Study on the Probability of Tokyo Area Residents to Participate in Green Space Conservation Activities Based on Willingness to Work

Yui TAKASE*, Katsunori FURUYA* and Shoko SAKURABA**

Abstract:

In Tokyo area, residents are participating in green space conservation activities. In this study, we aimed to clarify the potential of Tokyo area residents to participate in green space conservation activities based on their willingness to work in green space conservation activities. We conducted an attitude survey in March 2014. Responses were obtained from 757 people who had willingness to participate in green space conservation activities who lived in Tokyo area. Questions were asked about individual attributes, desired number of participation days, desired method of support, desired participation style, and attitudes towards participation in green space conservation activities. We revealed that holding activities around once a month is considered the key to encouraging the participation of all generations. And, it is essential to make residents of the Tokyo area fully realize the benefits of participating in conservation activities in order to increase their willingness to participate.

Keywords*:*

Green space, Tokyo area, Conservation activities, Willingness to work, Citizens

* Graduate School of Horticulture, Chiba University, **National University Corporation of Tsukuba University of Technology E-Mail: yui-takase@chiba-u.jp

* This is an abstract peer-reviewed by the International Affairs Committee of the City Planning Institute of Japan for ISCP2014.

1. Introduction

In Japanese cities, citizens are participating in green space conservation activities. In Tokyo area, residents are also participating in green space conservation activities. Each municipality in Japan is formulating a green area master plan referred to as the "Master Plan For Parks And Open Spaces". In fact, 157 of the 212 municipalities in and around the Tokyo area are formulating such a plan. "Master Plan For Parks And Open Spaces" describes the policy of resident participation in green space conservation. Conservation activities are actually performed by residents, and various green spaces such as public land like parks and rivers, and privately owned forest areas, etc. have been conserved. However, there are also activities that have become difficult to continue due to a lack of participation and aging of the participants.

Various studies of citizen participation in green space conservation activities have been conducted amidst this social background. Takase et al. [1)] conducted a survey on Japanese citizens about their attitudes towards participation in green space conservation activities. The results of this survey clarified the biggest concerns of residents are that "the activities are carried out far away and the area cannot be accessed conveniently" and they "don't have the time, and don't think they can continue to fit the activities into their schedule." The relationship between willingness to participate and the activity location has also been examined in the past. Nakajima et al. [2)] clarified the relationship between willingness to participate in green space conservation activities, distance to the green space, and size of the green space. They found that if the green area is located within 1,000m of the resident's home, the resident is likely to be willing to participate in activities concerning that green space.

While the relationship between willingness to participate in green space conservation activities and distance to the green space has been examined, there have been almost no studies on the relationship between willingness to participate and activity time. It is important to clarify this relationship. Many of the green space conservation activities in Japan are supported by citizens not only through monetary support and donations, but also through their actual volunteer work. In the future it will be important to conduct green space assessment with the index of "activity time" which facilitates the measurement of volunteer work. Muranaka and Terawaki[3)] also pointed it out, and they assessed the value of forests not only by willingness to pay, but also by willingness to work. Willingness to work is the maximum amount of time individuals are willing to work to conserve the environment.

In this study, we aimed to clarify the potential of Tokyo area residents to participate in green space conservation activities based on their willingness to work in green space conservation activities. Furthermore, we clarified the residents' preferred participation methods. To that end, we verified the relationship between attributes and willingness to work, and desired participation style and willingness to work.

2. Study Methods

We conducted an attitude survey in March 2014. From here on, willingness to work is referred to as WTW. We conducted a questionnaire survey over the Internet through the market research company. Responses were obtained from 757 people who had willingness to participate in green space conservation activities who lived in Tokyo, Kanagawa, Saitama, and Chiba prefectures.

Prior to the actual questions, the questionnaire defined "green space conservation activities". We explained "green space conservation activities" is "conservation activities performed at

parks, forests, farmland, and rivers, etc. Specific activities include mowing, planting trees, pruning of trees, clean-up activities, agricultural experience, nature's classroom, survey of flora and fauna, and removal of foreign organisms."

Questions were asked about individual attributes, desired number of participation days, desired method of support, desired participation style, and attitudes towards participation in green space conservation activities. In the first item, individual attributes, respondents were asked about their place of residence, gender, age, occupation, and participation experience. In the second item, desired number of participation day, respondents were asked "In one year, how many of your weekends and holidays would you like to spend participating in green space conservation activities? Please answer with a number of days." Respondents were allowed to respond from 0 to 120 days. In the third item, desired method of support, respondents were asked whether they placed more importance on "financially supporting conservation activities through donations, etc." or "supporting conservation activities by actually participating and performing volunteer work." In the fourth item, desired participation style, respondents we re asked five questions about activity time, activity location, activity content, participation frequency, and method of participation. The detailed content of these five questions about

Table1 Question items about desired participation style in green space activities [1]

Question items	
Activity time	a. Full-day activities
	b.2-3 hour activities
Activity location	c. To work at the same location
	d. To work at different locations
Activity content	e. Hard work, such as logging
	f. Light work, such as weeding and picking up garbage
Participation frequency	g. To participate periodically
	h. To participate sporadically
Method of participation	i. To become a leader or manage an activity group
	j. To continue working as a general participant

1 Questions about Desirered style of participation were asked by paired comparison analysis.

Table2 Question items about attitude towards participation in conservation activities

Question items	
Factors behind participation	
(1) Healing effect	The plants seem healing, I think it will be refreshing
(2) Learning about nature	I can make new discoveries about nature
(3) Exercise opportunity	It will be good exercise, I can work up a sweat
(4) Exchange opportunity	I can meet a variety of new people and make friends
Factors behind participation	
(5) Information acquisition	Don't know how to examine information, cannot find the information I want
(6) Nature experience	I have little experience with nature, the barrier to participation is high
(7) Lack of knowledge	I don't have any knowledge, I'm worried about whether I can do it or not
(8) Activity time	Don't have the time, and don't think I can continue to fit the activities into my schedule
(9) Human relationship	Whether I will be alone when doing activities and unable to talk well with others
(10) Lack of physical strength	Worried about my physical strength
(11) Activity significance	I doubt the activity can really conserve nature
(12) Activity interest	There are few appealing activities I actively want to participate in
(13) Activity environment	It's dirty, I'll get bitten by insects, it's hot, I'll hurt myself
(14) Activity location	The activities are carried out far away and the area cannot be accessed conveniently
(15) Activity cost	Expensive, worried about participation cost

desired participation style is shown in the table 1. The fifth item, attitude towards participation in conservation activities, included 15 questions about factors behind participation and issues related to participation. The detailed content of the 15 questions is shown in the table 2. Four questions were asked about factors behind participation with reference to the Kuramoto and Nagai[4] study, and 11 questions, clarified by Takase and Furuya[5], were asked about issues related to participation. Respondents were asked their feelings towards these 15 questions with one of four responses: "strongly agree", "agree", "disagree", and "strongly disagree".

The results were analyzed, and the relationships between attributes and WTW, and desired participation style and WTW were verified. The Kruskal-Wallis test was used to analyze whether there was any significant difference in WTW. The Steel-Dwass test of multiple comparisons was used to examine the respondents in which significant differences in WTW occurred. The chi-squared test was used to analyze significant differences between participation experience and each attribute. Residual analysis was also conducted to examine the respondents in which biased responses occurred. JMP 9.0.2 was used for statistical analysis.

3. Results and Consideration

3.1. Individual attributes

Respondents' residences were Tokyo (320 people, 42.3%), Kanagawa (197 people, 26.3%), Saitama (101 people, 16.6%), and Chiba (112 people, 14.8%) prefectures. Gender distribution was 50.9%(385 people) for males and 49.1% (372 people) for females. Age distribution was 10's (20 people, 2.8%), 20's (90 people, 16.2%), 30's (117 people, 18.9%), 40's (129 people, 21.3%), 50's (118 people, 18.6%), 60's (113 people, 17.0%) and over 70's (70 people, 5.1%). In this study, 41 people (7.0%) were students. 380 people (62.6%) were with holding a job, and 196 people (30.4%) were without holding a job. The cross-tabulation of age and occupation is shown in the figure 1.

The number of respondents who have experienced to participate in green space conservation activities was 140 people (18.5%). And, 617 people (81.5%) had no experience to participate.

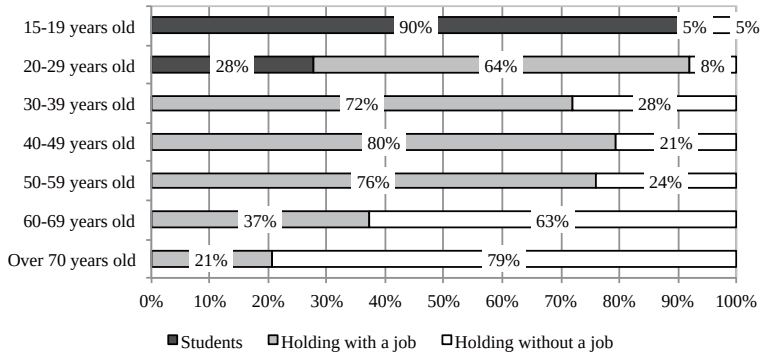

Figure 1 The cross-tabulation of age and occupation

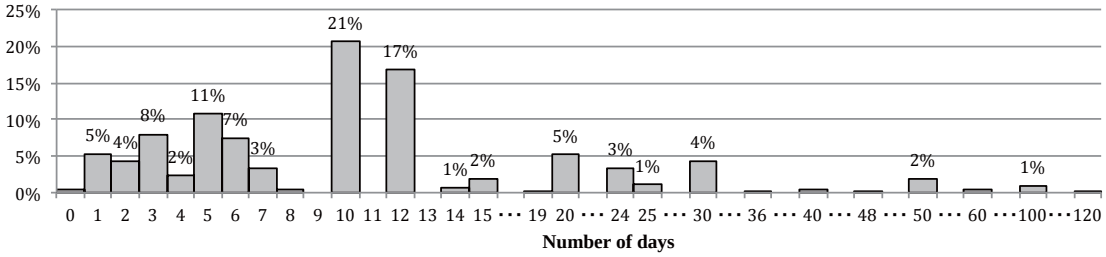

Figure 2 The desired number of participation days in green space conservation activities (WTW)

The results of the chi-squared test indicated a significant difference in participation experience by age (p= .038). Further residual analysis revealed that many 20-29 year-olds had participation experience in comparison to residents of other age groups.

3.2. Desired number of participation days

The desired number of participation days in green space conservation activities (WTW) is shown in the figure 2. The mean WTW was 12.1 days, with the most common response being 10 days (156 people, 20.6%) followed by 12 days (127 people, 16.8%). Almost 40% of respondents wanted to participate between 10 to 12 days per year.

The Kruskal-Wallis test was used to clarify the relationship between attributes and WTW. This test revealed a significant difference in WTW by age and occupation. However, there was no significant difference in WTW by place of residence, gender, and participation experience. The WTW answer distributions by age group and occupation group were shown in the figure 3 and figure 4. The dotted line indicates the response rate of all respondents in the figures.

The Steel-Dwass test was used to clarify the relationship between WTW and age, and WTW and occupation. This test revealed that the WTW of 15-59 year-olds is significantly lower than that of 60-69 year-olds [(1)]. And, This test revealed also that the WTW of 15-49 year-olds is

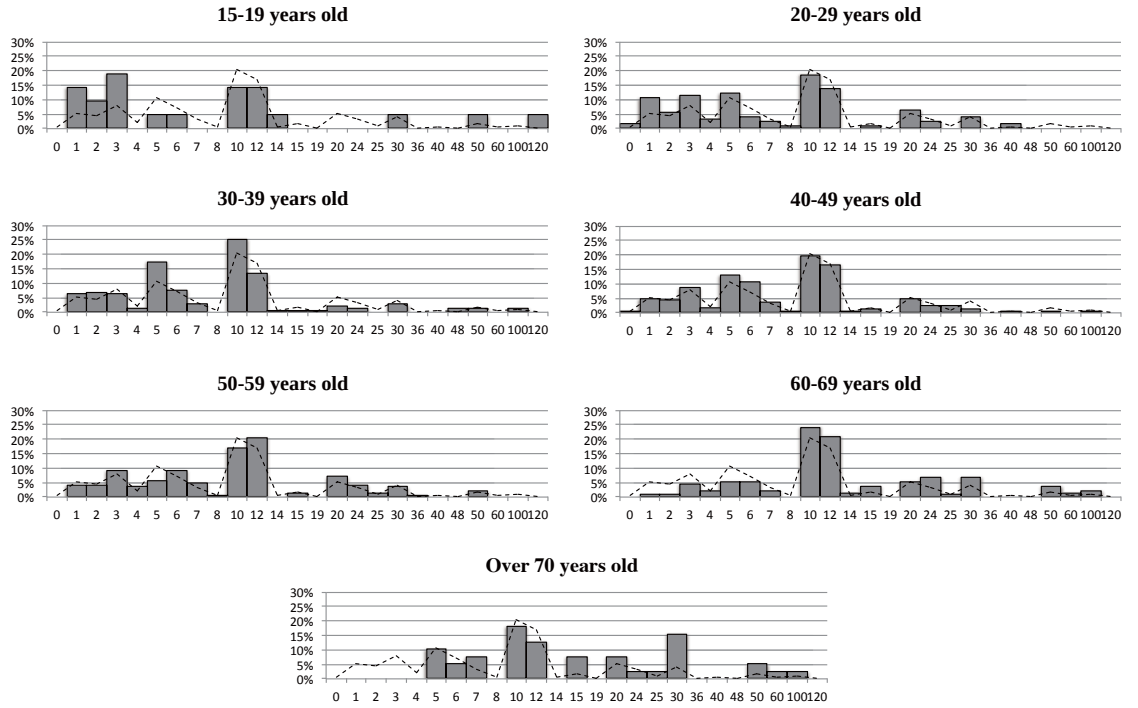

Figure 3 The WTW answer distributions by age group

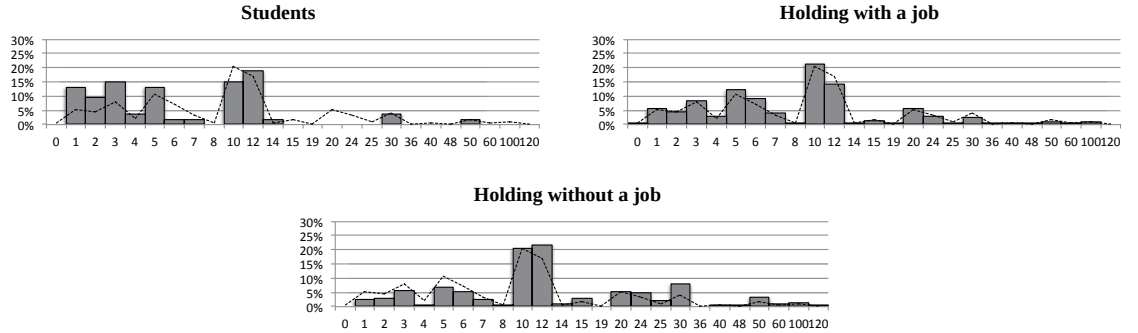

Figure 4 The WTW answer distributions by occupation group

significantly lower than that of over 70 year-olds [(2)]. So, they can be said that the elderly have a higher WTW. Looking at the WTW answer distribution by age group displayed in the figure 3, we can see that many 15-19 year olds, over 40% in fact, only want to participate on 1 to 3 days per year. There were almost zero 10-19 year olds who wanted to participate on 20 to 30 days. Amongst the 20-29 age group, similar numbers of respondents wanted to participate on 1 to 3 days and on 10 to 12 days (approx. 30% for each). There were also some 20-29 year olds who wanted to participate on 20 to 30 days. In the 30-39 and 40-49 age groups, there were more respondents who wanted to participate on 5 to 6 days than subjects who only wanted to participate on 1 to 3 days. The most common response amongst these age groups was 10 to 12 days. Amongst 50-59 year olds, the proportion of respondents wanting to participate on 20 to 30 days was higher than all respondent's. Looking at the 60-69 year-old age group, there were few respondents who wanted to participate on 1 to 3, or on 5 to 6 days; almost 50% of these subjects wanted to participate on 10 to 12 days. The proportion of subjects wanting to participate on 20 to 30 days was also higher than all respondent's. Finally, looking at the 70-79 year olds, there were no respondents in this age group who answered they would like to participate on 1 to 3 days. In this age group, number of respondents on 10 to 12 days was almost the same number of respondents on 20 to 30 days (approx. 30% for each). The WTW characteristics of each age group were revealed by focusing on the responses of 1 to 3, 5 to 6, 10 to 12, and 20 to 30 days.

On average, the respondents without holding a job had the highest WTW, followed by the employed, with students having the lowest WTW. Students, most commonly, wanted to participate on either 1 to 3 days or on 10 to 12 days (approx. 35% for each). There were almost zero students who wanted to participate on 20 to 30 days. No differences were observed between the responses of employed respondents and the all respondent's.

3.3. Desired method of support

The responses to the desired method of supporting green area conservation are shown in the figure 5. Respondents were asked whether they preferred to provide " financially supporting conservation activities through donations, etc." or "supporting conservation activities by actually participating and performing volunteer work". Preference for providing monetary

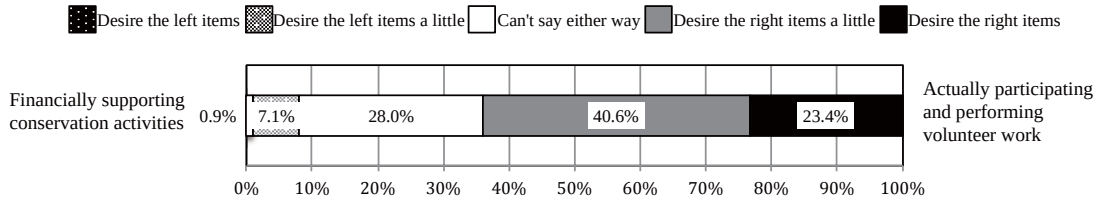

Figure 5 The WTW answer distributions by occupation group

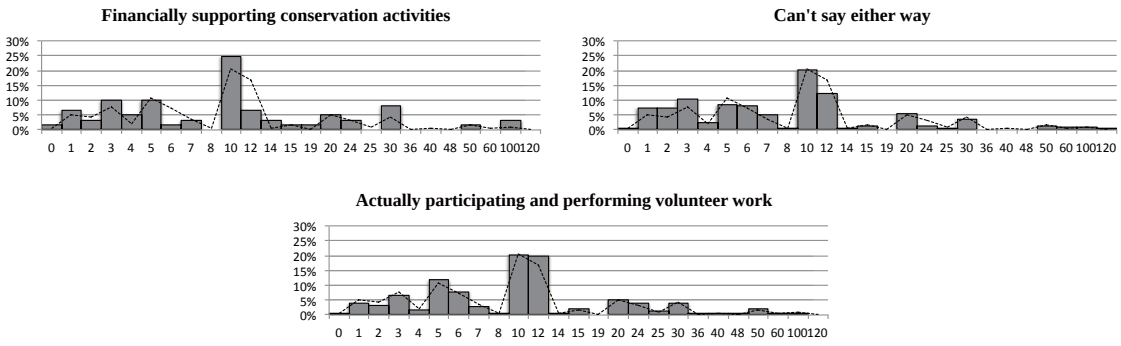

Figure 6 The WTW answer distributions in desired method of support

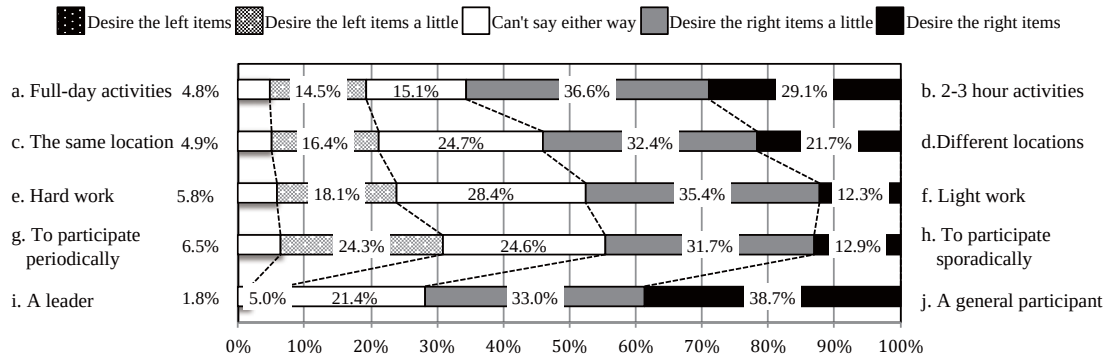

Figure 7 The responses to the desired participation style

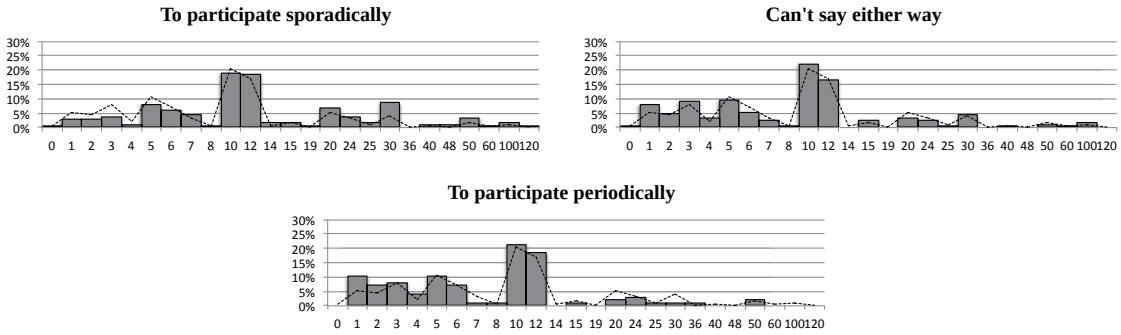

Figure 8 The WTW answer distributions in desired participation frequency

support was 8.0%, labor support was 64%, and 28% were undecided. These results suggest that WTW is an index of a citizens' disposition to participate in green space conservation activities. The Kruskal-Wallis test was used to analyze the relationship between desired support method and desired number of participation days, and revealed a significant difference in WTW ($p < .01$) [(3)]. The results of the Steel-Dwass test also revealed significant differences in WTW between respondents who answered "can't say either way" and those who responded "supporting conservation activities by actually participating and performing volunteer work"($p < .01$). Namely, WTW amongst those responding "can't say either way" was lower. The WTW answer distributions by each response group were shown in the figure 6.

3.4. Desired participation style

The responses to the desired participation style in green area conservation are shown in the figure 7. The desired method of participation was as general participant (71.7%), and the desired activity time period was 2-3 hours (65.7%). Desired activity content was light labor (54.1%), and 47.7% of participants requested to participate at different locations. Desired participation frequency was to participate sporadically (71.7%).

We then analyzed differences in WTW by desired participation style. The Kruskal-Wallis test revealed significant differences in WTW by activity content and participation frequency ($p < .01$) [(3)]. However, there was no significant difference in WTW by activity time, activity location, participation frequency, and method of participation.

The Steel-Dwass test was used to analyze activity content and participation frequency. In terms of activity content, there were significant difference in WTW between those who responded "hard work such as logging" or "light work such as weeding and picking up garbage", and those who responded "can't say either way". Namely, the average WTW of those responding "can't say either way" was lower.

In terms of participation frequency, there were significant difference in WTW between those

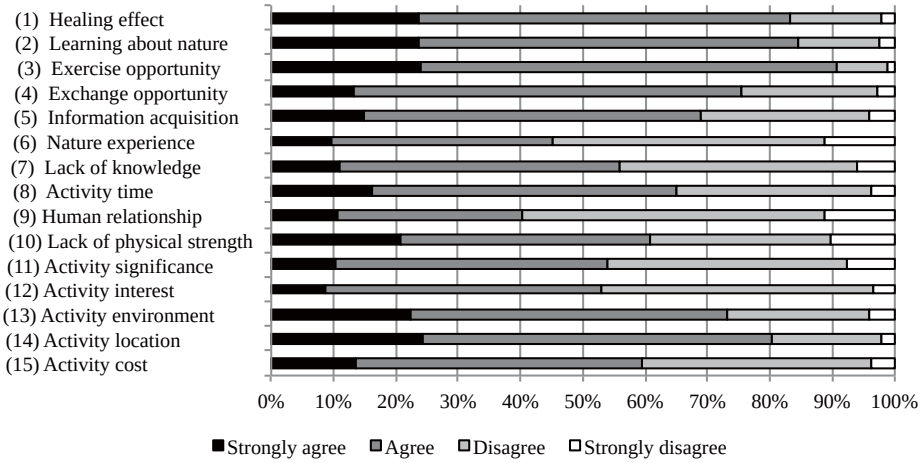

Figure 9 The responses to attitudes towards participation in green space conservation activities

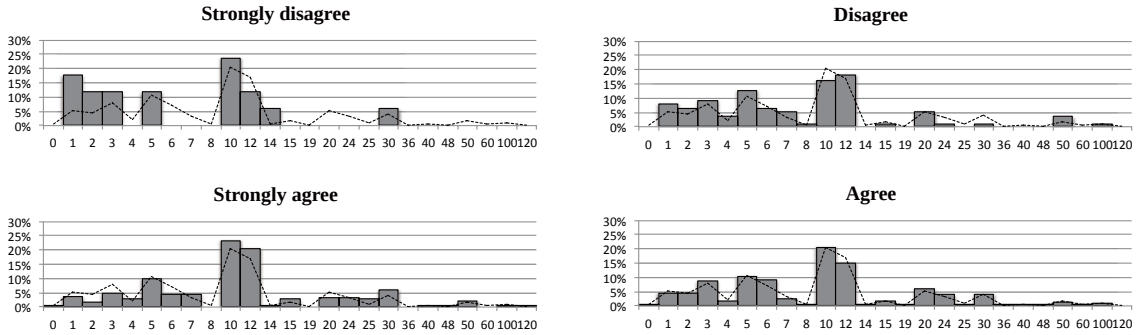

Figure 10 The WTW answer distributions in healing effect

who responded "wanted to participate sporadically" or "can't say either way", and those who responded "want to participate periodically ". The WTW answer distributions by each response group were shown in the figure 8.

It goes without saying that respondents who answered "want to continue to participate on a regular basis" didn't want so much to participate on just 1 to 3, or on 5 to 6 days per year; many of these respondents wanted to participate on 20 to 30 days. Likewise, many respondents answered "wanted to participate sporadically" wanted to participate on just 1 to 3, or on 5 to 6 days per year; few wanted to participate on 20 to 30 days.

3.5. Factors behind participation and attitudes towards issues related to participation

The responses to attitudes towards participation in green space conservation activities are shown in the figure 9 [(4)]. We analyzed differences in WTW by attitude toward participation in conservation activities. The results of the Kruskal-Wallis test revealed significant differences in WTW by the responses to all four questions on factors behind participation [(5)]. There were also significant differences in WTW by "activity time" and "human relationships", issues related to participation[(6)].

The Steel-Dwass test was used to analyze the questions in which significant differences in WTW were observed. Significant differences in WTW were observed between respondents who answered "strongly disagree", and respondents who answered "strongly agree" with regards to "healing effect", "learning about nature", and "exercise opportunity". Significant differences in WTW were also observed between respondents who answered "strongly disagree", and subjects who answered "agree" or "strongly agree" with regards to "exercise opportunity". Namely, the

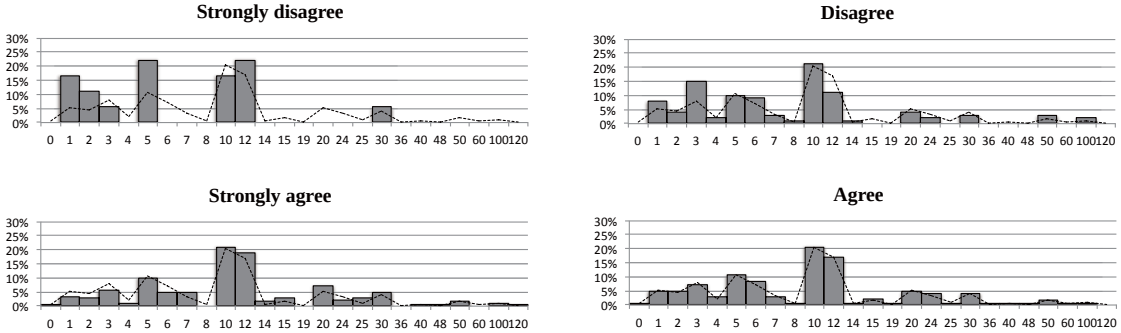

Figure 11 The WTW answer distributions in Learning about nature

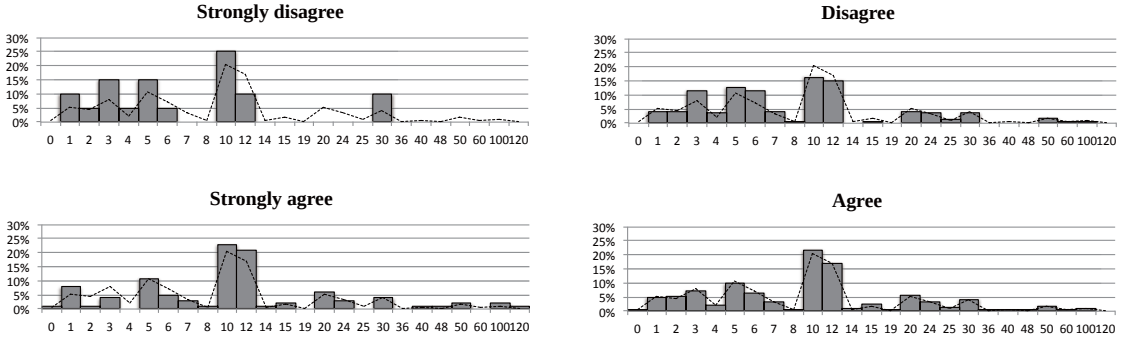

Figure 12 The WTW answer distributions in exchange opportunity

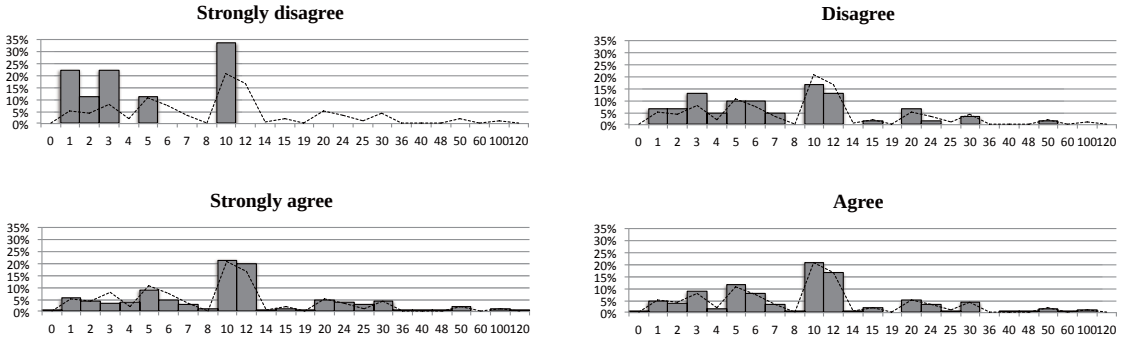

Figure 13 The WTW answer distributions in exercise opportunity

group with weaker feelings towards the factors behind participation had a lower WTW on average, and the group with the stronger feelings towards the factors behind participation had a higher WTW on average. The WTW answer distributions by each factors behind participation were shown in the figure 10-13. In all four questions about factors behind participation, over 30% of subjects who responded "strongly disagree" only wanted to participate on 1 to 3 days per year; a higher proportion than the all respondents. Almost no respondents who answered "strongly disagree" to the four questions about factors behind participation wanted to participate on 20 to 30 days per year.

The WTW answer distributions by "activity time" and "human relationships" were shown in the figure 14 and the figure 15. Significant differences in WTW were also observed by "activity time"; namely, between those responding "strongly agree" and those responding "disagree" and "strongly disagree". It goes without saying that the group with weaker feelings about activity time had a higher WTW on average, and the group with stronger feelings about activity time had a lower WTW on average. 30% of respondents who answered "strongly agree" to the question about activity time wanted to participate on 1 to 3 days per year. Finally, significant differences in WTW were observed by "human relationships"; namely, between those

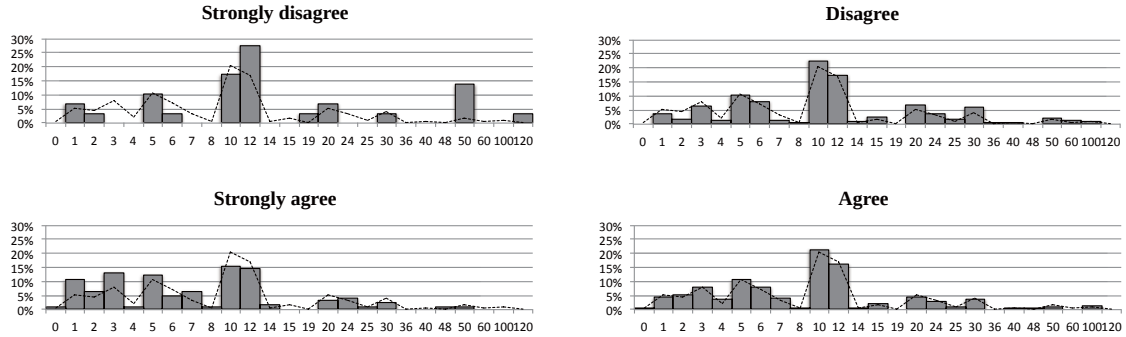

Figure 14 The WTW answer distributions in activity time

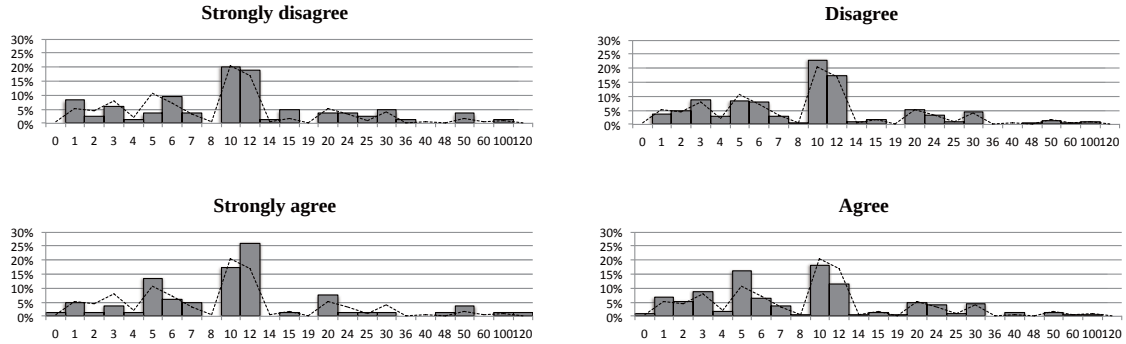

Figure 15 The WTW answer distributions in human relationship

responding "agree" and those responding "strongly agree" and "strongly disagree". A large proportion of respondents who answered "agree" to the question about "human relationships" wanted to participate on 1 to 3, or on 5 to 6 days per year (approx. 20% for each).

4. Discuss and conclusion

4.1. Trend of willingness to work and desired participation style

On average, the respondents of this study have WTW in green space conservation activities on 12.1 days per year. Almost 40% of respondents wanted to participate between 10 to 12 days per year. That is to say, many residents of the Tokyo area have WTW around once a month. Many respondents would prefer to work 2-3 hours at a time, to participate sporadically, performing easy work. So, activities that are easy for residents to participate in may be able to bring out the potential willingness of Tokyo residents to participate in green area conservation activities. Many respondents want to be involved as general participants and engage in activities in a variety of locations. This indicates that constructing a style of participation whereby residents can freely participate in activities in a variety of locations as opposed to the usual style of "joining a local conservation group and continuing to participate in activities in a specific area" may be able to bring out the potential willingness of Tokyo residents to participate in green space conservation activities.

4.2. The relationship between attributes and willingness to work

This study revealed a significant difference in WTW by age and occupation. So, more attention should be given to age and occupation, rather than participation experience, when examining the potential for participation of residents of the Tokyo area with an interest in green area conservation activities.

The most common response amongst each attribute group, regardless of age and occupation, was 10 to 12 days. So it can be said that this most common response of 10 to 12 days amongst

the overall population is not affected by these attributes. Accordingly, the average possibility of participation in conservation activities of residents of the Tokyo area was concluded to be 10 to 12 days per year. So, to take advantage of this potential of residents of the Tokyo area to participate 10 to 12 days per year, it would be suitable to hold around one activity per month.

To summarize the responses based on age and occupation, a high proportion of 10-19 year-olds and students only want to participate on 1 to 3 days per year. Therefore, they prefer one-off activities that they can participate in even on just the single occasion.

There is little possibility of these young people playing a central management-type role in activity groups. Next, a high proportion of 20-39 year-olds and respondents with holding a job want to participate on 5 to 6 days per year. While their WTW is higher than their younger counterparts, they prefer to be involved in activities carried out over short periods of time, or activities they are able to participate in whenever they have the time. Finally, a high proportion of 60-79 year-olds and the respondents without holding a job want to participate on 20 to 30 days per year. These groups have a lot of spare time and prefer continued participation over a longer period of time. People amongst these groups are also more likely to play a central management-type role in activity groups. To summarize the discussion on the relationship between attributes and WTW, constructing activities that younger people can participate in for short periods of time while also maintaining the usual management-type roles played by those in their 60s and 70s is considered the best method of bringing out the potential willingness of Tokyo residents to participate in green space conservation activities. In addition, holding activities around once a month is considered the key to encouraging the participation of all generations.

4.3. The relationship between desired participation style and willingness to work

Looking at the relationship between residents' desired participation style and WTW, it is only natural that a relationship between participation frequency and WTW was observed. However, there was no significant difference in WTW as a result of any of the other items under desired participation style. So, we consider that the WTW of residents of the Tokyo area is unlikely to be affected by desired participation style. Looking at participation frequency, many of those who wanted to participate sporadically only wanted to participate on 1 to 3 days per year. So, it goes without saying that 1 to 3 days per year is recognized as "sporadic". On the other hand, many of those who wanted to participate regularly wanted to participate on 20 to 30 days per year, so 20 to 30 days per year, or once every 2 weeks, can be considered as being recognized as "regular". However, a large proportion of respondents, both those who wanted to work "sporadically" and those who wanted to work "regularly", wanted to participate on 10 to 12 days per year. So, it is important to note that some respondents considered 10 to 12 days to be "regular participation" while others considered the same 10 to 12 days to be "sporadic participation". A detailed analysis of the differences between persons who consider 10 to 12 days to be "regular participation" and persons who consider the same 10 to 12 days to be "sporadic participation" is necessary in the future.

Next, we looked at attitude towards participation in green space conservation activities, and clarified the relationship between WTW and all four factors behind participation: "learning about nature", "exercise opportunity", "exchange opportunity", and "healing effect". Respondents with a high WTW were the respondents who answered "strongly agree" to the questions about factors behind participation. On the other hand, respondents who answered "disagree" and "strongly disagree" to these questions had a lower WTW, with many of these

respondents only wanting to participate on 1 to 3 days of the year. So, it is clear that whether or not residents of the Tokyo area can fully feel the benefits of participating in green space conservation activities influences their WTW, even if they already had an intention to participate.

We also looked at the responses to the 11 questions asked about issues related to participation and clarified the relationship between WTW, human relationships, and activity time. While it is necessary to solve issues related to participation, we think allowing residents of the Tokyo area to realize the benefits of participating in conservation activities will increase their WTW. Distinctive characteristics in WTW could be seen amongst respondents who answered "agree" to the question about human relationships. Many of these respondents wanted to participate on 1 to 3, or on 5 to 6 days per year. It can be said the concern about "whether I will be alone when doing activities and unable to talk well with others" is a factor that reduces WTW. Distinctive characteristics in WTW could also be seen amongst respondents who answered "strongly agree" to the question about activity time. Many of these respondents only wanted to participate on 1 to 3 days per year. So, obviously the concern of "don't have the time, and don't think I can continue to fit the activities into my schedule" can be considered another factor that reduces WTW. To summarize, we believe that focusing on the benefits of participation in conservation activities, rather than focusing on the desired participation style, will increase the WTW of residents of the Tokyo area. In other words, it is essential to make residents of the Tokyo area fully realize the benefits of participating in conservation activities in order to increase their WTW.

4.4. Conclusion

In this study, we clarified the potential of Tokyo area residents to participate in green space conservation activities based on their willingness to work in green space conservation activities. Furthermore, we clarified the residents' preferred participation methods. The results of this study are mainly 3 points. First, we reveled trend of willingness to work and desired participation style. Second, we revealed the relationship between attributes and willingness to work. Third, we revealed desired participation style and willingness to work. Clarifying the willingness to work of residents of the Tokyo area by comparing the results from residents of the Tokyo area and residents throughout Japan is an issue for future research.

Acknowledgment

This work was supported by JSPS KAKENHI Grant Numbers 23656355 and The Sumitomo Foundation.

Notes:

(1) The p-value between their teens-forties and their sixties is less than .01. The p-value between their fifties and their sixties is .012.

(2) The p-value between their twenties-forties and their seventies is less than .01. The p-value between their teens and their seventies is .010.

(3) Respondents were asked to provide answers on a five-point scale. However, few respondents gave certain answers. So, it was necessary to re-categorize "place importance on the left" and "somewhat place importance on the left" to "place importance on the left", and "place importance on the right" and "somewhat place importance on the right" to "place importance on the right".

(4) Takase et al.[1)] has provided a consideration of the attitudes towards factors behind participation and issues related to participation themselves. Therefore, we have omitted consideration of these attitudes in this paper.

(5) The p-value were less than .01 in "healing effect", "learning about nature", and "exercise opportunity". The p-value was .025 in "exchange opportunity".

(6) The p-value were less than .01 in "activity time". The p-value was .046 in "human relationships".

Reference:

1) Takase et al. , 2014. Challenges to Promote Participation in Conservation Activities Based on differences of attitude between Citizens and Open space Conservation Activity Organizations. Journal of the Japanese Institute of Landscape Architecture,.77(5):553-558. (In Japanese with English Abstract)

2) Nakajima et al., 2006. A study on the suburban inhabitants' thinking process until leading to belong to the open-space conservation activity: a case study in suburban Tokyo city. Environmental information science. Extra, Papers on environmental information science,. 20:199-204. (In Japanese with English Abstract)

3) Muranaka,A.and T.Terawaki, 2005. Socioeconomic Evaluation for Benefits of Satoyama Forest Management by Stated Preference Measures: Analysis of Willingness to Pay and Willingness to Work from Inhabitants around the Kannon Forest in Okunaka Hamlet, Naka Town Hyogo Prefecture, Japan. Japanese Journal of Human Geography,. 57(2): 27-46. (In Japanese with English Abstract)

4) Kuramoto, N. and K. Nagai, 2002. Opinions About the Activities and Organization of volunteers Working for the Conservation of the Coppice in Sakuragaoka Park in Tokyo,. Journal of the Japanese Institute of Landscape Architecture,.65(5):455-460. (In Japanese with English Abstract)

5) Takase,Y. and K.Furuya, 2013. Issues in Promoting Participation in Open Space Conservation Activities and Priority Ranking of Solutions from University Students' Perspectives,. Journal of the Japanese Institute of Landscape Architecture,.76(5):717-722. (In Japanese with English Abstract)