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Full Length Research Paper

During the sustainable physical planning processes, the visual landscape quality of Turkish provinces (Ağrı and Iğdır)

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In Turkey, landscape planning has no legal status within the physical planning processes. Landscape planning approaches were used in some environment plans, long-term national park development plans, and sectoral plans like Wetland Management plans. Works on the assessment of visual landscape quality (VLQ) are required for both landscape planning and the determination of landscape quality following the European Landscape Convention. In this study, maps of visual landscape quality were produced at sub-regional scale by using visual resource management model by using geographic information system (GIS) and remote sensing (RS) data. Within the scope of preparation of the environment plan at a scale of 1/100000 in the area of study, some suggestions were put forward on strengthening the protection status of the areas with very high visual landscape quality by using visual landscape quality classes, and making some uses available for the areas with low visual landscape quality. In conclusion, the importance of landscape planning studies for natural resource management and physical planning was emphasized.

Key words: Landscape assessment, land use, visual quality, Turkey, environmental plans.

INTRODUCTION

In Turkey, physical planning process follows a hierarchy based on the development plans as regional, metropolitan, sub-regional and development plans, environmental plans, regulatory development plans and plans specific to a sector. Landscape plans are not formally made in our country. However, some landscape planning approaches are used in sectoral plans like long-term development plans, the reports of Environmental Impact Assessment, upper scale environmental plans being carried out in recent years, etc. Along with the approval of the European Landscape Convention (ELC) in Turkey, there is a need for countries to identify their landscapes and form landscape protection and management policies. Additionally, landscape planning should be integrated with the sectors like urban and district planning, farming, industry, settlement etc.

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Recently, environment plans have been made by the Turkish Ministry of Environment and Forestry in the provincial level at a scale of 1/100000. Within the scope of the plans carried out in Turkey, there are some shortcomings about the identification, analysis, interpretation of the landscapes and formation of landscape policies. However, along with the approval of the ELC, more analysis and assessments related to the landscapes during planning works are been carried out each day. There are several studies based on ecology and landscape ecology during the planning works at regional and sub-regional levels (Altan, 1982; Başal et al., 1983; Karadeniz, 1995; Şahin, 1996; Uzun, 2003; Uzun, 2009). Besides ecologically-based methods in landscape planning works, studies based on visual landscape analyses, have also an important place (Çakcı 2007; Şahin et al., 2007).

There may be some concerns regarding the fact that visual landscape analysis is not based on an ecological structure. Fry et al. (2009) stated in their studies that the criteria for the visual-based or ecological-base

classifications of landscapes are substantially common. In Turkey, among the works conducted within the scope of visual assessment of landscape, it is seen that visual assessments are rather performed at sub-scales. Çakçı (2007), in the city parks and Şahin et al. (2007) in the Akdağ National Park used sub-scale visual landscape assessment methods in their studies. The study of Şahin et al. (2007) covers a larger area than that of Çakçı (2007). In the planning works at regional and sub-regional levels, visual examination and interpretation of the landscape comprises one of the important stages for taking decisions about planning. However, it is known that there is a lack of method to be used at sub-regional or regional scales.

Human is the most important factor that affects and changes landscapes (Naveh, 1995). This change is the concrete result that is formed as a result of the interaction between nature and culture (Altman and Chemers, 1980; Smardon, 1983). It is inevitable to perceive the changes that are to be made with natural and cultural structured planning and management decisions as visual. The physical character of the landscape can be defined according to its visual features. Therefore, there is a need for an assessment that will provide us with environmental data which is required for developing the land use decisions and present the visual quality of the landscape (Jakle, 1987; Zhang et al, 2000).Tveit et al. (2006) states the benefits of visual landscape quality assessments as follows:

1. It provides transparent and clear data that can explain the structure of the landscape,
2. It facilitates the use of available data,
3. It helps in monitoring changes landscapes easily and it also helps in make decisions on planning.

The works to determine visual landscape quality was launched by the Bureau of Land Management (BLM) in the USA in 1960s (Kennedy et al., 1988; Ryan 2005). The studies conducted can be divided into two; the user assessments and expert-based assessments (Daniels and Vining, 1983; Tveit et al., 2006). Visual landscape quality assessments are conducted not only by landscape architects but also by various experts such as sociologists, computer scientists and psychologists (Ryan, 2005). As a result of these studies that are conducted by different experts, different named models such as visual quality, scenic beauty and visual impact have emerged (Daniel and Boster, 1976). There are three models that have been used mostly in visual landscape assessments. They are landscape character assessment (Swanwick, 2002), scenic beauty estimation (Daniel and Boster, 1976) and visual resource management which is chosen as the method of this study (BLM, 1980). The BLM in USA has explained the necessity of visual resource management model; landscapes that have different visual quality need different management forms and assessing the visual quality of landscape is a subjective task. The need has arise to use ecological and visual-based criteria in explaining the main features of landscape such as landform, color, water surface and scarcity, to increase the objectivity (Fry et al., 2009).

Considering all this reasons, it will be right to conclude that, visual resource management is a suitable model for assessing visual landscape quality and managing the resources.

Bishop and Hulse (1994) attribute the reasons of GIS choice to the fact that the assessments are more objective and cost of operation is much cheaper. The usability of GIS in the visual landscape assessment has been examined in various studies. Steinitz (1990) stated that GIS can be applied to the visual landscape assessment effectively. Bergen et al. (1993) expressed that the structures that may have an effect on the visual landscape quality can be observed and directed. Crawford (1994) compared GIS with manual planning studies that are conducted with remote sensing data and concluded that important benefits can be obtained. Panagopoulos (2001) expressed that GIS presents the image as a whole to the planners and make it much easier to decide for them.

The purpose of this study is to develop a method related to visual landscape analysis during the physical planning processes of the provinces Iğdır and Ağrı, and to find out how to use these analysis results in GIS to make decisions at sub-regional scale. The scope of the study covers adopting “visual resource management” method used by the BLM (2010a) at sub-regional scale to the research area, and making decisions about planning and management for visual landscape quality classes determined under the method.

MATERIALS AND METHODS

Case area includes the provinces Ağrı and Iğdır, which are located in the northwest part of Turkey (Figure 1). The province Ağrı, situated in the Eastern Anatolia Region, shares land borders with the Islamic Republic of Iran to the east, Erzurum to the west, Kars and Iğdır to the north, Van and Bitlis to the south and Muş to the southwest. It is a rough plateau at an altitude of 1500 to 2400 m and the Murat River flows through it. It is surrounded by mountain ranges in the north and southwest. Major mountains are Mt. Ararat, Little Ağrı Mountain, Kösedağ, Süphan Mountain. As for climate, Ağrı province has the most and roughest continental climate. It is very cold and snowy in winters and very hot and arid in summers. Spring and autumn are very short. The total population of the province, with an area of 11376 km^2, is 530.879 according the 2007 Census (Anonymous, 2008a). Iğdır province is founded on a plain called “Sürmeli Çukuru” on the outskirts of Mt. Ararat, bordering Ağrı and Kars provinces, at the intersection of Armenia, the Nakhchivan Autonomous Republic and Iran. Mt. Ararat is the highest mountain in Turkey. Iğdır plain and its surroundings have continental climate close to the Mediterranean climate. The area of the province is 3588 km² and the average height/altitude of the Iğdır Plain ranges between 800 to 900 m. 26% of the province is plain, and 74% is mountainous. Iğdır province shares the border with the Aras River and Armenia to the north and northeast. The population of the province is 181866 according to the 2007 Census (Anonymous, 2008b).

These provinces (Ağrı and Iğdır) were selected for this study

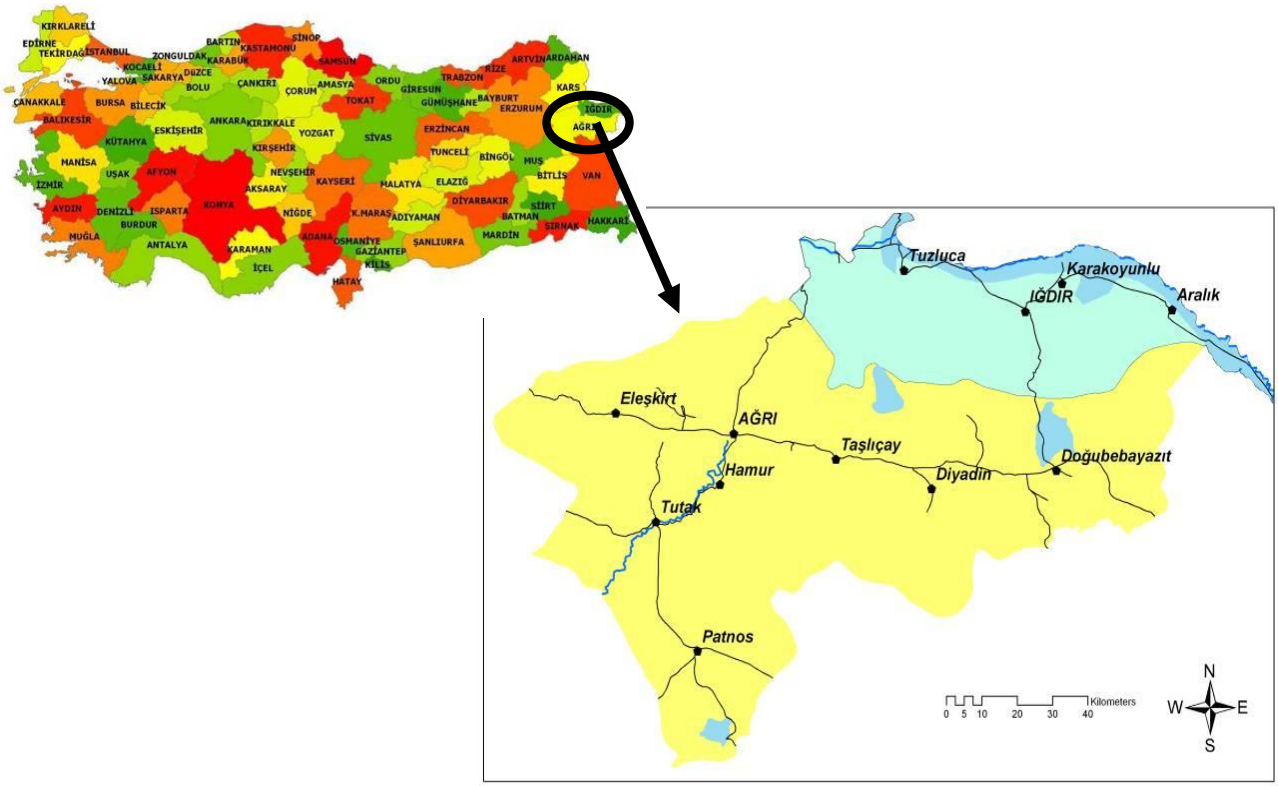


Figure 1. Study area.

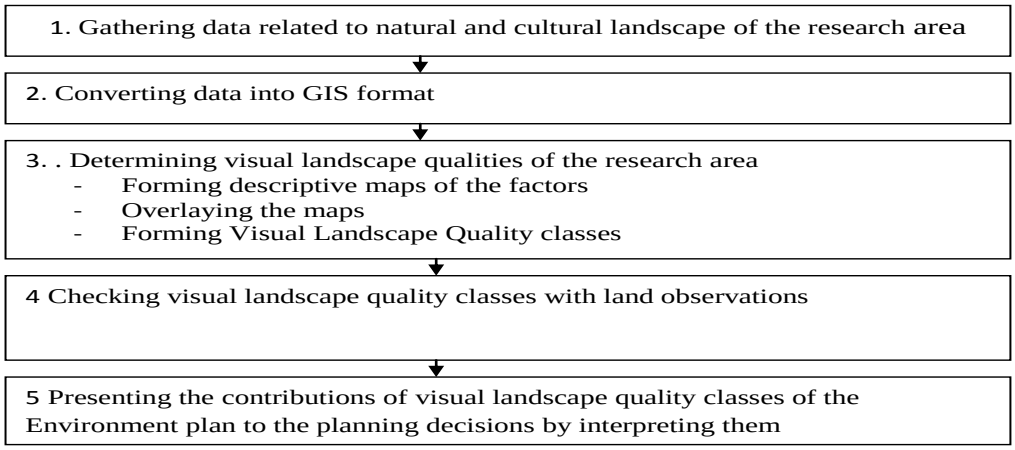


Figure 2. Method flow diagram.

since the Turkish Ministry of Environment and Urbanization carries out the Environment Plan at a scale of 1/100000 in this region and to make an assessment related to the landscape visual quality in this plan. Research method was carried out in a successive 5 stages (Figure 2).

During the 1st stage, data on the research area were gathered. In this context, GIS databases of the Turkish Ministry of Forestry and Water and CORINE (Coordination of Information on the Environment Land Cover, 2006) land cover databases were used. Additionally, related data were gathered from the administrators of the province and districts during land observations.

During the 2nd stage, the data obtained was converted into the GIS format and mapped based on the visual landscape resource management model developed by the Bureau of Land Management (BLM, 2010b) in the USA. Ayad (2005) emphasizes that interpreting the remote sensing data with their GIS is the fastest and low-cost way of making decisions at regional scale.

During the 3rd stage, maps were produced to explain seven factors including landform, vegetation, water, color, influence of adjacent scenery, scarcity and cultural modifications. During the formation of these maps, the criteria related to the interpretation of the factors in the observation forms (Table 1) developed by BLM

Table 1. Interpretation of criteria in visual landscape quality method (BLM, 2010b).

Key factor	Rating criteria	Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers	5
	National Park, wetland, wildlife development areas in high elevation	
	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional.	3
	Elevation groups; 2000 to 2500 m, 2500 to 3000 m, 3000 > m	
	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features	1
	Elevation groups; 0 to 1500 m, 1500 to 2000 m	
Vegetation	A variety of vegetative types as expressed in interesting forms, textures and patterns	5
	Forests and semi-natural areas, wetland, coastal lagoons	
	Some variety of vegetation, but only one or two major types	3
	Water courses, pastures, agricultural areas, artificial, non-agricultural vegetated areas	
	Little or no variety or contrast in vegetation	1
	Open spaces with little or no vegetation	
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape	5
	Dam, wetland, river, stream	
	Flowing, or still, but not dominant in the landscape	3
	Creek	
	Absent, or present, but not noticeable	0
	Other areas	
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields	5
	Forests and semi-natural areas, wetland, coastal lagoons	
	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element	3
	Water courses, pastures, agricultural areas, artificial, non-agricultural vegetated areas, open spaces with little or no vegetation	
	Subtle color variations, contrast, or interest; generally mute tones	1
	Artificial surfaces	
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality	5
	Elevation: more than 15 km from motorway, more than 2500 m, and pastures,	
	Adjacent scenery moderately enhances overall visual quality	3
	Between 5 and 15 km from motorway and agricultural areas	
	Adjacent scenery has little or no influence on overall visual quality	0
	Other areas	
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.	5
	National park, wetland, wildlife development areas, inland marshes, forestry, lake, natural sites and elevation > 2500 m	
	Distinctive, though somewhat similar to others within the region	3
	Elevation: 2000 to 2500 m, shrub and/or herbaceous vegetation associations	

Table 1. Contd.

	Interesting within its setting, but fairly common within the region	1
	Other areas	
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony	2
	Archaeological sites	
	Modifications add little or no visual variety to the area, and introduce no discordant elements	0
	Villages, agricultural areas	
	Modifications add variety but are very discordant and promote strong disharmony	- 4
	Urban fabric, Industrial, commercial and transport, Mine, dump and construction sites	

(2010b) were adapted and used according to the sub-regional scale. In order to identify the factors, three criteria were used for each factor. The effectiveness of the criteria used on the model was taken in their original form.

Expert and user assessments can be used for the models aiming to determine the visual quality of the landscapes. In this type of studies, an expert or a group of experts try to identify the current situations of the landscapes (Kaplan and Kaplan, 1989). Experts evaluate and compare the current situations of the physical elements comprising landscape (Daniel and Vining, 1983).

In this study, user assessments were not used due to the size of the land and timely limitations; instead, expert assessments were taken as basis to evaluate the factors in the method (Table 1). In Table 1, the criteria related to the data from which the factors were interpreted and how the scores of visual quality were given are shown under the original criteria.

For the criteria that explain the landform factor; national parks, wetlands, and the other protected areas maps that are in the database of the Ministry of Forestry and Water (MFW) were employed, and for the assessments of height changes, General Command of Mapping (GCM) 1/100000 scaled topographic maps were used. For the criteria explaining the vegetation factor, CORINE land cover 2006 data that are prepared by the MFW was employed. For the criteria that explain the water factor, the maps from the database of the MFW, the maps that include dam, lake, wetland, river, stream and creek and also 1000 m protection zone border, which is total for absolute and short distances that are stated in water pollution control regulations, were used. For the criteria that explain the color factor, the classification, which is the CORINE land cover type, regarding artificial green lands, agricultural areas, forest and semi-natural areas, wetlands and water structure were used. For the criteria explaining influence of adjacent scenery factor, arterial roads and the front, middle and far images of the roads that occupy 1/100000 scaled topographic maps by the GCM were employed. Moreover, height difference that may affect the visibility distance was marked. Agricultural lands with high visibility have been used to detect adjacent scenery in the CORINE land cover map. For the criteria explaining the scarcity factor, the maps including national parks, wildlife protection areas, natural protected areas, wetlands, continental reeds and lakes that are found in the MFW database was applied. Also, for the forest lands that cannot be observed frequently, stand maps from the MFW database was used. Additionally, scrubs and grasses from the group of CORINE land cover and height differences that are taken from GCM 1/100000 scaled topographic maps was used. While assessing the height values, the ones that are out of the average height groups are marked. For the criteria that explain cultural modifications factor, while the MFW takes cultural positive value from the maps that is digitized, the agricultural areas from CORINE land cover groups was evaluated as zero. Structural areas (excluding non-agricultural, artificial green areas) from CORINE land cover groups was evaluated as negative points as they are going to diminish the visual resource value.

The maps related to these factors obtained as a result of these procedures were overlaid. As a result of the overlays performed by using ArcGIS9.2, the areas were divided into four visual landscape qualities (VLQ) in line with the total scores of the areas. Those scoring 0 to 7 were evaluated as Class 1 Low VLQ, those scoring 8 to 15 Class 2 Moderate VLQ, those with 16 23 points Class 3 High VLQ, and those with 24 and more Class 4 Very High VLQ.

During the 4th stage, in order to prove the accuracy of the result map, visual landscape quality scores obtained from the 20 randomly-chosen points which are closer to the main transport lines of Ağrı and Iğdır and those obtained by filling out the forms of BLM (2010a) in the field/area were divided into four visual landscape qualities. Those scoring 0 to 9 points were assessed as Class 1 Low VLQ, those with 10 to 16 points Class 2 Moderate VLQ, those with 17 to 22 points Class 3 High VLQ, those with 23 points or more Class 4 Very High VLQ. Then, with the scores obtained, the reliability of the visual landscape quality scores obtained by overlaying the maps was statistically proved.

During the 5th stage, some suggestions were made according to the visual landscape maps during the decision-taking process of environment plan at a scale of 1/100000 for the provinces Ağrı and Iğdır.

FINDINGS

In the visual quality assessments that was conducted according to the visual research management methodology in Ağrı and Iğdır, analysis for seven criteria; landform, vegetation, water, color, influence of adjacent scenery, scarcity, cultural modifications, were made and maps for each criteria were obtained (Figure 2).

Landform

It is stated in several studies that changes in land morphology and existence of natural landscapes increase

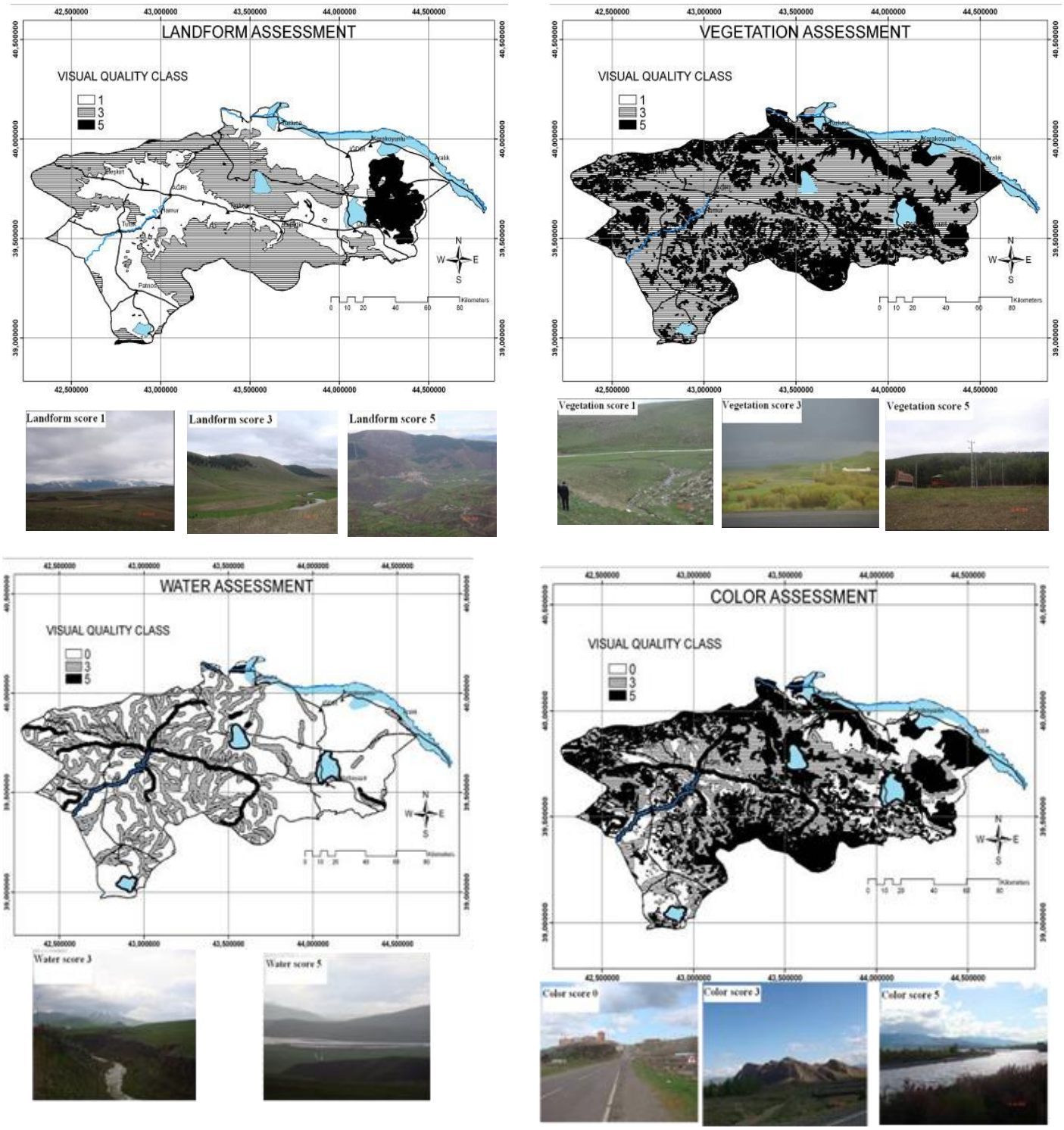
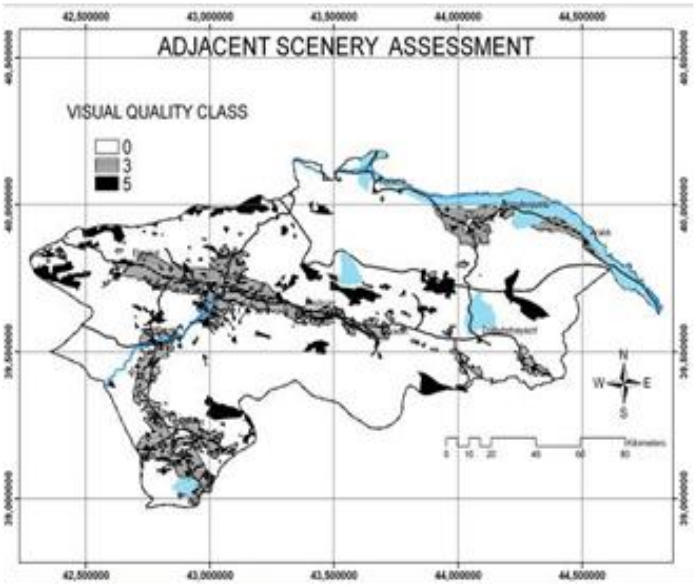
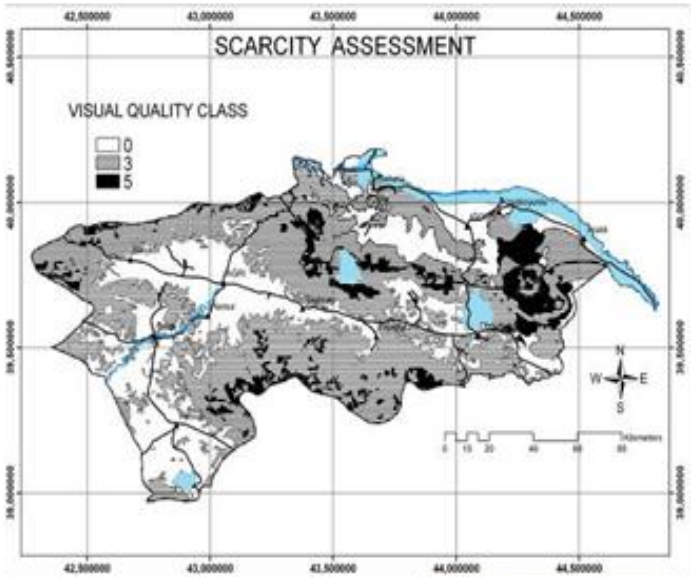


Figure 3. Factors that are used to visual quality assessments.

visual quality (Mitchel, 1991; Crawford, 1994; Arriaza et al., 2004; Wu et al., 2006). Due to the areas with the characteristics of a universal monument such as steep slopes and high mountains, landform is important to determine landscape characteristics. Mt. Ararat, which is located in the east of the research area, is the most distinct example of this. The areas with high visual values in the assessment of landforms are shown in Figure 3. Accordingly, it is seen that Iğdır province has a higher VLQ value than Ağrı province in terms of landform. Also, the environs of Mt. Ararat are the areas with the highest visual quality value for both provinces.





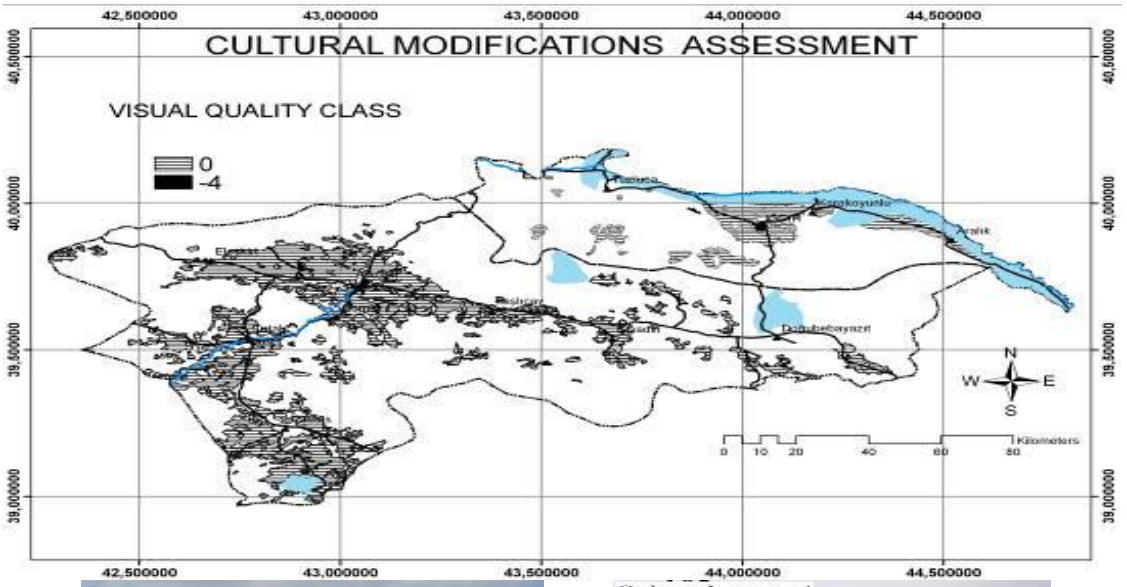


Figure 3. Continued.

Vegetation

It is one of the important determinants of form and texture that are important characteristics creating difference in visual perception (Ode et al., 2008). It also provides visual diversity due to its seasonal changes. When vegetation cover was considered, Iğdır province has more visual quality than Ağrı province. In terms of vegetation cover, general VLQ value of the area is seen as 3 points (Figure 3). Visual landscape quality is high in the north and south parts of Ağrı province. As for Iğdır province, VLQ is determined to be increasing along northwest and southeast.

Water

Most of the studies conducted on landscape preferences and examining the effects of water show that water gains appreciate. It comprises one the important assessment criteria in visual quality assessment studies (Ode et al., 2008). Water is a basic landscape element that increases coherence, imageability, naturalness in visual perception (Hammitt et al., 1994; van Mansvelt and Kuiper, 1999; Kuiper, 2000; Palmer, 2004; Ode et al., 2008). The region is rich in water. A part of Aras basin, one of the 25 river basins in Turkey, is located within the borders of Iğdır province. The important parts where the Euphrates and Tigris basins originated are located within the borders of Ağrı province. As seen, Ağrı and Iğdır have high visual quality value in terms of water factor (Figure 3). Visual quality value of Ağrı in terms of water factor is higher when compared to Iğdır. The places where visual quality is high in terms of water are mountainous areas that have the spring parts of the tributaries and the parts where wetlands and lakes are located.

Color

It is the basic component of landscape and can show seasonal or periodical changes. Therefore, due to its diversity, contrast and harmony, it can get high scores. It is known that land cover patterns reiterating on land cover have similar colors and that differences in land cover patterns lead to different colors in land patterns (Kaplan and Kaplan, 1989). Additionally, the seasonal changes appearing in vegetation cover also lead to the formation of different colors on land cover and gain importance in putting forward the seasonal effect of visual quality (van Mansvelt and Kuiper, 1999; Hendriks et al., 2000; Ahas et al., 2005; Jessel, 2006). As shown in Figure 3, the region has quite high visual values in terms of color. Especially, the southeast and northwest parts of the provinces (Ağrı and Iğdır) have high visual landscape values in terms of color. While visual landscape value is high in the northern and southern parts of the province Ağrı, visual landscape value is high in the southeast-northwest of the province Iğdır.

Influence of adjacent scenery

Depth of perspective and panoramic view is evaluated as one of the basic elements affecting image. It is proved to affect visual quality in several studies (Weinstoerffer and Girardin, 2000; Germino et al., 2001; De la Fuente de Val et al., 2006). In these studies, proportion of open land, viewshed size and depth of view were measured. The areas with the highest visibility in terms of depth and width of perspective of the area in the panoramic view were evaluated with the highest scores. The areas with a visibility distance of 15 km and more from the main highway and the areas above the average altitude of the area (above 2500 m) were evaluated as the areas with the highest visual value in terms of panoramic view (BLM, 2010b). Accordingly, Ağrı province has higher scores than Iğdır province (Figure 3).

Scarcity

Scarcity of an area is identified with the existence of landscape elements which are different from the uncommon view of that place. These landscape elements can be protected natural areas, scarce high altitude areas in that area, rare vegetation covers and water surfaces and man-made cultural elements (Green, 1999; Coeterier, 2002; Ode et al., 2008). The protected areas and forestlands in the region were evaluated as the areas with high scored visual quality since they are rare. Also, wetlands and lakes got high scores in terms of scarcity factor. Due to the terrestrial dunes in the northeast of Iğdır province, Iğdır province has higher visual quality value than Ağrı province (Figure 3).

The effects of cultural structure on landform, water, vegetation and structuring are evaluated in this factor. In the researches where cultural indicators of landscape were studied, density of cultural elements was emphasized (van Mansvelt and Kuiper, 1999). Structuring that increases the landscape value in the region is not seen much in terms of cultural modifications. Current land uses have no significant effect on cultural landscape. Archeological sites should be considered at sub-scales while making managerial decisions, although they do not have an effect on the total score since they cover very small amount of surfaces in the area at a scale. On the other hand, industrialization rate in the region is almost nonexistent, so no negative effects are seen due to this fact. For these reasons, it is observed that cultural modifications have neither positive nor negative effects on the VLQ (Figure 3).

With the interpretation of these seven factors within the framework of the assessment criteria previously

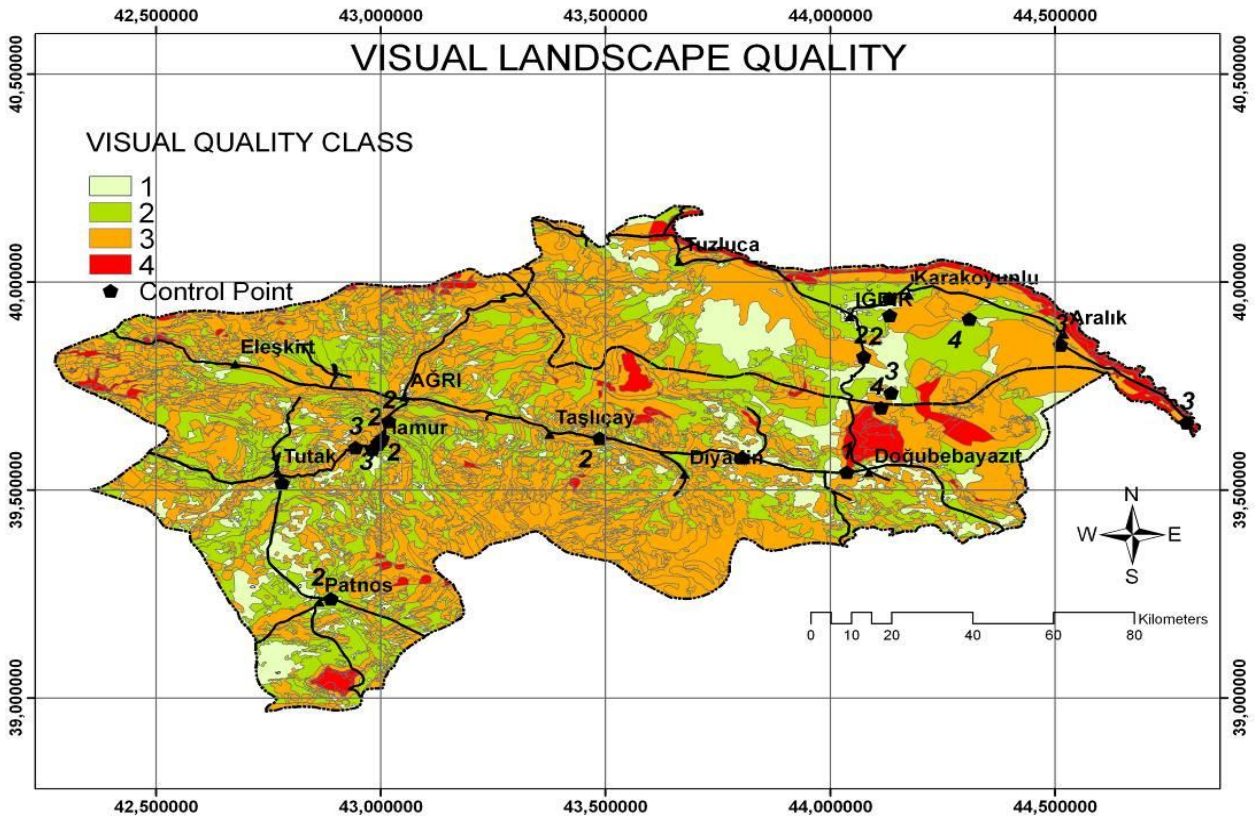


Figure 4. Visual landscape quality classes.

mentioned, maps were produced in the GIS format for each factor. Ultimately, the VLQ map of Ağrı and Iğdır provinces were produced by overlaying these seven maps (Figure 4).

According to the visual landscape quality classes of Ağrı province that were obtained by overlaying, 15.65% comprises the areas with class 1 VLQ, 34.18% class 2 VLQ, 47.25% class 3 VLQ and 2.91% class 4 VLQ. As seen, the districts that have all the visual landscape quality classes in Ağrı province are Doğubeyazıt and Patnos. Diyadin and Eleskirt have a small amount of class 1 VLQ. The province mainly has class 3 VLQ.

According to the visual landscape quality classes of Iğdır province, 17.2% comprises the areas with class 1 VLQ, 29.9% class 2 VLQ, 45.3% class 3 VLQ and 9.2% class 4 VLQ. Tuzluca district comprises all the quality classes. Therefore, managerial decisions should be made by taking the high sensitivity of Tuzluca district into consideration. Aralık district is the one with the highest VLQ in the province.

In order to control the accuracy of the method at sub-regional level (BLM, 2010a), the scores for the assessments conducted in the field on the check points were shown in Figure 4. No statistical difference was seen as a result of the comparison between the quality values obtained from the observations carried out for control on 20 points in the field and visual quality values of the last map obtained as a result of the overlays by implementing VRM produced by the Bureau of Land Management in the USA (BLM, 2010b) into the research area via paired samples t test ($t= -1.92$; $p= 0.07$). This proves that the VLQ map produced by overlaying the seven maps could be used for planning or different purposes.

DISCUSSION

According to Mitchel (1991), Crawford (1994), Arriaza et al. (2004) and Wu et al. (2006), increase in visual quality in rural areas is provided by changes in topography, increase in the presence of water and redundancies in the amount of natural areas; however, some cultural landscape elements reduce this effect. Similar judgments were passed during land observations. Additionally, in the study's method, the seven factors including landform, vegetation, water, color, influence of adjacent scenery, scarcity and cultural modifications used in the visual assessment of the landscape, comprises these criteria.

The method used by the BLM (2010a) is mostly seen suitable for assessment studies at sub-scales. It was determined that the method was used particularly for the Environmental Impact Assessment reports (VRM Africa, 2008). It was proved that the method could also be used

for the assessment of visual landscape quality at sub-regional and regional scales. Crawford (1994), by using remote sensing data, showed that visual assessment of landscape quality could be performed. By using digital height model along with remote sensing data, similar results were obtained in a shorter time when compared to the former classic visual quality assessment studies. In this study, the accuracy of the visual landscape quality assessment was proved by using the GIS and remote sensing data in a sub-region with a total area of 14 964 km^2 and this saved an important amount of time.

If the sensitivity level analysis is carried out regarding the criteria such as user type, number of users, environmental awareness of users, pressure to use the areas nearby for the specified visual quality classes, which is another stage of visual resource management and are determined in addition to the determination of VLQ, it will contribute to the planning decisions more, however, this kind of analysis is not mentioned for the scale to be worked on since these kind of studies require detailed field study.

VLQ is used as data that identifies landscape in the studies with different purposes. For example, in a study conducted by Ramos et al. (1980) in Granada, visual quality and visual fragility combinations were interpreted. The zones with high quality and high fragility were determined to be the areas that should be protected first, those with high quality and low fragility were determined to be the areas available for activities that basically require landscape quality; those with low quality and fragility were determined to be the areas available for the settlement of unattractive activities or activities with strong impacts (Anonymous, 2000).

As of 2010, an environment plan has been carried out in the provinces Ağrı and Iğdır at a scale of 1/100000. As required by the concerned plan and as part of ELC, ecological and visual analysis of landscapes should be conducted within the borders of the area. This study comprises only a part of landscape planning approach or a landscape planning to be carried out regarding the area. In this context, landscape ecology and ecology based approaches such as landscape identification, determining of landscape structure and functions, visual landscape analysis should be carried out in the area of study (Uzun et al., 2010). By using visual landscape quality classes that comprise only a part of these studies, and that are obtained as a result of the method used in the research area, some suggestions were made related to the planning and landscape management. However, it is suggested that ecologically-based analysis should be conducted related to the area to interpret these decisions and they should be evaluated along with the visual analysis results.

Class 1 low VLQ areas

Planning decisions requiring big changes can be made in the areas where visual quality of the landscape is low. For example, if this kind of areas shows ecological suitability and bearing capacity of the landscape is high, it therefore mean, these are suitable areas for structuring and industrialization. It is acceptable for these areas to have big changes in landscape character. This kind of changes can have a dominant character in the overall landscape character. However, in the direction of the decisions to be made at upper-scales, along with the “visual landscape assessments” at sub-scales, the least visual disturbance principle should be used for the land uses to be included. Class 1 VLQ is high in the south and southwest part of Iğdır province and northwest, west and south west parts of Patnos and Doğubeyazıt districts of Ağrı province. During the decisions to be made regionally, this kind of areas could be used to meet the needs of different sectors such as industry, settlement etc., regarding the criteria such as transport, accessibility etc.

Class 2 moderate VLQ areas

The existing landscape character should be partly protected in the areas where VLQ is moderate. Sudden and adverse uses of the capacity of landscape character should be avoided in case of the changes in landscape character. The effects of the decisions to be made on planning and management can be observed in the area; however, it should not be in a way to play a dominant role in the overall landscape character. The changes to be made should be integrated with the existing landscape character and they should be perceived as the repetition of the dominant elements. For example, main highways and dams are some of the uses that could take place within these areas. The areas with class 2 visual quality have spread almost all over the entire area. Particularly, in Iğdır province and Patnos and Doğubeyazıt districts of Ağrı province, the main highways pass through the class 2 areas. It is suggested that natural gas and oil pipe lines, an important land use in the area, should be built on this kind of areas or the areas with low quality class. If compulsory, the development direction of the settlements could be towards the areas with moderate quality.

Class 3 high VLQ areas

The existing landscape character should be protected in the areas where visual quality of the landscape is high. For example, protection measures should be taken to provide continuance of the existing land uses such as farming, pastureland and forests in the current situation of the area. The changes to be made in the landscape character should not be noticed. The traces of the concrete results to be created by the planning decisions should be observed; however, they should be attuned to the landscape character. All the changes to be carried

out should comply with the form, color, style and texture of the existing landscape and they should not cause changes in the land topography. The areas with high VLQ within the research area are densely situated in the south, northeast and north. This kind of areas is mostly seen in the mountainous parts of the area, near surroundings of the wetlands and lakes, and near the tributaries. The landscape character should not be used beyond its capacity in such areas and ecological analyses should be evaluated in detail. The decisions to be made about this kind of areas could lead to irrevocable problems. For this reason, it is suggested that the sub-scale planning decisions to be made for this kind of areas should be made following detailed analyses and they should support protection more.

Class 4 very high VLQ areas

It is important that the existing landscape character in the areas where visual quality of the landscape is very high should be protected within the protected area system. Since these areas have a very sensitive ecological structure, the decision to be made have to be for protection. It is of vital importance to make decisions by using ecological analyses for transferring the existing landscape character in the areas to the next generations, for example, construction of the roads to facilitate intervention in case of disasters such as fire. The traces of the planning decisions to be made should not be perceived in the area. It is suggested that the protection status of the terrestrial dunes in the north of Iğdır, Mt. Ararat and its surroundings near the borders of Doğu Beyazıt district, the areas in north of Taşlıçay and south of Patnos should be strengthened. Besides these areas having an important value at sub-regional scale, it is also important for the other areas unnoticed due to the scale to be planned for protection by using detailed ecological and visual analyses to be conducted at sub-scales.

Conclusions

This study revealed that methods such as visual source management, etc., are those to be used in the visual assessment of landscape. The method used in the research can be used for landscape planning with different purposes. It can be used for making decisions about tourism and recreation, the studies on strategic environmental assessment and it can also be used as a base for regional, sub-regional, basin plans, and environment plans to be carried out at provincial level.

Finally, as stipulated in the European Landscape Convention, landscape policies should be produced for different sectors. Within the scope of the study, during the physical planning process (VLQ study) one of the important parts of landscape planning was implemented in Ağrı and Iğdır provinces and some suggestions were brought forward about planning. These kinds of studies should be officially included in all planning works.

Moreover, it is thought that VLQ assessment studies could be used for the decisions to be made on the management of natural resources in the joint studies to be conducted under the European Landscape Convention along with Iran neighboring the provinces of Ağrı and Iğdır.

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