

Article

Community Approach for Public Flower Garden Renovation in Hanoi Center: Perspective for Building a Green City

Thai Huyen Nguyen ^{1,*}  and Didier Orange ² ¹ Institute of International Training and Cooperation, Hanoi Architectural University, Hanoi 12109, Vietnam² UMR Eco&Sols, IRD, CIRAD, INRAe, SupAgro Montpellier, 34060 Montpellier, France; didier.orange@ird.fr

* Correspondence: huyen.nt@hau.edu.vn

Abstract: Public gardens in urban areas play an important role in the development of physical and mental health of the people. These spaces are also social spaces, where people meet to interact, exchange, and organize collective activities. They create a unique identity for each residential area in the city, which is a premise for green urban development. In Hanoi, public flower gardens (PFGs) were formed and developed from the French colonial period, mainly those in the historic city centre. Facing the forceful urbanization process and the changing of urban structure, in order to evaluate the role of all public flower gardens in the historic city centre area, we carried out a systematic survey from 2019 to 2022. We surveyed all 30 PFGs in five central districts of Hanoi, and interviewed 229 users at these gardens. We also conducted research on relevant documents regarding the management and planning of green space and water infrastructure in the city. Moreover, we implemented an experimental workshop, combining an urban living lab (ULL) approach and an in situ landscape approach, to develop urban landscape design ideas with community participation. Based on the data from this research, this paper analyzes the potential for the establishment of urban blue-green infrastructure (BGI) from these PFGs and aims to evaluate the role of community participation in landscape design for the city. Data from multiple collection methods provide a multi-faceted understanding of the original characteristics of the PFGs in Hanoi and their importance in urban life. The project results supply experimental lessons from urban landscape design activities through community participation, which opens up the potential for developing sustainable urban spaces based on existing natural structures in the city. The main result proves that active community participation until the end of the research project raises public awareness and ensures the social acceptance of the final design. These lessons allow the improvement of urban landscape design practices and the establishment of BGIs from PFGs in an efficient and sustainable manner for green cities in the future.

Keywords: public flower garden (PFG); Hanoi; landscape design; Blue-Green Infrastructure (BGI); landscape approach; urban living lab (ULL); community participation



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1. Introduction

Sustainability is becoming a must for the development of cities, especially in the context of increasing impacts from climate change and biodiversity loss, which are the two limits that have been crossed out of the nine boundaries for the sustainability of the earth [1]. However, urban areas face a dilemma when consumption demand and population increase, while space, infrastructures, and resources are decreasing [2,3]. The Smart City is a concept that has received a lot of attention recently, taking advantage of information and communication technology [4]. But “first generation Smart City projects, strategies and academic literature has a rather technological-deterministic or techno-optimistic point of view” [5], while a sustainable city needs more than just “smart” technology because it is a life-containing environment characterized by the interaction between people, other living creatures, and infrastructures, both natural and artificial. Thus, tackling sustainability in

urban environments requires “better understanding of the multiple ways the developing science of cities can be incorporated into the planning, design and management of cities to activate the systems approach to the urban future” [3]. In reality, a city, despite being a highly anthropized environment, is fundamentally still a component of the global biome, interacting with other “natural” components, and even itself can be considered as an ecosystem, comprising both artificial and natural elements interacting with each other [6,7]. The sciences of ecology and of the landscape, transcending their original traditional limits, can become the key to smart, efficient, yet simple and low-consumption solutions [8–10]. For example, many social challenges can be addressed through nature-based solutions, which is a direction that is being promoted worldwide [10,11]. The establishment of urban Blue-Green Infrastructures (BGI), which can be accomplished by leveraging available blue and green spaces in cities, is one way of realizing this strategy. These infrastructures have been argued to be able to offer “environmental, economic and social benefits” [12]. On the other hand, since cities are run by multiple stakeholders, several studies suggest that sustainable development as well as the application of BGI to urban design and planning requires a participatory approach that involves the joint efforts of socio-economic enablers and places’ users [12–15].

First mentioned at the end of the 1990s by computer science scholars [16], the concept of the living lab concerned only user-driven, human-centered, and participatory approaches to design challenges. The recent attention for living labs in urban environments comes from the fact that within living labs, collaboration happens in a real-life setting, and expected outcomes (e.g., products, processes, learning) emerge within the participants’ daily life [17]. A living lab could be a physical or virtual space in which to solve societal challenges, especially for urban areas, by bringing together various stakeholders for collaboration and collective ideation [18]. The urban living lab is an urban design approach with community participation which was studied [19–27] and recently experimented in Vietnam [28–31]. The urban living lab (ULL) has been mentioned as a way to manage innovation processes in an open, inclusive, and collaborative approach, in which innovations are developed by engaging different stakeholders, including the community. This approach also promotes experimentally interdisciplinary integration in urban planning through field studies and exchanges, where participants are encouraged to innovate and to be creative in a realistic context. ULLs stimulate processes of reflection and questioning [32], facilitate discussions with the purpose of aligning and defining the possibility of action in a decision-making process [6], and may create changes that are valuable for a group of people and pressure existing regimes to broaden collaboration, engagement, and empowerment of citizens [17]. The city can benefit from practical and creative ideas based on contributions from the community, which are not always easy to implement and develop in urban planning projects because of lack of financial and human resources [30]. Moreover, cities can use ULLs to enable the systematic management of interactions between stakeholders and establish a link between top-down policy and bottom-up interactions. ULLs serve as collaborative ecosystems that foster the co-creation of sustainable and future-proof innovations, contributing to the improvement of urban life and the stimulation of economic growth [5]. In this sense, they are considered potential triggers of innovation in urban environments. It has been demonstrated that ULLs contribute significantly to the production of local knowledge in relation to the development of relational capital, which is of importance for experimentation with new practices, relationships, and governance arrangements.

Hanoi is a city with a high rate of urbanization over the past thirty years and currently faces many challenges for sustainable development. Public flower gardens (PFGs) have long played an important role in social and cultural life and have become an indispensable part of the green spaces network as well as of the urban structure of the city. For the city centre today, the presence of PFGs is not highlighted but they are always useful and attractive open spaces. These PFGs contribute not only to improving the city’s landscape, but are also important open spaces where cultural and entertainment activities take place and connect people. Until now, PFGs located in the historic city centre with a total area of 37 ha are

being managed by the municipal authority [33]. Most of these gardens were created during the French colonial period and remain in their original form. With determination to build a “Green, Clean, Beautiful and Livable City” [33], Hanoi city aims to develop these PFGs as a multi-purpose solution to address pollution issues in the city centre and to improve the living conditions of the people.

The network of public gardens could therefore be a starting point for the establishment of a system of BGIs in urban areas of Hanoi, a concept of urban development that has received much attention in recent times thanks to the benefits it brings [12]. A research project on PFGs in the city centre of Hanoi ordered by the Department of Science and Technology, Hanoi People’s Committee, was conducted by experts from Hanoi Architectural University (HAU) from September 2020 to February 2022. Because community involvement is indeed a key factor in creating an innovative and sustainable landscape design for the city [34], the project has been conducted to clarify the role, value, and potential of these PFGs in improving environmental quality and developing green urban infrastructure for the city with community participation [35]. This project, titled *“Assessment of the current situation and propose solutions to organize landscape architecture of PFGs in the historic city centre of Hanoi with the community participation”*, has been carried out in five districts of Hanoi city centre: Ba Đình, Hoàn Kiếm, Đống Đa, Hai Bà Trưng and Tây Hồ, which represent 5860 ha and 1,269,100 inhabitants.

This paper proposes to analyze the data collected from the above research project to evaluate the PFGs in Hanoi’s historic centre as potential BGI elements to integrate for city urban planning. We aim to present how the ULL approach and landscape approach could be appropriate methodologies to explore the potential of establishing a BGI for a sustainable city where many stakeholders are involved in the development process. The paper is organized into four sections. In Section 1, we engage with the literature on the establishment and the integration of BGIs into urban planning by the landscape approach and community participation through the ULL approach. In Section 2, we describe the research project and the methodology used to conduct this paper. In Section 3, we categorize results from the landscape approach and ULL approach in two phases of the research project. In Section 4, we discuss our main findings in relationship with the sociocultural value of PFGs and the dynamics and emerging practices of citizens at PFGs in view of their wider implications for landscape design and city development.

2. Materials and Methods

2.1. The Research Project

The research project *“Assessment of the current situation and propose solutions to organize landscape architecture of PFGs in the historic city centre of Hanoi with the community participation”* consisted in two phases. The first phase aims to assess the actual state and preliminary potential of all the PFGs in five districts of Hanoi’s historic centre (Figure 1) through three main activities: spatial mapping, a sociological survey, and document analysis. In the second phase, a pilot urban design project was carried out at Thanh Niên PFG in the Tây Hồ district (Figure 1) to test a landscape design project with the community participation. This garden was chosen for its special blue-green features. It is the most important PFG among five PFGs located next to West Lake, the city’s largest and most iconic urban water body. The garden also offers a substantial green space for the city, which shows potential for establishing BGIs.

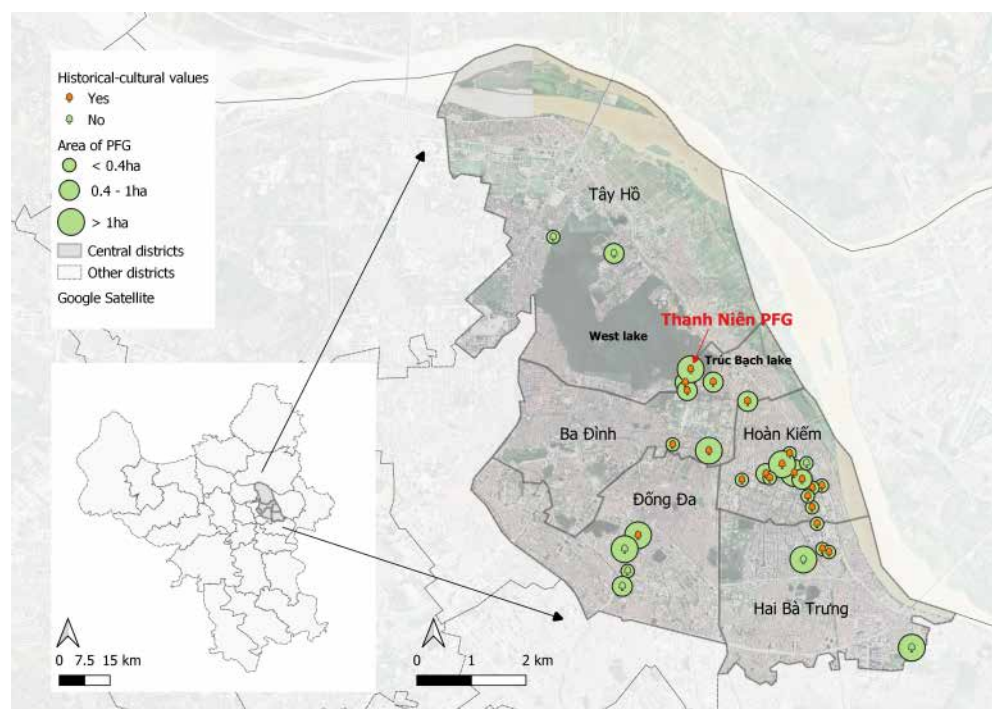


Figure 1. PFGs identified in five districts of Hanoi's historic centre: Ba Đình, Đống Đa, Hoàn Kiếm, Tây Hồ, Hai Bà Trưng.

2.2. Methodology

2.2.1. Landscape Approach and ULL Approach

The research project adopted a combination of the landscape approach and the ULL approach.

- About the landscape approach:

The landscape is not simply the physical land, but a concept that harmonizes the material and the spirit of the territory, seen through human perception. The landscape at each site shows us how the society and space are organized there. Firstly, landscape, which has been traditionally associated with gardening [9,36], has evolved into a multidisciplinary scientific field that includes not only art but also a multitude of scientific disciplines [9,36–38], “including ecology, geography, economics, anthropology, environmental sciences, spatial planning, and public administration” [36]. This approach stems from a broader definition of landscape, which is not just a spatial entity but also encompasses “economic, social, ideological, and psychological identities”, “shaped by both natural and sociopolitical processes, and it reflects a high multifunctionality, as it harbors both biodiversity and biocultural functions” [38]. This transformation has given landscape approaches an important role in the transition towards sustainable development [9,38], “which urges for cross-sectoral, multistakeholder, and policy integration approaches” [36].

Furthermore, while the approach has been updated, the core of landscape, which is a geography-based scientific discipline, remains unchanged [38]. “Landscape architecture is about site: without a locus (Latin for ‘place’), landscape architecture has no *raison d’être*” [36]. The association with a physical territory is also an advantage of the landscape approach when dealing with development issues because it allows working with specific issues [39] and solutions at various scales “from regional planning to detailed planning, urban design, public space design, technical infrastructure, landscapes, living spaces” [40], encompassing various entities such as “agricultural landscapes and forests”, “townscape”, and “parks and gardens” [36].

Therefore, the landscape approach helps to evaluate the territory from many angles: environmental, social, cultural, and even emotional [9]. An important requirement for the

landscape approach is the attachment to the ground. Elements observed, discovered, and perceived on the field are an important basis for understanding as well as inspiration for the landscape design.

The landscape approach used in the research project is based on landscape identification and decoding (Figure 2), a method of evaluating and analyzing landscape space through its own characteristics [40]. The identification and decoding of landscape space help the designers to understand the structural components of a given space, and the relationship between these structural elements and the process of transforming space from the past to the present, thereby envisioning and proposing a future scenario for the designed landscape space. The purpose of spatial identification and decoding is also to build a future intervention method within the landscape based on the ability to recognize the current and future changing laws of the landscape.

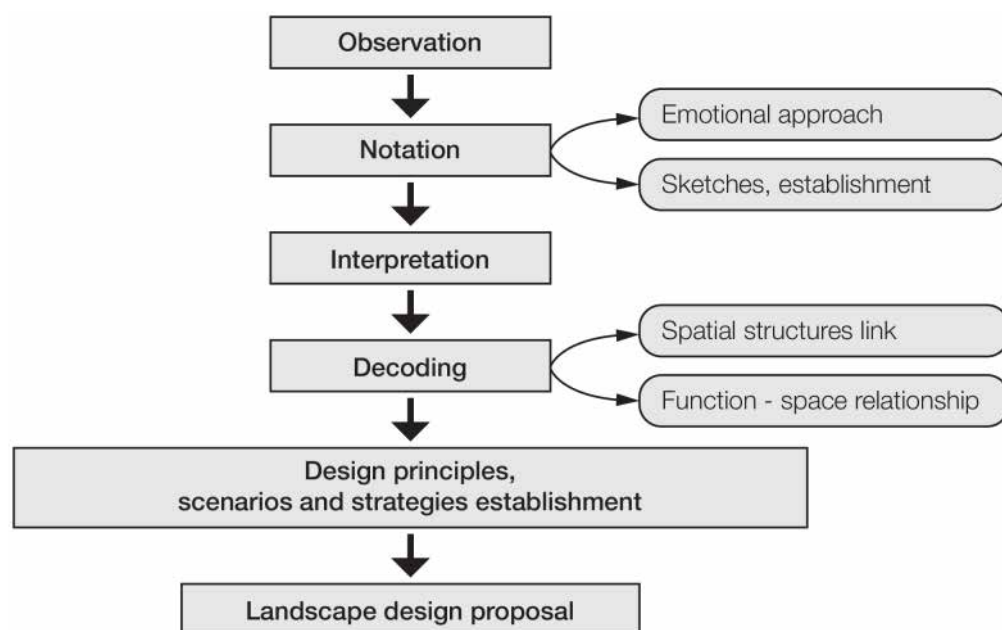


Figure 2. Sequence diagram from landscape reading and decoding to landscape design [40].

Landscape spatial identification and decoding is carried out in three steps: observing, recording, and interpreting the landscape.

Observing a landscape means seeing, feeling, and noting that landscape, not only in its entirety but also in its every detail. The purpose is to identify the landscape units and landscape structures that make up the features of the landscape.

Landscape recording is the collection of data, documents, and information about the landscape space in many forms: drawing, photographing, interviewing, filming, recording, etc. The point is to highlight the unique characteristics of the space.

Landscape interpretation is to analyze the features, movements, and changes in the landscape, and to find ways to explain those features and laws of movement through observation, feeling, and recording, combined with analysis of historical, cultural, and social data.

Finally, another distinctive characteristic and advantage of the landscape approach is the incorporation of emotions within the field. Landscape does not exist solely as a physical space; it is the perceived territory [37] that connects the physical environment with socio-cultural aspects [9]. The manifestation of human perception creates emotions that bond people and their environment. Therefore, landscape becomes a key to exploring concepts such as a “sense of place”, “place attachment”, and “sense of belonging” [41–43]. On one hand, through landscape, one can understand the “local distinctiveness, shaped by the stories and memories of its inhabitants” [38]. On the other hand, landscape serves as an effective tool for “negotiation and participation of populations” to “communicate, exchange

ideas, collaborate, and create connections between policies, cultures, ideas, people, and societies" [9].

- About the ULL approach:

The ULL is a local initiative that seeks to tackle urban challenges and promote long-term sustainability by engaging citizens and other stakeholders in the co-creation of innovative solutions. By bringing together companies, research communities, public sectors, and citizens, the ULL employs a collaborative approach for problem-solving. This ULL approach is widely recognized as a successful method for fostering innovation, particularly in situations where multiple stakeholders have conflicting interests [28]. By leveraging tacit knowledge and validating solutions in real-life environments, the ULL offers a comprehensive solution to complex innovation problems that require the active participation of all stakeholders [44]. In the research project above, the ULL approach was based on cooperation between four main stakeholders: (A) Authority (government); (B) Academia; (C) Socio-economic actors (institutions, enterprises, etc.); (D) the Community (users, citizens, tourists, etc.).

As with the landscape approach, the assessment of the potential of the space will be carried out holistically from many angles, the ULL approach allows to make the most of the participation of the community stakeholders, especially local people, in the urban development process [29].

2.2.2. Research Project Framework

The framework of the research project can be characterized by the application of the landscape approach and ULL approach in 2 phases (Figure 3). There was a slight crossover between the two approaches in each phase. On the one hand, the analysis and design activities, which are characteristic activities of the landscape approach, are carried out in phase 2. On the other hand, the participation of all stakeholders, which characterizes the ULL approach, also started from phase 1.

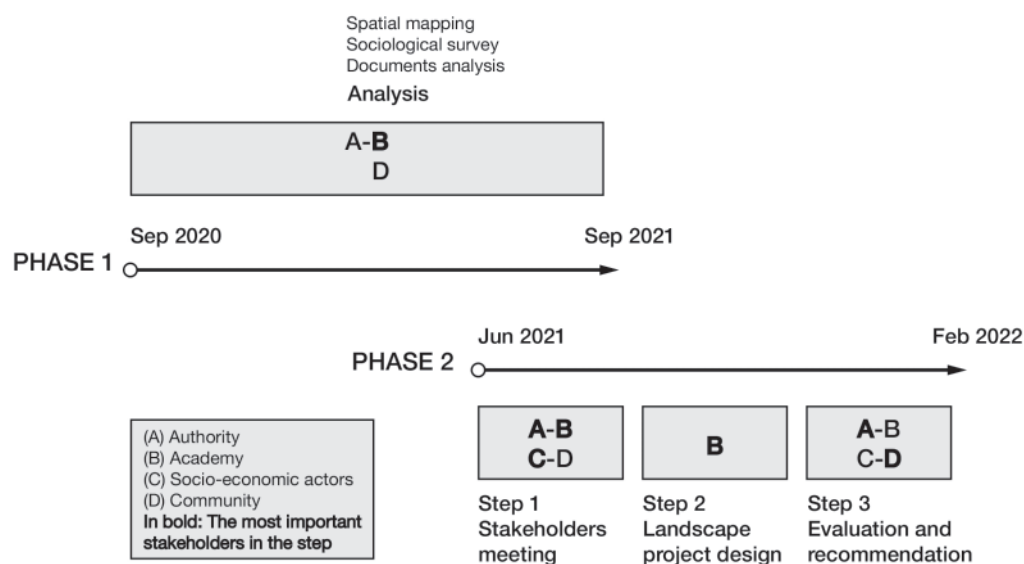


Figure 3. Framework of the research project.

- Phase 1

During the first phase of the research project, three activities were carried out, including spatial mapping, a sociological survey, and document analysis. The members of the research team were divided into five groups, each group having 4–5 members, and undertook all PFGs in each district.

Spatial mapping and analysis were mainly based on the landscape approach. At each PFG, the team drew the current plans and cross-sections of the vegetation, traffic, and

landscape lighting system operating in a few time frames (5–6 am, 5–7 pm, 8–11 pm). The team also systematically took pictures and plotted the featured spaces and activities. The objective was to have a good understanding of blue and green spaces and the activities, users, equipment, and services in each PFG.

The sociological survey was conducted on all the PFGs in five urban districts of Hanoi (Figure A1). A questionnaire including 40 questions was designed focusing on the following groups of information: (i) General information about PFG users; (ii) Purpose and personal use needs of PFGs in Hanoi; (iii) Assessment of the quality of space, trees, technical infrastructure, services, and management; (iv) Desire for the development of PFG space. The information from the interviews was used anonymously and for research purposes only. The initial goal was to conduct an average of 10 surveys per PFG. The target audience was all the people who use the PFG, including representatives of the local authority, tourists, and walkers.

Besides field study, document analysis was also applied. Documents collected and analyzed were satellite images, maps, historical documents, urban planning documents, laws, regulations, city strategy, etc.

- Phase 2

In phase 2, a pilot design project was implemented at Thanh Niên PFG with the ULL approach through 3 steps, as follows:

Step 1—Stakeholder meeting

In the first step, all stakeholders involved in the pilot design project came together to discuss the results of the data collection in phase 1, and to develop a preliminary program for the urban design project of Thanh Niên PFG. There were four stakeholder groups identified by ULL approach. For the Authority group (A), we had the participation of the local People Committee's representatives, including the cultural and urban management offices. The Academic group (B) was represented by experts and research teams from HAU. The Socio-economic group (C) was represented by a private company. Finally, the Community group (D) consisted of the Women's Union, the representatives of the sub-quarter, the people living in the surrounding area, and users of the PFG.

Step 2—Landscape project design

In the second step, a design workshop for Thanh Niên PFG was held for one week. This design activity was carried out by three groups of architects who were part of HAU and were involved in all the activities from the beginning of the research project. Each group produced an urban landscape design proposal for the Thanh Niên PFG, based on data collected and analyzed from phase 1 and assessments during previous stakeholder meetings in step 1.

Step 3—Evaluation and recommendation

After the completion of three landscape design proposals, an exhibition was held to present them to the public. At the same time, a community survey was conducted in two ways: on-line and in person, with the participants at the event. The survey had three goals: (i) Collection of information on the purpose and community demand for Thanh Niên PFG space based on landscape design proposals; (ii) Evaluation and classification of three landscape design proposals; and (iii) Collection of community comments and ideas for the landscape design proposals. The feedback of the respondents was used as a basis for selecting the best design and finalizing the technical dossier, as well as for the recommendations delivered to the city.

3. Results

3.1. PFGs Mapping Data in Five Districts of Hanoi's Historic Centre

The spatial mapping activity carried out in phase 1 of the research project resulted in a set of iconographic profiles of all the PFGs in the five central districts. For the first time, a PFGs mapping database was created. It is noteworthy that the implementation of data collection in phase 1 encountered many difficulties because the number of, and information on, PFGs in the five central districts of Hanoi in the official reports was not consistent. The

survey results identified a total of 30 PFGs in the five central districts (Figure 1), of which Ba Đình and Đống Đa districts have 4 PFGs each, Hai Bà Trưng and Tây Hồ districts have 5 each, and Hoàn Kiếm district has 12 PFGs (Table A1).

Each PFG is described by a set of iconographic documents, including maps, photographs, plans, and sections, as follows (cf. Figure A2):

- A map of the locations of the PFGs in their respective districts: the document is rendered on a Google Maps background, where the district boundary and the location of the PFG are highlighted in color.
- A Master plan of PFG provides an overall view from above of the components and the spatial composition of the PFG in the surrounding urban context.
- The current state of the PFG's vegetation is represented in two forms: photographs and cross-sections. The photos provide an overview of the different types of plants and planting methods used. The cross-sections illustrate the typical spatial composition of the planted areas within the PFG space. The number of photographs and sections varies depending on each specific situation.
- The current state of human activities at the PFG is represented in three forms: photographs, a plan (same scale as the Master plan), and cross-sections. The photos provide an overview of people's typical activities, while the plan and cross-sections represent the position and distribution of these activities within the spatial structure of the PFG. The number of shots and cross-sections varies depending on each situation.
- Traffic in the PFG is described by a plan at the same scale as the Master plan. This document indicates the access to the PFG from surrounding areas and internal routes inside the PFG.
- The lighting system at the PFG is explained through a plan (same scale as the Master plan) and cross-sections, showing the number, location, and lighting form of light poles. The number of the cross-sections depends on situation of each PFG.
- Street furniture at the PFG, including urban equipment such as toilets, benches, billboards, etc., is integrally represented in the lighting system documents, depending on the situation of each PFG.

A comprehensive dataset has been established, including images and detailed drawings that describe not only technical information but also the operational and functional aspects of all PFGs at different time points throughout the day. These are characteristic results of the landscape approach when using specialized landscape architecture tools, such as drawings, to describe the spatial and temporal characteristics of a PFG. This dataset has helped all stakeholders to easily understand the features, nature, and operation of the PFGs. Additionally, it has facilitated exchanges, sharing, and consensus ideas among inhabitants, authorities, and professionals.

3.2. Sociological Survey

Another result from phase 1 of the research project was a sociological dataset on 30 PFGs in five central districts of Hanoi. The responses were collected from 234 respondents, in which 45% were female and 55% were male. The ages of the respondents was mainly from 23–60 years old (52%). The groups of people aged 14–22 and over 60 years old accounted for 14% and 34% of the participants, respectively.

3.3. Landscape Design Proposals

In phase 2, three landscape design ideas were proposed, titled: 1—Associated with the historical and cultural path; 2—Towards a sustainable ecosystem; 3—From Thanh Niên (Youth) to Thanh Long (Blue Dragon). In general, all design teams began work by analyzing the site in terms of landscape, history, culture, activities, and transformation, etc. They then proposed a landscape design concept and illustrated the implementation. Despite having a similar framework, each team had different priorities and personal perceptions during the analysis, leading to differences in outcomes.

The first design proposal, titled “Associated with the historical and cultural path”, focuses on analyzing issues such as urban transformation, the process of social change, cultural features, accessibility, and activities (Figure A3a). This proposal introduces the concept of an “Urban healing station” through creating private spaces, renovating the square space, increasing access to surface water, and specially designing business spaces.

The second design proposal, titled “Towards a sustainable ecosystem”, highlights issues such as urban transformation, the process of ecological change, and the sense of space, vegetation, and activities (Figure 4). This proposal suggests “Ecosystem regeneration”, which can be achieved through activities such as promoting cultural and historical values, designing to recreate the natural-human ecosystem, enhancing existing public spaces, creating space for the wetland ecosystem, increasing access between people and natural spaces through a system of walkways, and planting embankments.



Figure 4. Ecological structure surrounding West Lake in landscape design proposal 2 (selected proposal by community).

Lastly, the third design proposal, titled “From Thanh Niên to Thanh Long”, focuses on themes such as cultural and historical values, tourism potential, economic value, infrastructure, and activities (Figure A3b). The standout concept of this proposal is a “Stage on the water”, which can help promote cultural and historical values, address space usage conflicts, and restructure and create spaces for human activities.

3.4. Community Participation in the Landscape Design Process

The evaluation and the selection of the best landscape design proposals were organized through community voting and surveys. A total of 102 questionnaires were collected from respondents, in which 82 were conducted on-line and 20 collected on-site during the exhibition event. At the end, design proposal number 2 was selected as the most satisfying to the public (Figure 5). It was later improved in the form of technical documents and submitted to the local authority.

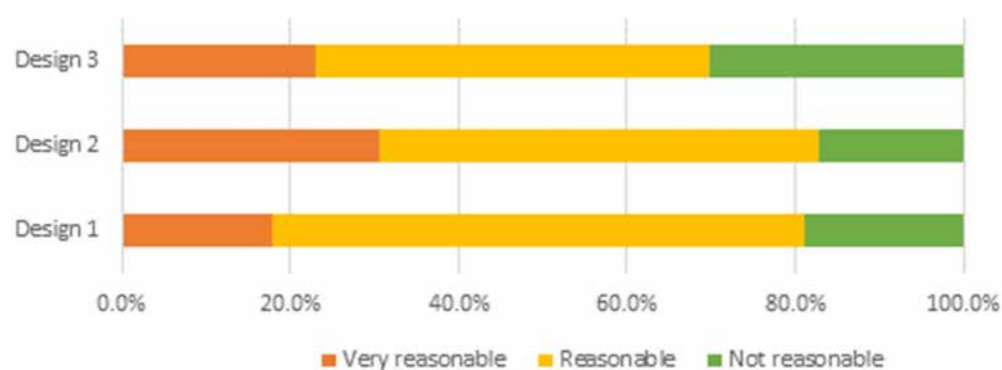


Figure 5. Community evaluation of three landscape design proposals for Thanh Niên PFG.

4. Discussion

4.1. Identification of Characteristics and Properties of the PFGs in Hanoi's Historic Centre to Recognize Their Role

4.1.1. Significant Cultural–Historical Values of the PFGs

In the five central districts, 73% of the PFGs have high historical and cultural values, especially for the PFGs in the Hoàn Kiếm district, with 92%. This can be explained by the historical and heritage characteristics of the district, which encompasses a public space complex with Hoàn Kiếm Lake—the famous iconic lake of Hanoi—and other cultural and religious structures such as Turtle Tower, Ngọc Sơn Temple, etc. Other PFGs located next to important traditional religious monuments such as temples and pagodas have the same names as the heritage monuments, such as Quán Sứ PFG, Bà Kiệu PFG, etc. These PFGs are clearly not only important public open spaces to improve the living environment for urban residents, but also ambassadors to communicate the cultural and historical values of the city. Therefore, the cultural and historical values of PFGs should be assimilated into a sustainable city development and urban landscape design to be appreciated.

Moreover, as social beings, humans have needs related to cultural–historical values that demand to be met as part of our well-being. These values can therefore be considered “drivers of change”, which can influence how communities behave towards the environment [45]. In fact, all three landscape design ideas for PFG Thanh Niên in phase 2 started from the historic and cultural values of the PFG. In contrast to the blue and green space management in Vietnam in which the cultural and historical values are usually separated from of the space, this experimentation could well become an entry point to promoting sustainable development [13]. Integration of these values into the urban design process of public spaces is therefore recommended.

4.1.2. Attractive and Multifunctional Qualities of PFG Spaces

- An important attractiveness of PFGs in Hanoi's historic centre

According to the surveys' results of phase 1, 67% of respondents are attracted by the spaciousness of the PFG and 75% by the green landscape. In addition, there are other factors involved, such as: security, cleanliness, cultural–historical values, etc.

- Dynamic and diverse usage of PFGs

People's activities at PFGs are very different; however, we can divide into three main groups: Entertainment, Gymnastic, and Business. Gymnastics is particularly prominent, as 53.4% of people answered that they come to PFGs for doing exercise. A wide variety of physical activities of varying intensity, with different ages, can be found at PFGs: gymnastics, martial arts, dancing, jogging, walking, cycling, etc. Entertainment activities are mostly based on enjoying the green space landscape. Some PFGs are used especially as venues for cultural and artistic festivals, such as the weekly pedestrian street at Hoàn Kiếm PFG. We also noted the privatization in parts of some PFGs for business activities, mainly for the sale of beverages. Despite the fact that the original design for PFGs was not holistically geared towards all the mentioned activities, but merely a public garden, the emergence of such activities demonstrates the dynamism in both demand and user appropriation of PFGs.

- Highly frequented urban spaces with regular rhythms

Survey results show that PFGs are very frequented public spaces. Up to 49.8% of respondents said that they go to PFGs daily, and 22.1% of people came several times a week. Most people have a habit of using flower gardens very often; up to 66% of people surveyed have the habit of going to flower gardens every day at fixed time frames, mainly around 7 am–8 am daily (Figure 6).

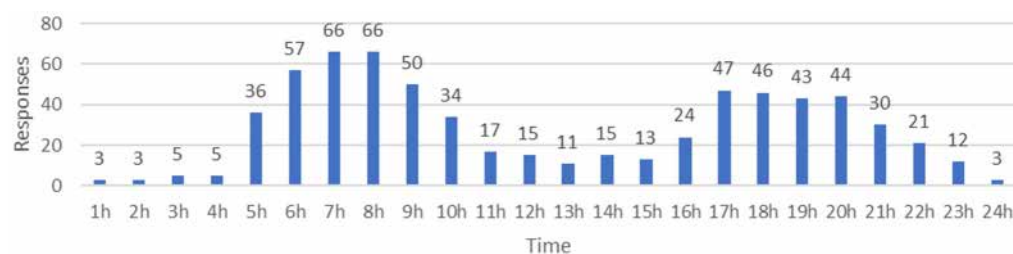


Figure 6. Rhythm and activity times of people at PFGs.

This information would change the way that architects, urban planners, and authorities understand and manage these places. The landscape design project must consider this rhythm to adapt and better answer the utilities of citizens.

4.1.3. Biodiversity and Permeability, Exceptional Ecological Values of PFGs

PFGs in five central districts of Hanoi present a considerable ecological value in the urban context. A common vegetation structure for all PFGs has been found throughout the spatial data collected by the research project. There are, in general, three layers of plants: canopy trees 15–20 m tall, shrubs, and grass. This creates a distinct place with a biodiversity quality that differs from the high-density building spaces of Hanoi. Most PFGs have a large area covered with grass that is regularly trimmed. Although this form of coating has poor biodiversity value, it still provides an important permeable surface. These characteristics can be recognized clearly in Thanh Niên PFG. Vegetation is the most prominent ecological feature for the space of this PFG. With a morphology extending along Thanh Niên Street, the vegetation structure of this PFG also repeats along the axis with three layers of plants: canopy trees 15–20 m tall, shrubs, and grass at ground floor (Figure A2). The species of trees grown in the Thanh Niên PFG area are quite diverse, especially the canopy tree group, which not only improve the local ecosystem quality by enhancing the climate regulation and creating habitats for animals, but also by creating a harmonious and attractive landscape to enhance the urban spatial quality. Besides, the natural surface covered by vegetation occupies most of the total area of Thanh Niên PFG, helping to increase the water permeability capacity of the space. In urbanized basins, 10–20% more of the total surface is impervious to water than in forested basins, and this is found to be sufficient to double the surface runoff [2]. The permeable surface is therefore very important in urban flood management. Urbanization is a powerful driver of land surface transformation, with strong impacts on biodiversity, ecosystem functions, and infrastructures disasters. The

diversity of plants and the high rate of permeable area at Thanh Niên PFG is of great value in improving green infrastructure to regulate floods and the environmental sustainability. Moreover, the sustainable existence of PFGs from their creation in Hanoi's historic centre, where urbanization is constantly increasing, creates an exceptional value for Hanoi life quality. The current network of PFGs serves as a premise for expanding the vegetation greenness for the city, thereby increasing the abundance of vertebrates (mammals, birds, and amphibians), an important indicator of the biodiversity [46].

4.2. Community Participation in the Urban Landscape Design of PFG Thanh Niên: Effectiveness and Limit

4.2.1. An Experiment of Community Involvement at All Urban Landscape Design Steps

Interdisciplinary science and community involvement is increasingly being promoted as an effective approach to tackle sustainability issues [13]. In the case of urban design, stakeholders have different schemes of work, approaches, and perspectives. The question here is how these actors effectively combine and work together on the project. This collaboration needs to be carried out in a reasonable way to avoid unnecessary conflicts. The implementation and results of the research project showcase the potential of different roles of the community groups in different activities of landscape urban design.

In the first phase of the research project, residents acted primarily as the source of sociological data collection by responding to surveys. A large amount of information on a wide range of aspects was gathered, thanks to the active participation of respondents. At this step, the community expectations for additional utilities and equipment would be an important source information for the PFG renovation proposals. Community feedback on proposed designs in phase 2 also helped to identify relevant trends in society's perception and expectations of urban design in relation to nature and surface water. Overall, this participation of the community helped to efficiently identify relevant characteristics and values of PFGs, giving interesting hints for the conceptualization of urban landscape designs.

A clear trend in the community's opinion about renovating the existing space of Thanh Niên PFG is the addition of urban utilities and increasing the diversity of space usability. The survey results show a remarkable convergence of people's attitudes towards decorative works, lighting equipment, amusement, and sports equipment in the PFG. The percentage of respondents who want an increase in the quantity and renewal of equipment is always over 45%, and the rate of those wishing to improve the quality of these urban equipment is over 30%. Only the numbers of recreational and sports equipment are partially meeting the needs of the people, as about 40% of the respondents said that they are satisfied with the current status (Table A1).

The community, as the end user of the PFGs, needs to be part of the approbation process of the design. The integration of community participation in this process is also in the spirit that has been mentioned in the official regulations on urban planning. The active participation of the community in the exhibition, where the presentation and selection of the Thanh Niên PFG design proposal was made in phase 2, showed the community's willingness and readiness on this matter. It also brought a relevant input for design selection.

4.2.2. Discovery of Community Views on Changing the Approach to Water

- Greater attractiveness of PFGs near surface water

The results of the first sociological survey in phase 1 confirmed a huge social demand for PFGs, especially for the ones with a connection to a water body. Across all surveyed PFGs, 49.8% of respondents answered that they go to the PFG every day, and 22.1% go there several times a week. But for the PFGs in the Tây Hồ district, where two of Hanoi's largest urban lakes are located, West Lake and Trúc Bạch Lake, these values are 73.3% and 11.1%, respectively. The outstanding daily user rate shows the exceptional value where the water is part of the PFG's attractiveness.

Another point worth noting is the attraction of PFGs with a relatively large impact radius, not only for residents living around them, but also for those living further away.

With all surveyed PFGs, 23.4% of respondents live less than 0.5 km from the PFG, 60.4% of people live from 0.5–2 km away. The presence of water makes this radius even wider. For the Tây Hồ district, these two values are 13.3% and 75.6% respectively. Especially in the in-depth survey for the case of the Thanh Niên PFG in phase 2, up to 54.9% of people live more than 5 km away, 43.1% of people live within 0.5–5 km, and only 2% live less than 0.5 km away.

- Potential for re-naturalizing water bound PFGs

Another interesting result from the survey in phase 2 is the gap between the current treatment of urban water and the community's point of view.

Hardening water banks and soil surfaces is a dominant trend in urban waterfront development in Hanoi [47]. Almost all lakes in the city have been embanked, including West Lake, the largest lake in the city, with a circumference of more than 15 km. However, in the case of the Thanh Niên PFG, which is located right next to West Lake, more than two-thirds of people surveyed at step 4 think that the water bank here should be naturalized (Table 1). This demonstrates that the regeneration of wetland ecosystems is a socially viable approach to urban landscape design.

Table 1. Community points of view on how to design the Thanh Niên PFG in cohesion with West Lake.

Action	Shouldn't Do	Keep the Same	Should Do
Naturalize the water bank	15.9%	6.8%	77.3%
Remove the balustrade	35.2%	23.9%	40.9%
Make a stage towards the lake	25.8%	10.1%	64%

The connection to water also differs between the current space design and the social perspective. Along with the hard embankment, most of the lakes in the city are equipped with railings, which prevent people from directly accessing the water surface. In the survey, 40.9% of the respondents said that this structure should be removed. As for the idea of building a stage overhanging the lake, up to 64% of people think it should be realized (Table 1). That suggests a change in approach to connecting to the water body. A new and bolder design is quite likely to receive a positive reception from the community.

4.2.3. Stakeholders' Involvement, Public Awareness, and Social Acceptance of the Design

The implementation of the research project showcased the active participation of local stakeholders in all activities, from start to end. The sociological survey activities have received a positive response from the people. With the PFG Thanh Niên landscape design pilot project, local authorities participated in the sociological survey as respondents, and provided substantial logistical support to the project. During the exhibition of landscape design proposals, both residents and local authorities attended and showed great interest in the designs through their feedback. In this way, the project's activities have been able to contribute to raising stakeholder awareness, not only about urban landscape design activities but also about their roles and capabilities.

In addition, the close involvement of local stakeholders in most of the research project's activities, especially the recurrent interactions with the proposals in phase 2, ensures the feasibility and understanding of stakeholders of the final design. Design proposal 2—the winning one—suggested a large-scale urban wetland reconstruction across the entire West Lake. This solution could bring many benefits, but it must be determined that the re-naturalization of urban spaces is not a magic wand. In the short term, it can cause certain conflicts of interest among many parties, “providing improved state of water related ecosystem services and livelihood proposals for some, while potentially effective sources of income for others” [48]. However, the trend of long-term benefits when wetland reconstruction is carried out with care and associated ecosystem services has been confirmed by many cases around the world, “the economic and social benefits can be exceptionally high” [48]. The results of the community survey in phase 2 gave some confidence in this scenario. It should

be noted that the feasibility of the selected proposal is also superior to that of the other two proposals. Firstly, it was the proposal that received the most votes, thereby becoming the chosen design for finalizing and making a technical dossier. In addition, the survey's results also demonstrated the clear interest of the community in ecologically friendly solutions for urban landscape design, like bringing a closer connection to the water surface and nature. Finally, the technical and economic comparison analysis conducted at the end of phase 2 also showed that the second design proposal requires a reasonable level of investment while providing the most sustainable profit.

4.3. Potential for Urban BGI Development with Community Participation

4.3.1. Fragmentation in the Management of Blue and Green Spaces in Vietnam

The values of PFGs, as well as the potential conflict between designed spaces and the actual use of the people, have not been fully studied. Integrating those characteristics into urban design can also be limited because the current method of planning in Vietnam is highly technocratic. In urban projects, spaces are divided and labeled into categories of "land". Both green space and surface water are collectively referred to as "land", or "green land", or "surface water land". In fact, the green space and surface water in the urban area is implicitly understood as a kind of "reservation land" for construction, which can be mobilized when needed for urban development. Moreover, the results of the document analysis showed that the problems in state management with blue and green spaces are also reflected in the inconsistency in calculating the area of PFGs associated with lakes. With some PFGs such as the Hoàn Kiếm PFG, water is included in the garden area. But with the PFGs around West Lake, the management area is only encapsulated in the space of the garden. Thus, the actual interactions between components in the socio-ecological system, between natural factors and between natural and human factors, are often overlooked. In addition, the role of the end users of urban space—the people—is very weak in the planning and design process. Identifying these causes would help to improve the PFG management and better renovation of PFGs.

4.3.2. Potential for BGI Implementation in Hanoi

PFGs tend to be concentrated in the historic urban core area of the Hoàn Kiếm district (Figure 1), one of the most densely populated districts in Hanoi (26,093 people/km²). However, the density of PFGs is clearly not as high in some other districts that have similarly high population density, such as Hai Bà Trưng (29,074 people/km²), Ba Đình (24,463 people/km²), or even much higher, like Đống Đa (37,869 people/km²) [21]. The inconsistency in the number and area of PFGs with respect to population density (Figure 7) is because these PFGs were formed during the French colonial period and there have been no new PFG additions. Therefore, the network of these PFGs has not yet met the current urban development. Towards the orientation of a Green, Clean, Beautiful and Livable city, Hanoi City needs to invest in new green spaces in urban planning and development.

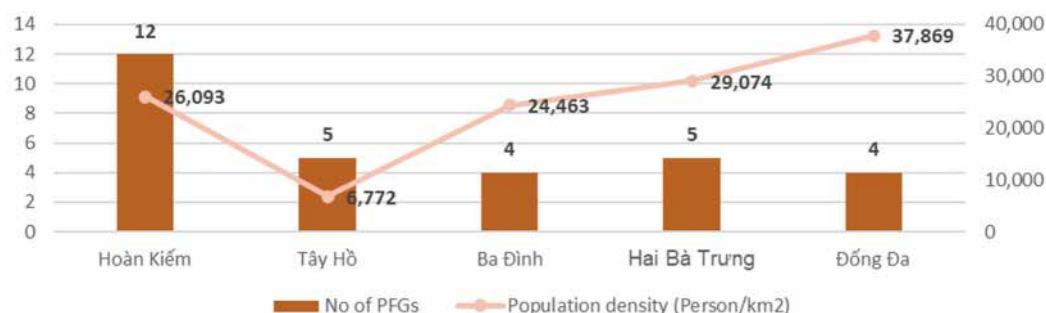


Figure 7. The number of PFGs and population density in five districts studied.

The results of the PFG project show the potential of linking urban design and BGI development in Hanoi, based on the surface water space and the PFG. Of the three design

proposals, only proposal 2 has deeply developed the idea of an ecosystem with a combination of natural and man-made elements. The authors proposed to recreate a flooded ecosystem by renovating the structure of the water bank, transforming from a concrete embankment to a vegetated embankment (Table A3). This space not only creates a friendly place to welcome wildlife, but people can also approach the water closely by walking along the water bank. The authors even proposed to expand the scale of this structure along the banks of West Lake, not just limited to the area of Thanh Niên PFG (Figure 4). This bold idea suggests recreating a wetland in the heart of Hanoi, which was historically built on a large wetland. Wetland regeneration is known as a method of creating BGIs and providing nature-based solutions [11], which has been supported by the UN recently [48,49]. It offers many direct benefits in terms of water supply regulation, flood mitigation, water purification, and temperature control. By extension, it also provides ecological and social co-benefits such as enhanced biodiversity, recreational, aesthetic value, livelihood income possibilities, and climate change adaptation and mitigation [32,49].

5. Conclusions

This study analyzes data from a research project on PFGs in the five central districts of Hanoi, applying a combination of the landscape approach and the ULL approach, to qualify the values of PFGs as well as the potential of community involvement in urban landscape design activities. The results of the analysis reveal the specific characteristics of the PFGs in Hanoi Centre and the promising potential to establish BGIs based on these spaces. This is a dynamic public space, in close connection with the transformation of the city, with cultural–historical values as well as the activities of contemporary urban residents. The system of PFGs also offers special ecological values for a highly urbanized environment, which is a prerequisite for the establishment of urban BGIs. However, improvement in urban planning and design approaches might be needed to overcome the fragmentation and inconsistency issues in urban management of blue and green spaces in Vietnam. Community participation has demonstrated effectiveness in the urban landscape design process. On the one hand, community participation contributes directly to urban design outcomes through providing information and inspiration, as well as participating in voting. On the other hand, active community participation until the end of the research project allows the raising of public awareness and ensures the social acceptance of the final design, which is a major challenge to establish BGIs in the cities [12]. These results would contribute to improving the way architects and urban planners work on public projects primarily dedicated to the community.

Nevertheless, the findings primarily rely on field surveys conducted through experimental methods during a pilot activity. Thus, it is essential to subject the assumptions and assertions to further verification through more extensive spatial and temporal studies.

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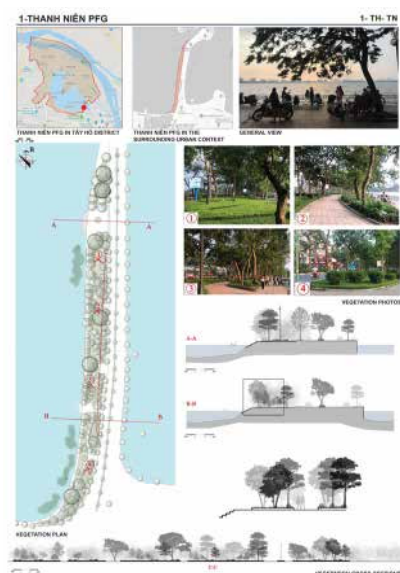
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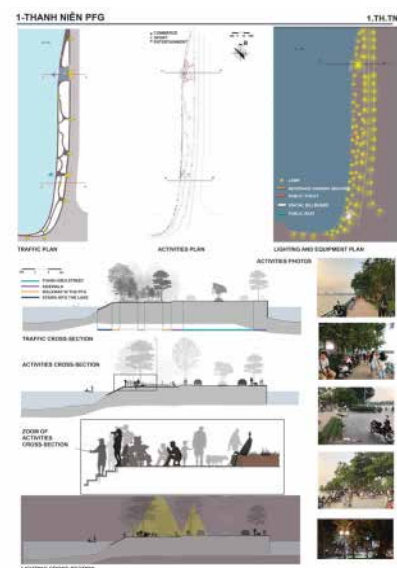
Appendix A



Figure A1. Performing surveys with people at PFGs.



(a)

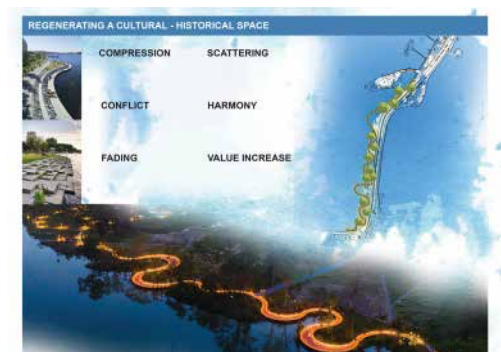


(b)

Figure A2. (a) Site vegetation analysis of Thanh Niên PFG; (b) Analyzing accessibility, utilization, and urban equipment of Thanh Niên PFG.



(a)



(b)

Figure A3. (a) Concept of landscape design proposal 1; (b) Concept of landscape design proposal 3.

Table A1. List of 30 PFGs in five central districts of Hanoi.

#	PFG	District	Area (ha)	Possessing Cultural and Historical Values
1.	Lê Nin	Ba Đình	1.32	Yes
2.	Lê Trực	Ba Đình	0.1	Yes
3.	Trúc Bạch	Ba Đình	0.73	Yes
4.	Vạn Xuân	Ba Đình	0.42	Yes
5.	Mùng 1 tháng 6	Đống Đa	1.36	Yes
6.	Trần Quang Diệu	Đống Đa	1.3	
7.	Trường Đại học Công Đoàn	Đống Đa	0.27	
8.	Trường Đại học Thủy Lợi	Đống Đa	0.76	
9.	Hình Thang	Hai Bà Trưng	0.06	Yes
10.	Hồ Hai Bà Trưng	Hai Bà Trưng	1.33	
11.	Pasteur	Hai Bà Trưng	0.09	Yes
12.	Vĩnh Tuy	Hai Bà Trưng	1.6	
13.	Yersin	Hai Bà Trưng	0.18	Yes
14.	Bác Cổ	Hoàn Kiếm	0.17	Yes
15.	Chí Linh	Hoàn Kiếm	1.04	Yes
16.	Cổ Tân	Hoàn Kiếm	0.27	Yes
17.	Bà Kiệu	Hoàn Kiếm	0.16	Yes
18.	Diên Hồng (Con Cóc)	Hoàn Kiếm	0.44	Yes
19.	Hàng Trống	Hoàn Kiếm	0.68	Yes
20.	Hoàn Kiếm	Hoàn Kiếm	19.77	Yes
21.	Ngô Quyền	Hoàn Kiếm	0.05	
22.	Quán Sứ	Hoàn Kiếm	0.06	Yes
23.	Tao Đàn	Hoàn Kiếm	0.14	Yes
24.	Tràng Thi	Hoàn Kiếm	0.1	Yes
25.	Vườn hoa 19/8	Hoàn Kiếm	0.27	Yes
26.	Lạc Long Quân	Tây Hồ	0.36	
27.	Lý Tự Trọng	Tây Hồ	0.85	Yes
28.	Mai Xuân Thưởng	Tây Hồ	0.87	Yes
29.	Quảng Bá	Tây Hồ	0.63	
30.	Thanh Niên	Tây Hồ	1.11	Yes

Table A2. Public view of decorative works, lighting, play, and fitness equipment in Thanh Niên PFG.

Decorative Works			
Quantity	Decrease 17%	Keep the same 28.4%	Increase 54.5%
Quality	Repair existing damage 34.8%	Keep the same 5.6%	Replace 59.6%
Lighting Equipment			
Quantity	Decrease 2.2%	Keep the same 27.8%	Increase 70%
Quality	Repair existing damage 31%	Keep the same 24.9%	Replace 54%
Play Equipment			
Quantity	Decrease 9.9%	Keep the same 40.7%	Increase 49.5%
Quality	Repair existing damage 34.9%	Keep the same 15.1%	Replace 50%
Fitness Equipment			
Quantity	Decrease 11.1%	Keep the same 40%	Increase 48.9%
Quality	Repair existing damage 34.1%	Keep the same 19.3%	Replace 46.6%

Table A3. Explanation of the nature-based concept of design proposal 2.

Idea	Explanation
POTENTIAL PUBLIC SPACE	Overall, the West Lake area has five flower gardens and other public spaces for the purpose of serving the community. These spaces can act as the main highlight of the itinerary to explore the ecological landscape of West Lake.
NATURAL DEVELOPMENT SPACE	West Lake also has potential spaces for natural development. These are spaces that are not located near residential areas or high-density traffic roads, such as the Dam Sen area north of West Lake, the area near Phu Tây Hồ, etc.
WETLAND ECOSYSTEM	West Lake is a potential area to establish a sustainable wetland ecosystem. Landscape design with a tendency to respect nature will contribute to the protection of biodiversity. The presence of native species such as Eurasian coot, white stork, etc. will create a unique identity for the space of West Lake. Moreover, aquatic plants also help to improve and clean the lake water.
“SOFT BANK REVETEMENT” ENGINEERING	Currently, many projects in the world have applied the “soft bank revetment” method. In Vietnam, however, this method has not been widely applied. Geotextile material is combined with rock to stabilize the bank. Advantages of this method: safe to execute, easy to find and use local materials, sustainable and UV resistant, not much mechanical support is required.
DISCOVERY WALKWAY	This is the proposed design of a wooden walkway network to access the wetland area. These promenades will increase the active space for people, open new interesting features, and increase the diversity of the landscape of the West Lake area. The proposed material is wood, to create harmony with the natural landscape here.
PARKING	It is proposed to strengthen the network of small parking lots and arrange them around West Lake, to bring convenience to users, as well as to limit the phenomenon of parking on the sidewalk due to lack of parking space.

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