



Mapping Cultural Ecosystem Services in Different Landscapes through the Perception of Tourists in Ugam Chatkal National Nature Park, Uzbekistan

Madina Bekchanova^{1*}, Andre van Amstel¹, and Jasmina Gerts²

¹Wageningen University, The Netherlands

²Tashkent Institute of Irrigation and Melioration, Uzbekistan

Abstract. Landscapes provide many ecosystem services, such as food and fibers, carbon sequestration, recreation possibilities, and aesthetic beauty or spirituality. These latter three services are cultural ecosystem services, which are rarely studied and their spatial distribution is poorly known. I developed and applied a framework to classify and map the provision of cultural ecosystem services as experienced by tourists in the Ugam Chatkal National Nature Park, which is located in the Uzbek Tashkent region. In this study, a photo-based questionnaire survey is combined with cartographic images of different landscape types to obtain hot and cold spot areas of cultural ecosystem services. The tourists' socio-demographic backgrounds on how they perceive these services are statistically analyzed. Each cultural ecosystem service shows a distinct spatial pattern in its distribution and in the different landscapes (i.e. natural lakes, traditional meadows, and forests) in which they occur. Specifically, midlands landscapes between 1,200 masl and 3,500 masl are considered as hotspot areas for recreational activities, aesthetic beauty, and spirituality. The highland zones above 3,500 masl mainly provide cultural heritage and recreational activities. The lowland plains below 1,200 masl do not provide major services. My results demonstrate that the tourist perception is most influenced by nationality and degree of education. Other factors, such as gender, age, and environmental behavior have a less importance in defining tourists' perceptions.

Keywords. *cultural ecosystem services, public perception, mapping, generalized linear mixed model, binomial regression model*

*Correspondence:
bekchanova1993@gmail.com

Introduction

Natural landscapes, such as mountains, lakes, forests, etc., are known to provide several services to people (Millennium Ecosystem Assessment, 2005). Landscapes are the main sources of providing provisioning, and regulating services and diverse cultural ecosystem services (CES) such as recreation, aesthetics, or spirituality (Tengberg et al., 2012). These multi-functional characteristics of landscapes support human needs and they have a valuable role in human survival (Plieninger et al., 2006). Nevertheless, during the past few decades, many multi-functional landscapes, which can deliver different ecosystem services, are being converted into mono-functional land use types like croplands.

The reason for these undertakings is that benefits provided by multi-functional landscapes have not been taken into consideration in environmental planning and decision-making. Furthermore, it is difficult to quantify the values of these landscapes through market-based economic analysis. Therefore, most of the land use policies have to be taken in accordance with incomplete information (de Groot, 2006). This lack of knowledge can lead to making inadequate policy (Leibel, 2011). As a consequence, many traditionally used landscapes, such as idiosyncrasies of the national history of culture and specific human nature relationships, are put at risk (Fon-

tana et al., 2013; Plieninger et al., 2006). Modifications in landscape structure and configuration are highlighted as a reason for the degradation of the visual quality of the landscape. This visual quality is valued by different stakeholders including tourists (Fyhri et al., 2009). Particularly, all these conversions have a negative impact on the provision of CES. Moreover, the likelihood of recovering damaged CES is often hardly possible. Landscape conversion to mono-cultural landscapes can cause various issues related to environmental restoration and stabilization (Millennium Ecosystem Assessment, 2005).

Particular conception of ecosystem services generally depends on the natural science paradigm, which complicates using the CES concept. CES are distinguished by their specific characteristics, which means that these services are not purely ecological phenomena, alternatively, they represent the consequence of complex and dynamic associations between ecosystems and humans in landscapes continuing for a long period of time (Fagerholm et al., 2012). It is apparent in some of researchers' published papers on ecosystem services that scholars mainly implemented studies depending on natural science and economics. Investigating these methods into the CES assessment is considered to be complicated. For this reason, two percent of its entire report of Millennium Assessment (MA) is dedicated to CES (Millennium Ecosystem Assessment, 2005). In addition, the assessment of The Economics of Ecosystems and Biodiversity (TEEB, 2010) only supports comprehensive analysis of ecosystem services, while their intangible cultural values are not included in the analysis. The scarcity of CES data can cause biased ecosystem assessments and landscape planning, impeding their integration into protection policies and hampering the important bond creation between society and nature (Chan et al., 2012). Current global analysis has pointed out that even if humans become less reliant on provisioning and regulating services, their demand for CES never decreases (Guo et al., 2010).

Problem Statement

CES are rich for providing mediation, religion, peacefulness, and a great deal of knowledge (Millennium Ecosystem Assessment, 2005). Despite their importance, there has been insufficient research to study values of CES and little is known about their spatial localization in different landscapes. One of the main reasons for this is that identifying a clear association between CES and some components of the ecosystems is challenging (Vejre et al., 2010). Consequently, CES are hardly considered in the assessment of ecosystem services (Plieninger et al., 2013). Additionally, there are few indicators available for assessing CES, while numerous indicators are accessible for the measurement of other ecosystem services (Feld et al., 2009). As a result, CES valuation is seen as a complicated process (Plieninger et al., 2013). Although some valuation methods (choice experiments, willingness to pay) exist for tourism and aesthetic services, other components of CES, such as religious and spiritual services remain resistant to monetary valuation, as these elements of CES are P (Chan et al., 2012). Thus, scientists have been struggling with inadequate valuation methods to display the significance of CES and their role in human wellbeing (Kumar and Kumar, 2008).

An additional challenge is the intangible character of CES and their different estimation by various stakeholders (Van Berkel and Verburg, 2014). As opposed to other services of an ecosystem, that can be measured based on the existence of humans (water supply and regulation services), CES are closely connected to personal and local value systems (Pejchar and Mooney, 2009).

As there is a lack of information about the value of CES, data about the landscape's potential to provide these services are also deficit. As a result, in the procedure of planning and designing land use opportunities, CES are rarely taken into consideration.

Landscapes of Uzbekistan are rich in providing various ecosystem services such as provision of food and timber. They also have a valuable role in affording non-material benefits, such as spirituality or aesthetic values (Shukurov et al., 2005). Unfortunately, due to anthropogenic activities,

such as excessive use of agriculture, overgrazing of natural areas, and industrial activities, a majority of ecosystem services are being degraded (UNDP, 2015). Concerning the environmental condition of Uzbekistan, lack of knowledge of population about the values of CES have been pointed out in the National Report as one of the reasons of ecosystem degradation and unsustainable use of these services (Samoylov et al., 2008).

Sufficient research on the landscape management and its supply of CES is required to inform the decision makers. It was crucially important to conduct research in Uzbekistan, where the problem was not investigated yet in an appropriate way. The administration of Ugam Chatkal National Nature Park (UCNNP) highlighted some problems concerning degradation of some valuable landscapes and CES, such as:

- Lack of knowledge about the existing landscapes of UCNNP
- Lack of knowledge about CES and its elements provided by landscapes of the park
- Insufficient information about supply of CES by different landscapes

Some studies were carried out to analyze some components of CES, however, CES of UCNNP have not been learned systematically yet. Most studies have done a qualitative analysis, while their spatial distribution has hardly been investigated. Accordingly, a research objective is built to reduce these deficits to some extent and bring reasonable value to policy makers.

Research Objective of the Study

This research aims to study cultural ecosystem services in different landscapes of UCNNP by identifying and mapping the potential supply of four CES in the landscape as perceived by tourists. To reach this goal, the following research questions were formulated:

Research questions:

- How the landscapes of UCNNP are spatially distributed?
- How tourists perceive CES supplied by the landscapes of UCNNP?

- What is the potential of UCNNP landscapes to provide CES?
- Which sociodemographic factors influence the perceived supply of CES?

Significance of the Research

The majority of research is mainly focused on assessing value and physical characteristics of ecosystem services in general. However, there is a lack of studies, directed to research CES in different landscapes, considering public awareness and interests. Owing to a shortage of research regarding CES, irregular decisions under CES and landscapes are prone to continue. This research aims to study CES in different landscapes of UCNNP, Uzbekistan. Analysis of UCNNP's cultural services and their public perception is significantly important to identify appropriate management strategies that would keep the balance between interests of key stakeholders. Mapping CES in different landscapes of the national park according to the perception of tourists can be useful in the decision-making process, considering the importance of landscapes in providing various CES. Simultaneously, the administration of UCNNP can use the research results as an effective tool in their management system.

Study Area

In 1990, the Ugam Chatkal National Nature Park was set up to preserve natural objects of the Western Tien Shan. The park has ecological, historical, and aesthetic value, and is used for environmental, recreational, educational, scientific, as well as cultural purposes. The total area of the national park is 574.6 thousand hectares, which was originally submitted to the State Forestry Committee (UNDP, 2015; Figure 1).

The national park is located in the territory of Bostanlyk and Parkent districts of the Tashkent region. The majority of the area, consisting of 329.4 thousand hectares, is covered with rocks and stony slopes while other parts consist of pastures and hayfields, constituting to 177.3 thousand hectares. The national park has a valuable

forest area which amounts to 56.4 thousand hectares, and a small amount of the area is related to irrigation lands that equals to 1.61 thousand hectares. The territory of the national park lies in the altitude range from 900 to 4,216 m and covers the low, middle, and high mountain belts of the Ugam, Maydantal, Pskem, and Koksay ranges, mid-mountains and high mountains of the Chatkal range. The territory of the park is dominated by medium and high-mountain landscapes with a dismembered relief. This is the largest protected area among nature reserves and national parks in Uzbekistan (Bensitova et al., 2014).



Figure 1: The map of Ugam Chatkal National Nature Park

Data Collection

To obtain the tourists' perception about the provision of the four CES (the opportunity of leisure activities, aesthetic beauty, spirituality, and cultural heritage) and the relations of these services with different landscapes of the research area, a paper-based questionnaire was employed with a paper sheet which presented pictures of selected landscapes located in the region. Data was collected in January and April 2017. A total number of 90 tourists were communicated in person at different touristic sites such as recreation areas (e.g. rope ways, mountains, skiing areas), public open spaces (e.g. marketplaces, play yards, hotels, and as well as eating out places) and parking services areas in the national park. The locations were chosen by investigating stratified random sampling to get a sufficient amount of tourists. Stratified random sampling is a sampling method which can help stratify population based on homogenous characteristics of what is being stratified (Kumar, 2014). The sample population for the research was family and group tourists.

Respondents were chosen randomly in each location. Moreover, questionnaires were conducted in various settings at different times and with different weather circumstances in order to reduce the level bias to a minimum level (as done by Zoderer et al., 2016). In order to show the landscape's capacity to supply CES in the form of map, the landscapes of UCNPN were identified in different altitude zones. It was implemented with the help of Landsat image classification and its combination with the Digital elevation model (DEM).

Landscape Pictures

Particular landscape pictures, presented on a sheet (A4) format, was used for each of the six landscape types as a source for the survey. One of the reasons for using these specific photos was the attempt to reach the comprehensive coverage of the research area through directing the emphasis on various landscapes. Using pictures in landscape study has been adopted as an analytical tool (Daniel, 2001), but until now, this sort of practice was not applied adequately in ecosystem research (López-Santiago et al., 2014; Zoderer et al., 2016). According to some empirical research, landscape assessment based on colorful pictures achieve similar outcomes as that are implemented on-site (Palmer and Hoffman, 2001). Moreover, this method is considered as a cost-efficient and more comprehensive way to manage than organizing on-site trips (Kaplan, 1985).

Questionnaire

Questionnaires were conducted during two seasons: winter and spring periods. The reason for selecting these two seasons is that most tourists are passionate about spending their time on holiday in winter when various activities are available such as skating, skiing, riding a horse, and others. The spring season is also an appropriate period for visiting the national park. This is due to the fact that the weather in spring is adequate, neither hot nor cold, and the area is covered with green grass and flowers. Therefore, most tourists visit UCNPN to relieve them from their daily stress and depressions in this period of time. The

survey started with an introduction into and description of the CES framework and the purpose of this study. Tourists spent approximately 10–15 minutes answering the questionnaire. The questionnaire included four sections (Figure 2).

The first part of the questionnaire involved a brief description of the research and the term “cultural ecosystem services.” In the second part of the questionnaire, tourists were kindly requested to specify their perceived significance of CES supplied by UCNNP. In order to implement this, Likert Scale questions were created with a value from 1 (not important at all) to 5 (very important) and tourists were requested to indicate the importance of each cultural service from this range. The third section was the focal point of the questionnaire. With the help of the picture sheet explained above, tourists were asked to show six landscapes’ capability to provide CES (yes/no). If tourists specified a specific service in a particular landscape, they were requested to evaluate the level of the services provision on a scale ranging from 1 (very little) to 5 (very much). The final section of the questionnaire was devoted to sociodemographic factors (i.e. gender, culture, place of residence, age, education, environmental behavior, and their experience with UCNNP).

Satellite Images

The data used in the study involves a Landsat 8 OLI raster image (Figure 3) obtained from the open Internet sources of the Product Generation

System at the United States Geological Survey (<https://earthexplorer.usgs.gov/>).

It is important to note that Landsat is an operational imaging system and each scene is ordered in a so-called World Reference System (WRS2), where Ugam Chatkal National Nature Park is situated within the scene with path 153; rows 31. The spatial resolution of Landsat 8 OLI images fluctuates between 15 m in panchromatic band 8 (PAN) and 30 m in rest of the bands, including thermal infrared bands, which are obtained at 100-meter resolution, subsequently resampled to 30 meter in delivered data product.

The estimated scene size is 170 km north-south and 183 km east-west (106 mi by 114 mi). Technical defaults and heavy cloud cover limited the amount of useable images. To cover the period with the highest vegetation values, only the satellite images from March to October 2016 were taken and the main reason for choosing this period of time is the lack of cloud in the image. Consequently, only the image from August 26, 2016 was available in a sufficient cloud-free condition. To implement classification on a particular date image, it is not necessary to carry out atmospheric correction for classification on a particular date image if it is cloud-free, which is the case in this study (Gong and Howarth, 1990; Song et al., 2001). In addition to raster image, the digital elevation model (DEM) was acquired from the Advanced Spaceborne Thermal Emission and Reflection Radiometer ASTER (Figure 4).

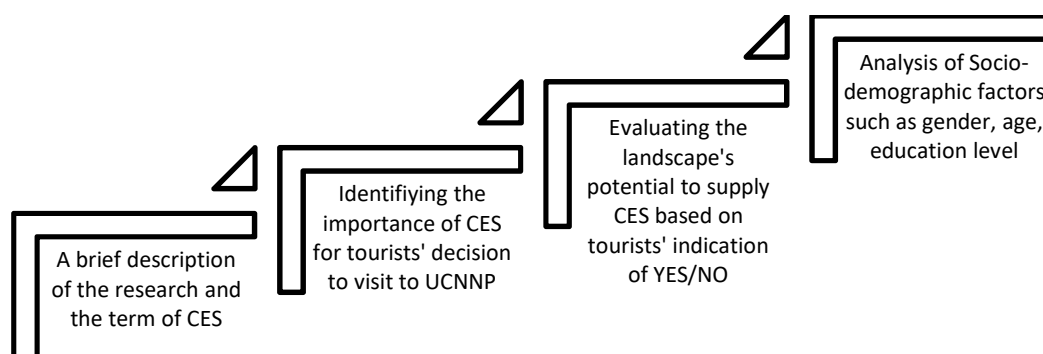


Figure 2: Overview of questionnaire parts

The ASTER GDEM covers land surfaces between 83°N and 83°S and is composed of 22,600 1°-by-1° tiles. The ASTER GDEM is in GeoTIFF format with geographic lat/long coordinates and a 1 arc-second (30 m) grid of elevation postings.

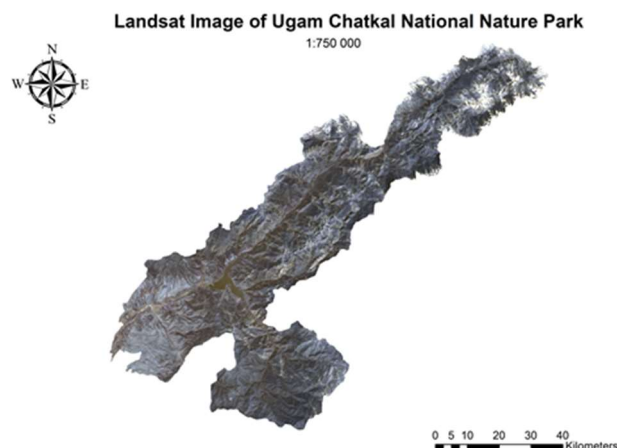


Figure 3: Landsat image of Ugam Chatkal National Nature Park

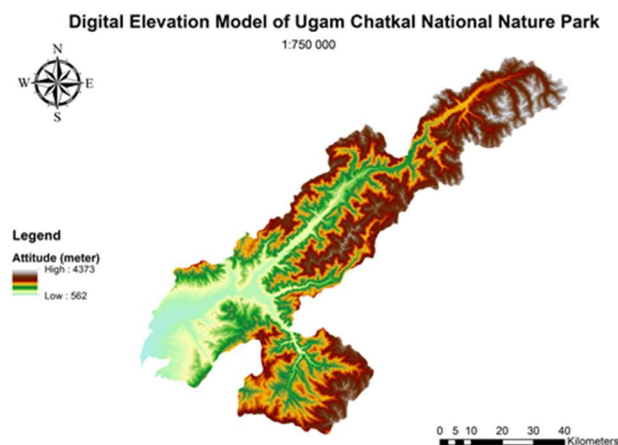


Figure 4: Digital elevation model of Ugam Chatkal National Nature Park

Spatial Distribution of Landscapes in UCNPN

To reach an appropriate answer to the second research question “How are the landscapes of UCNPN spatially distributed?” the land cover and land use classification system was applied to reflect the major land cover types in this area with reference to UCNPN. To carry out supervised

classification Maximum Likelihood (ML) algorithm ArcGIS software version 10.3 was used.

Figure 5 presents the result of LULC classification and overall five classes of LULC were determined, including water, forest, residential area, seasonal vegetation, and vegetation.

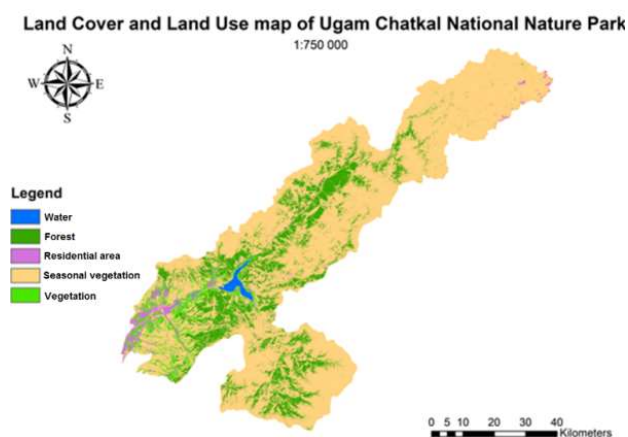


Figure 5: Land cover and land use map of Ugam Chatkal National Nature Park

In Figure 6, the relief of the UCNPN was demonstrated and a map was developed using the Digital Elevation Model (DEM) of the area.

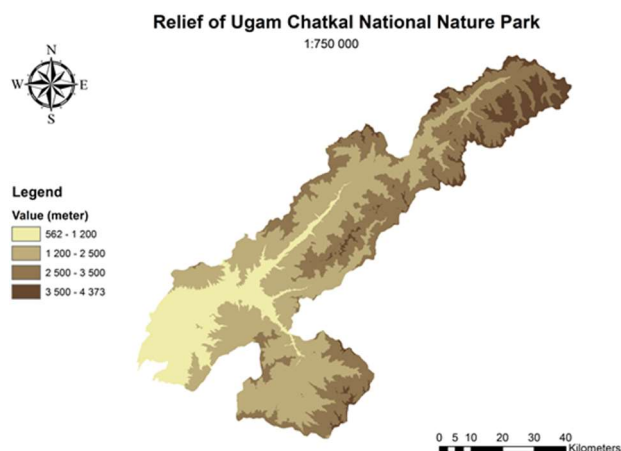


Figure 6: Relief map of Ugam Chatkal National Nature Park

In order to define the prevalence of the LULC through relief of the UCNPN, the above received results have been combined, and given below, Figure 7.

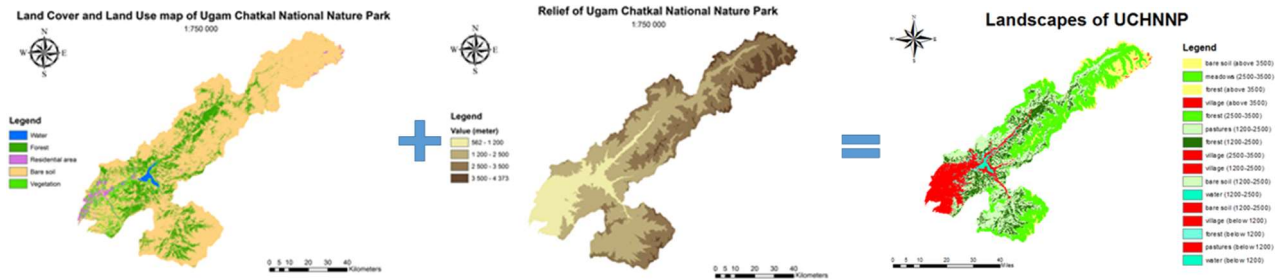


Figure 7: Land cover and land use types through altitude classes in Ugam Chatkal National Nature Park

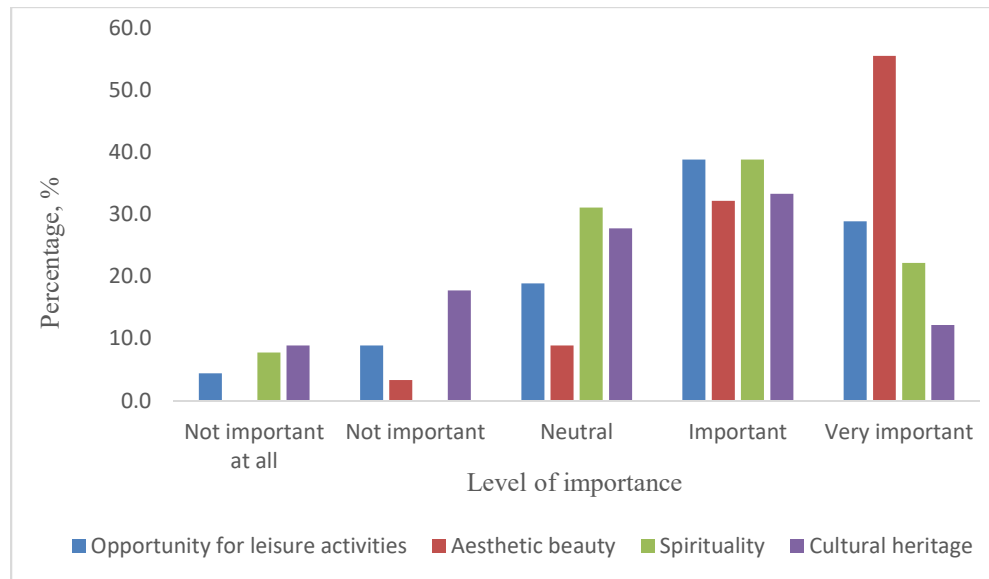


Figure 8: Importance of cultural ecosystem services of Ugam Chatkal National Nature Park as perceived by tourists (N=90)

After having combined the relief and LULC of UCHNNP, 16 classifications were observed. It can be understood from this classification that five types of classified LULC are located in different altitude zones of the national park.

The Perceived Supply of Cultural Ecosystem Services

The questionnaire results revealed tourists' perceived CES supplied by the landscapes of UCHNNP. Quite positive answers were achieved depending on respondents' perception. Tourists valued each CES from their personal perspective and their perception of these services during their stay in the national park.

Aesthetic beauty of the national park was highly appreciated by tourists, and more than half of tourists indicated aesthetic beauty as a very important reason for their visit to the national park (Figure 8).

Following, recreational activities and spirituality of UCHNNP were ranked as equally important reason for their visit to the area, constituting 38.9%. In the meantime, cultural heritage of the national park was also valued as an important reason for their stay in the national park. In other words, all cultural services of the ecosystems, which are supplied by UCHNNP, played a significant role in tourists' decision to visit UCHNNP, however, aesthetic beauty was highlighted as the most important factor in their decision.

Furthermore, questionnaire analysis manifested that CES of the UCNNP has a close bond with the landscapes of the national park. When tourists were planning their holiday in UCNNP, they highly considered all CES as an important feature of the landscapes. According to the analysis of the questionnaire, slight differences can be detected in tourists' perception. In particular, the recreational activities of the landscapes of UCNNP ($\bar{x} = 3.71$) and aesthetic beauty ($\bar{x} = 3.66$) were highly recognized services, whilst spirituality ($\bar{x} = 3.61$) and cultural heritage ($\bar{x} = 3.57$) were perceived to be less worthwhile. Figure 9 describes the number of tourists associating the CES with the landscape types.

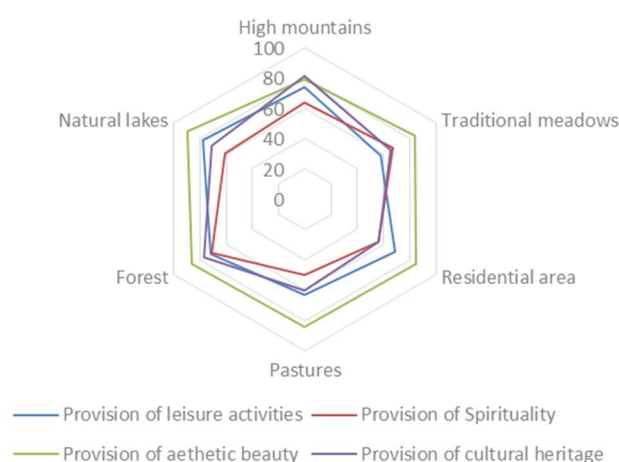


Figure 9: The tourists' perceived supply of the cultural ecosystem services in the landscape. (N=90)

The majority of respondents pointed out that they perceive more CES in certain landscapes, namely in natural lakes, traditional meadows, and forests of the UCNNP, in contrast to pastures and residential places of the area. Aesthetic beauty was mostly associated with natural lakes, forests, pastures, and traditional meadows, while recreational activities were mainly referred to high mountains and natural lakes. Likewise, high mountains and forests of the national park were accepted as the most capable landscapes in providing cultural heritages. Based on the tourists' perception of CES, spirituality was frequently discovered from forests and traditional meadows.

Mapping the Potential of the Landscape to Provide CES

In order to create a landscape map, some of the related classes from LULC's 16 classification results (Figure 7) were combined in accordance with the description of each landscape type. This procedure was implemented with the help of the raster calculator tool of the ArcMap 10.3.1. The merged classes are presented in the table below:

Table 1

Combination of landscape classes

Landscapes	Combined classes
Mountains	Seasonal vegetation (above 3,500 m) and forest (above 3,500 m)
Meadows	Vegetation (2,500–3,500 m) and forest (2,500–3,500 m)
Residential areas	Residential area (above 3,500 m), residential area (2,500–3,500 m), residential area (1,200–2,500 m), seasonal vegetation (1,200–2,500 m), residential area (below 1,200 m) and vegetation (below 1,200 m)
Pastures	Vegetation (1,200–2,500 m) and seasonal vegetation (1,200–2,500 m)
Forest	Forest (1,200–2,500 m)
Natural lakes	Water (1,200–2,500 m), water (below 1,200 m) and forest around the lake (below 1,200 m)

It should be noted that in our classified map, any unclassified pixels were not identified. It can be observed from the landscape image (Figure 10) that the highest amount of vegetation is detected at the highlands, and as well as in midlands, with the altitude of about 1,200 and 3,500 meters, while seasonal vegetation is located in the highlands and midlands. The seasonal vegetation is characterized being vegetated in seasons of spring and summer, while in the autumn and winter it stays in the form of bare soil. The main water reservoir "Charvak" is placed at the midlands with an altitude from 1,200 to 2,500 meters.

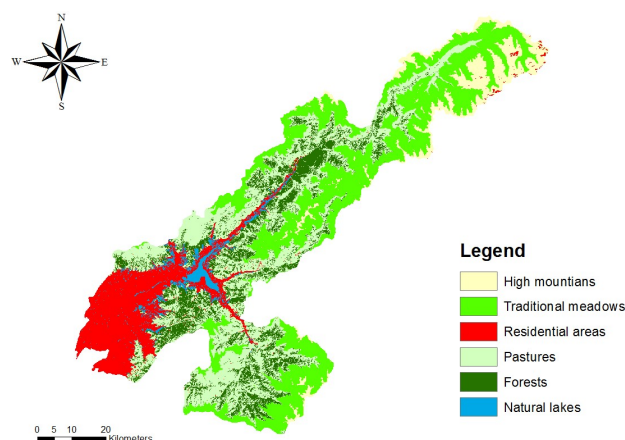


Figure 10: Landscapes of Ugam Chatkal National Nature Park

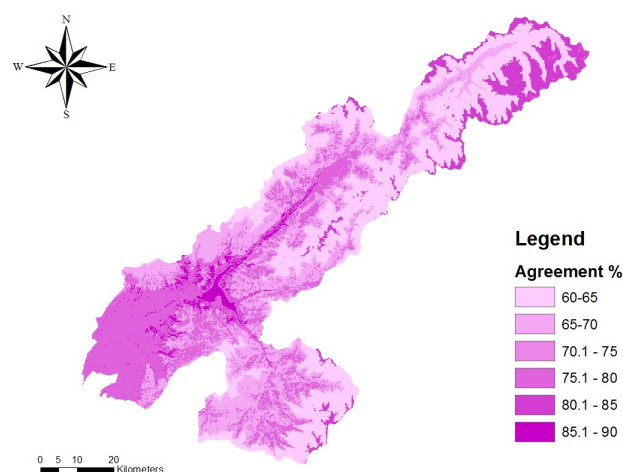


Figure 11: Recreational activities (agreement %)

To present the hotspots and cold spots of each CES, a proportion of the respondents' perception was translated into the landscape image to show their capability to supply the services.

Figure 11 describes that natural lakes and high mountains of the UCNPP, which are placed in the highlands and midlands of the area, were assigned to have high opportunity for leisure activities. In particular, natural lakes, were found as the major supplier of recreational activities by constituting 86.7% of positive responses. Correspondingly, the northeastern part of the UCNPP, where high mountains (above 3,500) are located, was also graded highly and amounted to 82.2% of positive responses of the tourists. Landscapes,

such as residential areas, traditional meadows and pastures were mentioned as having reasonable role in providing recreational activities, however, compared to highly prioritized landscapes, they have a lesser capability of giving the services as evaluated by tourists.

In general, all landscapes of the national park were mentioned as having an aesthetic beauty. In particular, the midlands of the national park were admitted as the most potential landscapes for supplying aesthetic beauty. Based on the highlights of the tourists, landscapes of the national park were considered to be a provider of an abundant aesthetic beauty. In the meantime, it is imperative to mention that 100% of agreement was achieved in the aesthetic beauty of the natural lakes. Excessive amount of aesthetic beauty was also scattered over other landscapes. High mountains gained less agreement as opposed to other landscapes, however, it obtained 87.8% of respondents' agreement (Figure 12).

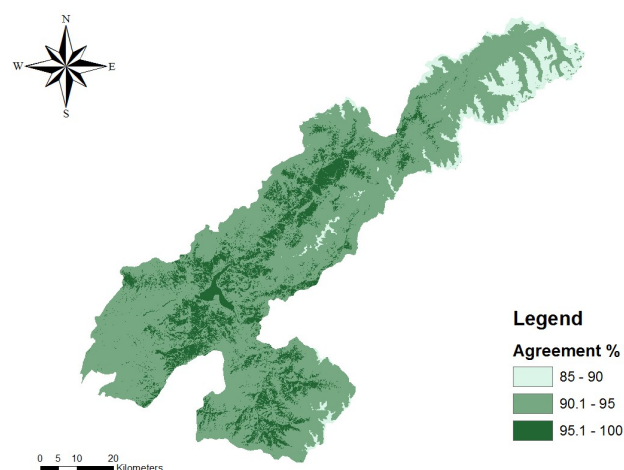


Figure 12: Aesthetic beauty (agreement %)

The likelihood of cultural heritage provisioning was frequently seen in the northeastern part of the national park as it hosts high mountains; particularly, opposed to natural lakes and forests, high mountains was the most preferred landscape to attain the service. Besides that, in the midlands of the area, traditional meadows and pastures played a significant role for perceiving cultural heritage. Whilst the southwestern part of the area, where the villages

are located, were conceded to be the least potential land use type for the provision of cultural heritages. High mountains were scored with the highest mark of “very much.” Traditional meadows were pointed out as the second most capable area for the provision of cultural heritage. However, in the overall yes/no answers, proportions showed that forests and natural lakes are more capable than traditional meadows and pastures. Forests were predominantly highlighted with the category of “much” (Figures 13 and 14).

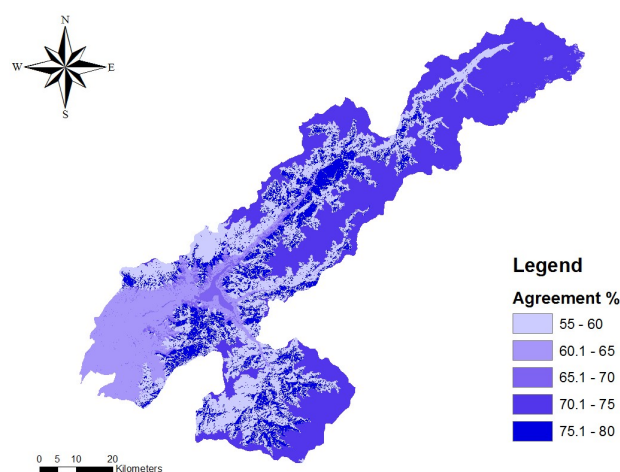


Figure 13: Spirituality (agreement %)

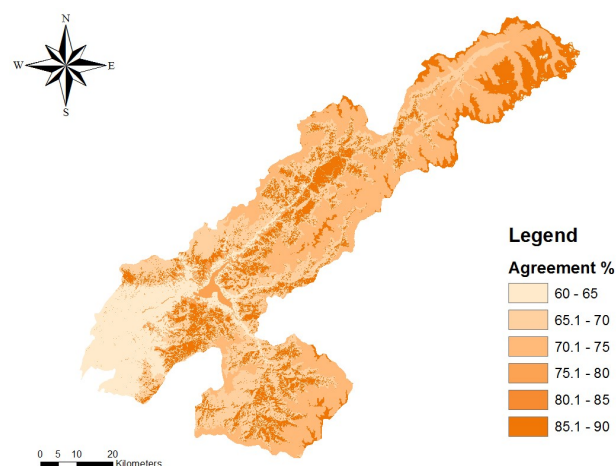


Figure 14: Cultural heritages (Agreement %)

Factors Influencing the Perceived Supply of Cultural Ecosystem Services

Sociodemographic Factors

Sociodemographic characteristics of respondents are presented in Table 2, according to which many of the respondents are young people of 18–25 years old (35.6%), followed by the age group of 36–45 years old (27.8%) and 26–35 years old (20%). Females embrace 51% of the overall distribution. With regards to nationality, most of the respondents were Uzbek (55.6%) and other nationalities such as Kazakh, Tajik, and Kyrgyz (23.3%) as well as Russian (18.9%); respondents of English speaking nationalities were hardly met.

Table 2

Sociodemographic characteristics of the respondents (N=90)

Respondent profile	N	%
Age of the tourists		
18–25	32	35.6
26–35	18	20.0
36–45	25	27.8
46–55	15	16.7
Gender		
Male	44	48.9
Female	46	51.1
Nationality		
Russian	17	18.9
Uzbek	50	55.6
English	2	2.2
Other (Kazakh, Tajik and Kyrgyz)	21	23.3
Education level		
Lower secondary school	1	1.1
Upper secondary school	45	50.0
University	44	48.9
Environmental education		
Not any education	3	3.3
Little	19	21.1
Average	57	63.3
Good education	11	12.2
Environmental organization membership		
Yes	9	10
No	81	90

Table 3

The influence of the respondents' sociodemographic background on the perceived supply of cultural ecosystem services

	Recreational activities OR	Aesthetic beauty OR	Spirituality OR	Cultural heritage OR
Socio demographic characters				
Gender				
Male	0.81	0.64	1.04	0.79
Female	-	-	-	-
Age				
18–25	1.39	0.91	0.66	1.44
26–35	1.44	2.51	0.65	0.95
36–45	0.87	1.55	0.72	1.05
46–55	-	-	-	-
Nationality				
Russian	1.72	0.58	0.95	0.87
Uzbek	1.86*	0.60	0.92	1.04
English	0.82	0.60	0.80	1.37
Others	-	-	-	-
Education level				
Lower secondary school	0.53	0.54	1.10	0.00
Upper secondary school	0.89	2.39*	0.91	0.73
University	-	-	-	-
Environmental behavior				
Environmental education				
No	1.15	0.25	1.02	1.59
Low	0.81	0.76	1.13	1.34
Enough	0.76	0.65	0.87	1.69
Good	-	-	-	-
Membership of environmental organization				
No	0.74	0.69	1.22	0.48
Yes	-	-	-	-
Experience with the landscape				
Stays in UCNNP				
Never before	0.49	2.43	1.13	0.55
Sometimes	0.46	1.69	1.04	0.75
Often	0.66	2.86	1.12	0.68
Very often	-	-	-	-

Note: OR = Odds ratio. Odds ratios are shown in bold and are marked with a * at a significance level of $p \leq 0.05$. Not significant variables are not shown.

Generalized linear mixed model with binomial logit function

The education level of participants showed that the majority of them had upper secondary school level (50%) and university degrees (48.9%), while lower degrees was only 1.1%. The environmental education of interviewees was mainly average (63.3%). Little knowledge owners constituted 21.1%, while 12.2% respondents had a good education. The majority of respondents (90%) were not a member of any environmental

organization while the minority of them (10%) had a membership.

Factors Influencing the Perceived Supply of Cultural Ecosystem Services

Statistical analysis showed associations between sociodemographic characteristics and respondents' perception about the supply of CES in the

landscape. The results underline the influential factors, which can determine the tourists' attribution to CES in landscapes. Although the majority of factors proved to be relevant concerning the perception of CES, some features had a significant role in predicting the perception of CES (Table 3).

It can be concluded from the table that female tourists as opposed to male tourists were more likely to associate CES with recreational activities, aesthetic beauty, and cultural heritage with the landscape; while male tourists were found to interlink spiritual services with the landscapes. There were considerable differences in the perception of CES in landscapes of UCNPP. Tourists in the 18 to 35 years old group were more prone to perceive recreational and cultural heritage in landscapes, than older age tourists. Spiritual services of landscapes were highly valued by the 45–55 years old group, whereas aesthetic beauty of the national park's landscapes was appreciated by tourists whose age was between 26 and 45 years old.

Nationality played a significant role in tourists' perception of recreational activities. In particular, tourists who were Uzbek had a significant effect on attaining recreational services of the landscapes. Furthermore, Russian tourists were considered as having high appreciation of recreational services. Surprisingly, aesthetic beauty and spirituality of landscapes were mostly grasped by other nationality groups, while cultural heritage was associated with landscapes by Uzbek and English tourists.

The upper secondary school level of tourists played a significant role in their perception of aesthetic services of the landscapes. Besides, the higher the tourists' educational degree, the higher was the likelihood to perceive the landscapes' recreational value, aesthetic value, and cultural heritage. It is interesting to note that tourists who had lower environmental education were more likely to obtain spiritual value and cultural heritage of the landscapes than people with a higher education. Respondents who were members of an environmental organization appreciated the landscape mainly for its recreational value, aesthetic value, and cultural

heritage rather than its spiritual services and they were more capable of perceiving these services opposed to non-members of environmental organizations. Apart from that, the tourists who had less experience with the landscapes of the UCNPP had more tendency of perceiving the spirituality and natural beauty of the national park, in contrast to the tourists who had visited the area many times before.

Discussion

This part of the study contains three key arguments regarding the research. In the first part of the discussion, weaknesses of the research in methodology and uncertainties in the outcomes are highlighted. Second, the validity of the study is discussed. Third, a comparison of the recent research with other studies is provided.

Methodological framework, which is applied for this research, provided evidence about the tourists' perception of CES. Findings highlight the relationships between land use type and respondents' perception of the services. In the practice, applying a photo-based questionnaire and the successive formation of maps demonstrated that these methods are easy to manage and flexible tools, which can be spread among other stakeholder groups and regional areas. Through the spatial integration of the tourists' perception, valuable information about potential areas for tourism development can be obtained to provide local decision makers with sufficient amount of information about future landscape management (Scolozzi et al., 2014). Furthermore, through this method, we could learn about the unwanted results, generated by change of land use, and aspects where the pressure between locals and tourists could be alleviated.

Some weaknesses were encountered in some similar studies, which were faced during the survey. In order to overcome those limitations, some strategies were taken which are listed below:

- *Translating from one language to another.* Studies, which are based on the analysis of public perception, require the questionnaires to be used. Many studies unfold that formation of questionnaires and its translation

to another language might impact on people's understanding the purpose of the survey (Chang et al., 1999; Ervin et al., 1952). The translation of the questionnaire into Uzbek language could change the main meaning of the questions. In order to lessen this issue, survey questions were translated very carefully. Once questions were translated into Uzbek language, they were experimented on in a pilot study, where a number of fellow students were surveyed in advance, to check whether respondents understood them correctly. After identifying what was inadequately formulated in the questionnaire, they were reorganized accordingly by modifying the translation and using suitable words to describe.

- *Limitations of landscape pictures.* In some studies, where pictures of landscapes were used, lack of landscape pictures were the main concern (Plieninger et al., 2013; Zoderer et al., 2016) which happened in the survey. Therefore, pictures, which were chosen for the description of landscapes, were also tested in a pilot survey with some of the respondents. Afterward, it has been realized, the selected six pictures of six landscape types restricted the consideration of site-specific characteristics of landscape types. Likewise, these aspects were mentioned as a considerable issue in the research carried out by Zoderer et al. (2016). To overcome this issue and get valuable data, colorful pictures of landscapes were printed out. Furthermore, extra pictures of six landscapes were taken for tourists' better visualization of those landscapes.

Besides that, there is an uncertainty on whether tourists grasp the concept entirely and point out the importance of CES depending on their comprehension. In some cases, they were confused in differentiating the terms used in the questionnaire such as aesthetic beauty and spirituality. Therefore, descriptions of each CES were described with examples until tourists obtain the meaning of each term used in the questionnaire. This undertaken action assisted respondents to comprehend questions clearly and answer them correctly. As a result, reliable and valuable data were acquired.

Research, which is based on public perception, usually involves a high rate of uncertainty (Lindsey and Norman, 1977). These uncertainties occur due to many intervening variables that can potentially influence the results. Although the research involves some limitations, which were described above, the outcomes are applicable because the survey questions were formed after having reviewed several literatures (Daniel et al., 2012; Plieninger et al., 2013; Zoderer et al., 2016). At the same time, studying the methodologies of different researchers became pivotal to improving the validity of the survey. Comparison of different works, which are related to my research, (Daniel et al., 2012; Plieninger et al., 2013; Scolozzi et al., 2014; van Berkel and Verburg, 2014; Zoderer et al., 2016) helped to increase the reliability of the work.

According to the attained results, CES have a considerable role in attracting tourists to the national park. The research results demonstrated similar results achieved by Zoderer et al. (2016) and van Berkel and Verburg (2014), that recreational opportunities and aesthetic beauty of landscapes were given a high value by respondents while spirituality and cultural heritage gained lesser importance. However, the difference between perceived CES in this research was not remarkably high, while research pursued by Zoderer et al. (2016) pointed out considerable differences between perceptions of CES. Which means all cultural ecosystem services have an important role in taking the attraction of tourists. Implemented studies by Plieninger et al. (2013) and Fagerholm et al. (2012) support my investigation in the research that tourists certainly associate CES with spatial structure and their appreciation indeed changes depending on the CES and landscape types applied. Studies conducted to identify people's preferences of CES emphasized mostly on the term of natural beauty, while the clear association between tourists' appreciation and other components of CES was rarely included (van Berkel and Verburg, 2014). Obtained results in this research eased the issue to some extent by involving four components of CES.

Further information about the spatial localization and magnitude of CES providing

areas were derived through the creation of maps (Burkhard et al., 2014). Natural landscapes such as high mountains, forests, and natural lakes were highlighted to be hotspot areas for the provision of recreational activities, aesthetic beauty, and cultural heritage values.

Different researchers have displayed variance in the factors such as respondents' gender, age, educational background, and others (Howley et al., 2012; Plieninger et al., 2013; van Berkel and Verburg, 2014). Derived results of this study unfold that each respondent perceives CES variously based on their nationality, age, gender, and educational background. Statistical analysis reveals that perception of CES varies depending on the gender. Similar to other studies (Howley, 2011; Plieninger et al., 2013; Zoderer et al., 2016), results disclose that female respondents, in the contrary to males, more readily appreciated the landscapes for non-material benefits. In some related studies, age variable was found as a statistically significant factor for tourists' appreciation of landscapes for the provision of CES (Van den Berg and Koole, 2006; van Berkel and Verburg, 2014), while this significance was not detected in this study. Instead, the research results reveal that nationality of tourists and their educational background that have a significant importance in association of CES with the landscapes. Although having the important role of some factors related to environmental behavior and experience with landscape in tourists' perception, no significant influence is found in relation to these variables.

Conclusion

In this study, a framework was tested to identify and map the CES provision based on the perception of tourists in the national park.

To determine the supply of CES in the landscapes of UCNPN, four categories of cultural ecosystem services were addressed, such as opportunity for leisure activities, spirituality, aesthetic beauty, and cultural heritages of the six types of landscapes, which are high mountains, traditional meadows, residential areas, pastures, forests, and natural lakes of UCNPN. Results based on annual reports and local publications

represent that the aesthetic beauty of the national park lays on each landscape and every year, thousands of tourists are fascinated by the natural beauty of the area. Furthermore, high mountains of the national park enable the provision of all listed CES. In particular, they welcome most of the tourists by offering a multitude of recreational activities (e.g. skiing, hiking, climbing, horseback riding, etc.), spiritual services (old monuments to pray), aesthetic beauty, and cultural heritages. Water activities such as swimming, boating, yachting, and other activities are found in natural lakes of UCNPN, where most tourists usually visit to practice water-related sporting activities. Apart from that, different ancient monuments and holy places are located near the natural lakes where tourists practice their worships and simultaneously enjoy the cultural heritage of the landscape.

Forests are found to be a very suitable place for organizing various scientific tours for tourists. However, it has been witnessed from the personal observation that forests and traditional meadows are not active in providing recreational activities, while they are used for a unique value in provision of spirituality, aesthetic value, and cultural heritage. Residential areas are also popular among most of local tourists with the provision of recreational activities and cultural heritages. Traditional activities and games are arranged in pastures for local tourists, however, the spiritual value of the landscape is not mentioned neither in local articles nor in reports of UCNPN. There is a room for improvement of numerous mediation activities in pasture zones such as Yoga for the local tourists who are coming only with the aim of praying. If other activities are introduced to the area, tourists can get spiritual benefits from other activities as well. Recommendations can be addressed to the national park administration to organize more recreational activities to attract tourists' attention and the value of the landscape.

The second objective was to detect physical characteristics and to attain an enhanced overview of the area together with spatial distribution of landscape units. It became evident from the analysis that a minor portion of the UCNPN consists of water reservoirs, showing

quite small amounts compared to other landscapes' area coverages. In contrary, the seasonal vegetation covers a huge area. Dominating altitude zones in the area are between 1,200–2,500 masl, which is the midlands of the national park, and altitude zones between 2,500–3,500 masl are the second leading zones.

A further goal was to analyze the tourist's perception of CES. This analysis was obtained from the results of the survey. Local and foreign tourists were asked to represent the role of CES for their decision to visit to UCNPN. The main finding of the research question is that aesthetic services are the most valued, whereas cultural heritage are the least important factor in their decision to travel the park. Recreational and spiritual services of the area have also a substantial role in the attraction of tourists. Furthermore, based on the results, association of four CES with landscapes were identified. Apparently, in contrast to pastures and residential areas, natural lakes, traditional meadows, and forests are highly linked landscape types with all CES.

Depending on the tourists' perception, the landscape's capability to supply CES was mapped. Results reveal that all landscapes have a considerable importance offering diverse CES. Capacity of the midlands (natural lakes) appeared to be among the most valued landscapes in terms of recreational activities and aesthetic beauty, while the highlands of the area (high mountains) are marked as the supplier of recreational and cultural heritage. Spiritual benefits are mostly associated with traditional meadows and forests. Currently, however, these landscapes are put at risk by polluting these

areas. Therefore, there is need for a comprehensive management tool to save the natural beauty of the area. It could be an option for the administration of the national park to introduce payment for ecosystem services (PES) to areas with high provision.

Statistical analysis (generalized linear mixed model with binomial logit function) helped to see the correlation between tourists' perception and the sociodemographic characteristics such as respondents' age, gender, nationality, educational level, environmental behavior, and experience with the landscape of the area. Research calculations demonstrated that level of education along with the nationality of respondents are among the most considerable factors, explaining the association of CES with landscapes. Other factors such as respondents' age, gender, and environmental behavior proved to be relevant but they did not show any significance toward the association of CES with the landscapes. Based on the results, it can be suggested to organize different workshops, seminars, and conferences about UCNPN landscapes and its vulnerable services, cooperating with researchers and institutions. These sorts of activities can facilitate for all people regardless of their age, gender, and nationality to understand the term CES and its association with landscapes.

The research results, which are mentioned above, enable to reveal the tourists' perception of CES that lay on different landscapes of the national park. These analyses can be helpful for decision makers in shaping future management strategies over the landscapes' of UCNPN and simultaneously considering visitors' opinions.

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