VISUAL LANDSCAPE CHARACTER OF ORIENTAL SPRUCE
(*Picea orientalis* (L.) LINK.) MOUNTAIN FORESTS IN TURKEY

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Submitted 13 Jul. 2009; accepted 15 Apr. 2010

Abstract. Oriental Spruce forests in Turkey have gained greater importance in forest management in recent years. Oriental Spruce is one of the most important species distributed in the north-eastern Black Sea Region of Turkey and Caucasia as a colchic element. It forms the main structure of the "forest landscape", affecting the landscape character of the region's mountains regarding with its distributions and land use. In this proceeding, the visual landscape character of Oriental Spruce mountain forests was tried to be determined in selected areas of the north-eastern Black Sea Region of Turkey. In this study, in order to determine visual character of mountain forest and assess the process of forest functional planning or landscape planning, some landscape areas were categorized by some criteria such as plant species composition, variety, colour, mass-void, edge, geomorphologic units, rocky, roadside, etc. in forest panoramas of the region. Conducting a participated approach to determine landscape character of forests and using slide show, the preferences were determined by semantic factors (naturalness, variety-complexity, unity, fascination, vividness, meaningfulness). As a result, the landscape character types of mountain forests were discussed, that is integrated to forest or landscape management regarding sustainability of forest visual resources as well as ecological and silvicultural characteristics.

Keywords: visual landscape character, forest planning and management, Oriental Spruce, Turkey.

1. Introduction

Mountains are important sources of water, energy and biological diversity. Their altitudinal range leads to variations in temperature, precipitation and radiation that constitute numerous habitats. Mountainous regions cover more than 20% of the world's surface but have only 10% of the world's population living in or around them (Karadeniz, Güneş 2002). In recent years, mountain ecosystems have been studied in relation to global warming, erosion, and negative changes in water resources (e.g. pollution), as well as for their rich biological diversity. Increasing tourism and recreation in mountain areas has led to people wishing to know more about mountains (Acar *et al*. 2006).

Approximately two-thirds of Turkey's total land area is classified as mountainous; 56.6% of the land mass is >1000 m and 29.9% is between 1000–1500 m (Atalay 2002). The mountains of North Anatolia and Taurus, part of the Alpine-Himalayan mountain belt, have played important roles in supporting yayla (local people visiting and/or living on very high plateaus), in stockbreeding activities and in cultural needs.

Nowadays, protecting and managing landscape has become an important issue because of previous inappropriate land-use activities, mainly caused by population growth. Evaluation of natural resources can be based on land use or protection, or a combination of the two. Thus, the physical and ecological resources that contribute to visual features are the basis of the scenic landscape and are important in evaluation and management. The human observer of the visual landscape is also important when defining landscapes (Appleton 1975; Ulrich 1983; Bell 1993; Knopf 1987; Daniel 2001; Behbahani, Haghighi 2009).

Oriental Spruce is one of the most important species distributed in the north-eastern Black Sea Region of Turkey and Caucasia as a colchic element. It forms the main structure of the "forest landscape", affecting the landscape character of the region's mountains regarding with its distributions and land use (Anşin 1979, 1980; Yaltırık 1993; Acar 1997; Terzioğlu 1998).

In this proceeding, the visual landscape character of Oriental Spruce mountain forests was tried to be determined in selected areas of the north-eastern Black Sea Region of Turkey. The aims of this study focus that:

− By which main parameters is the visual character determined?
− What methods can be used to determine the visual character of mountain forest landscape?
− How the visual landscape character can be assessed in the process of forest functional planning or landscape planning?

2. Material and Method

2.1. Study Area

The study area consist of Trabzon-Rize and surroundings' Orients spruce forest areas. In this context, Sis Mountain, Sümela Monastry, Hamsiköy, Zigana, Uzungöl, Sultanmurat (Trabzon) and Ayder (Rize) were observed (Fig. 1).

Fig. 1. Study Area

2.2. Methods

2.2.1. Taking Photos and Selecting Participants

Many approaches have been used and discussed for photographic landscape evaluation (Shafer, Brush 1977; Shuttleword 1980; Low, Zube 1983; Stewart *et al.* 1984; Clay, Daniel 2000; Acar *et al.* 2003, 2006, 2008; Eroğlu 2004; Eroğlu *et al.* 2005; Müderrisoğlu *et al.* 2006; Müderrisoğlu, Eroğlu 2006; Akkaya *et al.* 2008).

In this study, many landscape photographs were taken from Trabzon's forest areas. These photos were classified as 8 groups (composition, water, edge, roadside, sparseness, mass-void, rocky and colour). The 97 test photos were determined and evaluated by subjects that participated in "nature in national parks" event organized by TUBİTAK (The Scientific and Technological Research Council of Turkey) in summer of 2007.

2.2.2. Survey of Visual Quality Preferences

The visual quality (VQ) preferences in Oriental Spruce forests were rated using a participatory approach (Daniel, Boster 1976; Brown, Daniel 1990; Clay, Smidt 2004; Kalın 2004; Ode *et al.* 2009). The 30 participants consisted of 30 students from the environmental course o the Kaçkar Mountain National Park. The groups were shown

the 97 test slides from the study areas and asked to rate each slide on a 7-point scale (–3(1), –2(2), –1(3), 0(4), 1(5), 2(6), 3(7)), where a 1 indicated very low visual quality and a 7 indicated very high visual quality (Table 1).

In this study, correlations between the rating levels of visual quality and assessment of semantic descriptors assumed some descriptors unique or independent information about preference for a scenic composition. The survey of semantic descriptors correlated with visual quality was used for students. In this way, the 97 test slides were presented to the participants using 6 descriptor variables (naturalness, variety-complexity, unity, fascination, vividness, meaningfulness).

Earlier studies show that visual quality can be determined by landscape characteristics. Using a convenient model, the system can guess VQ score for feature states of the landscape, facilitating automated comparison and management alternatives. Therefore, by measuring the visual quality assigned to each slide on derived interval scale and the intensity of landscape features in each slide, a correlation can be obtained (Arriaza *et al.* 2004). Using category and nominal variable predictors related to visual landscape, preferences were examined and different regression models were enacted to explain landscape preferences (Real *et al.* 2000). To obtain this information,

Table 1. Semantic Preferences and Survey Form

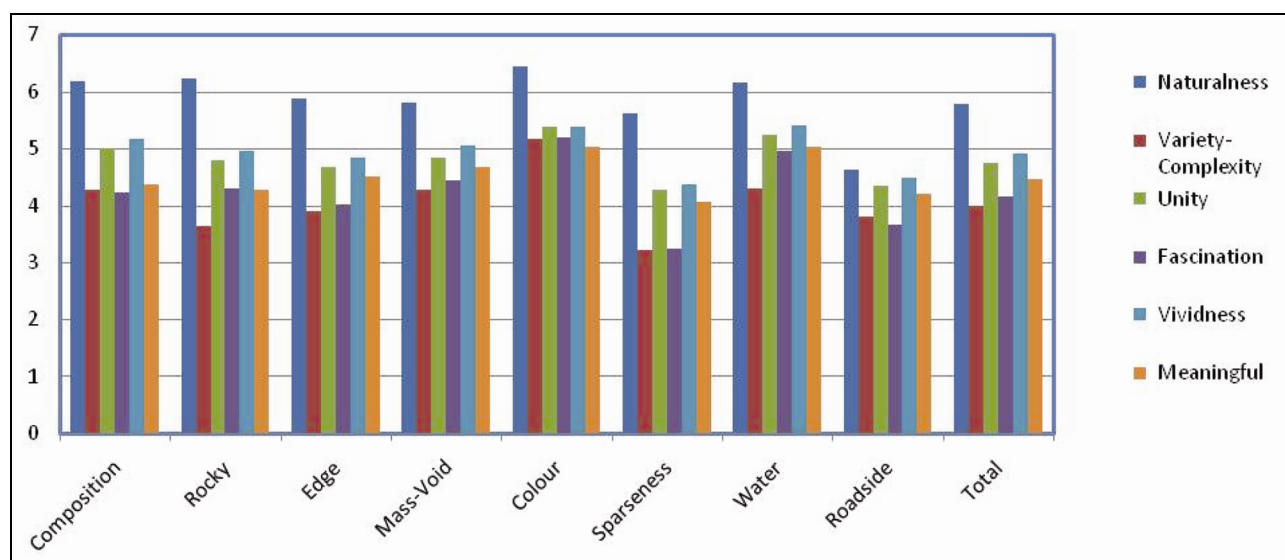| Age	Gender:		Education					Job:	
Semantic Assessment									
Naturalness	Low	1 (–3)	2(–2)	1(–3)	4(0)	5(1)	6(2)	7(3)	High
Variety-Complexity	Low								High
Unity	Low								High
Fascination	Low								High
Vividness	Low								High
Meaningfulness	Low								High
Photo no:									

Fig. 2. The Relationship Between Forest Landscape Types and Semantic Preferences

the students assessed each slide according to above measures. A total of 8 main landscape categories (composition, water, edge, roadside, sparseness, mass-void, rocky and colour) were used (Fig. 2).

2.2.3. Statistical Analysis

A data matrix was complied in Excel, including VQ preference score, VQ aims, semantic descriptors, landscape characteristics per slide and participants. Based on assessed values calculated from all scores, visual quality ratings were given to illustrate general pattern of preferences. Further correlation analysis was conducted to describe the explanatory variables in relation to VQ. While this analysis allowed prediction of some variables, regression analysis would show the importance of the degree and explain the VQ per scene.

The data were analysed using the SPSS (Statistical Package for Social Science) 15.0 statistical package (Acar *et al.* 2003, 2006; Eroğlu 2004; Eroğlu *et al.* 2005; Alkan *et al*. 2009).

3. Results

Visual quality rating by forest landscape and photo type

In the first part of the survey, the participants were asked to give a score from 0 to 7 to preferences of visual quality. According to the results of VQ ratings taken within the selected areas, there were differences in visual preferences regarding both values. Among mean preference ratings for the 97 test slides, the highest were given for slide 21(5.89), slide 57 (5.88) and slide 8 (5.84), while the lowest results were obtained by slide 85 (3.14), slide 89 (3.33) and slide 86 (3.45), with a mean of 4.67. In the study area, the preference results show that the colour, water, and rocky areas are important attractive places for the participant (Figs 3, 4 and 5).

Semantic descriptors for each slide according to forest landscape type were investigated using detailed surveys. Given the position of each scene in relation to preference in the six semantics selected for this study, mean scores for each semantic descriptor ranged from highs of 6.21 (Composition), 6.24 (Rocky), 5.89 (Edge), 5.83 (Mass-Void), 6.46 (Colour), 5.64 (Sparseness), 6.17 (Water) and 4.67 (Roadside) to lows of 4.24, 4.28, 3.91, 4.28, 5.05, 3.23, 4.31 and 3.68 respectively (Fig. 2).

Correlation analysis of VQ suggested that, 6 variables were significant at $p = 0.05$ and 0.001. Results from the correlation analysis also showed that naturalness and unity ($r = 0.772$, $p < 0.05$), variety-complexity and meaningfulness ($r = 0.680$, $p < 0.05$), unity and vividness ($r = 0.777$, $p < 0.05$), fascination and meaningfulness ($r = 0.874$, $p < 0.05$) and vividness and fascination ($r = 0.873$, $p < 0.05$) were positively associated with VQ at the highest level (Table 2).

Regression analysis confirmed the importance of using naturalness and unity of the selected photos to describe the forest landscape characteristics. This suggested five possible models and showed that the important variables effecting VQ are Naturalness ($\beta = -0.555$, $F = 42.233$, $df = 1$, $p < 0.001$), Naturalness with unity ($\beta = -0.894$; $F = 29.533$, $df = 2$, $p < 0.001$). The final regression model could account for 62.1% of the data. From analysis of the correlation and regression results, naturalness and unity were found to be the most important descriptor for forest landscape types in visual preference evaluations (Table 3).

4. Conclusions

In their process of their accession to the European Union, countries have been dealing with some pursuits in terms of landscape and landscape character. According to this study results, any forest landscape character should be determined by its physical, social, and aesthetical attributes correspond to the spirit of an agreement and so it can be possible to get a way in the context of conservation, development and management in forest landscape planning.

Fig. 3. High scores of photos
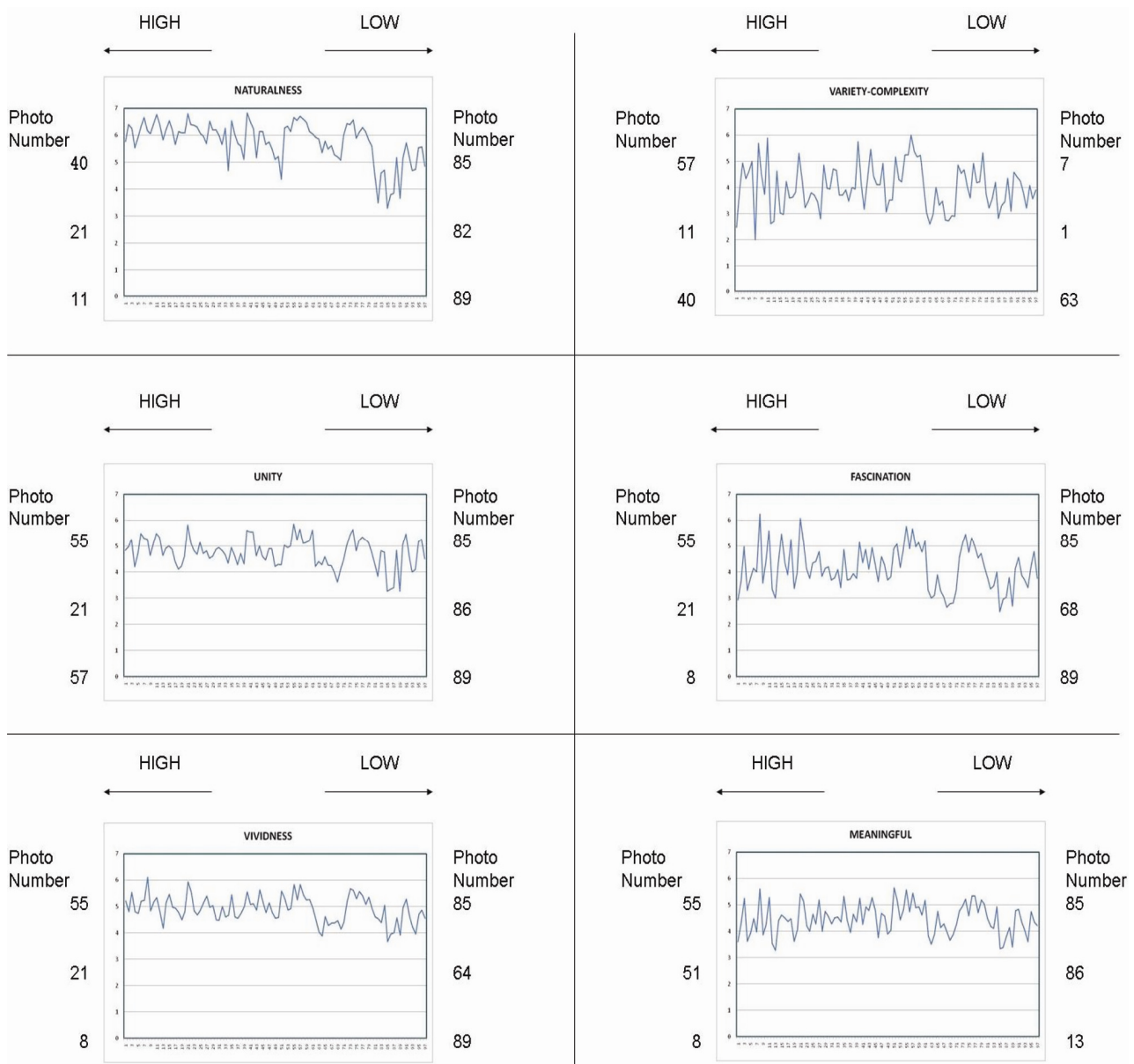
Fig. 4. Low scores of photo groups

Fig. 5. The semantic values of photographs

In Turkey, the classical understanding of forestry based on wood production has been gradually changing in recent years. Now, the forest ecosystem and its structure, its relation with surrounding peoples, biodiversity and wildlife, and tourism priorities are considered as concepts in the modern sense. In this new approach, forestry applications are based on not only on wood production, but also for meeting the expectations of people. In this respect, this research is important in terms of the balance between conservation and use to increase the value of oriental spruce forest landscapes.

The results of the study presented in this proceeding show the importance of the visual indicators associated with naturalness and unity in the formation of preference in oriental spruce landscapes. Therefore, these indicators can be useful within programs monitoring and assessing the implication of landscape management on visual landscape character. In order to assess the findings, there is a need for further research, which could include:

– Forest landscape types with different landforms and topography.
– Different viewpoints or vistas of the same forest landscape type.
– Relationships with landscape type and land use and ecosystem functions.
– Relationships with landscape type and silvicultural practices.

As a result, the landscape character types of mountain forests were discussed relating to landscape character that is integrated to forest or landscape management regarding to sustainability of forest visual resources as well as ecological and silvicultural characteristics. In this way, the "landscape aesthetics" attributes should be tried to be quoted in forestry applications. This study is important to determine landscape quality as well as management and silvicultural works in Turkey.

Table 2. The Correlations of Semantic Preferences

Correlations		Naturalness	Variety-Complexity	Unity	Fascination	Vividness	Meaning-fulness
Naturalness	Pearson Correlation	1	.393[**]	.772[**]	.611[**]	.643[**]	.447[**]
	Sig. (2-tailed)	.	.000	.000	.000	.000	.000
	N	97	97	97	97	97	97
Variety-Complexity	Pearson Correlation	.393[**]	1	.549[**]	.658[**]	.608[**]	.680[**]
	Sig. (2-tailed)	.000	.	.000	.000	.000	.000
	N	97	97	97	97	97	97
Unity	Pearson Correlation	.772[**]	.549[**]	1	.771[**]	.777[**]	.681[**]
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000
	N	97	97	97	97	97	97
Fascination	Pearson Correlation	.611[**]	.658[**]	.771[**]	1	.873[**]	.874[**]
	Sig. (2-tailed)	.000	.000	.000	.	.000	.000
	N	97	97	97	97	97	97
Vividness	Pearson Correlation	.643[**]	.608[**]	.777[**]	.873[**]	1	.818[**]
	Sig. (2-tailed)	.000	.000	.000	.000	.	.000
	N	97	97	97	97	97	97
Meaningfulness	Pearson Correlation	.447[**]	.680[**]	.681[**]	.874[**]	.818[**]	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.
	N	97	97	97	97	97	97
[**]Correlation is significant at the 0.01 level (2-tailed)							

Table 3. The Semantic Preferences of Identified of Forest Landscape Types

	Models	Unstandardized Coefficients β	Standardized Coefficients β	t	R	F	Signifi-cance
1	(Constant) **Naturalness**	14.484 −1.732	−0.555	9.343 −6.499	0.555	42.233	0.000
2	(Constant) **Naturalness** **Unity**	11.702 −2.792 1.870	−0.894 0.440	6.991 −7.032 3.458	0.621	29.533	0.000

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TURKIJOS KALNŲ, KURIUOSE AUGA KAUKAZINIŲ EGLIŲ (*Picea orientalis* (L.) LINK.) MIŠKAI, VIZUALUSIS KRAŠTOVAIZDŽIO APIBŪDINIMAS

E. Eroğlu, C. Acar

S a n t r a u k a

Turkijos miškininkystėje pastaraisiais metais tampa reikšmingesni šalies kalnuose augantys kaukazinių eglių miškai. Kaukazinės eglės yra viena iš svarbiausių medžių rūšių, paplitusių Juodosios jūros šiaurės rytų regione, Turkijoje ir Kaukaze. Jos sudaro pagrindinę „miško kraštovaizdžio" struktūrą, turinčią įtakos regioninių kalnų kraštovaizdžio savybėms. Straipsnyje bandoma aptarti vizualiąsias kaukazinių eglių miškų kraštovaizdžio savybes pasirinktame šiaurės rytų Juodosios jūros regione, Turkijoje. Studijos metu regiono miškų kraštovaizdžio panoramos buvo suskirstytos pagal tam tikrus

kriterijus, pavyzdžiui, pagal augalų rūšių sudėtį, veisles, spalvas, masines tuštumas, kraštus, geomorfologinius vienetus, uolotumą, kelius ir kt. Taip skirstant siekta identifikuoti kalnų miškų vizualiąsias savybes ir įvertinti miškų funkcinius planus ar kraštovaizdžio planavimo procesą. Miškų kraštovaizdžio savybės buvo vertinamos tiesiogiai bei iš skaidrių, pirmumas apibrėžtas reikšminiais faktoriais, kaip antai: natūralumas, įvairovė, kompleksiškumas, vienovė, patrauklumas, išraiškingumas, prasmingumas. Aptarti būdingieji kalnų miškų kraštovaizdžio tipai, kurie gali būti taikomi tvarkant miškus ar kraštovaizdį tvarumo principu, išsaugant vizualiuosius miškų išteklius ir ekologines bei miškininkystei svarbias charakteristikas.

Reikšminiai žodžiai: vizualusis kraštovaizdžio apibūdinimas, miško planavimas ir valdymas, kaukazinės eglės, Turkija.

ВИЗУАЛЬНЫЙ ПЕЙЗАЖНЫЙ ХАРАКТЕР ВОСТОЧНОЙ ЕЛИ (*Picea orientalis* (L.) LINK.) В ГОРНЫХ ЛЕСАХ ТУРЦИИ

Э. Эроглу, Дж. Аджар

Р е з ю м е

Горным лесам восточной ели (*Picea orientalis* (L.) Link.) в Турции в последние годы уделяется особое внимание. Восточная ель – одна из наиболее важных разновидностей, распространенных в северо-восточном черноморском регионе Турции и Кавказа как колхидский элемент. Ели формируют главную структуру лесного пейзажа, оказывающую воздействие на пейзажный характер гор области из-за ее распределения и землепользования.

В статье предпринята попытка рассмотреть визуальные свойства ландшафта горных лесов восточной ели в выбранном северо-восточном черноморском регионе Турции. Во время наших исследований панорама лесного ландшафта региона была поделена на основании определенных критериев, например, по составу видов, сортов, цвета растений, массовых пустот, краев, геоморфологических единиц, горных пород, дорог и др. Такое деление было предпринято для идентифицирования визуальных свойств горных лесов и оценки функциональных планов лесов или процесса планирования ландшафта. Свойства лесного ландшафта оценивались непосредственно или же с использованием снимков. Преимущество отводилось таким ключевым факторам, как естественность, разнообразие, комплексность, единство, привлекательность, выразительность, значимость. В результате были выделены характерные типы ландшафта горных лесов, которые могут применяться для целенаправленного ухода за лесами или ландшафтом, сохраняя при этом визуальные ресурсы лесов, а также важные в экологическом и лесоводческом отношении характеристики.

Ключевые слова: визуальный пейзажный характер, лесное планирование и управление, восточная ель, Турция.

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