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A demand-oriented examination of local park services: Park types, sizes, features and actual use in the City of Los Angeles

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Abstract. A local-park-dominated and service-oriented urban park system would attract proximate use and benefit residents' life quality. Park planning literature has established guidelines to measure the level of local park services. However, without empirical research evidence, it is difficult to understand how actual supply is meeting demand. In order to inspect the effectiveness of current services and examine the rationale of the existing planning standards, this paper investigated the types, sizes, service composition in 277 local parks and surveyed the actual use of park features in 24 recreation centers in the City of Los Angeles. To understand the levels of diverse services and how they are responded by actual park use, four demand-oriented categories were employed to measure the composition and commonness of park features, their popularity in actual use and compare the services with use. The paper concluded that (1) a local park system dominated by parks of high quality, consisting of diverse types of parks with limited services as enrichment and satisfying dimensions of recreational demand with flexible features would provide better services on small parcels of land; (2) the existing planning standards for local parks cannot provide sophisticated guides so that more complete and flexible guidelines need to be studied, especially in terms of park facilities/amenities.

Introduction

Local Park Services and Quality Guidelines. Local parks are most accessible green spaces and recreation estates that initiate contacts with nature and pursuits of outdoor activity in urban environment. Well designed, managed and maintained local parks are essential for providing quality to urban life with proven track records in improving residents' health [1], as well as enhancing social ties and sense of community [2].

Changing social and economic circumstances have impelled parks to serve more diverse communities and face competition from highly commercial leisure facilities [3]. Recent economic downturn and reduced resources further bring the challenge for an urban park system to keep going with less money, while safeguarding the service and quality expected by local people [4][5]. Setting appropriate targets and measurable standards of park quality can govern basic services and achieve higher quality locally and nationally.

To manage the quality of park services, park planning literature has established level of service guidelines to measure park services in a geographic area for future park investment decisions [6]. In practice, some countries have set minimum acreage standards for local parks and suggested guides for facility development in them. For example, the National Recreation and Park Association (NRPA) in the United States promulgated 0.25 to 0.5 acres, 1.0 to 2.0 acres and 5.0 to 8.0 acres per 1,000

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population for mini-park, neighborhood park or playground and community park respectively; besides, it listed basketball, handball, tennis, field hockey, running track, golf and swimming pools as suggested facilities in neighborhood or community parks [7]. But more countries, either established local park system (e.g., the United Kingdom) or exploring the way to build up their own local park system (e.g., China), are still in the absence of a specific suite of indicators for local park services. In such countries, sharing of good practice, innovation and experience has a key role to play in establishing acceptable quality standards.

However, the widely accepted standards established by the NRPA have been attacked in the past for the lack of consideration given to the complex variety of market assessment procedures which guide park planning [6]. Actual supply of park services might deviate from the guidelines (e.g., the number of parks, types of facilities and park acreages vary across cities in the United States [5]). Efforts thus are needed to comprehensively examine the diverse services and assess good practice for advising better standards and improving existing local park systems.

Local Park Qualities Associated with High-quality Services. Types, sizes and facilities are important qualities of park quality in terms of planning [3]. A diverse range of types and sizes of public parks can meet the needs and aspirations of local communities [3]. Parks containing a variety of facilities and amenities may support a wider range of users [8]. Besides the physical qualities, park programs are also proved to be positive [9], or even critical [10], to park use.

A shared typology of local parks should be capable of providing a supportive base to collect and monitor more consistent information about park amount and quality [3]. Some countries have adopted types of local parks after the long term practice. In the United States, administrations often define types of local parks according to (1) their predominant recreational offering, such as recreation centers or playgrounds; (2) their sizes, such as mini-parks or pocket parks; (3) their special function, such as dog parks. In addition to these developed types, most cities provide natural-based parks with trails and undeveloped lands [5] as supplements to offer free uses. But countries like the United Kingdom, of which public parks have been combined in the enormous green spaces, or China, of which the local park system is under construction, still lack an agreed typology of local parks and experience of how to achieve high-quality services with types of local parks in different sizes.

For park facilities and programs, research is beginning to accumulate [11] and there remain gaps in the literature. First, few research has investigated facility use or examined facility characteristics beyond availability [12]. So did research on programmed activities in parks. In the shortage of comprehensive, comparable information of park resource and use, it is hard to describe diverse parks and know whether the supply is meeting demand, what characteristics of park resources are most valued, and what gaps need filling for the long term sustainability of local park systems [5]. Second, although understanding community needs of parks has important policy and cost-effectiveness implications [13], demand-oriented studies focus on purposes of improving park development, conservation and distributional justice [6][14][15], instead of enhancing the quality of park services.

Special Challenges for Megacities. The development of megacities, as a spreading phenomenon, describes a new quality of today's urban growth and illustrates the urban challenges of the future [16]. Along with the new levels of size, these urban centers are also confronted with new levels of complexities to dispense social infrastructures, deliver basic services and provide accessible open spaces. Such multifaceted problems are affecting the quality of life of their inhabitants [16] and even become more serious in their core area with less available land and higher land price.

In terms of local park services, taking the megacity of Los Angeles as an example, residents' less access to proximate parks than other major US cities [17] and the disparities in park funding and accessibility among diverse communities [18][19] are typical problems. Although currently the parkland acreage per 1,000 population in its core area, the City of Los Angeles, is 9.36 acres [20] and meets the NRPA level of park service standard (i.e., at a minimum, a total of 6.25 to 10.5 acres of developed open space per 1,000 population [7]), a few large regional parks (see Table 1) locating in the natural mountains contribute the quota primarily. This results in the existing inequities in park access in the region. A series of relatively small parklands scattered across areas with high park pressure might engender an affordable, land-saving and more spatially equitable solution [18]. But small parks of limited sizes can hold less facilities/amenities and might impact on park use. Therefore, further examination of the relationship between park features and park use is constructive for the improvement of the local park system, especially for megacities.

Research Objectives. Taking local parks in the City of Los Angeles as samples, this paper aims to (1) identify the existing composition of park facilities/amenities/programs in dimensions of recreational demand and by park types of different size level, so that (a) the diversity of urban park services and characteristics of park facilities/amenities/programs may be interpreted comparably and (b) the differences of park services between park types can be presented; (2) explore the actual park use via interviewing park managers and observing visitors' activities in sampled parks, so that the most valued characteristics of park resources would be discovered and how the supply is meeting demand could be examined; (3) examine mismatches between the actual serving and using against the NSFC guidelines to inspect the effectiveness of current park services, indicate ways of improving park quality and examine the rationale of the existing planning standards, so that park systems would be upgraded and life quality of urban residents would be benefit from these improvements.

The City of Los Angeles was taken as the case because it conveys diverse local parks of the established types and by the NSFC standards in the megacity. The assess of the city's practice in local park services would not only help improving its own park system but provide experiences that can be shared regionally and globally.

Methods

Local Park Qualities. The type, size and feature information of each local park in the City of Los Angeles was collected during the years of 2010 and 2011 to examine the existing composition of the parks' features. An in-advance scoping study of parks and local parks in the City had been operated because of the various park holdings and the lack of a complete park list.

The park data of the City were created by pooling together information from the following public data sources: (1) holdings for parks and recreation, open space and historical/cultural use in 2010 CPAD v1.5 data from California Protected Areas Database (CPAD); (2) 2008 US parks data from ESRI's Data and Maps; (3) parks in 2005 Green Visions Plan (GVP) from GVP geospatial datasets published by the USC (University of South California) Geoportal. All of these data came in geospatial data formats and were cross-referenced with park/property lists from Department of Recreation and Parks in Los Angeles City (DRPLA), Los Angeles County and the State. After verified by information gathered from site visits and on the web sites of Los Angeles Parks Foundation (LAPF), Santa Monica Mountains Conservancy (SMMC) and Google Earth maps, 344 urban parks were sorted out, excluding natural beaches and membership golf courses. All the parks possess green spaces and recreational facilities/amenities, as well as offers open access for public recreation and communication. Among these parks, 277 local ones (Fig.1) were identified according to the DRPLA's service area maps of community parks, neighbor parks and mini parks. Park types were assigned according to the names and descriptions of parks. Size level of each park type was estimated by the mean, median or mode of park areas, using the data in the departments' forms instead of the GIS sources because of potential mapping errors.

The facility, amenity and program information of each local park was collected from the website of the manager (e.g., DRPLA and LAPF) or googled for a few of those without any managing information. For several parks with vacant information on their web pages, facilities/amenities were visually interpreted from Google Earth images and programs were regarded as absent. Although site visits did show that information online might not be updated in time, the changes were ignored because they are beyond the scope of this study.

Actual Park Use. In addition to the complete official data describing the park facilities and services, surveys on the actual park use were conducted in 24 sampled recreation centers (RCs) from March to May in 2011.

After a trial analysis of local parks' facility/ amenity/program composition, it was presented that most service features concentrate in recreation centers in the City of Los Angeles. Therefore, 24 RCs around the city were randomly selected from different communities to operate surveys (Fig.2). More RCs came from denser regions with smaller communities and more recreation centers. A telephone appointment was made with staffs in each RC to decide a visit for interviewing users for the typical daily use.

The study protocol was reviewed and approved by the Human Subjects Protection Committee of the Institutional Review Board in California State Polytechnic University, Pomona. In-depth interviews with park managers and observing park users were conducted to get popular park features. A park manager's experience from his own frame of overall reference may advantage the accurate identification of popular features via person-to-person discussion. But problems may also exist in generalizability because of nonrandom sampling and the interviewer's bias [21]. To rectify the biases, observation permits researchers to study people in their native environment [22] and users' activities may objectively reflect their preferences to special park features.

In the in-depth interview for each surveyed RC, the director or managing staff was asked to check the facility/amenity/program information collected from the web and select the most popular facilities/amenities/programs according to the individual's supervising understanding. To make it credible, the interviewee was also asked to give the approximate number of everyday users for the whole park and for each identified facility/amenity/program. For any doubtful item, a further discussion would be operated to make convincing judgment.

In each surveyed RC, a cross-sectional observation was operated to record user distribution. First, the observer went through the RC, grouped users by undergoing activities, counted the amount of each group and double-checked the sum with the approximate daily amount given by the manager. Second, certain proportions of users from each group were selected at random and their detailed observed information, including exact activities and sites, were recorded. Because it is difficult for the cross-sectional observation that was operated at the same point of time to get complete data of programs scattered in a week schedule, only use of facilities and amenities can be deduced from the site records. Considering the impact of events on the nature of user distribution, data recorded on days with events were abandoned in the analysis.

Usually the observer has to spend considerable time to gain a more comprehensive understanding of the people being studied [22]. But a careful selection of user samples with substantial sampling proportion (20-100% in this study) after pre-estimation of activity groups would improve the validity of limited, cross-sectional records in each surveyed RC and help to present a panorama of the actual park use. The observation results were compared with the manager's empirical visitor scale number. Whenever they deviated from each other remarkably, a second visit would be operated.

Four Dimensions of Park Feature Categories. A recreational-demand-based, four-dimensional sorting method was deduced after a literature review and then employed to analyze the composition of park facilities, amenities and programs. The surveyed data of popular features were also categorized in the same dimensions so that potential mismatches can be easily detected by a comparison between the supply and use results.

To deal with a variety of facility/amenity/program data, a deductive approach is used to simplify them into categories and then compare categories to discover potential relation patterns [23]. Some researchers divided and subdivided physical park features according to their functions on physical activity (PA), for particular research purpose [8]. In order to examine the supply structure and effectiveness of park services, however, the facilities/amenities/programs should be divided according to a variety of use demand. Cranz's original summary of the demand for park service when community parks came into being [24] were referenced here and four demand-oriented categories of facilities/amenities for sport and exercise (C1), hobby and play (C2), care and education (C3), as well as communication and event (C4) were developed for the purpose of this research. Since programs and physical features are related to some extent [24], the same categories were employed for program analysis. Considering the local park and recreation systems seldom deviated from the original pattern set up for them in the United States [24], these categories deduced from the original recreational demand that initiated the development of local parks during the 1930s and 1940s can still validly present the existing composition of recreational supply in local parks.

Composition of Park Features. The characteristics of feature composition in local parks were brought out by statistical analyses on account of similar local parks with similar features that were created by the standardized design in the United States. The composition study included a proportional analysis of the features in categories (i.e., the category analysis) and a distinguishing

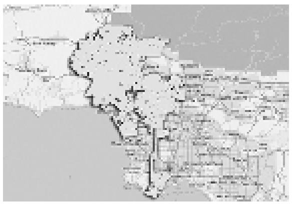


Fig.1 Local Parks in the City of Los Angeles

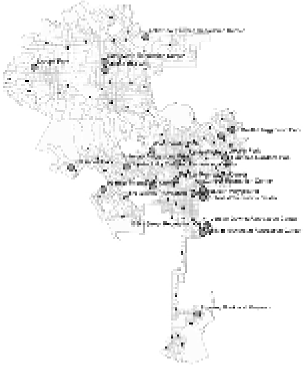
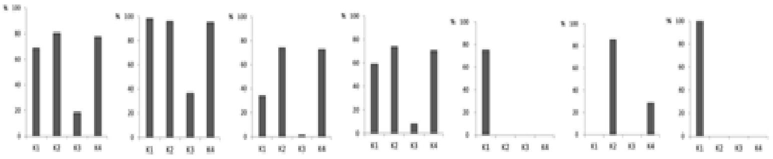
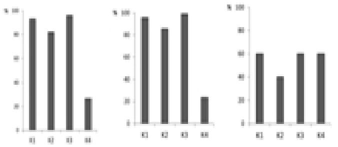


Fig.2 Surveyed RCs in the City of Los Angeles



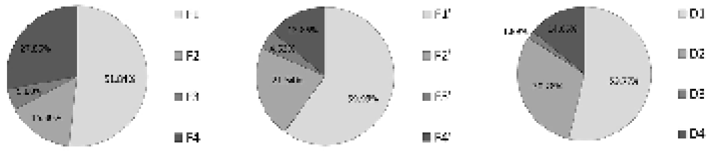


(a) For277Local (b) For Recreation (c) For Pocket (d) For Parks (e) For Open (f) For Dog (g) For Play- (a) For 277 Local (b) For Recreation (c) For Parks

Parks Centers Parks (Type) Spaces Parks grounds Parks Centers (Type)

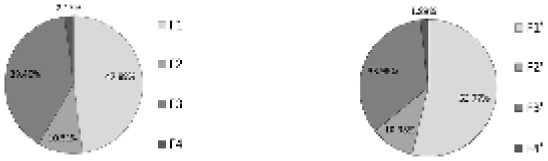
Fig.3 Category Composition of Park Facilities/Amenities in the City of Los Angeles **Fig.4** Category Composition of Park Programs

in the City of Los Angeles



(a) Supply Categories in 123 Recreation Centers (b) Popular Categories in the Surveyed RCs (c) Observed Category Use in the Surveyed RCs

Fig.5 Category Composition of Facility/Amenity Supply and Use in Recreation Centers



(a) Supply Categories in 123 Recreation Centers (b) Popular Categories in the Surveyed RCs

Fig.6 Category Composition of Program Supply and Use in Recreation Centers

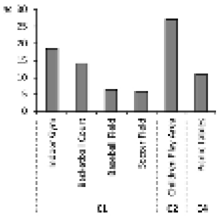


Fig.7 Facilities/Amenities with Higher Using Indices in the Surveyed RCs

Table 1. Local Park Composition in the City of Los Angeles

	Recreation center	Pocket/ mini park	Park (Type)	Open space	Dog park	Play-ground	Total
Amount	123	73	61	12	7	1	277
Percentage (%)	44.4	26.4	22.0	4.3	2.5	0.4	100
Park Acre per 1,000 Residents	0.39	0.11	0.33	0.11	0.02	0.00	0.96
Mean of Park Area (Acre)	12.14	5.93	20.28	33.66	8.37	8.00	13.12
Median of Park Area (Acre)	8.58	1.42	5.70	29.30	2.24	8.00	6.00
Mode of Park Area (Acre)	3.27	0.13	0.09				0.09
Average Deviation (Acre)	8.54	6.71	22.67	19.26	8.92		12.47

Table 2. Common Facilities/Amenities in Categories for All and Types of Local Parks in the City of Los Angeles

Commonness		All Parks	Recreation Centers	Pocket/mini Parks	Parks (Type)	Open Spaces	Dog Parks	Playgrounds
R1	≥60%	Basketball court	Basketball court Baseball field Indoor gym	Basketball court	—	Trails	—	Baseball field
	30-60%	Baseball field Indoor gym Tennis court	Tennis court Soccer field	—	Basketball court Baseball field Trails	—	—	—
	10-30%	Soccer field Football field Volleyball court MSF① Trails Jogging path	Football field MSF① Volleyball court Handball court Jogging path Swimming pool	Trails Baseball field	Tennis court Soccer field Volleyball court Jogging path	—	—	—
R2	≥60%	CPA②	CPA②	CPA②	CPA②	—	Dog area	—
	30-60%	—	—	—	—	—	—	—
	10-30%	—	—	—	—	—	CPA②	—
R3	≥60%	—	—	Historical site	Historical site	—	—	—
	30-60%	Classroom TV area	Classroom TV area	—	—	—	—	—
	10-30%	Day care center Historical site Teen center	Day care center Teen center	—	Day care center Nature center Museum Library TV area	—	—	—
R4	≥60%	Picnic tables	Picnic tables S/A③	Picnic tables	Picnic tables	—	—	—
	30-60%	S/A③ Barbecue pits CR/MR④	CR/MR④ Barbecue pits	—	—	—	Picnic tables Benches	—
	10-30%	Benches	—	Benches Barbecue pits	Barbecue pits Benches	—	—	—

Note: ①Multipurpose sports field; ②Children play area; ③Stage/amphitheater; ④Community/meeting/multi-purpose/club room.

Table 3. Common Programs in Categories for All Local Parks, Recreation Centers and Parks (Type) in the City of Los Angeles

Commonness		All Parks	Recreation Centers	Parks (Type)
R1	≥60%	Basketball Baseball	Basketball Baseball	—
	30-60%	Football Soccer Softball SC/SL/SP① GPLA② Aerobics	Football Soccer Softball SC/SL/SP① GPLA② Aerobics	Basketball Baseball Soccer Tennis
	10-30%	Tennis Gymnastics T-ball Volleyball Golf Exercise	Tennis Gymnastics T-ball Volleyball Golf Exercise	Volleyball Football Golf Hockey SC/SL/SP① GPLA② Aerobics Yoga Exercise Walking class
R2	≥60%	Arts & crafts Dance	Arts & crafts Dance	—
	30-60%	Martial arts Music	Martial arts Music	Trips Drama/perform
	10-30%	Drama/perform Family play Trips	Family play Drama/perform	Arts & crafts Martial arts Dance Bingo Knitting/sewing Shuffle board Bowling
R3	≥60%	PS/AS③ L.A. kids	PS/AS③ L.A. kids	—
	30-60%	Camps TP/TC④	Camps TP/TC④	PS/AS③ L.A. kids Camps
	10-30%	Child care YP/YE⑤ SE/SC⑥ Cooking Tutoring LP/SP⑦	Child care YP/YE⑤ SE/SC⑥ Cooking Tutoring LP/SP⑦ Computer	Safe house Science SE/SC⑥ Tutoring TP/TC④ Class park Historical program Social club/class
R4	≥60%	Yearly events	Yearly events	Yearly events
	30-60%	—	—	—
	10-30%	—	—	CM⑧ Cooling center

Note: ①Sports clinics/league/program/camp; ②Girls play L.A.; ③Pre-school/after school; ④Teen programs/club; ⑤Youth plus/enrichment; ⑥Senior enrichment programs/club; ⑦Lunch/snack program; ⑧Community meeting.

Table 4. Common Features in Categories for 123 Recreation Centers and Common Popular Features in Categories for the Surveyed RCs in the City of Los Angeles

Commonness		Facilities/Amenities		Programs	
		All Recreation Centers*	Surveyed RCs	All Recreation Centers**	Surveyed RCs
R1/ R1’	≥60%	Basketball court Baseball field Indoor gym	Indoor gym*** Basketball court	Basketball Baseball	Basketball
	30-60%	Tennis court Soccer field	Baseball field Tennis court	Football Soccer Softball SC/SL/SP① Girls play L.A. Aerobics	Baseball
	10-30%	Football field Multipurpose sports field Volleyball court Handball court Jogging path Swimming pool	Soccer field	Tennis Gymnastics T-ball Volleyball Golf Exercise	Soccer Tennis SC/SL/SP① Boxing Football T-ball Weight lifting/training Aerobics
R2/ R2’	≥60%	Children play area	Children play area	Arts & crafts Dance	—
	30-60%	—	—	Martial arts Music	—
	10-30%	—	Skate park	Family play Drama/perform	Arts & crafts Dance Martial arts
R3/ R3’	≥60%	—	—	Pre-school/after school L.A. kids	—
	30-60%	Classroom TV area	—	Camps Teen programs/club	L.A. kids Pre-school/after school Camps
	10-30%	Day care center Teen center	Classroom	Child care Youth plus/enrichment SE/SC② Cooking Tutoring Lunch/snack program Computer	Teen programs/club Youth plus/enrichment Child care Cooking
R4/ R4’	≥60%	Picnic tables Stage/amphitheater	—	Yearly events	—
	30-60%	CR/MR③ Barbecue pits	Picnic tables	—	—
	10-30%	—	CR/MR③	—	Yearly events

Note: * Same as the fourth column of Table 2; ** Same as the fourth column of Table 3; ***Calculate the frequency of indoor basketball court as well; ① Sports clinics/league/program/camp; ②Senior enrichment programs / club; ③Community/meeting /multi-purpose/club room.

analysis of the common features (i.e., the commonness analysis). The category analysis presented the supply of park features in category proportion. The commonness analysis identified relatively common features provided by the existing local parks. In order to examine potential differences between local park types, both category and commonness analyses were operated not only to the data of 277 local parks but also to group data of certain park type.

In the category analysis, the facilities, amenities and programs of local parks were divided into the four demand-oriented categories and the category composition was calculated from the proportion of each category as follows:

$$Ki=N_i / T\times100\%. \tag{1}$$

where i indicates the demand-oriented feature category number (i=1~4), K_i is the proportion of parks with features in category Ci, N_i is the number of studied parks with features in category Ci, and T is the total of studied parks (either all of the 277 local parks or parks from the same type group). The calculation used park numbers instead of facility/amenity/program numbers. Because for all of the 277 local parks, feature amounts in parks of different types and in different sizes would be significantly disparate and large parks with considerable feature numbers would affect the final results magnificently. The calculations in park type groups followed the same method, so that differences between features in certain type of parks and in all park can be observed easily in Fig.3 and Fig.4.

In the commonness analysis, proportion of parks with certain facility/amenity/program was calculated at first to measure the feature’s commonness as follows:

$$Ri=M / N_i\times100\%. \tag{2}$$

where Ri is the commonness of certain facility/amenity/program (e.g. basketball court) in feature category Ci (e.g. in C1), M is the number of parks providing certain feature, and N_i is the number of parks with features in category Ci. Thereafter, three ranges of commonness, ≥60%, 30-60% and 10-30%, were used to rank the common features in Tables 2 and 3.

Actual Use in the Surveyed Recreation Centers. In order to facilitate the comparison between the existing park feature supply and the actual use, the identified popular facilities/amenities/ programs in the surveyed RCs were also divided into the four demand-oriented categories and analyzed the category composition and commonness. The observed distribution of users in each surveyed RC made a double check to the analysis of popular features.

The category composition of popular facilities/amenities/programs was calculated as follows:

$$Fi'=F_i' / F'\times100\%. \tag{3}$$

where Fi’ is the proportion of popular features in category Ci, F_i' is the total frequency of identified popular features in category Ci, and F’ is the total of identified popular features. For the definite type of recreation center, park sizes are similar and feature amount disparity is not a remarkable affecting factor any more. So the calculation used facility/amenity/program numbers to bring out the characteristics of feature supply in each RC. Accordingly, the category composition of 123 recreation centers in the city was recalculated from facility/amenity/program numbers as follows to achieve comparable parity in Fig.5 and Fig.6:

$$Fi=F_i / F\times100\%. \tag{4}$$

where Fi is the proportion of features in category Ci measured by feature numbers in recreation centers, F_i is the non-repeated providing frequency of features in category Ci (e.g., if there are three basketball courts in one recreation center, its frequency is 1), and F is the total of non-repeated features.

The commonness of identified popular facilities/amenities/programs was calculated as follows:

$$Ri'=M' / T'\times100\%. \tag{5}$$

where Ri'is the commonness of certain popular feature in category Ci, M'is the number of RCs providing certain popular feature, and T'is the number of RCs with valid identified features. The three ranges of ≥60%, 30-60% and 10-30% were also used to group the common popular features in Table 4.

The study of observed user distribution employed a scale index of users at certain facility/amenity to indicate the feature's popularity and eliminate the disparity influence of absolute user magnitude in different RCs. The index calculation followed the three steps: (1) recorded users at certain facility/amenity were divided by the sampling proportion to restore the user number in situ; (2) the restored user numbers at all observed facilities/amenities were summed up and then the sum was checked with the observed amount and corrected if necessary to get the total of users in the RC; (3) the restored user number at certain facility/amenity divided into the total of users. The total of indices for certain facility/amenity in the RCs interprets the actual use of the feature. Those with higher values are facilities/amenities used more popularly in Fig.7. The category composition of observed popularly used features in Fig.5(c) was calculated from the indices as follows:

$$Di=\sum D_{ij}\times 100\%. \quad (6)$$

where Di is the category composition of popularly used features in category Ci, j indicates the number of sampled RCs (i=1~24), and D_{ij} is the scale index of certain facility/amenity in category Ci and in RC $_j$.

Results

Local Park Types and Sizes. Types of local parks in the City of Los Angeles include recreation center, pocket/mini park, park (type), open space, dog park and playground (Table 1).

Means can interpret characteristics of data with normal distributions while medians and modes may interpret those with skewed distributions. In Table 1, the area data sets of recreation center, pocket/mini park, park (type), dog park and playground are abnormally distributed with high average deviations. Only the data set of open space fits a normal distribution with the significance value of 0.354 from a Shapiro-Wilk normality test. Therefore, from large to small, size levels of open space, recreation center, park (type), dog park and pocket/mini park are about 35, 9, 6, 2 and 0.5 acres respectively. Although there is only one playground in the City of Los Angeles, it might interpret the size level of the type as about 8 acres because its size is essentially determined by sports fields.

Category Composition and Commonness of Park Features in 277 Local Parks. Fig.3(a) and Fig.4(a) show category ratios of park facilities/amenities and programs for 277 local parks in the City of Los Angeles. The composition differences between categories are obvious: while a majority of parks are serving C2, C4 and C1 demand via facilities/amenities, most parks are serving C3, C1 and C2 demand via programs.

The third column in Table 2 lists common facilities/amenities of 277 local parks in the City of Los Angeles. That in Table 3 gives common programs. Basketball court, children play area and picnic tables are the most general facilities/amenities. Basketball, baseball, arts & crafts, dance, pre-school/after school, L.A. kids and yearly events are the most typical programs.

Category Composition and Commonness of Park Features for Types of Parks. Fig.3(b) to Fig.3(g) show category ratios of park facilities/amenities for six types of local parks in the City of Los Angeles. The fourth to ninth columns in Table 2 list their common facilities/amenities. The disparities among different park types are obvious: while recreation centers, pocket/mini parks and parks (type) provide facilities/amenities of all four categories, open spaces, dog parks and playgrounds only offer those of one or two categories; while pocket/mini parks and parks (type) have the similar category composition to that of 277 parks in Fig.3(a), recreation centers, open spaces and playgrounds stress facilities serving C1 demand; while recreation centers possess the most substantial and various facilities/amenities, open spaces and playgrounds only have one category for sport and exercise use; parks (type) also possess various facilities/amenities, but the commonness is lower than that of recreation centers; while dog parks mainly serve dog-walking needs, some of them combine amenities for children play and dog walker rest.

Only recreation centers and some parks (type) are staffed and provide regular programs in the City of Los Angeles. Fig.4(b) and Fig.4(c) show program category composition ratios of the two types of local parks. The fourth and fifth columns in Table 3 list the common programs in them. Both of the two park types provide programs of all four categories. While recreation centers have the similar category composition of programs to that of 277 parks in Fig.4(a), parks (type) possess more balanced program categories and provide more programs of C4 category than of C2 category. The commonness of park (type) programs is also lower than that of recreation centers. But the programs present more diversity in all of the four categories.

Fig.5(a) and Fig.6(a) are the category composition ratios of features in all 123 recreation centers that were recalculated from facility/amenity/program numbers for the comparison with the results of popular feature composition in the surveyed RCs. The dominance of both facilities/amenities and programs that serve C1 demand is obvious.

Popular Facilities/Amenities/Programs and Their Composition in the Surveyed RCs. The in-depth interview study adopted 65 popular facilities/amenities identified by the directors and managing staffs of 15 RCs among 24 surveyed RCs. 114 popular programs identified for 20 RCs were analyzed as well. Fig.5(b) and Fig.6(b) show category ratios of these features: C1 is the most popular category of both facility/amenity and program in the surveyed RCs. Subsequently, facilities/amenities serving C2 demand, along with programs serving C3 demand, also have a large number of users.

The fourth and sixth columns in Table 4 list the identified facilities/amenities and programs among the most frequently-used range. Indoor gym, basketball court and children play area are ranked as the top popular facilities/amenities. Basketball is the most popular program distinguished from others.

Observed Use of Facilities/Amenities in the Surveyed RCs. The observation study adopted 253 valid user records in 18 surveyed RCs. Fig.5(c) shows category ratios of popularly used facilities/amenities. Facilities serving C1 demand attracted most users in the surveyed RCs, followed by amenities serving C2 demand. Children play area in C2 group ranks the top in the list of facilities/amenities with evident users (Fig.7). Other popularly used features include indoor gym, basketball court, baseball field and soccer field in C1 group and picnic tables in C4 group.

Discussion

Characteristics of Local Park Services. Although the NRPA standards only suggested park facilities in the category of C1, the existing feature services in local parks include both facilities/amenities and programs in all of the four demand-oriented categories. The different category composition and commonness of park features not only present the characteristics of existing park services but also prompt the need for more standard guidelines.

Fig.3(a) and Fig.4(a) indicate different concerns for certain recreational demand when building physical environment and programming park-based activities in local parks. While some concerns may have cultural roots (e.g., the neglect of programs serving C4 demand may contribute to the Americans' privacy culture. Because privacy is an important design consideration [25], amenities for communication in most parks encourage individual uses on initiative rather than programmed public activities.), the shortage of facilities serving C3 demand may result from the lack of relevant planning standards [26]. Actually, this kind of facilities should be of high effectiveness because a few of them can contain abundant relevant programs with carefully designed schedules (Fig.3(a) and Fig.4(a)) and attract regular use (Fig.5 and Fig.6). In order to provide better services, more suggested features in different categories that can satisfy more kinds of demand should be added into the existing guidelines.

Different type of local parks has different characteristics of park features (Fig.3, Fig.4 and Tables 2-3) and different size level accordingly (Table 1). The size level of certain park type should be determined mainly by the facilities and amenities in parks. Most parks of different type provide facilities or amenities but only recreation centers and some parks (type) serve park-based programs.

Recreation centers thus play an important role in the local park system on account of their relatively comprehensive services with quantities of features in various categories. Parks of other types with fewer features are supplements to enrich the system.

Although all of the suggested sports facilities in the NRPA standards appeared in the common feature list of the city's local parks, most of them possess lower commonness (Table 2). It might be difficult for local parks of small sizes to provide facilities that occupy considerable land. Thus the land-saving consideration should be important when suggesting facilities for local parks.

Supply and Actual Use of Park Features. According to the category composition of program supply and use in the surveyed RCs (Fig.6), a primarily balance is obvious. This may be owed to the frequent adjustments according to the actual use and can indicate the efficiency of program services to satisfy local recreational demand. However, use of facilities/amenities did not match the supply well in categories (Fig.5). In contrast to the relatively flexible park-based programs, facilities and amenities in local parks are fixed in the long term and cannot be adjusted quickly in response to the changing demand of local residents. Therefore, efficient services of these physical features need more reasonable instructions from planning guidelines than flexible programs.

Popular facilities/amenities identified and observed in actual use are less than the common ones provided in the RCs (Table 4 and Fig.7), even less than those suggested by NRPA standards. This might imply the similar preference for several certain facilities/amenities among different communities. But Table 4 also exhibits that most identified popular features are at lower commonness level than their counterparts in the supply list. This should indicate an actual diversity of recreational preferences. Considering the increasing diversity of cultural values due to demographic change over the past few decades is causing different perceptions of service quality and different recreational behaviors in parks among groups of different racial and ethnic composition in the United States [27], especially in the main immigrating destinations like the City of Los Angeles, a diversity of recreational preferences should be much more persuasive. In order to satisfy the diverse preferences, the list of suggested facilities/amenities should not be compulsive and a demand assessment procedure should be introduced into guidelines.

The relatively concentrated use of facilities/amenities serving C1 demand (Fig.5 (b) and Fig.5(c)) may not indicate the inadequate service supply but lead to the land-occupying development. The continuous, increasing promotion of physical activity by recreation and park management as well as relative research [28] result in not only this using preference but also a continuous focus on developing relevant park services. The observed scale index of users distributing at facilities for sport and exercise is 53.77%, falling into the ratio of 40-70% which is a normal range of park users participating in physical activities that has been reported in several published studies [29][30][31][32]. However, the most common sports facilities in recreation centers are kinds of standard fields for special sports and occupy considerable land. By contrast, multi-purpose sports field is a land-saving option.

This multi-use solution may also apply to the supply of amenities for communication and event. Although the popular proportion and use index of this kind of amenities are much lower that the supply proportion (Fig.5), in several surveys when events were holding, there were crowds of hundreds or thousands of users at one or a few amenities. The significant changes of user amount between daily use and event would force designers to consider a flexible supply of amenities. More sharing spaces from other kinds of facilities/amenities would be encouraged. Thus the traditional design ideal of the multi-use facility [24] might be re-emphasized, not for the faint underlying social goals but to improve service efficiency and save more land for green spaces at the same time.

Reflections on Guidelines and Further Research. Minimum acreage standards are primary guidelines for local parks. However, the poor acreage of the city's local parks (Table 1) is far below the NRPA standards. This might indicate that the execution of such standards is occasionally difficult, especially in the core area of megacities with higher land prices and less parkland. Therefore, the standards should be more flexible and better to be graded according to the size and density of cities. Further comparative studies on park service effectiveness between cities of different size and density can provide more empirical research evidence.

A shared typology of local parks should be one of the main concerns of guidelines. Although recreation centers dominate the local park system in the City of Los Angeles and determine the characteristics of its services remarkably, their standardized services might restrict more diverse uses. Considering the inadequate and disparate funding for local parks in the region [33], other parks than recreation centers should be more economical options to diversify the local park system. However, how the services is meeting demand in these parks will need more surveys on actual use.

The small sizes of local parks cannot afford substantial facilities so that improvements in services reckon on the effectiveness of limited features. Most of the suggested sports facilities in the NRPA standards are ineffective because of the low commonness and exclusion from the popular list (Table 4). A better suggested list should be further examined by more quantitative studies on the current sport-and-exercise-oriented park services and other recreational demand than physical exercises.

Besides, improvements in local park services need more sophisticated, complete and flexible guidelines on feature supply. In order to establish such guidelines, more evaluations on serving and using should be conducted to discover diverse preferences, especially in terms of facilities/amenities and in communities possessing different demographic compositions.

Conclusions

A local park system dominated by parks of high quality, consisting of diverse types of parks with limited services as enrichment and satisfying dimensions of recreational demand with flexible features would provide better services on small parcels of land. The existing NRPA standards cannot provide sophisticated guides. More complete and flexible guidelines need to be studied, especially in terms of park facilities/amenities.

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