

## 写真投影法と空間情報技術を用いた高尾国定公園における風景認識

## Landscape Perception of Takao Quasi-National Park Using by Visitor-Employed Photography and Spatial Information Technologies

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## 1. Introduction

Mt. Takao is, a famous natural tourist site, designated as Quasi-National Park. For landscape planning such as natural parks, it is important to understand how users percept and evaluate landscapes. The relationship between viewpoints and a viewing object has been regarded important in the landscape perception model which has been studied in landscape architecture, Geography and some sciences. One of the study methods to understand such landscape perception uses a camera called "Visitor-Employed Photography (VEP)", and this method is considered effective in extracting visual images of a space. However, while existing VEP is effective in understanding viewing objects, it still has shortcomings. It requires interviews and descriptions separately in order to extract viewpoints. Certainly, using a Global Positioning System helps effectively pinpoint photographed locations. Providing GPS logger (hereafter GPS) to visitors and gathering geospatial information offers the possibility of thoroughly understanding each photo's location. Additionally, GIS analysis enables to give the spatial distribution, other characteristics of the photos locations. This study conducted a survey combining VEP and GPS in order to understand landscape perception in Takao Quasi-National Park, in Hachioji, Japan.

## 2. Method

A survey was conducted with 30 respondents, and the Inariyama trail of Takao QNP in the suburbs of Tokyo, was selected as a site. The respondents were instructed to use their own cellphones or digital-camera and take over 15 photos of landscapes which respondents prefer. They were also instructed that carrying GPS. Following this activity, respondents selected 15 photos, and noted down 15 photos profile (contents of photos). Each 15 photos were evaluated four item 1) aesthetic, 2) naturalness, 3) rareness, 4) atmosphere by five scale. From the collected photos and geospatial information, we analyzed the places which visitors prefer and its landscape types in Takao Quasi-National Park by using GIS. To identify the place that were particularly popular area called hot spots, whole of trail was divided 5m lines. Then, the number of viewpoints (location where photos were taken) within each line was calculated. After this, Getis-Ord Gi\* statistic was used (chosen for its superior ability to extract locations with distance damping), so as to identify statistically significant hot spots.

## 3. Results

450 photos were collected from 30 respondents. These photos were categorized based on the viewing objects and viewing way. As a result, based on the trail as a viewpoint, "surroundings" (the photos of sceneries within the woods) counted most with 117 photos. "Panoramic views" (82 photos) were also common. We analyzed the collected geographic information with the Getis-Ord Gi\* statistic and identified the viewpoints of visitors' preference (Fig. 1). The results showed that three highly preferred locations called hot spot were extracted ( $p < .001$ ). This result was combined with the categorized viewing subjects for further analysis, and it was found that photo shooting density tends to be high at the following locations: 1) panoramic view at the top of the mountain, 2) panoramic view at the perspective field on the way, 3) locations with a shrine, and 4) around

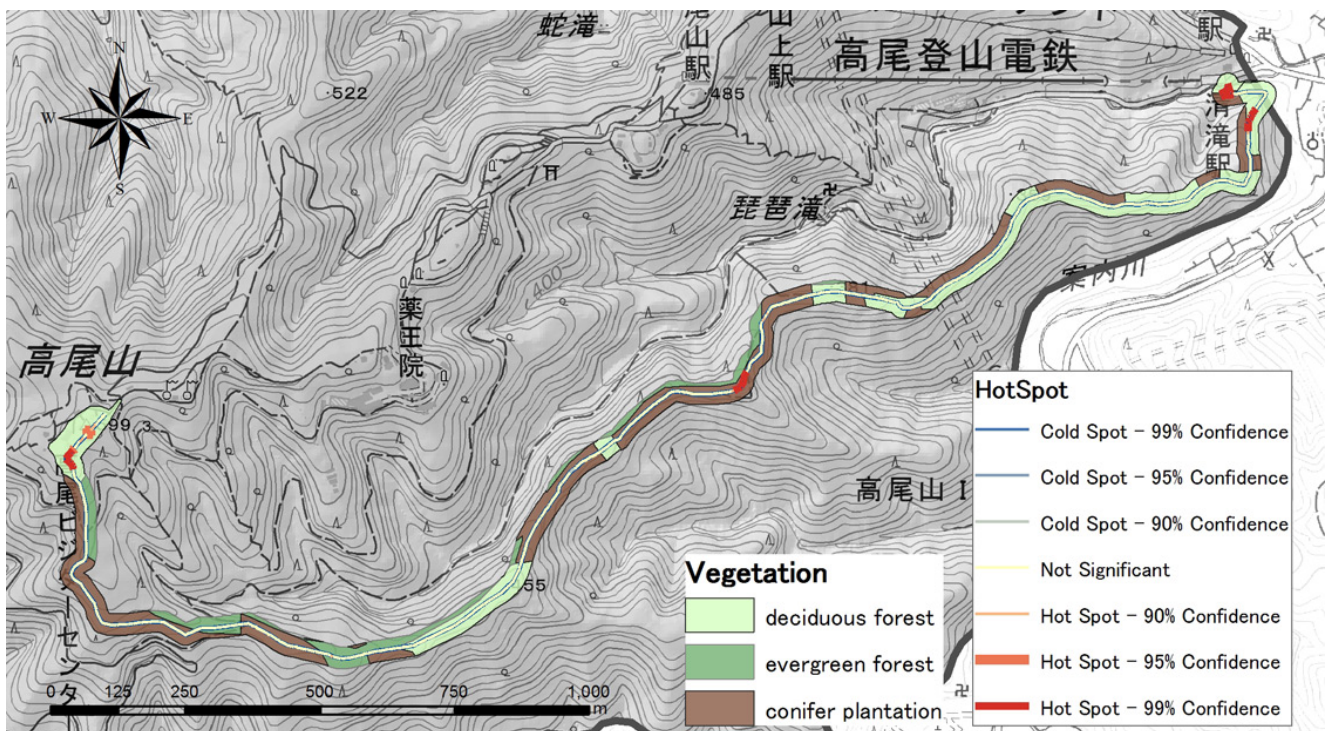
entrance of the trail.

#### 4. Conclusion

In this research, we clarified the places which visitors prefer and its landscape types in Takao Quasi-National Park by the survey combining VEP and GPS. By extracting the places and its landscape types which visitors prefer, the spatial condition which visitors prefer can be found by using GIS in future study. Lastly, the necessity of an on-site survey, including spatial analysis, was discussed in order to analyze landscape experience at natural landscape area.

キーワード：風景、GIS、GPS

Keywords: Landscape, GIS, GPS



## 札幌とロヴァニエミの冬景色イメージ

## Winter landscape imageries of the city in Sapporo and Rovaniemi

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Focusing on the snow culture and customs as new tourist resources, culturally different meanings of snow and winter landscape need to be understood. In this study, Ways of seeing the winter landscape in Sapporo and Rovaniemi was represented by using Landscape Image Sketching Technique. Students of the Lapland University, Department of Art and Design (n=93) and of Sapporo City University, School of Design (n=116) were asked to make a landscape imete sketch of an imagery of their favorite winter scenery in Rovaniemi or in Sapporo and to include keywords and text.

As a result, landscape image sketches revealed differences in characteristics between respondents in Finland and Japan. The typical landscape images of winter scenery were represented as natural landscapes from a long distance in Rovaniemi and as urban landscapes from a medium distance in Sapporo. The result suggested their different whole concepts of 'winter city' as well as their leisure activities in winter season.

キーワード：風景イメージスケッチ手法、冬景色、北方圏、フィンランド

Keywords: Landscape Image Sketching Technique, Winter scenery, Northern regions, Finland

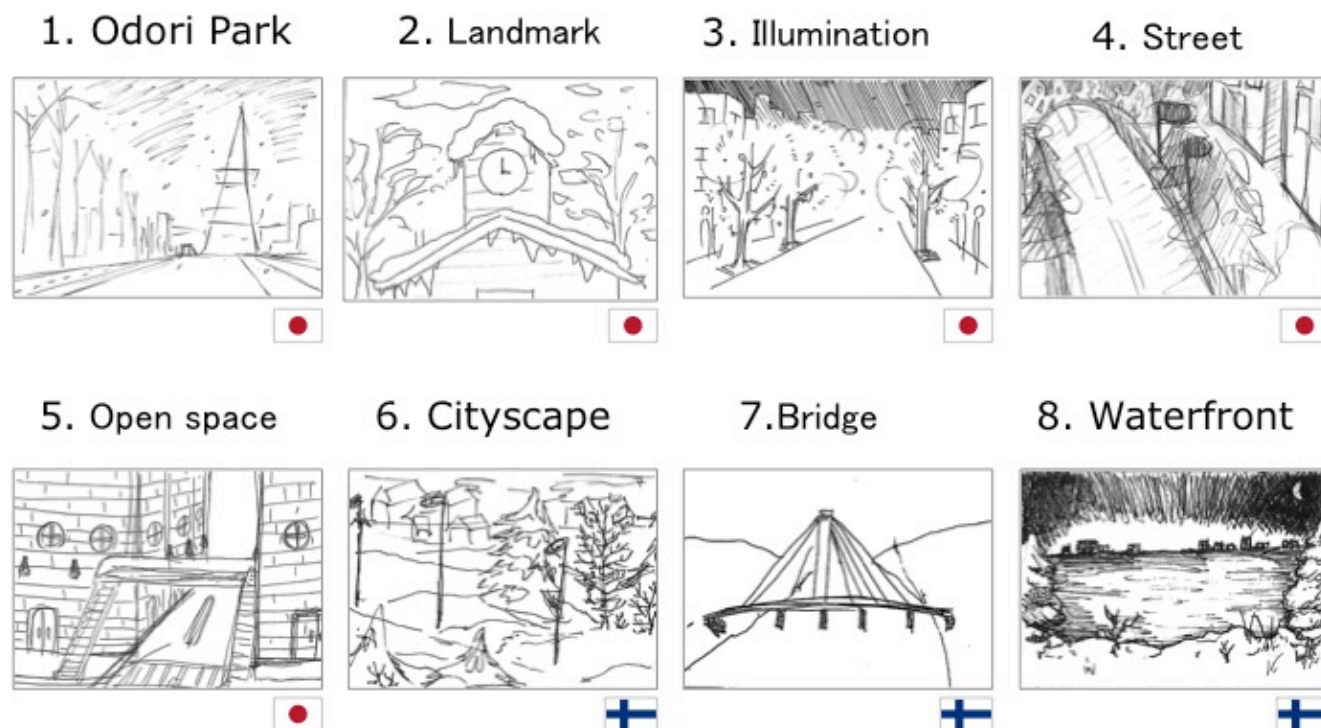


Fig1. Examples of winter landscape imageries categorized in 'City'

## 中国内モンゴル呼倫湖自然保護区における自然保護活動に対する観光客の意識

## Tourists' Attitude toward Nature Preservation Activities at Hulun Lake Nature Reserve in Inner Mongolia

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## はじめに

中国では自然保護区制度を、生態系や生物多様性、自然資源、景観保全の効果的な保護手段として使用している。2000年から始まった「西部大開発」の影響により、内モンゴルの自然保護区では観光開発が行われ、経済的な効果が認められている。しかし、観光利用をエコツーリズムへ転換し、観光客の生態系への理解、自然保護活動を促進するのが自然保護区内の観光管理の一つの課題である。また、観光客の自然保護活動を促進するには、観光客の意識を把握する必要がある。呼倫湖自然保護区は、中国の内モンゴル自治区フルンボイル市に位置する国家級自然保護区である。そこで、本研究では呼倫湖自然保護区における自然保護活動に対する観光客の意識を把握し、観光客の自然保護活動に参加要因を明らかにすることを目的とした。

## 研究方法

呼倫湖自然保護区を訪ねた観光客を対象に、2015年8月末から11月中旬にかけて意識調査を実施した。意識調査はアンケート方式で1536名の有効回答を得た。意識調査では、回答者の属性と、自然保護活動に対する意識を4段階（強くそう思う、そう思う、そう思わない、強くそう思わない）で回答してもらった。

## 結果

回答者の属性では男性749名、女性787名であった。回答者の72%は高校以上の学歴であった。回答者の内30代、40代の観光客が一番多く、45%であった。回答者の職業は、公務員などの職業に就いているが最も多く43%であり、学生は29%、無職と農牧民の合計が38%であった。回答者の69%は漢民族であり、24%はモンゴル民族であり、ロシア、エオネク等ほかの民族は7%であった。回答者の55%は内モンゴル以外の国内観光客であった。

観光客の回答した「強くそう思う」と「そう思う」の合計値でみると、「1. 活動を通して自然や緑地の大切さを他の市民に伝えられる(98%)」の回答が最も多く、次に「5. 動植物に癒され、リフレッシュできる(81%)」、「2. 動植物の観察といった自分の趣味が行える(81%)」、「6. 風景や遊び場として良好な緑地空間が残せる(80%)」、「3. 地域の雇用が増え、地域の経済が活性化する(78%)」であった。観光客の回答した「そう思わない」と「強くそう思わない」の合計値では、「4. 自然や緑地保全に対する知識や技術が深まる(34.6%)」であった。

本研究では、中国内モンゴル呼倫湖自然保護区における自然保護活動に対する観光客の意識を明らかにできた。

キーワード：自然保護区、自然保護活動、観光客、意識

Keywords: Nature Reserve, Nature Preservation Activities, Tourists, Attitude

## Motives for climbing Mount Fuji: A Comparative Study of Domestic and International Climbers

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The increasing number of international climbers at mountainous destinations necessitates monitoring of the demographic profile and motivation of existing and emerging visitor segments. This paper compares domestic and international climbers descending from Mount Fuji in the summer 2015 season. An intercept survey was conducted over five days near the 5<sup>th</sup> station trailhead on Yoshida, which has the highest footfall of Fuji's four trails. In total, 989 questionnaires were collected from domestic (n=408) and international (n=581) climbers. Findings revealed international climbers to be younger, with lower annual income. Most international climbers were tackling Fuji for the first time (95%), whereas 42% of Japanese had climbed before. The two segments showed common and unique motives. Amongst commonalities, the challenge of reaching the highest peak in Japan dominated both segments, but Japanese were less likely to seek solitude or meeting new people. This research identified variance in climbing motivations. These findings have applications for segment-based monitoring research, and implications for targeted management strategies.

Keywords: mountain climber segments, comparative study, motivation, Mount Fuji

## A Study on Landscape Assessment with Photo Classification Method: Focusing on Bukhansan National Park

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'Subjectivity' is one of the important factors of assessing the landscape cognition. However, the earlier studies were focused on finding out the objective and unified values rather than the subjective viewpoints from respondents. The purpose of the study is to find out the ways of appreciation of the landscape by analyzing and classifying subjective values and cognition of natural landscape using Q-method with the photographic medium to complement the problems of the earlier studies. The research focuses on Bukhansan National Park in Korea, collects the 1,738 pictures from hikers and extracts 25 representative landscape pictures of the whole. Second, The research classifies of 25 photographs by using Q-method with 5 factors which are naturalness, diversity, coherence, exotic feelings and preference. Lastly, the study analyzes the detailed reasons of evaluation by interview to participants.

In conclusion, green landscape with various vegetation is highly rated for naturalness. The landscape with various natural factors and seasonal change got high points on diversity. There are narrow variations of interpreting naturalness, but there are wide variations of interpreting diversity. The landscape which is stable and harmonious rated highly on consistency, and the unusual landscape with huge scale got a high points on exotic feelings. As a result of correlation between preference and assessment factors, the landscape which has a strong naturalness is highly preferred. The study indicates that people preferred the landscape with natural factors rather than man-made facilities on the landscape of Bukhansan National park. We may conclude that this study would be used as basic data to compare the ways of appreciation of the landscape between countries.

Keywords: cognition of landscape, Q-method, classification of photos, naturalness, preference

## Analysing visual landscape preferences of trails in Bukhansan National Park

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Bukhansan National Park is one of the national parks where the most people visit per year. Bukhansan National Park's 'Dulle-gil' is a trail that is constructed along with the boarder of the national park. The role of the trail is to conserve the national park ecosystem absorbing the demand for visiting the other trail that is made to the top of the mountain, and to provide new experiences for visitors. Following the results of the visitor satisfaction investigation, the effects on Dulle-gil have been insignificant yet.

The study purpose is the comparison analysis of visual landscape characters between a typical trail and Dulle-gil. Visitor-employed photography (VEP) has been used to select the most preferred landscape photos in two national park's trails. Visual concepts which is naturalness-man made, coherence-diversity, vusial scale, imageability are used to decribe different characteristics of visual landscapes in the trails.

The results is that naturalness is related to visitor's preference in the typical trail, while the character does not have the relationship with the preference in the Dulle-gil. The new trail has been experienced of what is more various types of visual landscape than the other one. It could be possible to get to the trail easily and to provide rich experience of visual landscape for visitors.

Keywords: Visual landscape assesement, Visitor-employed photography, Visual Charactors, National parks

## A Study on Urban Image of Ulsan and Ulsan Grand Park

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### 1. Introduction

Ulsan, South Korea, is designated a special industrial district. It has developed rapidly and become a pillar of the national economy. However, negative images such as "Polluted Factories" have insidiously arisen and become representative of the word "urban".

Thus, Ulsan has tried various projects, such as establishing parks, to minimize an anti-sentimental image of the urban area. Subsequently, the city has formed Ulsan Grand Park, which is an urban park of the highest scale, throughout the country. This effort is only one part of this project.

### 2. Method

In order to obtain information about Ulsan, this study utilized numerous newspaper articles for two reasons:

The articles are a good way to preserve information from the past and transfer it to the present. They make it easy for the public to reference date.

The period of referenced information is 1962 to 2013. The articles have been gathered by including the word "Ulsan" in the title. The collected materials describe the frequency of the contents in order. Then after deriving observations about how the image of the city has changed, I conducted a survey of the inhabitants.

### 3. Result and considerations

The main results and conclusions of this essay are as follows:

First, the urban image of Ulsan, which was analyzed in newspapers, has changed from an anti-sentimental image into a sentimental image. In addition, 85.6% of respondents say that Ulsan has changed over time.

Second, the most drastic change in people's image of Ulsan is that it is green, which proves the significance of Ulsan Grand Park's influence. Additionally, there are now seven major parks in Ulsan.

Third, the cultural thirst of Ulsan inhabitants is satisfied by the huge festival in the main field of Ulsan Grand Park.

Fourth, the evaluations of Ulsan inhabitants about Ulsan Grand Park have exceeded the normal viewpoint about neighborhood parks. Accordingly, their psychological viewpoint about Ulsan has improved.

### 4. Conclusion

In modern times, local governments want to enhance their urban image by establishing public spaces such as parks. Unfortunately, many established urban areas do not receive support from their inhabitants, which results in a difficult problem.

Therefore, when establishing urban parks, they need to be researched in conjunction with urban development procedures, according to urban inhabitants' viewpoints. Instead of simply making functionally oriented plans for urban infrastructures, they need to review what the potential requirements of urban inhabitants are, as well as how interactive the relationships with urban development procedures are.

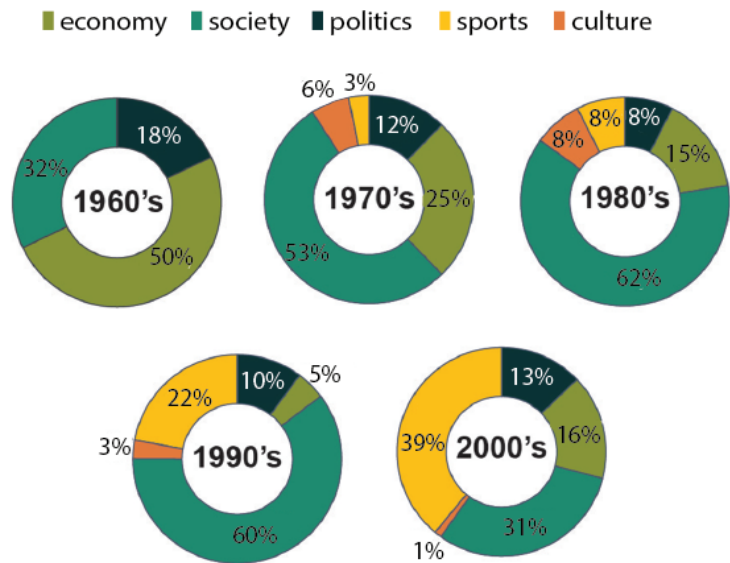
Keywords: Urban Image, Ulsan, Ulsan Grand Park



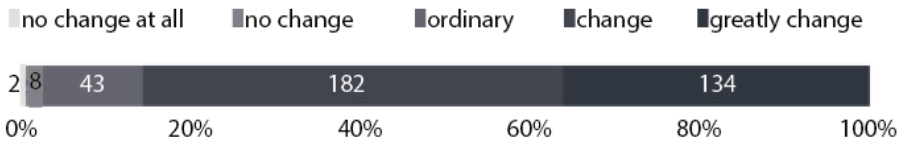
● Site location



● Chronological distribution of articles

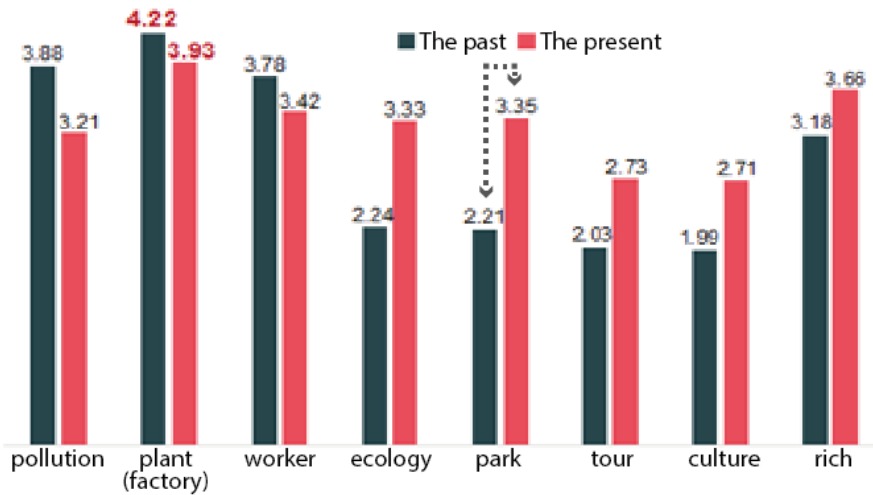


Q) Do you think Ulsan's image has been changed from the past?



Urban Image of Ulsan **has changed** compare to the past **85.63%**(316people)

Q) What do you think about Ulsan image of the past and the present?



comparison of two independent samples (changing image from the past and the present) about **'park'** is the best

## Comparing the visual perception and aesthetic evaluation of natural landscapes in Russia and Japan

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Japan and Russia have deeply rooted cultural traditions regarding natural landscape appreciation, share a common border, and have areas with similar natural environments. They differ, however, in cultural, historical, and economic aspects. The purpose of this study was to reveal the similarities and differences between Russian and Japanese respondents regarding the visual and emotional evaluation of landscapes based on ethno-cultural and regional differences. We asked respondents at universities in Russia (Moscow, Irkutsk, and Kamchatka) and Japan (Hokkaido, Chiba, and Miyazaki) to group and rate 70 color landscape images. Unlike theoretical concepts that explain landscape preferences within an evolutionary framework or according to individual and cultural differences, we found that these factors interact in more complicated ways. Cultural traditions and features of the natural environment that were familiar to respondents influenced their visual perception and aesthetic evaluation of landscape. Russian respondents seemed more emotional while Japanese respondents tended to be more restrained in their assessments. However, there was a rather strong correlation between their estimates of landscape attractiveness, which might confirm the existence of universal human concepts of landscape aesthetics. The most attractive for both Russian and Japanese respondents were waterfalls, mountains, and lakes; but the least attractive were waterless plains. At the same time, we found cross-cultural and regional differences in assessing seacoasts, rivers, forests, and swampy plains. There was practically no correlation between Russian and Japanese respondents in their appreciation of exotic/familiar landscapes. For the Russian respondents, the most exotic landscapes were also the most attractive, although we did not observe such a tendency for the Japanese respondents. All the Russian and Japanese respondents appreciated certain familiar landscapes that were symbols of native nature as very attractive. Unlike "geoscientific" landscape classifications, in the visual and emotional grouping of landscapes by respondents the most important feature appeared to be the presence/absence of water and the type of water basin (river, lake, and sea); for Russian respondents (especially for Moscow respondents), topography was also important, while the Japanese respondents mostly used visual and seasonal characteristics in their classifications. All Japanese respondents assessed the attractiveness and exoticism of landscapes almost identically, while there were some differences among Russian respondents from different regions.

Keywords: visual landscape classification, aesthetic evaluation, attractive landscape, exotic landscape, traditional landscape appreciation, influence of natural environment

インドネシアの伝統的広場alu-alunを表す単語について ガジヤマダ大学学生を対象として  
A study on students' recognition of words that represent alun-alun, Indonesia's  
traditional open spaces

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### 1.Introduction

To increase the value of an open space, it is important to clarify the current situation, especially what kind of images people have. This study focuses on alun-alun, which are traditional open spaces in Java, Indonesia. Alun-alun have spread all over Java. Generally, one alun-alun has been set in each city. It's usually located in the city center, and it serves as a precious open space.

It has been said that alun-alun have a strong relationship with Java's history. One could also say that alun-alun have a high historical and cultural value. The most famous alun-alun is located in Yogyakarta. This alun-alun has a strong relationship with the palace.

The objective of this study is to clarify the current situation of alun-alun through the key words that youth consider. The purpose of revealing the current situation is connected to understanding the kind of planning and designing that are needed.

### 2. Study Methods

In this study, the subjects are students of Universitas Gadjah Mada, located in Yogyakarta. The research method involved questionnaires. These questionnaires asked key words that the students associated with alun-alun. They were asked to write down keywords—a minimum of one and a maximum of six. The survey was conducted in September 2015. Regarding respondents' attributes, the number of valid responses was 202, with 105 males (52.0%) and 84 females (41.6%).

### 3. Results

Respondents were spread across all of Java. 12 people came from the province of Banten, 7 came from the province of West Java, 63 came from the province of Central Java, 54 came from the Special Capital Region of Yogyakarta, and 15 came from province of East Java. 1,242 keywords were collected from 202 respondents.

Key words were divided into four groups: emotion, utilization, existence, and space configuration. The emotion group had words that represented people's feelings about alun-alun (429 key words or 34.5%). The utilization group had words that represented people's activity in alun-alun (290 key words or 23.3%). The existence group had words that represented alun-alun's status from past to present (145 key words or 11.7%). The space configuration group had words that represented what constituted alun-alun (349 key words or 28.1%). In the emotion group, there were some words that involved bad emotions like "dirty" and "crime." But most of them were words that express good emotions like "cozy," "clean," and "relax." In the utilization group, the most common activities were playing sports, gathering people, and buying something; there were also more unusual activities like tourism, courtship, and festivals.

One could say alun-alun have two types of activities: daily use and extraordinary use. In the existence group, there were some words about the past, such as "culture," "history," "palace," and "king"; there were also some words from the present, such as "fields" and "park." Alun-alun have some historical aspects, but they're also used as open spaces in the present. The space configuration group revealed that ficus benjamina (a special kind of tree), other trees, and grass

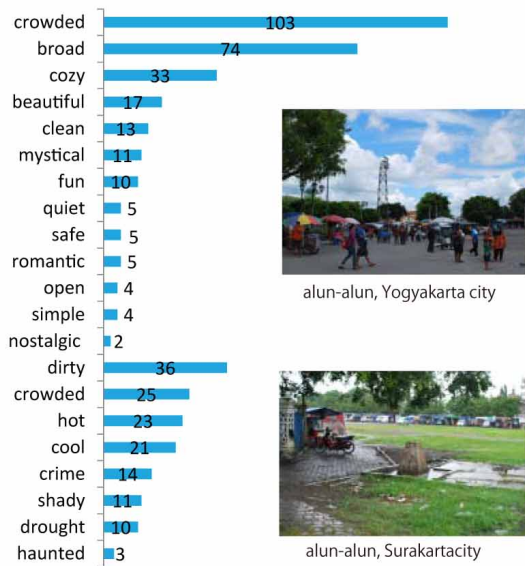
are thought of as components for alun-alun, and the land mass is huge. Most people think of alun-alun as mainly consisting of trees and grass, but there are other components, such as lights, flagpoles, and benches.

4.Conclusion

From this research, one could say that alun-alun are historical and cultural places that are used for extraordinary events. However, for some people who answered these questions, alun-alun are places where people spend their daily time for gathering, eating, and playing sports. Therefore, this study reveals that alun-alun are open spaces for urban people.

キーワード：インドネシア、ジャワ、オープンスペース、アルン・アルン、アンケート  
 Keywords: Indonesia, Java, open space, alun-alun, questionnaire

<The emotion group>



<The existence group>



<The utilization group>



<The space configuration group>



The Chinese Poetry of Soseki Natsume:  
 An Analysis of Nouns and Adjectives Related to the Features of Scenery  
 The Chinese Poetry of Soseki Natsume:  
 An Analysis of Nouns and Adjectives Related to the Features of Scenery

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### 1. Introduction

Soseki Natsume is a famous literary scholar well known in East Asia such as in China, Taiwan Area, and Korea. Soseki's excellent writing was deeply influenced by Chinese literature. Chinese poetry accounted for a large proportion of Soseki's work, even larger than Haiku. In this study, the objective is to examine the features of scenery depicted in his Chinese poetry by analyzing the relevant nouns and adjectives.

### 2. Study Methods

Soseki Natsume wrote a total of 208 Chinese poems. The poems that were selected for analysis featured in Soseki Shichu (Poetry Note) by Kojiro Yoshikawa in 1967. Nouns and adjectives related to scenery were the primary focus. In my other research, mainly nouns were analyzed. But in this research, adjectives related to scenery in the following categories were included:

Positive adjectives, such as "high," "full," and "bright"

Negative adjectives, such as "alone," "desolate," and "empty"

Neutral adjectives, such as "green," "distant," and "red"

Only those adjectives that appeared twice or more were counted. The percentages mentioned in the article indicate the frequency of appearance of the adjectives in the 208 poems. A cluster analysis (Ward's Method) was performed for the further analysis of nouns, and JMP software was applied for statistical analysis.

### 3. Results

#### 3.1 The frequency of the appearance of adjectives related to scenery

Within the 208 poems, the following adjectives related to scenery were used, in order of frequency of appearance: green (27%), distant (13%), alone (12%), desolate (11%), empty (10%), red (9%), old (9%), high (9%), idle (9%), cold (9%). The sum total of adjectives related to scenery was 541. Positive adjectives resulted in the following percentages: high (9%), full (8%), bright (7%), vast (6%), huge (6%). The total number of positive adjectives was 159, and they constituted 29% of all the scenery-related adjectives. As for negative adjectives, the total number was 236 (44%), with the following breakdown: alone (12%), desolate (11%), empty (10%), old (9%), idle (9%), cold (9%), silent (8%), and secluded (8%). The neutral adjectives totaled 146(27%): green (27%), distant (13%), red (9%), yellow (5%), natural (5%). Lastly, 122 adjectives were related to color (23%), and 27 were related to sound (5%).

#### 3.2 A cluster analysis of the combination of nouns related to scenery

As a result of a cluster analysis of the combination of nouns related to scenery, we divided 208 Chinese poems into 13 groups. Group 1 included 17 poems, 94% of which had content about water, clouds, and mountains. All 15 of the poems in Group 2 had content about mountains (100%). 60% of them included water, and 40% of them included wind. In Group 3, the percentage of poems (15) that included content about the moon was 100%, and 67% of the poems included content about water. As for other groups, please see the chart at the end of this paper.

## 4. Considerations

The nouns and adjectives that were related to scenery in Chinese poems written by Soseki Natsume were analyzed. Negative adjectives accounted for a large proportion (44%) of his Chinese poems. We can therefore draw the conclusion that Soseki Natsume preferred scenery with negative elements, such as desolate places, empty houses, and secluded gardens. Positive adjectives also appeared in his Chinese poems to some degree (29%). He depicted beautiful things, such as bright moons, new grass, and splendid flowers. Soseki was good at using adjectives related to color and sound. According to the result of the cluster analysis, the particular scenery that can most frequently be imagined is a vast view of water in the foreground with steep mountains in the distance and clouds floating above them. A bird flying in the vast sky among several leisurely clouds can also be imagined.

キーワード：漢詩、風景、夏目漱石、形容詞

Keywords: Chinese poetry, Scenery, Soseki Natsume, Adjective

Group	1	2	3	4	5	6	7	8	9	10	11	12	13
poem number	17	15	15	6	12	18	13	12	15	8	16	13	12
2water	94%	60%	67%	0%	25%	33%	54%	0%	13%	0%	0%	0%	100%
3cloud	94%	13%	7%	83%	100%	100%	23%	0%	0%	0%	19%	0%	25%
4mount.	94%	100%	27%	17%	0%	17%	31%	0%	0%	0%	25%	0%	0%
5flower	6%	0%	27%	50%	75%	0%	23%	25%	7%	0%	0%	100%	75%
6rain	53%	0%	13%	33%	25%	0%	0%	8%	7%	0%	100%	8%	50%
7moon	47%	0%	100%	17%	50%	6%	15%	25%	0%	0%	13%	8%	8%
8autumn	18%	7%	20%	17%	25%	0%	100%	25%	20%	25%	19%	0%	8%
9willow	12%	13%	27%	0%	8%	6%	15%	33%	0%	13%	0%	38%	50%
10bird	0%	7%	13%	100%	8%	11%	23%	0%	0%	0%	13%	54%	33%
11sky	41%	0%	13%	100%	0%	6%	46%	17%	0%	0%	0%	15%	8%
12spring	24%	20%	13%	0%	0%	0%	8%	8%	20%	13%	0%	46%	25%
13bamboo	0%	7%	13%	17%	0%	17%	0%	0%	0%	100%	19%	15%	17%
14sunset	24%	13%	13%	0%	8%	17%	8%	0%	27%	0%	0%	15%	25%

## 風力発電施設の景観紛争リスク低減に向けて

Study on the reduction of environmental disputes risk on the scene of wind farm.

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In recent years, conversion of renewable energy from fossil fuels is tackled to worldwide, particularly wind power generation has been introduced on a large scale. On the other hand, since the environmental dispute that causes the negative impacts such as noise, degradation of scenic value, bird strike, etc., also been reported, it has become a major burden for both businesses and residents. In particular, although the degradation of the scenic value by the wind turbine has been pointed out in a number of countries, it is not sufficient in the Japanese guidelines corresponding to the scenic value. In this study, to clarify the factors that affect the preference of the landscape with a windmill, aimed to reduce the environmental dispute risk on the scene of wind farm.

We selected five survey sites for questionnaire survey from coastal area in Hokkaido prefecture, which were with the highest potential for the construction of wind farms, depend on their relationships with wind farms, i.e. with or without wind farm, operation type, experience of environment dispute, etc.

The results showed that the key factors that affect the preference of the landscape with a windmill were the knowledge of wind power generation, operation types of wind farm and the history of environment dispute. To reduce the environmental disputes risk on the scene of wind farm, the appropriate information provision and consensus building that can dispel the fears and doubts of the residents is important in the site selection stage. And the introduction of the system, such as reducing the benefit to the public is required in construction and management stage.

キーワード：風力発電、景観印象評価、情報提供、海岸景観

Keywords: wind power generation, scenic evaluation, information provision, coastal landscape

## Appreciating the non-human landscape? Urban residents' willingness to coexist with animals and plants in Australia and Japan

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When we think about the urban landscape, we often think of buildings and streets, or natural elements such as mountains, rivers or the sea. But we also share cities with animals and plants, co-inhabiting urban space and interacting on a daily basis. These interactions can lead to wildlife conflicts (e.g., crows looking for food in trash, weeds growing on the sidewalk), because animals and plants are independent actors we cannot control.

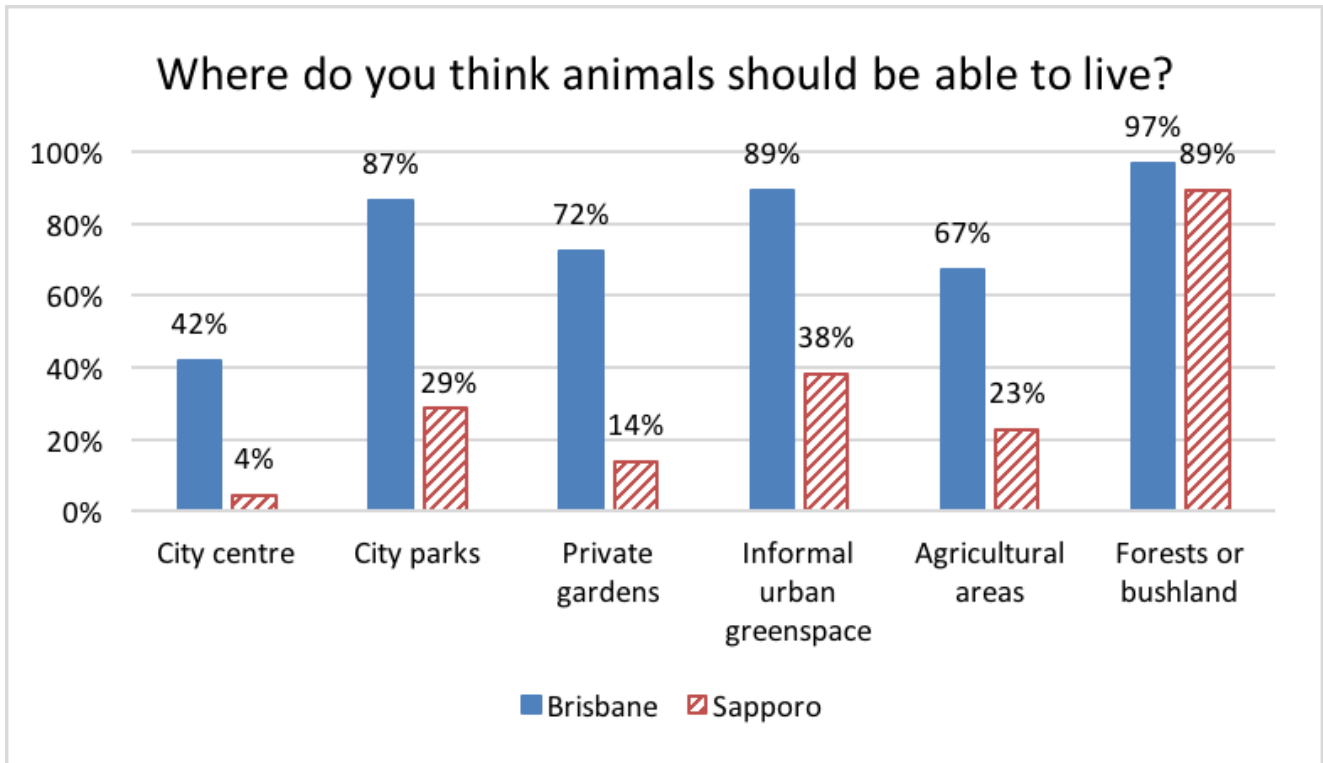
In the context of rapid urbanisation, geographers are calling for embracing non-humans as urban co-inhabitants. To find paths towards more-than-human cities and reduce wildlife conflicts, we need to better understand residents' willingness to coexist with plants and animals. This study used a mail-back survey and quantitatively compared residents' preferences toward sharing their neighbourhood and perceptions of belonging across urban green space in two geographically and culturally distinct cities: Brisbane, Australia and Sapporo, Japan.

Results suggest factors influencing respondents' willingness to coexist were geographical and cultural context alongside educational attainment and age, but not sex and income. Mapping respondents' preferences for animals in their neighbourhood revealed four categories divided by two axes -global-local and wanted-unwanted animals. These categories arose from the way animals contested human notions of control over urban space. Most respondents chose informal green space (e.g., vacant lots, brownfields etc.) as spaces of belonging after forests and bushland.

Drawing upon recent theoretical and empirical research on liminal urban spaces, I argue with Nohl (1990) that informal green space can offer 'provisional arrangements', allowing for conciliatory engagements with animals and plants. I thus propose informal green space as potential territories of encounter -a possible path towards more-than-human cities. Finally, I discuss some implications for planning and management of interspecies interactions.

Keywords: urban geography, wildlife conflict, more-than-human, quantitative methods, belonging, posthumanism





## 日本とロシアにおける自然風景のエキゾチック(日露共同研究の成果)

## Exotic natural landscape in Japan and Russia

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1.The open University of Japan, 2.Lomonosov Moscow State University, 3.Russia State Geological Museum, 4.Hokkaido University, 5.Niigata University

日本とロシアの共同研究として、両国の自然風景を両国の被験者に提示し、好ましさと異国情緒性についての比較研究を実施した。日本とロシアの代表的な自然風景の写真70枚を選定し、被験者に見せ、好ましさと異国情緒性(エキゾチック)を回答させた。ロシアで学生124人、日本で学生186人、高齢者24人の回答を得た。ロシア人は日本風景だけでなく自国の風景にもエキゾチックを感じた。日本人はロシアの広大な風景や無植生の山岳風景にエキゾチックを感じた。

キーワード：自然風景の評価、エキゾチック、日本とロシアの比較

Keywords: appreciation of natural landscape, Exotic, comparison of Russian and Japanese

Table Comparison of exotics on landscape photographs between Russia and Japan

oder	N Photo	State	Location	vegetation	Russia	oder	N Photo	State	Location	vegetation	Japan
1	56	Russia	Siberia, Altai	high mounta	109	1	59	Russia	Caucasus	high mounta	202
2	23	Russia	Siberia, Puto	tundra	101	2	23	Russia	Siberia, Puto	tundra	195
3	48	Russia	Kamchatka	high mounta	98	3	33	Russia	Siberia, Altai	steppe	193
4	33	Russia	Siberia, Altai	steppe	96	4	16	Russia	Siberia, Altai	steppe	185
5	6	Russia	Kamchatka	high mounta	88	5	56	Russia	Siberia, Altai	high mounta	180
6	15	Russia	Siberia, Nori	tundra	88	6	7	Russia	Kamchatka	taiga	174
7	55	Japan	Kurobe Dam	subalpine	88	7	55	Japan	Kurobe Dam	subalpine	165
8	58	Japan	Nanatsugam	deciduous	87	8	20	Russia	Kamchatka	taiga	163
9	59	Russia	Caucasus	high mounta	87	9	45	Russia	Hibiny	tundra	155
10	19	Japan	Fukuroda fal	deciduous	85	10	46	Russia	Siberia, Puto	tundra	155
11	67	Japan	Onneto, Akai	subalpine	84	11	47	Russia	Siberia, Chit	steppe	153
12	45	Russia	Hibiny	tundra	83	12	64	Japan	Kusasenri, A	deciduous	149
13	65	Japan	Ashinoko an	deciduous	83	13	67	Japan	Onneto, Akai	subalpine	144
14	13	Japan	Mt. Fuji, Yam	deciduous	82	14	54	Russia	Siberia, Bury	steppe	143
15	46	Russia	Siberia, Puto	tundra	81	15	1	Russia	Leningrad re	taiga	136
16	20	Russia	Kamchatka	taiga	76	16	6	Russia	Kamchatka	high mounta	135
17	66	Russia	Siberia, Altai	high mounta	75	17	18	Japan	Kamikochi, N	subalpine	135
18	16	Russia	Siberia, Altai	steppe	74	18	62	Russia	Pskov region	taiga	134
19	60	Japan	Maryudonota	sub tropical	74	19	48	Russia	Kamchatka	high mounta	132
20	63	Japan	Kegon fall, N	deciduous	73	20	66	Russia	Siberia, Altai	high mounta	127
			high mountain, subalpine						high mountain, subalpine		
			deciduous, mixed						deciduous, mixed		
			taiga						taiga		
			steppe						steppe		
			ever green						ever green		
			tundra						tundra		

ロシアの地理学者ア・イ・ワイコフの見た明治初期（1876年）の日本の原風景  
The Original Landscape of Japan in the early Meiji Era (1876) :  
from the Viewpoint of a Russian Geographer, A. I. Voeikov.

\*中谷 昌弘<sup>1</sup>

\*Masahiro Nakatani<sup>1</sup>

1.なし

1.none

This report will introduce the original landscape of Japan in the early Meiji Era (1876), which was described by a Russian geographer and meteorologist, *Aleksandr Ivanovich Voeikov*.

After the conclusion of the *Kanagawa Treaty* ("Japan-US Treaty of Peace and Amity") in 1854, many people began to visit Japan from Europe and America. *Voeikov* was one of them. He came to Japan in 1876 (Meiji 9) and traveled all over Japan (from *Hokkaido* to *Kyusyu*) in only five months. After returning to Russia, *Voeikov* contributed "Travelogue of Japan" (*Puteshestvie po Iaponii*) to the *Bulletin of the Imperial Russian Geographical Society* in 1877.

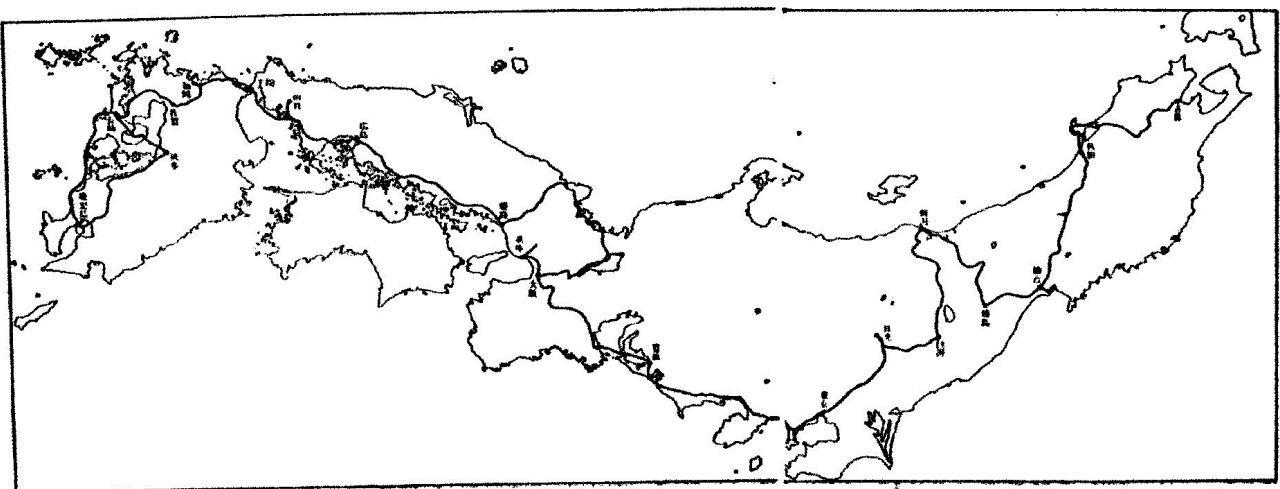
Talking of "Travelogue of Japan", it is well-known that *Isabella Lucy Bird*, an English explorer and writer, described *Unbeaten Tracks in Japan* in 1880. She came to Japan in 1878 (Meiji 11) and visited the *Tohoku*, *Hokkaido* and *Kansai* regions in seven months. But she didn't visit South-west Japan.

On the other hand, *Voeikov's* "Travelogue" is little known in Japan. An abridged(?) translation was made by *Hidetoshi Arakawa*, a Japanese famous meteorologist in 1961. But *Voeikov* observed Japan from many points of view (not only geography, meteorology, but also politics, economy, history, and culture) and in the "Travelogue" he also described many landscapes, which are now lost in the present day.

In this report I will show where *Voeikov* traveled and what he saw in Japan.

キーワード：原風景、明治時代、ア・イ・ワイコフ

Keywords: The Original Landscape, Meiji Era, A. I. Voeikov



## Research on Construction and Spatial Structure of Religious Space of the Izumo Grand Shrine

## Research on Construction and Spatial Structure of Religious Space of the Izumo Grand Shrine

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## Research on Construction and Spatial Structure of Religious Space of the Izumo Grand Shrine

### 1.Introduction

In this study, the Izumo Grand Shrine will be discussed, as it is considered one of the most ancient shrines, which is supposedly the original form of a garden in a palace. The purpose is to uncover the following items: the precinct and ancient forms of rituals at the Izumo Grand Shrine, space utilization structure through annual events at the Shrine and related shrines, and history of planting formations in the precinct.

### 2.Study Methods

In this article, in order to clarify space utilization structure at the Izumo Grand Shrine and related shrines, and history of planting formations in the precinct, the following methods have been applied: Topographic maps, sectional views, and soil layer charts were studied together with analysis of paintings to apprehend the process of scenery changes and soil layers of each time.

### 3.Results and Considerations

#### i. From Yayoi Period until the end of the 10<sup>th</sup> Century

Based on the excavation report of Izumo Precinct remains, a flow path originating from the south of the current front shrine has been detected, and its shape was assumedly Y-shaped. There is also a record that weapon-type bronze ware and jewels (green jade jewel) from the Yayoi Period were excavated during the construction in the Kanbun Era from the east of Inochi-Nushi-No-Yashiro (one of the smaller shrines attached to the Grand Shrine).

#### ii. From the beginning of the 11<sup>th</sup> Century until pre-construction of the Hoji Era

Since Year 4 in the Chogen Era (1031) until the ritual transfer of the main building in Year 2 in the Hoji Era (1248), the building fell five times. The average period between a transfer until a fall was 31 years. Okano (2010) stated that it was reasonable to expect that a building without a foundation would slant due to an uneven settlement and the liquefaction phenomenon.

#### iii. From the construction of the Hoji Era until another construction of the Keicho Era

According to a painting which is assumed to have captured the ritual transfer of the main building in Year 2 in the Hoji Era (1248), embankment construction was completed on the east side of the precinct; therefore, the building is believed to have been constructed on the elevated ground.

#### iv. From the construction of the Keicho Era until another construction of the Kanbun Era

Excavation research (Year 12 of the Heisei Era) unveiled that the structure of the main building was not earth-fast construction called Hottate-bashira, but was the first trial of the cornerstone method. The design is heavily influenced by Buddhism.

#### v. From the construction of the Kanbun Era until another construction of the Enkyo Era

More effective equipment has been completed in order to protect the shrine from flood and debris flows. The ground was gradually elevated with stone masonry as measures to flooding and landslides. The stones used for the masonry were carved out from a giant rock behind Inochi-Nushi-No-Yashiro.

#### vi. After the construction of the Enkyo Era

From the construction of Kizuki Taisha, the current Izumo Grand Shrine, in the Enkyo Era until the present, construction methods have been based on construction from the Kanbun Era. A new building was constructed in the first year of the Enkyo Era (1744) with partial modifications with a new placement, and the building still remains the same shape until now.

#### 4.Conclusion

In this paper, history of three items around Izumo Grand Shrine have been clarified: its construction, spatial structure of religious space, and planting formations in the precinct.

キーワード：神社、変遷、空間構成

Keywords: Shrine, tranisition, spacial structure

## Research on Spatial Structure of the Izumo Grand Shrine

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キーワード : Shrine、transition、spacial structure

Keywords: Shrine, tranisition, spacial structure



都市における生物多様性と自然景観の保全－空間の利用調整による自然との共生－  
Conservation of Biodiversity and Natural Landscape in Urban Area:  
An Adjustment for Urban Space between Nature and human use

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人口の多くが居住する都市は、緑地、水域等の生物の生息生育環境が少なく、都市における自然との共生や生物多様性の保全に関する関心が高まってきている。国土交通省は、生物多様性の保全を地域づくりのために取り組むべき重要な課題としてあげており、自然の保全・再生や創出としてビオトープの計画、施工等に加え、環境の質の向上、エコロジカル・ネットワークの形成、モニタリング、適切な管理手法の構築を支援している。

里山の復活や再生、河口干潟、河川等の自然が確保された空間の保全・再生だけでなく、都市部の宅地での自然の創出や復元が望まれる。

都市空間は人工化されており自然要素が確保しにくく、人間の存在は野生生物の生息に干渉することから都市における生物多様性の保全は困難である。しかし、コンクリート等に被われた形状を持つ雨水調整池は、都市部の宅地に存在する人工的構造物の一例でありながら、植生が繁茂し鳥類が多種出現する事例としてあげられる。

雨水調整池は、1960年代に宅地の大規模開発に伴い雨水流出に対応するために設けられた。雨水専用調整池は、水難事故を防ぐため金網や柵などで囲まれ人の立入はなく、生物の生息環境となり得ている事例がみられる。凹型の形状をしているため、囲障構造物が金網等により透視性を確保している場合は、調整池外部から内部の自然を眺望することが可能となる。人の立入不可という制約が空間内に自然を保全・創出し、身近な居住環境において自然景観を視覚的に享受することができるという意味で、空間の利用調整が自然との共生をもたらすと言える。

本研究は、都市の自然が保全された空間の利用調整について整理し、生物多様性の保全と自然景観を眺める行為との共生について考察する。特に、空間への立入を禁止し自然景観を眺望するという点では、触覚を制約し視覚を可能にしていると考えられることから、知覚の利用調整に着目する。

調査は、東京都の雨水専用調整池を対象とし、植生の繁茂状況と鳥類の出現状況を把握した。また、空間の特徴を整理し、調整池周辺住民の空間内の自然に対する知覚状況を検討した。その結果、都市の人工的基盤においても自然を創出できる可能性があることが示された。調整池内の自然と視覚、聴覚、嗅覚、触覚等の多様な知覚とのかかわりが整理され、それぞれへの関係の利点と欠点が明らかとなった。調整池内の自然は、季節感をもたらすなどの効果があることが示され、自然と人間との間の境界のあり方や関わり方の議論を行うことが重要だと考えられた。

キーワード：自然景観、生物多様性、利用調整、知覚の制約

Keywords: Natural Landscape, Biodiversity, Use Adjustment, Perceptual Constraint



## Landscape classification and mapping for Irkutsk city in Siberia region

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Traditional landscape approach is an important part of land-cover mapping in Russia. Since different regions have different landscape's hierarchy, it is impossible to use one classification for all the regions. We tried to analyze the correlation of such concepts as: land cover, landscape, geosystem, ecosystem, habitat, and biotope. Biotope is defined as a complex of factors, which determines physical conditions of existence (abiotic part) of a community (biotic part) to define geographical unites (Connor et al., 2004). Habitat is terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural (EEA, 2014). Ecosystems can be regarded as groupings of habitat types (EEA, 2014). Geosystem is a unity, which consists of interrelated components of nature, controlled by regularities, which operate in geographical shell and landscape sphere (Sochava, 1974a). It is an organized integrality, which interacts with cosmic sphere and human society (Sochava, 1972). The term "landscape" is controversial and may be interpreted in different ways. However, landscape is a part of the Earth's surface, which is shaped by natural conditions and formed by human influences to a different extent (Bastian et al., 2014). Since the terms have close meanings, it is necessary to specify which term needs to be taken for certain aim. So, we defined land-cover as the complex of biotic, abiotic and cultural components on the Earth's surface (Monsin et al., 2014). The aim of this study is to compile the landscape classification of terrestrial units for Irkutsk city urban area which can be used for complex and narrow purposes, for example, for research of soil or vegetation and their changes, as well, for spatial planning. Irkutsk is a large regional center and is located on the South of Eastern Siberia near Lake Baikal. Accepted in European Union CORINE Land Cover and EUNIS habitat classification doesn't have data for the studied area. In our research, we elaborate a synthetic approach with using CORINE and EUNIS database and conception of geosystem to classify the Irkutsk's city terrestrial units. Using QGIS software we analyzed the following data: fieldwork, Digital Elevation Model (SRTM), and remote sensing (Landsat 7, 8).

Keywords: urban landscape classification, landscape approach, geosystem

## 大学生を対象とした緑地保全体験プログラムの内容と得られる経験の関係性

Relation between the experiences and contents of a green space conservation volunteering program for university students

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### 1. Introduction

Green spaces, which are a part of the urban landscape, have been conserved by public participation in Japan. However, the advanced age of the participants and the lack of sustained participation hinder the continued existence of these spaces. In an attempt to deal with these problems, a movement promoting the participation of young people in green space conservation has taken shape. It is hoped that a green space conservation volunteering (GsCV) program is provided for students. This study identifies the experiences of students who participated in such a program.

### 2. Methods

The object of this study was a GsCV program provided to students at Takushoku University. In the program, 14 students joined the "Rangers Project" from April to December 2015. This project conserves green spaces in Japan's metropolitan areas. The students were provided with 44 opportunities to participate in conservation activities. Each student chose and participated in four activities. The GsCV program was divided into three parts: 1) maintenance of green space (e.g. weeding and farm work), 2) PR of conservation activity at an event, and 3) fieldwork in a city. KH coder, a free quantitative content analysis software was used to analyze 14 final reports and 56 activity reports by students. Firstly, words concerning experiences were sampled from all reports by KH coder. Secondly, coding rules were set in order to count concepts with contexts which included those words identified. Finally, KH coder created co-occurrence networks that showed potential relationships between the contents of the GsCV program and experiences or on the inter-relationship between experiences.

### 3. Results

Contexts in the reports were classified into 14 concepts from the experiences viewpoint. The main concepts are "understanding conservation groups and CSR activities", "one significant point and one challenge in making an appeal for our activity" and "getting my new idea about conservation". The results of co-occurrence networks showed that 1) maintenance of green space was related to five concepts: "experiencing enjoyment and fulfillment", "the importance of maintenance in the conservation of a good environment", "interest in a conservation activity", "acquiring knowledge about the ecosystem or maintenance methods" and "getting an extraordinary experience" (Figure 1). 2) PR of conservation activity at an event was related to three concepts: "understanding conservation groups and CSR activities", "one significant point and one challenge in making an appeal for our activity" and "getting an extraordinary experience". 3) Fieldwork in a city was related to three concepts "acquiring knowledge about the ecosystem or maintenance methods", "a perception of the ecosystem or the history of each green space", and "a perception of the worth and significance of green spaces".

Additionally, there is a relation between "understanding conservation groups and CSR activities" and "one significant point and one challenge in making an appeal for our activity" when attention was focused on the inter-relationship between experiences. The results of co-occurrence networks

also showed that “an interest in a conservation activity” had a relationship with “understanding conservation groups and CSR activities” and “a precious interaction with other people in an activity”.

#### 4. Conclusion

The results of this study suggest that an interest in conservation activities is increased by having experience with PR of conservation activity at an event, and that fieldwork provides a chance to understand the worth and significance of green spaces. Therefore, a GsCV program consisting of complex components is more effective than a program consisting only of maintenance of green spaces.

#### Acknowledgments

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キーワード：緑地、保全、体験、学生、ボランティアプログラム

Keywords: green space, conservation, experience, student, volunteering program

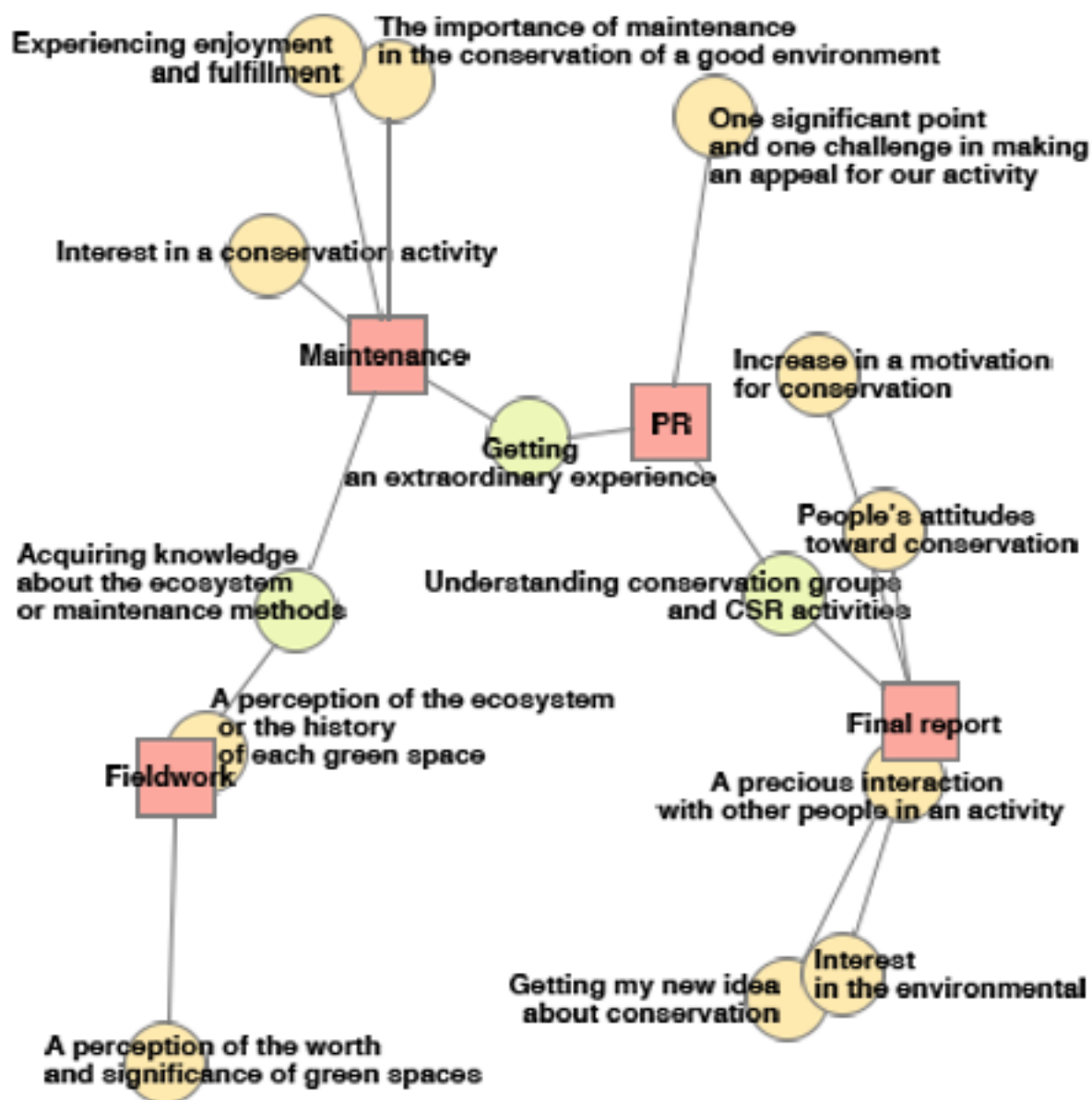


Figure1. Relationships between the contents of the GsCV program and experiences

内モンゴルフロンボイル草原におけるリモートセンシングによる植生量と炭素貯留モニタリング  
Remote Sensing Estimates of vegetation Biomass and Carbon storage in Hulunbuir grassland,  
Inner Mongolia

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The grassland ,as one of the most widespread terrestrial ecosystems in the world, plays an important role in regulating regional climate changes and reducing the emission of carbon dioxide. So it is important to do an accurate evaluation of grassland vegetation biomass and carbon storage , and analysis on spatial distribution patterns and environmental factors in the regional scale. Hulun Buir grassland is the study area in this paper . This study constructs grassland biomass model by integrating MODIS EVI data, climatic variables and topographic variables using RBF artificial neural network model. And aboveground biomass, carbon storage during 2000-2013 is simulated further by means of accuracy of the estimation. And With this source , the study estimates the underground biomass , total biomass and carbon storage of the study area by underground / aboveground biomass ratio in different types of grassland . The results are as follows:

The ability of RBF neural network model to estimate grassland biomass is better than multiple linear regression model. The spatial distribution of average aboveground biomass has gradually increasing trend from southwest to northeast in Hulun Buir grassland during 2000-2013. Besides the spatial distribution of average aboveground biomass has gradually increasing trend, and increased from 142.857 g/m<sup>2</sup> to 161.436 g/ m<sup>2</sup> in the rate of 1.034 / a . The total aboveground biomass, total aboveground carbon storage of study area were 8.26 Tg, 4.14 Tg·C. The total underground biomass , total underground carbon storage were 36.1 Tg, 18.06 Tg·C. The total biomass and total carbon storage were 44.4 Tg, 22.2 Tg· C. Typical steppe has the highest carbon storage, totaling 13.38 Tg·C.

キーワード：フロンボイル草原、RBFニューラルネットワーク、バイオマス、炭素貯留

Keywords: Hulun Buir Grassland, RBF artificial neural network, Biomass , Carbon storage

Seedling growth and photophysiology of *Quercus austrocochinchinensis* under two light levels

Seedling growth and photophysiology of *Quercus austrocochinchinensis* under two light levels

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#### Introduction

Protecting endangered species is an important part of conservation. *Quercus austrocochinchinensis* is an evergreen tree of the *Quercus* subgenus *cyclobalanopsis* Oerst. of Fagaceae. *Q. austrocochinchinensis* is an endangered oak species, which has only been identified at two sites in Yunnan province and Hainan province in China. *Q. austrocochinchinensis* is distributed in ravines in southwest China, northern Thailand, Vietnam, and Laos at elevations of 700 to 900 m. Because of tree felling, the distribution and population size of this species are both declining rapidly. At the same time, this species hybridizes with other common species, which might accelerate its extinction. The objective of this study was to compare the growth characteristics of *Q. austrocochinchinensis* seedlings under two light levels.

*Q. austrocochinchinensis* is an endangered oak species, which has only been identified at two sites in Yunnan province and Hainan province in China. *Q. austrocochinchinensis* is distributed in ravines in southwest China, northern Thailand, Vietnam, and Laos at elevations of 700 to 900 m. Because of tree felling, the distribution and population size of this species are both declining rapidly. At the same time, this species hybridizes with other common species, which might accelerate its extinction. The objective of this study was to compare the growth characteristics of *Q. austrocochinchinensis* seedlings under two light levels.

#### Material and Methods

*Q. austrocochinchinensis* seeds were collected from Pu-Er, Yunnan Province, in September 2011. Seeds were kept in a 4°C refrigerator before being sown on October 21, 2011. Seeds were sown in 32-cell plug trays with 60% peat and 40% perlite mix as a substrate. When the young seedlings reached 20 cm in height, they were transplanted into 18-cm plastic pots containing the same potting mixture. These seedlings were separated into two groups and grown under two different light levels in a greenhouse. The maximum PAR(Photosynthetically available radiation) of the high-light and low-light treatments was 530 and 150  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  respectively. Plant height, leaf number, and stem diameter of seedlings were measured monthly. Leaf chlorophyll content, stomatal density, chlorophyll fluorescence, and rapid light response curves were also measured at the end of experiment.

#### Results

*Q. austrocochinchinensis* had a low rate of seedling emergence (21.88%) and some seedlings died during the experiment, which may explain why *Q. austrocochinchinensis* is rare.

Seedlings differed considerably with respect to plant height, number of leaves, and stem diameter, especially the number of leaves under the low-light condition. The growth rate during the winter was slow, and growth started from February onwards. The higher number of lateral shoots on seedlings grown under the high-light conditions was of interest and might be explained by *Q. austrocochinchinensis* being shade tolerant; therefore, high light levels may have adversely affected the shoot growth of dominant seedlings.

The chlorophyll content of *Q. austrocochinchinensis* grown under high-light conditions was 3.17 mg/g for new leaves and was 2.88 mg/g for old leaves. At low light levels, the chlorophyll content of new leaves was 4.01 mg/g and that of old leaves was 3.39 mg/g. Leaf chlorophyll content of seedlings grown under low-light conditions was higher than that of seedlings grown under high-light conditions. In addition, the differences observed between new and old leaves under high light were greater than the differences observed between new and old leaves of seedlings grown under low light.

The stomatal density of *Q. austrocochinchinensis* under low light levels (318.42/mm<sup>2</sup>) was higher

than that under high light levels (286.84/mm<sup>2</sup>).

Chlorophyll fluorescence and rapid light curve, ETR raises with the increase of PAR, then reached saturation and remained stable. *Q. austrocochinchinensis* had higher ERT max under low light levels.

#### Conclusion and Discussion

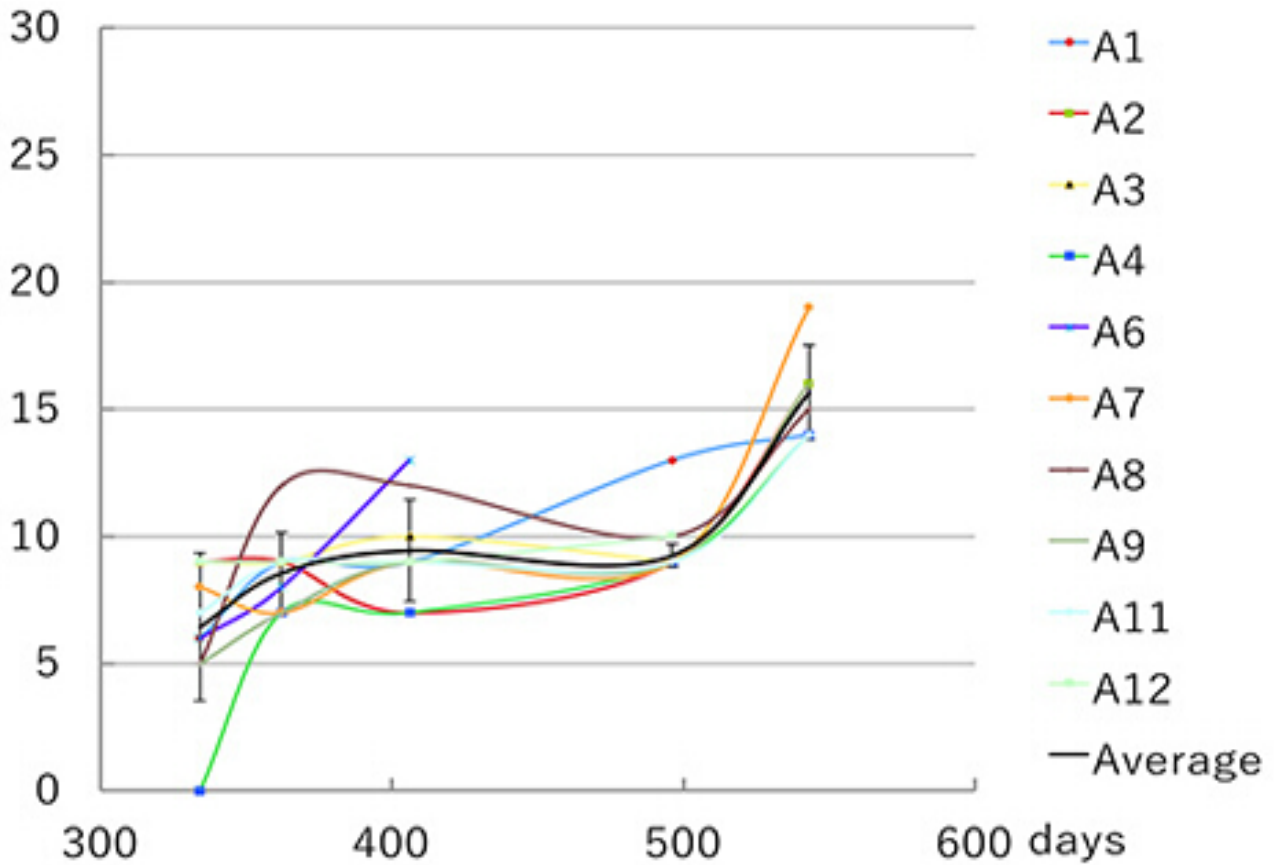
*Q. austrocochinchinensis* had a low seedling emergence rate, and some seedlings died during the experiment. *Q. austrocochinchinensis* presented large differences among its seedlings, suggesting that the quantity of seedlings should be increased.

Research on *Q. austrocochinchinensis* in biological engineering and physiology has been lacking. This study presents valuable information on *Q. austrocochinchinensis* and may be helpful in the recovery of this endangered species.

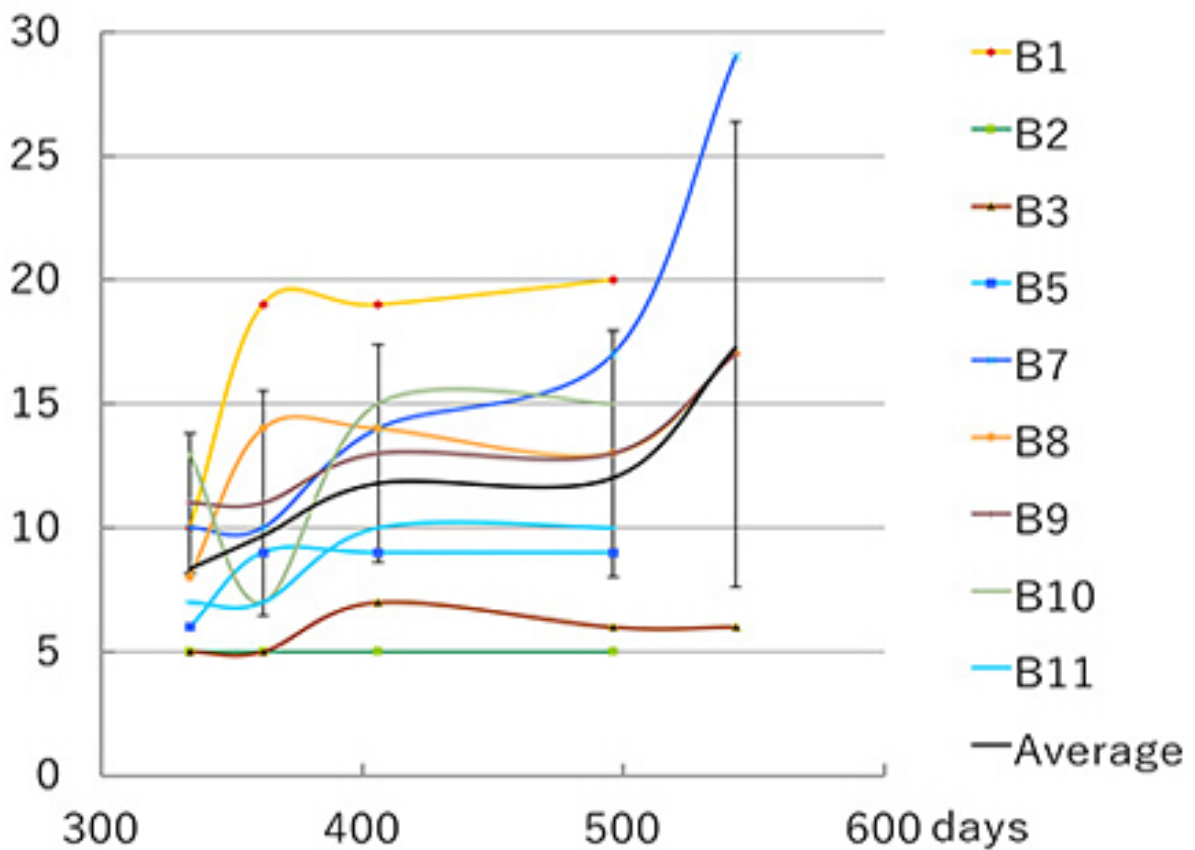
キーワード : *Quercus austrocochinchinensis*、Seedling growth、Photophysiology、Light level

Keywords: *Quercus austrocochinchinensis*, Seedling growth, Photophysiology, Light level

Number of leaves of *astrocochinchinesis* under high light



Number of leaves of *austrocochinchinesis* under low light







針葉樹二次林における森林管理が利用者の環境評価と心理的回復効果にもたらす影響  
The Effect of Forest Management of Secondary Coniferous forests on User's Landscape  
Appreciation and Psychological Restorativeness

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◆はじめに

ほぼ同じ林相（カラマツおよびアカマツ二次林）の未整備の針葉樹林（放置林）と整備された針葉樹林（整備林）で、利用者が懐く風景に対する印象および環境の有する回復特性等の環境評価、あるいは短時間の滞在を通じて獲得される心理的回復効果にはどのような違いが生じるのかについて調べた。

◆研究方法

実験は2014年の7月下旬に実施した。場所は東京大学富士癒しの森研究所敷地内における上記の放置林および整備林である。両プロットの面積は(0.25ha; 50m×50m)であり、森林内の物理環境については、照度を除いて気温、湿度、音圧などほぼ等しい環境であった。20~50代の男性の計18名を被験者とした。まず、順番効果を相殺するため、9人ずつ、最初に放置林に暴露され、その後に整備林に暴露されるグループ（グループA）と、最初に整備林に暴露され、その後放置林に暴露されるグループ（グループB）の二つのグループに分けた。全ての被験者は両刺激に各15分間ずつ暴露された。被験者には、両刺激への暴露前後に心理的回復効果を調べる調査票（気分(POMS)、感情(PANAS)、回復感(ROS)）への回答を依頼した。また、両刺激への暴露後に、環境評価を調べる調査票（印象評価（SD法）および環境の有する回復特性の評価（PRS））への回答を依頼した。

◆結果

Wilcoxon signed rank testによる比較結果から、環境の有する回復特性（PRS）の点からは、整備林の方が逃避、まとめ、適合性が有意 ( $p < .05$ ) に高いことが分かった。また、印象評価の点においても、整備林の方で高い評価（明るい、開放的、快適、美しい、安心、健康的 ( $p < .05$ )）が得られ、物理環境の違いについても妥当な評価（放置林よりも、整然としている、混雑していない ( $p < .01$ )）が得られた。二元配置分散分析（環境の違い×暴露の前後）による検定結果では、気分(POMS)、感情(PANAS)、回復感(ROS)の全ての指標において交互作用は確認できなかった。一方、環境の違い（放置林-整備林）と暴露の前後（暴露前-暴露後）のそれぞれの主効果について調べたところ、環境の違いが心理的な回復に影響を与えている関係は見いだせなかった ( $n.s.$ )。一方、暴露の前後については、整備林に暴露することでネガティブ感情（PANAS;  $p < .05$ ) や、緊張 - 不安（POMS;  $p < .05$ ) に影響しそれらを低下させていた。また反対に、放置林においては、活気（POMS;  $p < .05$ ) に影響し活気感を高めていた。

◆考察

整備林は環境の有する回復特性や印象評価が高い環境であったことから、整備林に暴露されることで被験者が心理的に回復した結果、ネガティブ感情や、緊張感、不安感が低下するに至ったのではないと思われる。一方、放置林で活気感上昇した理由は、被験者が全員男性であり、別途実施した性格特性検査にて、神経症傾向が低く外向性の高い集団であったこと、また、整備林に比べネガティブに評価されていた放置林が、前述の性格特性を有する集団にとっては、たとえば、Kaplanの好ましい環境理論におけるミステリを感じさせ、探索心を引き起こすような環境となっていたことなどが考えられる。

キーワード：景観評価、心理的回復効果、森林管理、針葉樹林、回復感

Keywords: Landscape appreciation, Psychological restorative effect, Forest management, Coniferous forest, Subjective restorativeness

table 1. summary of questionnaires using the experiment and the result of analysis.

category	Landscape appreciation		Psychological restorativeness		
	SD	PRS	POMS	PANAS	ROS
abbreviated form					
official name	Semantic differential method	Perceived restorativeness Scale	Profile of mood states	Positive and negative affect schedule	Restorative outcome scale
contents	scene appreciation	restorative property of environment	mood	affect	subjective restorativeness
number of subscales	25	5	6	2	1
timing of the measurement	after exposure		before and after exposure		
wilcoxon signed rank test	M.F. was statistically higher in "brightness", "openness", "comfort", "beauty", "safeness", "healthiness", "order" and "thin" than U.F. ( $p < .01$ to $p < .05$ ).		M.F. was statistically higher in "Being away", "Coherence" and "Compatibility" than U.F. ( $p < .05$ ).		
two-way repeated ANOVA	mutual interaction		n.s.	n.s.	n.s.
	main effect		U.F.: vigor ( $p < .05$ ) ↑ M.F.: tension and anxiety ( $p < .05$ ) ↓	M.F.: negative affect (PANAS; $p < .05$ ) ↓	n.s.



Photo. Unmanaged Forest (U.F.)



Photo. Managed Forest (M.F.)

U. F.: unmanaged forest, M. F.: managed forest, ↑ :increased, ↓ :decreased