

Evaluation of Public Perceptions and Aspirations Regarding the Landscape Arrangement of Situ Pangarengan in the City of Depok

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Abstract- Situ Pangarengan is one of the lakes situated in Depok City. Given that its lake banks have not been optimally utilized as urban green open space, these banks necessitate landscape planning that incorporates ecological, aesthetic, and functional values. This research endeavors to qualitatively ascertain the perceptions and aspirations of the local community concerning the function and requirements of green open spaces. The outcomes of this research can serve as a foundation for the development of landscape designs along the banks. The employed methodology is descriptive qualitative, involving data collection and analysis utilizing a 1-5 Likert Scale. The results indicate that green open spaces can evoke feelings of serenity (scoring 4.91) and aesthetics (scoring 4.77). The visual quality, in terms of appearance, along the banks of Situ Pangarengan is relatively low, scoring 2.78. However, with effective organization and management, the banks of Situ Pangarengan have the potential to evolve into a prominent tourist destination in Depok City. The amenities offered along the banks of Situ Pangarengan as green open spaces are considerably comprehensive when utilized as places for open-air activities (with a score of 4.75). According to the articulated aspirations, the most essential facilities required by the community are pathways or footpaths encircling the vicinity (scoring 4.87). People also desire well-designed green open spaces to reduce stress and alleviate feelings of boredom (with a score of 4.87). This enhancement simultaneously fosters various other functions, such as providing a place for individuals to engage in activities and facilitate social interactions.

Keywords: aspiration, green open space, public perception, the banks of Situ Pangarengan

I. INTRODUCTION

Situ Pangarengan is a shallow, small lake that represents a stagnant water ecosystem. Located in the Cisalak Village, Sukma Jaya District, Depok, it functions as a water infiltration area. According to Arnowo (2020), lake (*situ*) is a concave ground surface that is formed naturally or artificially which has a source of water that comes from the groundwater, rainwater, and/or other water sources.

Initially, Situ Pangarengan covered an area of 10 hectares; however, due to sedimentation processes, its current size has reduced to approximately 8 hectares, and during the dry season, it further diminishes to 6.7 hectares. Situ Pangarengan appears to be divided by the Juanda Toll Road passing above it into two sections: one to the South and one to the North, directly bordering residential areas and plant vendors along the roadside. One of the lake's inlets is sourced from the Jantung River, which carries pollution in the form of various types of waste and sediment. The infrastructure to access the lake is still inadequate, with a narrow road leading to Situ Pangarengan.

At present time, Situ Pangarengan is used by the surrounding communities for sports, fishing, and various passive recreational activities, such as sitting and socializing. However, due to the lack of proper planning and management, there are accumulations of trash and uncontrolled growth of various tree species along the lake banks. This lake holds untapped landscape beauty potential, as on clear days, the lake has borrowing view towards Mount Salak as a background. Therefore, if managed properly, the potential for the lake to become a tourist attraction is high, serving as one of the alternatives' tourism in the city (Dinas Lingkungan Hidup dan Kebersihan Kota Depok, 2019). Conservation efforts for the lake are needed to maintain its functionality. One of the measures that can be taken is preserving and organizing the lake's banks or buffer zone to reduce the environmental impact caused by human activities. This can be achieved through the implementation of the green open space concept in accordance with the government regulations.

According to Ministry of Home Affairs regulation No. 1 of 2007 concerning Open Space Planning, the lake banks are part of the green open space in urban areas (Farida, 2017). The lake banks area, as one of the urban green spaces (UGS), can be planned and developed into an ecologically, aesthetically, and functionally UGS. This transformation not only has benefits for the lake's ecosystem, but also the residents living in its vicinity. To undertake the planning of the UGS' lake banks, a preliminary research is necessary to identify existing site-specific issues. Furthermore, numerous aspects need to be considered for an optimal and community-aligned development to support the preliminary research.

Green open spaces refer to publicly accessible areas within open spaces that incorporate green elements. This is a common term that used to denote the land or plant structures such as parks, greenways, open spaces, natural heritage or environments, vacant land, conservation areas, or green infrastructure such as ditches. Green open spaces encompassed a variety of sites and uses; they can be in the form of neighborhood parks where children can play, benches in the side of the park, playgrounds for recreational and sports, community gardens that can be planted with edible plants, pathway to that providing pleasant and convenient routes, a water

lagoons serving as stopping points for migrating or homes for wetland birds, woodlands and farmers' fields, a small patch of shrubbery where people walk their dogs, natural areas that bring peace at the end of one's day, habitats for native flora and fauna, forests that provide natural services, and lakes that has a distinctive landscape shape. Green spaces play a vital role for all residents, regardless of their age, lifestyle, or path in life (Enger, 2005).

The connectivity between landscapes and water bodies is of utmost importance. Landscape changes are highly sensitive to water conditions. The functional landscape conditions around the water bodies have significant impact in terms of water management and nutrient cycles (Liu *et al.*, 2019). Zhang *et al.* (2012) and Xu *et al.* (2017) stated that, lake damages can be in the form of terrestrialization, where a lake transforms into land. This is caused by changes in water quality, decreasing water levels, siltation (sedimentation), and the loss of vegetation around the lake. This condition is frequently observed in small, shallow lakes and can lead to environmental issues such as flooding. The composition and configuration of the landscape affect the hydrological conditions of water bodies and serve as indicators for the quality of surface water and groundwater. Through appropriate landscape composition and configuration around water bodies, problems like eutrophication, flooding, groundwater depletion, and pollution can be managed (Qiu and Turner, 2015).

The genetic divergence of biota populations in the lake is influenced by the landscape conditions. When the landscape lake management is proper, the landscape and the lake will be in harmony to maintain the diversity of biota types in there. The nature, behavior, and life history of aquatic biota that interact with the surround landscape will produce dependent relationship. Therefore, the population structure of the landscape in various places and climatic conditions will influence the sustainability of the ecosystem there (Augsburger *et al.*, 2021). Assessment of aquatic ecological health depends on the relationship between physical habitat quality and biota composition (Schwartz, 2016).

Landscape planning for water bodies not only contributes to urban development, but also can enhance urban aquatic ecosystems. The restoration of urban river and lake ecosystems will create a sustainable aquatic ecological system, improve the natural purification capacity of the entire water system, and enhance the quality of human life integrated with these ecosystems (Liu, 2020). Water bodies require architectural and landscape design principles. Some of the main principles are: (1) the principle of complementarity between water and land, (2) the principle of transferring materials from land to water, (3) the principle of balance, (4) the principle of various technological approaches, design for the use of water in landscape architecture. The architecture and landscape design of water areas as habitat environments must be managed in order to mitigate and adapt to climate change. Urban planning, water landscapes and water ecosystems must be managed in an integrated manner (Ruban, 2018).

The research objectives are to identify the physical and non-physical conditions around the site, to assess the perceptions of the surrounding community based on their experiences and knowledge of the urban green space along the lake banks, to understand the community's aspirations, and to analyze the correlation between perceptions, aspirations, and community activities. This information can serve as a foundation for the development of the lake banks design.

According to Rahmat (1998) in Wulandari (2019), perception is experience about objects, tourism, relationships obtained by concluding information and interpreting messages. Perception in sociology can be said to be an understanding of community perception, namely a process in which groups of people who live together in a certain area have an opinion about something that interests them. Perception can influence people in determining their attitudes and actions so that people will take an active role and participate in them (Januarisa *et al.*, 2015)

II. METHOD

The research was conducted from October to June 2022 at Situ Pangarengan, Cisalak Village, Depok City. Figure 1 shows the research location map.

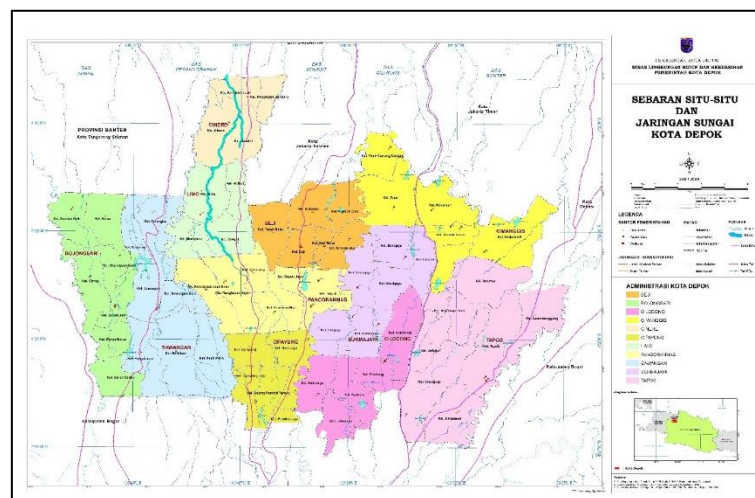


Figure 1. Situ Pangarengan Location Map

The research method was conducted with both qualitative and quantitative descriptive, aimed at identifying the perceptions and aspirations of the surrounding community based on the needs of urban green space along the lake banks. This data was used to determine criteria for the design development of the area in the future.

The data that collected during this research are as follows:

- a. The identification of physical and non-physical conditions around the site was conducted by:
 - Walking around the lake
 - Identifying the physical condition of the lake
 - Identifying the existing activities that have an impact on the lake's condition, as well as those that do not
 - Identifying the types of vegetation around the lake
 - Identifying the facilities and infrastructure for maintenance of the lake.

The identification process involves bringing an identification worksheet and capturing photographs at the location. Data was recorded for subsequent descriptive analysis.

- b. The identification of daily activities of the surrounding community along the lake banks and the assessment of the community's perception of the site based on their experiences and knowledge of the urban green space (UGS) along the lake. The variables in question are the community's perception, consisting of two sub-variables: community experiences and knowledge. Experience is measured by how often individuals spend time in the UGS and the activities they engage in, while knowledge is assessed based on the extent of the community's understanding of the functions of the urban green spaces.

Table 1. Research Variables

Variable	Sub-variable	Indicator
Perception	Experiences	<ul style="list-style-type: none"> - How often do you spend time in the urban green space along the lake? - What activities do you engage in at the urban green space? - Does it provide tranquility, joy, a sense of beauty, relaxation, tension relief, a different atmosphere, a closeness to nature, a sense of togetherness, and an opportunity to learn about nature (flora and fauna)?
	Knowledge:	<ul style="list-style-type: none"> - The ecological functions of the urban green space (UGS) along the lake, with indicators including: refreshing the air, influencing and improving microclimates; absorbing rainwater; flood control and water management; maintaining specific ecosystems and preserving genetic diversity. - Understanding the social functions of the UGS along the lake, which have indicators such as: a place for recreation and sports; a venue for social interaction; a source of fresh air; a facility for research and education as well as public awareness-raising about the environment; and a means to promote cleanliness, health, harmony, and beauty in the environment.

Meanwhile, aspiration is a strong desire characterized by efforts to achieve something considered higher and more valuable than the present. Aspirations regarding the arrangement of the Situ Pangarengan banks were obtained from respondents, both through structured and open-ended questions.

This research is also supported by supporting variables such as:

- Physical Data: including climate data, the condition of the lake's waters, topography, vegetation, accessibility, and the surrounding environment of the site
- Non-Physical Data: encompassing cultural and economic aspects of the surrounding community.

Primary data was obtained through direct field observations, interviews, and the distribution of questionnaires to the public and local government officials. Secondary data was obtained from literature, scientific articles, research papers, research journals, websites on the internet, and local government regulations. The total sample size was 35 individuals.

III. RESULT AND DISCUSSION

3.1 Physical and Non-Physical Conditions

The data obtained consists of primary data and secondary data, with the following results:

- a. Identification of Physical Conditions

- The surroundings of the site

Situ Pangarengan is a natural lake owned by the Depok government, located in Cisalak Subdistrict, Sukmajaya District, Depok City. Cisalak Subdistrict covers an area of approximately 2.59 km², and Situ Pangarengan stretches from south to north, separated by Jalan Juanda.

Situ Pangarengan, with an area of 7 hectares, is surrounded by vacant land (in the Southern zone) and residential areas (in the Northern zone). It is also close to several prestigious universities, as well as the business and shopping centers of Depok city. The population of Cisalak Subdistrict, Sukmajaya District, is 20,498 people with a population density of 7,914 people/km². The *Catchment Area* (CA) covers 217.62 hectares, and the water quality status of Situ Pangarengan is heavily polluted.

- Accessibility and Achievement

Accessibility to Situ Pangarengan in Depok can be easily reached from both Jakarta and Bogor. The site of the lake can be directly accessed via Juanda Street or from the residential areas.

- Zoning and Space:

Overall, Situ Pangarengan is divided into two by the Juanda toll road. The water bodies are still connected, but physically, the lake is divided into two zones: Southern zone covering 6 to 8 hectares and the Northern zone covering 2 hectares. Consequently, the lake banks are also divided into two, following the existing water bodies.

The green open space on the south side is larger, as besides the wider water body, there is a Public Cemetery Park (TPU) and undeveloped green areas. On the north side, the green open space on the banks of the lake is very limited, as it is close to residential areas. In both zones of this lake, no permanent buildings were found that serve as lake facilities.

- Existing Facilities and Infrastructure

In the Southern zone, there is a village road that cuts through the Public Cemetery (TPU), followed by a gravel road encircling the reservoir. In some places, there is no road along the reservoir's edge. The inlet channels in the Southern zone are almost unrecognizable because they are covered by wild vegetation, and the channels have narrowed. The reservoir's edge is still made up of soil.

In the Northern zone, the edge of the reservoir has been provided with a concrete retaining wall. There are 2 water gates capable of retaining trash and controlling the water level in the reservoir. In one corner of the reservoir, there is a concrete brush staircase for lifting trash from the reservoir to the land before it is finally transported and disposed of outside the area. There is an asphalt road that serves as an inspection road encircling the reservoir's bank. This road can accommodate one car, making it easy for garbage collection vehicles to operate.

- Circulation

In the Southern zone, circulation is very limited. There is only one main road that serves as a village road, passing through the public cemetery, and then continuing as an unpaved gravel road. Further access around the site is interrupted.

In the Northern zone, there is an asphalt road for inspecting the area around the lake with good condition, which can be traversed by a car. The road can also be used by two-wheeled motor vehicles and bicycles.

- Soil

The types of soil in Depok city include red Latosol and reddish-brown Latosol. These soils are suitable for various types of crops such as fruits, cassava, and vegetables.

- Topography/Land Slope

The ground level elevation for the expanse of Depok city from the south to the north is characterized by lowland and gently rolling hills, with elevations ranging from 50 to 140 meters above sea level and land slopes of 8% to 15%.

- Climate and rainfall

The Depok area is situated in a tropical climate region influenced by monsoonal weather patterns, with a dry season from April to September and a rainy season from October to March. The climate conditions in the Depok region are relatively consistent, characterized by a relatively small variation in rainfall. The annual rainfall is approximately 2,500 to 3,000 mm per year, with an average monthly rainfall of around 327 mm.

- The condition of the water in the lake.

Situ Pangarengan is one of the 26 lakes located in the city of Depok, where its water source comes from springs and the Jantung River. Situ Pangarengan serves as a flood control area and a conservation zone. Situ Pangarengan has 1 inlet and 1 outlet. The outlet of Situ Pangarengan flows into the Laya River.

The total area of Situ Pangarengan, as measured from the High-Resolution Satellite Image (HRSI) map at a scale of 1:5,000, is 7.00 hectares. The proportion of the lake area based on its depth, i.e., with a depth of less than 50 cm, is 4.84 hectares or 69%, while the area with a depth of more than 50 cm, mainly in the downstream and middle parts, is 2.16 hectares or 31% (DLHK, 2019).

The pollutant load entering Situ Pangarengan has exceeded its capacity. If Situ Pangarengan is designated as a conserved lake, actions that need to be taken to increase its capacity include (1) increasing the depth of the lake to more than 3 meters, (2) constructing a communal wastewater treatment plant (WWTP) to accommodate wastewater from both planned and unplanned settlements in its *catchment* area, and (3) arranging the lake's surroundings.

- Vegetation

In the southern zone, the banks of the water body are dominated by wild plants (not specifically planted), consisting of trees, shrubs, bushes, and ground cover, except in the area of the Public Cemetery (TPU). In the public cemetery area, greening has been carried out with shade trees such as Frangipani, Teak, and several other types of shade plants.

In the northern zone, the area near the water body is relatively clean without any plants. Some large trees are present in the spacious open area, including Bintaro, Acacia, and several Royal Palm trees, as well as some newly planted small trees. Along the road bordering the residential area with fences, apart from several trees, there are also shrubs and bushes. Open land is generally covered with grass. On one side of the water's edge, there is a row of newly planted ornamental plants for aesthetic purposes.

b. Identification of non-physical aspects around the site

- The potential views:

Situ Pangarengan is divided into two parts by Juanda toll road. The southern side covers an area of about 8 hectares, which may have reduced to around 6 hectares currently, and the northern side spans approximately 2 hectares. The toll road with its large concrete support pillars presents an attractive view from any angle along the lake's banks. The view of the water body itself is also a potential attraction, given the vast expanse of water and the supportive backdrop. Meanwhile, from the water area, the view can encompass the entire banks and the distant Mount Salak as a background. In the spacious section

of the lake on the southern side, the serene view of green trees still dominates the banks area, especially around the public cemetery.

Challenges encountered include the presence of trash piles in the water body and along the lake's banks, especially during periods of heavy rainfall. Additionally, rapid siltation on the southern side has made the view of the water body less appealing.

- The condition of the community around the lake (social, economic, cultural aspects)

With the influx of newcomers in the area around the lake, the original local culture is not as prominent. The socio-economic status of the community around the lake is quite diverse. Not far from the lake, along Juanda Street, there is a row of vendors selling ornamental plants.

3.2 The Perception of the Community

The public perception is obtained from views regarding green open spaces in terms of their functions, benefits, perceived atmosphere, the quality of the banks, and the level of importance. Table 1 shows the scores from the questionnaire results.

Perception Table 1. Public Perception of Green Open Spaces on the Banks of Situ Pangarengan

No	Perception	Score
1	Green open spaces can provide a sense of tranquility.	4,91
2	The banks of Situ Pangarengan can be utilized to create a green space that benefits the surrounding community. When properly planned and managed, the banks of Situ Pangarengan have the potential to become one of the tourist destinations in Depok city.	4,78
3	Green spaces provide a sense of beauty.	4,77
4	The primary quality of the banks of Situ Pangarengan is the visual quality (scenery) in the surrounding area of Situ Pangarengan.	2,78
5	The level of importance if the banks of Situ Pangarengan can be used as a place for activities in an open space, and the available facilities on the banks of Situ Pangarengan are complete as a public green space.	4,75

In addition to providing a sense of tranquility, green open spaces can also serve to reduce stress or boredom, improve the health of the surrounding environment, serve as a place for the local community to engage in activities and socialize. Importantly, green open spaces can also have economic value, particularly when viewed from the perspective of public health.

In addition to serving as a beneficial green open space for the local residents, when managed effectively, the green open space along the lake's edge is expected to become a tourist destination for the city of Depok, considering the potential of the water body and the surrounding views that are highly supportive. Fundamentally, the community may not be fully aware that the current state of the banks area has not been optimally arranged. If proper planning and management are implemented, the function and quality of the Situ Pangarengan lake banks area as a green open space will be maximized.

3.3 Community Aspirations

The aspirations of the community based on the questionnaire regarding the needed facilities and ambiance can be seen in Table 2.

Table 2. Community Aspirations for Required Facilities and Ambiance.

No.	Aspirations	Skor
1	Pathways/circulation around the lake.	4,87
2	A green open space atmosphere that can alleviate stress.	4,87

Some open-ended inputs from respondents regarding the facilities that should ideally be provided in public green spaces include:

1. Educational area about plants (e.g., providing information about types, benefits, etc.)
2. Planting a hedge along the banks
3. Children's playground
4. Sports facilities such as cycling swings (outdoor fitness), foot therapy stones, and others
5. Improved public green spaces, well-maintained, free from illegal buildings (rental properties or unauthorized stalls, and other unauthorized uses)
6. Multi-functional green spaces, for example, integrated with a community health center
7. Installation of CCTV cameras
8. Residents' canteen or culinary stalls managed by local residents
9. Open-air auditorium or permanent stage for communal events
10. Water-based tourism or sports activities
11. Nighttime lighting installations

There are several community aspirations that need to be further coordinated with various other relevant parties, such as clearing the banks area from illegal buildings. The permitting process should be clarified first, so that future development and management of the banks area can proceed smoothly. Coordination needs to be carried out from the neighborhood association level RT/RW (Rukun Tetangga/Rukun Warga), sub-district, district, up to the municipal government.

As for the desire of some residents to create a multi-functional green space integrated with the Community Health Center (Puskesmas), it may be challenging as it requires coordination with relevant authorities. Meanwhile, the availability of land in the Situ Pangarengan banks area may not permit the construction of a Puskesmas.

IV. CONCLUSION AND SUGGESTION

Based on the discussion that has been conducted, the following conclusions and recommendations are obtained.

Conclusion:

1. The lake banks green space is extensively utilized by both local residents and visitors for recreation, encompassing both passive and active forms of leisure.
2. The physical and non-physical conditions on the site and its surroundings strongly support the development of the banks green space as an activity space for the local community and a tourist destination for the city of Depok.
3. The perceptions of the community around the site, based on their experiences and knowledge of the lake banks green space, allow for the development of a multi-functional banks with functional, aesthetic, and ecological value simultaneously.
4. The community's aspirations for the development of lake banks green spaces are more directed towards enhancing activities and facilities that enable the improvement of the functional aspects of Situ Pengarengan green space.

Suggestion:

1. Based on the knowledge and experiences that have been researched, it is important to emphasize that public awareness of the functions of green spaces needs to be enhanced, so that the provided green spaces can be optimally utilized.
2. Public education is needed to improve the community's knowledge about the economic aspects of green spaces in terms of environmental health.
3. Education is needed regarding sustainable, well-maintained, clean, child- and elderly-friendly environmental management, and responsible utilization.

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