

# Studying Activities, Behaviors, and Impression of Users in the Green Spaces in Khon Kaen University Campus

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## Abstract

This study is focused on influences of physical design elements over activities, behaviors, and impressions of users in the two major green spaces in Khon Kaen University Campus: Si Than Lake and Plastic Lake. The research data is collected through the Caption Evaluation Method (CEM) and online questionnaires. The CEM is applied to record activities and behaviors of green space users in different time periods on maps. These activity patterns on the maps show how areas in the two green spaces are used. Meanwhile, the online questionnaire is employed to query the users about their behaviors and impressions while doing activities in the green spaces. The data from the questionnaires is analyzed by using Chi-square statistical model. The results show that there are nine activities that are associated with the listed impressions (jogging, sitting, gathering, feeding fish, walking pets, chatting, attending events, playing sports, and smoking). There are also issues with physical elements such as the running track, public toilet, and trash bin. The result of the study is applied to create design suggestions that encourage more positive impressions of the users of the green spaces.

## บทคัดย่อ

งานวิจัยชิ้นนี้มุ่งเน้นการศึกษาเกี่ยวกับผลจากองค์ประกอบกายภาพที่มีต่อกิจกรรม พฤติกรรม และการรับรู้ของผู้ใช้งานพื้นที่สาธารณะสีเขียวภายในรั้วมหาวิทยาลัยขอนแก่นสองแห่ง คือ สวนสาธารณะบึงศรีฐาน และสระพลาสติก ทั้งนี้ผู้วิจัยได้ใช้ Caption Evaluation Method (CEM) และ แบบสอบถามออนไลน์ เป็นเครื่องมือในการรวบรวมข้อมูลวิจัย โดย CEM จะถูกนำมาใช้เพื่อบันทึกพฤติกรรม ลักษณะกิจกรรม รวมถึงลักษณะกายภาพของพื้นที่สีเขียวในช่วงเวลาที่ต่างกัน แล้วนำมาสรุปเป็นแผนที่แสดงพฤติกรรมการทำกิจกรรมของแต่ละช่วงเวลาเหล่านั้น ในขณะที่แบบสอบถามออนไลน์จะทำการสอบถามที่เกี่ยวข้องกับการทำกิจกรรม การรับรู้ และข้อคิดเห็นต่างๆ ของอาสาสมัครผู้ตอบแบบสอบถามที่มีประสบการณ์ในการเข้ามาใช้พื้นที่สีเขียวทั้งสอง ผลจากงานวิจัยแสดงให้เห็นว่า

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กิจกรรมทั้งเก่า คือ วิ่งออกกำลังกาย นั่งเล่น พบปะเพื่อนฝูง ให้อาหารปลา เดินเล่นกับสัตว์เลี้ยง พุดคุย เข้าร่วมงานเทศกาล เล่นเกมกีฬาชนิดต่างๆ และสื่อบุหรี่ มีความสัมพันธ์กับการรับรู้ นอกจากนี้ผู้ตอบแบบสอบถามส่วนใหญ่ยังมีข้อเสนอให้ทำการปรับปรุงและเพิ่มเติมลู่วิ่ง ห้องน้ำสาธารณะ และจุดทิ้งขยะ อีกด้วย

**Keywords:** Green space, Campus, Activities and Behaviors, Users, Impressions

## Introduction

University campuses that are more connected to the city and those that are isolated from the city always improve their physical environment in order to respond to the demands of their future or new students. These developments also affect different urban aspects, such as environment, economics, social and politics. The development of campus green spaces eventually causes impacts to the surrounding communities.

Campus green spaces are considered important public spaces for students that support learning activities and provide recreational spaces. Green spaces can also be used as public spaces of the cities (Gumprecht, 2008), as well as private spaces to socialise with friends and fellow students. There are three primary values that guide the development of green space: that it should be responsive, democratic, and meaningful. Green space should be a place that in addition to considering the needs of people, pay attention to rights of people (diversity of users) and it becomes a center core of connection between personal life, social life and place. (Stephan Carr, 1992, pp.1-22).

Students spend a massive amount of time on campus that constantly need a good amount of concentration and focus (Felsten, 2009). A university not only functions as a location of formal education, but also offers an atmosphere in which students develop in life their individual and interpersonal identity (Abercrombie, et al., 1998). Gumprecht argues that university campuses in their aspects may be seen as elements that imitate and improve nature. People and green spaces are emotional through the interconnectivity between their perceptions and the environment. This is why it is essential to examine how the campus environment contributes to the life of students in their sturdy environment. (Abu-Ghazze, 1999; McFarland et al., 2008).



**Figure 1** Location and existing conditions of Si Than Lake

Khon Kaen University (KKU) is the first university founded in the Northeast according to the policy to expand higher education to the regions. The main campus is located at 123 Mittraphap Road, Moo 16, Nai Mueang Subdistrict, Muang District, Khon Kaen Province, 40002. The campus comprises teaching and experimental agricultural plots, different educational and administration and support facilities, and different types of housing units such as single houses, row houses, flats and dormitories. Si Than Lake and Romklao Kalla Pruek Lake (Plastic Lake) (Figure 1 and Figure 2)

are considered important natural conservation green spaces of Khon Kaen University. They provide a full range of activities for students and residents who live nearby. The two green spaces are surrounded by various educational facilities and public facilities. All the facilities have the highest rate of center activities in the KKU green spaces (Ibid). This study is focused on associations between impressions, activities and physical design elements Si Than Lake and Romklao Kalla Pruek Lake (Plastic Lake). The result of the study is applied to be a design suggestion of both green spaces in order to encourage satisfaction and positive impressions of users in the green spaces.



**Figure 2** Location and existing conditions of Romklao Kalla Pruek Lake (Plastic Lake)

## Research Questions

Three main research questions are set to identify green space users' activities, behaviors and impressions, then find associations between these three aspects.

1. What are physical design elements that associate human activities in the green spaces in Khon Kaen University?
2. What are the impressions of the users while they are doing the activities in the green spaces?
  - What are activities that generate positive impressions of people toward the green spaces?
3. What are the opinions of users toward the physical design elements in the green space?
  - What are the physical design elements that users like?
  - What are the physical design elements that users dislike?
  - What are the physical design elements that users think are insufficient?

## Literature review

Literature review is conducted into four parts to support the research questions.

### 1. Importance of Campus Green Spaces

Green spaces are considered important components of the university campus. They are a landmark of the university while being grounds for conducting activities, doing performances, and expressing emotions. Moreover, they provide students' experiences of life on campus and opportunity to connect to other students and also the local community. Thus, students can raise awareness of local biodiversity and identity of the places where the campus is situated (Patel, M., 2019). According to Xingin Li, developing campus green spaces also improves accessibilities, aesthetics, and utilization of the urban community. Meanwhile, each campus should have different green spaces in order to respond to different demands and needs of students. Furthermore, the study demonstrates physical aspects (such as physical elements of the green spaces) associated with human aspects (such as activities, behaviors and emotions).

### 2. Studies about Green Space Improvement

Green spaces are an important urban component that encourage social cohesion by attracting individuals to the area for recreational or social purposes. In order to make green spaces attractive, the area is needed to be easily accessible, have various amenities or different kinds of activities, provide spaces for different forms of interactions, and generate a relaxing atmosphere (Kazmierczak et al., 2007). Safety of green spaces is also another factor that encourages vulnerable people, such as aged and disable people, to feel comfortable to use green spaces (Andy Honga et

al., 2018). However, among different types of green spaces, campus green spaces have only limited features to serve different types of activities. Thus, the green spaces become unattractive to people (Ali Belmeziti et al., 2018).

### 3. Studies about Human Activities, Behaviors and Impressions in Green Spaces

People's behaviors in spaces are defined via patterns of their actions and activities within the environments (Barker, 1968). Especially, activities in public spaces such as street areas are associated to daily activities and behaviors of the urban citizens (Hall, 1963). The popular method to collect information about activities and behaviors in public spaces is based on the study of Whyte who did observations people activities and behaviors in specific public spaces in different times and days for weeks or in a few months (Whyte, 2000). Then, the study method is applied by Duy Thinh Do and his team in order to find design suggestion of green spaces and pedestrian areas in Vietnamese cities. Additionally, the researchers record activities between 10<sup>th</sup> and 16<sup>th</sup> of November, 2018. The observations are conducted on both weekends and weekdays in different periods of time. Then, the collected data recorded as behavioral maps. These maps illustrate patterns from connections between activities and the environments. Furthermore, the researchers included psychological information, such as sounds, smells, and other sensations (2019). According to Norberg-Schultz, emotions and feelings are the aspects that identify the senses of places through connections between people and spaces (1895). Meanwhile, Seamon explains the definition of feelings as a sense of attachment to locations from interactions with people in spaces (1982). By realizing the importance of feelings and emotions in space, Abu-Ghazzeah conducts research about human behaviors in campus green spaces via observing daily interactions and emotional connections of users of the green spaces. Abu-Ghazzeah also can identify physical settings that are attached to different types of activities and emotions (1999).

### 4. Studies about Association between Impressions, Activities and Physical Spaces

Caption Evaluation Method (CEM) is a study approach to study associations between people and physical spaces. The method is about marking locations where activities take place or where emotions are attached to (Neto et al., 2018). The method is also applied by several Japanese scholars. For example, Tanaka and Kikata apply the method to investigate impressions and activities toward physical elements in three public spaces in Kagoshima (2008). Meanwhile, Tsuchida and Tsumita apply the method to define privately owned public spaces (POPS) of people in choosing spots to rest in green spaces (2005).



## Research Methodology

To answer the first research question, the CEM is applied when the researcher conducts observation for people's activities and reactions in the two green spaces. The observation is done between 16<sup>th</sup> and 30<sup>th</sup> of November 2021. The process is conducted in the morning (6:00 AM-12:00 PM), afternoon (12:00-18:00 PM) and evening (18:00-21:00 PM) on both weekends and weekdays. Then, the data from the observation is summarized as behavioral maps to define physical elements of the green spaces and activities that occur.

In order to find answers for the other two questions, the questionnaire is created to ask for their impressions while doing activities and also their opinions about physical design elements in the green spaces. However, to comply with "social distancing" policies during COVID-19 pandemic, the questionnaire is only gathered through different online platforms. Therefore, samples of participants cannot be purposely chosen and the participants will be grouped by gender, age, and occupation to see how diverse the respondents are.

There are 90 participants who respond to the questionnaire. The majority of the participants are students of Khon Kaen University. Meanwhile, there are residents who are retired citizens and live around the campus who often visit the greenspaces as part of their daily activities. Additionally, there are university employees who come to the greenspaces during their break times. The summary of sample descriptive statistics, which shows demographic information about the participants, such as ages, genders, living areas, and occupations. Most of the respondents were female (54.7%), aged between 20–29-year-olds (70.9%), and most of them live outside the campus (51.2%) in Nai Muang Sub-district (56.8%). Most of the participants are students (88.4%).

To answer the second research question, one tailed chi-square test is applied to find association between users' activities and impressions while they are doing those activities. Additionally, to answer the third question, the opinion results are summarized and also made the statistical test to make sure that the choices in the questionnaire are not randomly chosen.

## Findings

### 1. Behavior Setting in the Green Spaces



**Figure 3** Classification of behavior setting on the green space in the Khon Kaen University campus

Activities of green spaces visitors were identified based on the observation and then classified by their similarity and locations in the space such as cycling, running, walking, sitting exercising, skateboarding, feeding fish, picnic, selling and walking pets as seen in the behavior maps at Si Than Lake and Romklao Kalla Pruek Lake (Plastic Lake). One behavior setting in the green



space can be treated as a typical behavior unit. The name of the behavior setting, and types classified into three major categories: health-related, social interaction, and recreational (Figure 3).

The first major category, health-related behaviors refer to different types of workout activities. There are three sub-categories of health-related activities. The first sub-category is cycling, which concentrates at the internal paths or the multipurpose bike lane. The third sub-category is running, which is conducted at the running track around the lake area.

The second major category is social interaction. Dating, chatting, camping and picnicking are some of the activities that generate a private sphere when two people sit and communicate at a bench or lawn. There are five sub-categories for this type of activity: intimate, gathering, social interaction, camping/picnicking, selling, joining special events and social media presence. Second sub-category is gathering for doing certain things or chatting. While they sit at their chosen spot, they also chat with each other or play together. This type of activity is often conducted at lawns, where users can have a meal or drink while sitting. The last one is joining special events that attract various groups of visitors who can also invite more people to come to them via social media.

The third major category is recreation includes four sub-categories - idling, sitting, skateboarding, walking/sightseeing, feeding fish and watching animals. While people are sitting, they often see others' activities in the same area, and this helps them to be more relaxed. Minor category is recreation, which is about people doing things to relax. Teenagers and kids use multipurpose bike lane or running track as playground. The third sub-category is feeding fish, which is often conducted at the lakeside area. The activity often occurs on the internal paths and also the surrounding area. While sightseeing, people walk slowly and look around. The seventh subcategory is watching animals in order to interact with them or just observe them for relaxation.

## 2. Usage Characteristic of Green Spaces by the Time and Behavior Mapping

There are different intensities of activities between weekends and weekdays in both green spaces. It has shown there are more people in the two greenspaces on the weekends than in the weekdays. In Si Than Lake, people tend to do their health-related activities such as running, jogging, and cycling on weekday mornings and afternoons and, they prefer gathering on weekends for social activities such as group activities and chatting. The lakeside area of Si Than is considered the most crowded area of the green space (Figure 4). In Plastic Lake, activity intensity on weekends is also higher than on weekdays. And same as Si Than Lake, most of the activities are concentrated at the area around the lake. The majority of the users do health-related activities such as running/ walking, exercising, and cycling. Meanwhile, sitting is also another preferable activity in Plastic Lake (Figure 5). According to self-observation by the researcher, although there are also high concentrations of activities on the west, south and east side of the Si Than lake, the areas are still considered disconnected and isolated while the walk path and other nearby physical design elements lack of good maintenance.

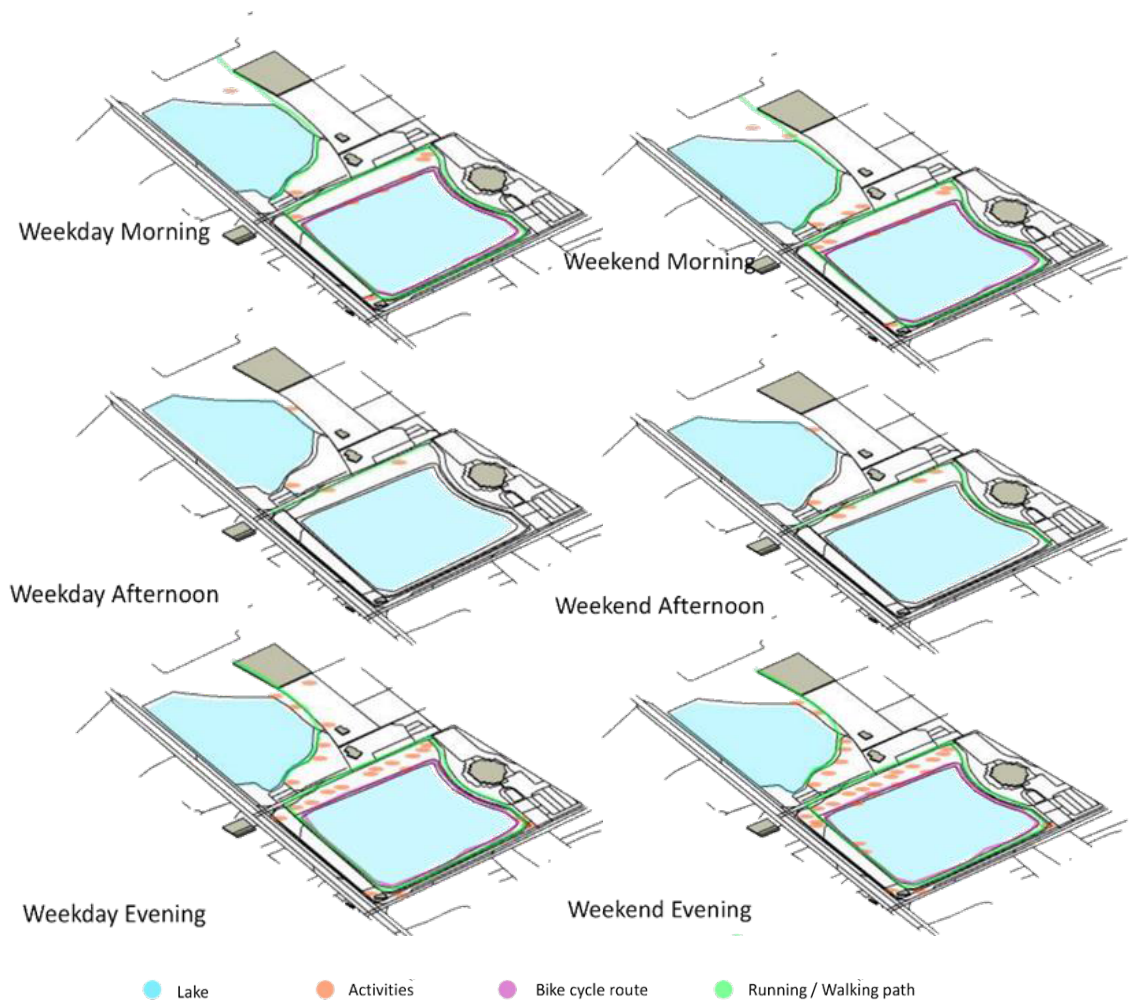
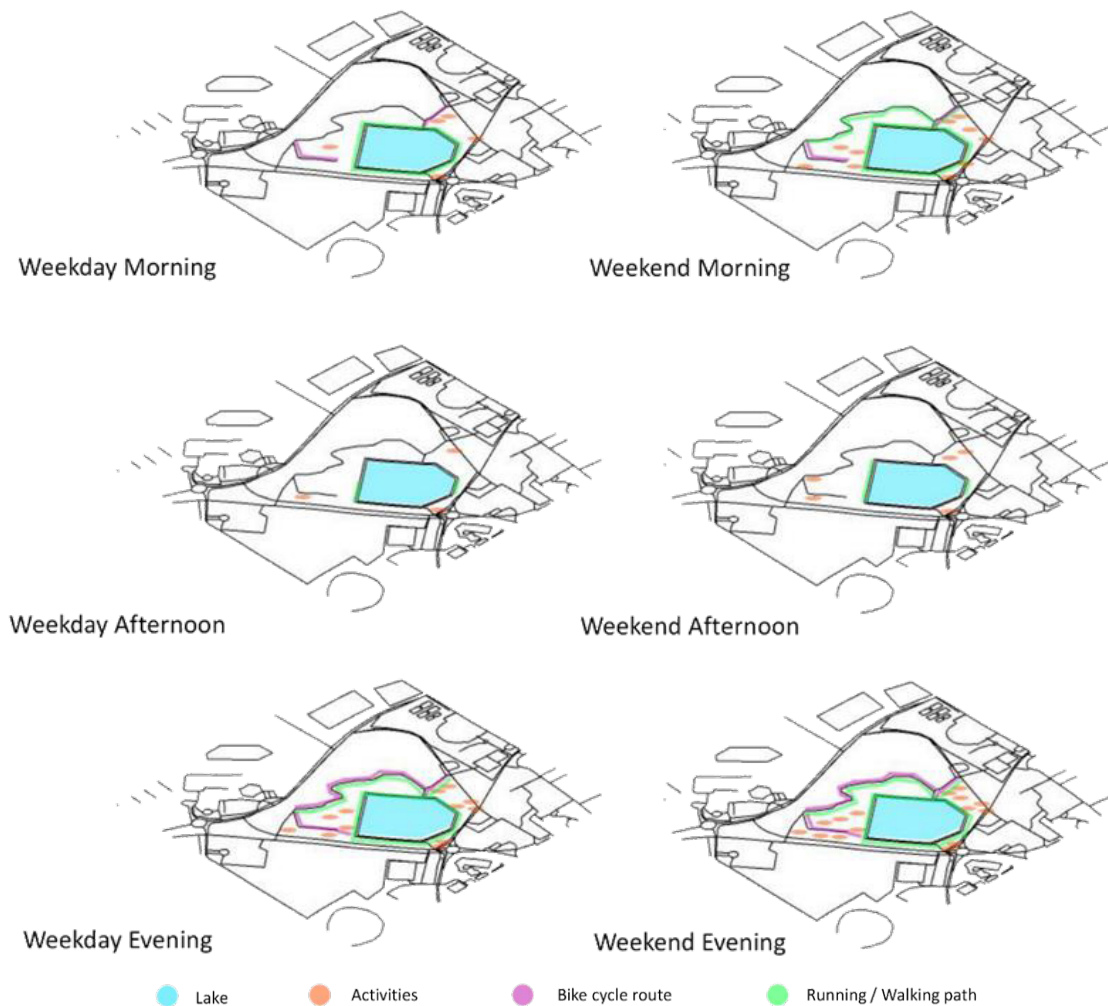


Figure 4 Crowd density in Si Than Lake weekday and weekend



**Figure 5** Crowd density in Si Than Lake and Romklao Kalla Pruek (Plastic Lake) weekday and weekend

### 3. Impression of the User's in the Campus Green Spaces

**Table 1** Chi-square of association between activities and impressions

Activity	Impressions
Jogging/running	safe (p-value=0.01), openness (p-value=0.05, pleasant (p-value=0.00), goodness (p-value=0.01), entertaining or fun (p-value=0.04), serene or calm (p-value=0.01) and interesting (p-value=0.04)
Sitting/relaxing	secured or safe (p-value=0.04), comfortable (p-value=0.03), pleasant (p-value=0.00) and serene or calm (p-value=0.00)
Gathering with friends	warming (p-value=0.02), liking or fondness (p-value=0.00), entertaining or fun (p-value=0.00), interesting (p-value=0.04), newness (p-value=0.04), refreshing (p-value=0.00) and active (p-value=0.00)
Feeding fish	pleasant (p-value=0.01), interesting (p-value=0.00), surprising (p-value=0.01) and delighted (p-value=0.03)
Walking dogs/pets	safe (p-value=0.00), healthy (p-value=0.01), warming (p-value=0.00), interesting (p-value=0.00), openness (p-value=0.00), active (p-value=0.03) and bustling (p-value=0.02)
Chatting/communication	surprising (p-value=0.03), active (p-value=0.00), bustling (p-value=0.03) and depress (p-value=0.03)
Joining special events	(p-value=0.02), warming (p-value=0.00), entertaining or fun (p-value=0.00), serene or calm (p-value=0.00), interesting (p-value=0.00), surprising (p-value=0.00), newness (p-value=0.00), active (p-value=0.00), delighted (p-value=0.00) and bustling (p-value=0.00)
Playing sports games	goodness (p-value=0.01)
Smoking	Cramped/frustrating (p-value=0.00)

If P-value is less than 0.05, the variable is significant

According to Table 1, There are nine activities (from 15 activities) that are significantly associated with impressions, which are jogging/running, sitting/relaxing, gathering with friends, feeding fish, walking dogs, joining special events, playing sport games, and smoking. The Table 1 also illustrates those eight activities (i.e., jogging/running, sitting/relaxing, gathering with friends, feeding fish, walking dogs/pets, chatting/communication, joining special events, and playing sports games) provide positive impressions: secured or safe, openness, pleasant, goodness, entertaining or fun, serene or calm, interesting, warming, liking or fondness, surprising, delighted, healthy, newness, refreshing, active, bustling. However, there are only two activities (chatting/communication and smoking) that generate negative impressions, which are depressing and cramped/frustrating. However, some actives such as cycling and doing yoga do not generate any significance impression according to the research population.

#### 4. The opinions of users toward to the physical design elements in the green space

There are 17 physical elements in both green spaces: running track, kid playground, benches, vegetation, bike lane, sidewalk, street, small garden, water side area, parking area, trash bin, lamp, shading area, park ramp, public toilet, and gathering spot. The physical design element that the users like the most is running track (45 votes), the physical design element that the users dislike the most is Public Toilet (28 votes) and the physical design elements that they think are insufficient is also the Public Toilet (31 votes). There are also demands for maintenance of some physical features, such as facilities for children, fitness equipment, benches, water bodies, public toilets, shading areas, pathways, lake banks. The result also conforms to researcher's self-observation in both green spaces that the walk path along the Si Than Lake is needed to be improved while there are insufficient not enough of benches and public toilets in the Plastic Lake.

## Conclusion

The two green spaces of Khon Kaen University, Si Than Lake and Plastic Lake, are recreation areas for students and young people to do health-related and relaxing activities, such as running, cycling, and chilling out around the waterside areas. For the weekends are the most crowded period of both green spaces. Although most users tend to have positive impressions staying in the two green spaces, there are still some dissatisfactions toward the physical conditions, especially the walking paths and bike lanes around the two lakes. Meanwhile, there are insufficient toilets and exercise equipment and playthings in the two green spaces also need better maintenance. Finally, the result of this study will be applied for the design suggestion of the two green spaces in the future.

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