Models for a Better Management of Linear Parks

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Abstract

This project provides a strategy to improve the quality of linear parks. It is based on recognizing the type of linear park in question through the activities carried out by users and the structural and functional characteristics of the green area. With this information we can establish or check the existence of essential elements to guarantee benefits to users. Three conceptual models were defined from four linear parks in the metropolis of Buenos Aires and the city of Formosa according to the supply and demand of the services they offer. For which it was necessary to consider the infrastructures and vegetation they present, uses and benefits of the linear parks and the activities that are carried out.

Keywords: Linear park, active and passive recreation, benefits

Resumen

Este proyecto proporciona una estrategia para mejorar la calidad de parques lineales. La misma se basa en reconocer el tipo de parque lineal del que se trate por medio de las actividades que realicen los usuarios y las características estructurales y funcionales del área verde. Con esta información se puede, establecer o chequear las existencias de los elementos indispensables para garantizar beneficios a los usuarios. Para ello, se definieron tres modelos conceptuales a partir de cuatro parques lineales en la metrópolis Buenos Aires y la ciudad de Formosa según oferta y demanda de los servicios que ofrecen. Para lo cual fue preciso considerar las infraestructuras y vegetación que presentan, usos y beneficios de los mismos y las actividades que se realizan.

Palabras claves: Parque lineal, recreación pasiva y activa, beneficios

Introduction

Linear parks (LPs) include greenways, waterfronts, and transportation infrastructure, frequently in re-used sites linking major urban nodes. Unlike other types of green areas, people use LPs for moderate and vigorous physical activities. Also, because of their linearity, they can be used by more people (Maddox, 2016) and contribute a climatic and aesthetic improvement and are habitats of biodiversity. In the last decade, linear parks received a great deal of attention among city planners as an opportunity to revitalize interstitial edge-spaces in the post-industrial era. In many cities, they are being planned as drivers for the regeneration of deprived areas and for residents to be more physically active.

People relate to linear parks not as a uniform space, but rather as a hierarchy of different supplies which provide a range of benefits that enable active and passive recreational experiences. Each linear can be having more or fewer cultural, ecological, developmental, agricultural, and recreational values. Each linear park type has its own appeal, and each park is filled with an array of elements to shape its character, creating individual feelings along with the experiences people have when they use the park.

A good design will depend on understanding a series of considerations and finding creative solutions to potential conflicts that require inspiration, innovation and experimentation (Cabe 2005, p.58). One of the first questions designers should ask themselves about their projects is for whom and for what are these linear parks being designed? In addition, they should explore what is the target that community most values about linear parks?

Hypothesis

The balance between gray infrastructures (built environment), green (vegetated areas) and blue (water bodies) and their synergies, together with the environmental function, social use, city regulations and institutionalism will be decisive for guarantee a city sustainable.

Materials and methods

It was necessary to define descriptive models of linear parks. By it there was evaluated the use, occupation, development of activities and perceptions in four linear parks, to diagnose the current condition. We determined qualitative and quantitative variables that analyze infrastructure, accessibility, urban complexity, ecological quality, connectivity, uses and opinions of the users.

A.   Infrastructure: banks, tables, light, dust-bins, public baths, machines of exercises, games, fields, etc.

B.   Accessibility: easy access to the public, parking lots, bicycle path, pedestrian paths, signage from information posters, activities, access, routes; etc.

In both cases (A and B) their quality was taken into account by means of an average index defined as:

Table 1. Quality of infrastructure and accessibility			
Ausense	Poor quality (broken, with vandalism)	Regular quality (low quantity, poor condition)	Good quality (Good supply)
0	1	2	3

C.   Ecological quality: the vegetation present in the linear parks was counted, considering its structural diversity. We inventoried climbing plant, palms, shrubs, and trees larger and smaller up to 5 m, as well as soil cover. In this last case, the following building materials (concrete / asphalt, pavers, concrete slabs, building stone, river gravel, lawn and bare soil) were identified as indicators of permeability. The soil was subsequently classified as permeable and non-permeable.

D.   Urban complexity: we detailed neighboring land-use, considering residential uses (buildings categorized in more or less than 3 floors), commerce, industry, empty lots and services (health center, cultural, schools, etc.). This index was considered, bearing in mind that more diverse environments, with more urban life, are more attractive (Gehl, p.16).

For the variables C and D, Shannon diversity index (H') $H' = -\sum_{i=1}^{S} p_i \log_2 p_i$ was calculated, which measures diversity and gives idea of the complexity and equitability of elements as values become bigger.

E.   Connectivity: we counted the availability of public transport, inside 200 m surrounding parks. For its evaluation we made an index with the sum of lines of trains, underground, number of stops of buses and bicycle path.

F.   Activities: we counted the visitors of the parks doing active recreation activities (walking, running, cycling, roller-skating, skateboarding, playing ball, and parents with children) and passive recreation activities (social interaction, walking the dog, eating/drinking, sitting, lying, sunbathing, and reading). The surveys were carried out on a weekday and weekend in two moments: in the morning (11 hs) and in the afternoon (17 hs).

G.   Perception: we surveyed the users to explore the different uses and benefits that they perceive and look for in the linear parks. We also asked about proposals for improvements.

Study area

In order to propound the models we selected the following linear parks: Bullrich (BLP), Tigre (TLP), Bella Vista (BVLP) in the metropolitan area of Buenos Aires and Formosa Capital (FLP). These one are representative of those LPs with metropolitan and neighborhood reach that differ in their location in areas with different population density and urban structure (Table 2, Fig. 1 and 2).

Fig. 1 Location of linear parks.

Bullrich (BLP)	
Tigre (TLP)	
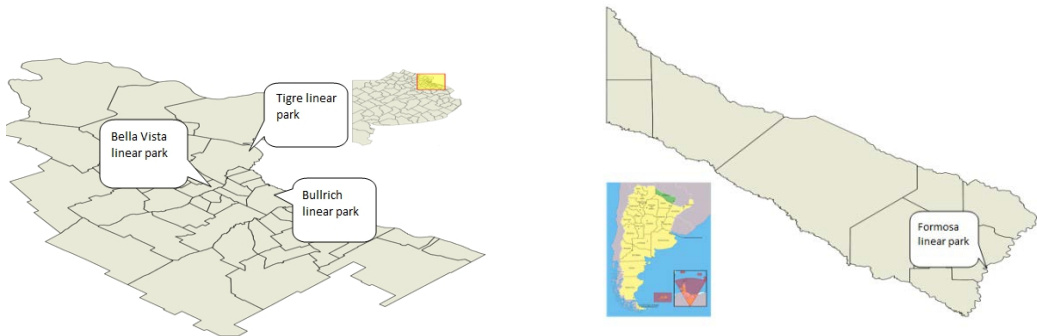
Bella Vista (BVLP)	
Formosa Capital (FLP)	

Fig. 2 Linear parks in study.

Table 2. Characteristics of linear parks				
	Bullrich	Tigre	Bella Vista	Formosa
Extension	750 m	3,1 km	3,6 km	5 km
Ubication	CABA - Palermo neighborhood	PBA - District of de Tigre	PBA - District of San Miguel	PF - City of Formosa
Population	225.245	380.800	276.000	222.200
Water courses	-	Tigre River- Luján River	-	Paraguay River
State at first sight	Good and clean	Good and clean	Regular and clean	Very good and clean

Results

The analyzed linear parks show different functions and characteristics that distinguish them (Table 3, Fig. 3) and generate different perceptions among users.

Table 3. Indices of the studied variables				
	BLP	TLP	BVLP	FLP
Quality of Infrastructure	1,30	1,15	0,60	1,75
Accessibility and signage	1,8	1,67	1,33	2
Urban complexity Shannon Index	1	1,95	0,79	1,57
Vegetation Shannon Index	1,12	1,86	1,43	2,09
Permeable soil %	60	48	82	50
Connectivity	29	8	9	8

The results indicate that Formosa's linear park has the best accessibility, infrastructure and ecological quality, distinguishing itself by its lighting, security cameras and police presence. Tigre has the best urban complexity (gastronomy, various services), which influences its attractiveness. Bullrich stands out for its greater connectivity with different railways, subways, buses and bicycles path, while Bella Vista has the highest permeable soil (Fig. 3).
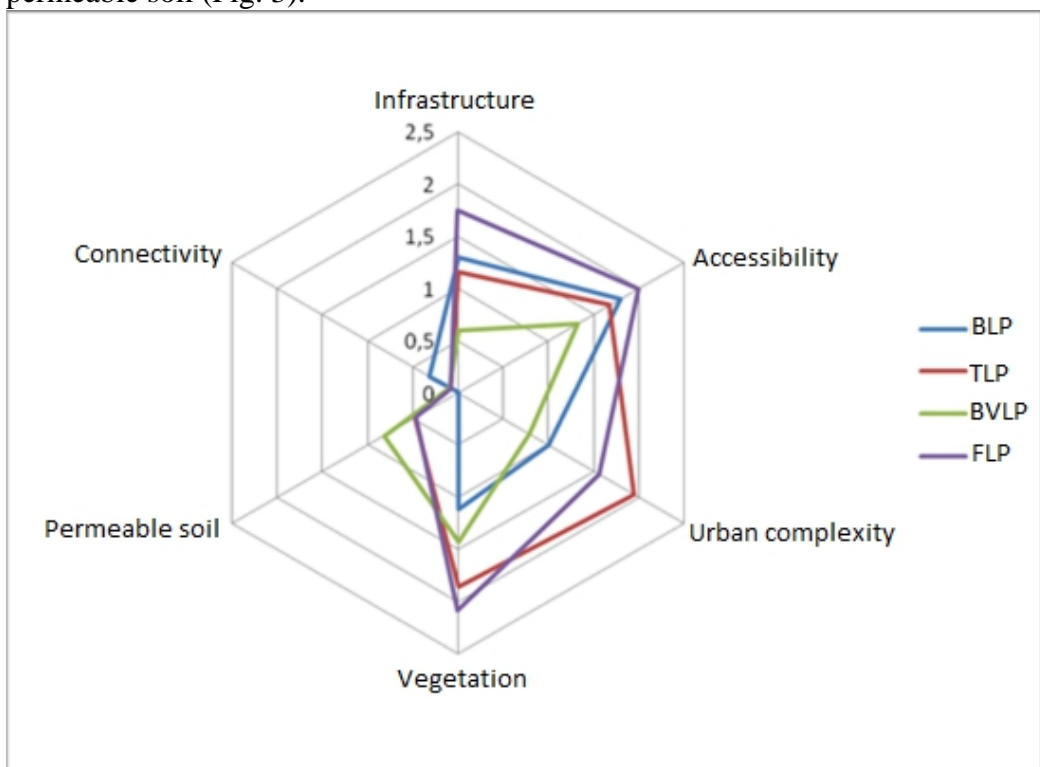

Fig. 3 Results of the calculated indices for the variables under study.

Uses indicate that active recreation activities (Formosa 60%, Tigre 59%, Bullrich 87%, Bella Vista 91%) predominate in the four parks, such as running, jogging, walking and cycling as a strong. In Fig. 5 we can observe that in Tigre and Formosa these activities are more frequent during the week. Meanwhile in Bella Vista we found differences between weekdays and weekends (BVLP 67 people, BVLP 274), quadrupling its number and Bullrich maintained its constancy every days.

Fig. 4 From left to right - active night recreation, passive recreation in the afternoon.
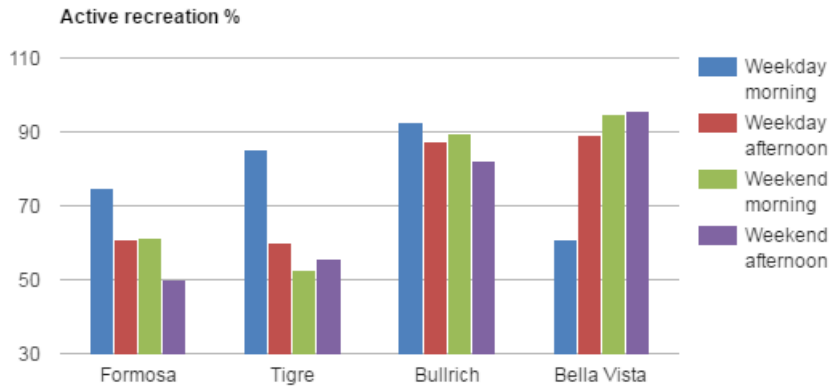

Fig. 5 Percentage of people performing active recreation according to day and schedule.
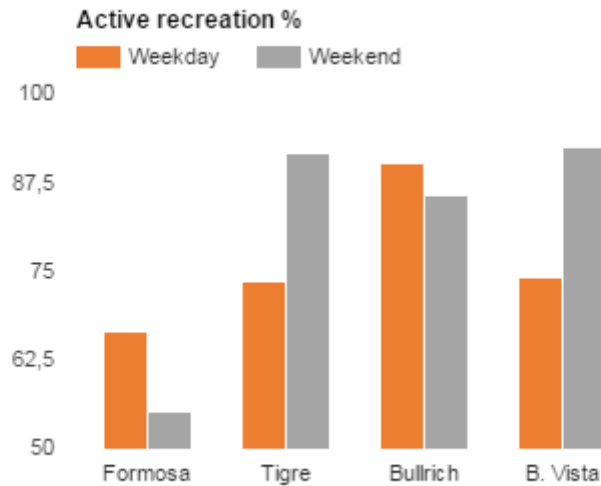
Fig 6. Percentage of people performing active recreation according to weekdays and weekends.

Fig. 7 To the left, Bella Vista, example
of a typical aerobic park. To the right, linear park Tigre as a place to walk. There are restaurant's tables in a travel sector.

It is possible to affirm that TLP (718 people) and BVLP (371) are the most crowded, obtaining these values in the sum of 15 minutes registered in the four quantified moments of the week.

Bella Vista stood out with active recreation on weekends (274 people), this happens because it is the only aerobic corridor with those characteristics in the area, most of the people surveyed belonged to Bella Vista and its surroundings. As opposed to this, with BLP, had a lower average number of people performing passive recreation, both weekdays (FLP 20, TLP 34, BLP 9, BVLP 9) (Fig. 10) and weekends (FLP 34, TLP 114, BLP 13, BVLP 7) (Fig. 11). This happens because they lack of the necessary infrastructures such as seats or tables. It should be clarified that in

BLP is very close to Bosques de Palermo, also serving as a connector between the park and nerve centers of traffit (Puente Pacífico) (Fig. 8 and 9).

FLP and TLP, according to Fig. 10 and 11, present similarities in the passive recreation because they have water courses in their margins, which stimulates the performance of these activities. The passive recreation observed in the survey were important at weekends (Fig. 11), practically equating to active recreation with an average of passive recreational people: (LPT 114, PLF: 34); active recreation (LPT 136, LPF 41).

Fig. 8 Murga in Bullrich park, a few meters from Puente Pacifico.

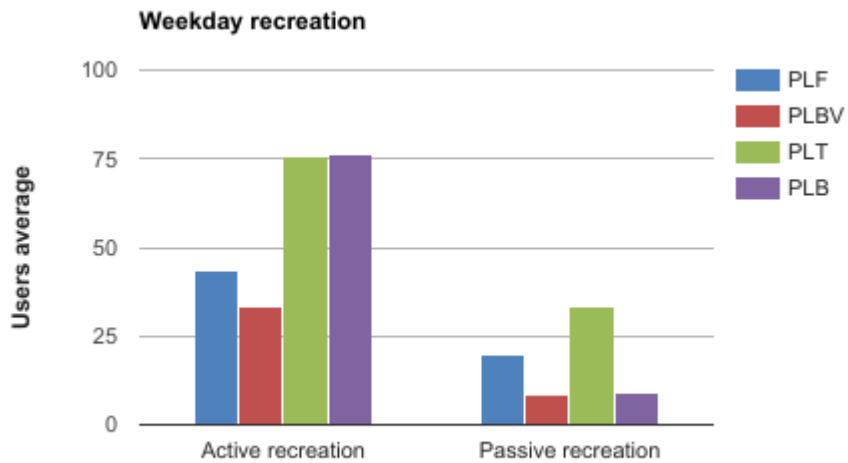Fig. 9 Linear park Bullrich in front of Tres de Febrero Park.

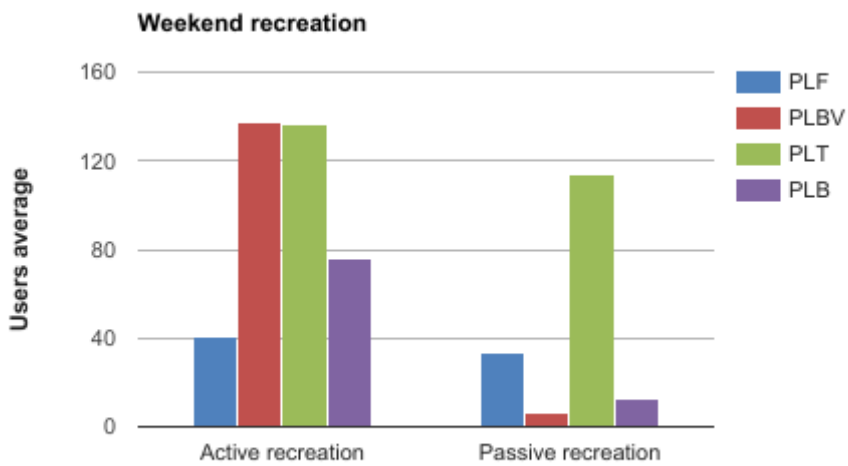Fig 10. Comparison between active and passive recreation on weekdays.

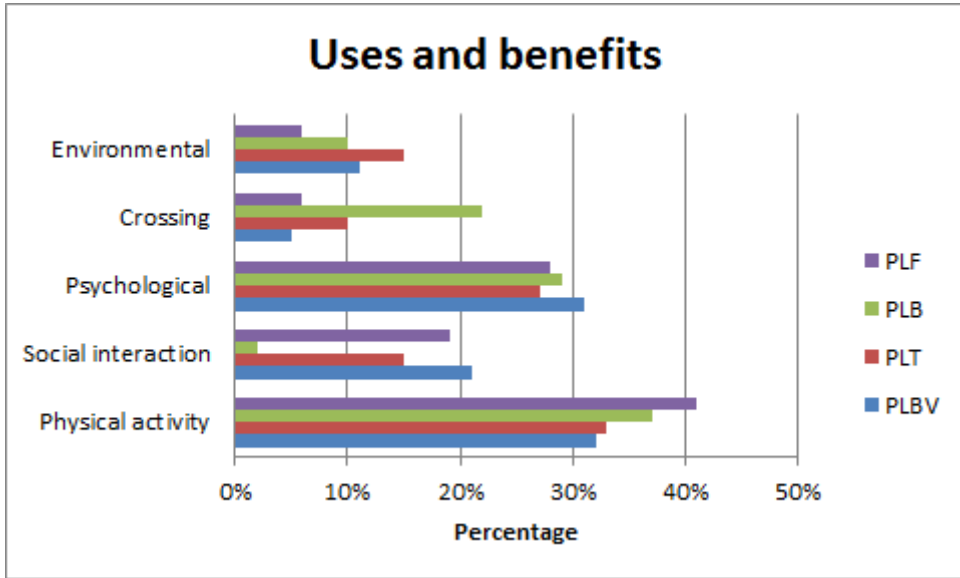Fig 11.Comparison between active recreation and passive on weekends.

Fig. 12 Uses and benefits perceived of the users.

The benefits mentioned from the surveys (Fig. 12) corroborate that the linear parks are recognized by the people surveyed as scenes for physical activity (FLP: 41%, BLP: 37%, TLP: 33%, BVLP: 32%), followed by psychological benefits (FLP: 28%, BLP: 29%, TLP: 27%, BVLP: 31%), that would be related to the well-being that comes from physical activity and the enjoyment of outdoor life.

Fig. 13 Linear park Tigre is a place to rest, contemplate the landscape or play sports.

Fig. 14 Linear park Bella Vista, practice sports in a natural environment.

Related to social interaction (FLP: 19%, BLP: 2%, TLP: 15%, BVLP: 21%) stand out the low value of BLP, because it is use mainly as crossing (FLP: 6%, BLP: 22%, TLP: 10%, BVLP: 5%). The perception of the users in relation to the sensation of nature, is lower (FLP: 6%, BLP: 10%, TLP: 15%, BVLP: 11%). The users of the parks of Buenos Aires and metropolitan area gave more importance to these benefits than those of the FLP.

This may be due that Buenos Aires' residents feel the environmental disadvantages of living in urban environments with lower green spaces, compared to the people of Formosa, who have frequent contact with the natural landscape.

As for security, in TLP (9%) and BLP (4%), surveyed proposed that they need for an improvement, due to incivilities and thefts, unlike the other parks which are located in more safety residential areas or endowed with better surveillance systems. (Fig. 15)

Fig. 15 Police surveillance in linear park Formosa and linear park Bella Vista.

These observations and the different perceptions of the users, allow to recognize three models of linear parks:

A) Connector between areas of interest where predominates the function of crossing,

B) Water front with active and passive recreation and

C) Typical linear park where distinguishes active recreation.

These three models require applying ad-hoc designs to each of them according to their needs (Fig. 16).

Estructure		Distinctive function	Required elements	Example linear park
Connector between areas of interest		Crossing	Bicycle path Signaling	Bullrich (Buenos Aires city)
Waterfront	Greater climate comfort	Active and passive recreation	Landscaping 40% trees, 60% lawn Landscaping 60% trees, 20% roundabouts, 20% lawn In both sites urban furniture (chairs, benches, tables, drinking troughs)	Tigre (metropolitan area of Buenos Aires) Formosa
	Climatic discomfort for high temperatures			
Typical linear park		Active recreation	Infrastructure for sports practice (exercise machines, drinking troughs, showers)	Bella Vista (metropolitan area of Buenos Aires)

Fig. 16 Conceptuals models of the linear parks according to structure, functions and derived requirements of the studied parks.

Connector linear parks: what we have called "connector linear parks" are mainly used as commuting axes—cool and quiet routes through which to pass on the way to other destinations, such as shops, services, and bus stops. It is known that natural settings with good access and amenities encourage people to walk for transport (Gehl 2010). LPB connected services and commercial areas, as well as parks and squares. Respondents gave them the highest values of environmental benefits and the lowest of social interaction. Connector parks require having well defined areas for walking, skating, cycle paths and establish specific areas to rest or for sports practices with waterers

Is important to pay attention to safety in order to avoid incivilities, as Cabe (2015, p.24) indicated, deteriorated parks, are no longer used and a vicious cycle of neglect and vandalism is installed which discourages their use.

Waterfront parks: these are somewhat similar to the connector park type in the amount of active recreation that they support, but waterfront linear parks are used less for commuting and more for contemplating the landscape. They also have great potential as meeting points for social events. Other significant activities in this park type are actions linked with water, such as fishing, boating, and reflection. There is substantive evidence, for instance, that water gives a landscape a special appeal. Architects, designers, planners, psychologists, and researchers interested in environmental behavior have consistently reported the presence of water as one of the most important and attractive visual elements of a natural or built landscape.

These LPs are places that attract passive recreation related to rest and contemplation. Therefore, the two linear parks that respond to this model present similarities between passive and active recreation. This is explained by the attractiveness of water in all landscapes and is known as hydrophilia (Herzog, 1985 en Faggi et al. 2013, p.82). In our example, the two parks of this type are representative of different climatic zones. For this reason and in order to guarantee climatic comfort, it is necessary to work in a landscaping adequate to the climate of each one in particular, as indicated in Figure 16. In case of parks with very warm summers is necessary to increase shadow, as it happens in the province of Formosa.

In addition, they are parks where passive activities are also significant, it is necessary to take into account the correct infrastructure (tables, benches, pergolas, etc.). In our case, it was observed that in Tigre, in spite of there were a lot of people launching along the park there were no tables at disposal. Generally, when they eat, they place the food in banks or stonecutters. Interestingly, a sector of the public space in the park (Fig. 7) is used by restaurants to locate their tables. This speaks of a certain social inequality, reason why at least one sector should be foreseen with tables of free access for all public.

Typical linear parks: These play a dominant role in daily recreation because they provide the greatest overall physical benefit, as indicated by active recreation (running, cycling, rollerskating, skateboarding, sports machines, drinking fountains, showers,) scoring highest in this type of park. This type does more than pretty up a district; it has an improvement effect on residents` health and well-being.

Is where active recreation prevails and should be well provided with an adequate infrastructure to support the activities that are deployed and invite other interns to perform them (sports machines, drinking fountains, showers, differentiation of bicycle path and running trail).

Proposals for connector between areas of interest (model A)
    1) Include signage to define uses.
    2) Establish security to avoid incivilities.
    3) Design and sectorize cycle paths, pedestrian paths, rest areas.

Fig. 17 Proposals for connecting parks. Connector linear park in Buenos Aires city: painting the pavement can create a better division between new bicycle lanes and pedestrian areas. The presence of guards is advisable to help maintain the security of the corridor.

<u>Proposals for water front (model B)</u>
    1) It is necessary a landscaping adequate according to climatic zone. Increase as much as possible green component with native species, incorporating lawn areas, green terraces, vertical gardens, etc.
    2) To install tables, gyms, benches, drinking fountains, bathrooms, children's games, wastebaskets.
    3) Assign a sector for meetings, awareness campaigns, solidarity events, recreational skills, classes of various activities.
    4) When it is possible, the surrounding streets can turn into pedestrian streets on weekends.
    5) Involve the community in the programming of activities.

Fig. 18 Proposals for parks with water fronts. Waterfront linear park in Formosa (Northern Argentina): a tropical climate requires that the park has shade to reduce heat. Outdoor furniture creates space for lunching and relaxing (top left). Currently, the lack of large trees means that the park is used more at night than it is during the day, necessitating artificial lighting (bottom right).

Proposals for typical linear park (model C)

        1) Adequate infrastructure that supports the practice of sports (gymnasiums, drinking fountains, baths).

        2) Design and sectorize cycle paths, pedestrian paths, rest areas, skateboarding.

Fig. 19 Proposals for typical linear parks. Aerobic linear park in Bella Vista, Buenos Aires. In this park, a better separation of activities and a good provision of devices for sport practices are advisable.

Conclusion

We have shown that design and location are keystones to what makes a successful linear park. Approaches to design must vary to suit the scope of the park, as its design influences how the place will be managed and used, not to mention that a green and pleasant area that is well-planned and well-managed is generally a well-used space. To achieve these goals, cross-disciplinary good practices will ensure that existing LPs settings can be better promoted or modified.

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