Data	12
◦ Ethical Considerations	12
• Results	13
◦ Interview Results	13
▪ Opportunities and benefits	13
▪ Challenges and drawbacks	13
▪ Contact and support from the municipality	14
▪ Community involvement	14
◦ Field Observation Results	14
• Discussion	17
• Conclusion	19
• Bibliography	20
• Appendix	22

Summary

Cities worldwide urgently have to find solutions to adapt to more frequent and intense weather events along with increasing urbanization. Green infrastructure is regarded as having an important part to play in urban areas' ability to preserve liveability and mitigate risks associated with extreme weather. However, as space is often scarce in cities, it is difficult to implement successful greening initiatives. Paris is one of the cities that has turned to its citizens for help, as part of its "greening permits" program, which allows citizens to cultivate small plots of public land, such as tree pits. This study investigates the effectiveness of such participative urban greening initiatives through a case study in Paris. Using a mixed-method comprised of field observations and semi-structured interviews, this paper aims to uncover factors which impact the success of participative greening projects in a dense capital city like Paris. Although the program has been scrapped in 2021, there are many examples of successful projects, with many of them still ongoing at the time of writing. Some factors, such as local community involvement, the type of nearby traffic and the proximity with community gardens contributed to improving greening projects, while littering, bad quality edges and lack of accessibility to water were challenges. Addressing these could be done by a greater involvement from the municipality through standardized edges, greater presence on the field and improved watering solutions. While this study focuses on the communities, further research could look into the barriers within institutions in order to complete the picture.

Keywords: participative greening, climate adaptation, institutionalization

Introduction

As urbanization intensifies globally, cities must find ways to accommodate conflicting land uses and balance the needs of inhabitants and their environment (Azabdaftari and Sunar, 2024). Paris is especially challenged in that regard as it is one of the densest cities in the world with over 20,000 inhabitants per square kilometer (INSEE, 2023). It also has one of the lowest ratios of green infrastructure among European cities, with very little space on the ground for green spaces (European Environment Agency, 2018). This prevalence of asphalt makes Paris more vulnerable to floods, heat waves, and pollution (Salagnac, 2007). As the atmosphere warms up and precipitation becomes more intense, the city needs to adapt if it is to remain liveable in a highly uncertain future. The benefits of vegetation in urban settings are well documented. Green cities have better air quality, temperature regulation, and increased well-being levels (Tzoulas et al., 2007; Wolch et al., 2014). Furthermore, the cultivation of public land has the potential of bringing many co-benefits such as social cohesion, beautification, and even the provision of food (Eizenberg, 2012).

It is in this context that the municipality of Paris turned to its citizens for a participative greening program called “*Végétalisons Paris*” (let’s green Paris) (Mairie de Paris, 2024). Comprised of various initiatives such as implementing gardens in schools or assisting and subsidizing transitions to permeable surfaces in private yards, it aims to harness the collaboration between private and public actors to achieve the municipality’s climate goals (Mairie de Paris, 2024). This study looks at one aspect of the municipal initiative, the “*Permis de Végétaliser*” (greening permits), which enables citizens to apply for a permit that allows them to cultivate a parcel of public land, given that they maintain the plot in a way that contributes to the public good. The permits were launched in 2015 along with the other initiatives and about 2,500 permits have been awarded in total (Mairie de Paris, 2024). However, in 2022, the deputy mayor announced the end of the greening permits, citing over 80% of them being abandoned. A few exceptions were made for some citizen associations which are still allowed to cultivate public land as of 2024 (Mairie de Paris, 2024). Despite these apparent failures, the legacy of the greening permits and their impact on public spaces has yet to be assessed. Finding efficient ways to collaborate with the population could bolster municipalities’ climate adaptation goals while delivering improvements in public space quality for inhabitants. Indeed, little is known about practical factors affecting the success of greening projects from a citizen perspective and such insights could help policy makers design successful participative programs. It is therefore relevant to look into opportunities and challenges associated with such initiatives in a very dense city like Paris. This study aims to critically examine the case of participative urban greening on public spaces by answering the following question and sub-questions:

- What are the opportunities and challenges associated with participative greening in public spaces?
 - To what extent do local governments have the potential to facilitate such initiatives?
 - What are the main factors influencing the quality of greening initiatives in densely populated urban areas?

Through field observations and semi-structured interviews with gardeners and non-gardeners, this research seeks to understand what caused the initiative to be halted, what could be done better in future projects, and find optimal conditions for a collaboration between governments and citizens in their cities' climate adaptation strategies, through financial or technical support of participative greening initiatives.

This paper will start with an overview of the challenges facing cities due to rapid urbanization and climate change, followed by a presentation of the environmental and social benefits of integrating vegetation in dense urban settings. Then we will explore the “*permis de végétaliser*” from a practical perspective to try and understand what has caused it to be terminated, along with a look into participative gardening movements and their activities in Paris. Following a presentation of the methodology, the results will be analysed and discussed.

Theoretical Framework

Urban challenges

Introducing more vegetation in cities is now widely seen as a requirement for climate adaptation (Gill et al., 2007; Bowler et al., 2010; Kabisch et al., 2016). Cities around the world are facing challenges posed by climate change. Temperatures are rising globally, and urban areas are particularly vulnerable due to the urban heat island effect (Mentaschi et al., 2022). This is due to urban surfaces having a lower albedo (which means they absorb more heat) than natural surfaces, therefore warming up the surrounding air and creating a heat island. Mineral surfaces also have another disadvantage: they are mostly non-permeable. As the frequency and intensity of precipitation rises, urbanisation is contributing to the risk of floods. Indeed, whereas natural surfaces have a higher permeability, asphalt causes water to run off on the surface and accumulate, therefore contributing to floods.

As precipitation levels grow beyond storm water infrastructures' capacities, cities need to find alternative ways to accommodate for such events and reduce the damage when they do happen (Fletcher et al., 2013). But water and temperature aren't the only challenges. Air quality is also on average lower in urban areas; A higher concentration of activities leads to higher emissions from transportation but also commercial and residential activities. Additionally, meteorological phenomena like temperature inversions may cause the pollution to be trapped, sometimes for days, leading concentrations to rise well above safe levels (Wolf et al., 2020).

Environmental benefits of vegetation in cities

Vegetation presents itself as an integrated and multifunctional solution to many of the challenges mentioned above (Tzoulas et al., 2007). Firstly, plants capture CO₂ and transform some of it into oxygen through the process of photosynthesis, storing the rest as carbon via carbon sequestration. This is not only beneficial at the local level, where it improves air quality, but also at a global level, to reduce CO₂ concentrations in the atmosphere and mitigate global heating. Plants also cool down the air around them through the combined processes of evaporation from the soil and transpiration from the plant, both of which release water vapour and help bring the temperatures down (Mistry et al., 2019). Solutions such as green roofs and walls also contribute to buildings' insulation and can reduce the need for air conditioning in the summer and heating in the winter, therefore lowering energy demand.

Another property of plants is the capacity to absorb pollutants and reduce their concentrations in the water and the air. As mentioned above, greenhouse gases for instance are absorbed through the plant's stomata – small openings present throughout the leaves – and used for photosynthesis. Particulate Matter molecules are also captured by sticking to the plant and eventually washing down into the soil after a rain event, thereby reducing airborne pollution. Roots also play their part by filtering water and capturing some of the pollutants (Han et al., 2022). All these factors can contribute to healthier urban ecosystems. Urban areas are often among the most polluted and Paris is no exception, with pollutants such as PM_{2.5}, PM₁₀, ozone and nitrogen dioxide often exceeding WHO recommended levels (Savouré et al., 2019). This has adverse effects on the health of inhabitants, such as cardiovascular and respiratory issues, altered development of children's

respiratory functions and even death. Introducing vegetation can significantly reduce pollution levels and the related harmful effects on ecosystems and humans (Kumar et al., 2019).

But vegetation in urban contexts can also increase biodiversity, a crucial point in densely built spaces where fauna and flora currently struggle to thrive. Every introduction of plants in cities creates new habitats for local species (Maes et al., 2021). Additionally, connecting existing green spaces through vegetated streets improves biodiversity by fostering species mixing and providing a bigger gene pool. This is often a challenge in cities, as urban infrastructure fractures habitats and limits movement of fauna and flora (Furberg et al., 2020).

Social benefits of participative greening

Studies have shown that participative greening also contributes to building a sense of community and reinforcing social cohesion (Javaid and Habeeb, 2018). An interesting point here is that participative greening also seems to have higher success rates where community ties are strongest. Along with social cohesion, participative urban greening can bring about environmental awareness. This is the explicit goal in the “*Un verger dans mon école*” program (which is part of *Végétalisons Paris*), which consists of integrating orchards in school yards in order to “boost the discussion on the role of nature in cities” (Mairie de Paris, 2024, translated by author). Green spaces have also been shown to improve mental and physical health by reducing stress and anxiety and promoting physical exercise (Coventry et al., 2021). Moreover, green streets have an influence on mobility choices and may contribute to shifting to softer modes of transport which are both healthier for inhabitants and emission free (Valente et al., 2021).

By many metrics, the benefits of greening urban spaces are evident. But what are people’s preferences regarding vegetation right on their doorstep? A study from Bonthoux et al. (2019) suggests that even unkept streets with spontaneous vegetation were perceived as more beautiful and less boring than a street without any vegetation. However, small designs, such as “flowers seeded in foot of wall, design of a meadow strip along the pavement” (Bonthoux et al., 2019) were valued the highest on average. This suggests that although any vegetation is preferred to none at all, there seems to be a general preference for contained interventions with a clear human involvement. Still, there is a wide range of preferences for the level of tidiness of urban vegetation, making a consensus hard to reach and resulting in some inhabitants inevitably rejecting some types of urban vegetation (van den Berg, van Winsum-Westra, 2010).

Participative greening practices

Despite a general preference for greener streets, the best course of action for greening initiatives is not straightforward. There is an extensive range of options to add vegetation to a street or a square and each of them has advantages and disadvantages (Kronenberg et al., 2021). This research seeks to explore participative practices, which are defined by the involvement of local communities in the process of adding vegetation to their neighbourhoods. From community gardens to a single seed being planted in a vacant piece of soils, ways to go about it are varied. The Guerilla Gardening movement, for instance, regards public space as an urban common which is to be reclaimed through gardening activities. Its intentions are both political and environmental, and the practice is

characterized by anyone being able to cultivate virtually any plot, embodying the concept of urban commons.

Although this idea of collective governance may seem to be an integral part of the greening permits launched by the municipality in 2015, there are some fundamental differences. As pointed out by Maurel (2017), the recipient of the permit is effectively handed exclusive use of the plot, granted it “serves public interests”. Greening projects are also required to display a sign specifying the name(s) of the permit holder(s), reinforcing the limited involvement of the community at large. Maurel continues to argue that this individualistic approach contributed to many of the site falling into abandonment due to the consequential amount of work to clean and maintain a project as an individual.

The following conceptual model outlines the key concepts of the framework and their interactions, such as the assumption that public acceptance and municipal support may influence maintenance levels in the long term.

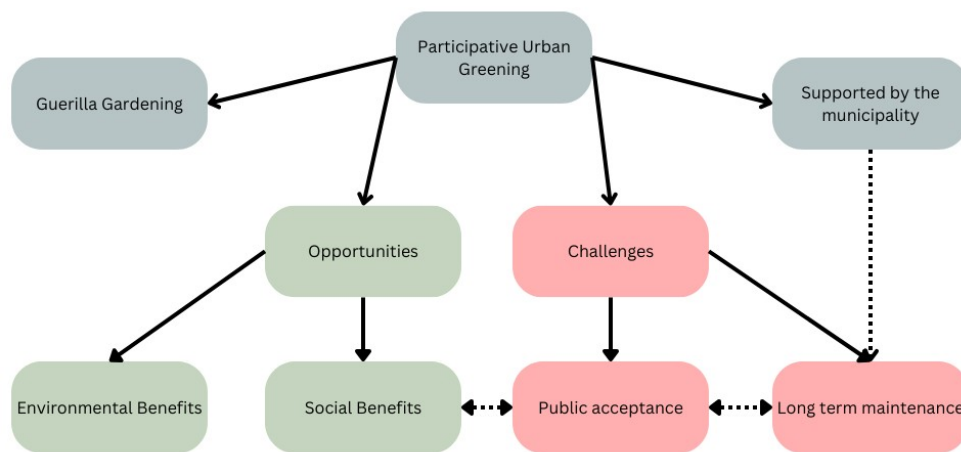


Figure 1 : conceptual model (made by author)

Methodology

In order to assess both the physical aspects of greening projects and people's perception of them, a mixed-method combining qualitative and quantitative data was chosen. This was done by conducting semi-structured interviews with a diverse group of participants, providing a range of insights and perspectives. 6 of the respondents have first hand experience with the greening permits by either holding one or having had one in the past. Two of the respondents are guerilla gardeners and cultivate public land without a permit. Lastly, a city gardener employed by the municipality was interviewed.

Data Collection

a) Semi-structured Interviews

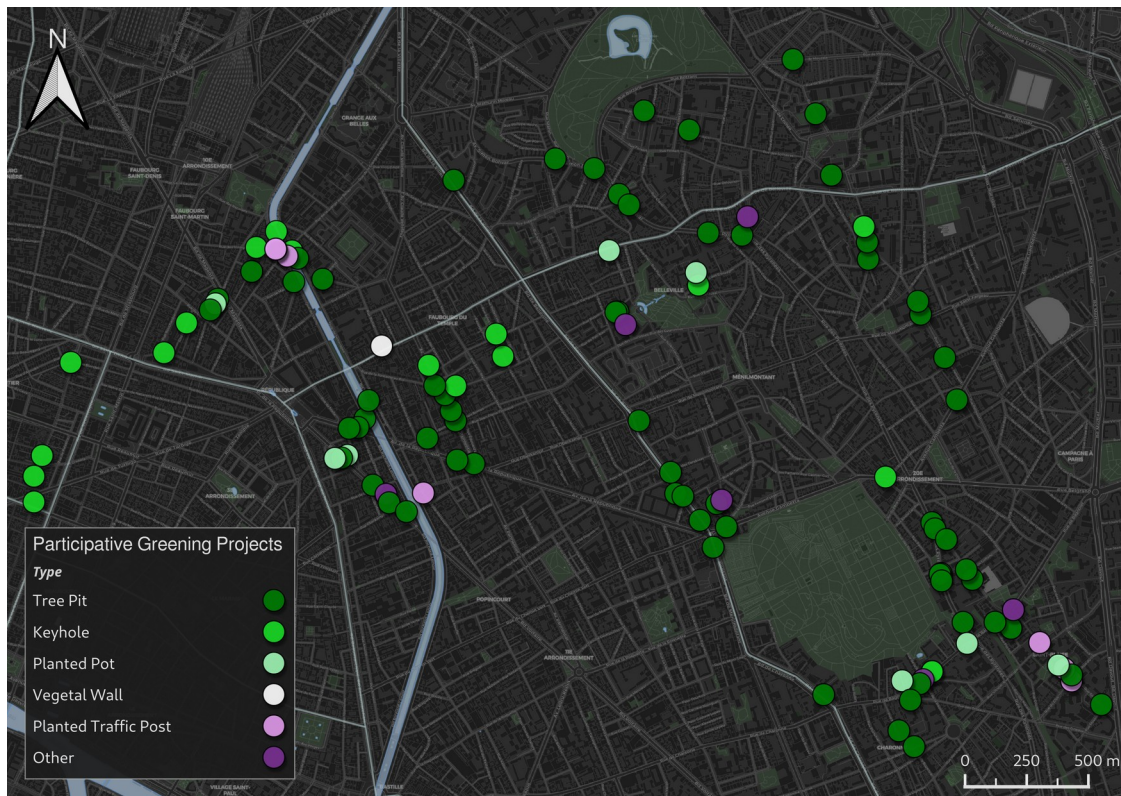
Over the course of four days, from Friday 10th of May to Monday 13th of May 2024, 8 participants were interviewed about their views on Participative Urban Greening, the greening permits program and more generally about the place of nature in the city of Paris. The discussions were conducted in the form of semi-structured interviews, ranging from 5 to 35 minutes. Respondents were chosen for their link to a greening initiative, either as participants, observers or passer-bys. The interviews took place in the street, mainly next to a greening project. For better integration into local culture and to facilitate communication, the interviews were conducted in French. Although participants were informed from the very beginning that the interview would be used for a research project, the semi-structured format was chosen for it is less formal and it allows for greater flexibility during the interview. Moreover, the aim was to allow respondents to freely express their views rather than feel a pressure to give a right answer, therefore minimizing social desirability bias. The majority of the questions were open-ended to enrich the discussion and add some nuance to a complex and context-dependent topic.

The following main topics were covered, with some additional ones coming up depending on the direction the interview took.

- Involvement of participant in Participative Urban Greening
 - Starting date of involvement
 - Reason for involvement
 - Influence of municipal greening program on their involvement
 - Challenges and opportunities encountered during their participation
- Thoughts on the program “Végétalisons Paris”
 - thoughts on the greening permits specifically
 - personal experience regarding contact with the municipality
- Ideas for improvements of collaborative processes

b) Field Observations

To capture the impact of greening projects on their surroundings, field observations were performed during the same days as the interviews. Field observations were preferred over alternative methods as they provide detailed first hand data on the state of the sites and allow to more precisely determine their maintenance and cleanliness levels, type and size of vegetation, or presence of flowers or edible plants. Additionally, observations allow the subjects to be placed within their environment, making assessments such as the influence of nearby shops possible. Lastly, field observations enabled the researcher to capture unanticipated factors that might not be obvious through planned methods. The map below shows all the data collected during the observations, amounting to 107 distinct greening projects.



Map 1 : representation of the 107 greening projects encountered during the field observations, along with their type (map made by author)

The observations took the form of spontaneous walks through various neighbourhoods of Paris. The areas covered were mainly in the 10th, 11th, 19th and 20th arrondissements (districts) due to a higher concentration of greening projects in the eastern part of the city. Along the walk, all instances of participative greening were systematically recorded. This was achieved by passing through the street, on both sides when necessary, and assessing every greening project encountered during the walk by taking photographs from various angles and recording data such as the height of vegetation or the type of nearby traffic. To avoid non-participative instances such as municipal works, two maps were consulted at all times during the observations. The first map contains the official data from the municipality of Paris and includes all the greening permits, along with their type (tree pit, keyhole, wall, etc...). Despite the termination of the program, the greening permits map is still

publicly available (Paris Data, 2024). The second map is run by the Guerilla Gardening community of Paris and records some projects completed by members, as well as spotted suitable locations for interventions (Guerilla Gardening Paris, 2023). Any interventions that was not featured on these maps was excluded from the data collection unless it explicitly displayed evidence of being participative. This only happened in two instances, one of which featured a poster describing the greening initiative as the work of a few neighbours, the other being claimed as a guerilla intervention by the gardener on site, who had not plotted it on the guerilla gardening map.

A check-list of observations was used to record the observation data and photographs of each site were taken to add any missing data following the observation. Along with the location, date and time of observations, information about the type of edge between the project and the street, the watering method or the height of the vegetation were recorded. Additionally, the levels of maintenance and cleanliness were assessed and ranked (from “1 – low” to “5 – high”) . A set of criteria was put in place for both assessments and used in the same way for each site. Maintenance has been assessed based on plant health, the condition of the edges and the presence of weeds. Cleanliness levels were attributed based on the presence of any type of litter, with no visible litter delivering the highest grade and the lowest grade being the result of an apparent accumulation of waste and debris. Based on these two assessments, an overall grade has been compiled for each site, calculated as the mean of maintenance and cleanliness levels. Test observations were conducted before the data collection to ensure consistency within the data, and all observations were recorded by the researcher himself. Figure 2 shows tree pits with a range of maintenance and cleanliness levels as an example.



Figure 2 : A variety of planted tree pits, some of the highest ranking on the left and lowest ranking on the right, and intermediate examples in between (photographs taken by author)

Other factors, such as the presence of flowers or edible plants were also taken into account. It is worth noting that the presence of flowers or edible plants was only assessed based on an assessment during observations in early May. This means that some plants which were not displaying clear signs of flowers or edible plants may have been wrongly emitted. Lastly, a project's direct vicinity to a shop or restaurant was recorded following the assumption that such businesses may benefit from having a clean and well maintained green space on their store front. The full check-list and the data from the field observations and the interviews can be found in the appendix.

Data Analysis

- *Qualitative Data Analysis*

The interview data, after being translated from French into English, was coded and categorized into various themes. Reoccurring topics were grouped and put in relation with each other to identify patterns between the various responses. Finally, key information was listed for each theme in order to be compared with the quantitative data gathered during the field observations.

- *Quantitative Data Analysis*

All the data gathered during field observations was entered into a spreadsheet, directly on site. With the help of photographs as well as data from OpenStreetMap, any missing information was later added to ensure complete coverage. The data was then cleaned and some projects were regrouped into one entry. This was the case when there was sufficient evidence suggesting the initiative was

undertaken by one person/community as a single project. Therefore, a row of tree pits with a sign saying it is being maintained by a local community group is displayed as one single entry in the spreadsheet, with the number of individual interventions in the project also specified.

- *Discussion and Compilation of Qualitative and Quantitative Data*

Finally, results from the interviews and field observations were simultaneously compiled and analysed as an attempt to strengthen or invalidate hypotheses. As an example, following multiple respondents citing access to water as being a challenge to the success of their greening project, a spatial analysis was performed to establish whether projects in proximity with a water source fared better.

- *Ethical Considerations*

To protect the privacy of the respondents, no personal information was collected apart from their participation in the greening permit program. The respondents are referred to as numbers to ensure the confidentiality of their identity. After being informed about the purpose of the study, all participants were told they could withdraw from the interview at any time and get their responses deleted immediately. The responses were not recorded by means of audio or video recording and only notes were taken by the researcher during the interview. Moreover, participants were informed that none of their responses and statements could be linked back to them. When taking photographs of the greening interventions, the researcher took great care to not have people in the frame. If someone was however still identifiable on a photograph, the person has been accordingly blurred. Finally, this thesis and the associated data will be stored on the University of Groningen's database.

Results

Interview Results

Over the course of four days, 8 people were interviewed, providing a range of insights and perspectives. Since only notes were taken during the interviews, an outline of the content was compiled shortly after the interview and later translated. In order to identify key ideas and reoccurring concepts, a thematic coding (see appendix) was performed based on the prevalence of some responses as well as the relevance to the aims of this research. The themes outlined below provide a structure to the analysis and link the results directly to the research questions.

- *Opportunities and benefits*

The first thing to note is that at least 6 of the respondents believe the greening permits are a good idea, with many answers underlining the difference between before the permits and after. Respondent number 1 for instance notes how her street became “filled with plants” following a permit being granted to a neighbours’ association. Although there were a few plants before, the permit boosted the process, coupled with cars being banned from the street due to structural issues. A couple in the 11th arrondissement have been gardening for years prior to the implementation of the permits but believe it is a great idea, as their neighbourhood is in dire need of more green spaces, with one of the lowest rates in the whole city at the moment.

Another respondent (number 5) mentioned getting a lot of compliments about the flower pots she maintains in front of her bookshop. She says it is a great way to start conversations and also believe it is good for business as it makes her shop-front more attractive.

- *Challenges and drawbacks*

One of the key issues identified by the respondents was the bad quality of the edges of some projects. Respondent number 2 noted that her edge, which she inherited from the previous permit holder, was starting to mould. As it required too much work to replace it, she left it as it was. Respondents 3, 6 and 7 also cited the edges as a challenges, with issues such as a high disparity between various projects, edges that broke off, leaned outwards and encroached the pavement or a limited height which did not prevent dogs from stepping on the plants.

Another major problem was the accumulation of trash and dog feces in and around interventions. Many interviewees complained about the amount of trash they had to remove every time they were gardening. Respondent number 4 reported lower levels of littering on interventions where the vegetation was the lowest, suggesting taller bushes made the site more prone to littering. The two interviewees who had edible plants reported almost never harvesting anything, because people helped themselves before the products were even ripe.

Finally, the city gardener cited the lack of gardening experience as a drawback, as he has seen many sites where plants are not being taken care of in an appropriate way, resulting in situations that are, in his opinion, worse than before the permit was granted. Respondents 2, 5, 7 and 8 also reported difficulties concerning watering options and believed it was hampering many initiatives as some

people give up when they realize they have to carry a lot of weight from their apartment or a local fountain.

- *Contact and support from the municipality*

Regarding the relations between citizens and the municipality, responses vary. While some believe the municipality is genuinely trying to improve public spaces and are actively helping citizens to do so, other respondents are more sceptical. For example, respondent number 4 asked the researcher to pass on her complaints as she felt like she would not be heard by the municipality. To echo those concerns, respondent number 6 believes the program is only a political one aimed at providing a “green image” of the city, but not interested in actually collaborating with citizens. A number of respondents (2, 3, 4, 6, 7 and 8) wished for greater governmental support with things such as building the edges, watering and providing gardening knowledge. One specific issue regularly mentioned (1, 4, 7) is the length and complexity of the document which must be signed in order to be issued a permit. The document of 6 pages contains directives such as the minimum space left for pedestrians along the sites, the personal responsibility of the permit holders over the plot, as well as all the costs of the projects being on them. It also states that permits can be revoked at any time and all the investments put forward by the permit holder will not be reimbursed.

A general sense of poor governance could be felt through comments such as “lack of long-term thinking” (4), “terrible communication” (6), “bad implementation” (4). However, some positive comments were also made, for instance concerning the possibility of getting free flowers at the local shared gardens. Respondent number 7 also stated that the municipality “did a good job” and wishes they continued the program.

- *Community involvement*

All of the respondents – without exception – cited community involvement as being either a requirement for the success of their project or an opportunity for future projects. 3 respondents (2, 7, 8) either provided or received flowers to be reused. Help with watering was also mentioned as being crucial, particularly for shop-front projects where shopkeepers would be gone sometimes for weeks consecutively and neighbours or colleagues agreed to water their plants in the mean time. Interestingly, 3 respondents took over a neighbour’s permit, highlighting the exchange between members of the community. Apart from respondents number 6, 7 and 8, everyone reported being part of a collective to care for their plants.

Field Observation Results

During the field observations, a total of 107 sites were analysed, amounting to over 600 individual tree pits, keyholes, planted pots or traffic poles (see figure 3). Various relationships could be established, underlining the influence of some factors on cleanliness and maintenance levels.



Figure 3 : A variety of urban greening interventions (photographs taken by author)

Firstly, the size of the project seems to have a direct influence on maintenance and cleanliness levels, with projects comprised of over 20 interventions (i.e. 20 individual planted pots for instance) scoring significantly better than smaller projects. Such projects were rated “4 - well-maintained” and “4 - clean” on average. That relationship seems to follow a u-shaped distribution, with smaller projects also faring better than medium-sized ones. A similar relationship can be established between vegetation height and maintenance level, with interventions taller than 100cm scoring significantly better than shorter ones, by also scoring “4 - well-maintained”. The height of the vegetation also seems to influence cleanliness, although to a weaker extent, as taller interventions are generally cleaner than shorter ones, although medium height scored the worst.

The type of nearby traffic was also found to have a significant influence on the success of greening projects, as shown in figure 4. The ones situated in pedestrian, low speed or mixed traffic (such as public transport/cycle lanes) areas were generally maintained better than areas with higher traffic speed and intensity, indicating that high traffic flows negatively impact the maintenance of greening projects. However, the types of traffic was not found to have an influence on cleanliness. A spatial analysis also revealed that projects located closer to a community or relay garden scored better on average, as shown in figure 5. However, it was found that the distance to the nearest fountains and other green spaces and parks did not have any influence on maintenance and cleanliness levels. Also, interventions located in the direct vicinity of a shop or restaurant fared significantly better, with median scores of “4 - well-maintained” and “4 - clean” as opposed to “2 - poorly maintained” and “3 - moderately clean” for projects that were not in such locations.

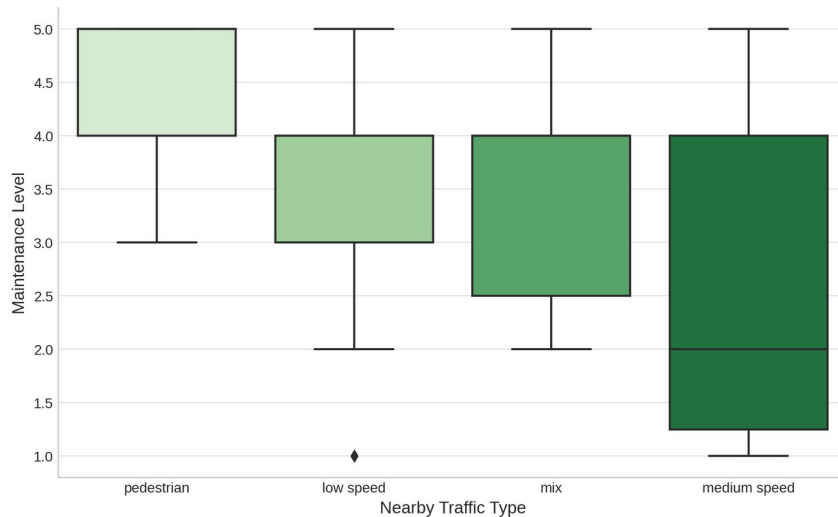


Figure 4 : Box plot showing the relationship between type of traffic and maintenance levels

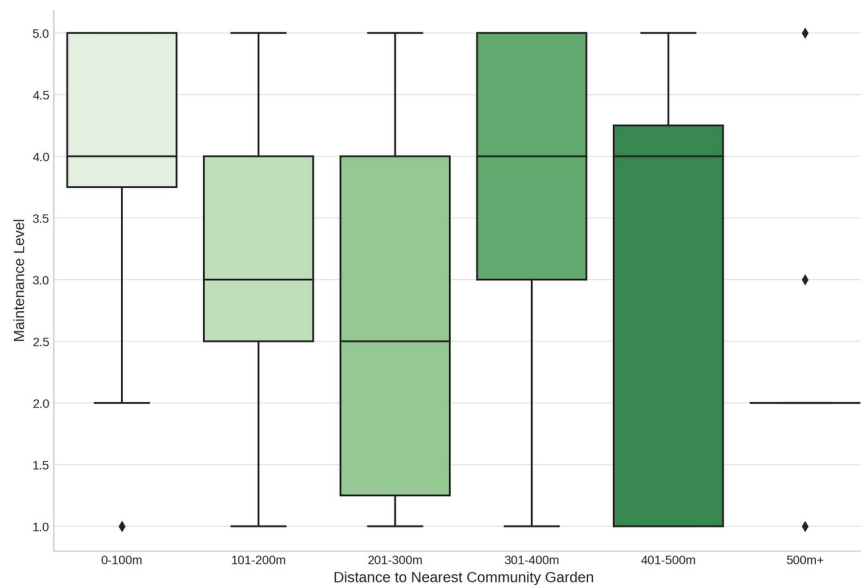


Figure 5 : Box plot showing the relationship between the distance to the nearest community garden and maintenance levels

Concerning the type of edges, project with planted pots made out of terracotta or a mix of various material were found to have the highest maintenance level. Cleanliness was not as impacted by the edge type and material, although most projects with no or broken edges did poorly, with the lowest scores for both cleanliness and maintenance.

Another factor influencing maintenance levels is the presence of flowers, with projects containing flowers having a median score of “4 - well-maintained”. Reported cleanliness levels were also higher but to a lesser extent. Similarly, the presence of edible plants had a significant impact on maintenance and a limited one on cleanliness. Concerning permit status, no significant difference was found between projects with a permit and guerilla interventions. Lastly, projects with an automatic watering system, although only four of them were recorded, were found to be cleaner and better maintained.

Discussion

The aim of this research is to identify opportunities and drawbacks associated with participative greening of public spaces. A range of factors have been found to influence the maintenance and cleanliness of greening projects, and therefore their capacity to improve public spaces and be accepted by the community (Javaid and Habeeb, 2018). One of the main findings of the interviews is the crucial role of community involvement for the success of greening projects, in the form of help from neighbours or colleagues to water and clean the sites, or provision of plants. This finding seems to be corroborated by the field observations, which showed that larger projects were on average better maintained and cleaner, and proximity to a community garden usually tends to lead to higher maintenance, highlighting the crucial role of communities in urban greening (Javaid and Habeeb, 2018).

Projects with flowers or edible plants scored better for both maintenance and cleanliness. Multiple respondents mentioned reusing flowers from the community gardens or local flower shops, suggesting a link between community involvement and the presence of flowers, therefore potentially contributing to enhancing biodiversity (Maes et al., 2021). However, this finding has to be put into perspective as it is difficult to assess whether projects with flowers or fruits and vegetables are better maintained or whether well-maintained projects tend to have more flowers and edible plants due to the fact that they are actively being taken care of. The same also applies to the height of vegetation, which was found to be higher on average in clean and well-maintained projects. This could be due to the fact that many of the abandoned projects displayed at most some grasses, weeds or dead larger plants, therefore lowering the average height of abandoned projects.

The type of edges, often mentioned in the interviews, also seemed to play a part and projects without edges had very low levels of maintenance. On the other end, projects with sturdy wooden edges, terracotta pots or a mix of various materials were found to score better for maintenance, but not necessarily for cleanliness. A neat looking edge around tree pits or a sleek keyhole were seen as important by some of the respondents who considered it crucial for public acceptance of greening interventions. This suggests that people not only value the aesthetics of the plants themselves but also the design of the edge, pot or keyhole, as put forward by Bonthoux et al. (2019).

The location of the interventions was also found to have an impact on maintenance and cleanliness. For example, projects located in pedestrian and low traffic zones fared significantly better than those located near heavy motorized traffic. This is to be expected since noise levels increase as traffic intensity and speed increase, making it unpleasant to be gardening nearby. Figure 6 below shows four pedestrian streets, all of which were part of the greening permits. Respondent 1, who was interviewed at Rue Ligner, emphasized on the increase of plants on the pavement since cars were banned from the street. This finding underlines the positive influence soft mobility and green infrastructure have on each other (Valente et al., 2021).



Figure 6 : Four greening projects in pedestrian streets (photographs taken by author)

While the interview showed mixed responses regarding the municipality’s role in facilitating greening initiatives, the greening permits were generally seen as a good initiative for the city of Paris. However, the way they have implemented the program is seen as sub-optimal by many respondents who wish for greater support in terms of provision of edges, help with watering and removing litter from municipal cleaning and gardening teams, and a greater presence on the field, which reflects the need for greater collaboration between all actors involved (Maurel, 2017). Interestingly, the observations don’t reveal any difference in maintenance and cleanliness between government-supported initiatives and guerilla interventions. The significance of this result is however limited due to the low sample size of 12 guerilla interventions as opposed to 95 projects with a permit.

The observations performed for this research only reflect the state of greening projects at a certain point in time, May 2024, and it is important to take into account the fact that some sites may have been reworked since the end of the greening permits. Therefore, some successful projects may have had their permits revoked and were abandoned as a result, and reversely, some abandoned projects may have been taken up by the municipality and are cleaner and better maintained now. Furthermore, the assessment of maintenance and cleanliness remain subjective and despite the researcher’s care while recording the data, the results must not be seen as definitive. This also applies to the permit status, as many of the entries of the guerilla gardening map dated back over a decade and activity within that community seems to have slowed in the past years. Therefore, some projects may have been omitted, although a thorough examination of the streets visited during the field observations have minimized that chance. Finally, the data collection method, in the form of spontaneous walks, limits the potential for spatial analysis as some spatial patterns are inherently present due to some areas being researched and some being omitted. Further research could alternatively record all instances of greening projects in a predefined area in order to get a deeper understanding of spatial factors influencing their success.

Conclusion

This study highlights the potential of participative practices for greening projects in a dense urban environment like Paris. Both the interviews and the field observations showed community involvement to be crucial for the success of interventions over time, through sharing maintenance and cleaning tasks, reusing gifted plants and having access to a nearby community garden. Additionally, greening projects located in low-traffic areas tend to have higher maintenance levels. However, challenges hindering the success were also identified. Littering is a common issue which many gardeners feel should not be their sole responsibility, considering the amount of work to clean up the trash of thousands of city dwellers. Similarly, greater support to build and maintain edges could improve the overall aesthetics and durability of initiatives while making them more recognizable and appreciated by the public.

Through greater support of projects, for instance by involving municipal cleaning and gardening teams with watering, cleaning and building edges, municipalities could improve the quality of interventions along with people's perception of them, contributing to bringing as many people as possible on board. Moreover, decreasing traffic speeds and limiting access to cars can have a direct effect on the success of greening projects, which then may encourage people to use soft modes of transport. But adapting our cities to a changing climate and a wave of urbanization is a shared task. Municipalities alone cannot achieve a sustainable transition without a tight collaboration with its inhabitants. Similarly, citizens operating without the support of their cities will only get so far as disruption rather than lasting change. The fastest track towards a greener city is one where everybody feels involved and enabled to do their part. Future research could look into the institutional aspect of the implementation of such programs to understand what barriers are hindering the success of participative urban greening. Alternatively, a comparative study of other cities deploying such programs could help identify best practices and guide policy making for future greening programs.

Bibliography

- Azabdaftari, A. and Sunar, F. (2024) 'Predicting urban tomorrow: CA-Markov modeling and district evolution', *Earth Science Informatics* [Preprint]. Available at: <https://doi.org/10.1007/s12145-024-01340-4>.
- van den Berg, A.E. and van Winsum-Westra, M. (2010) 'Manicured, romantic, or wild? The relation between need for structure and preferences for garden styles', *Urban Forestry & Urban Greening*, 9(3), pp. 179–186. Available at: <https://doi.org/10.1016/j.ufug.2010.01.006>.
- Bonthoux, S. *et al.* (2019) 'Improving nature experience in cities: What are people's preferences for vegetated streets?', *Journal of environmental management*, 230, pp. 335–344.
- Bowler, D.E. *et al.* (2010) 'Urban greening to cool towns and cities: A systematic review of the empirical evidence', *Landscape and Urban Planning*, 97(3), pp. 147–155. Available at: <https://doi.org/10.1016/j.landurbplan.2010.05.006>.
- Coventry, P.A. *et al.* (2021) 'Nature-based outdoor activities for mental and physical health: Systematic review and meta-analysis', *SSM - Population Health*, 16, p. 100934. Available at: <https://doi.org/10.1016/j.ssmph.2021.100934>.
- EEA (no date) *How green are European cities? Green space key to well-being – but access varies* — European Environment Agency. Available at: <https://www.eea.europa.eu/highlights/how-green-are-european-cities> (Accessed: 27 May 2024).
- Eizenberg, E. (2012) *From the ground up: community gardens in New York City and the politics of spatial transformation* (1 online resource (219 pages) vol). Farnham, Surrey, England: Ashgate (Re-materialising cultural geography).
- Fletcher, T.D., Andrieu, H. and Hamel, P. (2013) 'Understanding, management and modelling of urban hydrology and its consequences for receiving waters: A state of the art', *Advances in Water Resources*, 51, pp. 261–279. Available at: <https://doi.org/10.1016/j.advwatres.2012.09.001>.
- Furberg, D., Ban, Y. and Mörtberg, U. (2020) 'Monitoring Urban Green Infrastructure Changes and Impact on Habitat Connectivity Using High-Resolution Satellite Data', *Remote Sensing*, 12(18), p. 3072. Available at: <https://doi.org/10.3390/rs12183072>.
- Gill, S.E. *et al.* (2007) 'Adapting Cities for Climate Change: The Role of the Green Infrastructure', *Built Environment*, 33(1), pp. 115–133. Available at: <https://doi.org/10.2148/benv.33.1.115>.
- Han, Y. *et al.* (2022) 'Plant-based remediation of air pollution: A review', *Journal of Environmental Management*, 301, p. 113860. Available at: <https://doi.org/10.1016/j.jenvman.2021.113860>.
- Institut National de la Statistique et des Études Économiques (INSEE) (2023) 'État civil en géographie au 01/01/2023'. Available at: <https://www.insee.fr/fr/statistiques/1405599?geo=DEP-75> (Accessed: 15 May 2024).
- Javaid, S. and Habeeb, R. (2018) 'Participatory planning in urban green spaces: a step towards environmental and social equity', in *6th national seminar on architecture for masses on the theme of "Environmental Remediation & Rejuvenation"*, Jamia Milia Islamia, New Delhi, pp. 22–23. Available at: https://www.researchgate.net/profile/Riyan-Habeeb-2/publication/329264991_Participatory_Planning_in_Urban_Green_Spaces_A_Step_towards_Environmental_and_Social_Equity/links/5bff44c2299bf1a3c1556d04/

[Participatory-Planning-in-Urban-Green-Spaces-A-Step-towards-Environmental-and-Social-Equity.pdf](#) (Accessed: 31 May 2024).

- Kabisch, N. *et al.* (2016) 'Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action', *Ecology and Society*, 21(2). Available at: <https://www.jstor.org/stable/26270403> (Accessed: 27 May 2024).
- Kronenberg, J. *et al.* (2021) 'The thorny path toward greening: unintended consequences, trade-offs, and constraints in green and blue infrastructure planning, implementation, and management'. Available at: <https://brage.nina.no/nina-xmlui/bitstream/handle/11250/2987108/BartonTheThornyEcologyandSociety2021gull.pdf?sequence=1> (Accessed: 31 May 2024).
- Kumar, P. *et al.* (2019) 'The nexus between air pollution, green infrastructure and human health', *Environment International*, 133, p. 105181. Available at: <https://doi.org/10.1016/j.envint.2019.105181>.
- Maes, J. *et al.* (2021) 'BiodiverCities: A roadmap to enhance the biodiversity and green infrastructure of European cities by 2030 BiodiverCities: A roadmap to enhance the', *Publications Office of the European Union, Luxembourg* [Preprint]. Available at: https://www.researchgate.net/profile/Joachim-Maes-2/publication/352477799_BiodiverCities_A_roadmap_to_enhance_the_biodiversity_and_green_infrastructure_of_European_cities_by_2030/links/60caf5ba299bf1cd71d56766/BiodiverCities-A-roadmap-to-enhance-the-biodiversity-and-green-infrastructure-of-European-cities-by-2030.pdf (Accessed: 31 May 2024).
- Mairie de Paris (2024) *Le permis de végétaliser*. Available at: <https://www.paris.fr/pages/un-permis-pour-vegetaliser-paris-2689> (Accessed: 27 May 2024).
- Mentaschi, L. *et al.* (2022) 'Global long-term mapping of surface temperature shows intensified intra-city urban heat island extremes', *Global Environmental Change*, 72, p. 102441. Available at: <https://doi.org/10.1016/j.gloenvcha.2021.102441>.
- Mistry, A.N. *et al.* (2019) 'A review on biological systems for CO2 sequestration: Organisms and their pathways', *Environmental Progress & Sustainable Energy*, 38(1), pp. 127–136. Available at: <https://doi.org/10.1002/ep.12946>.
- Salagnac, J.-L. (2007) 'Lessons from the 2003 heat wave: a French perspective', *Building Research & Information*, 35(4), pp. 450–457. Available at: <https://doi.org/10.1080/09613210601056554>.
- Savouré, M. *et al.* (2021) 'Long-term exposures to PM2.5, black carbon and NO2 and prevalence of current rhinitis in French adults: The Constances Cohort', *Environment International*, 157, p. 106839. Available at: <https://doi.org/10.1016/j.envint.2021.106839>.
- Tzoulas, K. *et al.* (2007) 'Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review', *Landscape and Urban Planning*, 81(3), pp. 167–178. Available at: <https://doi.org/10.1016/j.landurbplan.2007.02.001>.
- Wolch, J.R., Byrne, J. and Newell, J.P. (2014) 'Urban green space, public health, and environmental justice: The challenge of making cities "just green enough"', *Landscape and Urban Planning*, 125, pp. 234–244. Available at: <https://doi.org/10.1016/j.landurbplan.2014.01.017>.
- Wolf, T., Pettersson, L.H. and Esau, I. (2020) 'A very high-resolution assessment and modelling of urban air quality', *Atmospheric Chemistry and Physics*, 20(2), pp. 625–647. Available at: <https://doi.org/10.5194/acp-20-625-2020>.

Appendix

Colour coded interview summaries

- Opportunities
- Challenges
- Contact with and support from municipality
- Involvement from the community

1. Rue lignée, 20ème arrondissement

Local resident who has been living there for 15 years

The road became pedestrian after it began subsiding due to the tunnels under it, about 5 years ago. Already a few flower pots before but in 2016, some neighbours got a PdV (permis de végétaliser) and started putting more of them. Now the street is filled with plants, vines and even vegetated traffic posts.

Respondent thinks it was a good idea and wishes they continued with the program.

However, she says 6 pages of info is a bit too much and probably puts some people off, especially non native speakers as it is a lengthy, contract-like document that feels a bit intimidating.

2. Avenue Parmentier, 11ème arrondissement

Bookseller who gardens the tree pit in front of her bookshop.

She inherited the greening permit from someone else who moved.

Now she has beautiful flowers and a vine climbing on the tree.

Sometimes she gets free flowers from the flower shop across from the library.

She says collaboration between various shop keepers has been crucial, especially during the summer holidays when water is most needed and people sometimes go on vacation.

She says the edge she inherited is starting to mould and she wishes the municipality provided the edge, or at least helped with it. Most city dwellers don't have tools such as sledgehammers, saws or any heavy tools required to build a proper edge. Most especially don't have the knowledge and end up building something that won't last.

3. Rue Jules Verne, 11ème

Gardener in a small shared garden who calls himself an anarchist and a guerilla gardener.

He has been gardening since before the PdV through an authorized shared garden on public land.

The garden opened in 2009 so the PdV didn't change much for them.

On the side he also plants seeds and writes the name of random spontaneous plants climbing on walls.

He thinks municipality should at least provide supplies to make it more worth it to people.

Even though he does it himself, he knows people who don't garden because they don't have money or time to go buy soil, seeds, and lack access to water.

He also thinks there is too much disparity between various interventions

Also, some tree pits now encroach the street and restrict access. He knows that is one thing a lot of people complain about

He says the garden only works because a lot of people give a bit of time, rather than a few people giving a lot of time.

However, they almost don't harvest anything as people just come and help themselves but they keep doing it because they like it and it keeps the area green and cooler.

He says the 11th arrondissement greatly lacks parks and gardens and says maybe more greening permits have been granted there because of that, people need more green.

As I show him the map of the PdV, he says it doesn't surprise him that there is a higher density of permits in the East as they have less parks and it is more middle class.

He suggests the municipality should hire people from the community to enhance collaboration and visibility.

4. Rue du Jourdain, 20^{ème}

Artisan who is part of a collective and works at a cooperative shop.

She's taking out weeds and trash from her tree pit.

She has two of them but has given up on the other one because of people throwing out their trash in it, vandalising it and stealing plants from it.

Some people have even defecated in it

She says if the bushes are too high around the tree, people are more prone to throw things in it, so now she only plants small plants

She says the municipality doesn't listen to the population. For example, at "rue des écoles", they're planning long green stripes along the street which will impede on local shop owners' store fronts and worsen their business. Moreover, the strips are continuous (cannot be crossed, need to go around) and restrict access to the shops. The municipality has been informed of the concerns but went on with the plan as they want to get it done before the olympics.

The municipality has also planted new trees (she didn't know the kind), which grow very fast as they need shadow fast, but when their flowers fall in late summer, it makes the ground filthy and very slippery, she's heard many old people complain about safety risks because of them. She criticizes their lack of long term thinking and the way they do things only to say they did it.

She believes gardening on the public space can only be successful if there is a consensus within the local community and everybody is on-board. If not, it will not be recognized and people won't care for it.

An old lady comes to congratulate her on her tree pit as we speak.

She tells me to inform the municipality of all these issues as she feels that they won't listen to her. However, she believes the PdV is a good idea, only badly implemented.

She thinks having greener cities is great but it has to be part of a wider strategy, including supporting local artisans and businesses, which she feels is not the case there. She says otherwise it will just be marketing for the municipality and won't have real long term impact.

5. Quai de Valmy, 10^{ème}

Bookseller who gardens suspended pots on a fence situated on a reclaimed parking spot. She received the permit 4 years ago and keeps maintaining it because she gets a lot of compliments for it.

She says it is also good for business to have a nice and green storefront.

She says the municipality removes everything that isn't official and thinks they shouldn't.

She argues that it only works because it's in front of the bookshop which is open all year round.

Otherwise the plants would die when they go on holiday.

Everyone in the bookshop is willing to help when necessary.

6. Rue Lucien Sampaix, 10^{ème}

Guerilla gardener who calls himself a “green terrorist”

At first he is a bit put off by me asking questions but gets very enthusiastic as I explain my intentions.

He used to have a permit for another tree pit but it was revoked because he didn't use plants on the authorized list.

He therefore continues gardening another tree pit, without permit, without an edge.

He planted a spiky bush to prevent people and dogs from stepping on the pit and bicycles to be parked there. The city gardeners don't like it but haven't removed it so far.

He tries to get the local community on board by for instance talking to servers from the nearby café and asking them not to throw their cigarettes on the ground or in his tree pit.

He also negotiated for one café to dispose of their coffee ground in the pit as fertilizer rather than throwing it away.

Although he thinks a collaboration between government and citizen is necessary, he says communication on their side is terrible and says that – as things are now - he would rather keep it within the community only, without governmental involvement. People don't want to sign a 10 page document with complicated words just to plant a few flowers in the street. He says it is too unclear what is doable and what is not.

He believes edges should be provided as there is currently too much disparity and some are bad quality.

Looking back, he believes the PdV was only a political move which harnessed people's work to help prepare for the olympics without explicitly stating it.

(the 2024 olympics were awarded to paris in 2017, so the PdV started before that)

They did not do it with people or nature in mind in his opinion.

He says a solution to make it more efficient is to have people in the field to coordinate efforts between the municipality and the multiple citizens who just want to garden and have a greener city.

7. Rue de Mouzaia, 19^{ème}

Older lady who garden a beautiful tree pit with lots of flowers of various colours and some wild strawberries (which she never eats herself as people take them before they are even ripe). She says all of them are native and she made sure to not have invasive species since she started around 5 years ago.

She gets her flowers from the shared gardens, which collect the flowers taken out by the municipality as they plant new ones bi-yearly. She thinks that's a good solution as there is less waste and it is cheaper.

She loves the idea of the PdV and thinks the municipality did a good job, however she wishes they kept the program going.

The main challenges for her are trash and dog poo. She says she would have put a taller edge but it is not allowed, which is a shame because it would help prevent those issues. She says the municipality regularly came to check on the tree pit.

Another issue for her is to water the plants, as she can't carry a lot of weight and it takes a lot of effort for her. She wishes the municipality at least helped residents with disability or older people with watering their project because it is a big no go for some people because of that.

One thing she found bizarre is the length of the document which she had to sign, which might put some people off, especially non native speakers.

8. *Passage de le petite ceinture, 15ème*

City gardener who is working on removing an old batch of flowers and planting a new one.

He says the old flowers will be brought to a shared garden to be reused.

He laughs when I ask what he thinks of the PdV then says its a good idea but also a bet to count on people's gardening skills like that.

He has seen lots of unkept interventions and thinks it makes it worse than if there is nothing.

He says most city workers don't bother picking up trash in and around greening interventions as it is not their job anymore and they have enough on their plate already.

He says he doesn't have a greening permit himself as he already gardens enough for his job.

He says the program could be improved if city gardeners worked along citizens to show them how and help them keep it clean and watered. However they don't have enough people as it stands.

Field Observation Data

→ see attached document