Building a Better World upon Local Empirical Walking Data: A Case of Pedestrian Demonstration Project in Chongqing, China

1 Introduction

In the search for creating sustainable cities, the world of urban planning practice is giving increasing attentions to walking and biking. However, amidst tremendous efforts to collect vehicle flow data and building traffic models in cities around the world, so far little attention has been given to the accumulation of local empirical data on walking and biking, making it hard for politicians and planners to make informed decisions and to evaluate what makes the most efficient use of space. The world and even China within itself is so diverse and every city possesses unique geography/socio-cultural context. Without empirical local knowledge in how people walk and bike in the city, the quality of existing public space and how it is being used, any decisions or actions for improvement will be blindly guided.

In 2010, the city of Chongqing in China was selected by Ministry of Housing and Urban Rural Development to participate a nationwide non-motorized transport system demonstration program. In summer and fall 2010, comprehensive surveys on local citizens' walking patterns and public space were performed on three pedestrian routes. Specifically, the survey followed "Public Life Public Space Survey" (PLPS, hereinafter) methodology to collect base-line data about three routes for problem diagnostics and bench-marking prior to improvement implementation on the Route 3. This experiment has proven to be a useful tool for the ongoing work of improving the quality of the walking environment in Chongqing.

In the next section, the paper will introduce the PLPS methodology. Then a pilot experiment in Chongqing, especially the result from data processing, visualization and quantitative analysis will be described. Finally, conclusions and lessons of Chongqing efforts will be discussed.

2 PLPS Methodology

Developed by Professor Jan Gehl, PLPS Methodology helps study walking, biking and their facilities and environment. The application of this methodology dates back to the experiment in the city of Copenhagen, Demark in 1968, later on being extended and improved by a number of international cities, such as London, Sydney, New York, Melbourne, Seattle, San Francisco, Zurich, Stockholm, and Rotterdam.

PLPS Methodology includes two aspects of research: PL (Public Life) and PS (Public Space). PL consists of two sub-components: pedestrian traffic (PL1) and stationary activity (PL2). PL1 uses the method of manual observation along the street, similar to motor vehicle section flow statistics. PL2 describes how people use streets, squares, parks and traffic nodes while time changing in a day, as well as other materials, such as where to go, how to go, where to sit, stand or take all kinds of stationary activities. The PL data can help find problems and objectively analyze and evaluate how people use urban public space and pedestrian and bicycle facilities. In specific operations, Public Life Survey (PL) needs to be carried out on weekdays (choose one from Tuesday, Wednesday and Thursday) and Saturday, while good weather is necessary to ensure the survey's results typical enough.

There are generally two people at one research point, from 8 am to 10 pm, conducting PL1 by picking up 10 minutes every hour and distributing it to pedestrians and bicycles five minutes each; and conducting PL2 by undergoing a stationary activity statistics every two hours. All the stuff for this survey is shown in Fig. 1.

On the other hand, PS concentrates on space provided for pedestrians and cyclists. The aspects often include: public space quality, access to traffic, location and quantity of route furniture, landscape sight, micro-climate, frontage, age and gender distribution of users, rules-breaking phenomenon like crossing the street, patency of walking and cycling, etc.

The main objective of using PLPS Methodology is to: 1) looking at the status quo of urban pedestrians and bicycle traffic; 2) analyzing demand in the future; 3) guiding the design of pedestrian and bicycle traffic planning and determining recent demonstration emphasis; 4) evaluating the effect of project implementation and adjusting technical ideas.

Fig. 1 Recording non-motorized traffic (left) and recording stationary activities in public space (right)

3 A Pilot Experiment in Chongqing [1]

Chongqing is the demonstration project city of 2010 non-motorized transport system demonstration program initiated by Ministry of Housing and Urban Rural Development. A pilot PLPS survey was carried out for three typical routes on the Yuzhong Peninsula of Chongqing (Fig. 2). On July 3rd (Saturday) and July 7th (Wednesday) 2010, under favorable weather, nearly 30 undergraduates from local university were organized by the project team to do the PL survey. As for the PS survey, it was simultaneously done by a three-member special research group from Gehl Architects and China Sustainable Transportation Center on July 3rd, 2010. It is worth noting that due to the special mountain features of Chongqing, bicycle-related content was not included in the survey, although in the PLPS methodology is capable of capturing biking.

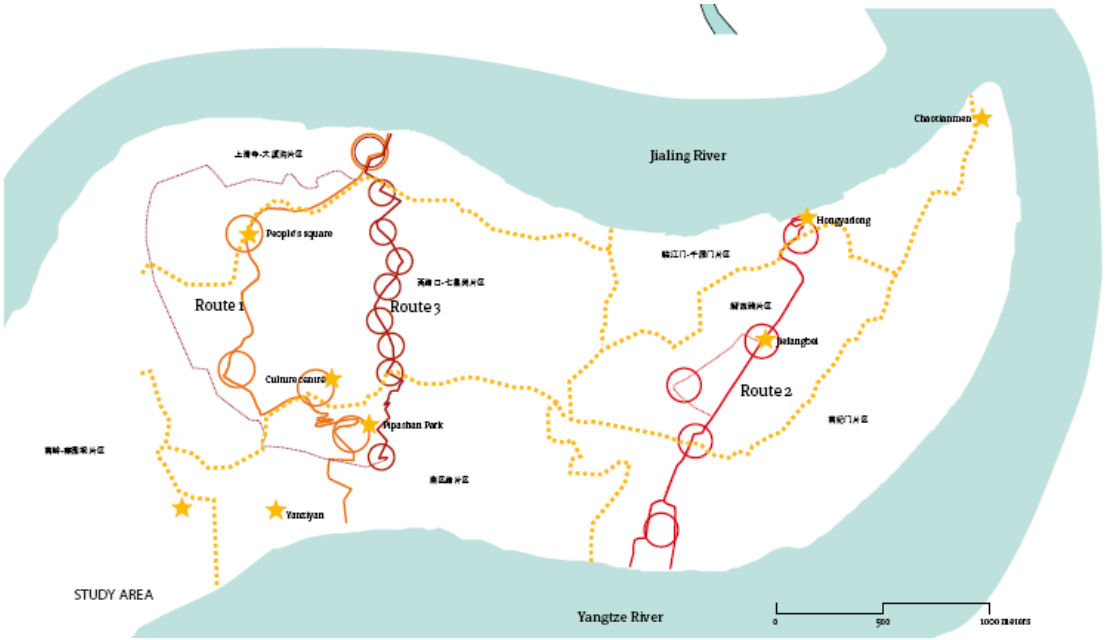

Fig. 2 Three routes of PLPS research in Chongqing

3.1 Pedestrian Traffic Analysis (PL1)

Based on the statistics and the mapping form of people flow on 18 nodes from 8am to 10pm on July 3rd, 2010, the distribution features of popularity in three main routes of Chongqing Yuzhong Peninsula is shown in Fig 3. By carefully scanning a whole day and checking out the viaration of flow between different times at the same public space, we find that several nodes with sharp decline of flow at night. This implies that those nodes lack of safety after getting dark, and requiring the project toreinforce lights and openness of frotage, especially ground-floor retailers.

With local pedestrian traffic statistics, we could compare it with that of other cities based on PLPS Methodology. Fig. 4 shows how the average value of people's flow on main routes change during the whole day in Chongqing, Sydney, London, Copenhagen and New York. It is interesting that although the people's flow is similar to most international megacities, Chongqing's walking flow peak happens around rush hours instead of daytime. We think it is due to a different climate and urban nature of Chongqing. On one hand, high temperature in Chongqing summers makes people more willing to go out at morning or night; on the other hand, Chongqing has fewer tourists than New York and London. This implies that the design of Chongqing's public space should consider more on citizens' demand, such as commuting and leisure activities.

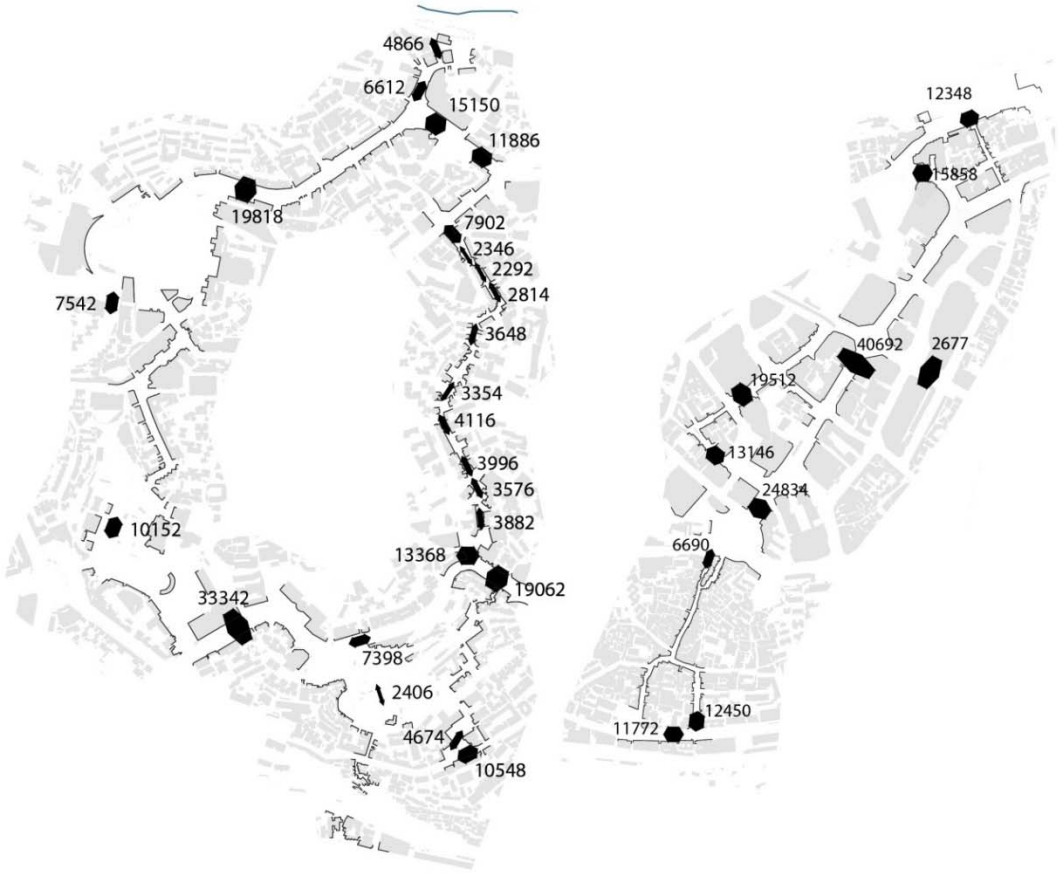

Fig. 3 The distribution of pedestrian flow at daytime on a typical weekday on three routes of Chongqing

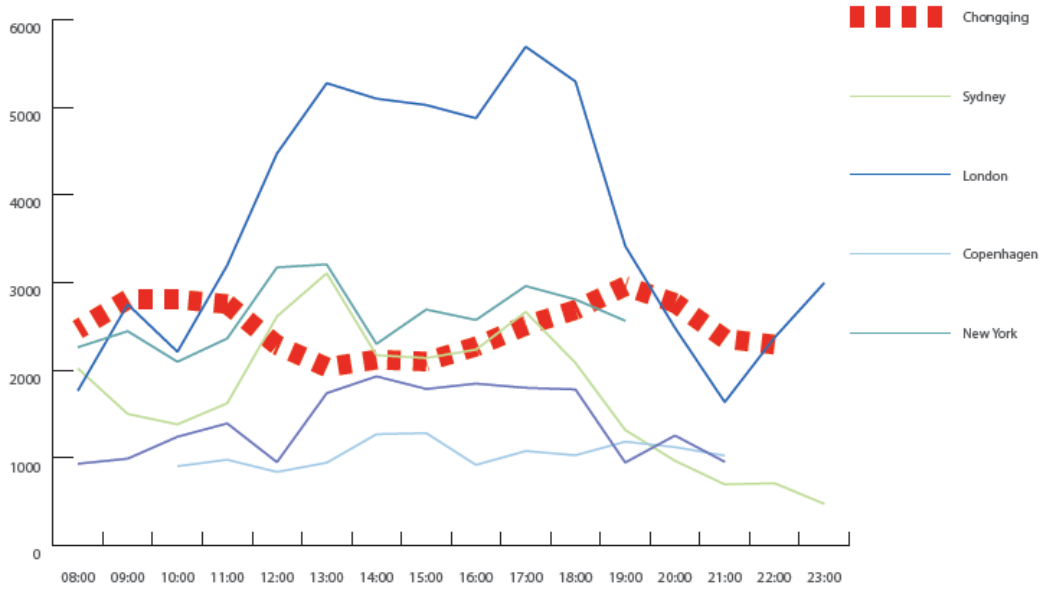

Fig. 4 Lateral comparison on whole day pedestrian flow among main routes of several cities

Due to the hilly topography of Chongqing, pedestrians are challenged by numerous stairs throughout the city. These pose very interesting views, vantage points, and access across the

city in a small scale network which is a unique quality about the city. However, the stairs also prevent accessibility to many areas, primarily for disabled persons and people carrying goods, and prevent the creation of bicycling networks in the city.

3.2 Stationary Activity Analysis (PL2)

Stationary activity data is a useful indictor of the attractiveness of public space. Fig. 5 shows the observed number of stationary people at daytime on the target public space nodes from 8am to 6pm. Most stationary activities are concentrated on Route 1 (right) and Route 2 (left), indicating that the public space there is popular; while probably due to the fact that there is not enough high quality social stationary space provided on Route 3 (middle). In addition, by comparing the number of stationary people between day and night, we find that Chongqing's stationary activities are concentrated after 6pm, 13% more than daytime; some nodes could attract many people to stay even after the stores are closed, reflecting the high quality of public space.

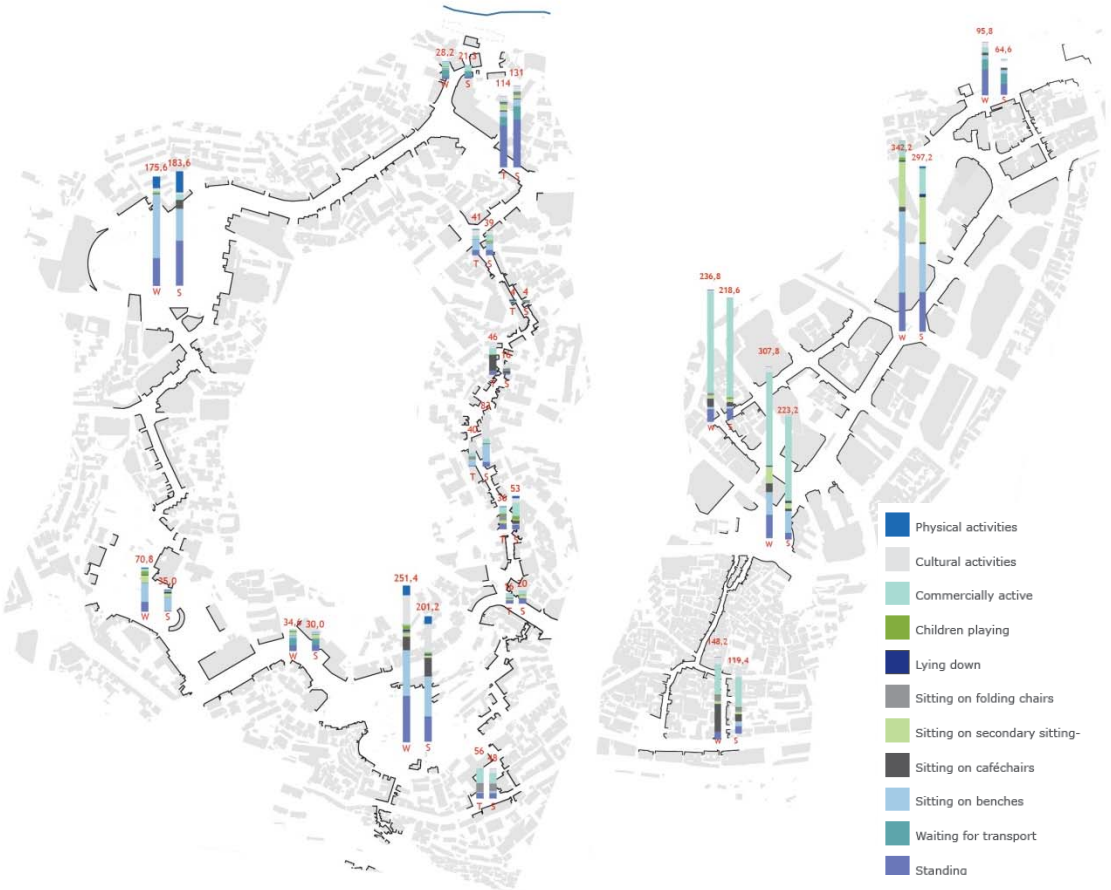

Fig. 5 Number of stationary people at daytime on 18 public nodes of Chongqing

In addition to the absolute number, Fig 5 also shows the composition of different activity types at each node. Some types unusual in the western world are observed, such as group dancing, taijiquan, majiang, street stalls, night markets, etc. This delivers the message that we should preserve and promote such local distinctive stationary activities in our designs, by accommodating them with sufficient and high-quality space.

3.3 Public Space Statistics Analysis (PS)

We evaluate key public space nodes along three Chongqing pedestrian routes by categorizing them into five spatial scales: super small (XS), small (S), middle (M), large (L) and super large (XL).. It could be seen that the rapid development of Chongqing in recent years is witnessed by massive construction of roads and high-rises, invading many local traditional small-scale urban spaces, as shown in Fig. 6.

Similarly, the quality of frontages along three routes is carefully judged from high (red) to low (black) according to the level of activity and openness. The percentage of passive and closed frontages of Route 1 (left) was as high as 71%. Generally speaking, small-scale urban space has more active and open frontages-- the only exception is part of Route 3, where old residential buildings on both sides of the small path were blocked by walls, forming narrow and closed pedestrian environment.

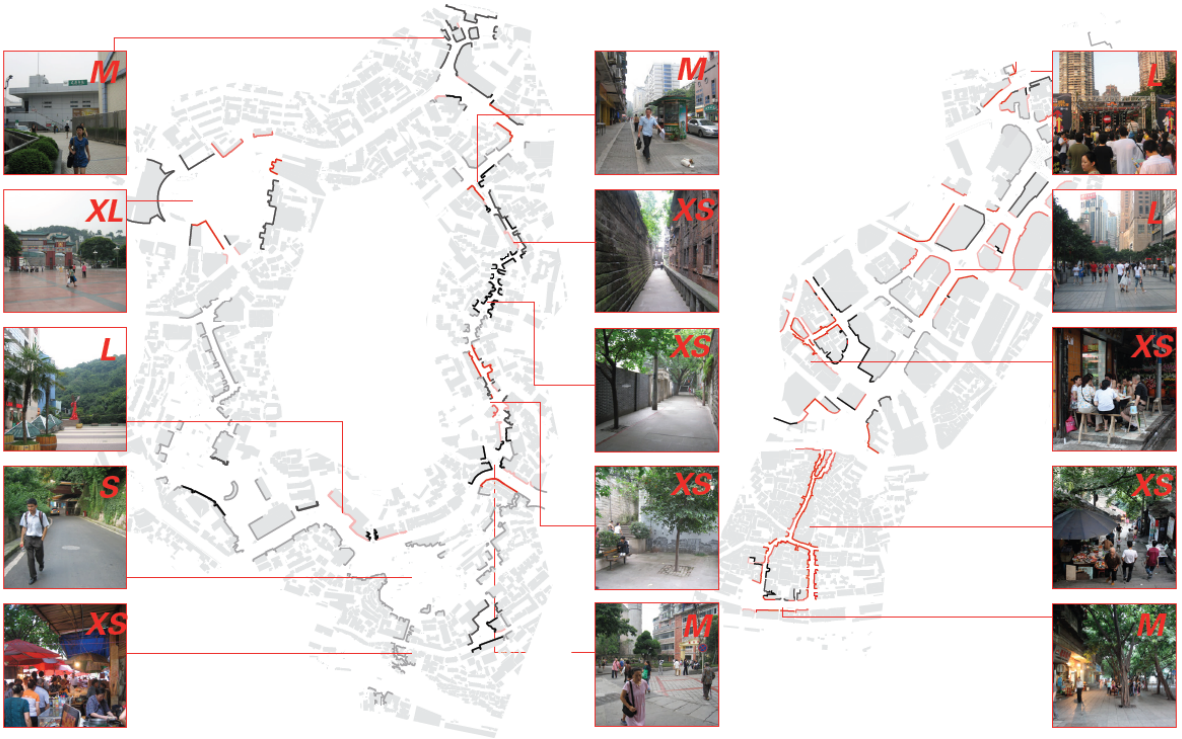

Fig. 6 The spatial scale and frontage quality on three routes of Chongqing

A task-force survey was also carried out to look at jaywalking problem among Chongqing citizens. The project team chose a typical crossing in the Jiefangbei area, where underpass was available. Within 10 minutes, 112 people went directly across the street “illegally” whereas only 11 people used the underpass, indicating a high jaywalking rate as 90%. Interestingly, this is not special case for China alone— in UK, 77% of jaywalking rate was found in 2004 on St. Giles Square, London following the same survey method [2]. Propaganda and education to persuade no jaywalking might be useful, but to build a truly walkable city, pedestrian bridges and underpasses should always be avoided, since they are barriers and unsafe to people especially the old, disabled and parents with baby strollers.

3.4 Design Strategy and Implementation

As described in the analyses, one of the main challenges in Chongqing is the very mountainous landscape. This creates difficulties for pedestrians when walking. The present proposed pedestrian routes are all placed north-south going connecting the two sides of the Chongqing Yuzhong peninsula. Although this is an admirable effort, the routes are in conflict with the natural landscape of the mountains forcing pedestrians to climb high rises of stairs. It is therefore proposed to supplement these by a network along the even lines of the landscape contours where walking is much smoother and more pleasant, as shown in Fig. 7.

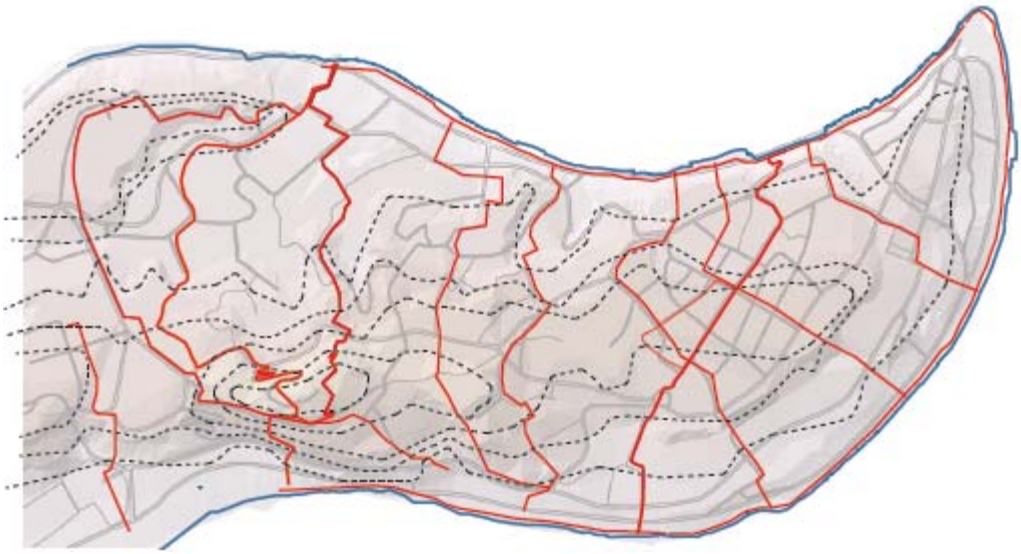

Fig. 7 Planned pedestrian routes for Chongqing

In addition, a series of design strategies were generated based on PLPS analysis for specific locations: 1) high quality streets and good connections, 2) reconnecting to the river, 3) create recognizable routes, 4) create unique sites, 5) improve crossings, 6) improve accessibility, 7) improve connections to public transportation, 8) provide small scale space for local communities. The allocation of these strategies is shown in Fig. 8. Implementation outcome can be partially illustrated by Fig. 9-11.

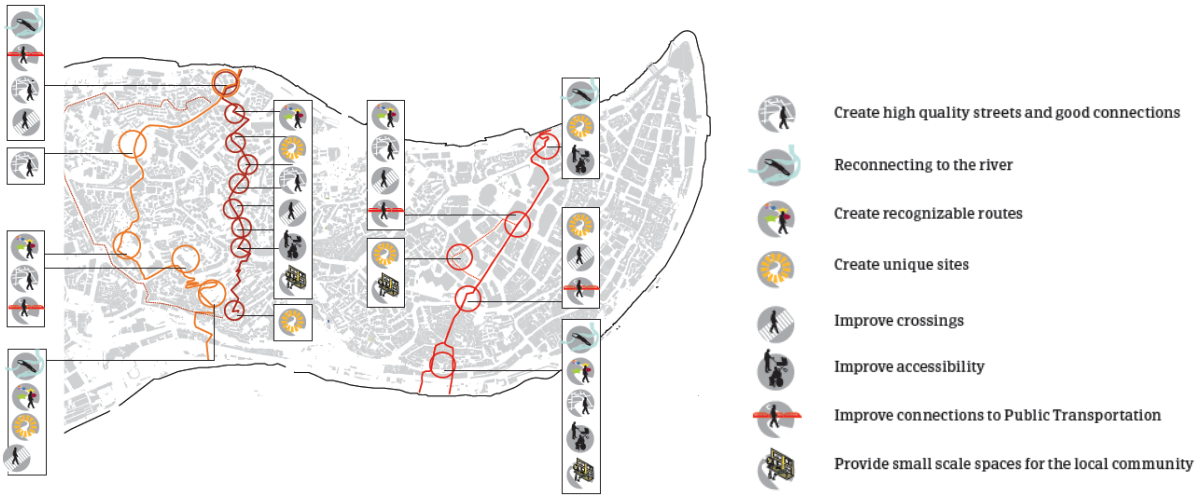

Fig. 8 Strategy map for three pedestrian routes of Chongqing

Fig. 9 Renhe street crossing improvement (before-after comparison)

Fig. 10 The installation of benches and handrails for elderly people

Fig. 11 The installation of fitness facilities and lamp poles

3.5 Plan a project post-evaluation

The benchmark established by PLPS survey in Chongqing makes it feasible to do the post-project evaluation work. In fact, it is the post-evaluation of a project that adds the biggest

value from PLPS. Through collecting longitude data and verifying the benefits (even periodically), long-term sustainable efforts of improving walking and biking could be incentivized in a city.

For example, the New York City initiated the "Green Light for Midtown" project in 2009 covering the range from Broadway Columbus Circle to 42nd Street and from 35th Street to 26th Street. Experiment was set temporarily and open to test two PLPS surveys separately in 2009 May (pre-project) and 2009 October (post-project). The conclusion shows the increase of pedestrian flows in peak hours (from 20219 to 22381 at Times Square), safety improvement implied by the increase of pedestrian signal compliance rate, and the enhance of public space supported by 84% more stationary people at Times Square and Herald Square [3]. Therefore, the city government of New York later on decided to transform temporary experiment into permanent retrofit, and further planned to expand efforts in more areas of the city in the future.

Copenhagen in Denmark is the original place of PLPS, and also the place where PLPS has been used mostly. The city has ever launched four PLPS surveys separately in 1968, 1986, 1995 and 2005, accessing precious historical vertically comparable statistics[4]. Nowadays, Copenhagen has recognized as one of the most livable cities in the world. While people are talking about the change of urban space and green transportation culture in Copenhagen, they may quite probably ignore the real story behind it, which is virtuous cycle formed by the longtime mutual echo, mutual complementation and mutual support between local practice and detailed report of PLPS surveys.

4 Conclusions and Reflections

What is the status quo of walking and biking in a city? How to improve urban public space to effectively encourage green transportation and enhance livability? How to verify such "effectiveness"? One could not answer above questions without the support of basic statistics. In this paper, we introduce the PLPS methodology to address such needs and describe a pilot experiment in Chongqing, China. The effort has proven to be very useful along the pedestrian project in different stages. In the pre-design stage, survey data analysis helped investigate status quo and problems in a quantitative and systematic way. During the design process, it facilitated the generation of pertinent ideas and strategies. After the implementation, with another round of PLPS survey, the post-evaluation could help verify project benefits, create political momentums and reflect design deficiencies. In addition, applying PLPS allows cross-comparison between cities, thus promoting information exchange and healthy competition.

We recognize that the application of PLPS methodology is still under exploration and subject to being localized under the China's context. Based on the Chongqing experiment, we suggest following improvement on PLPS:

- Complement with subjective evaluation and questionnaire survey on citizens, to understand people's stated preference and latent demand;
- Reinforce the integration with public transportation system, to illustrate the important role of walking and biking in accessing transit in China;
- Develop some indicator of congestion levels in public space, to respect the fact of high urban population density in China;

- Use the ratio of number of stationary people in public space to passing flows as a space quality indicator, to reflect the fact that Chinese people literally almost walk everywhere in cities;
- Add PSPL survey after bad weathers (such as heavy rains), to examine urban infrastructure's vulnerability in supporting walking and biking;
- Distinguish between motorcycles, electric bicycles and ordinary bicycles;
- Use density index for stationary activity statistics when comparing sites, to address the potential variance in the public space area with artificially-drawn boundaries.

To be fair, there are many uncertain factors affecting walking and biking, thus the survey and statistics could not be absolutely precise and scientific. However, PLPS Methodology at least provides a way to transform ideas and communicate decision makers with concrete evidence, and facilitate shaping a long-term proactive and incentive mechanism in improving the livability of cities. Therefore, it is encouraged to expand PLPS to more domestic cities in China. The initiative and commitment of conducting such survey and the process engaging itself is probably more important than the final result of analysis.

Reference

[1] Chongqing Public Space Public Life Study & Pedestrian Network Recommendations [R]. Gehl Architects. 2010

[2] Gehl Architects. Towards a Fine City for People: Public Spaces and Public Life- London [R]. July, 2004: 45

[3] The New York City Department of Transportation. Green Light for Midtown Evaluation Report [R]. January, 2010: 37

[4] Jan Gehl. Cities for People [M]. Ireland Press. 2010

JIANG Yang[1], Kristian S. Villadsen[2], Camilla van Deurs[2], WANG Yue[1], YU Jun[3], HU Hai[4]

1. China Sustainable Transportation Center, Beijing 100004, China
2. Gehl Architects, Copenhagen 1610, Denmark
3. Chongqing Planning & Design Institute, Chongqing 401147, China
4. Chongqing Urban Planning Bureau, Chongqing 400020, China