A THESIS FOR THE DEGREE OF MASTER OF SCIENCE

Preferences for management strategies aimed at conserving biodiversity in South Korea's national parks: A case of Seoraksan National Park

한국 국립공원의 생물다양성 보전관리 전략에 대한 선호도: 설악산국립공원을 대상으로

AUGUST 2017

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Preferences for management strategies aimed at conserving biodiversity in South Korea's national parks:

A case of Seoraksan National Park

UNDER THE SUPERVISION OF ADVISOR
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Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Forest Environmental Science

JULY 2017

APPROVED AS A QUALIFIED THESIS OF
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FOR THE DEGREE OF MASTER OF SCIENCE
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Abstract

Increasing developmental pressures and high visitation numbers have resulted in considerable damage to the natural ecosystems of national parks in South Korea. Balancing the primary management goals of conserving natural resources while ensuring the sustainable use of park resources presents challenges to park managers, and there is a need for new and relevant information on various stakeholders to guide future park management decisions. In this study, a choice experiment is conducted to investigate visitor preferences and the willingness-to-pay for management strategies aimed at biodiversity conservation in Seoraksan National Park. The choice experiment investigated the preferences for restoration programs for endangered animals, construction of wildlife passages, area of Special Protection Zones, and environmental education programs.

The main choice experiments visitor survey was conducted in April 2017 and a total of 252 valid responses were collected and analyzed. The marginal willingness to pay (MWTP) values for restoration programs to increase endangered animal populations by 15% and 30% from the present state are 3,249 KRW and 2,506 KRW per visit respectively, while those for the additional construction of 2 and 4 wildlife passages are 2,186 KRW and 5,323 KRW respectively. However, the MWTP values for reducing and expanding the area of Special Protection zones by 5% are -5,263 KRW and -2,402 KRW respectively – thereby indicating complexities in the preferences for such conservation strategies. The parameters for increases in environmental education-related programs were statistically insignificant. Visitors have positive values for biodiversity conservation in national parks, but may be indifferent as to how it is being protected. As the results indicate that visitors are willing to pay varying entrance fee amounts to contribute to the biodiversity conservation of the national park, possible policy recommendations such as voluntary donation schemes or zoning for visitor management purposes may prove to be feasible management options.

Keywords : biodiversity conservation, national parks, Seoraksan National Park park management, choice experiments, willingness-to-pay
Student Number : 2015-22344

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Chapter 1. Introduction

1.1 Research Background

Protected areas have been known to be a key component of conservation strategies owing to their effectiveness in protecting biodiversity. According to the International Union for Conservation of Nature (IUCN), "a protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values" (International Union for Conservation of Nature, 2017). The Convention on Biological Diversity (CBD) provides a more general definition of the term, defining a protected area as "a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives" (Convention on Biological Diversity, 2017).

There are seven IUCN categories of protected areas classified according to their management objectives. Widely recognized by international bodies and many national governments, these IUCN categories are utilized as the global standard for the definition and recognition of protected areas and hence, are being increasingly integrated into government legislation. The IUCN protected areas categories system includes *Strict Nature Reserve* (Category Ia), *Wilderness Area* (Category Ib), *National Park* (Category II), *Natural Monument or Feature* (Category III), *Habitat/Species Management Area* (Category IV), *Protected Landscape/Seascape* (Category V), and *Protected area with sustainable use of natural resources* (Category VI) (International Union for Conservation of Nature, 2017). All categories in this classification system are considered equally important and they differ in terms of the degree of human intervention (Suh & Steve, 2005).

All types of protected areas play a crucial role in the conservation of global biodiversity to a certain extent (Coetzee, Gaston, & Chown, 2014), whether they are managed in the form of nature reserves, national parks, community conserved areas or managed resource areas. Considering the threats of anthropogenic pressures on the world's natural resources, an effective global protected area system is most beneficial towards the ecosystem, habitat and species conservation

(Chape, Harrison, Spalding, & Lysenko, 2005). In the face of widespread threats to protected areas and their conservation values, proactive management with clearly defined objectives, framework, and monitoring, in addition to sufficient resourcing, play a crucial role in ensuring the viability of biodiversity in protected areas (Parr, Woinarski, & Pienaar, 2009). The establishment of more protected areas and increasing the performance of existing protected areas are expected to contribute significantly to conserving tropical biodiversity (Bruner, Gullison, Rice, & Fonseca, 2001). In the case of South Korea, national parks have been found to be vital for the freshwater fish diversity and its conservation, and the effective management of boundary areas is recommended (Jang, Lucas, & Joo, 2003).

According to the IUCN's categorization of protected areas, National Parks (Category II) are defined as:

"*Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.*" (International Union for Conservation of Nature, 2017)

Specifically, the primary objective of a *Category II National Park* is to protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation (International Union for Conservation of Nature, 2017). The *Yosemite Valley Grant Act* in 1864, as the first act providing state protection of wild lands in the United States, first expressed the need for planned use of natural environments at the national level. Several years later, the *Yellowstone Park Protection Act* in 1872 saw the establishment of the first national park in history. Although the designation of Yellowstone National Park was primarily aimed at the preservation of exceptional natural resources for the benefit and enjoyment by people, this notion encompasses inherent conflicts between preservation and use directives (Suh & Steve, 2005).

Biodiversity attracts visitors to national parks. A recent study on Finnish national parks provided evidence on the direct linkage between the protection of

biodiversity and the provision of ecosystem services in protected areas, based on results showing that Finnish national parks with high biodiversity values are more attractive to visitors as compared to those with lower biodiversity values (Siikamaki, Kangas, Paasivaara, & Schroderus, 2015).

The growth of nature-based tourism worldwide has led to the rising popularity of national parks as important tourist attractions. Concurrently, increasing pressure on fragile natural environments as a result of the growth of global tourism, which includes nature-based tourism, is a problem that needs to be addressed (Buckley, 2000). The rapid increase in the number of nature tourists, as a result of efficient land planning/usage and the amplification of the biophilia① effect, leads to decreases in areas of natural ecosystems and wildlife habitats, as well as physical damage and the extinction of endangered species. This phenomenon is increasingly being recognized as the main contributing factor towards biodiversity decline and therefore, a decrease in the benefits and services that biodiversity can provide.

As a result, park authorities increasingly develop park facilities to meet the demands for recreational services. (Juutinen, et al., 2011) However, recreation and tourism activities are considered as one of the main threats to the biodiversity of protected areas, and finding a balance between the preservation and use is a significant management challenge as national park managers constantly struggle between achieving conservation goals, the demands of the tourism sector, and the conflicting interests of various stakeholders. To achieve conservation targets without impeding the economic growth of nature tourism, more efficient and monitoring and management of visitors, improved funding mechanisms, as well as the allocation of other public and private land to nature tourism to alleviate the pressure on such protected areas is necessary (Buckley, 2000).

1.1.2 Korea's Protected Areas

In an extensive research on 39 protected areas in South Korea, including 18 national parks, and covering 40% of the total protected area system, the major threat is revealed to be associated with visitors. The top three major threats that

① The urge to affiliate with other forms of life- the human tendency to interact or be closely associated to other forms of life in nature (Edward O. Wilson, 1984)

affect protected areas in the South Korea are illegal harvest, inappropriate visitor behavior and inappropriate utilization by visitors (Hag, et al., 2010).

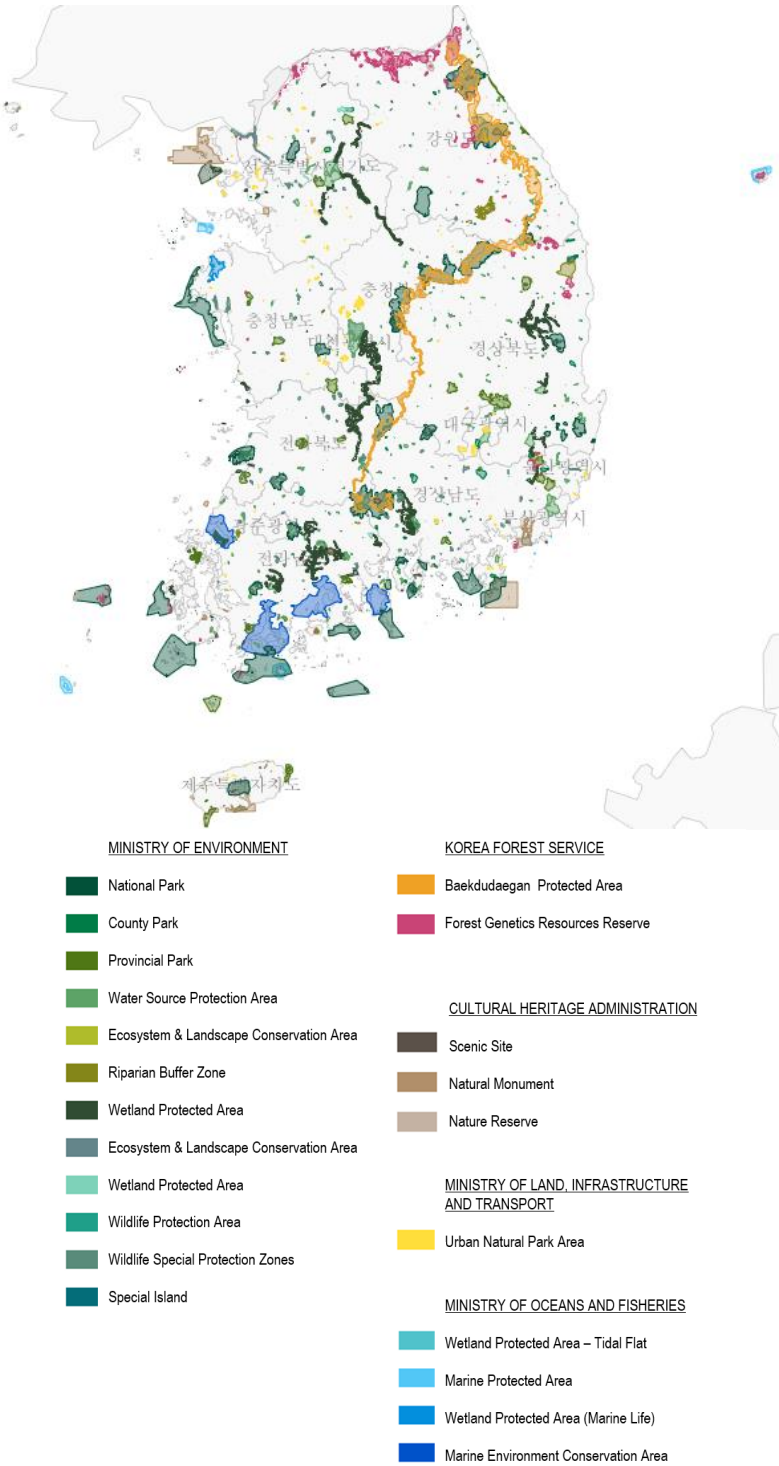

Figure 1. Protected areas in South Korea
(KOREA Database on Protected Areas, 2017)

As of 2017, there is a total of 1,499 sites designated as protected areas in South Korea and they constitute a total of 16,432.2 km^2. Terrestrial protected areas constitute about 11.2% of the total land area, while the total marine protected area constitutes 1.5% of the total marine area (KOREA Database on Protected Areas, 2017). These sites are designated as protected areas due to the need to protect their pristine natural ecosystems and rich biodiversity. The expansion of buildings, construction of new infrastructure and alteration of land shape is strictly restricted and in some cases, access is also prohibited (신용석, 2016). The Ministry of Environment manages several types of protected areas – Ecosystem and Landscape Conservation Areas, Wetland Protection Areas, Special Islands and Nature Parks. Nature Parks serve to protect natural ecosystems, beautiful natural landscapes, and cultural heritage sites to ensure that their sustainable usage by the public. Nature Parks can be categorized into 4 different types – national parks, provincial parks, county parks and geoparks. As of 2013, there is a total of 81 nature parks covering 8.1% of the total land area in South Korea. (Ministry of Environment, 2013)

1.1.3 National Parks in Korea

Korea's efforts to benchmark its national park system against best practices in other countries has resulted in the classification of 16 national parks* as *Category II National Park* under the IUCN classification system. The classification of certain protected areas within Dadohaesang National Park and Deogyusan National Park as *Category Ia Strict Nature Reserve* has also demonstrated the Korea National Park Service's continuous efforts in the restoration and conservation of ecosystem health in the region. The list of national parks in Korea, along with the year of designation, national park type, IUCN category and area as detailed in **Table 1**.

Table 1. List of 22 national parks in Korea

National Park	Year of Desig-nation	Type	IUCN Cat.	Total area (km^2)
Total (Average)	-	-	-	6,726.318
Bukhansan	1983	Mountainous	V	76.922
Chiaksan	1984	Mountainous	II	175.688
Deogyusan	1975	Mountainous	V	229.430
Gayasan	1972	Mountainous	II	76.256
Gyeryongsan	1968	Mountainous	V	65.335
Hallasan	1970	Mountainous	II	153.332
Jirisan	1967	Mountainous	II	483.022
Juwangsan	1976	Mountainous	II	105.595
Mudeungsan	2013	Mountainous	V	75.425
Naejangsan	1971	Mountainous	II	80.708
Odaesan	1975	Mountainous	II	326.348
Seoraksan	1970	Mountainous	II	398.237
Sobaeksan	1987	Mountainous	II	322.011
Songnisan	1970	Mountainous	II	274.766
Taebaeksan	2016	Mountainous	V	70.052
Wochulsan	1988	Mountainous	II	56.220
Woraksan	1984	Mountainous	II	287.571
Byeonsanbando	1988	Marine/Coastal	II	153.934 (136.707 land)
Dadohaehaesang	1981	Marine/Coastal	II	2,266.221 (291.023 land)
Hallyeohaesang	1968	Marine/Coastal	II	535.676 (127.188 land)
Taeanhaean	1978	Marine/Coastal	II	377.019 (24.223 land)
Gyeongju	1968	Historical	V	136.550

(United Nations Environment World Conservation Monitoring Centre, 2017)

(국립공원공단, 2016)

Korea national parks constitute about 31% of the total area of terrestrial protected areas as well as 25% of marine and coastal protected areas (신용석, 2016). National parks and are designated for the protection of key terrestrial and marine ecosystems, as well as the natural and cultural landscapes and seascapes (IUCN, KNPS, MOE, & Jeju Island Special Self-Governing Province, 2009). There are 22 National Parks in Korea, of which 21 are managed by the Korea National Park Service, with Hallasan under the management of the Jeju Provincial Government. The Korea National Park Service is in charge of the management of the national park estate. The 2nd Master National Park Plan (2012~2021) was drafted and implemented for the effective management of national park resources

as they constitute a core part of Korea's natural ecosystem. The management of national parks in Korea is focused on four key aspects –conservation of park resources, protection of park environment, sustainable use and participation and cooperation (Korea National Park Service, 2017):

1. **Conservation of Park Resources –** Conservation of species diversity and natural ecosystem; Improvement of the value of beautiful natural sceneries and important cultural assets
2. **Protection of Park Environment –** Enforcement of legal rules and management of regulations on persons using and damaging the parks
3. **Sustainable Use –** Development of a wide variety of tourist programs and high-quality services
4. **Participation and Cooperation –** Creation of a public sentiment on healthy park management and improvement of international recognition

As protected areas, there is constant controversy surrounding the use, management, and development of national parks. National parks play a crucial role in the protection of biodiversity and are valued as ecosystem service providers to the general public. It was possible to achieve both preservation and recreation goals in the past due to the low use pressures, but National parks in Korea have risen to become important recreational and tourism attractions to both domestic and international visitors.

In comparison to other countries, the national parks in South Korea are relatively smaller, mainly of the mountain terrain type, and consist of a significant proportion of privately owned land (33%) (신용석, 2016). Korea's national parks also boast of several unique features – in addition to the scenic beauty of mountains, waterfalls, forests, and flora, ancient Buddhist relics and temples are also situated within many national parks (Kim, Lee, & Klenosky, 2003). As observed in **Figure 2** (국립공원공단, 2016) (환경부, 2017), the number of visitors to national parks in South Korea has increased steadily over the years and has been averaging about 44 million visitors per annum over for the past few years. Visitation in national parks is dominated by a domestic crowd, with foreign visitors constituting only 1% of the total number of visitors (Hag, et al., 2010). Aside from the rising popularity

of nature tourism, another key reason that was attributed to the increase in visitor numbers is the abolishment of the entrance fee system in 2007. Later on, in 2013, Mudeungsan National Park, previously a Provincial Park, was designated as the 21st national park, contributing further to the increase in visitor numbers from 2013 onwards. The decreases in visitor numbers in the recent years were attributed to the outbreak of the Middle East Respiratory Syndrome in 2015 and the temporary closing off of certain hiking trails for maintenance work (Ministry of Environment, 2016).

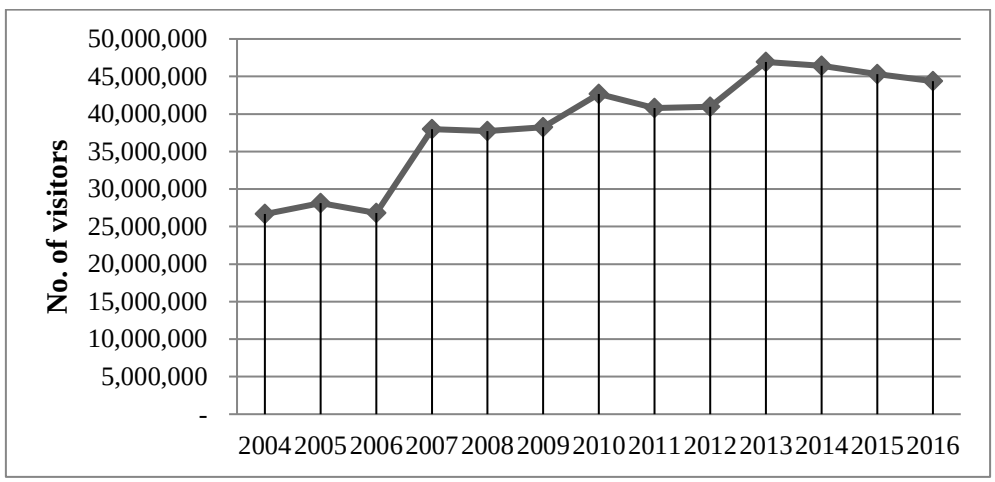

Figure 2. Number of visitors to National Parks in South Korea per annum

The increase in visitor numbers is also attributed to other factors such as growing affluence, decreases in average working hours (from 52.3 hours per week in 1988 to 44.5 hours per week in 2013), and increasing interest in leisure and recreational activities (hiking was ranked the top hobby in Korea in 2014) (윤여창 & 윤영일, 1996). About 49% of visitors ascend to the peaks, resulting in serious damage to the surrounding area. The high influx of visitors to national parks has also led to the emergence of side roads, which in turn, cause damage to ecosystems. In 2015, the number of side roads discovered in Seoraksan National Park, Jirisan National Park, and Bukhansan National Park is 44, 53 and 143 respectively. Visitor densities in Korea's national parks are also significantly higher than those in other countries (In 2015: Korea – 9,947 persons/km^2, United States – 0.36 persons/km^2; Finland – 233 persons/km^2). (환경부 자연보전국, 2016.5.3)

1.1.2 Seoraksan National Park

Seoraksan National Park was designated as the 5th national park in Korea in 1970 and as a nature preservation area on November 5, 1965. Internationally recognized for its rare species, the entire mountain was designated as a Biosphere Preservation District by UNESCO in 1982, and a *Category II National Park* by the IUCN in 2005. The total area of Seoraksan National park is 398.539 km^2. Over 1,400 rare plant species and 2,000 animal species inhabit Seoraksan National park, including the Korean goral (*Nemorhaedus caudate*). Although widely distributed in northeast Asia, the exceedingly rare Dwarf Stone Pine (*Pinus pumila*), which is under growing threat due to climate change, can only be found in the Daecheongbong area of Seoraksan National Park in Korea. The rich and colorful forests and majestic rock formations also attract about 3.5 million visitors to Seoraksan National Park annually. (Kim A. , 2015)

In the 1st Master Plan for the Conservation & Management of Seoraksan National Park (2013-2022), the strategic plans for the park covered two main areas.

Table 2. Budget allocation for Seoraksan National Park management aspects

Management Aspects	Key Plans	Specific Activities	Project Expenses	Proportion of Total
Conservation of Park Resources	4	36	(1,157.9억원) 99.2M USD	27%
Conservation of Baekdudaegan	2	7	(37.9억원) 3.2M USD	1%
Protection of Park Environment	4	22	(252.75억원) 21.6M USD	6%
Total (Preservation)	**10**	**65**	**124M USD**	**34%**
Sustainable Use	5	58	(2,677.7억원) 229.4M USD	63%
Cooperation with Local Communities	2	21	(65.65억원) 5.6M USD	1.5%
Management Base & Organizational Culture	2	15	(67.4억원) 5.8M USD	1.5%
Total (Use)	**9**	**94**	**240.8M USD**	**66%**

(국립공원관리공단, 2012)

With reference to **Table 2**, (1) conservation of park resources, (2) conservation of Baekdudaegan② ecological axis, and (3) protection of park environment constitute the preservation-based management of Seoraksan National Park, while (4) sustainable use, (4) cooperation with local communities, and (6) expansion of management base & improvement in organizational culture constitute the use-based management of Seoraksan National Park. As such, the scope of this research has been narrowed down accordingly to focus on visitors' preferences for conservation and use-related management attributes of Seoraksan National Park.

In addition to visiting pressure, national parks in Korea also face developmental pressures. Infrastructure development, such as the installation of cable cars, will inadvertently boost the visiting rate and contribute to the regional economy, but increase visitor stress in the area may result in irreversible environmental impacts. Between 2015 and 2016, plans to establish a second cable car system on Seoraksan National Park have been in discussions, and the proposal has also been approved by several key decision-making bodies, such as the Ministry of Environment. However, the proposal was eventually denounced on December 28, 2016, by the Cultural Assets Committee of the Cultural Heritage Administration (문화재청 문화재위원회) on grounds that the construction and operation of the cable car system will have immense negative impacts on Seoraksan National Park's (designated as Natural Monument No. 171) cultural assets, which includes its flora and fauna, geological features, landscape, and scenery. Following Yangyang country's appeal against the Cultural Heritage Administration's decision, the Central Administrative Appeals Commission (중앙행정심판위원회) passed a verdict on June 15, 2017, stating that the latter's decision is unfair and accepted Yangyang country's appeal. The residents of Yangyang country welcomed the new decision and plans to construct the cable car system will resume. On the other hand, environmental and citizen's groups who opposed to the cable car construction reinstated their intention to demobilize the installation of the cable car by any means necessary (연합뉴스, 2017).

Cable car systems have already been installed in certain national parks (Naejangsan National Park, Seoraksan National Park) and other national parks,

② Refer to Chapter 2.5 for more details on the Baekdudaegan mountain range

such as Jirisan National Park and Bukhansan National Park, are also constantly facing developmental pressures. The cable proposal to construct a cable car system in Jirisan National Park has been rejected for the third time (오마이뉴스(시민기자), 2017). The conflicting opinions of various stakeholders – local residents in the region, environmentalists, visitors, etc. – often result in clashes as well.

1.1.3 Problem Statement

The attraction for biodiversity conservation in protected areas (Siikamaki, Kangas, Paasivaara, & Schroderus, 2015) can be perceived as a double-edged sword – it can generate revenues for conservation through nature-tourism and increase social well-being, especially for local communities, but excessively high numbers of visitors can result in negative, and sometimes irreversible, impacts on the natural environment (Cole & Landres, 1995), thereby resulting in losses in biodiversity and reduced ecosystem services.

National parks, as protected areas, are perceived as both biodiversity protection tools and ecosystem service providers. In light of the increasing pressure for the diverse development of national parks, greater emphasis is being placed on the need for new and relevant information to guide future park management decisions to ensure the sustainable management of the parks. Understanding visitor attitudes allow park managers to gauge and predict responses to management strategies (Brooks, Warren, Nelms, & Tarrant, 1999).

Several studies have estimated the use and preservation values of national parks in South Korea and the results have shown that the preservation value of national parks in Korea is higher than its use value in general (Lee & Han, 2002; 김통일, 양성임, 김민수, 2010; 국립공원연구원, 2012). However, there have been few studies indicating the preferences for specific attributes of national parks in Korea to illustrate in detail, the marginal willingness-to-pay for different attributes. In particular, there are few choice experiments-based studies focused on the management aspect of national parks in Korea. There is a need for research to enhance park managers' understanding of visitors' attitudes and demands in order to balance between conservation goals, the demands of different stakeholders and

the local communities, as well as the interests and welfare of visitors, to effectively and sustainably manage national parks.

Although the entrance fee system was abolished in 2007, there is a need for research to support conservation management plans when the need arises, and to aid the future introduction of any payment policies as well as payments for ecosystem services (PES) schemes in the future.

This research focuses on one of the most highly visited national parks in Korea – Seoraksan National Park. Plans to install a second cable car system in the park has been shrouded in controversy in recent years and this incident is one of the many examples of public controversy over the development of national parks and protected areas. On top of their established reputations as recreational sites and tourist attractions, national parks are significant to the maintenance of biodiversity and provision of ecosystem services in Korea. Despite occupying about 4.6% of the total land area of the country, national parks contain 47% of the 42,756 species that exist in South Korea, as well as 64% of the endangered species designated by the Ministry of Environment (신용석, 2016). This makes the protection of national parks' pristine ecosystems and the conservation of its biological diversity important for the well-being of the Korean population, but also challenging. Thus, an assessment of perspectives towards biodiversity conservation is crucial. It is important that decision makers have sufficient information on visitors in order to guide the implementation of future park management strategies.

1.2 Research Objectives

This research aims to contribute to effective park management by providing park managers and decision-makers with insights on visitor preferences and feasible policy recommendations associated with the conservation of biodiversity in Seoraksan National Park. To achieve this, the willingness-to-pay (WTP) values for key management strategies aimed at biodiversity conservation will be estimated.

The choice experiment method is used to elicit the values visitors place on management strategies directed at the biodiversity conservation of Seoraksan National Park. A set of hypothetical park profiles composed of select management strategies related to the biodiversity conservation of the park will be created and presented to respondents visiting Seoraksan National Park in the form of a questionnaire survey. Respondents will then be asked to choose their most preferred management alternative. The specific objectives are as follows:

a. To estimate visitors' marginal willingness-to-pay, in the form of entrance fees, for various management strategies targeted at biodiversity conservation in Seoraksan National Park.

b. To determine if there are any relationships between visitors' sociodemographic characteristics and their willingness-to-pay to finance management plans aimed at biodiversity conservation in Seorakan National Park.

Considering the four management strategies to be focused on in this research, and relating them to research objective **a.**, the following hypotheses are proposed accordingly:

a1. The probability of a management option being chosen by visitors increases when the intensity of restoration programs targeted at endangered animals is increased.

a2. The probability of a management option being chosen by visitors increases when the number of wildlife passages constructed is increased.

a3. The probability of a management option being chosen by visitors increases when the proportion of the national park designated as Special Protection Zones is increased and vice versa.

a4. The probability of a management option being chosen by visitors increases

when the number of environmental education-related implementations is increased.

Correspondingly, the null hypothesis is that the probability of choosing a management option is not affected by the level of the management strategy.

The overall goal of the research is to reveal how visitors value the considered conservation-related management strategies of the park and based on this information, draw guidelines for the efficient management of national parks' natural resources while providing insight for the subsequent Korea National Park Master Plan. Furthermore, identifying heterogeneous preferences for various biodiversity conservation management strategies can facilitate future implementations targeted at specific groups of the community. For instance, if the results indicate a lower willingness to pay for the restoration of endangered animals, it can be implied that the visitors do not value this management strategy as compared to other strategies. Hence, additional environmental education programs may be organized to inculcate a better understanding of the importance of endangered animals and how they contribute to the ecosystem health and vitality of the national park.

1.3 Organization of Thesis

The organization of this thesis is as follows.

Chapter 2 provides background information on the valuation of non-market goods, an introduction to select valuation studies based on the Choice Experiments approach, and an overview of the management of national parks in South Korea, with a focus on Seoraksan National Park. The last section of the chapter summarizes the conservation management aspects and strategies of Seoraksan National Park.

Chapter 3 begins with an introduction to the Choice Experiments approach, the research framework and the steps taken in towards the development of the main Choice Experiments questionnaire. **This chapter also includes the findings of three other surveys conducted as part of the experimental design process for the Main Choice Experiments Survey –**

(1) the Preliminary Survey to determine appropriate levels for the payment attribute (entrance fee);

(2) the Online Survey to gather expert opinion and select the key management strategies to be included in the survey; and

(3) the Pilot Choice Experiments Survey to test the survey instrument before actual implementation.

This chapter concludes with the finalized list of attributes and attribute levels to be incorporated into the main survey questionnaire.

Chapter 4 reports on the results and interpretation of the Main Choice Experiments Survey conducted on 2 April 2017, providing the respondent characteristics, the estimated models of the data collected, as well as the estimated willingness-to-pay values for different levels of each management strategy.

Chapter 5 concludes the thesis by summarizing the results and discussing any implications that they have for the future development and management of national parks in Korea, while suggesting opportunities for further research.

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Chapter 2. Literature Review

2.1 Valuation of Nonmarket Goods

2.1.1 Introduction to environmental valuation

Many aspects of the environment are ‘valuable’ to people but their values may not be reflected in the market system. For instance, people value recreational activities such as hiking and camping, but the prices paid for these activities are often set administratively and are often low, or sometimes even free of charge. For various reasons, environmental goods and services have not been incorporated into the market system, and as a result, their economic values remain largely unknown and are often misunderstood by stakeholders. People have devised methods to determine the value of environmental goods and services and express them in monetary terms. The use of environmental valuation methods, as an attempt to place environmental goods on par with market goods so that they can be evaluated and compared using the same money metric, has increased markedly since the early 1970s. (Louviere, Hensher, & Swait, 2000) Environmental values, similar to the assessment of any other economic value, are measured as the amount an individual would be willing to pay for an increase in the quality or quantity of a good or service or the amount an individual would be willing to accept in compensation for a decrease in the quality or quantity of the good or service. The Total Economic Value of an environmental good or service can be broken down into use and non-use values, as listed in **Table 3**.

Table 3. Components of Total Economic Value

Component	Definition
Use values	*Direct use value* – the value derived from the actual use of a good or service *Indirect use value* – the value derived from the indirect use of a good or service
Non-use values	*Option value* – the value of the environment as a potential source of benefit in the future, rather than its actual present value. *Existence value* – the value derived from the existence of a particular wilderness, endangered species or another object in nature *Bequest value* – the value that people place on knowing that future generations will have the choice to enjoy something. (measured by the willingness to pay to preserve the natural environment for the sake of future generations)

(Krutilla, 1967) (Kengen, 1997)

Research on the valuation of non-market goods has developed into two branches – revealed preference methods and stated preference methods. The revealed preference method involves inferring the value of a non-market good by studying actual behavior in a closely related market. Although the revealed preference approach is advantageous due to its inherent nature of being based on the actual choices made by individuals, one of the drawbacks is that it is unable to measure non-use values (existence value, altruistic value, bequest value) as it is conditioned on the current and previous levels of the non-market good. Stated preference methods, on the other hand, assess the value of non-market goods by means of the stated behavior of individuals in a hypothetical setting. (Alpizar, Carlsson, & Martinsson, 2001)

2.1.2 Introduction to choice experiments

'Choice Modelling' is a stated preference approach to environmental valuation. It is a family of survey-based methodologies that are used to model the preferences for goods. Contingent valuation, the most used stated preference method in valuing non-market goods, estimates the economic value of a composite commodity, while

choice modeling methods unbundle the demand for the commodity into its attributes and value its attributes separately (Gunatilake, Patail, & Yang, 2012). Both contingent valuation and choice modeling can be used to measure all forms of values, including non-use values. Interest in choice modeling methods is attributed to its potential for providing more information about preferences of respondents as compared to contingent valuation and suitability for benefit transfer applications (Morrison & Benett, 2000).

As choice modeling provides information about the value of attributes, it has potential to be used in decision making since many management decisions are associated with changing attribute levels, rather than losing or gaining the entire environmental good. Hence, this necessitates the need for information on the value of attributes, rather than the value of discrete changes in environmental quality (Hanley, Wright, & Adamowicz, Using Choice Experiments to Value the Environment, 1998).

Choice modeling involves presenting respondents with variations of good descriptions, which are differentiated in terms of their attributes and levels, and then asking them to rank, rate or select their most preferred alternative. The conceptual microeconomic framework for choice modeling is based on the Lancasterian economic approach, where individuals derive utility from the characteristics of the goods rather than directly from the good themselves (Lancaster, 1966). The four main variants of the choice modeling approach include (Hanley, Mourato, & Wright, 2001):

- Choice Experiments, where a respondent is tasked to choose between two or more alternatives;
- Contingent Ranking, where a respondent is tasked to rank a series of alternatives;
- Contingent Rating, where a respondent is tasked to score alternative scenarios on a scale of 1 – 10; and
- Paired Comparisons, where a respondent is tasked to score pairs of scenarios on a similar scale.

As compared to the contingent valuation method, the choice experiments approach for environmental valuation seems to offer greater potential because it involves the decomposition of the total value for any environmental resource into characteristic values (Hanley, et al., 1998). In a choice experiment, respondents are presented with a set of two or more alternatives, which vary in terms of their attributes and levels, and then asked to select their most preferred alternative in the set. In order to interpret the results in standard welfare economic terms, a baseline alternative (either the status quo or 'do nothing' situation) is usually included in each choice set. **Figure 3** shows an example of a choice experiments questions that were used in a study to explore visitors' preferences among ecological and recreational management priorities of Oulanka National Park in Finland (Juutinen, Mitani, Mantymaa, Shoji, & Siikamaki, 2011). In this study, the good is a park management alternative, defined in terms its attributes such as biodiversity, expected number of visitors, resting places, information boards, and entrance fee. Each respondent is asked to answer 4 choice tasks, one of which is depicted in **Figure 3**.

Choice task 1.

	Alternative 1	Alternative 2	Alternative 3 (Basic Alternative)
Biodiversity: number of endangered species of plants and animals in the park.	**Decreases**: populations decrease so that 15 species extinct in the park.	**Decreases**: populations decrease so that 15 species extinct in the park.	**Stays at the present state**: number of endangered species 150.
Expected number of visitors: on average on the most visited places.	**Increases as anticipated**: a visitor encounters 40 people during a 1 km walk.	**Increases as anticipated**: a visitor encounters 40 people during a 1 km walk.	**Increases as anticipated**: a visitor encounters 40 people during a 1 km walk.
Entrance fee: for adult visitors only.	**Entrance fee € 2/** person/ visit.	**Entrance fee € 10/** person/ visit.	**No entrance fee**.
Size and number of resting places on the most visited places.	**Construction of new resting places**: a resting place after every 1 km.	**Stays at the present state**: a resting places after every 2 km.	**Stays at the present state**: a resting places after every 2 km.
Information boards by the side of hiking routes in English.	**Few more boards**: a board after every 3 km.	**Far more boards**: a board after every 1 km.	**Stays at the present state**: no information boards.
	○	○	○

Please choose one of these three alternatives by putting a tick to **one** circle above.

Figure 3. Sample choice experiment question

Initially developed in 1982 (Louviere & Hensher, 1982), the choice experiments approach is based on the Random Utility Model (McFadden, 1973). Based on this framework, the indirect utility function for each respondent is the sum of a deterministic term that can be described as a function of factors that influence the respondent's utility, as well as a random term that is observable and stochastic for researchers. The deterministic element (V) is usually specified as a linear index of the attributes of the n different alternatives in the choice set. The stochastic element (e) represents the unobservable influences on individual choice. The indirect utility U of alternative i for a respondent n, is as follows (Hanley, Mourato, & Wright, Choice modelling approaches: a superior alternative for environmental valuation?, 2001):

$$U_{ni} = V_{ni} + e_{ni} \tag{1}$$

The probability that a respondent chooses alternative i in the choice set to any alternative j, can be expressed as the probability that the utility of alternative i exceeds that of all other alternatives. Rearranging the expression to group the observable and unobservable components, equation (2) is obtained:

$$\begin{aligned} \mathrm{P}\left(U_{ni} > U_{nj}\right) &= \mathrm{P}\left[\left(V_{ni} + e_{ni}\right) > \left(V_{nj} + e_{nj}\right)\right] \text{ for all j} \neq \text{i} \\ &= \mathrm{P}\left[\left(V_{ni} - V_{nj}\right) > \left(e_{nj} - e_{ni}\right)\right] \text{ for all j} \neq \text{i} \end{aligned} \tag{2}$$

It is necessary to know the distribution of the error terms (e_{ni}) in order to derive an explicit expression for this probability. Assuming that the error terms are independently and identically distributed with an extreme-value distribution, the probability of an particular alternative i being chosen as the most preferred alternative (out of J alternatives) can then be expressed using a multinomial logit model:

$$\mathrm{P}_i = \frac{\exp(\mu V_{ni})}{\sum_j \exp(\mu V_{nj})} \tag{3}$$

μ is scale parameter, which is inversely proportional to the standard deviation of the error distribution, is typically assumed to be one as it is often not possible to separately identify it.

Socioeconomic variables can be included in the utility function together with the choice set attributes, but as they are constant for any given respondent across throughout the choice selections (e.g. educational level is the same when the first choice is made, and also when the subsequent choices are made), they can only be input in the form of interaction terms that are obtained via interactions with other choice-specific attributes. (Hanley, Mourato, & Wright, 2001)

As V_{ni}, the deterministic element in eq. (1) is a function of factors that influence the respondent's utility and consists of several attributes, can be expressed as a linear function of the attribute vectors. β_1 to β_k represents the parameters to be estimated for an attributes 1 to k that influences the respondent's utility, and X_{ik} is the value of the kth attribute of alternative i (Han, Lee, Mjelde, & Kim, 2010) (Koo, Park, & Youn, 2013) (Bullock & Lawson, 2008).

$$V_{ni} = \sum_{k=1}^{K} \beta_k X_i = \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots \beta_k X_{ik} \tag{4}$$

Marginal values can be calculated from the marginal rate of substitution between a coefficient β_k and the coefficient for the price parameter, γ. The marginal rate of substitution denotes the willingness to pay for changing an attribute from the baseline level to a predetermined level. Thus, marginal willingness to pay (MWTP) for an attribute k is determined by dividing β_k by the parameter of the cost attribute γ:

$$MWTP_k = -\frac{\beta_k}{\gamma} \tag{5}$$

Choice experiments are therefore consistent with utility maximization and demand theory when a status quo option is included in the choice set. Choice experiments are advantageous in that they:

- Enable the estimation of individual attributes that the environmental good is composed of;
- Can be used in benefit transfer applications; and
- Avoid the "yea-saying" contingent valuation methods as respondents have the opportunity to choose among alternatives, or the status quo or opt-out alternative and there are multiple opportunities to express individual preferences.

2.2 Studies Utilizing Choice Experiments

2.2.1 Choice Experiments studies

Tables 4 and **5** consist of a compilation of studies conducted on protected areas, national parks, and other nature sites, detailing the attributes and attribute levels used in each study.

Table 4. Selected choice experiments-based studies on protected areas and national parks

Research Location	*Attributes* and Attribute Levels Used
China – Lushunkou National Forest Park Valuing natural and non-natural attributes for a national forest park using a choice experiment method (Wang, Wei, & Liu, 2014)	1. *Vegetation coverage* – decreases to 60%, stays at present state of 75%, increases to 85% 2. *Number of rubbish bins* – decreases to 1 bin/100m, stays at present state of 2 bins/100m, increases to 4 bins/100m 3. *Number of pieces of rubbish* – decreases to less than 2 pieces/100m, stays at present state of 3-6 pieces/100m, increases to 7-12 pieces/100m 4. *Degree of crowding* (number of visitors encountered during a 100m walk) – 5, 20, 50, 60, 80 5. *Cultural and historical relics protection* – evident damage, stays at present state (minor damage), improved to no damage or well protected 6. *Entrance fee per person* – free, $0.95, $1.59, $3.17, $4.76
Finland – Oulanka National Park Combining ecological and recreational aspects in national park management: A choice experiment application (Juutinen, Mitani, Mantymaa, Shoji, & Siikamaki, 2011)	1. *Biodiversity (species diversity)* – populations decrease and 15 species become extinct in the park, stays at present state (150 endangered species), 10% increase in populations of endangered species 2. *Expected number of visitors a visitor encounters during a 1km walk* – 10, 40, 70 3. *Size and number of resting places at most visited places* – stays at present state (a resting place every after 2km), expansion of present resting places, new campfire places at crowded places 4. *Information boards by the side of hiking routes in English* – stays at present state (no information boards), a board after every 3km, a board after every 1km 5. *Entrance fee (for adult visitors)* – no entrance fee, € 2, € 5, € 10, € 20
South Korea – Jirisan National Park Measuring the Willingness to pay for Visit Attributes for the Gradation of Entrance Fee in Jirisan National Park (김태균 & 이주희, 2007)	1. *Length of visit* – 1 day, more than 1 day 2. *Season* – winter, other seasons (spring, summer, autumn) 3. *Interpretative services* – none, visitor information centers, visitor information centers and nature commentary 4. *Entrance fee* – 2000, 5000, 10 000, 15 000, 20 000, 30 000 KRW

(**Table 4** continued)

South Korea –Woraksan National Park Choice-experiment valuation of management alternatives for reintroduction of the endangered mountain goral in Woraksan National Park, South Korea (Han, Lee, Mjelde, & Kim, 2010)	1. *Population of gorals after 50 years* – 10, 50, 200 2. *Sanctuary* – no establishment, establishment of core zone, establishment of core plus buffer zones 3. *Education and information* – 5%, 40%, 60% of local residents 4. *Preservation fund (one-time payment per household)* – 1000, 10 000, 30 000, 50 000 KRW
Uganda – Mabira Forest Reserve, Budongo Forest Reserve, Kibale National Park Biodiversity and nature-based tourism at forest reserves in Uganda (Naidoo & Adamowicz, 2005)	1. *Number of bird species seen* – 20, 40, 60, 80 2. *Travel time (hours)* – 1, 5, 6 3. *Visit part of tour?* – yes, no 4. *Lodging facilities* – none, tents, cabin, luxury lodge 5. *Landscape features* – primary forest, secondary forest, agriculture, primary and secondary forest 6. *Chance of seeing large wildlife* – very slim chance, very good chance 7. Entrance fee - $5, $15, $25, $40
United States – Grand Canyon National Park Can environmental attributes influence protected area designation? A case study valuing preferences for springs in Grand Canyon National Park (Mueller, Lima, & Springer, 2017)	1. *Source (suitability as backcountry water source)* – yes, no 2. *Scenic (known for its scenic beauty)* – yes, no 3. *Habitat (suitable habitat for threatened, endangered, or endemic species)* – yes, no 4. *Accessible (accessible in a day from canyon rim/river)* – yes, no 5. *Cultural (known site of significance to Indigenous Nations)* – yes, no 6. *One-time fee on Federal Income Taxes* – $1.25, $2.5, $5, $8, $10, $16, $25, $50
Vietnam – Tram Chin National Park Estimating wetland biodiversity values: a choice modelling application in Vietnam's Mekong River Delta (Do & Benett, 2008)	1. *Percentage of area having healthy vegetation* – 50, 60, 70, 80 2. *Number of Sarus Cranes* – 150, 300, 450, 600 3. *Number of fish species* – 40, 50, 60, 70 4. *Number of local households worse off* – 0, 600, 900, 1200 5. *One-off increase in current monthly electricity bill* – 0, 10 000, 50 000, 100 000 VND

Table 5. Selected choice experiments-based studies on other nature sites

Research Location	*Attributes* and Attribute Levels Used
Canada – Saskatchewan forest areas Exploring the preferences of wildlife recreationists for features of boreal forest management: a choice experiment approach (Boxall & Macnab, 2000)	1. *Distance of travel from home to hunting areas* – 75 km, 250 km, 425 km 2. *Access within recreation area* – passable with a 2-wheeled drive vehicle, passable with a 4-wheeled drive vehicle, access on foot and/or ATVs (all-terrain vehicle) 3. *Level of congestion* – no other people encountered, other people on foot encountered, other people on ATVs encountered 4. *Evidence of forestry activity* – little or no evidence of logging, small, large 5. *Moose populations* – evidence of 1 moose every 2 days, evidence of 1 moose per day, evidence of 3 or more moose every 2 days 6. *Opportunity to see wildlife species* – only common species, common species of wildlife + 1 or 2 species not seen before, common species of wildlife + 1 or 2 species not seen before + chance of seeing a rare/endangered species
South Korea – arboretums An Economic Valuation of Arboretum Using Choice Experiments (홍성권, 김재현, 정수정, 태유리, 2010)	1. *Nature resource conservation* – botanical garden for the preservation of native plants, botanical garden for diverse hygrophytic plants to live in, large greenhouse for rare/exotic species from other countries 2. *Education* – experiential programs offered at forest museum, opportunities for cultural activities at outdoor theater area, arboretum interpretive programs 3. *Recreation* – walking trails in the forest, diverse themed gardens, wide fields of grass 4. *Facilities* – facilities for sale of plants & souvenirs, facilities for elderly & disabled, cafeteria 5. *Accessibility* – accessible by bike, accessible by foot, sufficient parking lots available for cars 6. *Entrance fee* – 2000, 3000, 5000, 6000, 7000 KRW
South Korea – urban forests Preferences of urban dwellers on urban forest recreational service in South Korea (Koo, Park, & Youn, 2013)	1. *Trail length (time taken to walk long trail without resting)* – 1, 2, 3 2. *Biodiversity (species variety and species richness)* – poor, average, rich 3. *Accessibility (travel time)* – 5 min, 10 min, 15 min 4. *Environment education programs* – none, only signs, guided program and signs 5. *Slope (trail gradient)* – flat, hilly, mountainous 6. *Entrance fee* – 1 000, 2 000, 3 000 KRW

2.3 South Korea's National Parks

Despite occupying approximately 3.9% of the total land area of the country (환경부, 2015), the 22 national parks in South Korea contain 64% of the 246 Ministry of Environment-designated endangered species and 47% of the 42,756 species that exist in South Korea (신용석, 2016). National parks of South Korea are protected areas designated and managed by the Ministry of Environment, on the premises of preserving and ensuring the sustainable use of the natural ecosystems and the natural and cultural landscapes that are representative of South Korea (국립공원관리공단, 2012). The definition and ideology behind South Korea's national parks differ from that of the IUCN as well as North's America's national parks. In the case of South Korea, it is being asserted that national parks represent the ecosystems and landscapes of the country, however, there are no definite references to the ecosystem and cultural values or locational characteristics (historical and native aspects), as well as regulations and limitations on the use of national parks (신용석, 2016). In order words, it is is not clearly asserted that South Korea's national parks are managed with preservation as the most important priority.As such, there are many aspects of South Korea's national parks that are targeted at regional development and increasing revenue from tourism. Visitor services and facilities are strongly demand-driven.

Since the beginning of 2007, national parks nationwide have been open to the public free of charge following the abolishment of the entrance fee system as part of the Korea National Park Service (KNPS) and the Ministry of Environment's decision to allow more people to enjoy nature. The new amendment has resulted in a rapid increase in the number of visitors in an already highly visited system. However, temples under the Jogye Order (South Korea's largest Buddhism Organization), which occupy 7% of national parks (신용석, 2016), continue to levy fees on visitors entering the temple's forests (which are designated as cultural heritage sites) to finance the maintenance of cultural assets, facilities and roads. These temples are considered as 'Facilities Operated by Private Businesses'③ and

③ According to the Seoraksan National Park brochure

fees are collected (**Table 6**) under the Cultural Heritage Protection Act Article 49④. The organization insists that levying fees on visitors is inevitable as the surrounding environment is being increasingly damaged due to the surge in visitor numbers after the abolishment of the entrance fees to national parks. This has drawn flak from several stakeholders, including civic groups and visitors, who claim that entrance fees are levied on passers-by who do not visit the temple, but merely use the temple's roads to get to the hiking trails in the national parks (The Korea Times, 2007).

Table 6. Entrance fees collected by the key temples in national parks

National Park	Temple Name	Entrance Fee for Adults (KRW)
Gayasan	Haeinsa 해인사	3,000
Jirisan	Choneunsa 천은사	1,600
Jirisan	Hwaeomsa 화엄사	3,500
Naejangsan	Naejangsa 내장사	3,000
Seoraksan	Sinheungsa 신흥사	3,500
Songnisan	Beopjusa 법주사	4,000

(서울신문, 2013)

In August 2015, the Ministry of Environment approved the plan to construct a cable car route connecting Osaek to Kkeutcheong Peak on Seoraksan National Park. Yangyang County in Gangwon Province was slated to begin the construction of the 3.5 kilometre-long cable car route, which will be supported by 6 pillars. This was the county's third attempt at filing a permit for the construction of a cable car system. Two previous plans in 2012 and 2013 were rejected amid concerns of negative impacts on the environment and clashes between civic groups and local residents, with the former criticizing the latter for pursuing economic gains at the cost of the environment (Lee, 2015). The locals in Gangwon Province were proponents of the plan, claiming that construction would boost visitorship to the

④ Article 49 (Collection of Admission Fees)

(1) An owner or holder of any cultural heritage who makes the cultural heritage available to the public may collect admission fees from visitors: Provided, that where a management organization is designated, the management organization shall be the collecting authority.

(2) Admission fees under paragraph (1) shall be determined by the owner, holder, or management organization of the cultural heritage concerned.

area, thereby revitalizing the local economy (The Korea Herald, 2015). On the other hand, environmental groups strongly opposed to the plan, on the grounds that indiscriminate development would cause irreversible environmental damage, especially since the national park is a natural habitat for many endangered species.

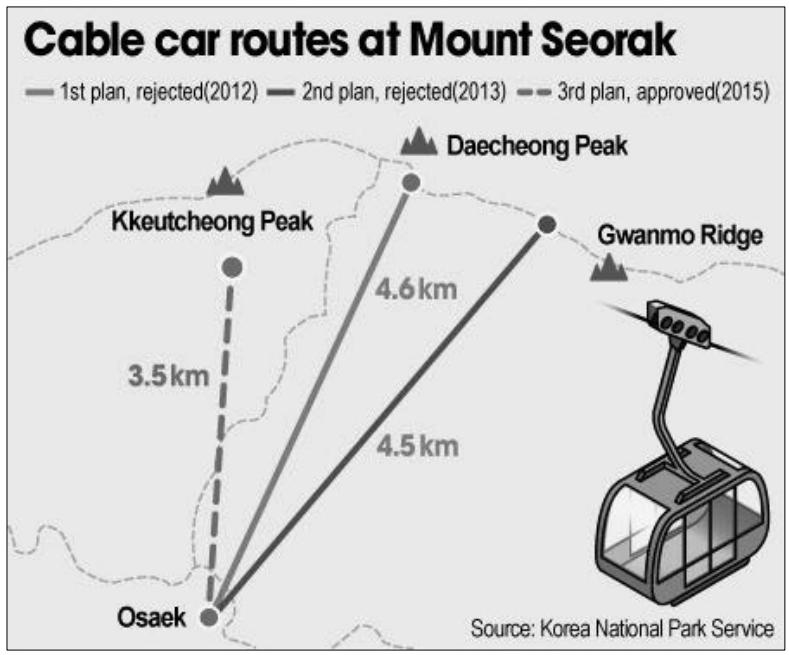

Figure 4. Cable car routes at Seoraksan National Park

National parks also suffer from visitor impacts such as path erosion from off-trail hiking, illegal camping, wildlife disturbance, and use of access-restricted areas. Although carrying capacities has been researched on and established, and considerable effort has been dedicated to visitor management and planning, management remains a challenge given the philosophy that access to national parks, albeit being designated as protected areas, should not be restricted (IUCN, KNPS, MOE, & Jeju Island Special Self-Governing Province, 2009).

Preservation value of national parks

Unlike many other local and international studies which directly asked for respondents' willingness to pay for the preservation of a national park, the 2012 study conducted by the Korean National Park Research Institute involved asking visitors for their willingness to pay for three separate components of national park

preservation – option value, existence value and bequest value⑤. The study was conducted on 20 national parks between 2006 and 2012, and the total number of respondents was 8,595. The breakdown of the preservation value of each national park is illustrated in **Table 7**.

Table 7. Estimated preservation values of national parks

National Park	Preservation Value per household per year (KRW)				Preservation Value per year (100M KRW)
	Option Value	Existence Value	Bequest Value	Total	
Bukhansan[1]	5,541	4,395	10,353	20,289	3,243.86
Chiaksan[1]*	1,452	1,087	2,739	5,278	759.60
Deogyusan[1]	3,327	2,559	6,141	12,026	2,113.53
Gayasan[1]	4,200	2,863	6,065	13,128	1,889.30
Gyeryongsan[1]	3,862	2,451	5,071	11,384	2,000.69
Hallasan[1]	3,331	2,638	5,898	11,867	2,085.47
Jirisan[1]	5,451	4,175	9,480	19,106	3,357.71
Juwangsan[1]	3,009	1,815	4,773	9,597	1,534.43
Naejangsan[1]	3,112	2,338	5,060	10,510	1,847.01
Odaesan[1]	3324	3,225	4,909	11,458	2,103.71
Seoraksan[1]	4,505	4,009	8,233	16,747	2,943.11
Sobaeksan[1]	5,752	4,598	8,289	18,639	2,682.50
Songnisan[1]	4,581	4,288	8,161	17,030	2,993.01
Wochulsan[1]	4,004	3,195	7,785	14,984	2,395.79
Woraksan[1]*	2,568	1,863	5,117	9,548	1,374.10
Byeonsanbando[2]	4,012	3,545	8,793	16,350	2,614.12
Dadohaehaesang[2]	3,180	2,418	6,446	12,044	1,925.61
Hallyeohaesang[2]	2,886	2,246	6,839	11,971	2,103.83
Taeanhaean[2]	3,280	2,397	5,639	11,316	1,988.69
Gyeongju[3]	3,346	2,608	7,731	13,685	2,188.16
(Average)	(3,736)	(2,936)	(6,676)	(13,348)	44,054.23

[1]Moutainous/ [2]Marine and Coastal/ [3]Historical national park
*Survey was conducted in 2006 before the abolishment of entrance fees

(국립공원연구원, 2012)

⑤ Non-use values of natural resources:
Option value – The value associated with the option or possibility of using the resource in the future, even if one does not use it in the present.
Existence value – The intrinsic value of a natural resource irrespective of its use – the satisfaction from knowing that the nautral resources of the national park exist.
Bequest value – The value derived from preserving natural resources so that future generations will have the chance to utilize them.

2.4 Overview of Management in Korea's National Parks

An overview of the key management plan for national parks from 2016-2020 is illustrated in the following long-term strategic operational framework (**Figure 5**) (국립공원관리공단, 2016):

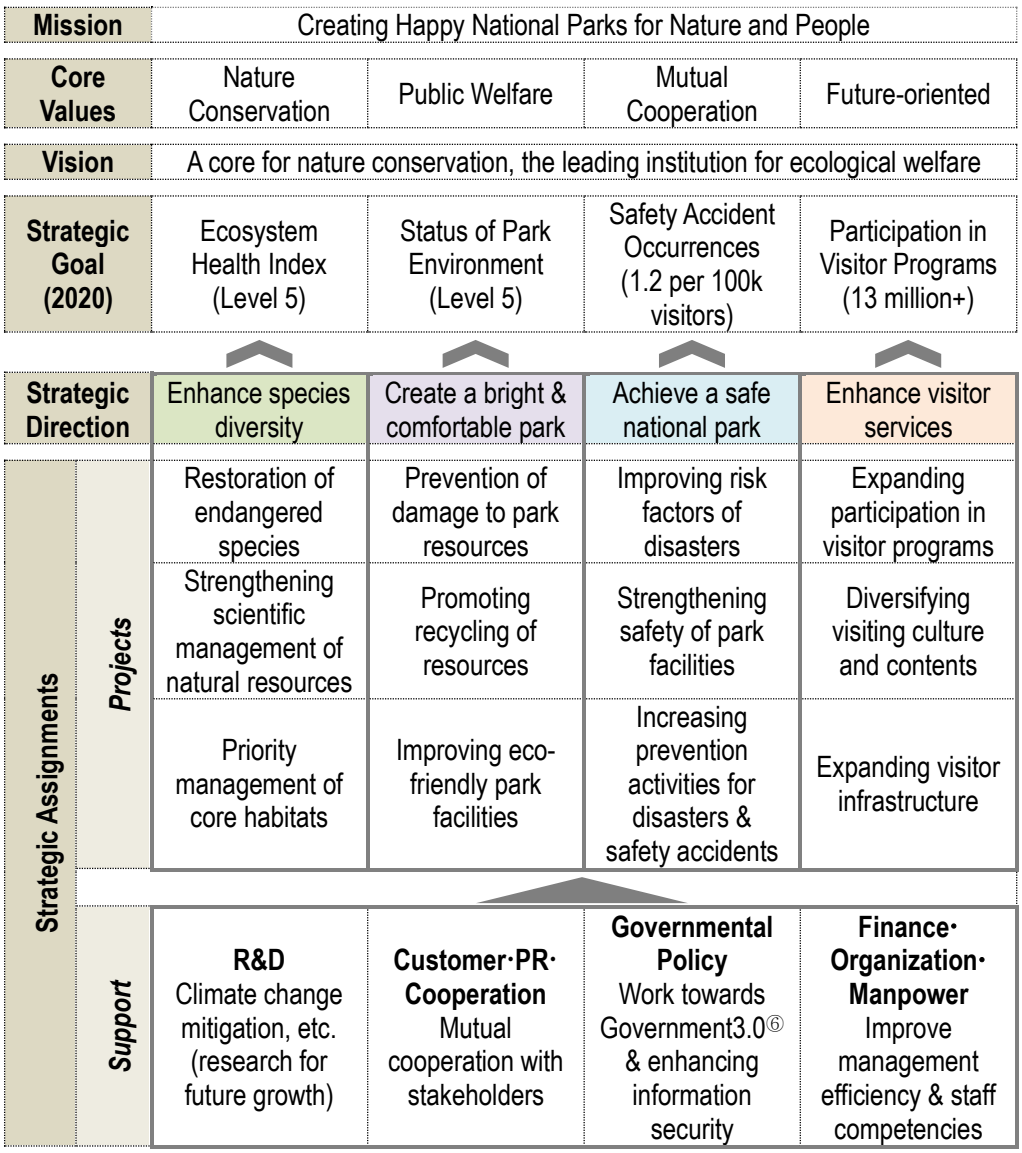

Figure 5. Mid-term Overview of National Park Management for 2016-2020

⑥ Government 3.0 is a new paradigm for government operation to deliver customized public services and generate new jobs in a creative manner by opening and sharing government-owned data to the public and encouraging communication and collaboration between government departments to make the government more service-oriented, competent, and transparent, thus pursuing the happiness of citizens. (행정자치부)

The current situation is that conflicts and clashes with local communities continue to exist due to restrictions on land use development and other activities, and there is a need for rational park management to address the demands for the development of local economies as well as deregulation. Specifically, there is a need for an integrated management of park resources focused on the expansion of regulations and park facilities, as well as a future-oriented park management strategy based on megatrends. Accordingly, the main goals of national park management for 2016-2025 include the (1) strengthening of ecosystem conservation and restoration of damaged/degraded land, (2) enhancing the effectiveness of natural park management, (3) creating value from the utilization of park resources, (4) improving visiting culture and boosting recreational services, as well as (5) establishing park management partnerships. The yearly budget allocation for each management aspect is depicted in **Table 8**.

Table 8. Annual budget allocation for park management (in KRW)

Management Aspect	2016	2017	2018	2019	2020	Total	%
(1)	34,115	36,707	35,523	37,483	42,564	*186,392*	**17.5**
(2)	55,760	57,925	65,761	64,463	70,680	*314,589*	**29.5**
(3)	3,150	3,762	3,774	3,786	3,798	*18,270*	**1.7**
(4)	70,251	104,640	101,010	109,490	132,600	*517,991*	**48.5**
(5)	4,330	5,350	6,300	7,100	7,400	*30,480*	**2.8**
Yearly budget	167,606	208,384	212,368	222,322	257,042	*1,067,722*	-

(환경부, 2015)

(1) Ecosystem conservation and restoration of damaged/degraded land

One of the key performance goals is to extensively increase the area of restored lands from 79,475m^2 in 2015 to 214,248m^2 by 2020, and eventually, reach a total of 257,200m^2 by 2025.

In addition to the strengthening of the conservation of core areas with high preservation values, there are also plans for the discovery and designation of new national park types, such as tidal mudflats and riparian areas.

To improve the ecological health of fragmented areas within the park, wildlife passages will be constructed, damaged and degraded lands will be restored, and

restoration programs for endangered species will be implemented. There are also plans to carry out coordinated research on park resources and establish an integrated database based on the ecology, history, and culture of the national park.

(2) Enhancing the effectiveness of nature park management

There are plans to establish an effective management infrastructure that incorporates the characteristics of different types of national parks, such as introducing a land use zoning system and improving the criteria of permission for land utilization.

Taking into consideration the local conditions of different parks, differentiated regulations on restrictions related to land use activities will be implemented to promote flexibility in nature park management.

Park management based on scientific evidence, information technology, as well as mobile and big data is also a priority.

(3) Creating value from the utilization of park resources

There are plans to create distinguishable brand identities for local specialty products found in parks, as well as to strengthen the distribution base for agriculture, forestry and livestock products manufactured within parks.

To increase the value of national parks, specialized contents will be developed according to the varied ecological, historical and cultural resources of different parks.

Programs targeted at supporting local communities will be initiated to contribute to the revitalization of regional economies.

(4) Improving visiting culture and boosting recreational services

Another key performance goal is to increase the participation in visitor programs from 983,000 participants in 2015 to 1,819,000 participants by 2020, and eventually, reach a total of 2,589,000 participants by 2025.

The current behavior pattern of visitors is mostly associated with a focus on climbing up to the mountain peaks and hence, poses a serious burden on the ecosystem and environment. This culture will be altered and gradually shifted

towards a ‘slow travel culture’ to advocate experiential, educational and healing visiting objectives. Various materials and contents, as well as environmental education and experiential programs, will also be developed to cater to the needs of visitors of different ages and abilities.

(5) Establishing park management partnerships

Participatory⑦ park management initiatives and programs involving local communities will be expanded, and communication and ties with regional communities will be strengthened as well.

On top of this, the management standards of national parks will be increased through cooperative and supportive partnerships with the management authorities of other protected areas, such as provincial and county parks.

⑦ Following the re-demarcation of national park boundaries in 2010, most villages were relocated and about 144 villages remain within national park boundaries. With the primary aims of conserving nature and revitalizing the local economy, the Korea National Park Service initiated the “Village of Excellence (명품마을)” project to construct villages that are well integrated with the landscape of national parks as well as its management objectives. The project has resulted in increase in visitor numbers (150%) as well as income growth (520%) in 14 Villages of Excellence (Korea National Park Service, 2016).

2.5 Conservation Management in Korea's National Parks

The Baekdudaegan mountain range, a core of biodiversity with spectacular views and beautiful natural sceneries that extend across most of the length of the Korean Peninsula, has been gaining popularity as both a cultural-tourism as well as an adventure-tourism site. The Korean government legislated the Act on the Protection of Baekdudaegan Mountains in 2003 to restrict the development of land in the protected areas. The interests of stakeholders of the emerging Baekdudaegan trail, which includes national and local government agencies as well as non-governmental associations, businesses and residential localities, coincide and conflict in complex ways. The development of a national strategy which addresses both concerns for ecological sustainability and economic demands was needed (Mason & Chung, 2008). Since 2011, the Korea National Park Service has laid out plans to increase the biodiversity of the Baekdudaegan, the key ecological axis of the Korean Peninsula. Projects such as the restoration of endangered species, construction of wildlife passages, restoration of aquatic ecosystems, and recovery of damaged lands have been implemented (Korea National Park Service, 2011).

National parks constitute about 50% (126,934 ha) of the total area (263,427 ha) of the Baekdudaegan mountain system (Miller & Kim, 2009). In particular, Seoraksan National Park, one of the 7 national parks situated along the Baekdudaegan mountain ranges, is located in the central part of the mountain system and possesses many natural landscapes, while being home to numerous plant and animal species. However, habitat fragmentation resulting from national highways No. 44 and No. 56 passing directly through the core area of Seoraksan National Park, as well as the concentration of visitors and disorderly use of park resources along the biodiversity-rich Baekdudaegan peaks and main valleys represent clear contradictions to the preservation-oriented management policies of national parks (국립공원관리공단, 2012).

2.5.1 Restoration of Endangered Species

The protection of endangered wildlife is a core biodiversity conservation policy in Korea. Endangered wildlife in Korea is classified as *Endangered Species Level I* or *Endangered Species Level II* depending on the degree of endangerment.

There are currently 51 species and 195 species designated under Level I and Level II respectively. (Ministry of Education, n.d.)

One example of Korea's dedication to biodiversity conservation is that of the restoration of the Asiatic black bear (*Ursus thibetanus*) in Jirisan National Park, which has also been recognized as a best practice in protected area restoration by the IUCN. A multi-disciplinary team consisting of both experts and members of the local communities has managed to reintroduce a self-sustaining population of Asiatic black bears in a suitable habitat by building public and political support for the program. This reintroduction project involved several key aspects such as the establishment of partnerships with local communities to implement compensation programs (for damage by bears) while raising awareness for the project, the formation of a specialized organization (Species Restoration Technology Institute) with the expertise and financial resources to ensure the long-term success of the program, the designation of the 'Asiatic Black Bear Broad Protected Area' to provide a larger habitat for the bear population, as well as the implementation of a continuous post-release monitoring system to collect and review related data. (Cairns, Dudley, Hall, Keeneleyside, & Stolton, 2012) The number of bears in Jirisan National Park has increased from an estimated 5-8 bears in 2001 to 43 bears as of May 2016 and aims to reach 50 bears by 2020 (국립공원관리공단, 2016).

Other endangered species proliferation and restoration plans to increase biodiversity include the 'Restoration Project of Korean Native Foxes' at Sobaeksan National Park. The Korea National Park Service began investigating the habitat characteristics of fox habitats for scientific its proliferation and in the last few years, foxes from China were released into Sobaeksan National Park (KNPS Sustainability Report, 2011). Like that of the Asiatic black bear, the restoration of foxes involved cooperation with various stakeholders. Future plans for the program include managing the habitats of foxes by removing threats and forming fox protection groups consisting of members of the local communities, as well as boosting the survival rate of introduced foxes by analyzing and evaluating reintroduction results and developing improvement measures for restoration techniques (국립공원관리공단, 2016).

The restoration of the eco-axis of the Korean long-tailed goral (*Naemorhedus*

caudatus) is a project aimed at improving the goral's ability to multiply in the wild by connecting its isolated habitats. The current number of long-tailed gorals residing in Seoraksan National Park was estimated to be between 161-251[⑧] individuals (조재운, 외., 2015). There are plans targeted at revitalizing the regional economy by establishing infrastructure (e.g. ecological learning center), strengthening research capacities related to habitat management, as well as promoting and educating the public and local citizens.

2.5.2 Special Protection Zones

The purpose of the Special Protection Zone policy is to impose limitations on access to areas that require protection from natural or man-made disasters. These areas include wild plant and animal habitats, wetlands, valleys and other key areas within national parks that contain important natural resources. In 2007, areas designated under the old Rest-year Sabbatical System ('휴식 년제' was first implemented in 1991), along with areas with endangered species that need protection, were reclassified and systemized under the new Special Protection Zone system (특별보호구역). Based on Article 28[⑨] of the *Natural Parks Act*, access restrictions and entry prohibitions to these designated areas are enforced, and fines are also imposed on violators. (Korea National Park Service, 2017) (Ministry of Environment, 2013)

Due to the increase in the number of visitors since 2007 after entrance fees were waived, hiking trails and the surrounding areas are being noticeably and

⑧ Supposing that there are currently 250 individuals at Seoraksan National Park, an expert interview with a Korea National Park Service official reveals that in 20 years' time, this number may increase to around 300 individuals considering the carrying capacity of the park.

⑨ Article 28 (Prohibition against Access, etc.)

(1) A park management agency may designate a certain area in a park area as a special protection area or temporary access control area within the natural park to prohibit access of persons or passage of vehicles or restrict the number of visitors for a fixed period, in any of the following cases:
Cases for the protection of a natural park, such as natural ecosystem and natural scenery, etc.; Cases for the restoration of nature destroyed by natural or artificial reasons; Cases for the safety of persons entering a natural park; Other cases where a park management agency deems it necessary for the public interest.

(2) A park management agency may implement necessary measures, such as restoration of endangered species and elimination of exotic animals and plants, in a special protection area within a natural park designated under paragraph (1).

(3) If a park management agency intends to prohibit access of persons or passage of vehicles or restrict the number of visitors under paragraph (1), it shall publish the details thereof in advance on the Internet homepage and publicly announce the details by methods of displaying information signboards thereon.

continuously damaged. Severely damaged or degraded areas that are accessible via hiking trails have been closed off and designated as Special Protection Zones to allow time for natural recovery. The rising importance of habitat management to support endangered species restoration projects also necessitated the need for such a law.

Designated special protection zones within parks are left to rest and recover for a period of 20 years usually, and during this period, access to the zone is completely restricted in order to protect and conserve the park's natural resources. Currently, the total area of such zones in Seoraksan National Park is 38.584km^2, which constitutes approximately 9.7% of the total park area. (국립공원관리공단, 2016) Currently, there are 9 Special Protected Zones in Seoraksan National Park with designation terms ending between year 2026 and year 2035, and these zones are all under the management of the Seoraksan National Park Office. Several core areas, which are key plant and animal habitats, have been identified as potential sites to be designated as Special Protection Zones by the Korea National Park Service in the future.

2.5.3 Restoring the Ecological Axis of Discontinued Habitats

The discontinuation of the ecological axis due to the construction of roads in national parks has resulted in the fragmentation of wildlife habitats as well as road kills. The Korea National Park Service has been actively implementing measures such as constructing wildlife crossing structures. In order to reduce the number of road kills, a company specializing in navigational software was engaged to developing a system to detect and monitor areas with high roadkill frequencies.

Currently, there is one wildlife passage each in Seoraksan National Park, Odaesan National Park, Sobaeksan National Park and Jirisan National Park. The usage frequencies of these wildlife passages by wildlife animals have increased from 641 in 2011 to 1,929 in 2015. In the case of Seoraksan National Park, usage of the Hangyeryeong wildlife passage has increased tenfold since 2011 to 595 in 2015 (국립공원관리공단, 2016). The number of species recorded to have used the Hangyeryeong wildlife passages has increased from 7 species in 2006 to 11 species in 2011, with consistent sightings of endangered species such as the Korean Goral

and the leopard cat (국립공원연구원, 2012).

The 1st Master Plan for Seoraksan National Park has emphasized the need for the continued monitoring of road kills as well as the usage of wildlife passages by wildlife animals along the through roads that cut across the national park. Future implementations include the priority construction of additional wildlife passages along areas where the Baekdudaegan ecological axis has been severed (Misiryeong, Hangyeryeong, Pilleryeong). Plans for construction along areas with a high concentration of roadkill occurrences as well as analyses on the effectiveness of wildlife passage construction will be carried out. After construction, regular monitoring of the passages will be conducted. Fences and animal crossing signs will also be installed if necessary. (국립공원관리공단, 2012)

2.5.4 Measures to Reform Visiting Culture

Rising income levels, decreases in the average number of working hours, as well as increasing interests in leisure activities (with hiking being listed as the top hobby) has resulted in a sharp increase in the number of visitors (윤여창 & 윤영일, 1996). The consequence of this increase in visitor numbers has also resulted in damage to natural ecosystems due to the formation of byroads, which contribute to habitat fragmentation. As of 2015, the number of byroads discovered at Bukhansan National Park, Jirisan National Park, and Seoraksan National Park is 143, 53 and 44 respectively. One of the key issues with the present visiting culture is that 49% of the visitors to mountainous national parks ascend to the peak, causing significant environmental damage to the land at the peak areas. In order to tackle this issue, there are plans to construct more pedestrian-friendly walking trails (돌레길) to encourage visitation at low altitudes or less-sensitive areas with tolerant vegetation and promote visiting with a focus on appreciating the aesthetic beauty of nature as well as historical and cultural attractions. Environmental education programs for the younger generation will be enhanced through the operation of experiential programs for excursions and free-semester systems. Customized programs for teenagers and adults will also be operated. (환경부 자연보전국, 2016.5.3)

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Chapter 3. Methodology

A visitor's experience at a national park is influenced by the way it is managed, and his/her appreciation of nature and biodiversity at a national park is dependent on the biodiversity conservation management strategies of the park. These may include management strategies such as restoration programs for endangered species, restoration of degraded land, establishment of sanctuaries and buffer zones, and continued monitoring of species abundance. As biodiversity management in a national park involves diverse strategies, one may thus think of individual management plans as different bundles of a given set of management strategies or attributes. It is postulated that visitors choose from a management plan from the set of biodiversity conservation management plans to indicate their preference for the type of management plan. One way to model this choice problem is to make use of random utility theory.

3.1 Development of the Choice Experiments Survey

Designing a choice experiment involves developing, testing and optimizing the survey questionnaire (**Figure 6**). The objective of the choice experiments survey in this research is to elicit respondents' valuation or their views on the relative importance of each biodiversity management strategy described to them in bundles (choice sets), resembling a management plan consisting of several management strategies (attributes).

Seoraksan National Park is a state-managed protected area managed by the national government. Management plans laid out by the Korea National Park Service can be perceived as a bundle of various management strategies as part of a holistic park management plan to achieve preservation-oriented professional park management policies and effectively deal with internal and external environmental changes, while promoting sustainable use.

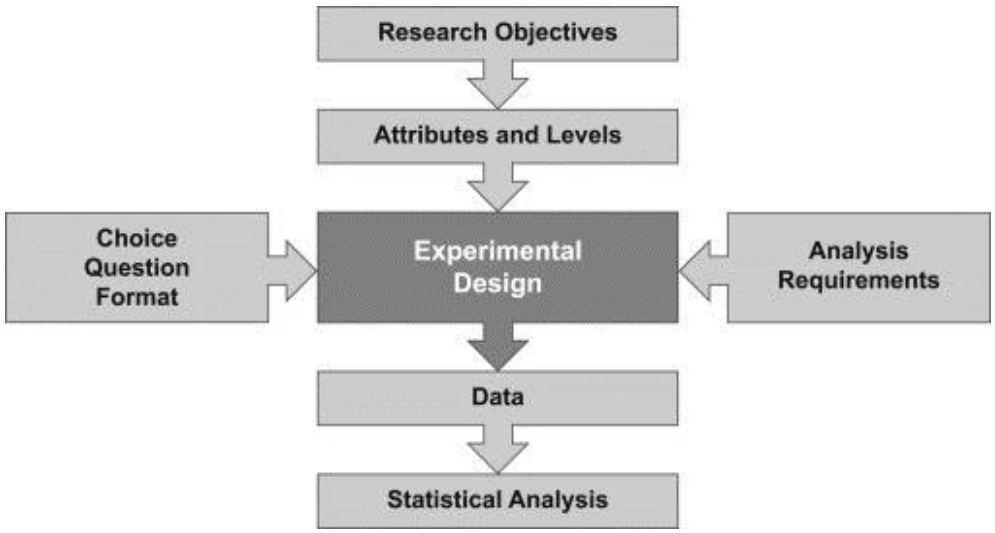

Figure 6. Key stages of developing a discrete-choice experiment
(Johnson F. , et al., 2013)

3.2 Determining the Payment Attribute and its Levels

The selection of attributes is done by identifying relevant attributes if the good to be valued. Typically, a monetary cost or payment vehicle is included as one of the attributes in order to allow for the estimate of willingness-to-pay values (Hanley, Mourato, & Wright, 2001). In this case, the good is a management plan for directed at the conservation of biodiversity in Seoraksan National Park. Literature reviews and expert surveys were carried out in order to identify and select the other attributes (illustrated in the next section).

Several other options, such as an annual tax or voluntary donations for the preservation of national parks, have been considered, but entrance fees were eventually selected as the payment vehicle as it is a realistic and appropriate payment vehicle for Korean visitors, who are familiar with paying for entrance fees at recreation sites (LeeChoong-Ki, 1997). Even after the entrance fee system to national parks in Korea was abolished in 2007, visitors continue to pay the admission fees to temples located within the national park grounds (Chapter 2.3, **Table 6**) even if they are merely passing through the land owned by the temple, which owns and manages cultural heritage assets, to reach the hiking trails. As such, there was a need to gauge the current willingness to pay for an entrance fee to the national park itself, on top of the additional payments such as admission fees to

temples and parking fees.

Accordingly, a contingent valuation method survey was conducted to estimate the mean willingness to pay for an entrance fee to Soeraksan National Park. The result was then used to guide the design of the entrance fee attribute in the Main Choice Experiments Survey.

3.2.1 Dichotomous Choice Contingent Valuation Method Survey

The "double-bounded referendum approach" is applied in this preliminary survey. It is an alternative questioning strategy that is intended to reduce the statistical inefficiency of dichotomous choice valuation questions. It involves introducing a second offered threshold in a "follow-up" dichotomous choice contingent valuation method (DC CVM) which elicits a second discrete response (Cameron & Quiggin, 1994). If a respondent indicates a willingness to pay the first offered amount, the subsequent question asks if the respondent is willing to pay an amount that is double that of the first offered amount. If a respondent is unwilling to pay the first offered amount, the next question asks if the respondent is willing to pay an amount that is half that of the first offered amount.

Referencing the estimated use value for Seoraksan National Park (20,107 KRW per visitor per visit) obtained by the Korea National Park Research Institute (국립공원연구원, 2012), the initial bid prices were accordingly set randomly at 20 levels at intervals of 1000 KRW from 1000 KRW to 20,000 KRW per visit.

3.2.2 Mean Willingness-to-pay for Entrance Fees

An onsite survey was conducted over the weekends on 21 and 22 May 2016 in the vicinity of Seorakdong Visitor Center at Seoraksan National Park. Experienced surveyors approached passersby, explained the survey context to those who agreed to participate and clarified any doubts that the respondents had. The survey questionnaire used is in **APPENDIX C**.

Out of 153 responses collected, only 142 responses were considered valid and were used in the data analysis. As the DC CVM was used, each respondent was asked to indicate their willingness to pay for (1) a random entrance fee offer (20 different entrance fee offers – 1000 KRW, 2000 KRW, 3000 KRW …… 20,000

KRW), and (2) a second entrance fee offer which was either half (if the respondent indicates 'NO' to (1)) or twice (if the respondent indicates 'YES' to (1)) that of the entrance fee offered in (1). Hence, the total number of responses was considered as n = 284.

A logistic regression model was used to determine the relationship between the respondents' willingness to pay for an entrance fee to Seoraksan National Park, and 7 other independent variables (bid price, age group, gender, education level, income level, number of national parks visited, number of visits to Seoraksan in the last 5 years, knowledge of natural environments & national parks, and knowledge of ecosystem services) (**Table 9**).

Table 9. (DC CVM Preliminary Survey) Estimated conditional logit models

Variable	Full model		Reduced model	
	B	Sig.	B	Sig.
BID	-0.000152	.000	-.000147	.000
AgeGroup	-0.209	.385	-	-
Gender	0.026	.935	-	-
EducationLevel	0.141	.184	0.157	.047
IncomeLevel	-0.066	.558	-	-
#NPsVisited	-0.034	.203	-0.041	.051
#SNPVisits	0.114	.405	-	-
KnowledgeNE&NP	-0.031	.495	-	-
KnowledgeES	0.056	.428	-	-
Constant	1.260	.161	0.626	
-2 Log Likelihood		312.559		315.431
Nagelkerke R^2		0.226		0.214
No. of observations:		284		284

However, as most of the variables were statistically insignificant, a reduced model consisting of only 3 independent variables – BID, EducationLevel and #NPsVisited – was used to estimate the mean willingness to pay for an entrance fee. The negative coefficient for 'BID', the proposed entrance fee price, indicates the expected inverse relationship between the entrance fee amount and the willingness to pay for an entrance fee (saying 'yes' to the proposed entrance fee amount) – the more expensive the entrance fee, the lower the probability of paying the entrance fee for entering the site. The positive estimated coefficient for 'EducationLevel', which indicates the level of education of the respondent, suggests that a respondent

who has received more education is more likely to say 'yes' to the proposed entrance fee amount, as compared to a respondent with a lower level of education. One possible explanation for this is that the more highly educated a respondent is, the more he/she understands the importance of the ecosystem services and benefits provided by national parks. The negative coefficient for '#NPsVisited', which represents the total number of national parks the respondent has visited, indicates that the number of national parks a respondent has visited has a negative impact on the willingness to pay for the proposed entrance fee amount. As respondents are accustomed to the free admission system to all national parks (since the abolishment of the entrance fee system in 2007), they may be less willing to pay for the entrance fee to Seoraksan National Park proposed in this hypothetical question.

The joint impact of the variables in the reduced model (**Table 9)** was analyzed by modeling the discrete yes/no response to the payment using a logit transformation illustrated in equation (6), where $Prob(YES)$ is the probability of a respondent saying 'YES' to the entrance fee offer:

$$LOGIT(YES) = ln\frac{Prob(YES)}{\left(1 - Prob(YES)\right)} = 0.62573 - 0.00014705(BID)$$
$$+0.15677(EducationLevel) - 0.040649(\#NPsVisited) \quad (6)$$

The mean willingness-to-pay can be defined as the amount where the probability of a 'YES' answer is 0.5. Substituting $Prob(YES) = 0.5$ and the mean values (education level = 3.38; number of national parks visited = 11.6) of the sample into equation (6), the mean willingness-to-pay for an entrance fee to Seoraksan National Park, $MWTP$, is derived as follows:

$$ln\frac{Prob(YES)}{\left(1 - Prob(YES)\right)} = ln(1)$$
$$ln(1) = 0.62573 - 0.00014705(MWTP) + 0.15677(3.383)$$
$$- 0.040649(11.596)$$
$$\boldsymbol{MWTP = 4,656\ KRW}$$

The results indicate that on average, the willingness to pay for an entrance fee to Seoraksan National Park is 4,656 KRW. This result has potential implications on the future pricing policies of national parks (further elaboration in Chapter 5.2)

3.3 Selection of other Attributes and Levels

Attributes must be formulated in a way that ensures that the respondents understand clearly and concisely the content of the attributes (Klojgaard, Bech, & Sogaard, 2012). Attributes can be either quantitative or qualitative and are derived from knowledge gathered from interviews, group discussions, literature reviews and expert opinions (Klojgaard, Bech, & Sogaard, 2012). As the setting and objective of choice experiments can vary significantly, there are no standard criteria for defining attributes (Louviere, Hensher, & Swait, 2000).

As a discrete choice experiment can seldom include all of the important attributes, it is crucial that the most important attributes that are relevant to the majority of the respondents are selected. The combined set of attributes, which constitute a choice set, should describe what the choice consists of and attributes should be selected such that respondents are willing to make trade-offs between them through compensatory decision-making. The causal relationships and interconnections between attributes as well as their mutual exclusivity should be considered as this influences the behavior of respondents and affect utility measures eventually. (Klojgaard, Bech, & Sogaard, 2012)

The assignment of attribute levels should be relevant and easy to comprehend while also being feasible and realistic. The attribute levels affect the estimates obtained from the study and hence should have a scope or range that elicits trade-offs between attributes on top of being acceptable to the respondents. By having the same number of levels for all attributes, the problem of unintentionally increasing the significance of an attribute (due to it having a higher number of levels) can be minimized. (Klojgaard, Bech, & Sogaard, 2012)

3.3.1 Expert Survey

To ensure that the selected attributes truly reflected the decision-making context, a list of proposed attributes and attribute levels was drafted by referring to official reports on national parks in Korea, and the list was compiled and included in an online expert survey to seek expert opinion.

The online survey included a segment with detailed information on the management plan and planned initiatives for Seoraksan National Park, the list of

proposed attributes, questions on the ranking of attributes and questions on the relevance of proposed attribute levels. A total of 16 experts (9 professors from the forestry and tourism sectors, 6 officials, and researchers in related fields, as well as a director from the Korea National Park Service) completed the survey. The results of the rankings of proposed attributes in order of importance are shown in **Table 10.**

Table 10. Rankings of attributes by experts in online survey

Seoraksan National Park Attributes	Points	Rank
Biodiversity	**47**	**1**
Endangered Animals	**13**	**4**
Wildlife Crossings	12	
Special Protection Zones	**38**	**2**
Restoration Of Damaged Land	12	
Hiking Trail	2	
Nature Observation Trails	10	
Visitor Programs	7	
Crowding	**19**	**3**
Ranked 1^{st} – 4 points; 2^{nd} – 3 points; 3^{rd} – 2 points; 4^{th} – 1 point		

Based on feedback and comments received, several of the attributes were combined. Biodiversity and Endangered Animals, Special Protection Zones and Restoration of Damaged Land, as well as Nature Observation Trails and Visitor Programs, were deemed to either be overlapping in meaning or are mutually dependent attributes. These pairs of attributes were subsequently combined after conducting further literature reviews. The finalized list of attributes used in the pilot and main surveys are illustrated in detail in the following sections.

3.4 Experimental Design

In order to combine the selected attribute levels into several alternative profiles to be presented to the respondents, statistical design theory was utilized. Factorial designs involve combining each level of each attribute with every level of all other attributes – it is a factorial enumeration of all possible combinations of attribute levels (Louviere, Hensher, & Swait, 2000).

Complete factorial designs, albeit their ability to estimate the full effects of attributes upon choice, often involve an impractically large number of combinations that have to be evaluated, and is therefore not often used in designs

with either larger numbers of attributes or levels or both (Hanley, Mourato, & Wright, 2001).

In this study, for both the Pilot Survey and Main Survey, the number of attributes and levels gave rise to 405 possible alternatives (3*3*3*3*5=405). Since it is unfeasible to develop a questionnaire containing all possible alternatives, the number of alternatives was reduced by applying an orthogonal fractional factorial design. The fractional factorial design was utilized (using the SPSS orthogonal design procedure) to select a particular subset of the sample of complete factorials (Louviere, Hensher, & Swait, 2000). The SPSS procedure produced 25 alternatives for both the Pilot Survey and Main Survey.

The list of alternatives used in the Main Survey is in **APPENDIX A**. The 25 alternatives were divided into 6 sets of 4 pairs using a random procedure. Dominating alternatives were checked and eliminated. By including a baseline scenario together with each pair of management alternatives in the form of an opt-out option (not choose any of the alternatives), non-participation can be allowed for. This inclusion of the baseline scenario ensures that the results can be interpreted in standard welfare economic terms (Hanley, Mourato, & Wright, 2001). A choice set is composed of 2 profiles and 1 opt-out option. Each of the 6 versions of the survey questionnaire consisted of 4 choice sets. Thus, each respondent encountered 4 choice questions and in each question, he/she had to select between 3 management options.

3.5 Pilot Choice Experiments Survey and Data

In order to prepare for the main survey, a pilot survey was carried out in order to: (1) test the format of the survey instrument and receive feedback on its design and effectiveness; and (2) gauge the significance of the conservation and use attributes of Seoraksan National Park in general.

In the survey questionnaire (**APPENDIX D**) used, information on all the attributes to be included in the choice experiment questions were included to provide respondents with basic information on the selected attributes of Seoraksan National Park.

Table 11. List of attributes, levels and variable names used in pilot survey

Attributes	Levels	Variable Name
Entrance Fee⑩	Free (current status); 1,000 KRW; 2,000 KRW;3,000 KRW; 4,000 KRW	EntranceFee
Biodiversity (species diversity measured by state of endangered species)	1. Decreases: Populations decrease leading to a few extinctions	BIODIVERSITY-
	2. Stays at current status: 40 endangered species	BIODIVERSITY±
	3. Increases:10% increase in populations of endangered species	BIODIVERSITY+
Area of Special Protection Zones	1. Decreases from 10% to 7% of total park area	SPROTECTIONZ-
	2. Stays at current status: 10% of total park area (approx. 3,920ha)	SPROTECTIONZ±
	3. Increases from 10% to 13% of total park area	SPROTECTIONZ+
Nature Observation Trails (NOTs)	1. Stays at current status: 5 NOTs	NOTRAILS ±
	2. Improvements: Addition of information boards along NOTs	NOTRAILS+
	3. Improvements & Expansion: Addition of information boards and construction of more NOTs	NOTRAILS++
Crowding (number of visitors encountered per 100m)	1. Decreases: 10 other visitors encountered every 100m	CROWDING-
	2. Stays at current status: 20 other visitors encountered every 100m	CROWDING±
	3. Increases: Encounters 40 other visitors encountered every 100m	CROWDING+

⑩ Excluding the Sogongwon Cultural Treasure entrance fee of 3,500 KRW that Sinheungsa (Temple) collects based on the Cultural protection Law Article 49.

3.5.1 Pilot Survey Data Collection and Results

An on-site pilot survey was conducted of visitors to Seoraksan National Park during the weekends on 29-30th October 2016, which was also the peak visiting season. A survey booth was set up near Baekdamsa (temple) along the Baekdam route and the survey was administered in the form of face-to-face interviews, which was deemed the most commonly utilized approach at recreation sites (Forster, 1989). The random sampling method was adopted and all individuals over 19 years of age⑪ who passed the survey booth were approached and asked for their willingness to take part in the survey. The exact location of the pilot survey booth is depicted in **APPENDIX A.1**

The total number of respondents was 153. We removed 12 responses from the analysis, leaving a total of 141 valid questionnaires for the analysis. Data from the pilot survey was analyzed using the multinomial logit model. Estimation results of the multinomial logit model using SPSS 23.0 are presented in **Table 12.**

Table 12. (Pilot Survey) Estimated multinomial logit model

Variable	B	S.E.	Wald	Sig.	Exp(B)
EntranceFee	-0.000112	.000	6.439	.011	1.000
BIODIVERSITY-	-0.461	.137	11.403	.001	1.586
BIODIVERSITY+	0.441	.149	8.792	.003	.643
SPROTECTIONZ-	0.182	.133	1.869	.172	.833
SPROTECTIONZ+	0.371	.168	4.876	.027	.690
NOTRAILS+	0.616	.134	21.012	.000	.540
NOTRAILS++	0.548	.165	11.046	.001	.578
CROWDING-	0.00298	.134	.000	.982	.997
CROWDING+	-0.159	.168	.893	.345	1.172
Constant	0.695	.356	3.812	.051	
-2 Log Likelihood	156.130			0.000*	
No. of observations: 1692					

The reference level for all variables is the current situation.

All coefficients turned out as expected except for those of 'Area of Special Protection Zones'. Respondents may have interpreted special protection zones as either conservation tools or as a form of access restriction. For instance, some have interpreted a decrease in the area of special protection zones in the park as a

⑪ The age of legal adulthood in South Korea is 19 years old.

decrease in restricted hiking trails, and hence, more hiking routes open for trekking and exploration. For such respondents, a decrease in the area of special protection zones would increase the probability of them choosing a management alternative in the choice set as a decrease in the area of special protection zones would increase their utility. However, the coefficients for special protection zones are not statistically significant.

Another statistically insignificant attribute is the crowding variable. This could be attributed to the local context in South Korea, where the high number of visitors in National Parks is a common situation that most people are accustomed to. Hence, the increase in the number of visitors may not affect the preference for a management alternative significantly unless the increase is considerably large.

The pilot survey included an option on the choice of maintaining the current way of management in Seoraksan National Park where all the attribute levels were kept at the current status with no change. When included in the multinomial logit model as the alternative-specific constant (ASC), the resulting coefficient was B = -0.456, with a *p* value of 0.070. As it was statistically insignificant in the model, it was removed from the model.

The calculated willingness-to-pay for an entrance fee per visit for various management strategies are illustrated in **Table 13**.

Table 13. (Pilot Survey) Calculated willingness-to-pay (WTP) for an entrance fee per visit for various levels of management attributes

Attribute	Level Change	WTP in KRW	(US$)
Biodiversity	CS → decrease in populations leading to a few extinctions	-4,116	(-$3.60)
	CS → increase in endangered species populations by 10%	3,940	($3.44)
Area of Special Protection Zones	(CS) 10% → 7%	1,629	($1.42)
	(CS) 10% → 13%	3,315	($2.90)
Nature Observation Trails	CS → increase in number of information boards along current NOTs	5,503	($4.81)
	CS → increase in number of information boards along current NOTs & construction of more NOTs	4,895	($4.27)
Crowding	(CS) 20 visitors encountered per 100m → 10 visitors encountered per 100m	27	($0.02)
	(CS) 20 visitors encountered per 100m → 40 visitors encountered per 100m	1,416	($1.24)

Note: Exchange rate used for conversion is 1145 KRW/US$, which is the average of the exchange rates on 28th October 2016 (Industrial Bank of Korea, 2016)

The pilot survey highlighted complexities in perspectives on the designation of Special Protection Zones, which will be further explored in the main survey. In addition, the insignificance of the crowding attribute attests that the respondents are unaffected by the degree of crowding along trails. Hence, the crowding attribute was removed from the main survey.

Another noteworthy observation was that a significant number of respondents felt that the length of the survey was inappropriate. Senior respondents also required assistance from the surveyors to answer most of the questions, while some adult respondents have difficulty understanding the format of the choice questions. These issues were taken into consideration in the construction of the main survey questionnaire, and special attention was given to shorten and simplify the main survey as much as possible.

3.6 Main Choice Experiments Survey

3.6.1 Development of Survey Instrument

Based on the feedback and results of both the expert survey and the pilot survey, the final questionnaire was developed and used in the main survey. The main survey questionnaire consisted of four parts as illustrated in **Table 14**. Observations and feedback gathered during the pilot survey revealed that the information on the attributes and attribute levels were too confusing and difficult to understand. In addition, most respondents were observed to have skipped the entire segment on background information of Seoraksan National Park. Hence, in the main survey questionnaire, background information on the 4 management strategies that would appear as attributes in the choice sets was disguised in the form of questions in order to induce respondents to read them. A short description of the management strategy was provided, and respondents were asked to rate how important they considered the strategy to be. The main survey questionnaire can be found in **APPENDIX E**. The main survey was targeted at park visitors in order to obtain results that are applicable and relevant to efficient park management.

Table 14. Structure of main survey questionnaire

Part	Key Contents
A	Introduction ・ Question related to visitors' environmental attitudes ・ Questions about the frequency of visit, visiting motives and activities during the visit to the park
B	Descriptions of the attributes of the choice experiment ・ Question on the importance of 4 biodiversity conservation management strategies in Seoraksan National Park (restoration programs for endangered species; wildlife passages; designation of special protection zones; and environmental education programs)
C	Choice Experiment ・ 4 choice sets (questions), each with 2 management alternatives and 1 opt-out alternative
D	Socio-economic data ・ Questions on respondents' socioeconomic status, including age, employment, education level, income level and number of years spent in the countryside

In Part C, respondents were given 4 choice sets, and each choice set included 3 alternatives. Respondents asked to choose which management alternative they preferred. The first 2 options were management alternatives of Seoraksan National Park that each contained varied management strategies (attributes) aimed at biodiversity conservation. The list of attributes and levels used in the main survey questionnaire is listed in **Table 15**.

Table 15. List of attributes, levels and variable names used in main survey

Attributes	Levels	Variable Name
Entrance Fee⑫	Free (current status); 2,000 KRW; 4,000 KRW;6,000 KRW; 8,000 KRW	EntranceFee
Restoration of Endangered Species	1. Populations of endangered animals remain at current status	ENDANGERED±
	2. 15% increase in populations of endangered animals	ENDANGERED+15
	3. 30% increase in populations of endangered animals	ENDANGERED+30
Wildlife Passages	1. Stays at current status (1 wildlife passage)	WPASSAGE±
	2. Construction of 2 additional wildlife passages	WPASSAGE+2
	3. Construction of 4 additional wildlife passages	WPASSAGE+4
Area of Special Protection Zones	1. Decreases from 10% to 5% of total park area	SPZONE-5
	2. Stays at current status: 10% of total park area (approx.. 3,920ha)	SPZONE±
	3. Increases from 10% to 15% of total park area	SPZONE+5
Environmental Education Programs	1. Increase in information boards	ENVEDU+
	2. Increase information boards and environmental education-related visitor programs	ENVEDU++
	3. Increase information boards, environmental education-related visitor programs, and nature observation trails	ENVEDU+++

⑫ Excluding the Sogongwon Cultural Treasure entrance fee of 3,500 KRW that Sinheungsa (Temple) collects based on the Cultural protection Law Article 49.

3.6.2 Main Survey Data Collection

The main survey was conducted on-site at Seoraksan National Park on 2nd April 2017. The survey booth was set up in Sogongwon and it was situated along the route to Sinheungsa (temple) and the Seorakdong route. The exact location of the survey booth set up for the implementation of the main survey is depicted in **APPENDIX A.2**. The survey was administered in the form of face-to-face interviews, which was deemed the most commonly utilized approach at recreation sites (Forster, 1989). As with the pilot survey, the random sampling method was adopted to maximize the responses obtained and all individuals over 19 years of age who passed the survey booth were approached and asked for their willingness to take part in the survey. 5 field researchers, who had experience administering the pilot survey and were briefed on how to implement the main survey, assisted with the implementation of the main survey.

Chapter 4. Results and Discussion

4.1 Estimation of Preferences for Park Management Options

The total number of respondents was 265. 13 incomplete responses were removed from the analysis, leaving a total of 252 valid questionnaires for the analysis. The descriptive statistics of respondents' sociodemographic characteristics are illustrated in **Table 16,** and details of each component are given in **Table 17**.

Table 16. Descriptive statistics of respondents' sociodemographic characteristics

Characteristic	Min	Max	Mean	SD
Gender[a]	0.0	1.0	0.541	.4984
Age (years)	20.0	80.0	48.968	12.8208
Education Level[b]	1.0	4.0	3.500	.6759
Monthly Household Income (1,000,000 KRW)	0.0	7.0	3.552	2.0351
Years Lived in Countryside	0.0	70.0	11.872	15.0597
Frequency of visit over the last year[c]	1.0	4.0	2.104	.8975

[a] Male = 0; Female = 1
[b] Did not complete middle school = 1; Middle school grad = 2; High school grad = 3; University grad = 4
[c] 1st visit = 1; 2nd visit = 2; 3~4 visits = 3; 5 or more visits = 4

Table 17. Demographic profile of respondents versus national park visitors

Characteristics	Sample *N=252*	National Park Visitors*
Gender	*(8 unknown)*	
Male	44.4	58.7
Female	52.4	41.3
Age	*(5 unknown)*	
20-29	9.1	17.0
30-39	16.3	24.4
40-49	20.6	37.0
50-59	27.8	22.6
60 or older	24.2	9.1
Monthly Household Income	*(11 unknown)*	
Less than 1 million KRW	5.2	3.8
1 – 1.99 million KRW	9.5	12.8
2 – 2.99 million KRW	22.2	25.5
3 – 3.99 million KRW	8.7	23.0
4 – 4.99 million KRW	21.8	19.4
5 million KRW and above	28.2	15.6
Education Level	*(10 unknown)*	
Elementary/Public school and below	1.2	-
Middle school graduate	6.3	-
High school graduate	31.7	-
University graduate and above	56.7	-
Main Purpose of Visit	*(1 unknown)*	
Improve health	8.3	25.4[a]
Spending time with family/friends	7.9	14.5[a]
Experience nature and culture	32.5	20.9[a]
Rest and relaxation	50.0	38.4[a]
Others	0.8	0.7[a]

* Visitor statistics based on mountainous national parks (국립공원연구원, 2013)

[a] Information specifically based on Seoraksan National Park

The results of the base model (without socioeconomic interactions) estimated with the multinomial logit model are presented in **Table 18.** All the qualitative variables were coded with dummy coding. The beta-coefficients (B) are the estimated parameters that are used to calculate the utility provided by the change in the given attribute. The signs of the beta-coefficients indicate the direction of movement of the utility derived when the level of the attribute increases. The bigger the coefficient, the stronger the effect on the probability of visitors preferring a management option. In other words, a positive coefficient implies that an increase in the attribute level will increase the utility provided, while a negative

coefficient implies that increase in the attribute level will decrease the utility provided, ceteris paribus (with all other conditions remaining constant). The p-value represents the risk level at which the null hypothesis (the hypothesis that an attribute does not affect the choice) can be rejected. The R^2 tells how much of the choice behavior the model can explain. The number of correct predictions tells the percentage of choices the model correctly predicts.

Table 18. (Main Survey) Estimated multinomial logit model

Variable	B	S. E	Wald	Sig.	Exp(B)
EntranceFee	-0.000109	.000	38.473	.000	1.000
ENDANGERED+15	0.354	.105	11.343	.001	.702
ENDANGERED+30	0.273	.135	4.126	.042	.761
WPASSAGE+2	0.238	.103	5.397	.020	.788
WPASSAGE+4	0.580	.134	18.712	.000	.560
SPZONE-5	-0.574	.105	29.747	.000	1.775
SPZONE+5	-0.262	.124	4.494	.034	1.299
ENVEDU++	0.019	.102	.036	.849	.981
ENVEDU+++	-0.185	.140	1.750	.186	1.203
optout	-2.843	.179	251.998	.000	17.160
Constant	-2.213	.429	26.552	.000	
-2 Log Likelihood		237.169			
Likelihood ratio (*p*)		668.788 (<0.0001)			
Mcfadden Pseudo R^2 (Cox & Snell)		0.174 (0.198)			
No. of correct predictions		70.4%			
No. of observations:		3024			

As expected, negative coefficients were obtained for the opt-out option and the entrance fee payment attribute. A negative coefficient of the opt-out option indicated that respondents were less likely to choose neither of the alternatives as compared to the other management alternatives, all other things being equal. The estimated coefficients associated with the entrance fee payment indicate the inverse relationship between the entrance fee amount and preference for an alternative. This means that the respondents preferred the lower cost alternative in general.

The basic multinomial logit model does not account for taste heterogeneity – the implication that individuals do not possess identical preferences when choosing alternatives in choice cards. In other words, the estimated multinomial logit model in **Table 18** is based on the assumption that the visitors have identical preferences when selecting the management options in the survey. Bhat (1997) classified taste

heterogeneity into two components – systematic heterogeneity, which explains variations that occur as a result of observable individual characteristics, and random (or stochastic) heterogeneity, which accommodates variations due to unobservable individual characteristics. Systematic heterogeneity can be accounted for in the multinomial logit model through interactions with sociodemographic characteristics, constant terms and or attributes of the alternatives (Wiktor, Joffre, Boxall, Jordan, & Williams, 1997)

Table 19 presents the full and reduced logistic models incorporating interactions of respondents' sociodemographic characteristics with the variable entrance fee. As the sociodemographic characteristics such as education level, income, rural living experience and visiting history, do not vary across decision, parameter estimates for these characteristics in the utility functions cannot be obtained by including them directly in the model.

Table 19. (Main Survey) Estimated conditional logit model with interaction effects

Variable	Full model		Reduced model	
	B	Sig.	B	Sig.
EntranceFee	-0.0000240	.729	-0.0000860	.000
ENDANGERED+15	0.315	.005	.385	.000
ENDANGERED+30	0.341	.017	.311	.023
WPASSAGE+2	0.269	.014	.246	.019
WPASSAGE+4	0.573	.000	.550	.000
SPZONE-5	-0.494	.000	-.559	.000
SPZONE+5	-0.226	.085	-.250	.046
ENVEDU++	0.019	.863	.023	.822
ENVEDU+++	-0.150	.311	-.217	.127
EF*gender	-.0000442	.039	-.0000424	.030
EF*education	-.00001353	.426	-	-
EF*hincome	.00000639	.247	-	-
EF*countryside	.00000003	.971	-	-
EF*visits	-.0000123	.313	-	-
optout	-2.737	.000	-2.859	.000
Constant	.090	.502	.169	.186
Log Likelihood		-1410		-1530
Cox & Snell R^2		0.196		0.202
No. of correct predictions		69.8%		70.3%
No. of observations:		3024		3024

The full model reveals that almost all the sociodemographic characteristics were statistically insignificant. This shows that most of the sociodemographic characteristics of visitors did not affect the entrance fee amounts they were willing to pay. A reduced model was estimated with the inclusion of gender as the only characteristic. In the reduced model, females (coded as '1') are revealed to be less willing to pay for entrance fees. This could be attributed to the fact that a significant number of female respondents in our sample are housewives with no income.

The estimated interaction coefficient of education multiplied by entrance fee is negative, indicating that respondents' willingness to pay for the entrance fee price decreased with an increase in education level. On the other hand, the positive interaction coefficients for income level and the number of years spent living in the countryside suggests that the willingness to pay for entrance fees increases as income level or the number of years spent in the countryside increase, assuming that all other variables remain constant. As for the number of visits to Seoraksan National Park in the past year, the negative interaction coefficient suggests that the willingness to pay for entrance fees is generally lower for frequent visitors.

The Cox & Snell R^2 values of both the basic model as well as the full and reduced models with interaction effects show minute differences, hence indicating that the explanatory powers of all three models are almost the same. As the inclusion of sociodemographic characteristics did not significantly improve the model fit, the basic model in **Table 18** was used in the computation of the marginal willingness-to-pay for the different management strategies.

This marginal willingness-to-pay for each attribute (management strategy) (**Table 20**) was calculated as a negative ratio of parameter on the attribute (or level) β_k and the entrance fee parameter γ as mentioned in Chapter 2 equation (5):

$$MWTP_k = -\frac{\beta_k}{\gamma}$$

Table 20. (Main Survey) Calculated willingness-to-pay (WTP) for an entrance fee per visit for various levels of management attributes

Attribute	Level Change	WTP in KRW (US$)
Restoration of Endangered Species	CS → 15% increase in populations of endangered animals	3,249 ($2.91)
	CS → 30% increase in populations of endangered animals	2,506 ($2.24)
Wildlife Passages	(CS) 1 WP → 3 WPs	2,186 ($1.96)
	(CS) 1 WP → 5 WPs	5,323 ($4.76)
Area of Special Protection Zones	(CS) 10% → 5%	-5,263 (-$4.71)
	(CS) 10% → 15%	-2,402 (-$2.15)
Environmental Education Programs*	Increase environmental education-related visitor programs	178 ($0.16)
	Increase environmental education-related visitor programs and nature observation trails	-1,694 (-$1.52)

** The base scenario is an anticipated increase in information boards along hiking trails*

Notes: Exchange rate used for conversion is 1117.50 KRW/US$, which is the exchange rate on 3rd April 2017 (Industrial Bank of Korea, 2017)

Table 20 shows that the reduction in the area of Special Protection Zones is clearly the most harmful management strategy on respondents' welfare. Also, increases in the area of Special Protection Zones as well as environmental education implementations, specifically nature observation trails, have negative effects on respondents' welfare. The other attributes result in welfare gains. More detailed interpretations of the results are in Chapter 4.3

4.2 Comparing across Respondent Groups

4.2.1 Non-university Graduates and University Graduates

Of the 252 respondents, 10 respondents did not indicate their level of education and hence, only data from the remaining 242 respondents were included in this analysis. Two models are estimated – Model (1) for respondents who are non-university graduates and Model (2) for university graduates. The marginal willingness to pay in terms of entrance fee per visit for each of the attributes are as follows (**Table 21**):

Table 21. Comparison of WTP values (education level)

Attributes	Model (1): Non-university graduates		Model (2): University graduates	
	WTP	B	WTP	B
EntranceFee	-	-0.000123*	-	-0.0000901*
ENDANGERED+15	5,039 ($4.51)	0.620*	2,525 ($2.26)	0.228
ENDANGERED+30	820 ($0.73)	0.101	4,896 ($4.38)	0.441*
WPASSAGE+2	890 ($0.80)	0.110	3,851 ($3.45)	0.347*
WPASSAGE+4	3,925 ($3.51)	0.483*	7,732 ($6.92)	0.697*
SPZONE-5	-4,059 (-$3.63)	-0.500*	-6,556 (-$5.87)	-0.591*
SPZONE+5	-2,613 (-$2.34)	-0.322	-2,248 (-$2.01)	-0.203
ENVEDU++	756 ($0.68)	0.093	-614 (-$0.55)	-0.055
ENVEDU+++	-1,533 (-$1.37)	-0.189	-2,059 (-$1.84)	-0.186
optout	-	-2.842*	-	-2.744*
Constant	-	-2.218*	-	-1.993*
Likelihood ratio (*p*)	261.846 (<0.0001)		387.133 (<0.0001)	
McFadden Pseudo R^2 (Cox & Snell)	0.173 (0.198)		0.177 (0.202)	
No. of correct predictions	71.5%		71.3%	
No. of observations:	1188 (99 respondents)		1716 (143 respondents)	

** p<0.05*

Note: Exchange rate used for conversion is 1117.50 KRW/US$

In the case of restoration programs for endangered animals, it appears that non-university graduates are willing to pay for restoration programs from

endangered animals, but yet, are indifferent towards the extent of increase in the number of endangered animals. University graduates have a higher willingness to pay for the construction of wildlife passages as compared to non-university graduates. If education is highly correlated to income level, this result could be attributed to higher income levels as well. As compared to non-university graduates, reducing the area of Special Protection Zones results in a greater decrease in the welfare of university graduates.

Consistent with the results of other studies (Hadker, Sharma, David, & Muraleedharan, 1997), the results of this study show that the level of education received by a respondent is significantly and positively related to willingness-to-pay. Arguably, the greater the number of years spent schooling, the more the knowledge one would have about social, political, economic and environmental happenings. People who have received more education can be assumed to be more aware of environmental issues and the impacts of conservation-related management strategies on the environment. Correspondingly, respondents who are more educated may be more knowledgeable about the need to conserve biodiversity and hence, have a higher willingness to pay for the biodiversity conservation of the national park.

A study on 6 states in the United States revealed that the proportion of people who possess traditional wildlife value orientations that emphasize the use and management of wildlife for human benefit is strongly and inversely related to income, urbanization, and education (Manfredo, Teel, & Bright, 2003). This shift away from traditional orientations could be prevalent in South Korea as well.

4.2.2 First-time Visitors and Visitors who have Visited More than Once

Out of the 252 respondents, 250 respondents indicated their visiting frequency over the past year (3rd April 2016 to 2nd April 2017) and their responses were included in this analysis. Two models are estimated – Model (5) for first-time visitors and Model (6) for visitors who have visited more than once in the past year. The marginal willingness to pay in terms of entrance fee per visit for each of the attributes are as follows (**Table 22**):

Table 22. Comparison of WTP values (number of visits)

Attributes	Model (3): First-time visitors		Model (4): Visited 2 or more times	
	WTP	B	WTP	B
EntranceFee	-	-0.0000939*	-	-0.000115*
ENDANGERED+15	5,050 ($4.52)	0.474*	2,881 ($2.58)	.332*
ENDANGERED+30	5,618 ($5.03)	0.528*	1,475 ($1.32)	.170
WPASSAGE+2	1,961 ($1.75)	0.184	2,297 ($2.06)	.265*
WPASSAGE+4	8,259 ($7.39)	0.776*	4,553 ($4.07)	.526*
SPZONE-5	-7,587 (-$6.79)	-0.712*	-4,289 (-$3.84)	-.495*
SPZONE+5	-2,556 (-$2.29)	-0.240	-2,292 (-$2.05)	-.265
ENVEDU++	1,952 ($1.75)	0.183	-379 (-$0.34)	-.044
ENVEDU+++	-659 (-$0.59)	-0.062	-1,797 (-$1.61)	-.207
optout	-	-2.508*	-	-2.939*
Constant	-	-1.419	-	-2.408*
Likelihood ratio (*p*)	182.578 (<0.0001)		481.853 (<0.0001)	
McFadden Pseudo R^2 (Cox & Snell)	0.173 (0.198)		0.175 (0.199)	
No. of correct predictions	70.4%		71.5%	
No. of observations:	828 (69 respondents)		2172 (181 respondents)	

** $p<0.05$*

Note: Exchange rate used for conversion is 1117.50 KRW/US$

The willingness to pay values for both restoration programs and wildlife passage construction is generally higher for first-time visitors as compared to visitors who have visited more than once. The welfare loss associated with a

reduction in the area of special protection zones is also greater for first-time visitors.

As expected, the number of previous visits made by respondents has a negative impact on the willingness to pay for entrance fees as frequent visitors would bear a higher financial burden as a result of the entrance fee policy. Another possibility is that experienced visitors feel accustomed to the free admission system ever since the abolishment of entrance fees in 2007. Experienced visitors may also value the use value of the national park more, and could have a higher willingness to pay for entrance fees targeted at enhancing the facilities and amenities available at the national park.

4.2.3 Countryside Living Experience

Of the 252 respondents, 19 respondents did not indicate either their age or the number of years they spent living in the countryside. Hence, only data from the remaining 233 respondents were included in this analysis. 3 models are estimated – Model (5) for respondents have never lived in the countryside, Model (6) for respondents who have spent up to half of their lives in the countryside, and Model (7) for respondents have spent more than half of their lives living in the countryside. The marginal willingness to pay in terms of entrance fee per visit for each of the attributes are listed in **Table 23.**

All the parameters obtained in Model (7) were revealed to be statistically insignificant, possibly due to the small size of 34 respondents. Comparing Models (5) and (6), respondents who have had experience living in the countryside have a clear preference for management strategies associated with restoration programs and wildlife passages. On the other hand, in the case of urbanites who have never lived in the countryside, both increases and decreases in the area of Special Protection Zones negatively affected the probability of selecting a management option.

Living in the countryside involves leading a rural lifestyle in an environment that is less modified by human activity. This would also mean increased dependence on the utilization and extraction of natural resources as well as an increased tendency to favor economic development to improve their financial circumstances. Differences in attitudes of urban people have been widely documented. This may lead to public conflicting over protected area management, as observed in the controversy over the installation of a cable car in Seoraksan National Park.

There are two different perspectives associated with the environmental attitudes of people who have lived in the countryside or are countryside dwellers. One perspective is that people who have spent some or all of their lives living in the countryside are more attached to nature as they understand the need for natural resource conservation and hence, have more positive values for wildlife and conservation. Another perspective is that these people are motivated to support economic development to improve their livelihoods and invigorate the local

economy.

As the conclusions about the motivations of the respondents cannot be determined from this analysis, one recommendation would be to test respondents' knowledge of the national park's conservation strategies as well as their environmental attitudes.

Table 23. Comparison of WTP values (countryside living experience)

Attributes	Model (5): Spent 0% of life in countryside		Model (6): Spent 1~50% of life in countryside		Model (7): Spent 51~100% of life in countryside	
	WTP	B	WTP	B	WTP	B
EntranceFee	-	-0.000110*	-	-0.000100**		-0.0000868*
ENDANGERED+15	2,378 ($2.13)	0.262	5,788 ($5.18)	0.581**	432 ($0.39)	0.037
ENDANGERED+30	3,254 ($2.91)	0.359	4,523 ($4.05)	0.454**	-2,419 (-$2.16)	-0.210
WPASSAGE+2	1,438 ($1.29)	0.159	3,287 ($2.94)	0.330**	3,033 ($2.71)	0.263
WPASSAGE+4	5,525 ($4.94)	0.610**	6,799 ($6.08)	0.682**	2,458 ($2.20)	0.213
SPZONE-5	-7,315 (-$6.55)	-0.807**	-2,117 (-$1.89)	-0.212	-6,252 (-$5.59)	-0.543*
SPZONE+5	-3,783 (-$3.39)	-0.417**	603 ($0.54)	0.061	-2,304 (-$2.06)	-0.200
ENVEDU++	1,719 ($1.54)	0.190	-1,439 (-$1.29)	-0.144	-1,149 (-$1.03)	-0.100
ENVEDU+++	93 ($0.08)	0.010	-2,200 (-$1.97)	-0.221	-4,910 (-$4.39)	-0.426
optout	-	-2.808**	-	-2.711**	-	-2.617**
Constant	-	-2.228**	-	-1.288*	-	-3.211**
Likelihood ratio (*p*)		258.619 (<0.0001)		290.680 (<0.0001)		68.250 (<0.0001)
McFadden Pseudo R^2 (Cox & Snell)		0.175 (0.199)		0.187 (0.211)		0.132 (0.154)
No. of correct predictions		70.6%		71.8%		71.6%
No. of observations:		1164 (97 respondents)		1224 (102 respondents)		408 (34 respondents)
*** p<0.05; * p<0.10*				Note: Exchange rate used for conversion is 1117.50 KRW/US$		

4.3 Interpretations and Discussions

4.3.1 Restoration Programs for Endangered Species

The coefficients for the both attributes representing the increase in populations of endangered species are positive as expected. This indicates that restoration programs increase the probability of choosing a management alternative, but interestingly pronounced implementation of restoration programs which result in larger increases in endangered species' populations are not desired changes. Both the marginal WTP values for attributes associated with restoration programs for endangered species and that of wildlife passages are higher as compared to the other attributes.

This is especially important considering the need for more intensive conservation and management to maintain the minimum viable population size in fragmented populations of the Korean long-tailed goral species along the Baekdudaegan Mountain Range. In a population viability analysis research on gorals, a significant number of these fragmented populations are expected to either show rapid population decline or disappear within 50 years. (Kim B.-J. , Lee, Lee, & Jang, 2016)

4.3.2 Wildlife Passages

The results of the study indicate that the building of wildlife passages as a management tool is the most valuable for the park. The marginal willingness-to-pay for an increase in the number of wildlife passages indicates strong support for the construction of wildlife passages as compared to other biodiversity conservation management strategies in this research.

Wildlife passages were initially built to control the number of the road kills. Nonetheless, it should be noted that the effectiveness of wildlife passages encompasses several aspects. Wildlife passages or crossings are built to increase permeability and habitat connectivity across roads. The usage of wildlife crossing structures has been found to be species-specific, and certain species responded better to landscape or structural variables. More importantly, human influence was consistently ranked high as a significant factor affecting species-performance

ratios⑬. As such, despite designing wildlife crossing structures based on topography, habitat quality, and location according to the local context, success is minimal if human activity is not adequately managed (Clevenger & Waltho, 2000).

4.3.3 Special Protection Zones

The goal of establishing such preservation zones in South Korea's National Parks is to protect natural ecosystems and landscapes within the parks while allowing for the recovery of natural environments that are damaged either by natural or man-made causes (국립공원관리공단, 2016).

The coefficients for both the decrease and increase in the area Special Protection Zones are negative, thereby indicating that respondents, in general, did not desire the reduction in the area of preservation zones, and neither did they prefer an expansion of such areas. Some respondents could have perceived the expansion of Special Protected Zones as synonymous with the increase in the number of restricted areas and available hiking routes.

In order to achieve the national goals set out Korea's National Biodiversity Strategy and Action Plan as part of its commitment to the Convention on Biodiversity, the number of protected areas will have to be expanded. As the results of this study reveal that visitors currently have differing opinions regarding the expansion of Special Protection Zones, it would be advisable to raise public awareness on the importance of limiting access to protect vital habitats and damaged areas.

4.3.4 Environmental Education Programs

In the original estimated multinomial logit model in **Table 18**, the positive sign of the coefficient of ENVEDU++ indicates that an increase in the number of information boards and educational programs for the younger generation increases the probability of choosing a management plan. On the other hand, the negative coefficient of ENVEDU++ shows that an increase in the number of information boards, educational programs for the younger generation and nature observation trails are not desired changes as they decrease the probability of choosing a

⑬ Observed crossing frequency to expected crossing frequency

management plan. This indicates that respondents generally opposed to the building of (or conversion of current trails to) nature conservation trails, indicating reluctance for nature observation trail development, despite it being for educational purposes.

In a study by Juutinen et al.'s (2011) choice experiments-based research on Oulanka National Park in Finland, the results showed that visitors were, to a certain extent, indifferent towards the addition of an excessive number of information boards along hiking trails. The coefficients representing the status of information boards are as follows (Juutinen, Mitani, Mantymaa, Shoji, & Siikamaki, 2011):

- Few more information boards in English by the side of hiking routes: a board after every 3km (0.205, $p<0.05$)
- Far more information boards in English by the side of hiking routes: a board after every 1km (-0.060, $p>0.05$)

Another study on Woraksan National Park in South Korea revealed that visitors considered the education of residents and provision of information regarding the reintroduction of the endangered mountain goral as desirable management strategies, and had a strong preference for the attribute (Han, Lee, Mjelde, & Kim, 2010).

Perhaps, if the levels of the environmental education attributes in this study were altered to focus on one type of implementation, instead of including different types of implementations (information boards, visitor programs, and nature observation trails), respondents may be able to interpret the variations across different management plans more clearly when answering the choice experiments questions. This would potentially lead to more meaningful and reliable results.

Finally, both the environmental education attributes of this study were statistically insignificant, thereby indicating that the respondents do not consider environmental education-related implementations such as the installation of more information boards, organization of more visitor programs and construction of more nature observation trails, as important management strategies that can contribute significantly to biodiversity conservation in the national park.

4.3.5 Entrance Fee

The coefficient of the entrance fee variable is represented by a considerably small negative value. The negative sign indicates that in general, the higher the entrance fee of a management alternative, the lower the respondent's probability of choosing the management plan and *vice versa*. This is in line with the economic theory of demand. There were a significant number of respondents who had a strong willingness to pay for the biodiversity conservation of Seoraksan National Park, and hence, there were many cases where respondents chose a management plan with a higher entrance fee. This resulted in a small negative value.

In Lee and Han's (2002) study on the use and preservation values of 5 national parks in South Korea (Soeraksan National Park, Bukhansan National Park, Gayasan National Park, Hallyo-Haesang National Park and Taean-Haean National Park), the contingent valuation method, in the form of a dichotomous choice questionnaire was employed. The research revealed that the national parks generated significant use and preservation values, with Seoraksan National Park having a use value of 17,208 KRW per visitor (in the form of entrance fees for recreational opportunities offered at the park) and a preservation value of 14,682 KRW per person per year (in the form of special taxes levied by the government for the preservation of the park).

Two other studies investigating the use and preservation values of national parks were conducted in 2010 and 2012 after the abolishment of the entrance fee system. The results of these studies are summarized in **Table 24**.

Table 24. List of use and preservation values of Seoraksan National Park

Year of Study	Use Value (KRW)	Preservation Value (KRW)
2002[1]	17,208 (entrance fee per visitor)	14,682 (annual tax per person)
2010[2]	17,717 (entrance fee per visitor)	11,220 (annual tax per household)
2012[3]	20,107 (per visitor per visit)	16,747 (per household per year)

[1](Lee & Han, Estimating the use and preservation values of national parks' tourism resources using a contingent valuation method, 2002); [2](김통일, 양성임, 김민수, 2010); [3](국립공원연구원, 2012)

These studies indicate that regardless of entrance fees, the public has generally been willing to both pay for an entrance fee as well as contribute towards the preservation of national parks, which coincides with the results of this study.

Chapter 5. Conclusions

The results show a clear message from the perspective of park management. Increases in populations of endangered species through restoration programs and additional construction of wildlife passages are desirable management strategies that visitors are willing to contribute towards. However, it appears that visitors consider the excessive increase in the number of endangered species populations to be less desirable. In the case of preferences for wildlife passages, the impacts and attribute levels are simple and clear, and the willingness-to-pay of visitors generally increases with the number of wildlife passages constructed.

Management strategies leading to the expansion or reduction in the area of Special Protection Zones are not clearly supported by this study. This may imply that although visitors are willing to pay for biodiversity conservation management, habitat protection measures that are applied at the expense of visitors access is not desired. Implementations related to environmental education are not valuable management strategies that are supported by visitors.

Finally, the results show that visitors are generally indifferent towards the implementation of environmental education programs. The negative willingness-to-pay for the additional construction of nature observation trails can possibly be interpreted as a reluctance to develop the park's trail – a preference for a more natural wilderness environment when hiking.

The results from the group-specific analysis show that differences in preferences for management strategies across various visitor groups exists to a certain extent. Wildlife interpretive and education programs as well as promotional and advocacy activities should be specifically targeted to address the differences in attitudes and knowledge of different visitors.

Another major finding stems from the perspective of paying for biodiversity conservation in terms of entrance fees. Previous contingent valuation studies that estimated the use indicated the high willingness of the public to pay to visit the national park to enjoy the natural scenery and recreational opportunities provided by the national park. On the other hand, using the same payment vehicle of entrance fees, this study explored the willingness to pay for biodiversity

conservation in terms of entrance fees and revealed that biodiversity conservation schemes and implementations can motivate people to pay for entrance fees. If this can be interpreted as a form of payments for ecosystem services (PES), it might be worthwhile to explore the potential of PES schemes to revitalize the regional economy through partnerships between the Korea National Park Service and the local communities.

One major limitation of this study is that the results are based on a considerably small sample of domestic visitors to Seoraksan National Park. Hence, caution should be exercised when interpreting and applying the results obtained to all other national parks in Korea.

5.1 Key Issues & Further Research

Knowledge of biodiversity conservation

There exists the issue of how much information on complex environmental resources, such as biodiversity and its conservation, an individual can be expected to assimilate and understand, and consequently make inform decisions during preference studies. A study by Spash & Hanley, 1995 indicated that understanding of the biodiversity concept is very limited, and a lack of knowledge about the meaning of biodiversity seems prevalent across two samples (students and the general public). The results revealed that biodiversity is understood even less by the general public than the students, thereby raising concerns about seeking the general public's opinions for their valuations of biodiversity. When the general public if not adequately informed about a public good, the information obtained will not accurately inform decision-makers of existing preferences – the information given will contribute to the formation of preferences rather than the elicitation of information on existing preferences. This is then followed by the different and more difficult issue on the amount of information that should be provided to individuals if a public agency is interested in utilizing their revealed or stated preferences as a guide to implementing policies.

In this research, the respondents at Seoraksan National Park were not tested on their knowledge of biodiversity conservation and its importance as the survey instrument was intended to be kept as short as possible to attract as many

respondents as possible. Experience from the pilot survey also showed that a majority of the respondents skipped the background information part of the pilot survey instrument. Respondents who were uninformed about biodiversity would have most likely underestimated the values of biodiversity conservation management attributes. If preferences for management strategies aimed at biodiversity conservation are to be utilized as an accurate guide to inform policy decisions, individuals need to be given as much information on biodiversity conservation as they can be reasonably be expected to understand fully. Hence, one modification that could be made in future studies is to include a segment which tests respondents' understanding of biodiversity conservation and consider this as a variable which affects the valuation of the biodiversity conservation management strategies.

Crowding in national parks

Although the crowing attribute was found to be statistically insignificant during the pilot choice experiments survey, useful insight can be obtained from comparing the results with other choice experiments studies that include the similar or identical attributes. A summary of the crowding attributes used and their corresponding coefficient signs are listed in **Table 25**.

Table 25. Crowding attributes in other studies

Location (Year)	Crowding Attribute	Coefficient
China – Lushunkou National Forest Park (2014)[1]	Decreases: 5 people/100m walk	(– – –)
	Decreases: 20 people/100m walk	(++)
	Stays at present state: 50 people/100m walk	(+)
	Increases: 60 people/100m walk	(–)
	Increases: 80 people/100m walk	(– –)
Finland – Oulanka National Park (2011)[2]	Decreases: 10 people/1km walk	(++)
	Increases as expected: 40 people/1km walk	(+)
	Increases: 70 people/1km walk	(–)
United States – Acadia National Park (2008)[3]	Few other people on trail	(+)
	Some other people on trail	(– –)
	Many other people on trail	(–)
United States – Yosemite National Park (2005)[4]	Encounters 5 other groups/day	(++)
	Encounters 5-15 other groups/day	(+)
	Encounters more than 15 other groups/day	(–)

[1](Wang, Wei, & Liu, 2014); [2](Juutinen, Mitani, Mantymaa, Shoji, & Siikamaki, 2011); [3](Bullock & Lawson, 2008); [4](Newman, Manning, Dennis, & McKonly, 2005)

In general, it is observed that an extensive degree of crowding is not desired by visitors in all the aforementioned national parks as well as Seoraksan National Park (based on results from the pilot survey in **Tables 12** and **13**. However, the coefficient of the crowding attribute representing a decrease in the number of visits encountered per 100m though positive is of a very small magnitude. This indicates that visitors to Seoraksan National Park are, to a certain extent, indifferent to the level of crowding in the park.

Overall, it can be concluded that the preferences of visitors in these studies differ due to variations in the environment and societal context in different countries. For instance, visitors in countries with relatively low visitation numbers at national parks may consider this as the norm and therefore, be more sensitive to excessive increases in visitor numbers and crowding effects. On the other hand, in the case of Korea, where the annual number of visits to national parks can reach as high as 44 million, visitors are well-conditioned and accustomed to crowded trails while hiking and hence be less sensitive to changes in visitor numbers.

This reinstates that point that preferences for both national park management alternatives and environmental attributes depend on local conditions and contexts. Managers of protected areas, therefore, need to understand the perspectives and preferences of different stakeholders well in order to propose efficient management policies.

Preferences of different user groups

Another area for further research is to compare the differences in preferences between residents and visitors. A study on the environmental perceptions (김정민, 2014) revealed that the perceptions of residents residing near Seoraksan National Park and the visitors to the park differ and the visitors tended to possess a high level of acceptance of the New Environmental Paradigm (NEP). Perspectives of the environment can affect preferences for management strategies directed at biodiversity conservation.

Non-users may be willing to pay for national parks. A research on on the Geum-river estuary revealed that on average, residents from neighboring areas of the Geum-river estuary were willing to pay 1,497 KRW/household/year while

residents from the other large nationwide districts were willing to pay 4,343 KRW/household/year for the conservation and management programs of the estuary (권영주, 유승훈, 박세헌, 2013.10).

This choice-experiments research could be extended to include residents of the local communities living near the park as well as people who have not visited Seoraksan National Park, so as to compare the preferences for biodiversity conservation management strategies of different user groups.

Environmental attitudes

Environmental attitudes can influence decision making. This research can be further extended to include an assessment of the respondent's environmental attitude using the New Ecological Paradigm (NEP) scale. It can be hypothesized that the more pro-environment a person is, the higher his/her willingness to pay for biodiversity conservation policies.

In a study conducted on Maine residents to measure environmental values and estimate the non-use values for the protection of two endangered bird species, it was revealed that respondents with stronger pro-environmental attitudes had significantly higher probabilities of accepting the proposed species protection fund donation. The mean willingness-to-pay estimates for respondents with stronger pro-environmental attitudes were also higher. In particular, respondents with stronger pro-environmental attitudes valued the importance of rights-based reasons (e.g. endangered species have a right to exist) for species protection. (Kotchen & Reiling, 2000)

5.2 Recommendations

An important consideration in the implementation of fee program is how recreation site users will respond to various levels and types of fees. In this study, the choice experiment approach was utilized to help anticipate the impact of entrance fees on visitors' choices among the various management options presented to them. The results of this study provide some evidence that a successful entrance fee system or voluntary donation program directed at the conservation of biodiversity in Korea's national parks can be designed to generate additional revenue to increase the amount of funding dedicated to conservation management or alleviate any financial shortages encountered.

Reintroducing entrance fee policies or increasing entrance fees to national parks may result in a decrease in visitation, which subsequently, has implications on the generation of tourism revenues for the local economy. High visitation numbers inevitably put Korea's national parks under pressure, but the impacts are mostly concentrated (Hag, et al., 2010). In the case of Seoraksan National Park, the installation of the second cable car system is expected to boost visitor numbers and increased damage to the environment is a cause for concern. As the results indicate that people are willing to pay for management strategies aimed at the biodiversity conservation of Seoraksan National Park, with sufficient information and effective awareness raising campaigns, the selective implementation of fee-paying policies at specific sites within the park may be feasible. For example, entrance fees to breeding centers for endangered species or arboretums within the park can be implemented. The feasibility of voluntary donation schemes can also be tested.

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List of Appendices

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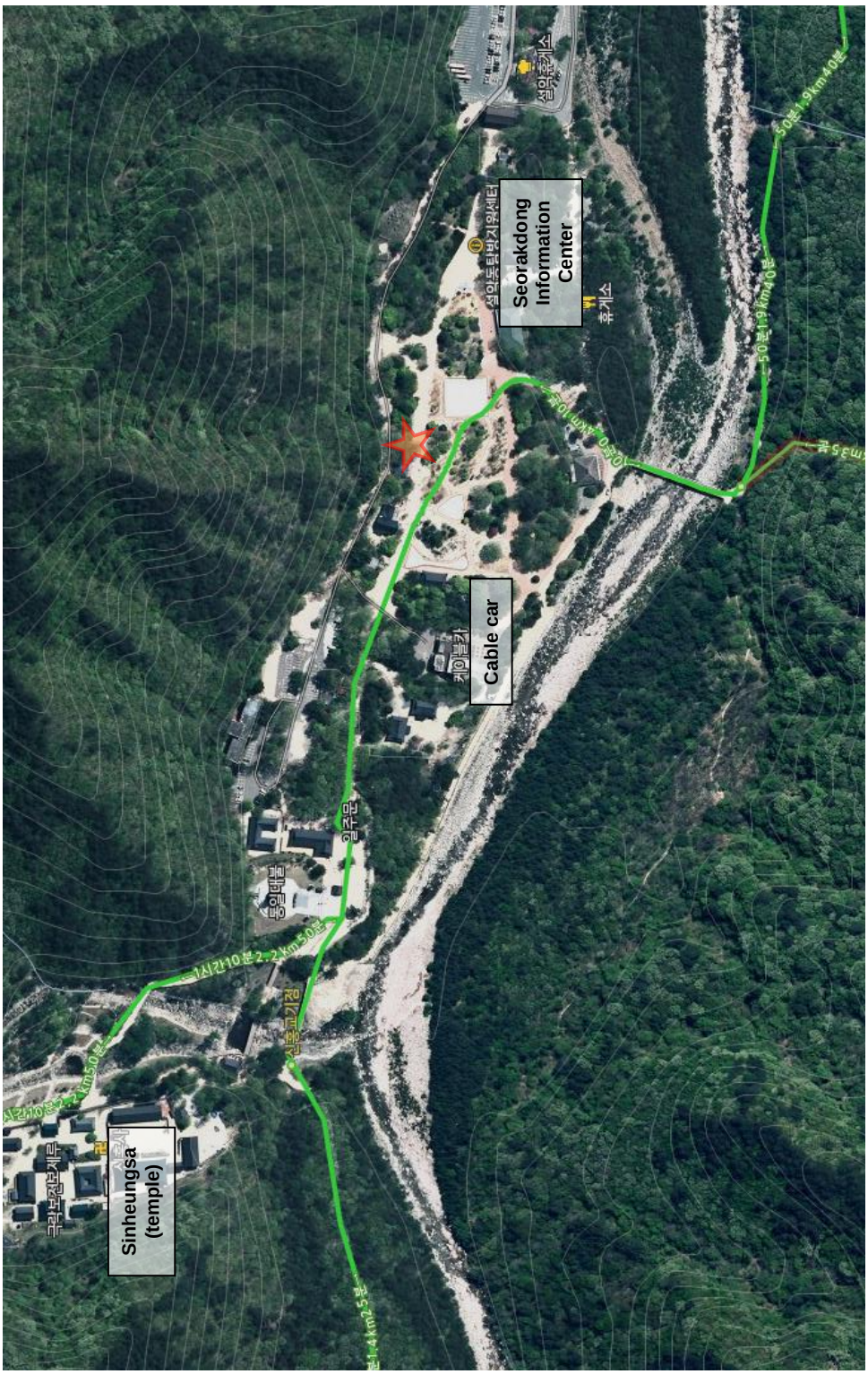
APPENDIX A. Survey Site Locations

A.1 Pilot survey booth near Baekdamsa (temple)

A.2 Main survey booth near Sinheungsa (temple)



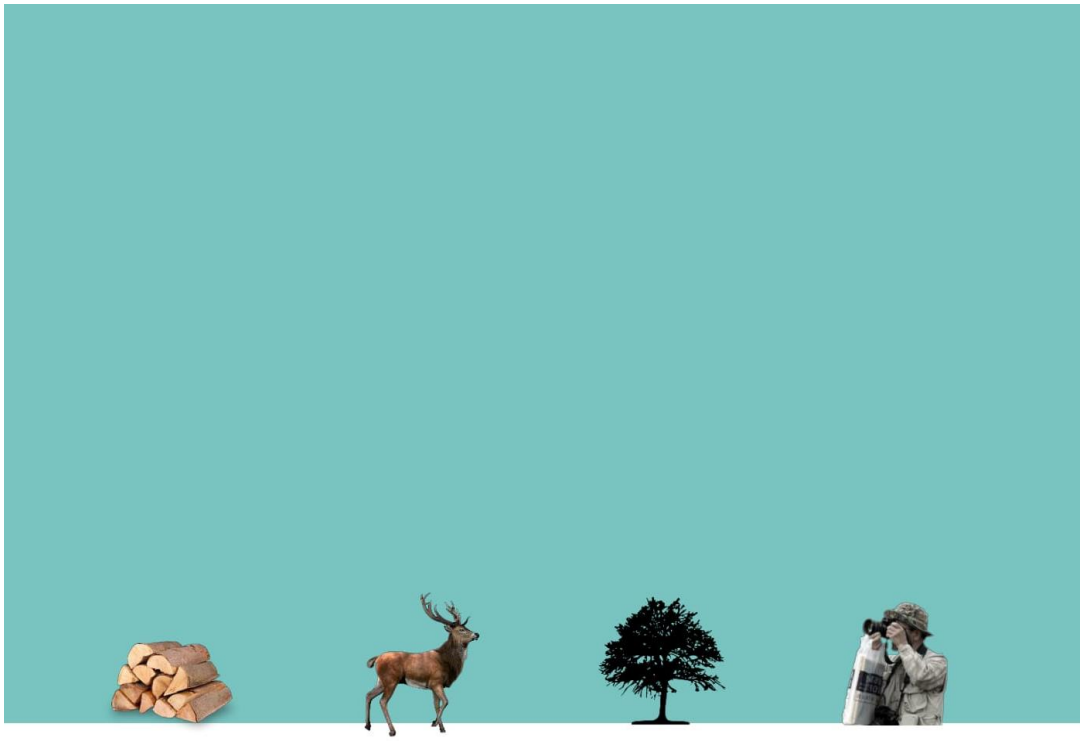

설악산
설문조사

APPENDIX B. List of Seoraksan National Park Management Options

ID	Population sizes of endangered animals	No. of wildlife passages	Area of Special Protection Zones	Level of environmental education	Entrance fee amount
1	increase by 30%	1 WP (current situation)	decrease by 5%	LOW (signs increase)	8000KRW
2	(current situation)	1 WP (current situation)	10% (current situation)	HIGH (signs+programs+ trails increase)	6000KRW
3	increase by 15%	addition of 2 WPs	increase by 5%	MEDIUM (signs+programs increase)	8000KRW
4	increase by 15%	1 WP (current situation)	increase by 5%	LOW (signs increase)	free (current situation)
5	(current situation)	addition of 4 WPs	10% (current situation)	MEDIUM (signs+programs increase)	8000KRW
6	(current situation)	1 WP (current situation)	10% (current situation)	MEDIUM (signs+programs increase)	2000KRW
7	increase by 15%	1 WP (current situation)	10% (current situation)	HIGH (signs+programs+ trails increase)	8000KRW
8	increase by 30%	1 WP (current situation)	increase by 5%	MEDIUM (signs+programs increase)	6000KRW
9	increase by 15%	addition of 2 WPs	decrease by 5%	MEDIUM (signs+programs increase)	2000KRW
10	(current situation)	addition of 2 WPs	increase by 5%	HIGH (signs+programs+ trails increase)	4000KRW
11	(current situation)	addition of 2 WPs	decrease by 5%	LOW (signs increase)	6000KRW
12	increase by 30%	addition of 2 WPs	10% (current situation)	MEDIUM (signs+programs increase)	free (current situation)
13	(current situation)	addition of 4 WPs	increase by 5%	LOW (signs increase)	2000KRW
14	increase by 15%	addition of 2 WPs	10% (current situation)	LOW (signs increase)	4000KRW

15	increase by 15%	addition of 4 WPs	decrease by 5%	HIGH (signs+programs+ trails increase)	free (current situation)
16	(current situation)	addition of 2 WPs	decrease by 5%	LOW (signs increase)	8000KRW
17	(current situation)	1 WP (current situation)	decrease by 5%	LOW (signs increase)	free (current situation)
18	(current situation)	1 WP (current situation)	decrease by 5%	MEDIUM (signs+programs increase)	4000KRW
19	increase by 15%	addition of 2 WPs	10% (current situation)	LOW (signs increase)	6000KRW
20	increase by 15%	addition of 4 WPs	decrease by 5%	MEDIUM (signs+programs increase)	6000KRW
21	increase by 15%	1 WP (current situation)	10% (current situation)	LOW (signs increase)	2000KRW
22	increase by 15%	1 WP (current situation)	decrease by 5%	MEDIUM (signs+programs increase)	4000KRW
23	(current situation)	addition of 2 WPs	10% (current situation)	MEDIUM (signs+programs increase)	free (current situation)
24	increase by 30%	addition of 2 WPs	decrease by 5%	HIGH (signs+programs+ trails increase)	2000KRW
25	increase by 30%	addition of 4 WPs	10% (current situation)	LOW (signs increase)	4000KRW

APPENDIX C. Preliminary Study Questionnaire (2016 May)



국립공원 핵심 생태계서비스에 대한
설 문 조 사

안녕하십니까? 저희 서울대학교에서는 “대한민국의 국립공원이 제공하는 핵심 생태계서비스에 대한 선호도” 에 관한 기초적 연구를 하고 있습니다. 이 조사는 1) 일반인들이 국립공원의 생물다양성 및 다른 핵심 생태계서비스에 대한 시민 인식을 조사하고, 2) 지불하고자 하는 국립공원 입장료 가격 범위를 추정하려는 목적이 있습니다.

이런 뜻에서 선생님께서 응답해주시는 내용 하나하나는 귀중한 자료로 사용될 것입니다. 아울러 응답하신 자료는 순수한 학문적 목적으로만 이용될 것이며, 응답자의 비밀은 보장됨을 약속드립니다. 선생님의 협조를 부탁드립니다. 감사합니다.

이 조사는 설악산 국립공원에 집중하여 세 부분 – A, B 및 C – 으로 이루어집니다. 10 분 이내로 끝낼 수 있는 조사입니다.

문의 사항이 있으시면 조사자에게 연락을 해주시길 바랍니다:
서울대학교 산림과학부 생태경제학연구실
조사자 : 석사과정 (임)마리

PART A – 개인정보

A1. 귀하의 국적은 어떻게 되십니까?

☐ 한국인 ☐ 외국인 – 나라 이름 :

A2. 2016 년 기준으로 귀하의 연세는 만으로 어떻게 되십니까?

☐ 19 – 25 ☐ 26 – 45 ☐ 46 – 65 ☐ 66 이상

A3. 성별

☐ 여자 ☐ 남자

A4. 귀하의 직업은 무엇입니까?

☐ 농업, 어업, 임업 (가족종사자 포함)
☐ 자영업 (종업원 9 사람 이하의 소규모장사 및 가족 종사자, 택시기사)
☐ 판매/서비스직 (상점점원, 세일즈맨 등)
☐ 기능/숙련공 (운전사, 선바느 목공 등 숙련공)
☐ 일반작업직 (토목관계의 현장작업, 수위)
☐ 사무/기술직 (일반회사 사무직, 기술직, 초/중/고 교사)
☐ 경영/관리직 (5 급이상의 고급공무원, 교장, 기업체부장이상)
☐ 전문/자유직 (대학교수, 의사, 변호사, 예술가)
☐ 가정주부 (주로 가사에만 종사하는 부인)
☐ 학생
☐ 무직
☐ 기타 (적을 것 :

A5. 귀하께서는 학교를 어디까지 마치셨습니까?

☐ 초/중학교 또는 무학(미취학)
☐ 고졸
☐ 대학 중퇴
☐ 직업/전문학교
☐ 대재 이상
☐ 대학원 재학 이상

A6. 귀하의 일 년 평균소득은 얼마정도 입니까?

☐ 1 만 달러 이하 (1181 만원 이하)
☐ 1 ~ 2 만 달러 (1181 ~ 2363 만원)
☐ 2 ~ 3.5 만 달러 (2363 ~ 4135 만원)
☐ 3.5 ~ 5 만 달러 (4135 ~ 5907 만원)
☐ 5 ~ 7 만 달러 (5907 ~ 8270 만원)
☐ 7 만 달러 이상 (8270 만원 이상)

A7. 1~10 사이에서, 귀하께서 해당 주제의 관련된 이해 정도를 표시해주십시오.

(**1** – 전혀 잘 모름---------- **10** – 아주 잘 알고 있음)

	1	2	3	4	5	6	7	8	9	10
자연 생태계	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
생태계 서비스	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
국립공원	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

PART C – 설문지 질문

<국립공원관리공단 소개>
국립공원관리공단은 환경부 장관의 권한을 위탁 받아 국립공원을 관리하는 준정부기관으로서, 대한민국의 21 개 국립공원 중 한라산을 제외한 20 개의 국립공원을 관리하고 있습니다.

<설악산국립공원 소개>
설악산국립공원은 398.237 ㎢에 이르는 광대한 면적에 수많은 동식물들이 함께 살고 있는 중요한 생태계이며, 수려한 경관을 지닌 아름다운 공원입니다. 설악산 일대는 세계적으로 희귀한 자연자원의 분포 서식지로 1982 년 유네스코(UNESCO)에 의해 우리나라 최초로 생물권보전지역으로 설정되었습니다.

현재 설악산에서는 2000 마리 이상의 동물들과, 1400 종 이상의 희귀 식물들이 존재합니다. 그리고 그 중에는 국제적 멸종위기종이자 멸종위기 야생생물 1 급에 해당하는 산양을 비롯하여 수많은 멸종위기 생물들이 포함되어 있습니다.

C1. 다음의 모든 국립공원 중 어느 국립공원을 방문하셨습니까?

☐ 가야산국립공원	☐ 변산반도국립공원*	☐ 월출산국립공원
☐ 경주국립공원	☐ 북한산국립공원	☐ 주왕산국립공원
☐ 계룡산국립공원	☐ 설악산국립공원	☐ 지리산국립공원
☐ 내장산국립공원	☐ 소백산국립공원	☐ 치악산국립공원
☐ 다도해해상국립공원*	☐ 속리산국립공원	☐ 태안해안국립공원*
☐ 덕유산국립공원	☐ 오대산국립공원	☐ 한려해상국립공원*
☐ 무등산국립공원	☐ 월악산국립공원	☐ 한라산국립공원
☐ 국립공원을 방문한 적이 없습니다.		*해상 및 해안국립공원

C2. 귀하는 지난 5 년동안 설악산을 몇번이나 방문하셨습니까?

☐ 설악산에 방문한 적이 **없습니다**.
☐ 1 번 방문했습니다.
☐ 2 번 방문했습니다.
☐ 3 번 방문했습니다.
☐ 4 번 이상 방문했습니다 – 몇 번이나 방문하셨습니까? _____

다음 질문(C3,C4)의 답변을 위해, 밑에 생태계 서비스를 대표하는 사진들을 참조하시고 답해주시기 바랍니다.

BIODIVERSITY CONSERVATION 생물다양성 보전

RECREATION & TOURISM OPPORTUNITIES 경관·휴양 서비스

CLIMATE REGULATION (CARBON STORAGE) 기후 조절 서비스 (탄소 흡수/유지)

PROVISION OF EDIBLES & MATERIALS 식량·약품·원료 공급 서비스

C3. 설악산국립공원에 대한 이해와 생각을 바탕으로, 4 가지 주요생태계서비스의 대한 중요성 순위를 매겨주십시오.

(**1** – 중요도가장 높음 ---------- **4** – 중요도 가장 낮음)

____ 생물다양성 보전 / Biodiversity Conservation

____ 경관·휴양 서비스 / Recreation & Tourism Opportunities

____ 기후 조절 서비스 (탄소 흡수/유지) / Climate Regulation (through carbon storage)

____ 식량·약품·원료 공급 서비스 / Provision of Edibles and Materials

C4. 현재, 설악산국립공원의 입장료는 무료입니다. 그러나, 새로운 정부정책에 따라서는 입장료 부과를 할 수도 있습니다.

설악산국립공원을 방문하기 위하여 1,000 원의 입장료를 지불할 의사가 있으십니까?

지불할 의사가 있으시면, (i)항목에 답해주십시오.

지불할 의사가 없으시면, (ii)항목에 답해주십시오.

☐ 예, 지불할 계획이 있습니다.
아래 (i)항목에 답해주십시오

(i) 설악산국립공원을 방문하기 위하여 2,000 원의 입장료를 지불할 계획이 있으십니까?

☐ 예

☐ 아니오

☐ 아니오, 지불할 계획이 없습니다.
아래 (ii)항목에 답해주십시오

(ii) 설악산국립공원을 방문하기 위하여 500 원의 입장료를 지불할 계획이 있으십니까?

☐ 예

☐ 아니오

다음 질문(C5.1, C5.2, C5.3)의 답변을 위해, 아래에 적은 생태계 서비스의 간략한 설명을 참고하시고 답해주시기 바랍니다.

생물다양성 보전

생물다양성은 지구상에 존재하는 다양한 생물 모두를 지칭하는 표현입니다. 산림 생태계는 수많은 생물들에게 삶의 터전을 제공하여 생물다양성을 유지 및 발전시키는 데 큰 기여를 합니다.

기후조절 (탄소 흡수/유지)

온실기체를 흡수하여 지구온난화를 규제합니다. 식물들, 특히 나무는 이산화탄소를 흡수하기 때문에 산림생태계는 탄소흡수원 및 탄소저장소로서의 역할을 수행할 수 있습니다

경관·휴양 서비스

산림은 인간이 휴식을 취할 수 있는 중요한 장소입니다. 아름다운 경관뿐만 아니라 등산, 낚시, 수영, 그리고 캠핑 등 수많은 여가활동의 기회를 제공해줍니다

식량·약품·원료 공급 서비스

임산물을 비롯한 식량, 섬유, 생화학물질, 천연약재 및 의약품, 장식용 자원, 그리고 담수 등을 공급해줍니다.

C5.1 **만약, 경관·휴양 서비스에 중점을 두어 케이블카 설치와 같은 새로운 국립공원 관리체계를도입하여, 이로 인해 국립공원의 생물다양성이 줄어든다면, 이 새로운 생태계 관리체계를 얼마나 지지하실 생각이십니까?**

C5.2 **만약, 기후 조절 서비스 (탄소 흡수/유지)에 중점을 두어 탄소흡수 능력을 증진하기 위한 수중갱신 등 체계를 도입하여, 이로 인해 국립공원의 생물다양성이 줄어든다면, 이 새로운 생태계 관리체계를 얼마나 지지하실 생각이십니까?**

C5.3 **만약, 목재, 식량 및 생약원료 생산 (공급 서비스)에 중점을 두는 새로운 산림 생태계 관리체계가 도입되어, 이로 인해 국립공원의 생물다양성이 줄어든다면, 이 새로운 생태계 관리체계를 얼마나 지지하실 생각이십니까?**

설 문 지 평 가

제출 날짜 2016 년 5 월 일

PART B 에서 제공해드린 정보에 대해 어느정도 이해하셨습니까?

이해를 아예 못 하였다	이해를 잘 못하였다	보통이다	상당부분 이해하였다	완전히 이해하였다
☐	☐	☐	☐	☐

어느 부분이 이해하기가 가장 어려웠습니까?

기타 의견이나 생각이 있으시면 말씀해주십시오.

답변하신 내용을 파일 저장하여 저에게 이메일(silverballcactus@gmail.com)로 보내주시면 감사하겠습니다.

도와주심에 감사드리며 귀댁의 평안과 번창을 기원합니다.

☺ ☺ ☺ ☺ ☺

APPENDIX D. Pilot Choice Experiments Survey (2016 October)

CALS

V1 | SITE 1 / 2 | 2016.10. 29 / 30

안녕하십니까? 저는 석사논문을 위해 "**설악산국립공원의 선택적 관리 대안에 대한 탐방객 선호도**" 에 관한 연구를 하고 있습니다. 이 연구는 탐방객들이 설악산의 관리에 대한 태도와 선호를 철저히 조사하여, 탐방객들의 편익을 더 높이는 동시에, 국립공원의 자연생태계를 보전할 수 있는 효과적인 국립공원 관리정책을 추천하기 위함입니다. 귀하의 응답내용은 순수한 학문적 연구목적 이외의 어떠한 용도로도 사용되지 않음을 약속드립니다. 도와주셔서 진심으로 감사드립니다. ***서울대학교 산림과학부 생태경제학 연구실 | (임)마리 연구원 |***

(A) 환경에 대한 태도 및 방문 빈도

A1. 선생님께서는 사회의 자연보전이 여타의 사회적 문제들에 비하여 얼마나 중요하다고 생각하십니까?

매우 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

A2. 귀하께서 설악산국립공원을 방문하시는 가장 큰 목적은 무엇입니까? 다음 중에서 1 가지만 선택해 주십시오.

☐ 휴식과 재충전 ☐ 등산/운동 ☐ 경치관람 ☐ 자연체험(교육) ☐ 기타 : _____

A3. 귀하께서는 지난 1 년동안 우리나라에 있는 국립공원을 통틀어 몇 번이나 방문하셨습니까? _____번

A4. 귀하는 지난 1 년동안 설악산국립공원을 (이번을 포함하여) 몇 번이나 방문하셨습니까?

☐ 이번이 처음 방문 ☐ 2 번 ☐ 3~4 번 ☐ 5 번 이상

A5. 선생님은 설악산국립공원의 자연보전이 우리 사회의 건전한 발전에 얼마나 중요하다고 생각하십니까?

매우 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ☐	2 ☐	3 ☐	4 ☑	5 ☐

A6. **설악동출입구에서 내신 3,500 원의 입장료는 신흥사가 전통 불교문화유산를 보존/관리하기 위한 재원으로 활용하기 위하여 받고 있습니다. 현재로서는(문화유산 지구 이외의) 설악산에의 입장은 무료입니다. 만약, 자연자원 보전을 위하여 설악산국립공원에서 입장료 제도를 재도입한다면, 귀하께서 입장료를 지불할 의향이 있으십니까?** ☐있다 | ☐없다

(B) 설악산 국립공원 관리정책 선택실험법 질문

설악산 국립공원의 관리는 다양한 요구들에 의하여 큰 개발의 압박을 받고 있습니다. 설악산국립공원 관리자들은 탐방객이 자연과 산림휴양에 대하여 어떻게 생각하는지에 대한 정보를 파악할 필요가 있습니다. 이 설문조사를 통하여, 귀하께서 어떤 설악산국립공원을 선호하실 건지 여쭙고자 합니다.

▶▶ 다음은 제시된 설악산국립공원의 속성에 대한 설명입니다.






① 생물다양성 설악산국립공원은 천혜의 자연경관과 다양하고 특이한 생물자원이 분포하는 곳이다. 식물, 동물 등 모두 4,635 종이분포하고 있는 것으로 확인 되었으며, 이중 천연기념물이 23 종, **환경부지정 멸종위기 야생생물이 40 종 분포하고 있다**. (멸종위기 야생동물 I 급 및 천연기념물 217 호인 산양은 현재 1 000 개체 이하가 파편화된 지역에 잔존하는 것으로 파악되고 설악산에서 약 250 마리 살고 있다)

사진: 운림의 소소한 이야기

② 설악산국립공원의 특별보호구역 면적 **특별보호구역**이란 자연공원 내 자연생태계와 자연경관이 자연적·인위적인 영향으로부터 중요 생물 서식지를 보호, 안정화하기 위하여 일정기간 사람 또는 차량의 출입을 통제하거나, 탐방객 수를 제한하여 공원자원을 보전·관리하는 곳이다. 지정요건은 자연·인위적인 위협요인으로 인해 보호관리가 필요한 법적보호종이 서식하는 것이다. (**현재 설악산의 총 특별보호 지정 면적: 39.2km^2, 총 면적의 9.84%**)

③ 자연관찰로 설악산에는 특유의 자연자원에 대한 학습을 경험할 수 있는 자연관찰로가 있다. 자연관찰로를 설치하는 것은 문화, 역사 자원도 같이 학습할 수 있는 장점이 있다. 특히 학생들에게 다양하고 쉬운 해설내용으로 흥미를 유발하여 자연학습을 통해 자연의 중요성을 깨우칠 수 있는 학습의 장으로 이용되고 있다. (5 개소: 비룡폭포 2.4km/선대 1.8km/용소폭포 3.5km/백담 0.6km/소공원~울산바위 3.1km)

④ 탐방객 혼잡도 최근 설악산국립공원을 방문하는 **탐방객수는 연간 약 282 만명이다**. 환경부가 양양군의 개발계획을 승인한 「오색으로부터 끝청까지 이어주는 제 2 케이블카」가 설치될 경우, 탐방객수는 더 늘어날 것으로 전망된다. 이런 탐방객의 증가는 설악산의 생태계에 부정적인 영향을 줄 수도 있다.

⑤입장료 (사찰문화재관람료와 별도로) 설악산 자원관리/보전 및 시설 보수/유지와 더 나은 경험을 위해 국립공원 입장료를 새로이 걷는다고 가정한다.

B1. 귀하께서 각 속성들이 귀하의 설악산국립공원 탐방경험에 미치는 영향을 얼마정도 중요하다고 생각하십니까?

		1	2	3	4	5	
A. 생물다양성	매우 중요하지 않다	☐	☐	☐	☐	☐	매우 중요하다
B. 설악산국립공원의 특별보호구역 면적		☐	☐	☐	☐	☐	
C. 자연관찰로		☐	☐	☐	☐	☐	
D. 탐방객 혼잡도		☐	☐	☐	☐	☐	
E. 입장료		☐	☐	☐	☐	☐	

"귀하께서 공원에 가실 때, 어떤 공원을 선호하십니까? 꽃이 가득한 공원을 좋아하시나요? 혹은 큰 나무가 많은 공원을 원하시나요? 탐방시설이 많은 공원을 좋아하시나요? 휴식공간이 많은 공원을 좋아하세요?"

▶▶ 설악산 국립공원의 관리정책에 따라, 아래 표시된 속성(관리방향)들의 현황 및 수준은 바뀔 수 있습니다. 다음 페이지의 질문들은 각각 설악산국립공원 관리대안에 관한 질문입니다.

아래 표시된 속성 수준에 대한 설명문을 참고하여, 다음 페이지의 문항에 응답하여 주시기 바랍니다.

설악산 속성 이름 (관리 방향)	속성 설명	대안 별 속성 수준				
① 생물다양성	종 다양성의 현황	 (감소) 개체군 크기 감소를 인해 몇몇 멸종위기 야생생물 소실	 (현수준유지) 멸종위기 야생생물이 40 종 서식하고 있다	 (증가) 멸종위기 야생생물의 개체군 크기 10% 증가		
② 설악산국립공원의 특별보호구역 면적	설악산국립공원의 면적 중 특별보호구역으로(통제지역) 지정된 공원 면적의 비율	 (감소) 약 7% (1,200ha / 여의도 면적의 4 배 감소)	 (현 수준 유지) 약 10% (3920ha / 여의도 면적의 13.5 배)	 (증가) 약 13% (1,200ha / 여의도 면적의 4 배 증가)		
③ 자연관찰로	설악산 특유의 자연자원에 대한 학습을 경험할 수 있는 산책로의 개설/관리	 (현 수준 유지) (5 개소)자연관찰로 현 상태 유지	 (개선) 기존 (5 개소)자연관찰로에 안내표지판 추가 설치	 (개선+증가) 기존 (5 개소)자연관찰로에 안내표지판 추가 설치 + 자연관찰로 추가 조성		
④ 탐방객 혼잡도	10 월 성수기에 탐방 하는 동안 평균적으로 마주치는 탐방객 수	 (탐방객 수 감소) 백미터당 10 명의 탐방객을 마주치는 수준	 (현수준 유지) 백미터당 20 명의 탐방객을 마주치는 수준	 (탐방객 수 증가) 백미터당 40 명의 탐방객을 마주치는 수준		
⑤ 설악산국립공원 입장료 (사찰 문화재 관람료 제외)		(현 수준 유지) 무료	1,000 원	2,000 원	3,000 원	4,000 원

▶▶ 설악산 국립공원의 관리정책에 따라, 속성들이 바뀔 것입니다. 질문 B2,B3,B4,B5 에 서로 다른 3 개의 대안에 제시되어 있습니다. 대안 A 과 B 는 새로운 대안이며, 대안 C 은 현재와 같이 관리하는 것입니다.

B2. 귀하께서 대안 A,B,C 중 가장 선호하는 대안을 하나만 골라 ◯란에 √로 체크하여 주십시오.

카드 18.10	대안 A	대안 B	대안 C (현 수준 유지)
생물 다양성	 개체군 크기 감소를 인해 몇몇 멸종위기 야생생물 소실	 개체군 크기 감소를 인해 몇몇 멸종위기 야생생물 소실	 멸종위기 야생생물이 40 종 서식하고 있다
설악산국립공원의 특별보호구역 면적	 약 13% (1,200ha / 여의도 면적의 4 배 증가)	 약 10% (3920ha / 여의도 면적의 13.5 배)	 약 10% (3920ha / 여의도 면적의 13.5 배)
자연 관찰로	 (5 개소)자연관찰로 현 상태 유지	 (5 개소)자연관찰로에 안내표지판 추가 설치	 (5 개소)자연관찰로 현 상태 유지
탐방객 혼잡도	 백미터당 20 명의 탐방객을 마주치는 수준	 (탐방객 수 감소) 백미터당 10 명의 탐방객을 마주치는 수준	 백미터당 20 명의 탐방객을 마주치는 수준
입장료	3,000 원	4,000 원	무료
	◯ A	◯ B	◯ C

B3. 귀하께서 대안 A,B,C 중 가장 선호하는 대안을 하나만 골라 ◯란에 √로 체크하여 주십시오.

카드 12.2	대안 A	대안 B	대안 C (현 수준 유지)
생물 다양성	 개체군 크기 감소를 인해 몇몇 멸종위기 야생생물 소실	 멸종위기 야생생물이 40 종 서식하고 있다	 멸종위기 야생생물이 40 종 서식하고 있다
설악산국립공원의 특별보호구역 면적	 약 10% (3920ha / 여의도 면적의 13.5 배)	 약 7% (1,200ha / 여의도 면적의 4 배 감소)	 약 10% (3920ha / 여의도 면적의 13.5 배)
자연 관찰로	 (5 개소)자연관찰로에 안내표지판 추가 설치	 (5 개소)자연관찰로 현 상태 유지	 (5 개소)자연관찰로 현 상태 유지
탐방객 혼잡도	 (탐방객 수 증가) 백미터당 40 명의 탐방객을 마주치는 수준	 (탐방객 수 증가) 백미터당 40 명의 탐방객을 마주치는 수준	 백미터당 20 명의 탐방객을 마주치는 수준
입장료	1,000 원	무료	무료
	◯ A	◯ B	◯ C

B4. 귀하께서 대안 A,B,C 중 가장 선호하는 대안을 하나만 골라 ◯란에 √로 체크하여 주십시오.

카드 15.23	대안 A	대안 B	대안 C (현 수준 유지)
생물 다양성	 멸종위기 야생생물이 40 종 서식하고 있다	 개체군 크기 감소를 인해 몇몇 멸종위기 야생생물 소실	 멸종위기 야생생물이 40 종 서식하고 있다
설악산국립공원의 특별보호구역 면적	 약 7% (1,200ha / 여의도 면적의 4 배 감소)	 약 7% (1,200ha / 여의도 면적의 4 배 감소)	 약 10% (3920ha / 여의도 면적의 13.5 배)
자연 관찰로	 (5 개소)자연관찰로에 안내표지판 추가 설치	 (5 개소)자연관찰로 현 상태 유지	 (5 개소)자연관찰로 현 상태 유지
탐방객 혼잡도	 (탐방객 수 감소) 백미터당 10 명의 탐방객을 마주치는 수준	 (탐방객 수 감소) 백미터당 10 명의 탐방객을 마주치는 수준	 백미터당 20 명의 탐방객을 마주치는 수준
입장료	3,000 원	무료	무료
	◯ A	◯ B	◯ C

B5. 귀하께서 대안 A,B,C 중 가장 선호하는 대안을 하나만 골라 ◯란에 √로 체크하여 주십시오.

카드 7.5	대안 A	대안 B	대안 C (현 수준 유지)
생물 다양성	 개체군 크기 감소를 인해 몇몇 멸종위기 야생생물 소실	 멸종위기동물의 개체군 크기 10% 증가	 멸종위기 야생생물이 40 종 서식하고 있다
설악산국립공원의 특별보호구역 면적	 약 7% (1,200ha / 여의도 면적의 4 배 감소)	 약 7% (1,200ha / 여의도 면적의 4 배 감소)	 약 10% (3920ha / 여의도 면적의 13.5 배)
자연 관찰로	 (5 개소)자연관찰로에 안내표지판 추가 설치	 (5 개소)자연관찰로 현 상태 유지	 (5 개소)자연관찰로 현 상태 유지
탐방객 혼잡도	 (탐방객 수 감소) 백미터당 10 명의 탐방객을 마주치는 수준	 백미터당 20 명의 탐방객을 마주치는 수준	 백미터당 20 명의 탐방객을 마주치는 수준
입장료	3,000 원	4,000 원	무료
	◯ A	◯ B	◯ C

B6. 귀하께서 만약 방금 답하셨던 선택질문들에 대한 답변으로 "대안 3<현 수준 유지>"만 골랐다면, 아래 표시된 이유 중 하나만 선택하십시오.

☐ 모든 질문에서 "**대안 3<현 수준 유지>**"라는 선택을 가장 선호했기 때문이다.

☐ 제공된 다른 선택들을 (대안 1 와 대안 2) 개인적으로 받아들일 수 없기 때문이다.

☐ 선택 질문들이 너무 복잡하다.

☐ 설악산국립공원에서 입장료 제도를 재도입하는 것에 반대하기 때문이다. 국립공원 관리는 공원을 이용하는 것뿐만 아니라 모든 국민이 함께 책임여야 하는 공유자산이므로 세금을 걷어 관리하여야 한다.

☐ 입장료를 지불할 의향이 없기 때문이다. 설악산국립공원에서 입장료 제도가 다시 도입 된다면 입장료가 없는 다른 국유림과 같은 곳을 찾아가겠다.

(C) 응답자 개인 정보 | 자료분류용 질문

C1. 성별: ☐여자 | ☐남자

C2. 2016 년 기준으로 귀하의 연세는 만으로 어떻게 되십니까? 만_____세 **또는** _____년 생

C3. 귀하의 직업은 무엇입니까?

☐ 농업, 어업, 임업 (가족종사자 포함)	☐ 경영/관리직 (5 급이상의 고급공무원, 교장, 기업체부장이상)
☐ 자영업 (종업원 9 사람 이하의 소규모 사업 및 가족 경영 업체 종사, 개인택시운영)	☐ 전문/자유직 (대학교수, 의사, 변호사, 예술가)
☐ 판매/서비스직 (상점점원, 세일즈맨 등)	☐ 가정주부 (주로 가사에만 종사하는 부인)
☐ 기능/숙련공 (운전사, 선반 목공 등 숙련공)	☐ 학생
☐ 일반 노무직 (토목관계의 현장 노무, 주택/건물 관리원)	☐ 무직/퇴직
☐ 사무/기술직 (일반회사 사무직, 기술직, 초/중/고 교사)	☐ 기타 (직접 기입 : _____)

C4. 귀하께서는 학교를 어디까지 마치셨습니까? (단, 중퇴는 졸업에 포함되지 않습니다.)

☐ 중학교 졸업 이하 ☐ 고등학교 졸업 ☐ 대학교 졸업 ☐ 대학원 졸업 이상

C5. 실례지만, 귀하께서는 결혼하셨습니까: ☐ 미혼 | ☐ 기혼 (이혼, 별거, 사별 포함)

C6. (결혼하셨다면) 귀하께서는 만 19 세 이하 자녀가 있으십니까? (있다면) 총 몇 명입니까? _____ 명

C7. 귀하 댁의 한 달 평균소득은 얼마 정도 입니까?

☐ 99 만원 이하	☐ 200~299 만원	☐ 400~499 만원	☐ 600~699 만원
☐ 100~199 만원	☐ 300~399 만원	☐ 500~599 만원	☐ 700 만원 이상

귀하께서 이 설문지에 대해 어느 정도 이해하셨습니까?

이해를 아예 못하였다	이해가 충분하지 못했다	어느 정도 이해하였다	상당부분 이해하였다	완전히 이해하였다
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐

이 설문지에 대한 기타 의견이나 국립공원 관리정책에 대하여 건의할 사항이 있으시면 말씀해주십시오.

설문에 응답하여 주셔서 감사합니다! 귀댁의 평안과 번창을 기원합니다.

APPENDIX E. Main Choice Experiments Survey (2017 April)

CALS

V1 | SITE 1 / 2 | 2017.04.

안녕하십니까? 저는 "**설악산국립공원의 생물다양성 보전관리 대안에 대한 탐방객의 선호도**" 에 관한 연구를 하고 있습니다. 이 연구는 탐방객들의 설악산 생물다양성 보전관리에 대한 태도와 선호를 철저히 조사하여, 탐방객들의 편익을 더 높이는 동시에, 국립공원의 자연생태계를 보전할 수 있는 효과적인 국립공원 관리정책을 마련할 수 있도록 하기 위함입니다. 귀하의 응답내용은 순수한 학문적 연구목적 이외에 어떠한 용도로도 사용되지 않음을 약속드립니다.

▶서울대학교 산림과학부 생태경제학 연구실 | (임)마리 |

(A) 환경에 대한 태도 및 방문 빈도

A1. 귀하께서는 생물다양성 보전이 여타의 사회적 문제들에 비하여 얼마나 중요하다고 생각하십니까?

전혀 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

A2. 설악산국립공원을 방문하시는 가장 큰 이유는 무엇입니까? (1 가지만 선택해 주십시오.)

❍ 건강 증진 ❍ 친목 도모 ❍ 자연문화체험 ❍ 휴양/휴식 ❍ 기타 : _____

A3. 설악산국립공원에서 어떤 활동을 하셨습니까? (복수 응답)

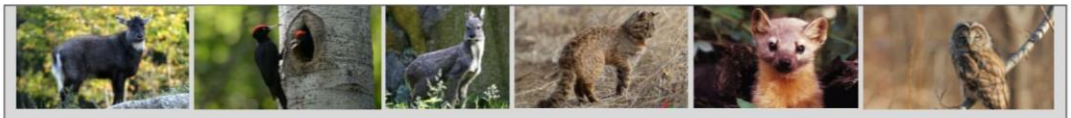
❍ 자연체험 ❍ 등산 ❍ 사찰 관람 ❍ 약수터 이용
❍ 산책 ❍ 경관 감상 ❍ 사진·그림 등 ❍ 숲 치유(힐링) ❍ 기타 : _____

A4. 귀하께서는 지난 1 년동안 우리나라에 있는 국립공원을 통틀어 몇 번이나 방문하셨습니까? ___번

A5. 귀하는 지난 1 년동안 설악산국립공원을 (이번을 포함하여) 몇 번이나 방문하셨습니까?

❍ 이번이 처음 방문 ❍ 2 번 ❍ 3~4 번 ❍ 5 번 이상

(B) 설악산국립공원 생물다양성 보전



백두대간 생태축에 위치한 설악산에는 천연기념물이 23 종, 환경부지정 멸종위기 야생생물이 40 종 분포하고 있다. 국립공원 내 멸종위기동물종의 체계적인 복원을 통해 국립공원의 생물종 다양성을 제고하고 생태계 건강성을 회복시킬 수 있다. 복원사업의 추진을 위해서는 서식지 안정화와 지역사회의 협력이 필요하다. (향후 설악산에 반달가슴곰, 산양 및 사향노루 복원사업 추진)

B1. 귀하께서는 설악산의 멸종위기종 복원 사업이 어느 정도 중요하다고 생각하십니까?

전혀 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

생태통로란 야생동식물의 서식지가 단절되거나 훼손 또는 파괴되는 것을 방지하고, 이들의 이동을 돕기 위하여 만들어 놓은 인공설치물이다. 현재 설악산-한계령에 위치한 생태통로를 이용하는 주요 야생동물은 멸종위기종인 산양 및 삵이다. (2015 년에 약 600 마리의 야생동물이 한계령 생태통로를 이용했음)

B2. 귀하께서는 설악산의 백두대간 생태축을 복원하기 위한 생태통로가 어느 정도 중요하다고 생각하십니까?

전혀 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

특별보호구역이란 자연공원 내에서 자연적·인위적 영향으로부터 중요 생물 서식지를 보호, 안정화하기 위하여 일정기간 사람 또는 차량의 출입을 통제하거나, 탐방객 수를 제한하여 공원자원을 보전·관리하는 곳이다.
(현재 설악산의 총 특별보호 지정 면적: 3920ha, 총 면적의 9.84%)

B3. 귀하께서는 설악산의 특별보호구역 면적이 어느 정도 중요하다고 생각하십니까?

전혀 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

▶**생태해설 안내표지판**은 탐방객들에게 다양하고 쉬운 해설내용으로 흥미를 유발하여 국립공원의 자연자원에 대한 정보를 제공한다. (설악산의 모든 안내표지판 중 생태해설 안내표지판은 15%를 차지한다.)

▶설악산국립공원의 **환경교육 탐방프로그램**인 『찾아가는 국립공원』과 『어린이 생태학교』는 미래세대의 다양한 참여 유도로 환경보전 가치관 형성에 기여한다.

▶설악산에는 특유의 자연자원에 대한 학습을 경험할 수 있는 **자연관찰로**가 5 개소에 조성되어 있다. (비룡폭포, 비선대, 용소폭포, 백담, 소공원~울산바위)

B4. 귀하께서는 설악산의 환경교육 방안들이 어느 정도 중요하다고 생각하십니까?

전혀 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

****설악동출입구에서 내신 3,500 원의 입장료는 신흥사가 전통 불교문화유산을 보존/관리하기 위한 재원으로 활용하기 위하여 받고 있습니다.**** (사찰문화재관람료와 별도로) 설악산 자원관리/보전 및 시설 보수/유지와 더 나은 경험을 위해 국립공원 입장료를 새로이 걷는다고 가정한다.

B5. 귀하께서는 입장료가 귀하의 설악산국립공원 탐방경험에 미치는 영향이 어느 정도 중요하다고 생각하십니까?

전혀 중요하지 않다	중요하지 않다	보통이다	중요하다	매우 중요하다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

(C) 설악산국립공원 생물다양성 보전 관리정책 질문

▶▶ 다음과 같이 다양한 가상의 관리 대안들을 설정할 것입니다.
각 관리대안에서 설정된 입장료금액은 해당 대안의 생물다양성 보전관리 정책/조치들의 시행에 쓰일 것입니다. 이를 통해, 귀하께서 보전정책들의 가치를 어느 정도로 여기시는 지 알아볼 수 있습니다.

C1. 귀하께서 가장 선호하는 대안을 A, B, Z 중 하나만 골라 ❍ 란에 √로 체크하여 주십시오.

18.11	관리 대안 A	관리 대안 B	대안 Z
 멸종위기종 복원 사업	멸종위기동물의 개체수를 현 수준 유지	멸종위기동물의 개체수를 현 수준 유지	둘 다 아님
 야생동물 생태통로	현 수준(1 개의 생태통로) 유지	생태통로 2 개의 추가 조성	
 특별보호구역 지정 면적	축소 (10%→5%)	축소 (10%→5%)	
 환경 교육	생태해설 안내표지판 및 환경교육 프로그램 증가	생태해설 안내표지판 증가	
입장료	4 000 원	6 000 원	
선택 (√)	❍ A	❍ B	❍ Z

C2. 귀하께서 가장 선호하는 대안을 C, D, Z 중 하나만 골라 ◯ 란에 √로 체크하여 주십시오.

22.10	관리 대안 C	관리 대안 D	대안 Z
 멸종위기종 복원 사업	멸종위기동물의 개체수를 15% 확대	멸종위기동물의 개체수를 현 수준 유지	둘 다 아님
 야생동물 생태통로	현 수준(1 개의 생태통로) 유지	생태통로 2 개의 추가 조성	
 특별보호구역 지정 면적	축소 (10%→5%)	확대 (10%→15%)	
 환경 교육	생태해설 안내표지판 및 환경교육 프로그램 증가	생태해설 안내표지판, 환경교육 프로그램 및 자연관찰로 증가	
입장료	4 000 원	4 000 원	
선택 (√)	◯ C	◯ D	◯ Z

C3. 귀하께서 가장 선호하는 대안을 E, F, Z 중 하나만 골라 ◯ 란에 √로 체크하여 주십시오.

8.6	관리 대안 E	관리 대안 F	대안 Z
 멸종위기종 복원 사업	멸종위기동물의 개체수를 30% 확대	멸종위기동물의 개체수를 현 수준 유지	
 야생동물 생태통로	현 수준(1 개의 생태통로) 유지	현 수준(1 개의 생태통로) 유지	
 특별보호구역 지정 면적	확대 (10%→15%)	현 수준 유지 (10%)	둘 다 아님
 환경 교육	생태해설 안내표지판 및 환경교육 프로그램 증가	생태해설 안내표지판 및 환경교육 프로그램 증가	
입장료	6 000 원	2 000 원	
선택 (√)	◯ E	◯ F	◯ Z

C4. 귀하께서 가장 선호하는 대안을 G, H, Z 중 하나만 골라 ◯ 란에 √로 체크하여 주십시오.

19.1	관리 대안 G	관리 대안 H	대안 Z
 멸종위기종 복원 사업	멸종위기동물의 개체수를 15% 확대	멸종위기동물의 개체수를 30% 확대	
 야생동물 생태통로	생태통로 2 개의 추가 조성	현 수준(1 개의 생태통로) 유지	
 특별보호구역 지정 면적	현 수준 유지 (10%)	축소 (10%→5%)	둘 다 아님
 환경 교육	생태해설 안내표지판 증가	생태해설 안내표지판 증가	
입장료	6 000 원	8 000 원	
선택 (√)	◯ G	◯ H	◯ Z

(D) 응답자 개인 정보 | 자료분류용 질문

D1. 성별: ❍여자 / ❍남자

D2. 2017 년 기준으로 귀하의 연세: 만_____세

D3. 귀하의 직업은 무엇입니까?

❍ 농업, 어업, 임업 (가족종사자 포함)	❍ 경영/관리직 (5 급이상의 고급공무원, 교장, 기업체 부장 이상)
❍ 자영업 (종업원 9 명 이하의 소규모 사업 및 가족 경영 업체 종사, 개인택시 운영)	❍ 전문/자유직 (대학교수, 의사, 변호사, 예술가)
❍ 판매/서비스직 (상점 점원, 세일즈맨 등)	❍ 가정주부
❍ 기능/숙련공 (운전사, 선반 목공 등 숙련공)	❍ 학생
❍ 일반 노무직 (토목관계의 현장 노무직, 주택/건물 관리원)	❍ 무직/퇴직
❍ 사무/기술직 (일반회사 사무직, 기술직, 초/중/고 교사)	❍ 기타 (직접 기입 : _____)

D4. 귀하께서는 학교를 어디까지 마치셨습니까? (단, 중퇴는 졸업에 포함되지 않습니다.)

❍ 초등(국민)학교 졸업 이하 ❍ 중학교 졸업 ❍ 고등학교 졸업 ❍ 대학교 졸업 이상

D5. 실례지만, 귀하께서는 결혼하셨습니까? ❍미혼 / ❍기혼 (이혼, 별거, 사별 포함)

D6. (결혼하셨다면) 귀하는 만 19 세 이하 자녀가 있으십니까? (있다면) 총 몇 명입니까? _____ 명

D7. 귀댁의 한 달 평균소득은 얼마 정도 입니까?

❍ 99 만원 이하	❍ 200~299 만원	❍ 400~499 만원	❍ 600~699 만원
❍ 100~199 만원	❍ 300~399 만원	❍ 500~599 만원	❍ 700 만원 이상

D8. 귀하께서는 시골에서 몇 년 동안 사셨습니까: _____년

귀하께서 이 설문지에 대해 어느 정도 이해하셨습니까?

이해를 아예 못하였다	이해가 충분하지 못했다	어느 정도 이해하였다	상당 부분 이해하였다	완전히 이해하였다
1 ❍	2 ❍	3 ❍	4 ❍	5 ❍

이 설문지에 대한 기타 의견이나 국립공원 관리정책에 대하여 건의할 사항이 있으시면 말씀해주십시오:

_____

_____

설문에 응답하여 주셔서 감사합니다! 귀댁의 평안과 번창을 기원합니다.

국 문 초 록

한국의 국립공원의 생물다양성 보전관리 전략에 대한 선호도: 설악산국립공원을 대상으로

소속 : 서울대학교 산림환경학과
성명 : Emily Marie Lim (임 마 리)

우리나라의 국립공원은 보호지역으로서 생물다양성 보호 도구이자 다양한 생태계서비스의 제공자로 인식되고 있다. 설악산은 천연보호구역, 국립공원, 생물권 보전지역으로 지정된 우리나라 식물자원의 보고이며, 온대중부의 대표적인 삼림지대이다. 그러나 설악산 국립공원의 관리는 다양한 요구들에 의하여 큰 개발의 압박을 받고 있다. 설악산국립공원 관리자들은 탐방객이 생물다양성 보전을 위한 여러 가지의 조치에 대하여 어떻게 생각하는지에 대한 정보를 파악할 필요가 있다.

이 연구는 선택실험법(choice experiment)이라는 비시장재 가치평가방법을 사용하여 설악산 국립공원의 생물다양성 보전을 위한 관리대안들에 대한 설악산 탐방객의 선호를 측정하였다. 이 방법은 비용을 포함해 중요 공원자원 관리 속성별 수준을 조합해 작성한 가상대안들을 응답자들에게 제시한 후, 그 중에서 하나를 선택하게 하는 방법을 사용하였다. 그럼으로써, 설악산을 방문하는 사람들이 선호하는 국립공원 관리대안이 무엇인지를 간접적으로 확인하고 각 대안 별로 그 경제적 가치를 추정하였다.

본 연구는 설악산 국립공원의 보전을 위한 '멸종위기동물 복원 사업', '야생동물 생태통로', '특별보호구역', '환경교육' 등의 생물다양성 보전관리 대안에 대한 지불의사금액(willingness to pay)을 평가하는 것을 통하여 탐방객들이 설악산의 생물다양성 보전을 위한 지불의사를 알아내고자 하였다. 이 연구는 탐방객들이 설악산의 보전관리에 대한 태도와 선호를 조사하여, 탐방객들의 편익을 더 높이는 동시에, 국립공원의 자연생태계를 보전할 수 있는 효과적인 생물다양성 보전관리정책을 추천하기 위하여 수행되었다.

설악산 탐방객의 설악산 국립공원 보전에 대한 선호를 알아보기 위한 조사는 설문을 통해 이루어졌다. 2017년 4월에 설악산 국립공원을 탐방한 탐방객들을 대상으로 설악산 소공원 인근에서 현장 설문조사를 실시되었으며 총 252명으로부터 자료를 수집하였다. 연구 결과, 4가지의 속성 가운데'멸종위기동물 복원 사업'과 '야생동물 생태통로', '특별보호구역'의 관리 수준이 탐방객의 후생에 영향을 미치는 것으로 나타났다.

'멸종위기동물 복원 사업'을 통하여 멸종위기동물의 개체수를 15% 또는 30% 증대시키는 것은 통계적으로 유의성 있는 수준이었다. 만약 이 수준들이 설악산 국립공원에 반영될 경우, 응답자들은 각각 약 3,249원과 약 2,506원의 입장료를 더 낼 용의가 있었다. 또한 '야생동물 생태통로'의 추가 설치가 통계적으로 유의성이 있는 것으로 나타났으며, '야생동물 생태통로' 2개 또는 4개의 추가 설치를 설악산 국립공원에 설치하기 위해, 응답자들은 각각 약 2,186원과 약 5,323원의 입장료를 더 낼 용의가 있었다. 그러나 '특별보호구역'으로 지정한 지역이 현재의 설악산 국립공원 면적 대비 약 5% 축소와 약 15% 확대될 경우, 응답자들은 각각 약 -5,263원과 약 -2,402원의 입장료를 더 낼 용의가 있는 것으로 나타났다. 이러한 결과는 탐방객들은 '특별보호구역'의 설정에 대하여 복잡한 선호를 가지고 있으며 국립공원에서의 '환경교육'은 생물다양성 보전에 유의성이 없는 것으로 나타났다.

탐방객들이 국립공원의 생물다양성 보전을 위하여 입장료를 낼 의사가 있는 반면에 생물다양성을 유지하거나 보호하는 수단에 무관심할 수도 있다. 연구 결과에 의하면 탐방객들이 국립공원의 생물다양성 보전을 위한 다양한 수준의 입장료를 낼 용의가 있음으로, 자발적인 기금 조성과 탐방객 관리를 위한 국립공원 탐방 지역지정제도가 적합한 관리대안이 될 수도 있다.

주제어 : 생물다양성 보전, 국립공원, 설악산 국립공원, 공원관리, 선택실험법, 지불의사금액

학번 : 2015-22344