

Monitoring Suburban Nature Trail Visitors and Their Attitudes to Voluntary Trail Maintenance in Sapporo, Japan

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Introduction

Recreational greenways, including walking trails, comprise one of the major categories of greenways (Fábos, 1995). Among the benefits provided by urban biodiversity are those people obtain from visiting nature trails in suburban forests. Managers need precise data, including data about usage levels, demands, and visitor satisfaction to demonstrate the importance of trails, and examine management measures. As challenges, managers also face a lack of funding and staff shortages in managing and maintaining the trails, having increasingly come to rely on volunteers for management. Alongside increasing interest, local stakeholders and visitors have progressively become expected to play a larger role in the collaborative management of protected areas.

Background/Literature Review

Several studies have indicated that the increasing demand for and accessibility of urban forest settings have impacted environments and induced conflicts among various types of visitors (Arnberger, 2006). Urban forest visitors vary in their demands and perceptions (Arnberger et al., 2010).

Visitor data can serve as a basis for formulating management plans for operations, budget, facilities, and maintenance (Aikoh, et al., 2012). Such data can help park managers understand their current situations and assist them in examining management strategies for the future to maintain and enhance visitor satisfaction, and improve information services.

Collaborative management with visitors has garnered increasing interest among managers and stakeholders. Providing opportunities for the public to adopt their parks as part of stewardship programs can promote a connection between the public and their parks (Ryan, 2006). One study found that visitors' enthusiasm for national park management was associated with the local residence, site loyalty, and age (Weaver, 2012).

Goals and objectives

The goal of this study was to monitor visitor levels and visitor behavior on an urban network of hiking trails and to investigate among visitors the willingness

to participate in voluntary trail activities. We also examined the relationships among frequency of visits, place attachment, and willingness to participate.

Methods

Hiking trail network in Sapporo, Japan

Sapporo city is the prefectural seat of Hokkaido where a population of 1.9 million people lives. From December to the end of March, it is covered by snow. There are 75 kilometers of hiking trails in the suburban area (Fig 1 and 2). Sapporo City Hall manages these trails as well as various activities for all age groups. Biological features, scenery, recreational facilities, and accessibility vary across the trails (Table 1). Visitor demands have increased and become more diverse; this has made the management of the trails more challenging.

Monitoring methods

We operated five pyroelectric infrared counters at several trailheads from December 2012 to November 2013. Each day, the counters recorded the number of visitors on an hourly basis who entered and left the trailheads. Direct observations of visitors were conducted at each trailhead three days each in the winter, spring, summer, and autumn.

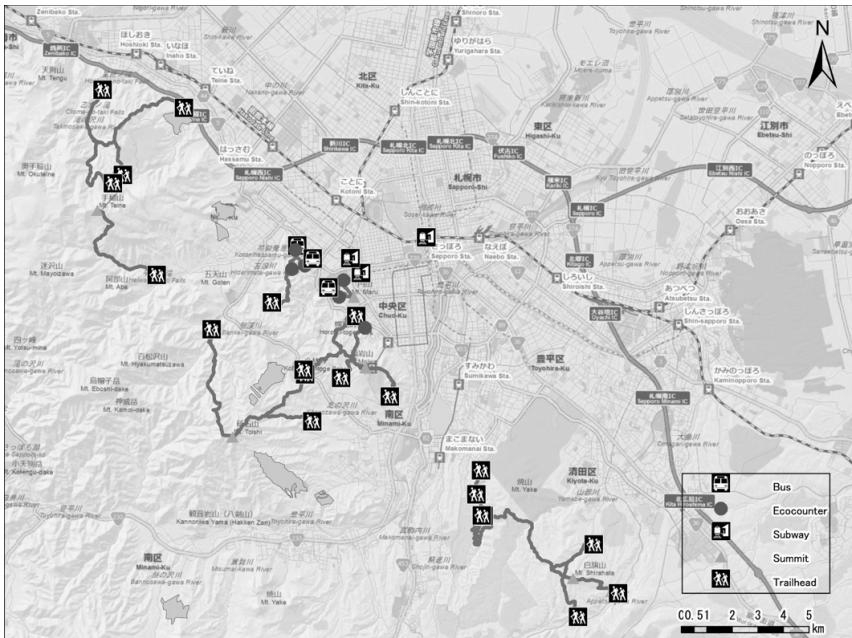


Figure 1. Major hiking trails in suburban Sapporo, Japan



Figure 2. A View from the hiking trail

Table 1. Characteristics of major routes and trailheads

Major Summit	Trailhead	Time to Summit	Public Transportation	Parking
Mt. Maruyama (225.4 m)	88-Kasho	40 min.	Subway	Toll
	Maruyama-Nishi	30 min.	None	None
Mt. Moiwayama (530.9 m)	Jikeikai	70 min.	Tram, Bus	Free
	Kobayashi	60 min.	Bus infrequently	None
	Shimin-Ski	90 min.	Bus	Free
Mt. Sankakuyama (311.1 m)	Yamanote	40 min.	Bus	Free
	Miyanomori	45 min.	None	None
	Kobetsuzawa	80 min.	Bus infrequently	None

During the same period, we distributed questionnaires to visitors that were to be returned by mail. These surveys solicited information about the visitors'

demographic characteristics, the frequency of visits, motivation for visits, place attachment and willingness to participate in voluntary trail maintenance activities. We received 821 valid responses for an effective response rate of 60.3%.

Results

The pyroelectric infrared counters were highly accurate in counting visitors at the trailheads and enabled visitor use to be monitored throughout the year. We estimated the number of visitors at each summit and trailheads. The most popular mountain was Mt. Moiwayama, with 95,000 visitors annually. Nature trails in Sapporo were estimated to have received 260,000 visitors in total. The popular trailheads were Mt. Moiwayama’s Jikeikai, Mt. Maruyama’s 88kasho, and Mt. Sankakuyama’s Yamanote. These trailheads have public transportation access and parking lots. Among people who chose these trailheads, their accessibility and convenience of these trailheads were the most important factors. The most popular season was early summer, from May to July (Fig. 3). Although there were least visitors in February, a certain amount of urban residents visited even in the winter when it had snowed. The number of visitors and fluctuation patterns in daily and hourly visitation varied among the trailheads according to the weather and social factors (Fig. 4).

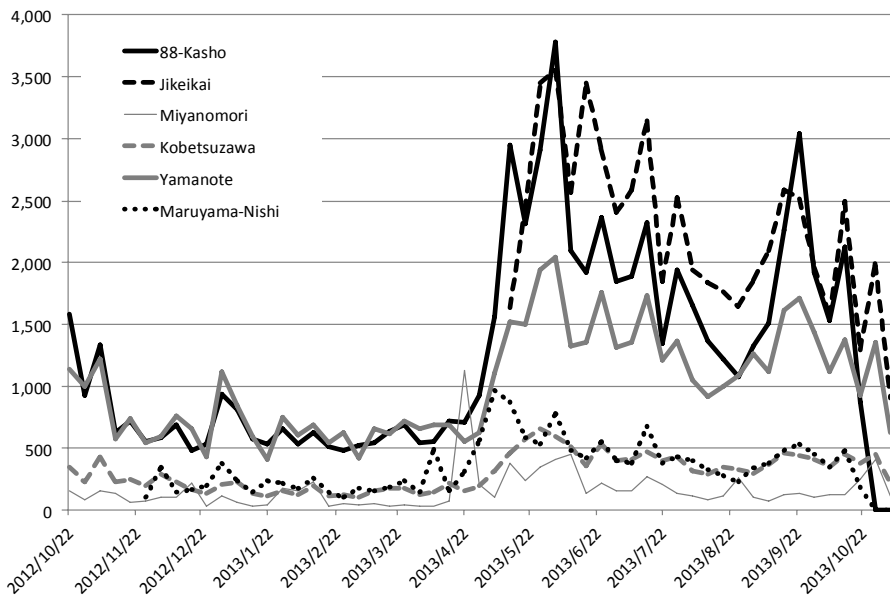


Figure 3. The weekly number of visitors at major trailheads

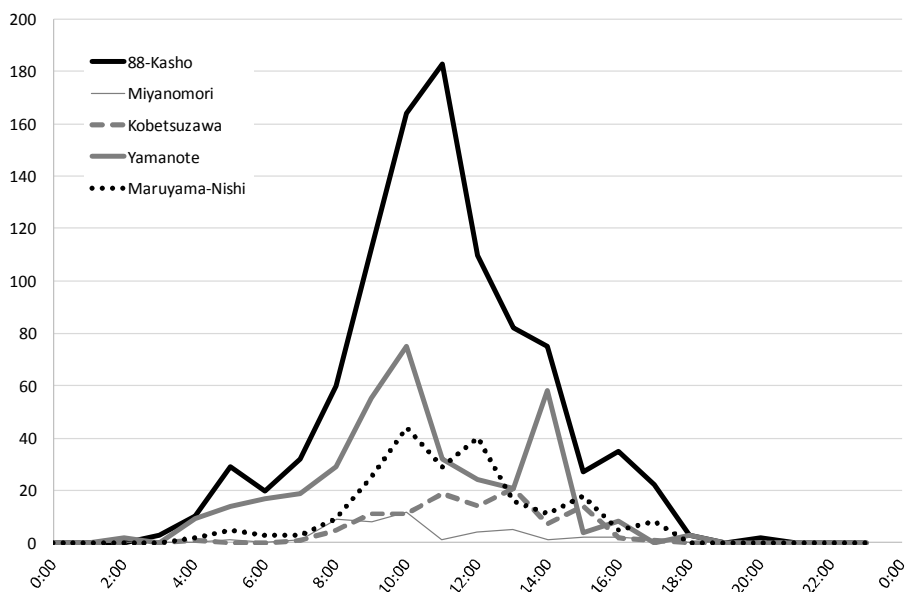


Figure 4. The hourly number of visitors on Saturday May 18 2013

There were more male (65.1%) than female visitors. More than half of them were older than 60 years (54.3%). Visitors who lived one hour away or less and 30 minutes away or less comprised 90.0%, and 60% of the respondents, respectively; 60% traveled to the trailhead by using their own cars, and some traveled on foot. Half of the visitors stayed on the trails for between two and four hours. More than half had visited the same trailheads more than ten times (58.0%). About 30% of the visitors visited every week, and 10% of visitors hiked every day even in the winter.

The largest number of visitors visited to "experience nature" (70.1%), and "for health" (65.2%). 81% of visitors were satisfied their experience. They showed a strong attachment to the trail; 82.5% of them agreed with the statement, "This trail is important for me." Issues that visitors were concerned about included a lack of parking lots (24.6%), littering (23.3%), pets (20.9%), and a shortage of restrooms (19.5%). More than half were willing to participate in certain volunteer activities for trail maintenance (55.4%).

We segmented the respondents into three groups by their frequency of visits and visiting season. A total of 33.2% of the respondents were frequent visitors who visited more often than every week throughout the year; 44.2% were less-frequent visitors who were either visiting for their first time or visited several times a year. Others visited only between spring and autumn. There were

significant relationships between the frequency of visits, place attachment, awareness of and experience with volunteer activities, and the willingness to participate in voluntary trail maintenance. Frequent visitors reported a stronger place identity with and dependence on the areas they visited (Fig. 5). They also reported having more knowledge and experiences and indicated a greater willingness to participate in voluntary trail maintenance (Fig. 6).

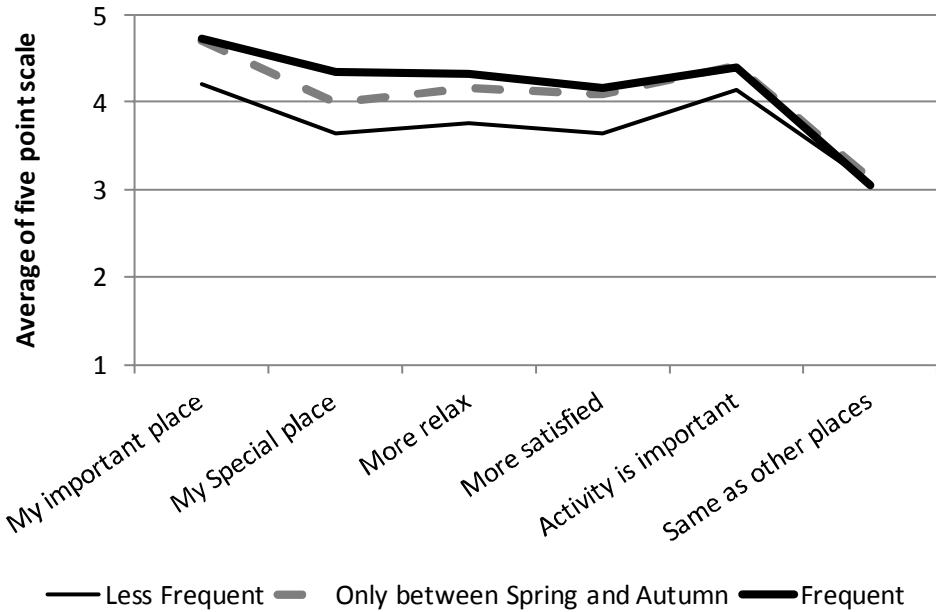


Figure 5. Frequency of visits and place attachment

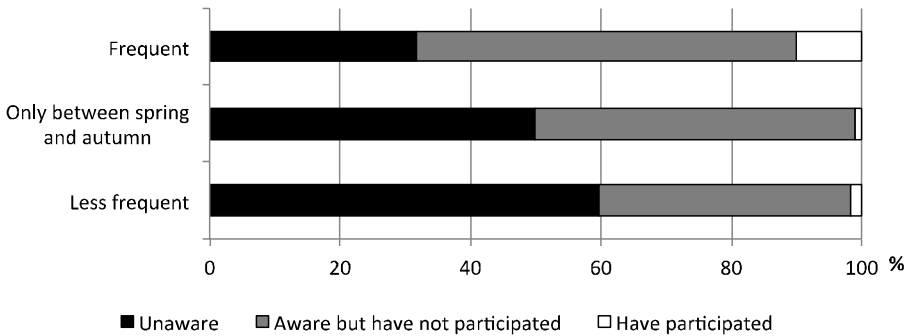


Figure 6. Frequency of visits and experience with volunteer activities among visitors

Discussion and Conclusions

Based on figures obtained by the infrared counters and by observation, the total number of visitors was estimated at 260,000. The number of hikers and fluctuation patterns varied among trailheads according to their accessibility and convenience. The factors that are important in suburban forest areas differ from those that are important in remote protected areas (Aikoh *et al.*, 2012). Physical access and equity in physical access are important for facilitating urban residents' use of greenways (Gobster and Westphal, 2004).

Accessibility to nearby nature can increase residents' frequency of visits, duration of visits, and satisfaction with local green spaces of residents (Soga *et al.*, 2015). In this study, we found strong relationships between the frequency of visits, distance from home, place attachment, and awareness of and the willingness to participate in volunteer trail maintenance. The enthusiasm for volunteer activities among visitors to Australian national parks was found to correlate with age and residence (Weaver *et al.*, 2012). The study found that among residents, the frequency of visits and place attachment facilitated the willingness to participate in volunteer activities.

Participating in volunteer activities enhances citizens' willingness to engage in environmentally beneficial behaviors, as well as their sense of community (Ryan, 2015). Providing equal accessibility and opportunities to participate in volunteer activities can strengthen visitors' emotional bonds to trails and bring various benefits to visitors' lives and local communities.

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