RECREATIONAL USE OF GREENZONE FORESTS IN ULAANBAATAR CITY

Bayartulga A.

Institute of Geography and Geoecology, Mongolian Academy of Sciences, Ulaanbaatar, Mongolia
2-School of Agroecology, Mongolian University of Life Sciences, Ulaanbaatar, Mongolia

Co-author: Delgerjargal D.

Abstract: Although recreational use of forest has been one of the most familiar usage of forest resource by people for centuries, there are not enough studies on this field in Mongolia. The negative impacts of forest recreational overuse and urbanization-related issues are associated with the impact of population and air quality on urban green zone forests, and there is a risk that deforestation and further degradation of urban ecosystems will continue. Practical recommendations need to be made for the protection and sustainable use of forests in the surrounding areas. Here we are presenting some results of study conducted in January 2020, to reveal the usage of recreational forest by people in greenzone forest recreational sites and the calculation of economic values of recreational use. As household income and education levels increase, the use of forest recreation increases. Estimated recreational use of forest is 40 hours per year by individuals who stay and use forest for outdoor recreation in greenzone forest in Ulaanbaatar city. Also some suggestions regarding the management of recreational forest resource are reflected in this paper.

Keywords: Forest recreation; Travel Cost Method; Urban forest; Forestry Public Awareness

Introduction

The total forest area of the green zone in Ulaanbaatar is 116,257 ha, of which 95,234 ha is covered by forest, 17,534 ha is not covered by forest, and 3,480 ha is non-forested (Figure 1). According to the "Law on Forests" (2015), the forest zone of the green zone of the capital city belongs to the forest of the protected zone due to its ecological and economic significance. Urban green zone forests play an important social, hygienic and recreational role in protecting the city from adverse weather events, improving the microclimate, reducing urban "overheating", reducing urban noise, and creating favorable living conditions for the population. Therefore, the ecological condition of the city depends on the stability of the forest in the urban green zone (Tsendsuren, 2004).

According to the 2018 national statistical database, the population of Ulaanbaatar is 1,491,375 which is equivalent to the population of the world's large cities. This high population density increases the impact of urbanization on the environment. According to WHO standards, the average size of green space per person should be 9 m2. In Ulaanbaatar, as of 2012, 5% of the land area, or 1.6 m2 per capita, is green space which is 5 times less than the standard. Furthermore, improving the health and condition of forests in the green zone is expected to have a positive effect on the health and socio-economic problems of the population of Ulaanbaatar, which lacks green space. The negative impacts of recreational overuse and urbanization-related deforestation are associated with the impact of population and air quality on suburban green zone forests, and there is a risk that deforestation and further degradation of suburban ecosystems will continue. It is necessary to make practical recommendations related to the protection and sustainable use of forests in the surrounding areas.

Therefore, in the last years of urbanization and

expansion, there is a need to determine how forests perform their aesthetic and hygienic functions, to classify forest recreational use by gender, and to develop a scientific basis for further improvement of forest resource management.
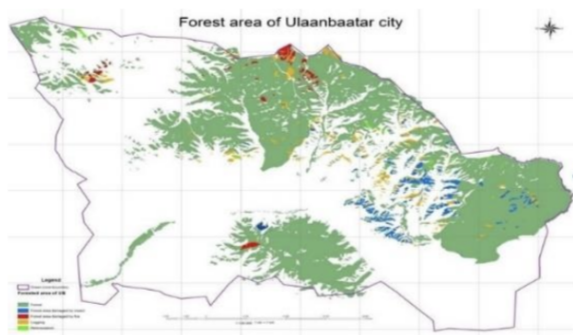

Figure 1. Distribution of the green zone forests in Ulaanbaatar and location of the study area

Methods

The main purpose of this study was to identify the behavioral characteristics of the recreational use of forests around Ulaanbaatar and to link them to the socio-economic conditions. A total of 23 questions were included in the questionnaire, and as a result of the initial processing, some of the questions that were considered to be the key to achieving this goal were selected as indicators and analyzed.

We conducted a survey of citizens' forest recreational use behavior using a questionnaire. First, questionnaire on forest recreational use was selected from three most visited locations in Ulaanbaatar, for a total of 40 questionnaires. These include: Zaisan, Sky Resort, and Khureltogoot. Questionnaires were collected from a random sample of people who came to rest in the forest in January 2020 through personal interviews. Second, the relevant baseline data were analyzed.

The average time a person spends in the forest during a year is calculated based on (Petrov's 2005) methodology (1).

$$V_i = 4M_i * U_i * t_i \quad (1)$$

Where,

V_i – Total time of forest use during the participant's stay in the forest, hour

M_i - the number of months spent in the forest per year

U_i - the frequency of the participant's trip to the forest during the year

t_i - the amount of time spent in the forest

The economic value of ecosystems and natural recreational use is calculated using the travel cost method. The travel cost method involves collecting data on the costs incurred by each individual in travelling to the recreational site. This 'price' paid by visitors is unique to each individual and is calculated by summing the travel costs from each individual's original location to the amenity. By aggregating the observed travel costs associated with a number of individuals accessing the amenity a demand curve can be estimated, and as such a price can be obtained for the non-price amenity. (Ward, Frank A, Beal, Diana J., 2000).

The cost of the trip was calculated by the following formula:

Formula 2. The formula for calculating the travel cost

$$V = ((T \times w) + (D \times v) + Ca) \times Va \quad (2)$$

Where,

T = travel time (in hours)

w = average wage rate (tugrik/hour)

D = distance (in km)

v = marginal vehicle operating costs

Ca = cost of Admission to asset
Va = average number of visits per year

To estimate marginal vehicle operating costs (v), it is included in the survey method by walking, by bicycle, by bus, by hybrid car, other vehicles. The most popular hybrid car used in UB is the Prius 20, while the other cars are considered based on the average fuel consumption of the Mitsubishi Delica D: 5. The average fuel price was calculated as Al-92 = 1650MNT Al 95 = 2000 MNT.

Results

The results of the survey on the use of recreational areas in the green zone of Ulaanbaatar are shown below.
The participants are grouped by age and sex in the chart below (Graph 1).
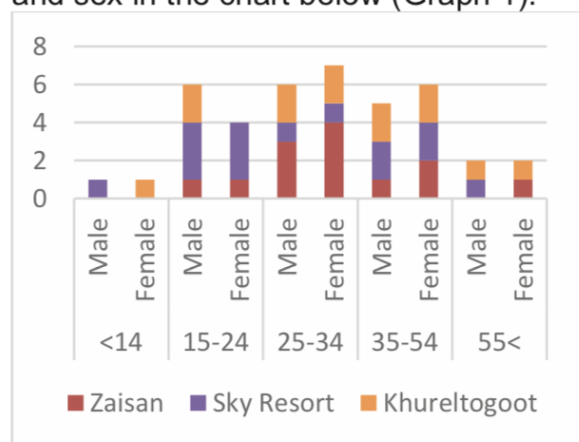

Graph 1. Age group and gender of the survey participants

The majority of respondents, or 85 percent, have tertiary education, and the remaining 15 percent have completed secondary, or specialized secondary education. The survey was conducted over the weekend, and the majority of respondents worked in public and private organizations (Table 1).

Table 1. Employment status

Employment status	Number
Public sector	13
Private sector	11
Self-employed	8
Students	5
Unemployed	2
Retired	1

The average household income is 801,000-1,200,000 MNT, which is close to the national average salary (Graph 2).
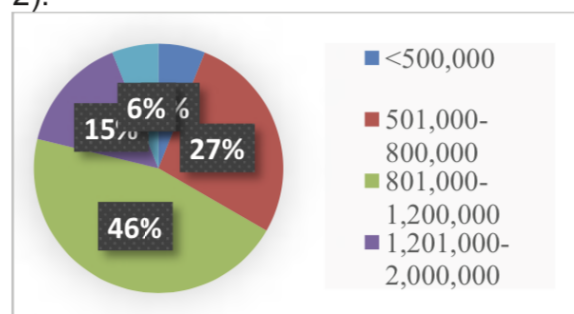
Graph 2. Average household income, tugrik

Results of a survey on the recreational use

As a result, 50% of respondents are men and 50% are women; Of these, 5% were aged 0-14, 25% were aged 15-24, 32% were aged 25-34, 28% were aged 35-54, and 10% were aged 55 and over. In terms of forest use, 6.25% collect fruits, mushrooms and herbs, 50% restore physical fitness and relaxation, and 43.75% enjoy the beauty of nature.
The answers to the questions "Do you go to the forest, how many times a year do you go to the forest on average, and how many hours do you spend there when you go to the forest" were formulated (1) and calculated for each person and analyzed by age and sex of the participants.
Table 2. The amount of forest use in the recreation area of the participant

Age class	Gender	Number of participants	Total amount of recreational use by participants hour/summer	Average amount of forest recreational use per person hour/summer
>14	M	1	6	6
	F	1	12	12
15-24	M	5	78	15.6
	F	3	135	45
25-34	M	7	486	69.5
	F	7	68	9.7
35-54	M	5	650	130
	F	7	49	7
55<	M	2	55	27.5
	F	2	96	48
Total	M	20	1275	63.75
	F	20	360	18

The table 2 shows that a person spends an average of 40 hours per year, of which one man spends an average of 63 hours, and a woman spends an average of 18 hours on forest recreation, which is 3.5 times less.

The estimated travel cost
Table 3. Total travel cost (MNT) per participant per year

T	W	D	v	Va	V
8	4545.455	0.5	0	1	36363.64
5	8522.727	5	115.5	24	1036587
5	4545.455	5	115.5	12	279657.3
2	5681.818	5	115.5	36	429880.9
2	2840.909	5	280	12	84981.82
4	8522.727	0.5	115.5	52	1775730
8	5681.818	12	280	1	48814.55
5	5681.818	12	280	1	31769.09
1	2840.909	5	280	1	4240.909
2	5681.818	5	115.5	12	143293.6
2	8522.727	12	115.5	12	221177.5
5	5681.818	20	25	15	433636.4
5	4545.455	12	280	2	52174.55
2	4545.455	20	25	5	47954.55
5	5681.818	20	25	12	346909.1
5	4545.455	5	280	1	24127.27
8	8522.727	5	280	2	139163.6
5	5681.818	5	280	3	89427.27
5	4545.455	20	25	12	278727.3
5	4545.455	0.5	0	1	22727.27
5	5681.818	5	115.5	12	347839.1
5	5681.818	20	25	24	693818.2
8	4545.455	10	0	2	72727.27
2	5681.818	5	280	24	306327.3
2	8522.727	5	280	12	221345.5
5	5681.818	5	115.5	24	695678.2
5	5681.818	20	25	5	144545.5
5	14204.55	5	115.5	36	2577608
5	5681.818	10	0	24	681818.2
8	14204.55	5	280	3	345109.1
8	4545.455	10	0	12	436363.6
2	8522.727	12	280	52	1061084
5	5681.818	12	115.5	20	595901.8

Note: marginal vehicle operating costs (v) is included in the survey method by walking, by bicycle, by bus, by hybrid car, other vehicles. The most popular hybrid car is the Prius 20, while the other cars are considered based on the average fuel consumption of the Mitsubishi Delica D: 5. The average fuel price was calculated as AI-92= 1650MNT, AI 95 = 2000 MNT.

Discussion & Conclusions

In the green zone around Ulaanbaatar, at least 655,168 hours of forest recreation is used in one summer (Delgerjargal and Tsendsuren, 2008), which provides sufficient grounds for policy planning and attention by the relevant authorities to develop a

favorable relationship between citizens and forest resources. As household income and education levels increase, the use of forest recreation increases. Researchers (John A. Dixon, 1993, 2000) relate the use of forest recreation to the indirect use of forest resources, but many agree that it is a direct benefit to the consumers.

According to the results of the survey, only 31 percent of the respondents answered that the knowledge on forest protection and sustainable use is sufficient, while the remaining 69 percent answered that it is moderate or insufficient. This suggests that it is important to increase public awareness of forest protection and sustainable use. In addition, the percentage of forest recreational use by age group shows that the majority of people are between 25 and 34 years old, which suggests that advocacy through the Internet and social media is effective.

Instead of visiting the forest, a total of 65 percent preferred to use recreation by physically when offered to pay in cash. This shows that importance of recreational use of forest. Additionally, 50 percent of the respondents did not support the idea of paying in the forest, and the remaining 50 percent suggested that it should be spent on nature conservation and landscaping. These results show that in the areas of active recreation, it is necessary to create conditions for rest and travel along the established routes, And payments should be spent on sanitary facilities, nature conservation and restoration.

References

Loomis, John. 2001. *Valuing Nature with Travel Cost Models: A Manual* Frank Ward Diana Beal. Marine Resource Economics. 16. 315-317. 10.1086/mre.16.4.42629340.

Agency of Environment. 2017. *Brief introduction of the capital city's green zone forest fund*. Ulaanbaatar

John A. Dickson., Luisa Fallon Skura, Richard A. Carpenter, Pol B. Sherman. 2000. Assessment of effectiveness of Environmental impact assessment system. Vita Press. pp.272

Delgerjargal D., Khishigjargal M., Munkhbat G., Bayartulga A. 2020. *Livelihoods of people living close to the green zone of Ulaanbaatar, access to non-timber forest products, demand and supply of firewood*. Contract labor report

Petrov V.N., Zubko A.A. 2005. *Economic assessment of forest recreation*. SPb .Nauka, pp.195

Tsendsuren D. 2004. *Challenges in Green Zone Forest Research*. Ulaanbaatar. National University of Mongolia. Proceedings of the Scientific Conference on "Forest Protection and Restoration". pp.124-129