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DEVELOPMENT OF SECTOR-BASED ECOLOGICAL LANDSCAPE GUIDES WITHIN THE FRAMEWORK OF EUROPEAN LANDSCAPE CONVENTION. THE CASE OF SUGLA LAKE IN TURKEY

O. UZUN[a]*, G. C. CIFTCIOGLU[b], F. E. NEMUTLU[c], E. F. ILKE[d], S. ACIKSOZ[e]

[a]*Department of Landscape Architecture, Faculty of Forestry, Duzce University, 81 620 Duzce, Turkey*
E-mail: *pmosmanuzun@gmail.com*; *osmanuzun@duzce.edu.tr*
[b]*Department of Landscape Architecture, Faculty of Architecture, European University of Lefke, 10 Lefke, Turkey*
[c]*Department of Landscape Architecture, Faculty of Architecture and Design, Canakkale Onsekiz Mart University, 17 020 Canakkale, Turkey*
[d]*Department of Landscape Architecture, Faculty of Agriculture, Ankara University, 06 110 Ankara, Turkey*
[e]*Department of Landscape Architecture, Faculty of Forestry, Bartin University, 74 100 Bartin, Turkey*

ABSTRACT

According to the European Landscape Convention, each contracting country, ratified the ELC, is responsible for integrating its landscape protection, planning and management strategies into other sectoral plans such as urbanisation, agriculture and forestry. Purpose of this study is to develop sector-based (agriculture, forestry and urbanisation) ecological landscape guides by evaluating natural and cultural landscape components of the region of Sugla lake located in Turkey. Major objectives of the study include: determination of natural and cultural landscape characteristics and analysis of the functions (e.g. erosion process, infiltration, habitat and biodiversity). A range of dataset (e.g. geological and coordination of information on the environment land cover maps and questionnaire) was used to conduct the study. Method of the study consists of three stages: inventory, analysis and assessment. Major natural (e.g. flora and habitat distribution) and cultural (e.g. historical important areas and cultural heritage) landscape components of the region were identified and mapped in the first stage. Natural (erosion process, infiltration and biodiversity) and cultural (e.g. cultural

* For correspondence.

heritage) landscape functions, which form the basis of the sector-based ecological landscape guides, were analysed and mapped by adapting a landscape ecology-based approach in the second stage. The ecological landscape guides for forest, agriculture and settlement sectors were determined by overlapping the delineated maps (e.g. erosion risk, infiltration and habitat) in the final section. We hope that the sector-based ecological landscape guides can be an effective tool particularly in the management of natural resources embedded in each sector by policy makers.

Keywords: ecological landscape guide, landscape planning, Sugla lake, Turkey.

AIMS AND BACKGROUND

'Landscape' means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors[1]. Human is an indispensable part of the landscape. For this reason it is quite important to protect, plan and manage the landscape in terms of enhancing the quality of both individuals and society life. In this context, several definitions of landscape planning have been made until now. For instance, according to International Union for Conservation of Nature[2]; landscape planning is a strategical approach which contributes to the sustainable livelihoods, protection of nature and biological diversity and ensuring the food production and its safety at the spatial level. European Landscape Convention (ELC) (Ref. 1), which is a legal tool developed by the European Union, defines landscape planning as further actions whose aim is to enrich the present landscapes, enhance the broken landscapes and create new landscapes. Landscape planning should be integrated with various planning strategies and policies (environment and nature protection, agriculture and economy) in order to achieve the stated goals (protecting the biological diversity and food production)[1,3,4].

Landscape ecology is one of the most common approaches used for landscape planning. Landscape ecology is a science that examines the mutual interaction between the structure of the landscape (landscape pattern and associated components) and functions of the landscape (the capacity of a landscape maintenance). Principles based on landscape ecology can be used in land use planning[5]. Some scholars[6,7] emphasise that landscape metrics make a great contribution to practical and theoretical parts of landscape planning. There are various studies on using landscape ecology for landscape planning in Turkey[3,4,8,9]. The concept of ecosystem services has stood out in terms of stating the advantages of ecosystem and categorising it in recent years. Ecosystem services are defined as situations, process, functions and productions that ecosystem offers in order to enhance people welfare and maintain their lives. Four function groups of ecosystem services consist of resource provider, organisation, supporter and cultural services. People make use of resource provider and cultural services directly while organisation and supporter services are used indirectly[10,11]. The concept of ecosystem services has been used in management and planning of natural resources in recent years[12–16].

The main patterns of a landscape consist of agriculture, forest and settlement lands. Functions of a landscape can be analysed based on biological diversity, habitat functions, infiltration, erosion process, landscape functions and cultural sources. For instance, potential erosion[4,17–25] and infiltration capacity[4,25–35] of a landscape is stated on the basis of several studies. Habitat, biological diversity and cultural functions of the landscape help not only to create various and culturally rich habitats but also to enrich the landscape pattern. If the dominant pattern of a landscape consists of agriculture, forest and settlement lands then the results of analysis and evaluation must be integrated with the related sectoral plans. In this context, various landscape guides relating to various sectors are prepared today.

Sector-based landscape guides based on ecology are a tool that is useful for making the most reasonable decisions on the basis of the sector and informing the decision makers about certain issues (sustainable usage of natural resources, protection of biological diversity, food production and sustainable life). Landscape guides will be the main document that the decision makers will apply especially for landscape management on sustainable usage of natural resources, forming policies and related issues.

Within this context, the purpose of this study is to develop sector based (agriculture, forestry and urbanisation) ecological landscape guides by evaluating natural and cultural landscape components of the vicinity of Sugla lake located in Turkey. Major objectives of the study include: determination of natural and cultural landscape characteristics and analysis of the functions (e.g. erosion process, infiltration, habitat and biodiversity). The dominated land use types in the region are agriculture, forest and settlement. This study is a part of the project entitled Landscape Management, Protection and Planning Project for Konya Province and Sugla lake, supported by the Ministry of Environment and Forestry of Turkey between 2008 and 2010.

EXPERIMENTAL

The study area of Sugla lake and its surrounding landscapes is located in Konya Province of Turkey (310°52′43″–320°16′02″ east meridians and 370°10′46″–370°29′46″ north latitudes) and covers a 74.152 ha area[4] (Fig. 1). Major datasets used in this study include: geological, topographical and forest management maps with a scale of 1/25 000, CORINE landcover map, questionnaire and interviews conducted with target groups, and literature review.

The method of the study consists of three stages: inventory, analysis and evaluation.

Inventory. Major natural (e.g. flora, fauna, soil, hydrology, landform, habitat types and distribution) and cultural landscapes (e.g. demographic and socio-economic structures, current land property and administrative management statues, infrastructure, arcaeological and historical important areas, and cultural heritage) components of the region of Sugla lake were identified and mapped[4].

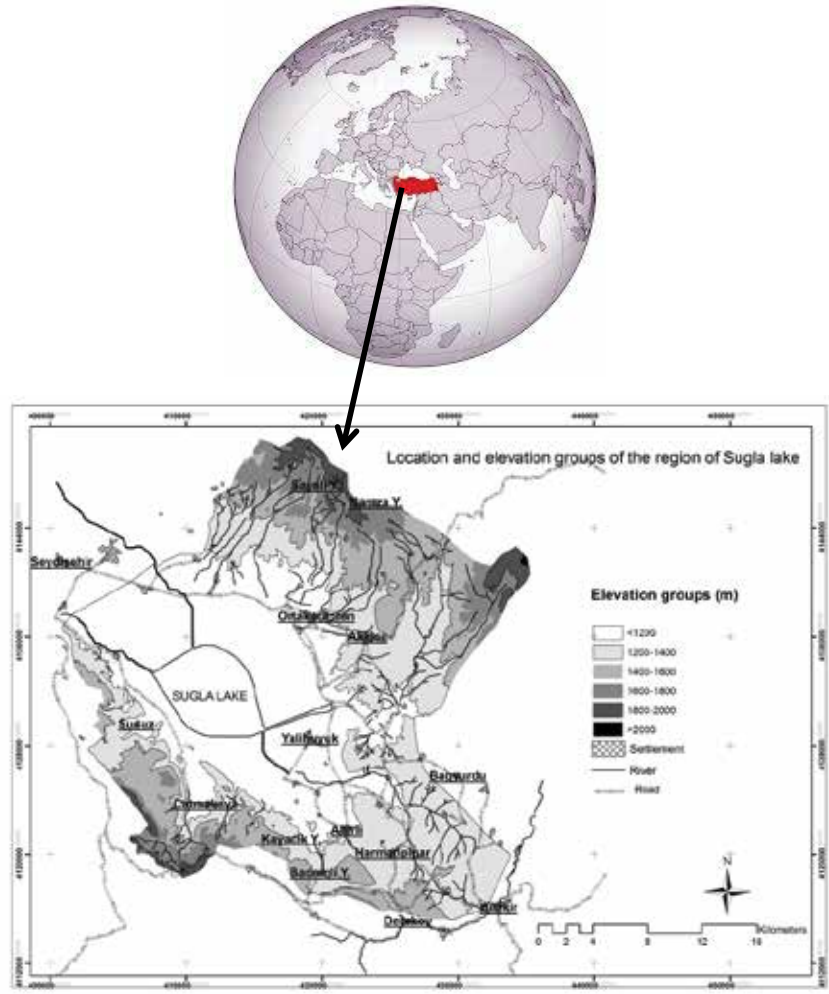


Fig. 1. Location of the region of Sugla lake[33]

Experimental analysis. Cultural landscape analysis for Cultural Ecosystem Services (ES); habitat and biological diversity analysis for Resource Provider ES; infiltration analysis for supporter ES and erosion analysis for Organisation ES are done in order to create the maps and decide on the analysis of landscape functions that will be the basis of landscape guides. Areas that have potential erosion risk are detected during the examination of erosion process. For this reason, ICONA method developed by the Ministry of Agriculture Directorate of Nature Conservation in Spain has been applied to the research area. Wearability condition is stated by overlaying the data of slope and vegetation and by using soil conservation, wearability of geological rocks and slope all together. Later, map of potential erosion risk[4,17–19,22,24,25] is formed by overlaying soil conservation and wearability maps. A method based on presenting levels of infiltration

zones is used for water infiltration. The amount of infiltration is affected by various factors. The number of the variables is limited with soil textures and values of rock permeability as a part of the analysis. Infiltration zone maps related to the area are formed by overlaying the permeability values of hydrogeological structure and soil structure[3,4,22,24,26–29]. Analysis based on landscape ecology is used for evaluating the habitat functions. Patch classes of only forested lands are used as a base for habitat functions. Function degrees among the classes are stated by presenting the partiteness of the patch classes which are coniferous forests, mixed forests, coniferous and mixed forests, broad-leaved forests and forest glades. In this context, measurement of patch size and number, patch form, patch edge and core areas is evaluated. The map of habitat functions is formed by doing analysis on the basis of the classes with the help of 'Patch Analysis 4' programme[31]. Important areas in terms of the existence of animals and plants are mapped by doing land surveys related to flora and fauna as a result of the studies done for the project by the experts and biological diversity function is formed related to the research area[4,23] (Figs 2–5).

The cultural diversity function of the landscapes in the region of Sugla lake was investigated by data collection, literature review and site survey. Results of this assessment revealed that the study area includes important tangible (e.g. archeological and historical sites such as Yalihoyuk) and intangible (e.g. festivals) cultural landscape components. The cultural landscape components were evaluated in accordance with the 12 criteria by using the 1–4 score system at the base of each village. Thus, the total value of the cultural landscape components in each village was estimated.

Evaluation. Landscape guides are created for forest, agriculture and settlement lands in order to form sector-based guides by overlaying the related maps. In landscape guide of forestry sector, guides related to forestry are prepared based on habitat and biological diversity function of the landscape and by evaluating them interactively. In agriculture sector, guides related to the agricultural industry are prepared based on infiltration and erosion function of the landscape. It is suggested to shape the slope and development of settlement lands according to these criteria. It is taken into consideration that the rate of erosion process and biological/habitat diversity is high while forming sector-based landscape guides which belong to settlement lands.

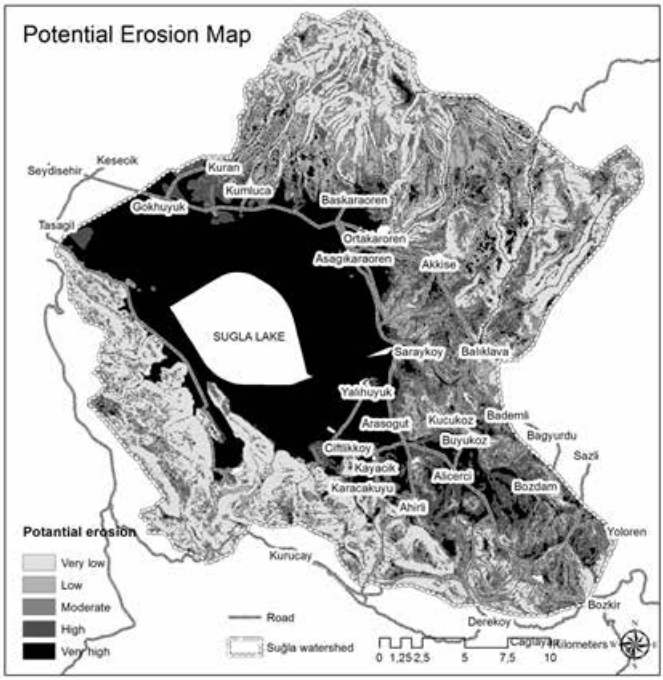


Fig. 2. Erosion process map

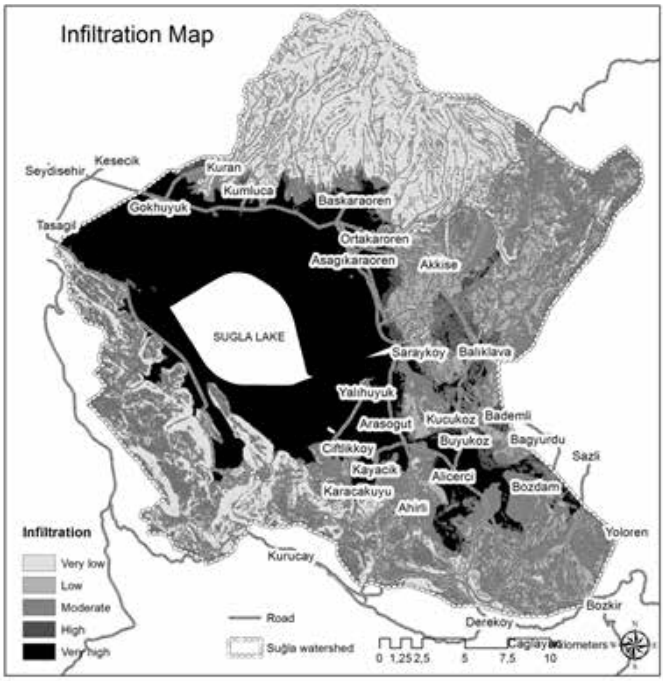


Fig. 3. Infiltration map

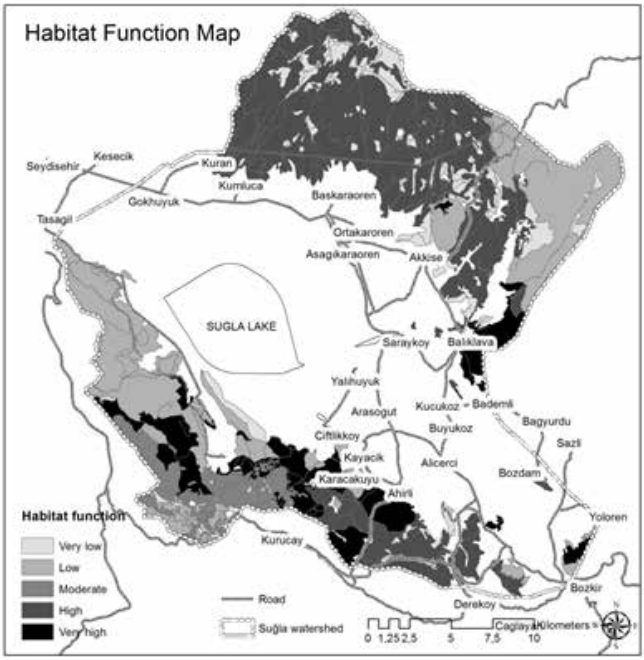


Fig. 4. Habitat map

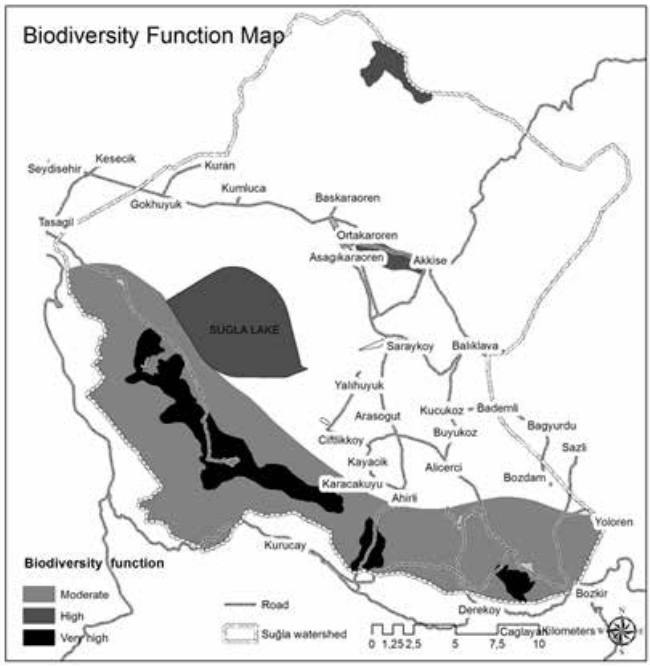


Fig. 5. Biodiversity map

RESULTS AND DISCUSSION

As a result of the analysis, 5% of the research area is covered with surface of lake. It is stated that 37% of the area has very low; 13% low; 1% middle; 9% high and 35% very high potential for erosion. It is known that erosion risk is used in spatial planning, nature protection plans and landscape restoration studies[4,17–19,22,24,25,30]. 31% of the area has very low; 20% low; 13% middle, 2% high and 29% very high water infiltration. Infiltration zones are important in terms of avoiding usages that will harm the ground waters especially in high permeable places[3,4,22,24,26,27,34–36]. According to the results of habitat analysis done in forested lands which take up 47% of the research area, 10% of this area has very low; 27% low; 6% middle; 44% high and 13% very high potential for erosion. The project area contains a few landslide zones because of the karstic structure. There are only minor landslides on some road routes on the village. When 35% of the area are examined in terms of the existence of animals and plants it is stated that biological diversity is quite important. 13% of this area has very high; 19% high and 68% middle rate of biodiversity (Figs 2–5). Data related to habitat and biodiversity has an important role in spatial planning in terms of specifying protection areas and areas which should be used under control[3,5–7,35–37]. According to evaluation principle (presence of historical and archeological places, presence of traditional architecture, important monuments to be protected, handicrafts, religious places, traditional agriculture and products (e.g. chickpea, viticulture, tahini), transhumance traditional lifestyle, traditional festivals and festivities, traditional fishing, traditional knowledge, recreation and aesthetic value), villages with 7–9 points were evaluated as the areas with very high cultural landscape diversity (e.g. Ortakaraoren and Derekoy). The villages with 4–6 points were considered as the areas with high cultural landscape diversity (e.g. Caglayan, Baliklava, Sazli) and the ones with maximum 3 points were assessed as an area with moderate cultural landscape diversity (e.g. Buyukoz village)[38].

Landscape guides are formed as is stated in the method part after analysis (Figs 6–8). Three areas defined as landscape which has absolute protection, landscape with limited usage and landscape with controlled usage in terms of landscape character function are formed while preparing the guides for the sectors of agriculture, forest and settlement lands based on landscape functions.

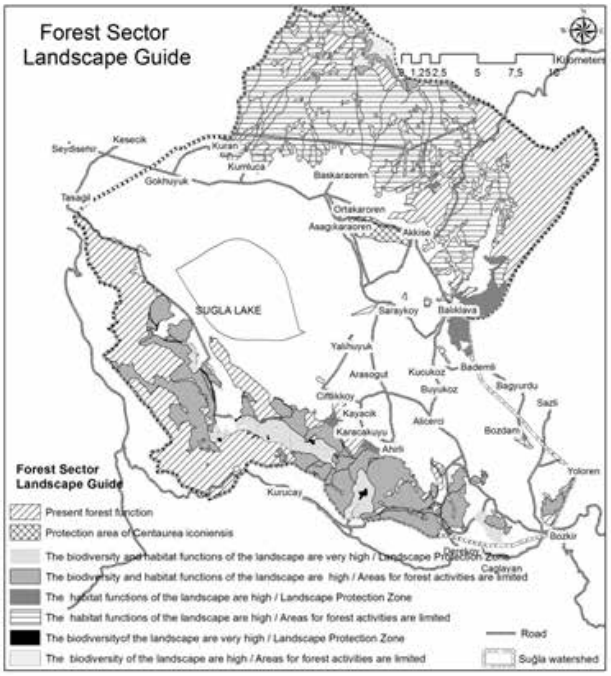


Fig. 6. Forest sector of landscape guide

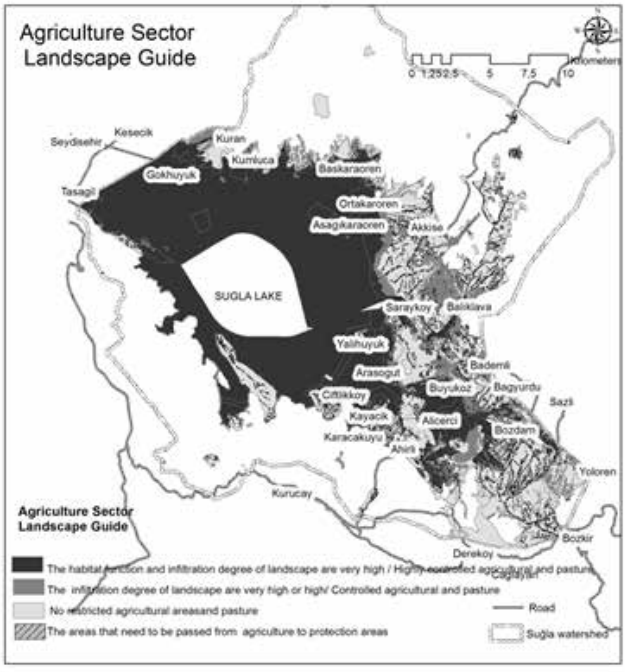


Fig. 7. Agriculture sector of landscape guide

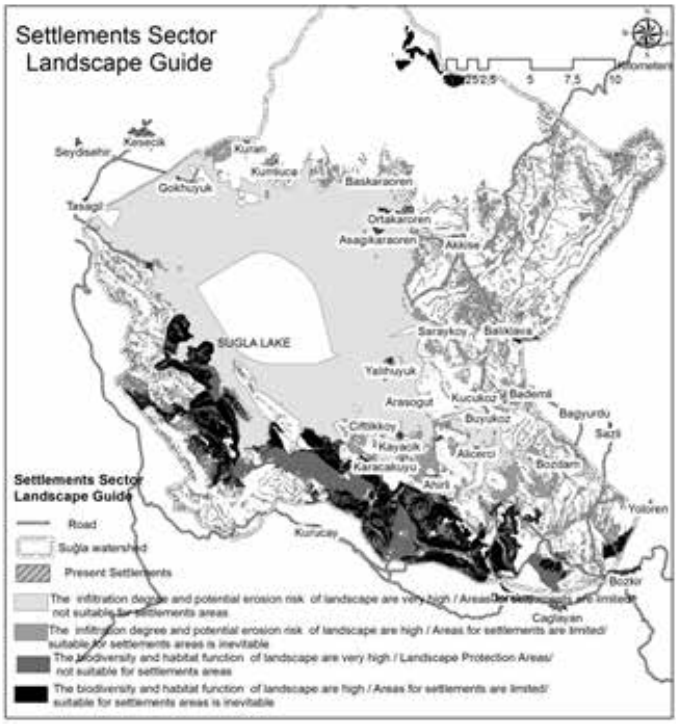


Fig. 8. Settlements sector of landscape guide

Landscape, which has absolute protection in terms of landscape character function, involves the areas which should be protected and have unique natural features. Landscape with limited usage in terms of landscape character function involves the areas which are naturally related to the landscape with absolute protection and can be a buffer zone with it. These areas have integrity with its ecological structure and natural features but they are also opened for usage to a certain extent. Landscape with controlled usage in terms of landscape character function involves the areas in which the effects of human activities can be seen more, compared to other two landscape types mentioned above. In these areas settlement lands, tourism and recreational activities are maintained.

CONCLUSIONS

Landscape guides provide a basis for landscape planning studies. As emphasised in the European Landscape Convention, natural and cultural interactions can be used in leading the developments in the areas of agriculture, forest and urban. This fact stands out especially in landscape planning of recent years and ecological planning studies[39–41]. Sugla and its immediate environment have been planned to carry out

some acts for decision makers within three zonings done as a part of the guides for agriculture, forest and urban areas.

Some suggestions are made that activities allowed to be done should aim to strengthen, support and develop the habitat and biological diversity functions with scientific research and education activities, some precautions should be taken to maintain the existence of flora and fauna, activities that threaten the wild life and destroy the natural vegetation should be prevented, pasturage should not be allowed and any activities that pollute aquatic and land environment should also be prevented in the landscape with absolute protection in terms of landscape character function.

In the landscape with limited usage in terms of landscape character function, it is suggested that use of garbage, debris fan, liquid and solid fuel tanks should be prohibited[42], habitat continuity should be maintained, agricultural activities should continue only if there will be no new cultivated areas, primary areas for vineyards, cereals, fruit growing, production of organic vegetable and forage plants should be specified, barnyard manure usage should be controlled, using manure without any necessary soil analysis should be prevented and medication for fighting with chemicals, pesticide, disease and pests should be used with caution[43].

Suggestions made for the landscape with controlled usage in terms of landscape character functions are that direction of habitats development should be the way as described in the landscape guides, site selection for landfill in the areas with low landscape functions should be done in order to solve the solid waste problem, storage areas should be improved, construction activities in tablelands and new activities for construction should not be allowed, settlements[44] should be controlled and planned, activities for the needs of the visitors (accommodation, food/beverage, etc.)[45,46] and transhumance activities with the purpose of continuity of transhumance should be carried out according to plans.

If our data are used both for research area and other areas that will be applied by decision makers, it will make great contribution to the protection of natural and cultural landscapes which provide benefits for human beings (food, water, fuel and development of cultural and local identity), enhancement of the quality of locals life, protection of ecosystems and critically endangered species in the parts with the ecotone features. It also plays important role in developing the models for the sustainable usage of natural resources and integration of the related policies, ensuring the continuity of the traditional cultural heritage and history (traditional agricultural models, traditional life, product range, handicrafts and traditional architecture, etc.) and raising the awareness of the locals and institutional representatives of the region for the importance and protection of landscape.

Sector-based landscape guides which are formed based on an ecological approach serve as a guide in the management of natural resources and these guides represent the ecological sensitivity in the study. In conclusion, it is discovered that analysis and synthesis done as a part of the landscape planning can be applied to all regions of the

world and they can be used as a tool in keeping the balance of protection usage of natural resources in the landscape.

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