

Proceedings of the Fábos Conference on Landscape and Greenway Planning

Volume 7
Issue 1 *Moving towards Health and Resilience
in the public realm*

Article 41

August 2022

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Recommended Citation

Abualhagag, Asmaa and Valánszki, István (2022) "The Application of Public Participation GIS (PPGIS) For Visitor Demands Estimation: A Case Study of Outdoor Recreation Activities in Aswan City, Egypt," *Proceedings of the Fábos Conference on Landscape and Greenway Planning*: Vol. 7: Iss. 1, Article 41. DOI: <https://doi.org/10.7275/kjjg-x237>
Available at: <https://scholarworks.umass.edu/fabos/vol7/iss1/41>

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The Application of Public Participation GIS (PPGIS) For Visitor Demands Estimation: A Case Study of Outdoor Recreation Activities in Aswan City, Egypt

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Abstract

Landscape planning for recreation aims to achieve a balance between resources and community needs with management planning objectives to improve the quality of life for people. This paper contributes to a better understanding of recreational landscapes and the connection between greenspace policy and planning for Recreation Services (RS). The aim of this study was: (1) to explore visitor perceptions and preferences of RS and future demands; (2) to investigate the connection between recreational planning and landscape/greenspace policy. Furthermore, enhancing the understanding of visitors' preferences and spatial behavior has the potential to improve existing recreation sites management tools. Visitor perceptions and preferences of RS were collected via the Public Participation Geographic Information Systems (PPGIS) method to assess the demand for future RS in the study area. PPGIS was implemented using both a paper-based questionnaire and with hardcopy maps in the field. We examined the linkages between visitors' future demands of RS and physical landscape features (supply) to help urban planners identify natural resource management synergies, and to focus management efforts on features that matter. By utilizing the overlaying analysis in Arc GIS, we can investigate the linkages between visitors' future demands of RS and physical landscape features. The results demonstrate that; (1) Public participatory mapping method, though not without limitations, can be effective in measuring visitor experiences, perceptions, preferences, and facility needs for a variety of RS planning processes; (2) PPGIS expands methods to engage the public in planning and can help build and sustain trust in recreation managers' planning process and decisions; (3) There is a high relationship between the preferred RS and sites for different recreation facilities and the physical features of the landscape/green spaces; (4) There is a high relationship between the preferred kind of RS and the distance from natural and cultural attraction sites (the feature of landscape).

Introduction

Recreation Services (RS) have become one of the most significant economic sectors. It is noted that the Arab region attracts only 3% of the arrivals and international tourism revenues. The cultural, natural, and historical resources that the region provides for the development of tourism can definitely catch much stronger flows of tourists from all over the Arab region as well as from outside it (Groizard and Santana-Gallego, 2018). As the cradle of world religions, and ancient civilizations, the Arab world has one of the densest collections of monuments and antiquities, including the ancient Egyptian monuments and the rock-carved city of Petra in Jordan. Arab culture has created a rich tradition of urban culture in countries, including special architectural structures, and artisanal workshops (Ali Al Moosa, 1989).

The research is conducted in Aswan, the most popular tourist city in the southern part of Egypt, situated along the Nile River banks. There are various kinds of archaeology and history in Aswan,

and visitors can visit some of the best-preserved temples and burial sites in Egypt in this wonderful city. The main objectives of this research are to (1) to explore visitor perceptions and preferences of RS and future demands; (2) to investigate the connection between recreational planning and landscape/greenspace policy. Furthermore, enhancing the understanding of visitors' preferences and spatial behaviour has the potential to improve existing recreation sites management tools.

Background and Literature Review

RS includes activities that people practice in their leisure time, and it could be multifaceted, containing cognitive, physical, emotional, and social components (Lee, Huang and Yeh, 2010; Nahuelhual et al., 2013). Recreation includes various activities such as visiting areas like river sailing, social meeting, horse riding, and mountain climbing and participating in different physical exercises like fishing, trekking, camping, and hunting. Participating in recreational activities is essential for maintaining individuals', families, and communities mental and physical health (Kirtland et al., 2004; Stålhammar and Pedersen, 2017). As indicated in various studies, engaging in recreational activities two or three times a week or for half an hour a day is beneficial for human health (Kara and Demirci, 2010; Aklıbaşında and Bulut, 2014). A positive relationship was found between human health and landscape feature in recent studies whose findings support the idea that parks, green spaces, and their facilities affect public health positively (Beeco, Hallo and Brownlee, 2014; Schneider and Lorencová, 2015). Recreation is high on today's research and planning agenda (Dağistanlı, Turan and Dengiz, 2018). First of all, planning authorities in the Arab countries have begun to acknowledge the link between RS, active living, and public health (Hussein Mustafa, 2010; Seyfi, 2018) Lifestyle diseases receive a lot of political and public attention, and the functional role of RS in prevention and recuperation regarding stress and obesity is integrated into planning objectives (Nahuelhual et al., 2013; Stålhammar and Pedersen, 2017).

The demand evaluation focuses on measuring recreation demand for resource policy, planning, and management at multiple scales. Several ways have been used to evaluate the future demands of recreation facilities. Assessing the quality of facilities and the outcomes for those who participate is necessary for the attainment of organizational goals and objectives, ascertaining the benefits of recreation facilities and programs, and for evaluation purposes relative to accountability (Christie et al., 2012; Katz-Gerro and Orenstein, 2015). Therefore, the perception studies importance in developing more successful maintenance management programs is emphasized in the scientific literature (Kara and Demirci, 2010; Szell, 2012; Katz-Gerro and Orenstein, 2015). For example. Katz-Gero (2015) outlined the main reasons by which the social component influences the development and preservation of recreational areas, and the importance of developing participatory management by integrating the local population, so the attitudes and perceptions of the local population should be investigated (Katz-Gerro and Orenstein, 2015). Although little attention has been focused on local perceptions of recreational areas, knowledge in this area is still limited in Arab countries such as Egypt. Thus, investigating the perceptions of locals and identifying criteria that influence views toward recreational use will provide a starting point for understanding the fundamentals of successful maintenance management (Kara and Demirci, 2010; Szell, 2012)

Method and Data

Study area

Aswan is located at the southern tip of Egypt and is the state capital of the Aswan governorate (Figure 1). Aswan city is considered as the southern gateway to Africa. The city of Aswan's

population almost about 900,000, and its area about 35,7 km². Aswan is considered one of the best tourist destinations around the world, because of its distinctive tourist features, especially in winter. In addition, its moderate and dry climate is the most important feature of Aswan city because of its location on the Nile east bank. Moreover, it has many different archaeological and historical attractive sites, so, it is known as one of the best open museums that dates back to various ages with sites spread throughout the city. Aswan is a busy market and tourist center and it is considered, in addition to Luxor city, as a huge tourism source in Egypt. Furthermore, Aswan city has a vast variety of natural and cultural attraction destinations and ancient pharaonic civilization including Pharaonic, Islamic, and Nubian (Figure 2).

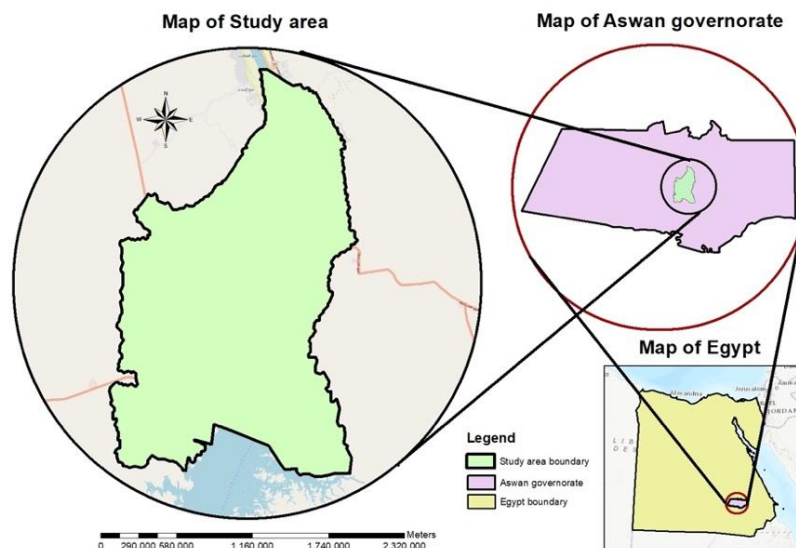


Figure 1: Study area location and boundary (Source: author)



Figure 2: The attractive historical sites in the study area¹

Procedure

To gain a better understanding of the demands of local residents in the study area, quantitative and qualitative data collection was conducted in Aswan city. Data collection was accomplished with

¹https://www.google.hu/search?q=historical+places+in+aswan&hl=en&sxsrf=AOaemvLpjGcPyf4NorSsS6TCKtirdIFg9g:1641549954203&source=lnms&tbn=isch&sa=X&ved=2ahUKewjAwqPsp_1AhWK6aQKHYYVCmgQ_AUoAnoECAIQBA&biw=1280&bih=570&dpr=2

the implementation of a paper-based questionnaire and PPGIS as a map-based questionnaire. Conduction of surveys was completed within a two-month period between May and June 2021. Two questionnaires were designed to collect information by involving local residents. The purpose of these questions was to capture the inherent differences between local residents and ensure a more appropriate basis for the comparison between local residents. Moreover, the comparison between the previous aspects have been conducted across demographic characteristics.



Figure 3: Example of semi-structure questionnaire samples, Source: Author from study area survey (Source: author)

The version of the questionnaire was phrased in both Arabic and English. The questionnaire included questions that aim to determine the recreation utilization and tendencies of the urban residents. Section 1 contains basic demographics questions about the sample visitor and includes questions about the participants ‘gender, age, kind group, and income. Section 2 contains questions about the preferred areas for different kind of recreation facilities. In the first section in the questionnaire, we utilized semi-structure questionnaires (Figure 3). However, in the second section, the PPGIS method is utilized to collect answers about the preferred areas for different kind of recreation facilities (Figure 4).

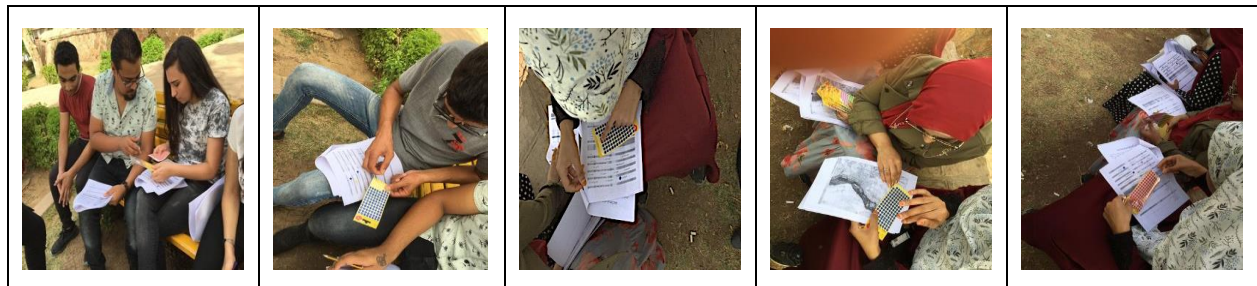


Figure 4: Example of PPGIS samples, Source: Author from study area survey (Source: author)

Results

Demographic Characteristics of the Sample

The sample group consisted of various types of participants with different beliefs and opinions of adaptive recreation opportunities. The respondents in this sample were asked several socio-demographic questions, such as gender, income, age-group, and kind of group. According to gender, respondents are relatively well distributed across male and female categories (Table1). Of the total number of survey participants, a majority of the adaptive recreation participants were Female (71.0%), while approximately (29.0%) were Male. From the above results, we can highlight that more woman than men participated in the survey. To provide a clearer understanding of the distribution of respondents across various age-group, four major age intervals have been established prior to data analysis (Underage, Youth, Adult, Older). If “Underage” is age 0:14, “Youth” is age 15-24, “Adult” is 25-45 and “Older” is 45 and up, the distribution of age

participation is more even (Table 1). Overall, the vast majority of the total number of respondents were belong to youth age-group (71%). Approximately one fifth of participants (19%) were adult age-group, while just 7% and 3% belonged to older and underage age-group respectively.

Table 1: Number of respondents across Demographic data

Demographic categories		Number of respondents	Percentage
Gender	Male	43	29%
	Female	103	71%
Age-group	Underage (0-14)	5	3%
	Youth (15-24)	103	71%
	Adult (25-45)	28	19%
	Older (+45)	10	7%

Response rate analysis

In this research, we investigate the preferred area of the most preferred recreation activities by using PPGIS evaluation method. This part of this paper presents the results from the PPGIS questionnaires based on GIS-analyses performed on the collected data. These analyses are a response rate analysis and preference area analysis to find where the appropriate site for the most preferred recreation activities in the study area. The results of the response rate analysis show that respondents' numbers were generally different across the study area. Further on, the response analysis resulted in denser response rates close to the city centre and in the north part of the city core. Several areas in the south parts of Aswan city, along with villages outside the city centre are experiencing low response rates. These areas do not exceed 5 responses per 146 inhabitants. Figure 5 shows total number of responses of 146 inhabitants, in each of the areas.

Preference Areas Analysis

In this section we intend to discuss the preferred sites for different kind of recreation activities and social meeting. The survey question in this section is to ask the respondents to choose the preferred site for different items.

In case of ride a horse carriage and camel riding, the most preferred sites for those kind of recreation activities were located around the river beach (Figure 6 Sec.3). When we asked the participants to indicate which areas, they prefer for meeting friends, the answers differed. The majority of respondents prefer Seheil Island as the most preferred site for meeting friends, followed by Aswan Botanical Garden and Kornish el-Nile (Figure 6 Sec.1). However, the lowest number of respondents consider both of Feryal Garden and Elephanrine Island Pyramid as the most preferred sites for meeting friends. According to the preferred sites for gathering with family, the results showed that the majority of respondents stated that both Aswan Botanical Garden and Seheil Island were the most suitable areas to gather with family. In case of the preferred sites for sailing to by boat and the site where the respondents were feeling the peaceful and relaxing, most of respondents preferred the Islands as the preferred site. Overall, the results show that several areas are identified as preferred spots for different kind of outdoor recreation activities such as walking in nature and cycling, gathering with family, meeting friends, horse carriage, feeling peaceful and relaxing, and sailing by boat. Preferred sites containing areas along the river beach and others are located in the islands (Figure 6). Riding a horse carriage activity, walking in the nature and cycling is preferred to other uses in several areas, such as the east and west bank of the river coast (see Figure 6 Sec.3,4),

meaning a high number of respondent's entries are found there. However, the most prominent areas with numerous entries which preferred as a site for gathering with family is found in two islands and one garden, which are Aswan Botanical Garden (see Figure 6 Sec.3) and Seheil Island (see Figure 6 Sec.1), and Feryal Garden (see Figure 6 Sec.3). Subsequently, only three main spots can be identified as preferred areas for family gathering which were shown in Figure 6 Sec.2 and Sec. 3.

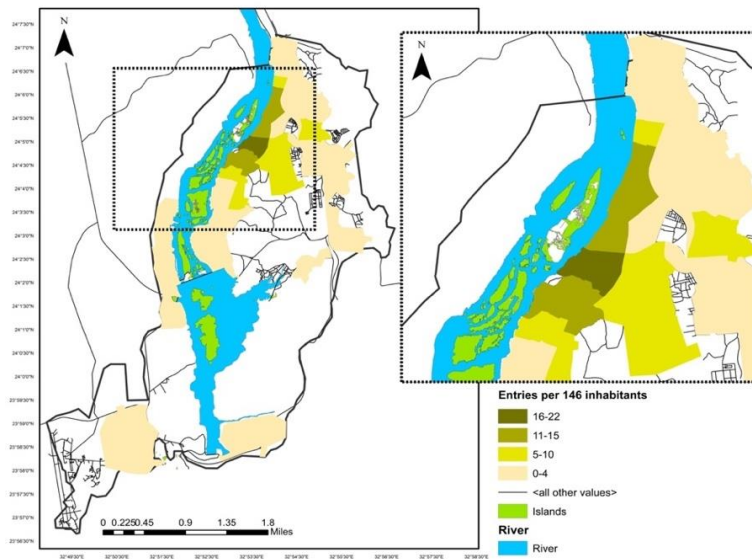


Figure 5: Response rate analysis (Source: author)

Moreover, preferred places for meeting friends can be clearly identified just in six places: Pyramiss Island Hotel Aswan, Seheil Island, Aswan Botanical Garden, Movenpick Aswan, Feryal Garden, and Kornish Al-Nile. These areas are the most prominent spots in the city which are preferred for friend gatherings, meaning that it is the area where the most entries are statistically significant over a specific spatial extent. The results also show several areas can be identified as places where the visitors feel peaceful and relaxing. These areas are primarily located along the river beach and islands. These areas are the ones with the large respondents' rates from participants, and they are all located very close to each other. Notable is that they are also located close to the city center and main road in the city. According to the appropriate place for sailing with boat, the results showed that the majority of survey respondents identified four main spots as appropriate place for sailing to by boats: Aswan Botanical Garden, Movenpick Aswan, Pyramiss Island Hotel Aswan, Mafia Island Gabbans tohamy and Qubbet el- Hawa. Figure 6 illustrates all the appropriate places as a spot for different kind of recreation activities. Generally, the distribution of appropriate sites for practicing specific kinds of recreation activities was identified along the coast rather than the more distant islands and gardens.

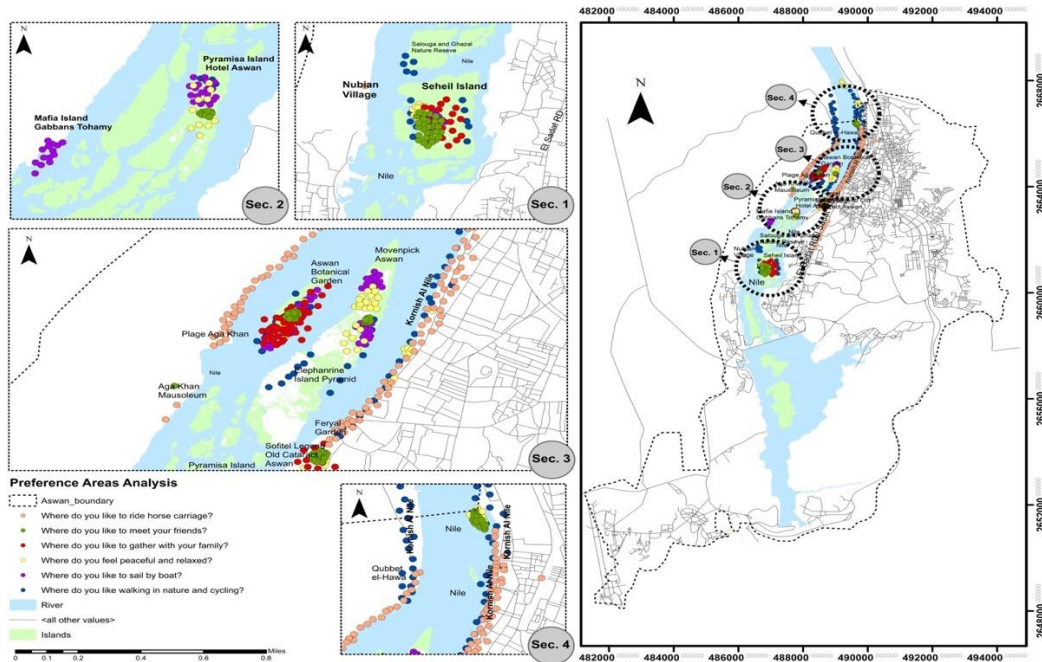


Figure 6: Preference Areas Analysis based on PPGIS results (Source: author)

Discussion and Conclusion

The main aim of this study was to analyse the preferred areas of different kind of recreation services using PPGIS. Key aspects in this approach are the nature of PPGIS data, the constitution and spatial distribution of public use, its role in recreation areas management and the public's perceptions, and opinions of it. Based on the demand evaluation using a semi-structured questionnaire with local communities, it has been assumed that there are specific differences between locals in attitudes, perceptions according to the preferred areas of recreation activities sites. It was stated in previous research that many recreation services strive to create equal access for all and to enhance the quality of life of individuals who utilize their services (Kara and Demirci, 2010; Szell, 2012; Katz-Gerro and Orenstein, 2015). Our research investigated the opportunities for recreation facilities that have become an integrated part of municipal urban planning policy landscape and greenway planning (Peña, Casado-Arzuaga and Onaindia, 2015). Furthermore, closeness to nature and the feature of landscape with opportunities for outdoor recreation plays a key role in peoples' choice of settlement. This study has several implications for the practice of recreation. First, this study again suggests that individuals are unique but also similar; therefore, it is important to assess each individual's special needs, interests, and preferences within recreation services. In this study, it was evident that the participants had preferences regarding specific activity involvement and social interaction. Many participants enjoy recreation services that offer opportunities to improve aspects of their self-concept and human wellbeing. Secondly, this study purposes that individuals and locals in Arab countries may prefer activities involving social interaction opportunities. Therefore, when planning recreation areas, it is suggested that recreation professionals provide opportunities and particular sites for users to meet other people, such as friends and family. Recreation planners should accommodate inclusive recreation opportunities in the same planned area when considering adaptive planning options. Study findings also demonstrate how vegetation management can affect use patterns and preferences. Location, design, and management decisions that include landscape

features can help metropolitan greenway systems achieve a broad range of recreational, social, and environmental goals (Paul H. Gobster, 1995).

Although there are many potential applications of this research in developing more effective evaluation policies, there are some limitations. The majority of limitations to this research are given by insufficient financial resources and time to conduct more in-depth data collection. First, variations of residents' attitudes and perceptions between various areas would have better understood if a more significant number of the selected areas located to a different extent were included, such as urban and pre-urban areas. Often, subtle changes in the local cultural or economic characteristics of the selected areas can considerably impact human attitudes and perceptions. Thus, as our research study area is restricted to the urban areas, results might not be entirely suitable for making assumptions about rural or pre-urban areas. Second, although participation among residents was relatively high, constraints imposed by Covid 19 not only made traveling between urban areas difficult but also reduced the data collection period to three weeks. As a result, the number of residents who participated in this research could be considered relatively low relative to the population density in the study area. To overcome the limitations of this study, future research should investigate people's attitudes and perceptions for improving the effectiveness of outdoor recreation planning at larger spatial and temporal scales. The scope of this study can be expanded in various ways. Additional studies could enhance our understanding of the leisure and recreation experiences and quality of adaptive recreation services from the perspectives of individuals in others research areas. According to greenway planning strategies, study results suggest that from a recreational use perspective, local greenway trails should give more attention to future planning strategies of recreation areas

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