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School forests in South Korea are trees and vegetation areas within schoolyards, and they provide natural environments for schools and neighborhoods. After the Korea Forest Service (KFS) and local governments create these school forests, the management of school forests transfers to the host schools. Some studies suggest that experiences with school forests positively affect student temperament. However, little is known about how schoolteachers use school forests or how school forests are managed. This study addresses these knowledge gaps by exploring schoolteachers' opinions on school forests. Data were obtained from an online survey of schoolteachers in South Korea ($N = 149$). This survey found that schoolteachers frequently visit school forests, but their most significant problem is a lack of time for planning their use of school forests. Furthermore, schoolteachers are satisfied with school forest management. However, this survey showed that schools experience a lack of maintenance funding and a lack of expert advice in management. The KFS and local governments can use these results to support the management of school forests.

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Exploring the Constraints of the Use and Management of School Forests in South Korea

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TABLE OF CONTENTS

	<u>Page</u>
1. Introduction.....	1
1.1. Research Problems and Purpose	7
1.2. Research Questions	8
2. Literature Review.....	11
2.1. The Benefits of School Forests	11
2.2. Schoolteachers' Problems with School Forests	13
2.3. The Importance of Accessible Urban Forests	15
3. Methods.....	20
3.1. Survey Questionnaire.....	20
3.2. Study Sites	23
3.3. Data Collection and Analysis.....	26
3.4. Limitations	29
4. Results.....	31
4.1. Schoolteachers' Use of School Forests	31
4.1.1. Frequency of school forest visits	31
4.1.2. Activities in school forests	35
4.1.3. Educational purposes	38
4.1.4. Problems with the use of school forests.....	41
4.2. School Forests as Neighborhood Urban Forests	44
4.2.1. School forests in neighborhoods	44
4.2.2. School forests in Korean provinces	47
4.2.3. Components of school forests	51

4.3. The Management of School Forests	53
4.3.1. Schoolteachers' satisfaction with management	53
4.3.2. Management support in Korean provinces	56
5. Discussion	59
5.1. Schoolteachers' Use of School Forests	60
5.2. The Value of School Forests in Neighborhoods	64
5.3. The Need for School Forest Management	67
6. Conclusion	69
Bibliography	73
Appendix.....	77
Appendix: Questionnaire with Results	78

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. The area of urban forests in Korean provinces	6
2. The number and area of school forests in Korean provinces.....	25
3. Summary of school information	28
4. Summary of school type	30
5. The frequency of schoolteachers' visits according to school type	33
6. The frequency of schoolteachers' visits in the percentage of school forests.....	34
7. The frequency of schoolteachers' visits according to the satisfaction of management	34
8. Schoolteachers' activities according to school type	37
9. Schoolteachers' educational purposes according to school type	40
10. Schoolteachers' problems according to school type.....	43
11. Summary of schoolteachers' opinions and school information.....	46
12. Schoolteachers' opinions on school forests	49
13. The frequency of residents' use of school forests.....	50
14. Components of school forests to promote local residents' visits.....	52
15. Components of school forests to discourage residents from visiting forests.....	52
16. The satisfaction of school forest management.....	55
17. Support for the management of school forests	55
18. Management problems of school forests	56
19. Support for management in Korean provinces	58

1. Introduction

In South Korea, there are two types of urban forests—neighborhood urban forests and other urban forests—and, nationally, neighborhood urban forests are considered more important than other urban forests. All types of urban forests were categorized as either neighborhood urban forests or other urban forests when the Korea Forest Service (KFS), which manages urban forest policy nationally, established the National Plan for Urban Forests (KFS, 2008). For example, neighborhood urban forests include living-zone parks, green areas, and school forests, all of which are easily accessible in neighborhoods. Other urban forests, such as recreational forests and natural park zones, are not usually located in neighborhoods. The KFS describes neighborhood urban forests as more necessary to urban residents than other urban forests because urban residents easily access neighborhood urban forests. Based on the area of neighborhood urban forests and urban population, the KFS set a national goal of the National Plan for Urban Forests, which was to increase the national average of neighborhood urban forests per capita from 7 m² in 2008 to 10 m² by 2017 (KFS, 2008). Thus, the KFS nationally emphasizes the increase of neighborhood urban forests per capita, which in turn promotes the area of accessible urban forests in urban areas.

Although the KFS emphasizes the increase of neighborhood urban forests per capita from 2008 (KFS, 2008), locally, Korean provinces have a significantly small percentage of neighborhood urban forests, which means that most of the urban forests are not generally located in neighborhoods. For example, the percentage of neighborhood urban forests in the total urban forests ranges from 1% (provinces of Jeollanam-do,

Gangwon-do, and Jeju) to 35% (province of Seoul) (see Table 1). Seoul has 35% neighborhood urban forests, which is the largest percentage among Korean provinces. Nevertheless, its neighborhood of urban forests per capita is only 4.35 m², which is the lowest among Korean provinces.

Based on the KFS' (2008) explanation, neighborhood urban forests are more necessary to urban residents than other urban forests due to the accessibility of urban forests in neighborhoods. Neighborhood urban forests per capita represent the amount of accessible urban forest to urban residents. A few Korean provinces significantly restrict the amount of accessible urban forest. For example, five out of 17 provinces (Seoul, Incheon, Sejong, Daegu, and Gyeonggi-do) have considerably lower neighborhood urban forests per capita than the national average of neighborhood urban forests per capita (8.32 m²) (KFS, 2014). It is a significant problem that two provinces—Seoul and Gyeonggi-do—contain approximately half of the Korean urban population, but their neighborhood urban forests per capita are 4.35 m² in Seoul and 5.29 m² in Gyeonggi-do (KFS, 2014). This is much lower than the national average of 8.32m². Thus, it is necessary to increase the area of neighborhood urban forests in Korean provinces to provide more accessible urban forests to urban residents.

The KFS (2008) categorizes school forests as neighborhood urban forests. Originally, school forests changed a schoolyard into tree and vegetation areas, providing natural environments for students. A Korean non-governmental organization, Forest for Life, created 10 school forests with private company funding in 1999 (KFS, 2015). The KFS then started providing national funding to local governments in 2001. Although the

creation of school forests is the same as its original purpose to enhance natural environments within schoolyards, KFS school forest policy expands its targets from schools to neighborhoods (KFS, 2015). For example, when local governments choose new schools for forests, they must prioritize schools located in areas lacking neighborhood urban forests. Accordingly, the creation of school forests within schoolyards enhances the amount of neighborhood urban forest, and the users of school forests include local residents near schools.

The creation of school forests is an inexpensive way for local governments to increase the amount of neighborhood urban forest. First, the creation of school forests does not require purchasing schoolyards, which means the process is relatively easier than creating new parks. Based on a survey of 151 officials responsible for urban forests in South Korea, acquiring property for the creation of new parks posed a difficult challenge (Kim, Tae, Chang, & Kim, 2010). Second, the establishment of new school forests attracts sponsorship from different stakeholders. For example, traditionally the KFS and local governments jointly fund school forests. Recently, public-private sponsorships have financially supported a number of new school forests, usually combining private company funding and non-governmental organization labor. Such public-private sponsorships created 20 school forests between 2012 and 2015 (KFS, 2016a). Thus, when local governments create accessible urban forests in neighborhoods, all schoolyards are noticeably good places requiring less funding if the school members agree to the forests.

After local governments create new school forests, the management of school forests transfers them to the host schools. When local governments choose new schools for the forests, they consider whether schoolteachers and school staff want school forests and understand the responsibility of management (KFS, 2016b). Funding from the KFS and local governments provide management support for the schools. For instance, the KFS and local governments hire coordinators who can assist the schools with expert advice on forest management (KFS, 2016a). Although these coordinators are experts on trees because they are arborists or have working experiences in forests, the KFS and local governments also provide them with training programs to promote their knowledge of school forests every year. Thus, the local governments create school forests with the schools' agreement of management, and the schools manage the school forests with support from the local governments.

The number of school forests increases significantly every year because natural environments and students' experiences in school forests benefit students (KFS, 2015). For example, research showed that students' thoughts about forests were associated with their aggressiveness (Son & Ha, 2013). Students with school forests thought forests were more enjoyable places than those without school forests; similarly, those students with school forests showed less aggressiveness than those without school forests. Moreover, students were more likely in a good mood in a large size of forested area per student (16–65 m²) than those in a substantially small size of forested area per student (2–4 m²) (Jeong, Shin, Yeoun, Lee, & Lee, 2010). Research also showed that students' experiences with nature were considerably more important than the school forests themselves (Shin &

Ryu, 2004). There were significant differences in students' temperaments between those with and without forests. Students who experienced nature showed more adjustment, focus, and persistence than those without such experience. There were no differences in students' temperaments when they did not experience nature. Therefore, students' experiences with nature are more beneficial to students than the school forests themselves.

As previously mentioned, there is a significant disparity regarding the distribution of accessible urban forests across the country. The KFS deals with a lack of accessible urban forests on a national level. However, a few Korean provinces still restrict the amount of accessible urban forest. School forests created within schoolyards provide accessible urban forests, and these natural environments and experiences in school forests benefit students.

Table 1. The area of urban forests in Korean provinces¹

Province	Total (ha)	Urban forests				Neighborhood urban forests per capita (m ²)
		Other		Neighborhood ²		
		ha	%	ha	%	
Seoul	12,777	8,366	65	4,411	35	4.35
Busan	23,947	20,523	86	3,424	14	9.90
Incheon	12,845	11,169	87	1,676	13	5.95
Sejong	406	366	90	40	10	5.66
Ulsan	18,194	16,431	90	1,763	10	16.16
Gwangju	16,519	15,176	92	1,343	8	9.12
Daejeon	24,984	23,132	93	1,852	7	12.08
Daegu	27,416	25,479	93	1,937	7	7.88
Jeollabuk-do	57,184	53,804	94	3,380	6	23.34
Gyeongsangnam-do	77,491	74,694	96	2,797	4	10.63
Gyeonggi-do	170,000	163,957	96	6,043	4	5.29
Chungcheongnam-do	49,661	48,231	97	1,430	3	10.25
Chungcheongbuk-do	68,654	67,020	98	1,634	2	13.04
Gyeongsangbuk-do	106,946	104,666	98	2,280	2	11.25
Jeollanam-do	115,801	114,102	99	1,699	1	13.19
Gangwon-do	223,150	220,863	99	2,287	1	18.91
Jeju	89,387	88,871	99	516	1	9.20
Total	1,095,362	1,056,850	96	38,512	4	8.32

¹ This table is based on the national statistics of urban forests (KFS, 2014).² This table is ordered by the percentage of neighborhood urban forests from the largest to the smallest.

1.1. Research Problems and Purpose

The use and funding of school forests requires clarification: if school forests are not used by schoolteachers and local residents, then it is necessary for school funding to support other urban forest projects. A survey of 300 schoolteachers found that less than half do not have programs in school forests (Gallup Korea [GK], 2013). This implies that less than half of students do not experience school forests even though there are school forests within schoolyards. In addition, only 3% of schoolteachers agreed that school forests are for local residents, whereas 93% reported that school forests are educational places for students (GK, 2013). If residents visit school forests, then the schools open them to the public because they are in schoolyards. However, it is not known whether schools provide school forests for residents.

The management of school forests remains unclear: if school forests are not properly managed, it is reasonably expected that they are not used in schools and neighborhoods. Approximately 70% to 80% of school forest funding supports planting trees and vegetation in schoolyards (KFS, 2016b), which means trees and vegetation need maintenance, such as pruning and removal. It is predicted that schools might need additional financial support for the management. For example, a survey of schoolteachers reported lack of maintenance funding and lack of experts as problems (GK, 2013). Although in 2016 local governments hired 45 coordinators to advise the management of school forests, this number is substantially lower than the 1,456 schools with such forests (KFS, 2016a). Although the management of school forests is important to maintain school forests in good conditions, little attention has been paid to their management.

Based on this situation, this study sets out to explore the use and management of school forests. The use of school forests by both schoolteachers and local residents describes the necessity of school forests in schools and neighborhoods. In addition, schools' difficulties in management reveal whether schools need additional supports for their management of school forests.

1.2. Research Questions

This study focuses on the use and management of school forests with seven research questions.

First, schoolteachers' use of school forests was assessed across school types with three research questions (RQs):

(RQ1): How frequently do schoolteachers use school forests?

(RQ2): What kind of activities do schoolteachers do with students in school forests?

(RQ3): What are their purposes and their problems with the use of school forests?

Because there are three different school types—elementary, middle, and high—it is valuable to note that schoolteachers might use school forests differently. Previous research showed that experiences with nature in school forests are more beneficial to students (Shin & Ryu, 2004). However, less than half of schoolteachers do not have programs relating to school forests (GK, 2013). Unfortunately, previous studies do not focus on how schoolteachers use school forests, and what kind of problems they have

using school forests. This study addresses schoolteachers' problems, which are necessary for school forest policy to support those who provide students' experiences with nature.

Second, the local residents' use of school forests was assessed based on schoolteachers' opinions in each province:

(RQ4): Do schoolteachers think that school forests are neighborhood urban forests, and do residents use school forests?

(RQ5): What kind of opinions do schoolteachers have about the design of school forests?

According to school forest policy, local governments must consider a lack of neighborhood urban forests when choosing new schools for forests (KFS, 2016b). However, a previous survey showed the majority of schoolteachers do not agree on making school forests available for local residents (GK, 2013). Even though schoolteachers are not residents, their opinions are helpful for understanding the current use of school forests as neighborhood urban forests in each province.

Third, the management of school forests was investigated in each province with two research questions:

(RQ6): Do schools need additional support for the management of school forests?

(RQ7): How do schools manage school forests with school support and outside support in each province?

Schools currently manage school forests with assistance from the local governments. However, a survey of schoolteachers indicated a lack of maintenance funding and a lack of experts, which means that schools might need additional support for management (GK,

2013). Therefore, how schools manage school forests and how local governments support schools were examined in each province with RQ6 and RQ7.

This study had seven research questions about the use and management of school forests. The first three research questions assessed the use of school forests among the different school types. The use of school forests as neighborhood urban forests and the management of school forests were revealed in each province.

2. Literature Review

2.1. The Benefits of School Forests

Natural environments and nature experiences in schools benefit students and schoolteachers. For example, potted plants in a classroom positively influenced students' health and behavior (Han, 2008). Students in a classroom with potted plants showed less sick leave and punishment than those in a classroom without plants. When there were green spaces within schoolyards, both male and female students were more likely to play in green areas, which were the only places with no gender differences among sports areas and other places within schoolyards (Lucas & Dymont, 2010). Furthermore, when schoolteachers use natural environments for their classes, both schoolteachers and students benefit. For example, gardening experiences in school gardens promoted students' knowledge of plants, which means that school gardens used for classes helped students to understand course topics (Wells et al., 2015). Schoolteachers in Canada were more inspired when they had classes in green schoolyards compared to their experiences of indoor classes (Dymont, 2005). Consequently, students prefer natural environments within schoolyards, and when schoolteachers use natural environments for their classes, nature experiences benefit both schoolteachers and students.

In South Korea, the creation of school forests provides more trees in schoolyards; forested areas within schoolyards are associated with students' mood and their satisfaction with school forests. For example, schools with forests had two times more trees and three times more tree species than those without forests in the city of Chung-ju (Ju, Kim, Kuk, & Yoon, 2010). Research showed that treed areas in schoolyards were

related to students' satisfaction with school forests (Jang, Jung, Jang, Kim, & Oh, 2009). Students were less satisfied with school forests when there was less area of school forests per student and less percentage of school forests in school areas. After the creation of school forests in nine elementary schools, the average area of school forests per student was 14.05 m² and the average percentage of school forests in school areas was 13.7%. Students' satisfaction with school forests was the lowest in two schools that had the least area of school forests per student (1.08 m² and 2.41 m²) and the least percentage of school forests in school areas (5.8% and 8.56%) among nine elementary schools. Another study showed that students with more area of school forests per student (16–65 m²) showed higher mood stability than those with extremely less area of school forests per student (2–4 m²) (Jeong et al., 2010). Thus, although the area of school forests per student and the percentage of school forests used in these previous studies depended on the size of schoolyards and the number of students, it is generally accepted that more forested areas within schoolyards benefits students' mood and their satisfaction.

The importance of students' experiences in school forests is widely recognized when schools have forests. For instance, students who attended schools with forests were more likely to think forests were enjoyable places (Son & Ha, 2013). Students with enjoyable experiences toward forests showed less aggressiveness than those without school forests. Research also indicated contrasting findings between elementary and both middle and high school students because studying for college starts in middle school in South Korea, which means both middle and high school students do not have time for nature experiences in their school life (Shin & Ryu, 2004). Elementary students with

school forests were more likely to show differences in temperament, such as adjustment and persistence in ability to focus on one task, whereas there were no differences in temperament of middle and high school students with and without school forests. Thus, students with nature experiences in school forests get more benefits than those without nature experiences in school forests.

Schoolteachers play a key role in providing students with nature experiences because they manage the classes, but little is known about their use of school forests. According to a survey of schoolteachers, less than half do not have programs in school forests, which means less than half of students do not experience school forests (GK, 2013). However, these findings do not prove how often schoolteachers use school forests and what kind of activities they do with students. This study investigated the schoolteachers' use of school forests. These findings may be helpful for the KFS and the local governments to confirm the usefulness of school forests as educational places.

2.2. Schoolteachers' Problems with School Forests

Schoolteachers play a key role in providing students with nature experiences. When schoolteachers considered students' outgoingness towards green spaces outside schools, their attitudes were more important than the distance to green spaces (Wolsink, 2015). When there were no natural environments, such as school gardens within schoolyards, students' field trips were necessary to provide them with experiences in nature. The close distance to green spaces was associated with the frequency of students' field trips. However, schoolteachers' attitudes based on their experiences and positive feedback from students and parents made them go out with students despite the distance

to destinations. Thus, schoolteachers' attitudes about their students' experience in nature are significantly more important than the distance to the green spaces.

It is worthwhile to explore schoolteachers' problems related to students' experiences in nature, such as weather, etc. For example, a survey reported by 257 Swiss elementary school teachers found that weather was a problem for schoolteachers to have classes in forests located an average of 1.2 km from their schools (Lindemann-Matthies & Knecht, 2011). However, the significance of weather as a problem reported by schoolteachers depended on their experiences. Schoolteachers who previously conducted classes in forests showed less importance towards weather than those who had not conducted classes in forests. In addition, a survey of 190 middle school teachers in the US proved the importance of tests, state standards, and a lack of funding that prevented them from conducting environmental education (Ernst, 2009). Schoolteachers who previously conducted environmental education thought these problems less significant than those who did not experience environmental education. Apparently, schoolteachers' problems appear different in outdoor settings, and such significance is generally inconsistent with the schoolteachers' experiences.

In South Korea, a major focus of school forests is their benefit to students. Although schoolteachers play a key role in providing students with nature experiences, previous work is limited to schoolteachers' problems with the use of school forests. A survey of 300 schoolteachers indicated their dissatisfaction with school forests because of the small size, lack of maintenance funding, and lack of experts (GK, 2013). However, it is complicated that these three reasons are related to schoolteachers' use of school forests.

Previous studies in other countries have examined schoolteachers' problems preventing students' outdoor activities (Ernst, 2009; Lindemann-Matthies & Knecht, 2011); therefore, this study conducted a survey of South Korean schoolteachers to examine their issues. These results may be helpful for schools to define schoolteachers' problems with students' experiences in school forests.

2.3. The Importance of Accessible Urban Forests

The accessibility of urban forests is widely recognized as a critical issue in urban areas. For example, unevenly distributed green spaces decreased residents' access to urban parks, which relates to quality of life, such as recreational opportunities (Wolch, Byrne, & Newell, 2014). The close distance to green spaces promoted residents' daily activities, such as jogging and walking, which ultimately relates to their health (Neuvonen, Sievänen, Tönnnes, & Koskela, 2007). Children living near parks were more likely to do outdoor activities than those without parks (Epstein et al., 2006). For this reason, an indicator of urban forests is used to assess the accessibility of urban forests.

For example, one indicator for examining the accessibility of urban forests examines the amount of green area in urban areas as the percentage of citizens living within 300 m of green areas larger than 5000 m² (Ambiente Italia Research Institute [AIRI], 2003). Similarly, another indicator is the percentage of population within 300 m of green spaces larger than 1 ha (World Health Organization [WHO], 2016). Ultimately, these two indicators show the distance of 300 m is commonly used as an accessible distance from residential areas to parks, and it is reasonably expected that an increase in the amount of urban forests can partially achieve their accessibility in urban areas.

The small size of green spaces contributes to the increased amount of urban forest. For urban areas with packed buildings, the creation of small green spaces can be easier than the creation of large parks because it is hard to find significant places for new parks. For example, an abandoned or unused small area, such as a railroad side, can be changed into green space, which is valuable for increasing the amount of green space (Wolch et al., 2014). A schoolyard that has become green space enhances the amount in urban areas (Iojă, Grădinaru, Onose, Vânău, & Tudor, 2014). Thus, the small size of a place, such as a railroad side or schoolyard, can help increase the amount of green space in urban areas.

Although the size of each green space is relatively small, it is possible that the total area of small green spaces is significantly important in urban areas. For example, the size of each garden with houses ranged from 155 m² to 253 m², which are extremely small, but the total area of gardens was approximately 22% to 27% of the total green spaces in five cities in the UK (Loram, Tratalos, Warren, & Gaston, 2007). Trees, vegetation, and soils in these gardens were valuable assets to mitigate environmental problems, such as air quality and water quality (Cameron et al., 2012). Similarly, residential yards were the most cost-efficient green spaces than other urban forests, such as park trees in Chicago in the US (McPherson, 1994). When considering maintenance costs, residential yards showed less dead trees than those in parks. Yard trees around houses provided shading and wind blocks that contributed to homeowner energy savings. Thus, the small size of tree and vegetation areas, such as gardens and yards, are beneficial assets to urban environments.

The small size of parks is also important. For example, urban dwellers visited small parks on their way home or when headed somewhere (Peschardt, Schipperijn, & Stigsdotter, 2012). The close proximity of parks to residential areas was related to the frequency of residents' visiting neighborhood parks (Neuvonen et al., 2007), but the distance from the residents' houses to small parks was not critical. More people traveled a longer distance to small parks than those who travelled a short distance to small parks. Thus, small parks also matter to urban residents just as neighborhood parks do.

In South Korea, school forests are neighborhood urban forests, which means school forests are usually located in neighborhoods and natural elements are considered important in the creation of school forests. According to school forest policy, the size of school forests is at least .05 ha; approximately 70% to 80% of school funding supports planting trees and vegetation (KFS, 2016b). The majority of the funding, which supports natural elements, is essential to promote rest environments and provide playful places for students. For example, research showed the importance of natural elements for rest environments in a small park (Nordh & Østby, 2013). When participants were asked about important assets for rest environments, they highly rated nature, such as trees and grass, more than other components. In addition, when children played in urban parks, more trees and vegetation enhanced the diversity of their activities (Taylor, Wiley, Kuo, & Sullivan, 1998). Thus, these previous studies seem to indicate that natural elements in school forests may be beneficial to urban residents who rest there and to students who play there.

As all urban forests need continuous maintenance (Dwyer, Nowak, & Noble, 2003), trees and vegetation in schoolyards are necessary to management. Both School Ground Greening (SGG) in Canada and school forests in South Korea are similar in that schools have the responsibility of the management. For example, schools must consider maintenance when they create the SGG (Dyment, 2005). To properly manage the SGG, partnerships with local governments are useful for schools because the SGG also contributes to enhancing natural environments in urban areas (Evergreen, 2017). In South Korea, local governments create school forests and inform school members of school forest management (KFS, 2016b). After the creation of new school forests, local governments support expert advice for the management. However, both the SGG and school forests have difficulty in the management. For example, schoolteachers and parents with SGG reported problems, such as lack of funding, lack of time, and difficult maintenance (Dyment, 2005). Schoolteachers with school forests reported the small size of school forests and a lack of both maintenance funding and experts (GK, 2013). Thus, these survey results suggest that management is a critical issue for schools.

In South Korea, previous research was limited to the management of school forests and the use of school forests by residents. Unfortunately, it is unknown whether school forests are currently well managed, and schools get sufficient support from local governments. Although the KFS categorizes school forests as neighborhood urban forests, which means that school forests are accessible urban forests to local residents (KFS, 2008), it is not proven that residents use school forests. To address these

knowledge gaps, this study investigated the current management of school forests and the use of school forests in neighborhoods.

3. Methods

This study conducted an online survey of schoolteachers from schools with school forests in South Korea. It used a quantitative approach for two reasons. First, an online survey was an efficient way to collect schoolteachers' opinions across the country because it approached multiple users in different provinces. Second, data regarding the current use and management of school forests in South Korea would help inform school forest policy which is managed by the KFS, a central government body. Thus, the results of the online survey addressed the overall use and management of school forests in South Korea.

3.1. Survey Questionnaire

The survey questionnaire consisted of four sections: (a) the use of school forests, (b) the role of school forests in neighborhoods, (c) the management of school forests, and (d) general information.

The first survey questionnaire section asked schoolteachers about the frequency of their visits to school forests, along with their activities, purposes, and problems.

(RQ1): How frequently do schoolteachers use school forests?

(RQ2): What kind of activities do schoolteachers do with students in school forests?

(RQ3): What are their purposes and their problems with the use of school forests?

First, schoolteachers were asked about their number of visits to school forests per month and year. The remainder of the section focused on their activities, purposes, and problems. The questionnaire about activities and purposes was based in part on a

previous quantitative study of elementary school teachers in Switzerland (Lindemann-Matthies & Knecht, 2011). Although the previous research surveyed schoolteachers in a different country, it shares objectives with this current study because they had outdoor classes in forests near schools. The questionnaire about problems was adapted from the survey results of middle school teachers in the US (Ernst, 2009). Because the previous survey of middle school teachers in the US not only included schoolteachers who conducted environmental education but also those not related to it, the questionnaire about problems was adjusted to South Korean teachers, regardless of whether they previously used school forests.

The second survey questionnaire section addressed schoolteachers' opinions on school forests as neighborhood urban forests.

(RQ4): Do schoolteachers think that school forests are neighborhood urban forests, and do residents use school forests?

(RQ5): What kind of opinions do schoolteachers have about the design of school forests?

First, schoolteachers were asked whether they agree school forests are public green spaces and whether school forests are open to the public. A previous survey showed that only 3% of schoolteachers agreed that school forests should provide green spaces for residents, and 93% agreed that school forests provide green spaces for students (GK, 2013). It also is necessary to know about school forests being open to the public because they provide residents with accessible urban forests (KFS, 2016b).

Second, schoolteachers were asked about neighborhood environments near schools, such as the existence of other green spaces near schools and the distance to other green spaces, and the frequency of residents' visiting school forests. This is because new school forests are created in areas lacking neighborhood urban forests. The existence of other green spaces and the distance to other green spaces had to do with whether school forests are the only green spaces in neighborhoods. In addition, based on an accessibility indicator using 300 m as the distance to green spaces (AIRI, 2003; WHO, 2016), this study examined whether there were other green spaces within 300 m to determine the value of school forests as accessible urban forests. Fourth, schoolteachers were asked about the important components of school forests. Those questions were adapted from a study on small parks because the components of school forests and small parks are very similar (Nordh & Østby, 2013).

The third survey questionnaire section focused on the current management of school forests and related problems.

(RQ6): Do schools need additional support for the management of school forests?

(RQ7): How do schools manage school forests with school support and outside support in each province?

First, schoolteachers were asked about their satisfaction with school forest management and the percentage of the school forest area in relation to the school area. This study assessed the differences in the frequency of schoolteachers' visits with respect to their satisfaction with the management and the different percentages of the school forest area. This is because a previous survey of schoolteachers identified problems, such

as the small size of school forests, and management problems, such as lack of maintenance funding and lack of experts (GK, 2013). Second, schoolteachers were asked about current support for the management, such as school-based support and outside support other than schools, because schools manage school forests with assistance from local governments. The questionnaire about school-based support was adapted from previous research on environmental education (Fazio & Karrow, 2013). Third, one of the questions asking about management problems was an open-ended question for the purpose of identifying specific problems related to management.

The fourth and final survey questionnaire section collected general school information, such as type (elementary, middle, or high school) and location (Korean provinces). This study only examined the differences in the use and management of school forests across school types and within each province.

3.2. Study Sites

There were 1,456 South Korean school forests in 2015 (see Table 2). Nationally, the total number of school forests increased from 1,272 in 2013 to 1,456 in 2015. Locally, the number of school forests increased in most Korean provinces, while the number of school forests did not increase in two provinces (Seoul and Sejong). Gyeonggi-do remarkably had the highest number of school forests (278) among provinces, whereas Sejong had only four school forests. Although the number of school forests were different in Korean provinces, the increase in the number of school forests showed that the local governments wanted to create new school forests because the KFS and the local governments jointly fund the creation of new school forests (KFS, 2016a).

The total area of school forests and the average area of school forests per school were different in provinces. According to the recent statistics of urban forests in 2014, the total area of the 1,272 school forests was 925 ha (KFS, 2014). The province of Gyeonggi-do had the highest number of school forests (257), but it did not have the largest area of school forests. The province of Busan had the largest area of school forests (203 ha) with 74 schools. Because the KFS (2016b) suggests that a schoolyard becomes a school forest if there is at least .05 ha, the average size of school forests per school in provinces was larger than .05 ha. For example, the national average area of school forests per school was .73 ha, and locally the average area of school forests per school ranged from .09 ha (Jeju) to 2.75 ha (Busan). It is interesting that the province of Sejong showed no area of school forests.

As previously mentioned, the number and average area of school forests per school differed across the 17 provinces. It is important to note that all Korean provinces created school forests, which promoted an average .73 ha size of neighborhood urban forests in South Korea.

Table 2. The number and area of school forests in Korean provinces

Province	2015 ¹		2013 ²		Average area of school forests per school (ha)
	Total number ³ (a)	Difference in total number (a – b)	Total Number (b)	Total Area (ha)	
Gyeonggi-do	278	21	257	102	.40
Jeollanam-do	143	26	117	49	.42
Gangwon-do	119	12	107	97	.90
Jeollabuk-do	104	21	83	26	.31
Gyeongsangnam-do	103	16	87	16	.18
Gyeongsanbuk-do	99	11	88	11	.13
Chungcheongnam-do	98	13	85	19	.22
Busan	83	9	74	203	2.75
Chungcheongbuk-do	74	6	68	94	1.38
Gwangju	66	11	55	52	.94
Daegu	61	8	53	85	1.61
Daejeon	61	3	58	36	.61
Ulsan	53	8	45	10	.22
Incheon	48	13	35	26	.74
Seoul	37	-	37	98	2.65
Jeju	25	6	19	2	.09
Sejong	4	-	4	-	-
Total	1,456	184	1,272	925	.73

¹ The number of school forests was based on the KFS data from 2015 (KFS, 2016a).

² The national statistics of urban forests was included urban forest data from 2013 (KFS, 2014).

³ This table is ordered by the total number of school forests from the largest to the smallest.

3.3. Data Collection and Analysis

This study conducted an online survey using South Korean schoolteachers who attended schools with forests during the second week of June 2016 and the last week of November 2016. An email with the web link to the online survey was sent to a KFS official, along with a notification that one teacher from each school with a forest should participate in the survey. The KFS official forwarded the email to other officials in 17 local governments because the school forests were located in 17 Korean provinces.

The local government officials first contacted each school with a forest by phone and then sent an email if schoolteachers voluntarily gave an email address to the officials, because in South Korea email addresses are not accessible without a person's agreement (Korea Legislation Research Institute, 2017).

In total, 149 participants completed the survey questionnaire, which represents 10% of the total number of school forests. As shown in Table 3, 53% of the participants worked in elementary schools, and 22% and 25% worked in middle and high schools, respectively. Indeed, more than half of the participants worked in elementary schools. This is reasonable because the number of elementary schools with forests was 52% of the total number of school forests. In addition, there was no response from three (Incheon, Gwangju, and Sejong) of the 17 provinces.

IBM SPSS (Statistical Package for the Social Sciences) Statistics was used to analyze the 149 completed survey questionnaires. One-Way ANOVA was used to compare the survey results across different settings, such as school type and the

percentage of the area of school forests in total school areas. Descriptive statistics, such as mean and standard deviation, also addressed the results of the survey.

In sum, 149 survey questionnaires were returned in most of the Korean provinces. They represented 10% of the total number of school forests because each school was asked to participate in the survey.

Table 3. Summary of school information

School type (the number of school forests / %) ¹		Sample size	Percentage
		(<i>n</i>)	(%) ²
Elementary school	(758 / 52)	79	53
High school	(299 / 21)	37	25
Middle school	(368 / 25)	33	22
Other	(31 / 2)	-	-
Total	(1,456 / 100)	149	100
School location (the number of school forests / %) ¹			
Gangwon-do	(119 / 7)	39	26
Jeollabuk-do	(104 / 7)	22	15
Jeollanam-do	(143 / 10)	20	14
Ulsan	(53 / 4)	18	12
Chungcheongbuk-do	(74 / 5)	13	9
Chungcheongnam-do	(98 / 7)	9	6
Gyeongsangbuk-do	(99 / 7)	6	4
Seoul	(37 / 3)	6	4
Gyeonggi-do	(278 / 19)	5	3
Daejeon	(61 / 4)	4	3
Busan	(83 / 6)	2	1
Daegu	(61 / 4)	2	1
Gyeongsangnam-do	(103 / 7)	2	1
Jeju	(25 / 2)	1	1
Incheon	(48 / 3)	-	-
Gwangju	(66 / 5)	-	-
Sejong	(4 / -)	-	-
Total	(1,456 / 100)	149	100

¹ The number of school forests was based on the KFS data from 2015 (KFS, 2016a).

² This table is ordered by the percentage from the largest to the smallest.

3.4. Limitations

This study had limitations in the data collection and collected data. First, the survey participants might be more likely interested in school forests than other schoolteachers. Local government officials asked schoolteachers to participate in the survey by phone and then sent them emails with a web link. For this reason, it is possible that schoolteachers who participated in this survey might be more likely to use school forests because they wanted to participate in this survey.

Another limitation in this study was the data represented all types of school forests in a few provinces. As shown in Table 4, three provinces lacked participants (Incheon, Gwangju, and Sejong) and four provinces had a noticeably small number of participants (1 or 2) (Busan, Daegu, Gyeongsangnam-do, and Jeju). The small number of participants in those four provinces resulted in undistributed data in school types. For example, a few provinces, such as Busan, Gyeongsangnam-do, and Jeju, showed that only elementary school teachers participated in the survey. In a few provinces all three types of schoolteachers (elementary, middle, and high) did not participate in the survey.

As previously mentioned, this study had limitations in the data collection. However, the number of completed surveys (149) was 10% of the total population of school forests, and more than half of participants worked in elementary schools, which was the same as the total number of school forests.

Table 4. Summary of school type

Province	Total (<i>N</i> = 149)	School type (%)		
		Elementary (<i>n</i> = 79)	Middle (<i>n</i> = 37)	High (<i>n</i> = 33)
Gangwon-do	39	69	23	8
Jeollabuk-do	22	32	32	36
Jeollanam-do	20	60	30	10
Ulsan	18	28	-	72
Chungcheongbuk-do	13	46	39	15
Chungcheongnam-do	9	44	12	44
Gyeongsangbuk-do	6	50	33	17
Seoul	6	68	16	16
Gyeonggi-do	5	60	20	20
Daejeon	4	50	-	50
Busan	2	100	-	-
Daegu	2	50	50	-
Gyeongsangnam-do	2	100	-	-
Jeju	1	100	-	-
Incheon	-	-	-	-
Gwangju	-	-	-	-
Sejong	-	-	-	-
Total	149	53	22	25

4. Results

4.1. Schoolteachers' Use of School Forests

4.1.1. Frequency of school forest visits

RQ1 addressed how frequently schoolteachers use school forests among school types. In this study, the overall response was that schoolteachers visited school forests on average 6 times per month and 57 times per year, which illustrate that schoolteachers frequently use school forests (see Table 5). These findings are corroborated by the results of a previous survey. This survey showed that less than half of schools with forests do not have programs in school forests, which means that half of schools with forests do not use school forests (GK, 2013). The results of the frequency of schoolteacher visits could be concluded that they may use school forests without specific programs.

Table 5 displays the frequency of schoolteachers' visits across school types. High schools showed a highest number of forest visits ($M = 8.03$ per month, $M = 78.62$ per year) than elementary ($M = 5.16$ per month, $M = 54.10$ per year) and middle schools ($M = 4.42$ per month, $M = 41.58$ per year). Although this difference across school types was not statistically significant, $F(2, 146) = 2.26$ to 3.04 , $p = .051$ to $.108$, the results indicate that high school teachers considerably use school forests.

The frequency of schoolteachers' visits was compared with two different settings: (a) the different percentage of the area of school forests in school areas, and (b) the satisfaction of the management of school forests. This was done because schoolteachers in a previous survey reported that the problems of school forests were their small size and

the management of school forests, such as lack of maintenance funding and lack of experts (GK, 2013).

First, the small percentage of school forests was used less than the large percentage of school forests in school areas. For example, when the percentage of the area of school forests in school areas was less than 11%, the average use of school forests was 4 times per month and 36 times per year (see Table 6). When the percentage of the area of school forests in school areas was 11~20%, the average use of school forests per month and year was 7 times and 69 times, respectively. In addition, when the percentage of the area of school forests in school areas was more than 20%, the average use of school forests was 6 times per month and 69 times per year.

There were significant differences in the frequency of schoolteachers' visits depending on the different percentage of school forests: $F(2, 146) = 3.29$ to 3.30 , $p = .040$. Tamhane's post-hoc tests for unequal variances showed the means of forest visits per month and year were significantly lower in less than 11% of school forests than the 11~20% of school forests. Despite these statistically significant differences among the percentage of school forests, the eta (η) effect sizes for both means were only $\eta = .21$. Using guidelines from Cohen (1988), these effect sizes suggest significant differences in the means of forest visits per month and year were between "small" and "medium" ($\eta = .21$). These findings support the previous survey's report on the small size of school forests as a problem (GK, 2013).

Second, the average visits to school forests were much higher when schoolteachers were satisfied with school forest management. For example, the average

use of school forests was 6 times per month and 62 times per year when schoolteachers reported that school forests were well managed (see Table 7). The average use of school forests per month and year were 4 times and 46 times, respectively, when schoolteachers reported that school forests were not well managed. Although it was not statistically different at $F(2, 146) = .60$ to 1.67 , $p = .193$ to $.552$, this suggests that management is also important to the use of school forests.

These results determine the small size and management of school forests, which were reported as problems in the previous study, in relation to the frequency of schoolteachers' visits. It is evident that the size of school forests is significantly important to their use and the management of school forests is also related.

Table 5. The frequency of schoolteachers' visits according to school type

No. of forest visits	Elementary school (<i>n</i> = 79)		Middle school (<i>n</i> = 33)		High school (<i>n</i> = 37)		Total (<i>N</i> = 149)		<i>F</i> 2,146	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
	Per month	5.16	6.34	4.42	5.43	8.03	8.45	5.71		
Per year	54.10	70.58	41.58	59.86	78.62	95.72	57.42	76.18	2.26	.108

Table 6. The frequency of schoolteachers' visits in the percentage of school forests

No. of forest visits	% of the area of school forests in the total school areas ¹								<i>F</i> _{2,146}	<i>p</i>	Eta (η) effect size
	< 11%		11~20%		> 20%		Total				
	<i>(n = 51)</i>		<i>(n = 53)</i>		<i>(n = 45)</i>		<i>(N = 149)</i>				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Per month ²	3.80 ^a	4.52	7.09 ^b	7.87	6.24 ^{ab}	7.37	5.71	6.84	3.30	.040	.21
Per year ²	35.57 ^a	47.98	68.58 ^b	81.37	69.02 ^{ab}	90.77	57.42	76.17	3.29	.040	.21

¹ The percentage of the area of school forests in the total school areas was originally measured from 1 to 6 (1 = 0~10%, 2 = 11~20%, 3 = 21~30%, 4 = 31~40%, 5 = 41~50%, and 6 > 50%).

² Means with different letter superscripts across each row were significant at $p < .05$ based on Tamhane's T2 post-hoc tests for unequal variances.

Table 7. The frequency of schoolteachers' visits according to the satisfaction of management

No. of forest visits	The satisfaction of management ¹								<i>F</i> _{2,146}	<i>p</i>
	Not well		Satisfactory		Very well		Total			
	<i>(n = 11)</i>		<i>(n = 36)</i>		<i>(n = 102)</i>		<i>(N = 149)</i>			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Per month	4.36	6.00	4.17	4.89	6.40	7.43	5.71	6.84	1.67	.193
Per year	45.91	70.01	47.81	76.66	62.05	76.90	57.42	76.18	.60	.552

¹ The satisfaction of school forest management was measured on 5-point scales of 1 = "very bad" to 5 = "very good." The reported satisfaction of management showed "not well" rated from 1 to 2, "satisfactory" rated 3, and "very well" rated from 4 to 5.

4.1.2. Activities in school forests

RQ2 assessed what kind of activities schoolteachers do with students in school forests. According to a previous survey of schoolteachers, less than half of schools with forests do not have programs in school forests (GK, 2013). In this study, schoolteachers freely used school forests because the most popular answers regarding their activities were to visit a forest ($M = 3.68$) and free exploration of the surroundings ($M = 3.52$) (see Table 8). However, school forests were not used for schoolteachers' classes because the least answers were scientific experiments and examination ($M = 2.83$) and lecture and explanations of schoolteachers ($M = 2.96$). The results seem to indicate that schoolteachers freely use school forests and are in line with the previous survey, where schoolteachers reported no programs in less than half of school forests. Unfortunately, the reasons school forests are not used for schoolteachers' classes was not within the scope of this study.

In this study, the survey results were compared among the three different school types, and the results of the ANOVA indicated significant differences across school types for three of the eight activities: (a) playful investigation of nature, $F(2, 146) = 5.04, p = .008$; (b) collecting, analyzing, and identifying forests, $F(2, 146) = 6.54, p = .002$; and (c) scientific experiments and examination, $F(2, 146) = 4.59, p = .012$. Scheffe's post-hoc tests for equal variances showed that: (a) the mean of playful investigation of nature was significantly higher in elementary schools than the other two school types, and (b) the means of collecting, analyzing, and identifying forests, as well as scientific experiments and examination, were significantly higher in elementary schools than middle schools.

The eta (η) effect sizes for these three questions range from .24 to .29. Using guidelines from Cohen (1988), these effect sizes suggest significant differences in the means of playful investigation of nature, and collecting, analyzing, and identifying forests were between “medium” and “large” ($\eta = .25$ to $.29$), and the significant differences in the mean of scientific experiments and examination was “medium” ($\eta = .24$). These findings indicate that elementary school teachers are more likely to provide experiences with nature than middle and high school teachers.

It is evident from these results about schoolteachers' activities with students that schoolteachers freely use school forests, and elementary school teachers more frequently provide nature experiences in school forests than the other schoolteachers.

Table 8. Schoolteachers' activities according to school type

My students and I use school forests for ¹	Elementary school (<i>n</i> = 79)		Middle school (<i>n</i> = 33)		High school (<i>n</i> = 37)		Total (<i>N</i> = 149)		<i>F</i> _{2,146}	<i>p</i>	Eta (η) effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
	Visit to a forest	3.82	.84	3.52	.94	3.51	1.04	3.68	.92	2.10	.127
Free exploration of the surroundings	3.61	.87	3.24	1.09	3.57	.83	3.52	.92	1.93	.148	.16
Practical work (e.g., cleaning of forest, planting trees)	3.61	.99	3.33	.96	3.24	1.16	3.46	1.04	1.88	.157	.16
Creative activity (artistically, musical, theatrical)	3.49	.99	3.15	.97	3.11	1.15	3.32	1.03	2.37	.097	.18
Playful investigation of nature ²	3.37 ^a	.92	2.85 ^{bc}	1.23	2.84 ^c	.96	3.12	1.03	5.04	.008	.25
Collecting, analyzing, identifying forests ²	3.32 ^a	.88	2.61 ^b	1.22	2.86 ^{ab}	1.06	3.05	1.05	6.54	.002	.29
Lecture/explan ations of teacher	3.11	1.06	2.67	1.02	2.89	1.10	2.96	1.07	2.16	.119	.17
Scientific experiments and examination ²	3.05 ^a	.90	2.52 ^b	.97	2.65 ^{ab}	1.03	2.83	.98	4.59	.012	.24

¹ Responses originally measured on 5-point scales of 1 = "very seldom" to 5 = "very often."

² Means with different letter superscripts across each row were significant at $p < .05$ based on Scheffe's post-hoc tests for equal variances.

4.1.3. Educational purposes

This section examined schoolteachers' educational purposes when using school forests with students. In general, students' well-being was most important to participants ($M = 3.71$), followed closely by social skills ($M = 3.70$) and sensory experiences ($M = 3.66$) (see Table 9). Otherwise, the least important educational purpose was curriculum topics ($M = 2.91$).

Middle and high school teachers showed the same popular purposes, such as the promotion of well-being, social skills, and sensory experiences. However, elementary school teachers highly rated the promotion of nature experience more than the promotion of well-being. It is evident that elementary school teachers think nature experiences are more important than other schoolteachers do. This is consistent with results obtained in the schoolteachers' activities. In the previous section, it is apparent that elementary school teachers more frequently use school forests for students' nature experiences, such as playful investigation of nature and collecting, analyzing, and identifying forests.

When comparing schoolteachers' purposes among school types, the results of ANOVA suggested that four educational purposes were statistically different: (a) promotion of nature experiences, (b) promotion of curiosity, (c) training of scientific skills, and (d) consideration of curriculum topics, $F(2, 146) = 4.44$ to 9.70 , $p = < .001$ to $.013$. However, there was no significant difference in six of the 10 educational purposes among school types, $F(2, 146) = 1.20$ to 2.92 , $p = .057$ to $.304$. Scheffe's post-hoc tests for equal variances showed: (a) the means of the promotion of nature experiences, training of scientific skills, and consideration of curriculum topics were significantly

higher in elementary schools than the other schools, and (b) the mean of the promotion of curiosity was significantly higher in elementary schools than middle schools. The eta (η) effect sizes ranged from .24 to .34. Using guidelines from Cohen (1988), these effect sizes suggest the significant difference in the mean of promotion of curiosity was “medium” ($\eta = .24$), and the significant difference in the means of nature experiences, training of scientific skills, and consideration of curriculum topics were between “medium” and “large” ($\eta = .33$ to $.34$). The results seem to indicate elementary school teachers’ purposes differ from other schoolteachers.

Consequently, it is evident that elementary school teachers think nature experiences are more important than the other schoolteachers, which is consistent with the results of schoolteachers’ activities.

Table 9. Schoolteachers' educational purposes according to school type

I use school forests for educational purposes because of ¹	Elementary school (<i>n</i> = 79)		Middle school (<i>n</i> = 33)		High school (<i>n</i> = 37)		Total (<i>N</i> = 149)		<i>F</i> _{2,146}	<i>p</i>	Eta (η) effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
	Promotion of well-being	3.70	.95	3.42	1.12	4.00	1.00	3.71	1.02	2.90	.058
Promotion of social skills	3.77	1.00	3.45	1.12	3.78	1.08	3.70	1.05	1.21	.301	.13
Promotion of sensory experiences	3.78	.93	3.27	1.28	3.73	1.04	3.66	1.06	2.92	.057	.20
Promotion of nature experiences ²	3.73 ^a	.90	2.94 ^{bc}	1.12	3.16 ^c	1.04	3.42	1.04	9.17	<.001	.33
Promotion of creativity	3.53	1.01	3.18	1.24	3.38	1.16	3.42	1.10	1.20	.304	.13
Promotion of curiosity, freedom, and adventure ²	3.62 ^a	.96	3.06 ^b	1.09	3.19 ^{ab}	1.08	3.39	1.04	4.44	.013	.24
Other reasons (e.g., teacher's love for forests)	3.32	.99	3.21	1.11	3.62	.95	3.37	1.02	1.66	.194	.15
Promotion of physical activity	3.27	1.02	2.91	1.10	3.30	1.15	3.19	1.08	1.51	.224	.14
Training of scientific skills ²	3.51 ^a	.97	2.70 ^{bc}	1.13	2.89 ^c	1.02	3.17	1.08	9.19	<.001	.33
Consideration of curriculum topics ²	3.22 ^a	.87	2.45 ^{bc}	.97	2.65 ^c	1.01	2.91	.98	9.70	<.001	.34

¹ Responses originally measured on 5-point scales of 1 = "very seldom" to 5 = "very often."

² Means with different letter superscripts across each row were significant at $p < .05$ based on Scheffe's post-hoc tests for equal variances.

4.1.4. Problems with the use of school forests

This section examined schoolteachers' problems with the use of school forests. A previous study suggested that studying for college starts in middle school, which is a significant problem for both middle and high students that prevent them from experiences in school forests (Shin & Ryu, 2004). In this study, a lack of planning time ($M = 2.96$) was indicated as the most significant problem (see Table 10), and the second rated problem was an emphasis on state standards ($M = 2.74$). In this study, schoolteachers' problems with the use of school forests were in line with the previous study. Although the previous study indicated the importance of studying as a problem of students' experiences in school forests, it seems that the emphasis on state standards makes teachers do not sufficient time for planning their use of school forests.

The total means of all problems ranged from 2.11 to 2.96, which was originally measured on 5-point scale from 1 "not an obstacle" to 5 "obstacle." This suggests the problems reported in this survey are not significant to schoolteachers. Unfortunately, this study did not explore how much schoolteachers' problems are barriers to use of school forests.

When the schoolteachers' problems were compared across three school types, the results of ANOVA indicated that two of the 18 questions were statistically significant: (a) emphasis on state testing, $F(2, 146) = 6.18, p = .003$; and (b) counter to school climate, $F(2, 146) = 4.62, p = .011$. However, there were no significant differences among school types in their answers to 16 of the 18 questions, $F(2, 146) = 0.05$ to $3.17, p = .045$ to $.952$. Scheffe's post-hoc tests for equal variances showed: (a) the mean of an emphasis on

state testing was significantly higher in high schools than the other schools; and (b) the mean of a counter to school climate was significantly lower in elementary schools than middle schools. The eta (η) effect sizes for these means ranged from .24 to .28. Using guidelines from Cohen (1988), these effect sizes suggest the significant difference in the mean of emphasis on state testing was between “medium” and “large” ($\eta = .28$), and the significant difference in the mean of counter school climate was “medium” ($\eta = .24$). It is, therefore, evident that an emphasis on state testing is a significant problem to high school teachers.

Accordingly, a lack of planning time is a significant problem to schoolteachers. It is apparent that the emphasis on state standards may cause schoolteachers’ lack of planning time for their use of school forests. It could be inferred that providing curricula tied to state standards may increase the frequency of schoolteachers’ use of school forests because the curricula may help schoolteachers reduce planning time and then use school forests for their classes.

Table 10. Schoolteachers' problems according to school type

I don't use school forests because of ¹	Elementary school (<i>n</i> = 79)		Middle school (<i>n</i> = 33)		High school (<i>n</i> = 37)		Total (<i>N</i> = 149)		<i>F</i> _{2,146}	<i>p</i>	Eta (η) effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Lack of planning time	2.86	1.18	3.15	.94	3.00	1.22	2.96	1.14	.78	.460	.10
Emphasis on state standards	2.63	1.01	2.94	1.09	2.81	1.08	2.74	1.05	1.10	.337	.12
Lack of pedagogical knowledge	2.52	1.04	2.88	.99	3.00	1.11	2.72	1.06	3.17	.045	.20
Comfort level with current teaching approach	2.49	1.12	2.88	.86	2.70	1.10	2.63	1.07	1.64	.198	.15
Emphasis on state testing ²	2.32 ^a	1.07	2.88 ^{ab}	1.11	3.05 ^b	1.35	2.62	1.19	6.18	.003	.28
Lack of natural area to study	2.48	1.15	2.82	1.01	2.68	.82	2.60	1.05	1.32	.271	.13
Subject I teach	2.48	1.10	2.79	1.05	2.68	1.06	2.60	1.08	1.08	.344	.12
Lack of environmental content knowledge	2.43	1.05	2.58	.90	2.54	.93	2.49	.98	.32	.729	.07
Grade level I teach	2.34	.99	2.61	.97	2.57	1.17	2.46	1.03	1.05	.351	.12
Concerns regarding safety, liability and classroom management	2.46	1.11	2.48	1.03	2.41	1.07	2.45	1.07	.05	.952	.03
Lack of training	2.38	1.12	2.52	1.00	2.51	1.07	2.44	1.08	.28	.752	.06
Lack of comfort being in the outdoors	2.34	1.07	2.42	1.06	2.46	.99	2.39	1.04	.18	.834	.05
Counter to school climate ²	2.16 ^a	.91	2.67 ^b	.92	2.57 ^{ab}	.90	2.38	.93	4.62	.011	.24
Lack of community partners	2.20	.94	2.48	.87	2.59	1.09	2.36	.97	2.42	.092	.18
Lack of administrative support	2.29	1.00	2.42	.97	2.35	1.01	2.34	.99	.21	.808	.05
Lack of convincing evidence	2.11	.89	2.58	.87	2.32	1.06	2.27	.94	2.96	.055	.20
Lack of funding	2.19	.96	2.33	.92	2.22	.98	2.23	.95	.27	.767	.06
Lack of support from parents	1.99	.88	2.24	.94	2.24	.86	2.11	.89	1.53	.221	.14

¹ Responses originally measured on 5-point scales of 1 = "not an obstacle" to 5 = "obstacle."

² Means with different letter superscripts across each row were significant at $p < .05$ based on Scheffe's post-hoc tests for equal variances.

4.2. School Forests as Neighborhood Urban Forests

4.2.1. School forests in neighborhoods

RQ4 asked if schoolteachers think school forests are neighborhood urban forests, and residents use school forests. The creation of school forests provides accessible urban forests for residents because new school forests are created in areas lacking neighborhood urban forests (KFS, 2016b). In general, this study found that 81% of participants agreed that school forests are public green spaces, and 92% reported that school forests are open to the public (see Table 11), which means the majority of schools currently provide residents with school forests. In addition, 32% reported that residents very seldom visit school forests. Although the data in this study were not obtained from residents, it seems that residents may not frequently use school forests.

School settings and other green spaces near schools are also reported in Table 11. In this study, school forests were located in both city core (46%) and outside city core (54%), which means school forests can be created wherever neighborhoods need urban forests. In addition, 36% of school forests are the only green spaces in neighborhoods, whereas 64% of participants answered there are other green spaces near schools. When there were other green spaces near schools, only 35% of the number of schools had other green spaces within 300 m, which means that 65% may be too far for residents to access other green spaces. Previous studies on an indicator of the accessibility of urban forests used 300 m that is a distance to green spaces, which means that 300 m is commonly used as a reasonable distance from residential areas to green spaces (AIRI, 2003; WHO, 2016). In this study, the distance from schools to other green spaces is not related to residents'

distance to green spaces. Nevertheless, these results suggest that school forests are valuable assets as neighborhood urban forests because less than half of school forests were the only green spaces; when there were other green spaces near schools, more than half of other green spaces may be too far for local residents near schools to use other green spaces.

Table 11. Summary of schoolteachers' opinions and school information

	Sample size (<i>n</i>)	Percentage (%)
Reported agreement of school forests as public green spaces		
Yes (School forests are public green spaces)	121	81
No (School forests are not public green spaces)	28	19
Total	149	100
Reported openness of school forests to the public		
Yes (School forests open to the public)	137	92
No (School forests do not open to the public)	12	8
Total	149	100
Reported the frequency of resident visits ¹		
Very seldom	47	32
Neither	57	38
Very often	45	30
Total	149	100
Reported school setting		
Rural area (Outside city core)	81	54
Urban area (City core)	68	46
Total	149	100
Reported other green spaces in neighborhoods		
Yes	96	64
No	53	36
Total	149	100
Reported estimated distance to other green spaces from schools ²		
< 300 m	34	35
300 ~ 500 m	28	29
501 m ~ 1 km	20	21
> 1 km	14	15
Total	96	100

¹ Responses originally measured on 5-point scales from 1 = "very seldom" to 5 = "very often." The reported frequency of residents' visits showed "very seldom" rated from 1 to 2, "neither" rated 3, and "very often" rated from 4 to 5.

² The distance to other green spaces was only asked to participants who reported the existence of green spaces. The total number of participants ($n = 96$) was the same as "yes ($n = 96$)" reported for other green spaces in neighborhoods.

4.2.2. School forests in Korean provinces

The previous section examined overall schoolteachers' opinions related to RQ4, "Do schoolteachers think that school forests are neighborhood urban forests, and do residents use school forests?" This section assessed schoolteachers' opinions in each province.

Schoolteachers' opinions on school forests and environments near schools can be seen in Table 12. First, all schoolteachers in five provinces agreed on school forests as public green spaces, whereas 67% in Gyeongsangbuk-do disagreed on school forests as public green spaces. Second, all schoolteachers in eight provinces reported that school forests are open to the public. Otherwise, 17% of schools in the province of Gyeongsangbuk-do are not open to the public. Third, more than half the number of schools in 12 provinces have other parks near schools, while 51% of schools in Gangwon-do do not have other parks near schools. Thus, although schoolteachers' opinions on school forests and school environments differed in each province, it is important that schoolteachers in Gyeongsangbuk-do showed the highest disagreement about school forests as public green spaces, and schools in the same province showed the largest percentage of un-openness to the public. Unfortunately, this study did not attempt to find out why schoolteachers in the province of Gyeongsangbuk-do have different opinions on school forests as public green spaces.

Table 13 shows the frequency of local residents' use of school forests. The total mean of residents' use was 3.04 and ranged from 2.00 (province of Gyeongsangbuk-do) to 4.00 (provinces of Jeju and Gyeonggi-do). The school forests in the province of

Gyeongsangbuk-do showed the least frequency of use ($M = 2.00$). Both the provinces of Jeju and Gyeonggi-do showed the highest frequency of use ($M = 4.00$). When considering the neighborhood urban forests per capita in each province, it is important that the provinces of Jeju, Gyeonggi-do, and Daegu reported the highest frequency of residents' use and had the lowest accessible urban forests per capita. It should be noted that the sample size of these three provinces was noticeably small. These findings indicate that schoolteachers in areas lacking neighborhood urban forests may be more likely to think that residents frequently use school forests than other provinces.

Accordingly, it is evident that schoolteachers in the province of Gyeongsangbuk-do have different opinions on school forests from other provinces. In addition, it seems that residents in areas lacking neighborhood urban forests may more likely use school forests.

Table 12. Schoolteachers' opinions on school forests

Province	Sample (<i>N</i> = 149)	Agreement on public green spaces (%)		Open to the public (%)		Other green spaces near schools (%)	
		Yes	No	Yes ¹	No	Yes	No
Jeju	1	100	-	100	-	100	-
Gyeonggi-do	5	80	20	100	-	80	20
Daegu	2	100	-	100	-	50	50
Chungcheongbuk-do	13	77	23	100	-	62	38
Seoul	6	67	33	100	-	100	-
Gyeongsangnam-do	2	100	-	100	-	100	-
Daejeon	4	75	25	100	-	75	25
Busan	2	100	-	100	-	100	-
Ulsan	18	89	11	94	6	72	28
Gangwon-do	39	85	15	92	8	49	51
Chungcheongnam-do	9	100	-	89	11	56	44
Jeollabuk-do	22	91	9	86	14	68	32
Jeollanam-do	20	65	35	85	15	70	30
Gyeongsangbuk-do	6	33	67	83	17	50	50
Total	149	81	19	92	8	64	36

¹ This table is ordered by the percentage of openness to the public from the largest to smallest.

Table 13. The frequency of residents' use of school forests

Province	Neighborhood urban forests per capita (m ²) ¹	Sample size (N = 149)		Frequency of local residents' visit ²	
		<i>n</i>	%	<i>M</i> ³	SD
Jeju	9.2	1	1	4.00	-
Gyeonggi-do	5.29	5	3	4.00	1.41
Daegu	7.88	2	1	3.50	0.71
Chungcheongnam-do	10.25	9	6	3.44	1.24
Chungcheongbuk-do	13.04	13	9	3.31	1.11
Seoul	4.35	6	4	3.17	1.47
Ulsan	16.16	18	12	3.17	1.15
Gyeongsangnam-do	10.63	2	1	3.00	0.00
Jeollabuk-do	23.34	22	15	3.00	0.93
Gangwon-do	18.91	39	26	2.97	1.06
Jeollanam-do	13.19	20	13	2.80	0.83
Daejeon	12.08	4	3	2.75	0.50
Busan	9.9	2	1	2.50	0.71
Gyeongsangbuk-do	11.25	6	4	2.00	0.63
Total	8.32	149	100	3.04	1.05

¹ Neighborhood urban forests per capita is based on the national statistics of urban forests (KFS, 2014).

² Responses originally measured on 5-point scales from 1 = "very seldom" to 5 = "very often."

³ This table is ordered by the frequency of resident visits from the largest to smallest.

4.2.3. Components of school forests

RQ5 asked what kind of opinions schoolteachers have about the design of school forests. According to school forest policy, 70~80% of school forest funding supports tree and vegetation planting (KFS, 2016b). In this study, when asked about the significant components of school forests related to residents' visits, participants highly rated good seating ($M = 3.63$), calm atmosphere ($M = 3.49$), and little traffic ($M = 3.36$) (see Table 14); whereas water feature ($M = 2.48$) and much grass ($M = 2.79$) were the least elements. In the comparison of natural elements with others, calm atmosphere ($M = 3.49$), little traffic ($M = 3.36$), and good management ($M = 3.36$) were highly rated more than natural elements. Otherwise, many flowers and plants, and many bushes and trees were 3.15, and 3.14, respectively. It should be noted, however, that the design of school forests related to residents' visits was obtained from schoolteachers. It could be inferred, therefore, that natural elements in school forests may be less important than other elements related to residents' visits.

Table 15 shows the components of school forests that discourage local residents from visiting. Participants reported forest size ($M = 2.97$) was the most discouraging element. In addition, lack of natural elements, such as too few bushes and trees ($M = 2.74$) and too few flowers and plants ($M = 2.55$), were discouraging elements to residents; whereas many people ($M = 1.99$), many hard surfaces ($M = 2.11$), and much traffic ($M = 2.13$) were the least rated discouraging elements. These findings are consistent with the results shown in Table 14. It is, therefore, evident that lack of natural elements is a significant problem in relation to the frequency of local residents' visits.

Table 14. Components of school forests to promote local residents' visits

Elements ¹	Total (N = 149)	
	M	SD
Good seating	3.63	1.00
Calm atmosphere	3.49	.98
Little traffic	3.36	1.04
Good management	3.36	.96
Possibility to sit alone	3.32	.97
Nice view	3.23	.99
Many flowers and plants	3.15	1.04
Many bushes and trees	3.14	1.02
Much grass	2.79	1.05
Water feature	2.48	1.11

¹ Responses originally measured on 5-point scales of 1 = "strongly disagree" to 5 = "strongly agree."

Table 15. Components of school forests to discourage residents from visiting forests

Elements ¹	Total (N = 149)	
	M	SD
Forest size	2.97	1.25
Too few bushes and trees	2.74	1.21
Too few flowers and plants	2.55	1.11
Too few and uncomfortable benches	2.54	1.09
Too little grass	2.36	1.03
Poor management	2.21	.96
Poorly shielded from the surrounding	2.20	.92
Much traffic	2.13	.95
Many hard surfaces	2.11	.86
Many people	1.99	.85

¹ Responses originally measured on 5-point scales of 1 = "strongly disagree" to 5 = "strongly agree."

4.3. The Management of School Forests

4.3.1. Schoolteachers' satisfaction with management

RQ6 asked if schools need additional support for the management of school forests. In general, schoolteachers were satisfied with school forest management. The mean of the satisfaction of school forest management was 3.80, which was between “good” and “very good” on a 5-point scale of 1 “very bad” to 5 “very good” (see Table 16).

A previous survey of schoolteachers showed that the small size of school forests was a problem with school forests (GK, 2013). Table 16 shows the schoolteachers' satisfaction of management according to the different size of school forests. Schoolteachers' satisfaction of school forest management was substantially less in a small percentage of school forests (< 11%) than in a large percentage of school forests in school areas (11~20%). The reported schoolteachers' satisfaction with management was statistically different in the different percentage of the area of school forests in the total school area: $F(2, 146) = 6.17, p = .003$. Tamhane's T2 post-hoc tests for unequal variances showed the satisfaction of the management was significantly lower in less than 11% than in 11~20% of the area of school forests. The eta (η) effect sizes for the variables were .28. Using guidelines from Cohen (1988), the effect size suggests the significant difference was between “medium” and “large.”

Unfortunately, this study did not examine management problems in the small percentage of school forests. Reasonable answers were found in an open-ended question in this survey (Appendix A, Part 3, Question 6). It is possible there were too many trees

in a small space. Nevertheless, the problem of too many trees was only reported two times. These findings indicate that the small size of school forests may be associated with the management.

Table 17 shows both school-based support and outside support for the management. The means of the questions of school-based support ranged from 2.90 to 3.10, while the means of the questions of outside supports ranged from 2.60 to 2.71. Overall support was highly rated ($M = 3.10$) and school funding was the least rated ($M = 2.90$) in the list of school-based support. In the case of outside support, overall support was highly rated ($M = 2.71$) and access to management information was least rated ($M = 2.60$). It is evident that schools currently manage school forests with school-based supports than outside supports.

Management problems schools experienced can be seen in Table 18. Lack of maintenance funding and lack of experts were found in a previous survey of schoolteachers (GK, 2013). In this study, the most problems were a lack of funding ($M = 3.44$) and a lack of experts' advice ($M = 3.25$), whereas the least problems were safety problems ($M = 2.85$) and a lack of school board policy or guidelines ($M = 2.98$). A lack of experts' advice, such as coordinators' advice, was expected because only 46 people were hired to provide expert advice to 1,456 school forests in 2016 (KFS, 2016a). Lack of funding and lack of experts were the primary answers to the open-ended question (Appendix A, Part 2, Question 6). These findings are consistent with the previous survey. Although this survey was not obtained from schoolteachers who do not directly manage school forests, it can be assumed that schools need additional support for management.

Table 16. The satisfaction of school forest management¹

	% of the area of school forests in the total school areas ²								<i>F</i>	<i>p</i>	Eta (η) effect size
	< 11%		11~20%		> 20%		Total				
	(<i>n</i> = 51)		(<i>n</i> = 53)		(<i>n</i> = 45)		(<i>N</i> = 149)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	2,146		
Reported satisfaction of management ³	3.47 ^a	0.99	4.04 ^b	0.76	3.89 ^{ab}	0.78	3.80	0.88	6.17	.003	.28

¹ The satisfaction of school forest management was measured on 5-point scales of 1 = “very bad” to 5 = “very good.”

² The percentage of school forests in the total school areas was originally measured from 1 to 6 (1 = 0~10%, 2 = 11~20%, 3 = 21~30%, 4 = 31~40%, 5 = 41~50%, and 6 > 50%).

³ Means with different letter superscripts across each row were significant at $p < .05$ based on Tamhane’s T2 post-hoc tests for unequal variances.

Table 17. Support for the management of school forests

Support for the management of school forests ¹	Total (<i>N</i> = 149)	
	<i>M</i>	<i>SD</i>
School-based support to school forests		
Overall support	3.10	1.06
School board policy/guidelines	3.03	1.00
Access to management information	2.97	1.00
School funding	2.90	.95
Outside support to school forests		
Overall support	2.71	1.05
Government policy/guidelines	2.64	1.01
Community partners	2.64	1.05
Municipalities’ management support (e.g., coordinators’ advice)	2.62	1.09
Access to management information	2.60	1.00

¹ Responses originally measured on 5-point scales of 1 = “low” to 5 = “high.”

Table 18. Management problems of school forests

Problems related to the management of school forests ¹	Total (N = 149)	
	M	SD
Lack of funding	3.44	.99
Lack of experts' advice (e.g., coordinators' advice)	3.25	.99
Lack of community partners	3.22	.95
Lack of government policy/guidelines	3.20	.87
Lack of access to management information	3.20	.93
Poor tree and plant health	3.19	.91
Lack of school board policy/guidelines	2.98	.86
Safety problems	2.85	.96
Other	2.72	.89

¹ Responses originally measured on 5-point scales of 1 = "not an obstacle" to 5 = "obstacle."

4.3.2. Management support in Korean provinces

RQ7 explored how schools manage school forests with school support and outside support in each province. According to school forest policy, schools currently manage school forests with assistance from local governments (KFS, 2016b). Table 19 shows the support for management. Schools in the most of Korean provinces received more school-based support than outside support for the management. Both Gyeonggi-do and Seoul were the only provinces that showed more outside support for management than school-based support. For instance, the total mean of outside support in the province of Gyeonggi-do was 3.40, while the total mean of school-based support was 2.05. In addition, the total mean of outside support in the province of Seoul was 3.20, whereas the total mean of school-based support was 3.13. Although there are the only two provinces

with more outside support for management, these two provinces are significant in South Korea due to approximately half of the Korean population living there (KFS, 2014). It is also noted that the average of neighborhood urban forests per capita in the provinces of Gyeonggi-do and Seoul was 5.29 m² and 4.35 m², respectively, which were relatively lower than the national average (8.32 m²). It could be inferred, therefore, that local governments in Gyeonggi-do and Seoul may consider school forests more important than other provinces because these two provinces significantly lack neighborhood urban forests.

Another province that had lower than the national average of neighborhood urban forests was Daegu (7.88 m²). Although the mean of school-based supports was 3.88 and slightly higher than the mean of outside support ($M = 3.5$), Daegu was the highest outside support in Korean provinces. Nevertheless, because there were only two samples from Daegu in this survey, the study is unable to confirm that local governments in areas lacking of neighborhood urban forests per capita may be more likely to support schools for school forest management.

Table 19. Support for management in Korean provinces

Province	Neighborhood urban forests per capita (m ²)	Sample size (<i>N</i> = 149)	Support for management ¹				Satisfaction of management ²	
			School		Outside		<i>M</i>	<i>SD</i>
			<i>M</i>	<i>SD</i>	<i>M</i> ³	<i>SD</i>	<i>M</i>	<i>SD</i>
Daegu	7.88	2	3.88	.18	3.50	.71	4.50	.71
Gyeonggi-do	5.29	5	2.05	.84	3.40	.93	3.80	1.30
Gyeongsangnam-do	10.63	2	3.75	.35	3.30	.14	5.00	-
Seoul	4.35	6	3.13	.97	3.20	1.13	4.17	.41
Ulsan	16.16	18	3.33	.86	2.99	1.07	4.28	.83
Jeollabuk-do	23.34	22	3.25	.74	2.74	1.02	3.50	.74
Jeollanam-do	13.19	20	2.98	1.04	2.59	.86	3.45	1.15
Chungcheongbuk-do	13.04	13	2.81	1.05	2.55	.85	4.00	.71
Gangwon-do	18.91	39	2.73	.96	2.52	1.04	3.62	.85
Busan	9.9	2	3.13	.18	2.50	.71	3.50	.71
Daejeon	12.08	4	3.75	.96	2.30	.48	4.50	.58
Jeju	9.2	1	3.75	-	2.20	-	4.00	-
Chungcheongnam-do	10.25	9	3.08	.72	2.18	.57	3.89	.60
Gyeongsangbuk-do	11.25	6	2.63	.67	1.77	.91	3.83	.75
Total	8.32	149	3.00	.93	2.64	.98	3.80	.88

¹ Cell entries are the total mean of school-based support and outside support. Responses originally measured on 5-point scales of 1 = “low” to 5 = “high.”

² The management of school forests was measured on 5-point scales of 1 = “very bad” to 5 = “very good.”

³ This table is ordered by the mean of the outside support for management.

5. Discussion

The Introduction presented seven research questions that assessed the use and management of school forests. First, three RQs addressed schoolteachers' use of school forests:

(RQ1): How frequently do schoolteachers use school forests?

(RQ2): What kind of activities do schoolteachers do with students in school forests?

(RQ3): what are their purposes and their problems with the use of school forests?

Second, two RQs examined schoolteachers' opinions on school forests related to neighborhood urban forests because school forests are neighborhood urban forests:

(RQ4): Do schoolteachers think that school forests are neighborhood urban forests, and do residents use school forests?

(RQ5): What kind of opinions do schoolteachers have about the design of school forests?

The last two RQs concerned the management of school forests because schools currently manage school forests with assistance from local governments:

(RQ6): Do schools need additional support for the management of school forests?

(RQ7): How do schools manage school forests with school support and outside support in each province?

This section discusses these seven RQs in terms of the survey results.

5.1. Schoolteachers' Use of School Forests

Research showed that students' experiences in school forests are beneficial to their temperaments because there were no differences in their temperaments when they did not experience nature (Shin & Ryu, 2004). A previous survey documented that half of the schoolteachers with school forests do not have programs in school forests (GK, 2013). However, the previous survey did not focus on how schoolteachers use school forests with students. In this study, the frequency of schoolteachers' use of school forests, their activities, their purposes, and their problems were assessed among three different school types.

This study found that schoolteachers frequently visit school forests. In general, the number of schoolteachers' visits to school forests was 6 times per month and 57 times per year. The frequency of schoolteachers' visits per year, 57 times per year, was higher than the 8 times per year found in a previous survey of Swiss elementary school teachers (Lindemann-Matthies & Knecht, 2011). Unfortunately, it is hard to note that school forests are more frequently used in South Korea than forest education in Switzerland because there were three possible reasons.

First, the distance to forests was noticeably different. South Korean school forests were within schoolyards, whereas forest education in Switzerland was conducted in forests that were an average distance of 1.2 km from schools. Research showed that the close distance to green spaces enhanced the number of students' field trips, and schoolteachers' attitudes about the importance of nature experiences were more important than the distance to destination (Wolsink, 2015). It seems that school forests located

within schoolyards may promote the frequency of schoolteachers' visiting school forests. However, this study did not focus on the effect that the close distance to school forests may influence the frequency of schoolteachers' visits.

Second, this study did not ask about the number of schoolteachers' visiting school forests during the period of school class hours. For this reason, schoolteachers might count any visits with students. In contrast, Swiss schoolteachers were only asked their number of classes in forests during class hours.

Third, the participants in this study ranged from elementary school to middle school and high school teachers, whereas the Swiss elementary school teachers were in the first to third grades. Consequently, it is impossible to compare the number of school forest visits with another survey. However, these findings, such as an average visit of school forests per month and year, provide compelling evidence that schoolteachers frequently use school forests with students.

It is apparent that the frequency of schoolteachers' use of school forests is associated with the percentage of the area of school forests in the total school areas. These findings are in line with a previous survey that schoolteachers were unsatisfied with the small size of school forests (GK, 2013). In addition, the improvement noted in this study was the percentage of the area of school forests related to the frequency of schoolteachers' visits. This study, therefore, indicates that more than 10% of the area of school forests in the total school areas may be relatively useful for schoolteachers who use school forests with students.

However, some limitations are worth noting. Although these findings were supported statistically, the percentage of the area of school forests is not a real size of school forest because schoolteachers reported it. Currently, according to school forest policy, the recommended minimum size of a school forest is 0.05 ha within schoolyards (KFS, 2016b). These findings may be helpful for local governments when they create new school forests that should be more than 10% of the area of school forests in school areas.

This study found that elementary school teachers more importantly considered nature experiences than the other school teachers. These findings were in line with the previous study. For example, elementary students were more likely to show the differences in temperaments due to their experiences in school forests, whereas there were no differences in temperaments of middle school and high school students because they did not experience school forests (Shin & Ryu, 2004). The improvements noted in this study were that elementary school teachers more importantly considered nature experiences in their educational purposes and activities in school forests. Although these findings were supported statistically, schoolteachers' purposes and activities in school forests cannot be the only reasons related to students' experiences with nature because students can freely use school forests. These results indicate that elementary school teachers provide more frequently experiences in school forests than the other schools.

Previous research has shown different schoolteachers' barriers in different countries to using school forests. For example, elementary school teachers in Switzerland reported that weather was the most significant problem to outdoor classes in forests near

schools (Lindemann-Matthies & Knecht, 2011). Middle school teachers in the US reported emphasis on state testing, emphasis on state standards, and lack of funding as barriers to environmental education (Ernst, 2009).

This study found that a lack of planning time was the most significant barrier with the schoolteachers' use of school forests. Unfortunately, the significance of the problem with the use of school forests was not assessed in this study. Other studies in different countries documented schoolteachers' problems, and the significance of their problems was different in their experiences related to classes in forests or environmental education (Ernst, 2009; Lindemann-Matthies & Knecht, 2011). For example, the weather was a significant problem to non-experienced schoolteachers in forests, whereas it was not significant to those who experienced classes in forests (Lindemann-Matthies & Knecht, 2011). Another study showed that schoolteachers' attitudes were more important than the distance to green spaces when they went students' field-trip to provide nature experiences outside schools (Wolsink, 2015). In this study, although it did not examine how the effects the current problems reported in this survey prevented schoolteachers from the use of school forests, these findings indicate that schoolteachers need planning time to prepare adequately before using school forests.

In addition, the improvements noted in this study that high school teachers had significant problems with the use of school forests, but it is interesting that they more frequently used school forests than middle and elementary schools. For example, high school teachers reported over an average score of 3.0 on three problems, such as an emphasis on state testing ($M = 3.05$), a lack of planning time ($M = 3.0$), and a lack of

pedagogical knowledge ($M = 3.0$). Middle school teachers highly rated only one question, which concerned a lack of planning time ($M = 3.15$). There was no problem that was rated over an average score of 3.0 by elementary school teachers.

However, high school teachers more frequently visited school forests than the other schoolteachers. For example, the number of high school teachers' visits was 8 times per month, and the number of middle and elementary school teachers' visits was 4 and 5 times per month, respectively. Furthermore, high school teachers also showed the highest number of visits ($M = 79$) than other schoolteachers (Middle schools $M = 42$; Elementary schools $M = 54$). These results indicate that although high school teachers have more significant problems than the other schools, they more frequently visit school forests than the other school teachers. It does, therefore, indicate that high school teachers' problems related to the use of school forests may not discourage them from the use of school forests.

5.2. The Value of School Forests in Neighborhoods

Nationally, the KFS sets a goal to increase the area of neighborhood urban forests per capita from 7 m² in 2008 to 10 m² by 2017 because a lack of neighborhood urban forests was identified as a problem (KFS, 2008). Although the KFS has emphasized the increase of neighborhood urban forests per capita from 2008, five years later, the recent statistics of urban forests show that provinces still need more neighborhood urban forests for residents. For example, the neighborhood urban forests per capita in the provinces of Seoul and Gyeonggi-do, which contain approximately the half of the Korean urban population, is 4.35 m² and 5.29 m², respectively, are extremely lower than the national

average (8.32 m²) (KFS, 2014). It seems that almost half of the Korean urban population are exceptionally restricted neighborhood urban forests. Unfortunately, there remains a need for an increase of neighborhood urban forests.

School forests are categorized as neighborhood urban forests, which means the creation of school forests provide residents with accessible urban forests (KFS, 2008). In addition, the creation of school forests is an efficient way to increase the area of neighborhood urban forests because local governments do not require the purchase of schoolyards (KFS, 2016a), and it is a current problem to find places for new parks (Kim et al., 2010). However, there are limited studies to determine whether school forests are currently being used by local residents. In this study, the use of school forests in neighborhoods and the components of school forests were examined based on schoolteachers' opinions.

Most teachers agreed that school forests are public green spaces. These findings are inconsistent with a previous survey of schoolteachers, which showed that only 3% of schoolteachers agreed that school forests are for local residents, and 93% reported that school forests are for educational places (GK, 2013). It is, therefore, evident that schoolteachers generally know school forests as public green spaces and may believe in school forests being specially used for students.

The improvements noted in this study were that most of the school forests are currently open to the public. This indicates that residents access school forests. According to indicators which evaluate the plenty of accessible urban forests to residents, the distance of 300 m to green spaces is used to assess the accessibility of urban forests

(AIRI, 2003; WHO, 2016) because the close distance to green spaces is related to residents' daily activities. For example, the close distance to green spaces promoted the frequency of residents visiting parks (Neuvonen et al., 2007) and enhanced children' outdoor activities (Epstein et al., 2006).

Most notably, this study found that 36% of school forests were the only green spaces in neighborhoods. When there were other green spaces near schools, 65% of green spaces were located more than 300 m from schools. Some limitations are worth noting. Although schoolteachers in this study reported their opinions about the frequency of residents' visits, they may do not know the actual frequency of their visits. The results seem to indicate that school forests may be used by residents when there are no green spaces or when other green spaces are considerably too far for residents to visit.

In this study, natural elements in school forests did not promote residents' visits to school forests, and too few natural elements discouraged residents from visiting forests. These findings were in contrast with school forest policy and previous research. According to school forest policy, approximately 70% to 80% of school funding supports planting trees and vegetation (KFS, 2016b). Schools with forests had two times more trees and three times tree species than those without forests in the city of Chung-ju (Ju et al., 2010). This study, therefore, indicates that the amount of natural element may be still not enough after the creation of school forests.

Although schoolteachers reported a lack of natural elements, which discouraged local residents from visiting school forests, these findings are consistent with previous research. For example, natural elements in small public green spaces were the most

important that enhanced relaxation environments (Nordh & Østby, 2013). In addition, children played a wide range of activities in green spaces with more trees and vegetation (Taylor et al., 1998). Thus, natural elements in school forests should be considered more importantly in the design of school forests. These results may be used for school forest policy because it appears that current 70% to 80% funding for trees and vegetation do not provide enough natural elements in school forests.

5.3. The Need for School Forest Management

After local governments create new school forests, the management of school forests transfers to the host schools, and local governments provide expert advice to assist school forest management (KFS, 2016b). However, schools need additional support for management. For example, a previous survey showed that lack of maintenance funding and lack of experts are indicated as problems (GK, 2013). In this study, the current school forest management and management problems were assessed.

Participants in this study were satisfied with school forest management, and their satisfaction of management was associated with the percentage of the area of school forests in school areas. Schoolteachers' satisfaction with management was significantly lower in a small percentage of school forests (< 11%) than in a large percentage of school forests in school areas (11~20%). In addition, lack of funding and lack of expert advice were also identified as problems with school forest management. These findings provide compelling evidence that additional management support is needed.

In this study, most of the schools depended on school-based support, such as school funding, for school forest management. Participants also highly rated outside

support over school-based support in the only two provinces—Gyeonggi-do and Seoul—which contain approximately half of the Korean urban population and show the lowest area of neighborhood urban forests per capita among Korean provinces (KFS, 2014). Although the sample size of these two provinces was relatively small (5 and 6, respectively), these findings indicate that local governments in a neighborhood lacking urban forests may provide more support to school forests. This study, therefore, may be useful for the KFS to evaluate local government support of school forest management.

6. Conclusion

The quantity of school forests, such as size, was a popular issue in the school forest research. For example, previous research has shown that a more forested area was beneficial to students' temperaments and promoted their satisfaction of school forests (Jang et al., 2009; Jeong et al., 2010). However, this study presents the use and management of school forests. Schoolteachers frequently visit school forests, and they are satisfied with school forest management. For example, this survey showed that schoolteachers visited school forests with students on average 6 times per month and 57 times per year. The reported satisfaction of management was more than "satisfactory." However, the frequency of schoolteachers' visits and their satisfaction of management were statistically different depending on the percentage of the area of school forests in school areas. In addition, schools need additional support, such as maintenance funding and expert advice, and natural elements are not enough in school forests.

Although this study examined the use and management of school forests based on schoolteachers' opinions, more research is needed to generalize these findings to promote the use of school forests by students, schoolteachers, and local residents. The following recommendations are made for future research and the KFS which manages school forest policy.

First, future work should focus on students in school forests. This study conducted an online survey of schoolteachers to examine their use of school forests because they provide classes in school forests for students. It found that the frequency of schoolteachers' use of school forests differed according to the percentage of school

forests in school areas. Although schoolteachers provide students with experiences in school forests, how students use school forests when they have free time in their school life requires further exploration. For example, previous research in other countries monitored students' playing in schoolyards and children's activities in urban parks (Lucas & Dymont, 2010; Taylor et al., 1998). Students preferred natural areas in schoolyards, and the more number of trees promoted children's diverse activities. Several studies in South Korea showed that students' mood and their satisfaction with school forests were significantly different, depending on the amount of forested area in schoolyards (Jang et al., 2009; Jeong et al., 2010). It would be beneficial to monitor the students' use of school forests in different size of school forests.

Second, future research should assess visitors in school forests. In this study, schoolteachers perceived that residents do not frequently use school forests; however, school forest settings showed that 36% of school forests are the only green spaces in neighborhoods, which means residents may differently use whether other green spaces are near schools. Previous research conducted an on-site survey of small park visitors to determine who use small parks and why they use small green spaces (Peschardt et al., 2012). It would be worthwhile to examine visitors in school forests to know why they visit school forests when there are other green spaces near schools.

Third, research is required to compare the use and management of school forests in Korean provinces that have the different area of neighborhood urban forests per capita. Because the sample size in a few provinces was too small and the data was from 14 out of 17 Korean provinces, this study did not examine the differences in the use and

management of school forests across provinces. However, this study did find that two provinces (Seoul and Gyeonggi-do) with the lowest neighborhood urban forests per capita among Korean provinces showed more outside support for school forest management than school-based support. It is possible that school forests may be differently used and managed in provinces that need more accessible urban forests. Future research should verify the use and management of school forests across provinces.

Fourth, the KFS should develop indicators related to the quality of school forests. Currently, school forest policy by the KFS emphasizes the quantity of school forests, such as the minimum size of school forests is .05 ha, and 70~80% of school forest funding supports planting trees and vegetation (KFS, 2016b). Although the funding policy emphasizes natural elements in school forests, this study found contrast results, which seem to indicate a possible problem of the quantity of school forests. There are too many trees and plants in a relatively small sized school forest, which were reported as management problems. In contrast, participants reported a few natural elements in school forests as a problem related to residents' visits. The KFS should, therefore, include indicators related to the quality of school forests.

Fifth, the KFS should take a great role in curriculum development and delivery to schoolteachers. A significant problem found in this study is a lack of planning time due to an emphasis on state standards. It is possible that providing curricula tied to state standards may help schoolteachers reduce planning time. For example, the American Forest Foundation provides the Project Learning Tree that offers schoolteachers natural resource curricula ("Project Learning Tree," 2017). Because these curricula for

schoolteachers have many activities depending on both educational levels and topics, they ultimately benefit students' nature experiences. An important suggestion for the KFS is to develop curricula for South Korean schoolteachers, which will be completed in a school forest setting.

Finally, this study was limited to representing the use and management of school forests. Data were not collected from a few provinces and this study only focused on schoolteachers' opinions. More research is required to generalize the use and management of school forests across the provinces.

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Appendix

Appendix: Questionnaire with Results

I consent to participate in this survey.

100% (149)

Part1: Use of School Forests

1. How often do you go to school forests with your students?

_____ Times per month

	Frequency	Percent	Valid Percent	Cumulative Percent
0	15	10.1	10.1	10.1
1	32	21.5	21.5	31.5
2	24	16.1	16.1	47.7
3	9	6.0	6.0	53.7
4	19	12.8	12.8	66.4
5	9	6.0	6.0	72.5
8	5	3.4	3.4	75.8
10	13	8.7	8.7	84.6
12	2	1.3	1.3	85.9
13	1	0.7	0.7	86.6
15	3	2.0	2.0	88.6
18	1	0.7	0.7	89.3
20	10	6.7	6.7	96.0
21	1	0.7	0.7	96.6
22	1	0.7	0.7	97.3
25	2	1.3	1.3	98.7
30	2	1.3	1.3	100.0
Total	149	100.0	100.0	

Times per year

	Frequency	Percent	Valid Percent	Cumulative Percent
0	5	3.4	3.4	3.4
1	4	2.7	2.7	6.0
2	8	5.4	5.4	11.4
5	7	4.7	4.7	16.1
6	1	0.7	0.7	16.8
7	1	0.7	0.7	17.4
8	6	4.0	4.0	21.5
9	1	0.7	0.7	22.1
10	18	12.1	12.1	34.2
12	9	6.0	6.0	40.3
13	1	0.7	0.7	40.9
15	2	1.3	1.3	42.3
20	9	6.0	6.0	48.3
21	1	0.7	0.7	49.0
24	4	2.7	2.7	51.7
25	2	1.3	1.3	53.0
27	1	0.7	0.7	53.7
28	1	0.7	0.7	54.4
30	2	1.3	1.3	55.7
36	2	1.3	1.3	57.0
40	9	6.0	6.0	63.1
48	4	2.7	2.7	65.8
50	6	4.0	4.0	69.8
60	4	2.7	2.7	72.5
64	1	0.7	0.7	73.2
80	4	2.7	2.7	75.8
90	1	0.7	0.7	76.5
92	1	0.7	0.7	77.2
96	1	0.7	0.7	77.9
100	12	8.1	8.1	85.9
120	1	0.7	0.7	86.6
135	1	0.7	0.7	87.2
144	1	0.7	0.7	87.9
150	1	0.7	0.7	88.6
160	1	0.7	0.7	89.3
180	2	1.3	1.3	90.6
190	2	1.3	1.3	91.9
200	2	1.3	1.3	93.3
240	2	1.3	1.3	94.6
250	4	2.7	2.7	97.3
252	1	0.7	0.7	98.0
300	1	0.7	0.7	98.7
365	2	1.3	1.3	100.0
Total	149	100.0	100.0	

2. How do you use school forests with your students?

My students and I use school forests for:	Very seldom								Very often		Total
Playful investigation of nature	11%	16	10%	15	41%	61	33%	49	5%	8	149
Collecting, analyzing, identifying forests	12%	18	11%	16	43%	64	29%	43	5%	8	149
Free exploration of the surroundings	3%	5	8%	12	34%	50	44%	65	11%	17	149
Scientific experiments and examination	13%	19	17%	25	47%	70	21%	32	2%	3	149
Lecture/explanations of teacher	15%	22	11%	16	42%	63	28%	42	4%	6	149
Creative activity (artistically, musical, theatrical)	7%	11	11%	16	34%	50	39%	58	9%	14	149
Practical work (e.g., cleaning of forest, planting trees)	7%	11	5%	7	37%	55	37%	55	14%	21	149
Visit to a forest	3%	5	3%	4	35%	53	40%	59	19%	28	149

3. What reasons make you go to school forest with students?

I use school forests for educational purposes because of	Very seldom								Very often		Total
Consideration of curriculum topics	13%	20	11%	16	50%	74	24%	36	2%	3	149
Promotion of nature experiences	7%	11	9%	13	29%	44	44%	65	11%	16	149
Training of scientific skills	10%	15	13%	19	34%	51	36%	53	7%	11	149
Promotion of physical activity	9%	13	12%	18	42%	62	26%	39	11%	17	149
Promotion of curiosity, freedom, and adventure	7%	10	9%	14	35%	52	36%	54	13%	19	149
Promotion of social skills	5%	7	8%	12	21%	32	44%	65	22%	33	149
Promotion of sensory experiences	6%	8	8%	12	22%	33	44%	66	20%	30	149
Promotion of well-being	5%	8	3%	5	28%	41	42%	63	22%	32	149
Promotion of creativity	8%	11	10%	15	32%	48	34%	51	16%	24	149
Other reasons (e.g., teacher's love for forests)	5%	7	11%	16	42%	63	27%	41	15%	22	149

4. What prevents you from using the forest?

I don't use school forests because of	Not an obstacle		Obstacle								Total
Lack of funding	27%	40	32%	48	33%	49	7%	11	1%	1	149
Emphasis on state testing	24%	35	20%	30	33%	49	17%	26	6%	9	149
Emphasis on state standards	15%	23	20%	30	43%	64	18%	26	4%	6	149
Lack of planning time	13%	19	20%	29	36%	54	22%	33	9%	14	149
Lack of community partners	23%	35	28%	41	40%	59	8%	12	1%	2	149
Concerns regarding safety, liability and classroom management	23%	35	25%	37	40%	59	7%	11	5%	7	149
Lack of support from parents	31%	46	31%	47	34%	50	4%	6	-	-	149
Lack of training	25%	37	25%	37	33%	50	15%	22	2%	3	149
Lack of natural area to study	17%	26	28%	41	35%	52	17%	26	3%	4	149
Lack of environmental content knowledge	18%	27	30%	44	40%	60	9%	14	3%	4	149
Lack of administrative support	25%	37	27%	41	39%	58	7%	10	2%	3	149
Lack of pedagogical knowledge	15%	22	25%	37	39%	58	17%	25	4%	7	149
Lack of convincing evidence	26%	39	28%	42	39%	58	6%	9	1%	1	149
Comfort level with current teaching approach	17%	25	27%	40	37%	56	14%	21	5%	7	149
Subject I teach	19%	28	25%	38	37%	55	15%	22	4%	6	149
Counter to school climate	21%	31	31%	46	39%	58	8%	13	1%	1	149
Grade level I teach	21%	32	27%	40	40%	59	9%	13	3%	5	149
Lack of comfort being in the outdoors	23%	35	31%	46	31%	46	13%	19	2%	3	149

Part2: Role of School Forests

1. School forests are public green spaces in cities.

100% (149) Yes 81% (121) No 19% (28)

2. School forests open to the public.

100% (149) Yes 92% (137) No 8% (12)

3. Public green spaces such as parks are near your school.

100% (149) Yes 64% (96) No 36% (53)

If respondents reported “Yes” in question 3, question 4 was asked about the distance to public green spaces. If respondents reported “No,” respondents skipped question 4.

4. What is the approximate distance to public green spaces from your school?

	Distance to public green space				Total
	< 300 m	300 m – 500 m	501 m – 1 km	> 1 km	
Green spaces	35%	29%	21%	15%	100
	34	28	20	14	96

5. How do you perceive the degree of local residents visiting school forests?

	Degree of local residents visiting school forests				Total
	Very Seldom	Seldom	Frequently	Very Often	
	6%	26%	38%	19%	100
	8	39	57	29	149

6. What design elements of forests do you think to promote visitation by residents?

	Strongly Disagree				Strongly Agree				Total		
	15%	22	18%	27	45%	67	17%	26			
Much grass	15%	22	18%	27	45%	67	17%	26	5%	7	149
Many flowers and plants	9%	13	14%	21	38%	56	32%	48	7%	11	149
Water feature	23%	35	26%	39	34%	50	13%	19	4%	6	149
Many bushes and trees	9%	14	12%	17	41%	61	32%	48	6%	9	149
Calm atmosphere	5%	8	7%	11	32%	47	44%	66	12%	17	149
Little traffic	6%	9	11%	17	36%	54	34%	50	13%	19	149
Good seating	4%	6	8%	12	26%	39	44%	66	18%	26	149
Possibility to sit alone	7%	10	9%	13	38%	57	39%	58	7%	11	149
Good management	4%	6	13%	19	36%	54	38%	56	9%	14	149
Nice view	7%	11	10%	14	44%	66	31%	46	8%	12	149

7. What elements of forests do you think to discourage residents from visiting forests?

	Strongly Disagree								Strongly Agree		Total
Much traffic	31%	46	33%	49	28%	42	8%	12	-	-	149
Many hard surfaces	29%	43	35%	52	33%	49	3%	5	-	-	149
Poorly shielded from the surrounding	26%	39	35%	52	32%	47	7%	11	-	-	149
Poor management	27%	40	34%	51	30%	45	8%	12	1%	1	149
Too little grass	24%	35	32%	48	31%	46	11%	17	2%	3	149
Too few and uncomfortable benches	21%	32	26%	38	34%	50	16%	25	3%	4	149
Many people	35%	52	34%	50	29%	44	2%	3	-	-	149
Too few flowers and plants	22%	32	24%	36	38%	56	11%	17	5%	8	149
Forest size	18%	26	15%	23	32%	48	23%	34	12%	18	149
Too few bushes and trees	20%	30	20%	29	36%	54	15%	22	9%	14	149

Part3: Management of School Forests

1. How do you perceive the degree of the management of school forests? (e.g., planting trees, pruning, etc.)

Very bad	Bad	Satisfactory	Good	Very good	Total
1%	6%	24%	49%	20%	100%
2	9	36	72	30	149

2. What is the estimate of school forests in your school area?

% of school forests in the total school areas						
0 – 10%	11 – 20%	21 – 30%	31 – 40%	41 – 50%	More than 50%	Total
34%	36%	15%	9%	3%	3%	100%
51	53	23	14	4	4	149

3. How adequate is the school-based support in the management of your school forests?

School-based support to school forests	Low										High	Total
Overall support	9%	13	16%	25	39%	58	27%	40	9%	13	149	
School funding	8%	12	21%	32	48%	71	18%	27	5%	7	149	
School board policy/guidelines	6%	9	23%	34	41%	61	23%	34	7%	11	149	
Access to management information	8%	12	21%	32	42%	62	24%	35	5%	8	149	

4. How adequate is the support for the management of your school forests by groups other than schools?

Outside support to school forests	Low					High					Total
Overall support	13%	20	28%	41	40%	59	13%	20	6%	9	149
Government policy/guidelines	14%	21	28%	42	41%	61	13%	19	4%	6	149
Municipalities' management support (e.g. coordinators' advice)	16%	24	32%	47	33%	49	13%	20	6%	9	149
Access to management information	14%	21	32%	48	37%	55	14%	20	3%	5	149
Community partners	16%	23	28%	42	39%	58	12%	18	5%	8	149

5. What kind of problems does your school experience related to the management of school forests?

Support to school forests	Not an obstacle					Obstacle					Total
Lack of funding	4%	6	11%	17	34%	50	38%	57	13%	19	149
Lack of government policy/guidelines	4%	7	11%	16	49%	73	31%	46	5%	7	149
Lack of school board policy/guidelines	5%	8	19%	28	51%	76	22%	33	3%	4	149
Lack of experts' advice (e.g. coordinators' advice)	6%	9	15%	22	34%	51	38%	57	7%	10	149
Lack of access to management information	5%	8	14%	20	42%	63	34%	50	5%	8	149
Lack of community partners	5%	8	13%	19	44%	65	31%	46	3%	11	149
Poor tree and plant health	5%	8	12%	18	46%	68	32%	47	5%	8	149
Safety problems	11%	17	17%	25	52%	77	16%	24	4%	6	149
Other _____	15%	23	9%	13	67%	99	7%	11	1%	3	149

6. What kind of problems does your school experience related to the “other” option in question 5?

- There were too many trees in a small space.
- We got help from local governments.
- School forests are not a good place for students’ education.
- The size of school forests is too small to compare with the size of schools. I think it is a garden. I need more trees.
- Lack of tree species
- Lack of funding for management, such as pruning
- Too many trees in a small size of a school forest
- No problem
- Lack of knowledge of forest management
- No problem
- Tree diseases and the lack of spaces within schoolyards
- Lack of knowledge of management and the responsibility on dead trees
- Lack of experts on management
- Lack of experts
- We need consideration on the management of school forests after the creation of school forests.
- Lack of teachers’ time
- Require school forest management
- Teachers’ lack of time for education
- Tree pruning
- Disagreement of local residents
- There is no problem because local governments support very well after the creation of school forests.
- I need a maintenance system for the management of school forests.
- Lack of information about trees and vegetation
- Lack of experts
- The consideration of school forests will be needed by people who manage school forests.
- Experts’ advice
- Lack of funding and lack of guidelines used in classes
- There were few chances to get experts’ advice because of lack of funding.
- There was no problem to manage school forests. It is difficult that many students cannot use school forests together because the area of school forests is too small.
- Lack of experts
- The area of school forests was depleted.
- No problem
- Lack of information about trees and vegetation

- There were many problems because of lack of funding and experts' advice. I think that local governments have to support the management of school forests such as planting trees, tree pruning, and insect control programs.
- Lack of funding and lack of experts' advice because the area of school forests is too big.
- Pruning
- We use school funding that is not enough to manage trees and vegetation.
- Trails in school forests are too narrow to walk. It is difficult to walk the trails in rainy days due to mud.
- There was no expert who manages trees. We need experts and funding.
- Thanks
- It was difficult when we found insects on trees.
- Lack of space in schoolyards
- Local residents brought dogs during weekends. It is difficult to ban residents entering with dogs.
- We need more funding for tall tree pruning.
- We need funding and management supports.
- I hope that the area of trails will be covered with concrete blocks. We need a covered place with chairs for outdoor classes.
- We need funding for management.
- Lack of experts and funding

Part 4: General Information

1. My school is in urban area (City core) 46% (68)
 rural area (Outside city core) 54% (81)
100% (149)

2. My school is elementary school 53 % (79)
 middle school 22 % (33)
 high school 25 % (37)
 other 0% (-)
100% (149)

3. My school is in the city of _____.

	Frequency	Percent	Valid Percent	Cumulative Percent
Busan	2	1.3	1.3	1.3
Chungcheongbuk-do	13	8.7	8.7	10.1
Chungcheongnam-do	9	6.0	6.0	16.1
Daegu	2	1.3	1.3	17.4
Daejeon	4	2.7	2.7	20.1
Gangwon-do	39	26.2	26.2	46.3
Gyeonggi-do	5	3.4	3.4	49.7
Gyeongsangbuk-do	6	4.0	4.0	53.7
Gyeongsangnam-do	2	1.3	1.3	55.0
Jeju	1	0.7	0.7	55.7
Jeollabuk-do	22	14.8	14.8	70.5
Jeollanam-do	20	13.4	13.4	83.9
Seoul	6	4.0	4.0	87.9
Ulsan	18	12.1	12.1	100.0
Total	149	100.0	100.0	