



# Inclusive engagement for vulnerable population in co-creating Nature-Based Solutions: the case of “Villaggio Barona” social housing within the CLEVER Cities project

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**Abstract.** In the context of the EU-funded CLEVER Cities project, the imperative inclusion of all citizens and stakeholders in a collaborative design process was paramount. This paper focuses on the co-design pathway developed by the Urban Living Lab 1 in Milan, namely CLEVER Action Lab.1 (CAL1), following the CLEVER Co-Creation Guidance. Emphasizing engagement, this pathway facilitated the involvement of citizens and local stakeholders in implementing nature-based solutions (green roofs and walls), amidst challenges posed by the Covid-19 pandemic. Confronted with restrictions on physical co-creation activities, CAL1 adapted by conducting all co-design activities online within the four selected pilot projects. One of these pilot projects, the subject of this paper, consists of building four green roofs on terraces of social housing buildings named “Villaggio Barona” situated southwest of Milan. Different vulnerable groups of people live in each of the buildings, including the elderly, people with HIV/AIDS, and people with psychiatric illnesses, while one of the buildings is open for public use.

The aim of this paper is manifold. By in-depth narrating the co-creation activities of NBS in “Villaggio Barona”, the paper will show all the impacts that challenged the implementation of green roofs. To critically discuss the role of the participants and the tools employed throughout all the phases of co-creation, the paper revolves around the question of accessibility, inclusion, and social innovation. It will provide insights on how the elderly were engaged during the online co-design activities, which served in bridging the “digital gap” that affects mostly this group of people.

**Keywords:** Co-creation, Nature-based Solutions, Inclusive engagement, Social Housing, Urban Living Lab

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## 1 Introduction

As a collaborative approach, co-creation of nature-based solutions (hereinafter NBS) seeks to involve diverse participants to ensure a diversity of perspectives and thus a wide range of co-benefit [1]. To ensure that the benefits of co-creating NBS are as equal as possible for all participants who are impacted, the principle of social inclusion must be fundamental [2]. It implies the involvement and empowerment especially of the vulnerable groups of people ensuring that their needs, knowledge, and values are considered.

Social inclusion has driven many EU-funded projects dealing with adopting NBS to address environmental and societal challenges. Nonetheless, the recent report by the European Commission, which reviewed 24 EU-funded projects, has acknowledged that social inclusion is not automatically ensured in co-creation processes of NBS, particularly with regard to the participation of vulnerable groups of people [3]. Moreover, as also research warns that empirical evidence is missing on how the benefits generated from co-creation of NBS (co-design and implementation) are contributing to the sustainability that those vulnerable groups need or desire in the longer term.

The Horizon 2020 CLEVER Cities project, whose core objective is to establish socially inclusive engagement processes for co-creating locally tailored NBS, is providing more comprehensive data from real-world cases studies that are demonstrating that such sustainability is being considered, particularly by empowering the vulnerable groups to self-organize in NBS utilization and further exploitation of the co-benefits NBS generate. This is supported by the ‘inclusive framework for co-creation planning, co-designing, co-implementing, and co-monitoring and co-management of NBS’ [4] that has been developed by Politecnico di Milano and tested in this EU-funded project in three main front runner cities, Milan, London and Hamburg through ULLs (Urban Living Labs hereinafter CLEVER Action Labs, CALs).

In Milan, one of the three CALs of CLEVER Cities project (namely CAL1 – “Re-greening Milan”) foresees the promotion and implementation of NBS, green roofs and walls. One of the four selected pilot projects of CAL1, the subject of this paper, consists in building four green roofs in the terraces of “Villaggio Barona” which is a multifunctional complex of buildings combining social housing, shops, integrated nursing homes, as well as a public park. Different vulnerable groups of people reside in each of the buildings with green roofs: people affected by HIV/AIDS live in the nursing house named ‘Casa Alloggio A77’; those with psychiatric illnesses reside in ‘Casa Serena’; the large apartment named ‘Casa Noemi’ accommodates elderly individuals aged at least 60 years old for a maximum of 30 consecutive days. The fourth green roof is situated on the building partly dedicated to the ‘Villaggio Barona’ community for their events, while the other part is available for public use through bookings and payment.

Building the green roofs of Villaggio Barona in a co-creative approach has been significantly challenging due to the pandemic situation. Adapting to the sudden changes caused by the Covid-19 pandemic has not only presented challenges to the continuity of co-creation activities, as planned in the Grant Agreement of the CLEVER Cities project, but has also catalyzed new ideas in reaching the promised results. This implies the actions needed primarily during the transition to an online environment. The process

of transition and continuous adaptation has itself been inclusive, during which supporting mechanisms were created to enable the different phases of co-creation, particularly co-design and (co)implementation.

The paper presents the empirical knowledge acquired by putting into practice the “Co-design pathway” developed in CAL1 to engage citizens and local stakeholders in implementing green roofs and walls [4]. It builds on the co-creation process established in the CLEVER Co-Creation Guidance [5] [6] and has tested various tools and digital participation instruments, given that all co-design activities were conducted online. Additionally, it will illustrate the completed co-creation pathway of 'Villaggio Barona', encompassing all elements that influenced the different phases: co-design, (co)implementation, and (co)monitoring of NBS.

The aim of this paper is manifold. By in-depth narrating the co-creation activities of NBS in “Villaggio Barona”, this paper aims to elucidate the various impacts that have challenged the implementation of green roofs. Focusing on the critical discussion of participants' roles and the tools utilized in both co-design and (co)implementation, the paper centralizes the themes of accessibility, inclusion, and 'social innovation' [7]. It will provide insights on how the elderly were engaged during the online co-design activities, effectively bridging the 'digital gap' that predominantly affects this group of people [8]. Lastly, it will also provide some recommendations and reflections on overcoming obstacles to inclusively engage the most vulnerable groups. And it will underscore the crucial role these groups play in establishing an effective co-creation pathway while contributing to the sustainability of co-benefits from NBS.

## 2 Methodology

As previously mentioned, the CLEVER Co-creation Guidance and further the CAL1 co-design pathway were the basis for co-creating the green roofs of “Villaggio Barona”. This pathway consisted in steps (see Fig.1) that guided the participants into different phases of co-creation using different tools and digital participation instruments to co-produce knowledge around NBS [4]. These tools and instruments enabled the co-creation pathway to be flexible and adaptable to all four CAL1 projects, leaving room for a continuous process of 'learning by doing' [4]. This method has been proven to be effective in CAL1, particularly in unexpected conditions such as the pandemic, in achieving promising outcomes.

Before discussing the tools in each phase, it is worth explaining that firstly, this pilot project was selected through a procurement process where the Municipality of Milan issued two public calls: one for the selection of interested projects (owners of the buildings) to build green roofs and walls, and the other for the creation of a list of technical experts with adequate skills in the design and implementation of green roofs and walls to support these projects in the co-creation process of their NBS.

The co-creation pathway commenced with the initial phase of stakeholder engagement from September 2020 to October 2020, conducting four online meetings. These sessions aimed to establish trust among stakeholders and create opportunities for them to convene and network. The topics covered in these meetings included presentations

on two incentives put in place by the CLEVER Cities project and the Municipality of Milan. These incentives aimed to facilitate the installation of green roofs and walls and foster collaboration among the selected pilot projects, including 'Villaggio Barona,' with technical experts and potential green roof suppliers. Coordination for these meetings was led by the CLEVER Cities partners 'Ambiente Italia' (hereinafter “AMBIT”) and the Municipality of Milan (hereinafter “CdM”), while representing 'Villaggio Barona,' participation came from the management of the village, the 'Fondazione Cassoni' (hereinafter “Cassoni Foundation”).

During these meetings, technical experts had the opportunity to present their projects. This was essential as afterward, the owners needed to choose their technical expert for the upcoming co-design meetings. Additionally, the suppliers showcased their projects and innovative systems to the technical experts and owners, aiming to be selected for the implementation phase, offering their materials and green roof systems. Moreover, these four meetings served as an icebreaker for different parties/stakeholders to come together - owners, technical experts, and suppliers - laying the groundwork for the co-design process. It allowed for technical knowledge sharing and exchange among the diverse stakeholders involved.

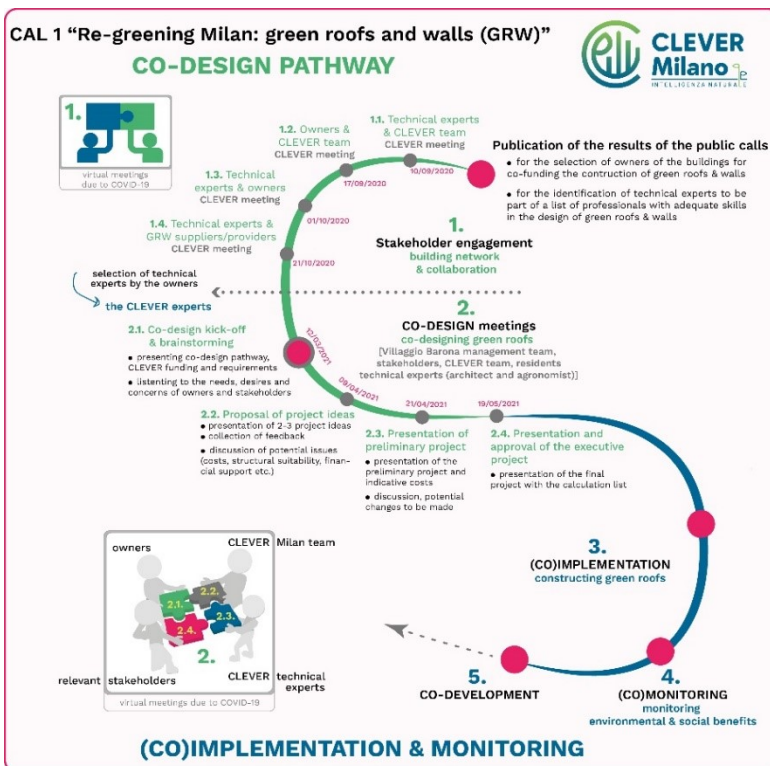


Fig. 1. Adopted Co-design pathway in CLEVER pilot project “Villaggio Barona”

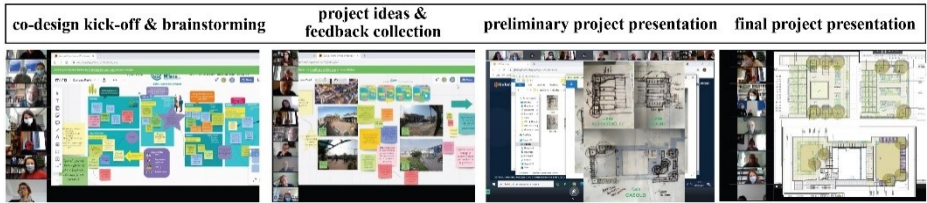
### 3 Co-design phase

The co-design activities took place online in a relatively short period, four meetings in a period of two months (March 2021 – May 2021), all led by AMBIT and coordinated with the management of the buildings, the Cassoni Foundation. The co-design meetings included the participation of various stakeholders: the community representative and facilitator; representatives from Casa Alloggio A77 and Casa Serena; senior residents from Casa Noemi; the buildings manager; resident representatives for Sala Casolo; other residents of 'Villaggio Barona'; the Milan CLEVER team (Eliante, Politecnico di Milano, CdM, Environment, Mobility, and Territory Agency of the Municipality of Milan, hereinafter referred to as AMAT); and the technical expert for green roofs, selected by the management of 'Villaggio Barona' from the list of experts.

According to the CAL1 Co-design pathway (for further details, refer to [4]), the 'Value Proposition Canvas' tool was utilized in the subsequent four co-design meetings following the stakeholder engagement meetings. This tool was an additional tool included in Step 8 of CLEVER Co-creation Guidance [9]. Its purpose was to support participants in concentrating on the topics discussed in line with the objectives set for each meeting within the co-design pathway (see steps 2.1-2.4 in Fig.1). In particular, the Value Proposition Canvas enabled:

- Exploring and listening to the desires, needs, and concerns of residents and stakeholders regarding the new green roofs being co-designed.
- Thoroughly discussing the technical characteristics and benefits associated with green roofs.
- Collaboratively clarifying various functions, topics, and encountered issues (e.g., accessibility, (co)management).
- Ensuring the sustainability of green roofs together, addressing future maintenance, potential financial benefits generated from NBS functions, potential job creation for residents, etc.

All these topics were discussed using the Miro Board online tool, involving all participants in the discussion, while the coordination team compiled the canvas with the real-time feedback received. Subsequently, a report summarizing the discussions, co-design tools, conclusions, and next steps of each meeting was prepared. This report was then shared via email with all the participants, who were given additional time to gather feedback from other residents of Villaggio Barona.



**Fig. 2.** Co-design meeting following the CAL1 co-design pathway

In the first co-design meeting, the Miro board employing the Value Proposition Canvas tool was organized into sections to gather feedback for each topic. The first section aimed to initiate discussions on the positive benefits that participants believed green roofs would bring, the characteristics desired by participants, particularly the residents, for their green roofs, and the experience concerning how the residents and users would feel upon having the new green roof. The subsequent section delved deeper into topics encompassing fears, desires, and more specific needs.

During the second co-design meeting, there was an in-depth discussion about the prospective functions of green roofs and the potential challenges that could emerge for each of the four terraces. Additionally, pivotal points of discussion encompassed questions regarding accessibility, maintenance, and management.

In the third meeting, following the presentation of the preliminary project for each terrace, additional details, modifications, and issues were discussed, and suggestions were made for the final projects.

The fourth meeting involved further discussions regarding project management, maintenance, and project sustainability. A significant emphasis was placed on biodiversity, which garnered considerable interest from all the residents. As the number of stakeholders and residents nearly doubled compared to the previous meetings, the discussions expanded to explore additional parallel projects and how project communication would be carried out.

Besides the co-design meetings and feedback iterations, site visits were conducted by the Milan CLEVER team, partially adopting a 'participant observation' approach [10] to identify behaviors and activities in the utilization of terraces by vulnerable groups of people residing in Casa Serena and in Casa Alloggio A77. The observations confirmed the information provided and the needs expressed by the representatives of both Case/Houses during the co-design meetings.



**Fig. 3** Site visits in the terraces of Villaggio Barona

Conducting solely online activities for an extended period has proven to be quite challenging, especially in meeting new stakeholders. Finding an appropriate timetable for everyone appeared to be remarkably difficult. There was a consistent scheduling overload, given that attending online events was less time-consuming, allowing attendance at numerous events. While these issues might appear trivial, they were, in fact, significant.

To alleviate this challenge, one action taken was to further expand the Urban Innovation Partnership (UIP), a concept developed by the CLEVER Cities project, which refers to an informal alliance of local stakeholders supporting the project in the co-creation of NBS. This approach aimed to sustain relationships through contacts established before the pandemic, helping in strengthening ties between the Villaggio Barona community and other stakeholders, thereby laying the groundwork for the continued impact of NBS after completion.

The transition to an online environment posed a notable challenge in including vulnerable groups, particularly the elderly at Casa Noemi, in participating in online co-design meetings due to limited technological skills. To overcome this obstacle, small groups gathered to follow the meetings together in one room, with only one person having access to the meeting online. This arrangement, compliant with prevailing Covid-19 measures, was consistently employed in nearly every co-design meeting and proved effective in engaging all relevant participants. During one co-design meeting, an elderly participant encountered difficulties activating the microphone on the online

platform (GoToMeeting). To ensure his participation we called him on the phone and put him on loudspeaker. This allowed the elder to express his concerns about the design of the green roof and engage in discussion with the other participants.

The involvement of end-users, comprising both residents and representatives, had significant influence over the design of the green roofs, primarily centered around their specific needs. For instance, they expressed the desire for large grassy areas dedicated for relaxation, along with spaces allocated for planting vegetables and flowers. They have actively participated in reviewing project designs to ensure their preferences aligned with the expertise provided by the CLEVER experts (architect and agronomist). While the latter played an essential role in translating ideas into tangible designs, they were not the sole providers of technical knowledge during the co-design sessions, as other participants, including agronomist and engineer were the supporters with their expert knowledge. Additionally, other stakeholders displayed a high level of interest in the project, offering valuable insights and information that improved the overall project design.

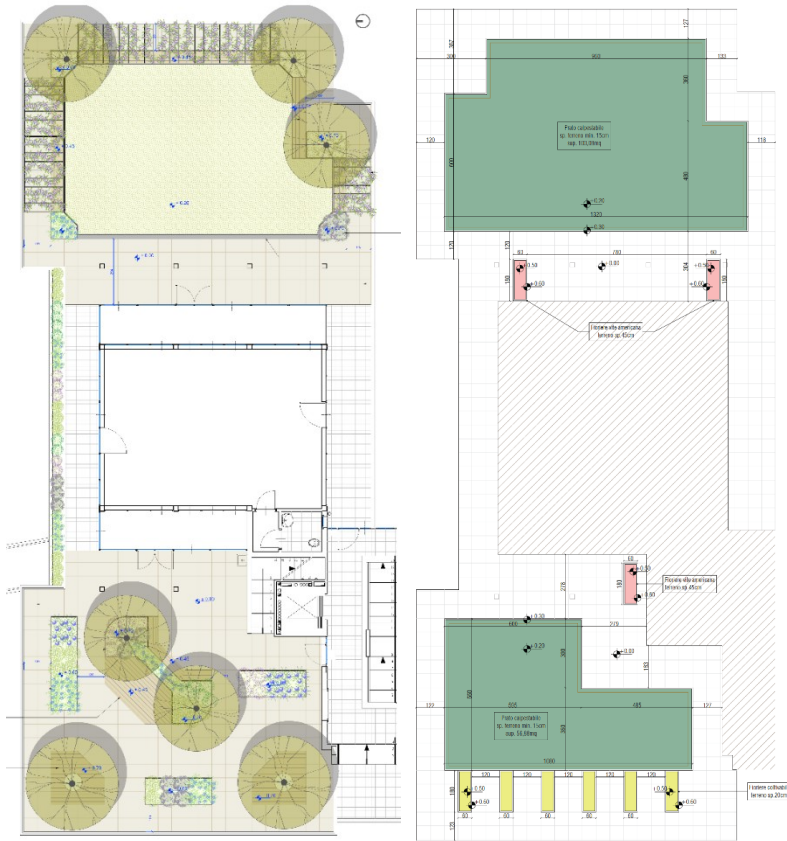
#### **4 (Co) implementation phase**

After the initial stakeholder engagement and co-design meetings, the management team of Villaggio Barona had no difficulty in selecting a supplier and company to construct the green roofs. However, after the completion of the final co-designed project, the management conducted additional cost assessments and found that the proposed design by the CLEVER expert incurred very high construction costs. Consequently, the Villaggio Barona management team opted for some design simplifications while ensuring the essential functions requested by the residents of the Houses/Case were preserved. The executive project was designed from September 2021 until December 2021.

During the implementation phase, a critical issue emerged, significantly impacting and challenging the construction of the green roofs. When installing the scaffolding for roofing works, the building management received a substantial fine from the public authority due to temporary occupation of public space, blocking sidewalk access. The fine imposed was substantial, rendering the project costs unmanageable, thereby necessitating further modifications in material and simplification of vegetation choices.

However, the concept and the size of the green areas designed based on the needs of the people living in the Houses remained unchanged. After resolving the issue, the installation of the green roofs progressed as planned. Within a month (during mid-January and February 2022), the terraces were transformed into green roofs, featuring large meadow/lawn areas and big plant pots/nano gardens.





**Fig. 4.** On the left-hand side the final co-designed project, while on the right-hand side the project implemented of Sala Casolo (source: AG&P greenscape srl, 2021; ARPOSTUDIO, 2021)

Over the course of the last year, following ongoing discussions between the management team, community representatives of Villaggio Barona, and AMBIT from the CLEVER Cities project, and after the availability of an additional budget, it was collectively decided that the green roof of Sala Casolo required further activities to enhance its greenery, involving the residents. The activity (see Fig.5) took place on February 19, 2023, with interested residents of Villaggio Barona. Present at the event were elderly individuals, children, including one child with Down syndrome, and adults.

The CLEVER partner, AMBIT, developed activity cards that participants used to choose the ‘Functions’ to be incorporated into the green roofs as well as the ‘Vegetation Types’ to be planted in the meadows and nano-gardens. The functions included options such as Relaxation, Events, Barbecue, Meetings, Training courses (e.g., yoga), Social activities, and others that residents could suggest. The vegetation types encompassed Bulbs (e.g., dahlia), Vegetable garden, Beehives, Aromatic plants, Shrubs, Honey plants, Cut flowers, etc.

This activity was conducted on two additional occasions, allowing residents to further refine the final design of a section of the green roof for Sala Casolo. These workshops also facilitated the establishment of a maintenance and management protocol for the green areas by the residents. Another workshop is scheduled for December 17, 2023, where the residents will plant together different species they chose.

As highlighted in the introduction, the northern part of the terrace is accessible to the general public, while the southern part is designated for use by the Villaggio Barona community and will be managed accordingly. Contrarily, the other houses within Villaggio Barona have independently organized their lawn meadows. For instance, Casa A77 is cultivating chili peppers in their nano gardens on the green roof and mixing them with salt for sale in small quantities.



Fig. 5. Co-implementation activity

## 5 Conclusions

In conclusion, the empirical knowledge gained with the experience of co-design pathway and implementation of green roofs in Villaggio Barona, has identified some recommendations for enhancing the inclusive engagement of vulnerable groups of people. Despite 'Villaggio Barona' having a well-established community with a functional structure including social housing representatives, building management, community facilitators, and active inhabitants, it was observed during the co-creation of NBS that additional guidance and support were necessary throughout the process, while also allowing for flexibility to foster creativity and the emergence of new ideas that may not have been previously considered.

While the recent co-implementation activities were not initially planned in the co-creation pathway of CAL1, they proved highly beneficial as they clearly revealed the significant role of end-users as designers of their spaces [11]. In a short period, the participants in the co-implementation activity managed to redesign functions and vegetation typologies without disagreements or conflicts. On the contrary, by spontaneously sharing their local knowledge (e.g., they all wanted to reuse the old vases and integrate them with the new nano gardens) and also technical one (one of the inhabitants is an agronomist) they have co-defined the new project.

In terms of accessibility, it was observed that the measures taken to facilitate the participation of the elderly in online meetings were quite effective. However, it is of utmost importance to consider additional potential measures to ensure that everyone can participate. They measures may include providing technical support prior to the meetings and activities, such as through tutorials, practice sessions, and other means of communication. With regard to the sustainability of these communities need to continue benefiting from NBS, it is recommended to work from the very beginning on a co-management plan and design the NBS around such a plan. This approach will help to maximize the positive impact of NBS in the long run.

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