



Canalside Healthy Community Area Prototype: Bang Mot Canal Case

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Abstract

Urban environments tend to discourage physical activity and participation in physical activity is difficult by many factors, including overcrowding, high-volume traffic, heavy use of motorized transportation, poor air quality, and lack of safe public spaces and recreation/sports facilities. Globally, road traffic injuries are the ninth leading cause of death. Almost half of those who die from road collisions are pedestrians, cyclists, or two-wheel drive users. The objectives of this research were to create a healthy space suitable for increasing physical activity support for everyone in the area along the canal by using Bang Mot Canal as a case study and create a guideline for 1,682 canals and 186 communities in Bangkok. The results of the fundamental analysis with ArcGIS program for spatial analysis due to the factor of an alternative area and the situations showed that the community along the Bang Mot Canal lacked space to support physical activities. Therefore, alternative areas for community healthy space were analyzed. The results of statistical analysis from the opinion of the sample were divided into two groups: local people and outsiders about the healthy space revealed that on average people in the area wanted to have a well-equipped healthy space. The most needed requirements were space, field, and cleanliness. Meanwhile, on average, most outsiders needed healthy space. The most needed requirements are safety, cleanliness, and shade.

Keywords: Active lifestyle, Canalside community, Healthy Cities, Healthy Community, Physical activities

1. Introduction

The world is facing the growth of the largest city. Currently, more than half of the world's population lives in cities, as urban populations are rapidly increasing, basic infrastructure is insufficient, economic, social and health inequities in urban areas result in significant health inequalities (Urbanization and health, 2010). Bangkok, Thailand is one of them. Bangkok is growing rapidly with very little city planning or regulations (Thailand populations, 2010), which has led to inadequate infrastructure and a haphazard layout. This caused the current many canals have now disappeared as a result of the rapid expansion of the city, there still are few long canals with communities of traditional lifestyle and there are still water traveling routes for local people who live in some areas such as Khlong Saen Saep, Khlong Phra Khanong, Bangkok Noi Canal, Phasi Charoen Canal, and Bang Mot Canal.

Bang Mot Canal is a canal in which people can swim, with many local communities, temples, mosques, and houses built on its banks, resulting in everyday activities of the people, reflecting Thai ways of living. Besides, the path along the canal can be walked and cycled. However, this traditional way of life is becoming less and less familiar due to the rapid coming of global urbanization and the Covid-19 situation, which makes our lifestyles become increasingly dominated by sedentary behaviors, less active lifestyle, and living at risk with various diseases. This phenomenon leads to problems on health and physical on everyone.

Urban environments tend to discourage physical activity and participation in physical activity is difficult by many factors. One possible solution for this problem and also for Covid-19 (Coronavirus, 2020) situation is using a built environment design that responds to the needs of people and the community. Many studies review that a built environment holds enormous potentials for addressing many of today's health challenges. To promote physically active lifestyles through environmental design, a healthy community can be an effective solution. Fundamentally, a healthy community should be good access, clean, and safe (WHO, 2015); for example, people should have access to a qualified residence, transportation, public space, and



recreation area, in addition to qualified health care. A person's health is a product of their environment, by developing and improving community environments resources. Healthy communities can help everyone to have opportunities for all physical activities and live their lives to the fullest. They should have the potentials to make healthy choices easier for residents.

2. Objectives

- 1) To create a healthy space suitable for the area along the canal
- 2) To design a healthy community along the canal using Bang Mot Canal as a case study
- 3) To increase physical activity support for everyone
- 4) To provide an area with facilities for supporting physical activities such as relaxing, exercising, playing sports, and socializing
- 5) To create a guideline for 1,682 canals and 186 communities in Bangkok

3. Materials and Methods

3.1 Data collection

The first part of the study was field observation at the Bang Mot canal to collect the data. The second part consisted of open-ended questions and close-ended questionnaires with the local community and outsiders using online and paper questionnaires. The online and paper questionnaires were the same set of questions.

Observation

Exploration and observing to study the physical characteristics of a healthy community of the Bang Mot Canal area were based on the concept of WHO and Ottawa; Accessibility, Safety, Green area, Facilities, Clean and Recreation.

Questionnaires

There were 2 sets of questionnaires that are a mixture of open-ended and closed-ended questions for the 2 sample groups of local people in the Bang Mot Canal community and outsiders information such as accessibility to the Bang Mot Canal, the understanding, and needs of the respondents.

3.2 Interview

A small focus group of 5-7 subjects was interviewed with in-depth questions about daily life, physical activity, and accessibility to various public areas. Opinions about the design of suitable areas for communities in Bang Mot Canal from 2 groups, namely, people in the Bang Mot Canal community and outsiders, were received.

3.3 GIS (Geographic Information Systems) uses spatial analysis can be used to answer questions.

From the observation, spatial exploration with a collection of data can be made as a big map of Bang Mot Canal. It was ready to be analyzed by the GIS program to show the result presented as maps and related tables, charts, graphs, diagrams, or multimedia.

4. Results

4.1 Site: Bang mot canal

A survey of the area along the Bang Mot Canal found that there are still communities that still use the traditional way of life and have the area along the canal that can be used in many ways but they are still just small areas and not enough for all people in the community which can be seen from Figure 1.



Figure 1 Bang Mot Canal map

Most accessibility problems are caused by the slopes that are steep with, uneven surfaces and some points cannot use wheelchairs or micro-mobility. It is found on the canalside paths that connect between main roads which can be seen in Figure 2. The red dot on the map shows all the problem points on the roads and the canalside path.



Figure 2 Accessibility in Bang Mot Canal

Form the survey in the nighttime, the lighting seems to be insufficient for outsiders like the researcher. From Figure 3 overview lighting, the yellow point that is shown on the map is lighting indicating positions with practical use while the distance of light pole is quite far and some places on the map there on the map have no lighting.



Figure 3 Overview lighting in Bang Mot Canal

The facilities do not seem to be enough for the Bang Mot Canal community, see Figure 4. The yellow points represent the public areas, which is an important religious place for people in the community that leads to the observation in 3 important locations of local people in Bang Mot Canal.



Figure 4 Facilities in Bang Mot Canal

When the researcher entered the Bang Mot Canal area, it was noticed that the Bang Mot canal had 3 public places. All of which were religious sites of community that can be accessed at any time. One place had been a playground before. There are courtyard and fields, and outsiders are allowed to come to these areas for activities, including being a place adjacent to the path along the canal. It is easier come to walk along the canal than along a normal road. The researcher observed and collected data from the 3 places, and information is shown in the next part.



The observations in 3 locations are defined at the same time during 05.00 - 07.00 pm., in 3 patterns: weekdays (Monday – Friday), weekends (Saturday – Sunday), and event day (days with markets, important days, or long weekends). The number of people from the entrance-exit adjacent to the canal of each place is counted.

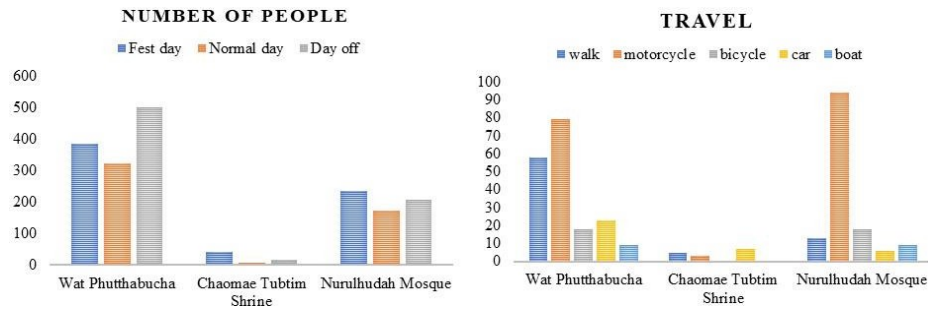


Figure 5 Column chart: Comparing the number of people and traveling in 3 areas.

The results are summarized as a column chart in Figure 5. It is divided by the number of people and travel occurring along the Bang Mot Canal. It is found that more people use Wat Phutthabucha to enter the canal area than other places (64.34%), followed by Nurulhudah Mosque (32.41%) and Chaomae Tubtim Shrine (3.26%).

The commute that is the most popular for local people are riding, motorbikes along the canal (43.02%), walking (26.99%), riding a bicycle (12.46%), driving cars (11.07%), and boats (6.46%).

The age range of people entering to use along the canal is shown in the pie chart in Figure 6. The average percentage is that, elders (8.03%), young people (8.69%), teens (17.15%), and adults (65.86%).

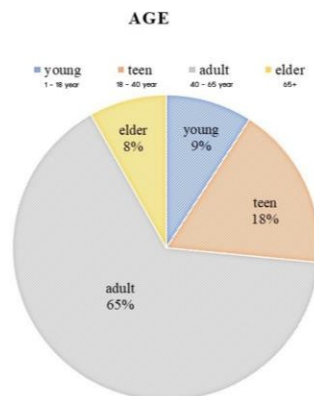


Figure 6 Pie chart: Age range people enter using along the canal from 3 areas

The summary about the paths along the canal from both groups of voluntary interviewees shows an agreement that the paths should be improved the most between Wat Phutthabucha and Daryan Hasan Mosque route (38.46%). Most outsiders start coming to the Bang Mot Canal from the Wat Phutthabucha. There should be some improvement this route.

The person needs a healthy space. According to the survey of the 2 volunteer groups, the highest percentage is 9.03% comprising safety, shady area, and supporting elders. Cleanliness, ramp, accessibility have the percentage ranging, between 8.82% - 8.19%, respectively. Public toilet, seat area, garden, and courtyard range between 7.98% - 6.93%. The least interesting item are the recreation area, field, exercise, shop, and playground (5.46%-2.73%). Since the percentages are not much different, the exact percentages are shown in the figure below.



4.2 Analysis

There are many problems with the exploration of the path along the Bang Mot canal. One of them is the inefficient path and lack of community healthy space as shown in the ArcGIS program in Figure 7 below.



Figure 7 Analysis for the area

Figure 7 shows an area analysis to check distance and sufficiency for healthy space using the analysis of the ArcGIS program by determining the location from the survey and preliminary observation. The distance is for walking, running, and biking within 800 meters or 10 minutes, and then the map will show the boundary from the specified location within walking distance in 10 minutes is a purple polygon. However, the results show that the center of the map does not have a place for good health.

From area analysis, it does not mean that the center of the map is the most appropriate to have a healthy space but to find the most suitable area from the location-allocation analysis can determine the location as a public space of the community (This is an area where people can enter and exit the common area of the community). There are 5 locations with the potential to create healthy space and mark the location of the community. The distance can be walked or biked within 10 minutes so the community can reach its healthy space.



Figure 8 Analysis for Alternative area



The results show that the star-shaped area is most suitable for a healthy space. On the right side of the map, there are 2 circular areas which can be other appropriate areas for a healthy space (Figure 8). The red line is drawn in the direction for the community to go to a healthy space.



Figure 9 Analysis for of the path

From the initial survey, the map shows many walking obstacles as of the analysis route of the ArcGIS program. Two locations are established and barriers are marked on the map then the program will show the best route for traveling. The established locations are 1) point A Chaomea Tubtim Shrine and 2) point B as a Wat Phutthabucha.

The result shows in Figure 9 that on the left is a route problem analysis. If users want to travel from point A to point B on a route that has obstacles, users need to pass by with other directions such as using a route that requires a car or a more distant route. This takes more time to travel or is not safe. Nonetheless, if there is no obstacle in the right-side path, traveling from point A to point B is shorter, safer, easier to walk or bike, and also supports physical activity for health. It is a very interesting choice for daily life.

4.3 Guideline for a healthy community along the canal side

According to the study of healthy and physical activity, a good environment leads to a healthy community by developing and improving the resources available in the community. Design is a guideline suitable to apply for the long term.

Accessibility

Design of the path along the canal will be mobility options that allow pedestrians, motorcycles, and micro-mobility to use this path. Sidewalks should be at least 1.00 meters wide, motorcycles should be at least 1.20 meters wide, micro-mobility width should be at least 1.30 meters. Also, the width that is comfortable for pedestrians, motorcycles, and micro-mobility is 3.50 meters. The subsequent width is 3.00 meters, which pedestrians and users of micro-mobility can also be safely connected with motorcycles. The recommended minimum width is 2.50 meters. Pedestrians are required to stop when handling bicycles or motorcycles show in figure 10. The width of the connection point between the path along the canal and the main road should belong to the same standard. The guard rail of the path should have a height of no less than 0.90 meters and the ramp for the user micro-mobility or wheelchair users who can use the path themselves conveniently should have the slope that is most comfortable to the user, which is 1:20 meters. Also, the slope commonly used by designers is 1:12 meters because the slope is smooth more.

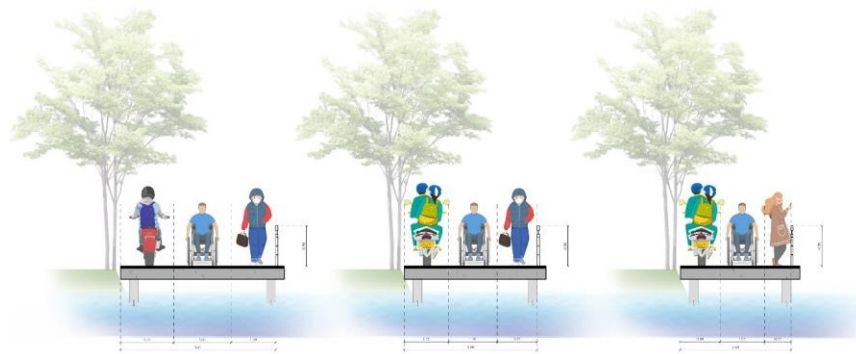


Figure 10 Example of alternative width of the path along the canal

Safety

For lighting design, using solar cells is a technology that is becoming very popular because it helps to save electricity bills and is also environmentally friendly. For the functions of opening and closing, solar cells can be turned off automatically. Because solar cells will change lighting into energy, light is supplied as electrical energy and stored for use in the dark. Therefore, the light turns on when it is dark and goes out as soon as it gets bright. This lighting type is suitable for being installed in places such as playgrounds, sports fields, or the path. Alternatively, it works as a movement detection when something moves towards the light, it will turn on automatically and will turn off after a while. The corridor illumination value should have a minimum average of 10 lux, with an elevated or potentially hazardous area of 50 lux or more. The light pole should have an installation height of about 3.00 meters and the best installation distance is 6.00 - 8.00 meters as a figure 11 below. The public facility such as children's playgrounds, recreation and activity yard or sports field used for activities should have an illumination value of 50 lux or more.

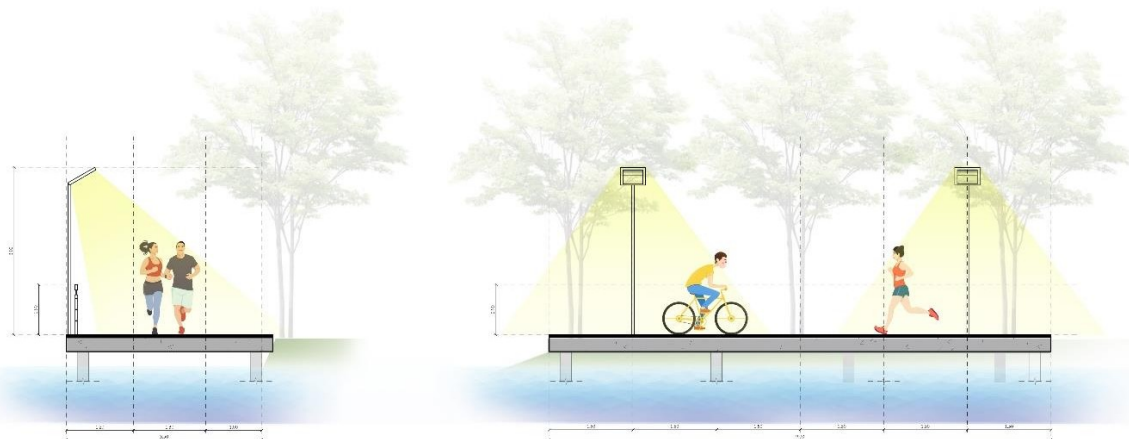


Figure 11 Example of alternative light pole distance

Aesthetic

Improvement and design landscape are vital aids in making people want to get out and spend more time outside. Of course, in the community along the canal, they have the canal which is indeed the most important thing, so there should be no litter in the canal. That might result in another continuity to the canal in the following phase. The color and smell of the canals also affect the view. If the canal is black, it will emit a bad smell.



The current design of green spaces and gardens surely lacks the shade and green area of the trees. The canal path that connects the site should be shaded by trees along the way. Trees that should be planted are medium to large perennials with a height of 5.00 - 15.00 meters as an example of planting trees in Figures 12 and 13. If they are higher than this, the maintenance may be difficult. They should be water-loving trees and have the potential to reduce carbon dioxide or increase oxygen, for example, *Cerbera odollam* Gaertn, *Erythrina variegata*, Variegated mini-rubber, *Ficus Benjamina*, Spanish Cherry, *Michelia alba* DC, and *Vatica diospyroides* Symington. The plants should be those with no flowers and fruits that are easy to fall into the water, which will contaminate the water, such as *Polyscias fruticosa*, *Schefflera arboricola*, *Lantana sp.*, and hybrid Cape Jasmine.

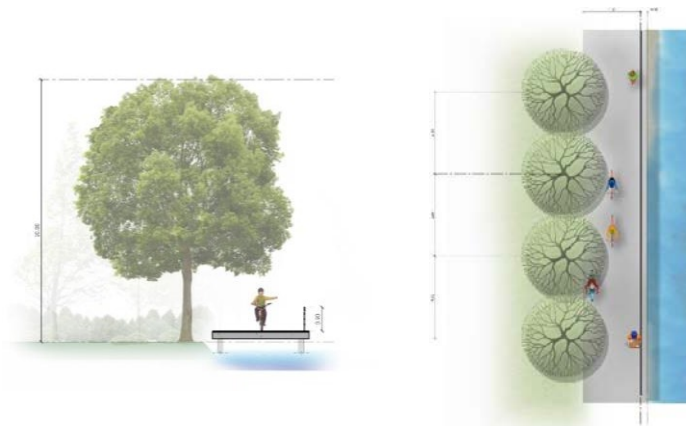


Figure 12 Example of planting trees along a canal

The house should have a green area or a small garden with, medium shady plants for a medium canopy which is not too wide canopy as example Figure 14. They should be non-deciduous plants. One possible is woody plants with a light fragrance from beautiful flowers. They should be free from diseases and pests. Another choice can be herbaceous plants, ivy, and mulch such as Peace lily, Coatbuttons, Mexican daisy, and *Kalanchoe blossfeldiana* Poellnitz. Planting trees in the public space help achieve a beautiful shade and suitable area for recreation. Therefore, emphasizing plants that have a beautiful shape gives shade and beautiful flowers around 10.00- 20.00 meters of height as example Figure 13. Most trees are quite tall and large, such as White cheesewood, *Alstonia Schoiaris* (B), and Cabbage Tree.



Figure 13 Example of planting trees for public area

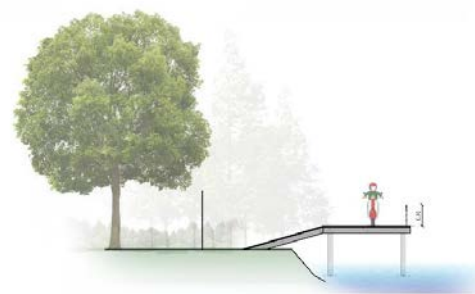


Figure 14 Example of planting trees for houses along the canal

Facilities

To design the area comfortable for the community including outsiders, there should be adequate recreation areas, playgrounds, sports fields, and public toilets. In case the people in the community have to drive to exercise elsewhere, it indicates that the community should have an exercise area. Even if it is an economic community, these public spaces will help attract more tourists to the community.



4.4 Guideline for the design

For the design of the area along the canal path, the bridge along the canal is one of the obstacles in traveling. Since it is too tall and steep for cyclist or wheelchair users to push themselves up and down. An example is a phase of the path along the canal with a high bridge lift. This design, therefore, is to adjust the bridge slope which will see a design example in Figure 15 for everyone who uses small wheels to use conveniently and consistently. Also, colors should be added to the route for telling distance and the energy obtained. At present, there is a painting showing the distance on this canal already.



Figure 15 Perspective; the path along the canal after design



Figure 16 Layout and perspective; weekday

For the re-designs of healthy space, which is designed in the Nurulhuda Mosque. There is an additional playground for children and a seating area under the trees, by arranging garden decoration along the walkway. Old concrete yard improvements and the use of color can be applied for the basketball court or futsal, for example, the design in Figures 16 and 17. Sometimes, they can also use the indoor courtyard as an activities area for their community. People of all genders and ages whether they are outside or within the community can use this area. The outsiders can come to sit under the trees. The original toilet cannot be accessed by disabled outsiders. Therefore, increasing disabled toilet and ramp is a very necessary basic shows in figure 18.



Figure 17 Before and after Mod Ta Noi Market day



Figure 18 Before and after Mod Ta Noi Market day

At night, design with solar cell lights should be installed for sustainability and safety. Solar cell light installation at the tree provides safety and beauty as something that attracts people to use the area as well which will see a design example in Figure 19.



Figure 19 Before and after at night time



This guideline is recommended for other communities located along the canal around Bangkok and along the canal path. Creating a healthy community in the Bang Mot canal can be applied and extended from the focus group of local people around Bang Mot canal and the outsiders, and other communities should learn and share the experience.

5. Conclusion

From this study, the environment in which we live has a great influence on promoting physical activity. Many factors in our environment affect us, with its cities and neighborhoods, streets and buildings, parks and paths, which play a major role, and in the face of Covid-19 situation limiting living lives as needed. From collecting data and analyzing the Bang Mot canal, it is found that the community of Bang Mot canal still lacks exercise areas, playgrounds, and sports fields, causing children in the community to have no physical skill development equipment or places. Nevertheless, there are still paths along the canal where people can walk, run, cycle to get some exercise. It seems unlikely to see people using a wheelchair in this path because the canal crossing is very steep; Besides, there are only some shadows, making people not want to come outsider and turning the paths to be useless. However, these issues are designed to help by developing and improving environmental resources to enable all its people to prevent themselves, have more physical activity and be healthy as all these can help to make a healthy and easy choice for people in their daily life.

The guidelines in this research are suggested as a canalside healthy community. This research presents the background and importance of the process of developing and improving a healthy community guideline to increase physical activity. Sustainable development by relying on the resources available increasing the potential in the community, the participation of the community, and the support from the network partners involved in the community to develop the community will result in a strong and sustainable healthy community due to the guideline that can be applied in other canals around Bangkok.

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