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THE USE OF CULTURAL ECOSYSTEM SERVICES: A COMPARISON BETWEEN LOCALS AND TOURISTS IN THE CHIMBORAZO NATURAL RESERVE

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Abstract: *Ecosystem services make human life possible by providing benefits associated with recreation, education, inspiration, and spirituality. Assessing the perception on the provision of cultural services helps in understanding the value of landscapes and improving their management. However, there are few studies on the relationship between the landscapes and the sociocultural values that people are getting from them. The present analysis was carried out using a comparative approach to estimate the frequency of use and the perceived capacity of the flow of cultural services in the view of local communities and tourists of the Chimborazo Wildlife Production Reserve, Ecuador. Based on 356 valid questionnaires for locals and 250 questionnaires for tourists, 208 of which were applied to nationals and 42 to foreigners, the results indicate that respondents tend to use and place value on cultural services provided by Chimborazo Mountain. The frequency of use seems to be related to proximity and local beliefs in the case of locals, and to the knowledge of tourism activities in the case of tourists. Out of the 10 selected tourist attractions, Chimborazo volcano with the surrounding patches of natural forest was perceived to hold the capacity to ensure the flow of cultural services for both locals and tourists. Factors that modified the perception were found to be quite heterogeneous in the cohorts taken into study. The results found could sustain the management and responsible use of the local ecosystems.*

Key words: *local inhabitants, tourists, frequency of use, perception, cultural ecosystem services, Chimborazo Natural Reserve, Ecuador.*

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1. Introduction

Biodiversity is the diversity of the living world; it includes the ecosystems of a region and all the species and genes contained in them [53]. Within the great global diversity, there is the methodological approach to ecosystem services which recognizes the dependence of mankind on natural ecosystems [24]. Research in this area has steadily increased over the last decades [12], [17], increasingly showing and recognizing that ecosystem services are the ecological components consumed or directly enjoyed to produce human well-being [3]. Therefore, it was acknowledged that it inter-connects natural processes and functions with human well-being and emphasizes their synergies and mutual inter-relations [25]. As such, the concept is increasingly applied to the conservation of the environment, human well-being, including poverty alleviation, as well as to inform for a sustainable development [16].

A globalization of the concept is progressively important and urgent, even more so when humans develop their activities in natural landscapes [29], which stand for a frequent temporary escape for a large part of the citizens who go out to look in the natural and rural landscapes for what an urban life cannot provide [51]. Therefore, conservation has become a global challenge [5].

Many classifications describe four groups of services that include the cultural ones [9], [37], which are now seen as contributors to many human-related features such as physical and mental health [4], [44]. However, they have received the least scientific attention [13], [54]. Cultural ecosystem services refer, among other things, to the aesthetic, educational, and religious relationships that exist between mankind and nature [37], standing for the benefits arising from such relationships [8]. Protected areas are known to offer various services which are provided manly in the form of recreation that enhances well-being and develops the local economy [47].

Specificity of local landscapes can affect the perception of natural services, having as drivers local geography and culture, beliefs and ways of life [11], [15]. Cultural ecosystem services are considered important to meet human and social needs even in socio-ecological contexts [22], [30], [36], [41]. Furthermore, different stakeholders may attribute different potential uses to biophysical factors in nature [48]. However, knowledge about how cultural ecosystem services influence humans and their direct relationship with nature remains incomplete [43], even though the study of these types of services continues to expand in response to an increasingly sophisticated society, and it requires the involvement of various stakeholders in the sustainable improvement of these processes [18].

Ecuador is among the countries holding a huge biodiversity [42] which is seen to be the result of the geographical location of the country, the presence of the Andes mountain range, and the influence of the Pacific Ocean. These factors give rise to the diversity of climatic floors [34]. To conserve its biodiversity, Ecuador has set up a wide network of protected areas [14] which were merged in the National System of Protected Areas (SNAP) and which are sources of services coming from several types of ecosystem services [10]. The Chimborazo Fauna Production Reserve (RC) has been part of the SNAP since 1987 and it is located in the

Tungurahua, Chimborazo, and Bolívar provinces [35]. The reserve is a territory in which some indigenous communities are settled, being also an ideal site for tourism development because it holds the Nevado Chimborazo (Chimborazo volcano) as its main attraction [7], while the development of the tourism sector, in a way similar to other regions [32], was seen to be a good strategy.

A previous paper of Castillo et al. [7] revealed the preferences and use of cultural ecosystem services in the RC by the local communities, placing emphasis on the Chimborazo Mountain and on other features of the landscape such as the Polylepis Relict Forest. However, the landscapes of RC are typically frequented by national and international tourists for which quite a different behaviour is expected in terms of preferences and use of the area's cultural ecosystem services.

As such, this research was designed to estimate what type of cultural services are used by the local inhabitants (communities) in comparison to the national and foreign tourists who visit the CR, an attempt that has been made in relation to existing tourist attractions. Additionally, the research aimed to get to know the perception of the inhabitants and tourists on the provision of cultural services and the factors that can affect their perception. To reach these objectives, part of the data used in this paper was reinterpreted from the database that was used to document such issues in the case of local communities [7], while data concerning the tourists' preferences and uses was collected by a new, independent exercise.

The approach used to collect the new data on the tourists' preferences had similar methodological procedures in the field activity and the same kind of data collected and statistical analyses undertaken, an approach that enabled data comparability.

2. Materials and Methods

2.1. Study Area

The area taken under study ranges altitudinally between 3,800 and 6,310 m.a.s.l., being placed at the boundaries of three provinces, in the CR (Figure 1A). In Ecuador, there are currently 59 protected areas, one of them being CR, located in the Andes Mountains, South America (Figure 1B). CR's goal is to guarantee and safeguard the sustainability of the natural resources and wildlife at risk in the area [35]. It includes 10 tourist attractions, among which are the Chimborazo (volcano that gives the name to the reserve) and the Carihuairazo Mountains, and which are considered to be the backbone for developing agricultural, touristic, and conservation activities [35]. Their scenic values are directly linked with 5 of the 10 ecosystem types (Figure 1A). These Andean highland ecosystems are important for human welfare since they provide elementary goods and services for social, environmental, and economic development [6]. Moreover, the landscape around Chimborazo Mountain is located in an impressive area, the mountain being one of the highest volcanoes in the world [23].

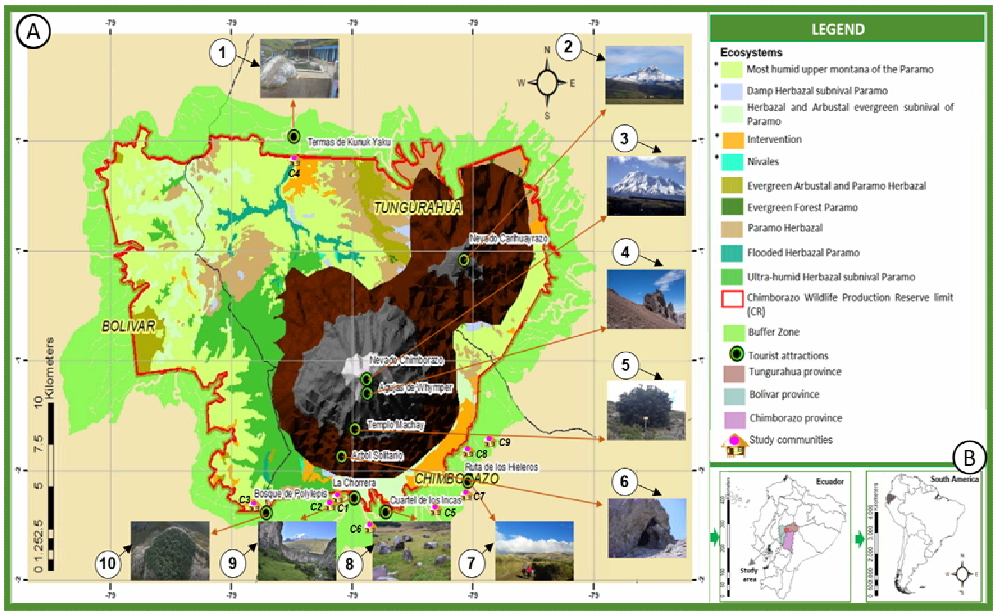


Fig. 1. *Map of the study area. Legend: (A) map of the CR showing the tourist attractions; (B) location of the CR in Ecuador, South America, (1) Whympers's Needles, (2) Chimborazo Mountain, (3) Carihuairazo Mountain, (4) Machay Temple, (5) Solitary Tree, (6) Fortress of the Incas, (7) Polylepis Forest, (8) Route of the Ice Makers, (9) Chorrera Canyon, (10) Kunuk Yacu Hot Springs*

The tourist attractions and their associated ecosystem types reported in this study are those well-documented and used in the territory. The selection of attractions considered the assumption that the customs, local activities and beliefs are related in a special way with the Chimborazo Mountain. As shown in Table 1, the parties involved that use the cultural ecosystem services and tourist attractions present in the CR are the stakeholders from the surrounding communities, including national and foreign visitors [35]. To define which communities should be included in the study, distances between populated areas and the chosen tourist attractions from the CR were estimated [7]. According to the CR management plan developed by MAE [35], the usual and traditional productive activities carried out by the local communities are mainly subsistence activities developed as agricultural work. At the same time, the foremost activities by tourists in the area are closely related to several types of landscape use, consisting of agro-rural tourism, experiential tourism, and sustainable tourism [35].

The opportunity for spare time activities, aesthetic beauty appreciation, immateriality and cultural heritage valuation attracts tourists to the area taken under study [46], [52].

2.2. Questionnaire Development and Field Survey

The research was based on a questionnaire administrated to two

groups of stakeholders, a reason for which the sample size was calculated differently. The questionnaire was administrated to locals from 9 communities, between May and July 2018, with the purpose to interview all the population, excluding the minors [7]. Therefore, the information given by 356 respondents was collected, standing for 78% of the overall population. To estimate the sample size in the case of tourists, a probabilistic formula was used at a confidence threshold of 95%, having as input the number of tourists that visited CR. Following that, the number of observations was set at 208 and 42 questionnaires, for national and foreign tourists, respectively. Interviews with tourists were conducted and validated during 2019. The questionnaire was planned in three sections to describe the respondents and the cultural services resulting from the tourist attractions. The first section aimed to collect social and demographic conditions using seven features (Table 1). The questions were constructed to enable differentiated analysis procedures. The procedures included detailed descriptions of the socio-demographic attributes as well as testing the implications of various social and demographic conditions on the capacity of provision. Typically, Ecuador lacks studies on the types of ecosystem services and approaches used to define them, a fact that limits the approach to the use of suggestions made by external experts to map the local ecosystem services [20]. To define the potential cultural ecosystem services used in this work and to develop the questionnaire, a brainstorming discussion group was set up to acquire knowledge and expertise from well-experienced local people and CR park rangers.

The field phase of the study aimed to collect information from the perspective of locals and tourists regarding the frequency at which the cultural ecosystem services are used as different types of recreation and relaxation activities. The obtained responses were processed as "the demand" for cultural services. For this purpose, a matrix was designed by considering two major groups of ecosystem services and 27 associated activities describing the use of specific ecosystem services associated to the 5 types of ecosystem complexes present in the territory (Figure 2).

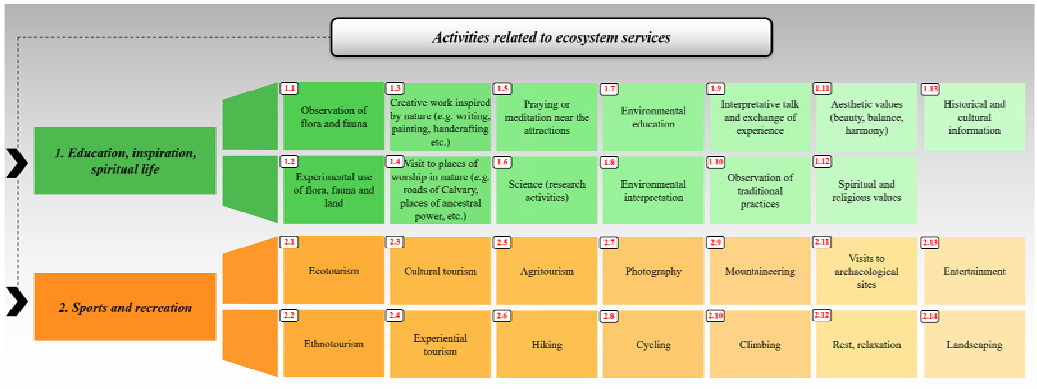


Fig. 2. *Leisure activities related to cultural ecosystem services and their categorization into specific groups*

Table 1

Items used to characterize the socio-demographic condition of the local and tourist respondents

Item	Type	Expected answers		Forecasted coding procedure
		Locals	Tourists	
Place of residence	Open	Communities	Countries	String variable
Gender	Closed	Male Female	Male Female	Binary variable
Age	Closed	18-28 29-40 41-51 52-63 64-75	<= 30 31-40 41-50 51-60 >60	Ordinal variable
Civil status	Closed	Single Married Free union Divorced Widow	Single Married Free union Divorced Widow	Ordinal Variable
Education level*	Closed	No education Incomplete primary Complete primary Secondary education incomplete Secondary education complete Bachelor education incomplete Bachelor education complete Specialization Master PhD Others	No education Primary Secondary complete Technician, Technologist Bachelor Master PhD	Ordinal Variable
Occupation **	Closed	Agriculture and Livestock Commerce Tourism Building Other	Unemployed Retired Student Freelancer Private Public	Ordinal Variable
Monthly income	Closed	386-708 $ 709-1030 $ 1031-1353 $ 1354-1676 $ 1677-2000 $ Other	≤ $ 100 100 – $ 386 > $ 386	Ordinal Variable

* Assuming the local learning system MAE [35]. ** Based on the provisions of INEC [26].

The response section of the questionnaire was built in a way that allowed the respondents to evaluate their own frequency of use based on a bipolar numeric scale, from 0 to 4, where 0 represents "have no idea or is not applicable", 1 - "never", and so on, up to 4, which stood for "frequently". The last part was configured to evaluate the capacity of local landscapes to provide cultural services by a more succinct matrix which was developed following the methods described by Affek and Kowalska [1]. The rationale of evaluation was similar to that from the second part of the questionnaire. The difference was that the respondents were asked to answer by zero when they believed that the considered landscape had no capacity to provide any cultural ecosystem services.

Prior to its administration, the questionnaire was validated following some tests done with the support of the ESPOCH (Escuela Superior Politécnica de Chimborazo) staff, then an updated version was developed and printed according to the number of copies needed. The final version was administrated in the field phase by a face-to-face interview approach. The language used in the questionnaires was natural and the scientific terms which could have been misunderstood by respondents were replaced by commonly used words. The questionnaire developed in Spanish was administrated to those who were native speakers of this language (locals, tourists from the country, and Spanish speakers from other countries) while the version prepared in English was administrated to the rest of the respondents.

2.3. Analysis

The systematization of the information collected during the field stage was done into a Microsoft Excel® sheet. Then, the socio-demographic features of the locals and tourists were analysed. Table 1 shows the features and type of data used in the analysis of the socio-demographic features. The first databases that were built were fundamental for the development of the statistical analysis that corresponded to the processing phase. In this study, most of the data was collected by Likert scales [31] applied to measure the respondents' points of view which were assumed to be equidistant and opposed at the endpoints, e.g., [55] even though there are known differences between the equidistance of scales and the equidistance of feelings expressed by them, e.g. [50]. The type of statistics used was parametric and it was based on the rationale of Norman [39], robustness and comparability of results [38]. Based on the parameters shown in Figure 2, the statistical analysis considered the share of ratings per category of activities and for each attraction, using the responses given by the two studied groups. In addition, the data was processed and used as the average values according to the type of activities declared by the locals and tourists; aggregated values of use were also computed per tourist attraction and cohorts taken under study. For this last part, as a prerequisite to the data analysis, the coherence of responses in the completed questionnaires was verified.

The assessment of the collected and refined information regarding the provision potential of cultural ecosystem services was developed systematically. This information was analysed by using

the data aggregated as arithmetic means of the 4 categories such as: recreation, inspiration for creative works, education and research activities, and spiritual experiences. This method was implemented for both cohorts, taking into account their distribution in the reported categories as well as their distribution in the tourist attractions taken under study. The statistical tests used were the Student's t and the analysis of variance, assuming a confidence of 95%; they were used to check which of the socio-demographic features could act as modifiers, and were done for all the tourist attractions taken under study. The software used for the analysis was mainly Microsoft Excel 2013® which included the Real Statistics® add-in (version 6.2). All the artwork from this study was developed using the same software.

3. Results and Discussion

3.1. Socio-demographic Features

For the locals, the valid questionnaires accounted for 78% of the population surveyed, resulting in a number of 356 analysed questionnaires. In what regards gender, females dominated in the sample size (61%) compared to males (39%), because in most of the communities there are more women than men. 91% of the respondents were aged between 18 and 63 years old. Shares of respondents in the categories described in the materials and methods are given in Figure 3. Detailed statistics on the distribution of respondents in categories are given in [7].

Females were also dominant in the sample size in the case of tourists (52%), as shown in Figure 3. With regard to the age variable, the majority of tourists were under 30 years old (62%), followed by those aged between 31 and 40 (21%). Regarding the level of education, the majority of tourists have completed the bachelor's level (72%), followed by 19% who have completed secondary school. Finally, there is the occupation variable, where the results show that the work activities of the surveyed tourists are strongly related to education (33%), public (25%) and private (24%) sectors.

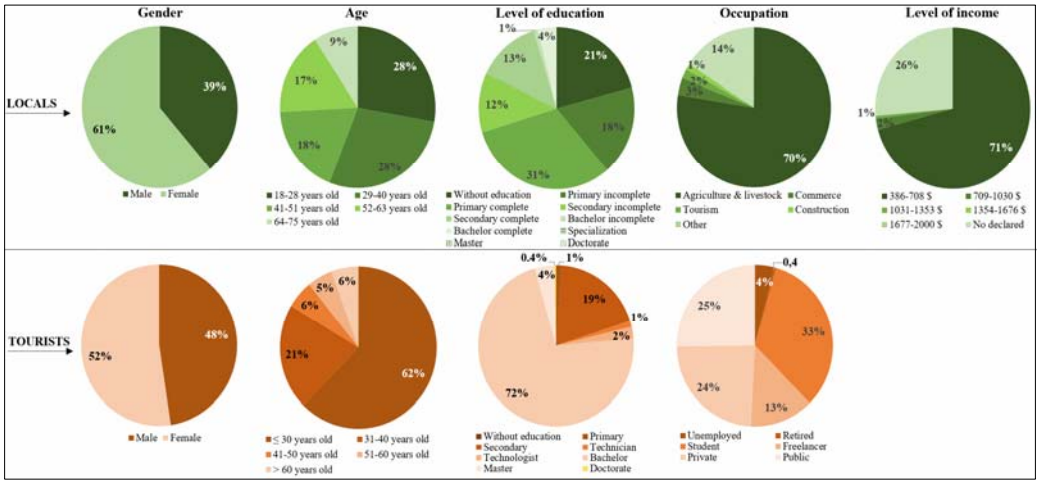


Fig. 3. *Social and demographic features of locals and tourists at the study level*

3.1.2. Frequency of Use

Figure 4 shows the average values of ratings in relation to the services' frequency of use. The results indicate a certain difference between locals and tourists for some of the cultural services. In general terms, at the level of mean values, the most frequented cultural services were 5: observation of flora and fauna (1.83), walk (1.90), rest, relaxation (1.92), entertainment (1.94), and landscaping (1.87). In general, the reported results indicate that different ecosystem services are used by locals and tourists, in addition to showing an increasing trend towards the category of recreation. This fact is probably attributed to the scenic beauty of the study area.

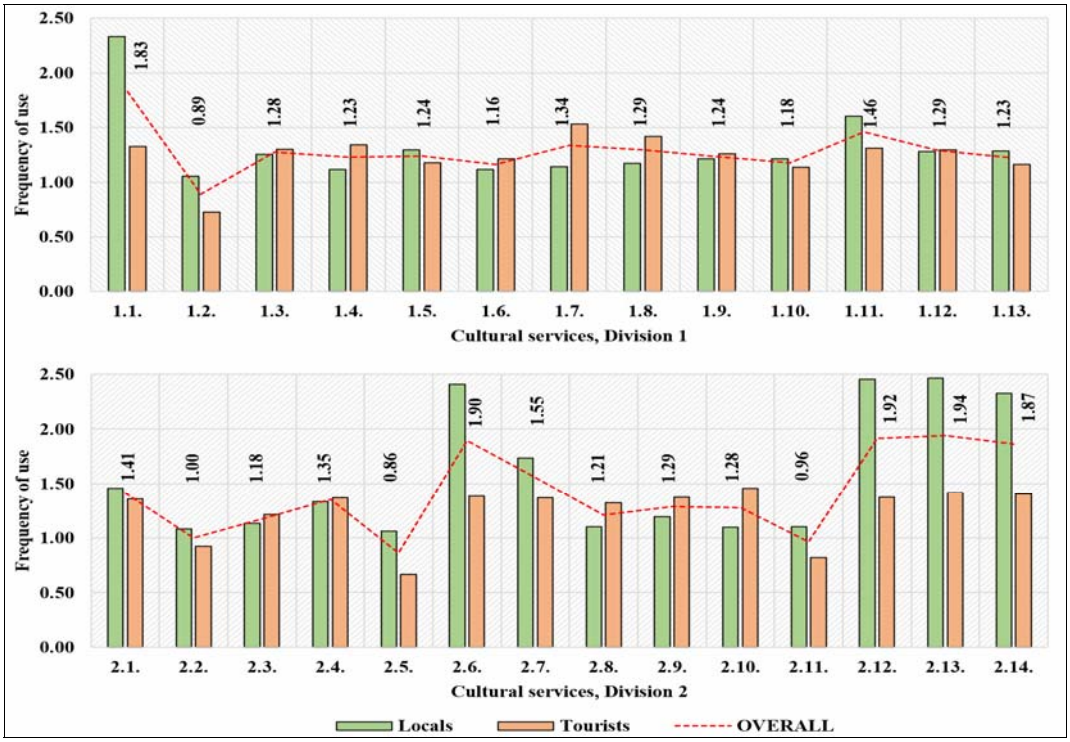


Fig. 4. *Aggregated average values of frequency of use of cultural ecosystem services for local inhabitants and tourists*

On the other hand, Figure 5 presents the comparison of the average values of the frequency of use of the cultural ecosystem services by locals and tourists in relation to tourist attractions. Chimborazo Mountain (1.3), La Chorrera (0.8), and Kunuk Yaku Hot Springs (0.7) were the tourist attractions most frequented by locals. For tourists, on the other hand, the most frequented tourist attractions were the Chimborazo Mountain (0.5) and the Polylepis Relict Forest (0.1). The reported results clearly show an increasing trend towards the Chimborazo Mountain in both cases, with an average value of 0.9. Given the aggregate average rating values shown in Figure 4, we need to interpret these results with caution. For instance, a

value of 1.3 would mean rather "never" at the community level. Similarly, a value of 0.5 would mean an average rating placed between "have no idea" and "never". In general, locals have shown a higher frequency of use of the tourist attractions, compared to tourists. This behavior can probably be attributed to the proximity and the daily tasks that they carry out near the local attractions, and to the lack of knowledge of other tourist attractions in the case of tourists.

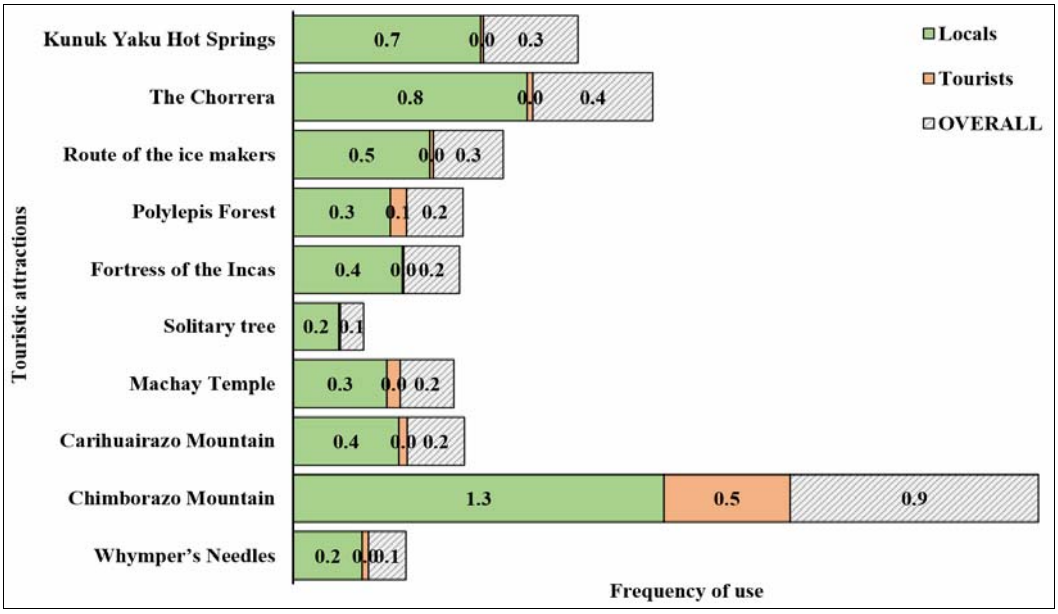


Fig. 5. *Frequency of use of tourist attractions: a comparison between locals and tourists*

3.1.3. Perception on provision potential

Figure 6 shows the results obtained on the perceived provision potential of the CR, by categories of services and cohorts. The perception of locals was mainly focused on the Chimborazo Mountain which was evaluated with a medium capacity (1.9 - 2.8) to provide the 4 categories of cultural ecosystem services (Figure 6a-d). The rest of the tourist attractions were evaluated with a low capacity (0.1 - 1.4). On the other hand, the perception of tourists was also oriented towards the Chimborazo Mountain which was evaluated to hold a medium to very high capacity (average ratings of 2.8 - 3.7) to provide cultural services (Figure 6a-d). The results clearly show that, for both cohorts, the trend was increasing towards the Chimborazo Mountain, a fact that may have been influenced by the world-wide knowledge regarding this place available for tourists. The locals, on the other hand, consider the place to be sacred, and many of them use it for ancestral ceremonies. Finally, the rest of the tourist attractions were evaluated with a rather low capacity to provide cultural ecosystem services (0 - 0.4).

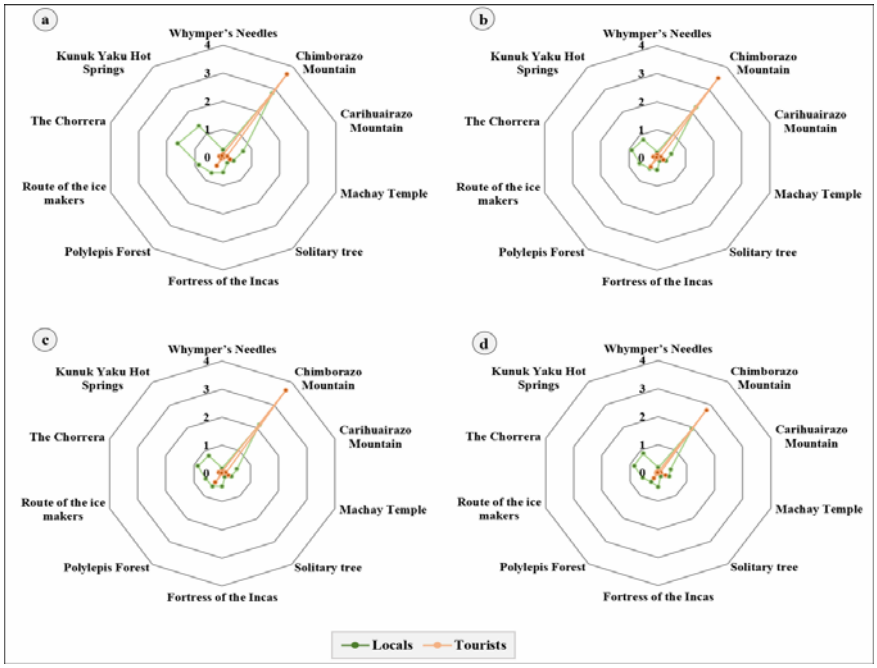


Fig. 6. *Perceived capacity to provide cultural services in four categories: a) recreational, b) inspiration, c) education and study, d) spiritual experience, where 0 means "Not applicable", 1 means "Lowest capacity", and 4 means "Highest capacity"*

Figure 7 shows the capacity to provide on tourist attractions of the CR, as perceived by locals and tourists in relation to the cultural ecosystem services. For both locals and tourists, Chimborazo Mountain was the tourist attraction evaluated to hold the highest capacity to provide cultural services with an average rating of 2.8. Tourists' responses averaged a higher value (3.4) compared to locals (2.4). This result could be attributed to factors of visual perception and especially to the scenic beauty that this attraction holds. In addition, the other top-rated tourist attractions were La Chorrera (0.6) and Kunuk Yaku Hot Springs (0.5), where locals were the ones who attributed a higher value compared to tourists. On the other hand, the Whymper Needles (0.2), the Fortress of the Incas (0.2), and the Solitary Tree (0.1) were evaluated as holding a rather low capacity to provide cultural ecosystem services by both groups of respondents.

An important aspect in this comparative analysis was the low or no rating given by tourists to most of the attractions of the CR. This factor can be attributed to the ignorance of the attractions by tourists, especially by foreigners.

3.1.4. Modifiers of Perception

Figure 8 shows the factors that influenced the perception of the locals on the capacity of tourist attractions from the CR to provide services from the 4 categories. This analysis was carried out only for the Chimborazo Mountain, due to its high rating values in perception, both for the locals and the tourists. The graph shows all the variables in the recreation

category, since it was the category in which there were significant differences. In this sense, variables such as gender, occupation, and income level were found to be among the factors that influenced the perception. Local men who work in tourism activities perceived capacity to provide quite differently.

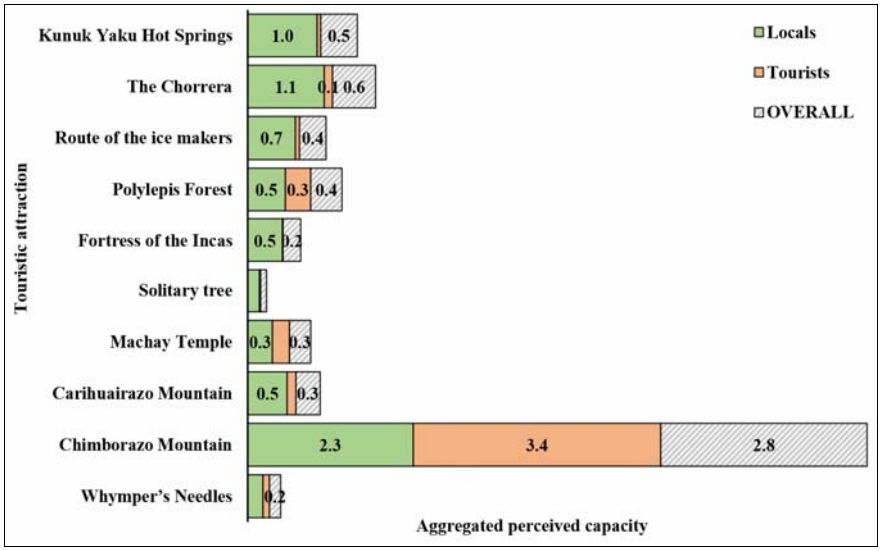
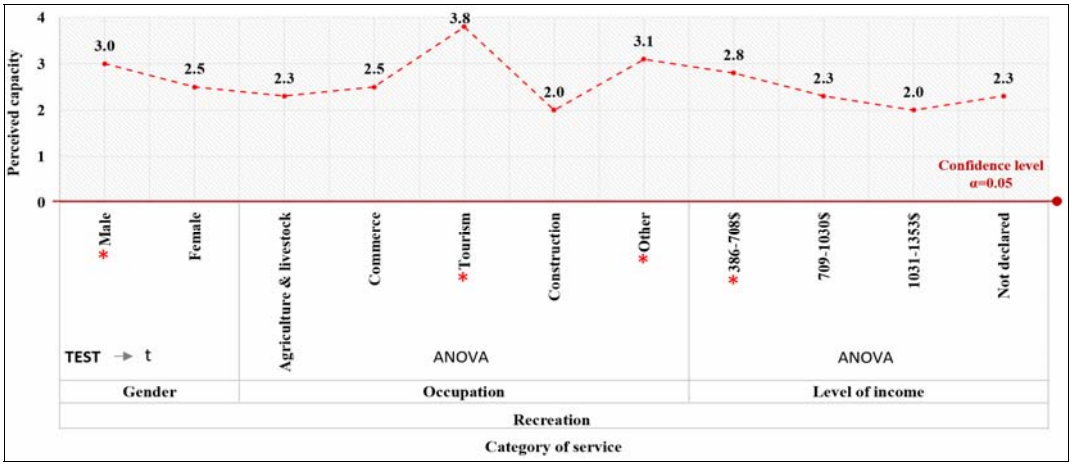


Fig. 7. *Perceived capacity to provide cultural services: a comparison between cohorts*

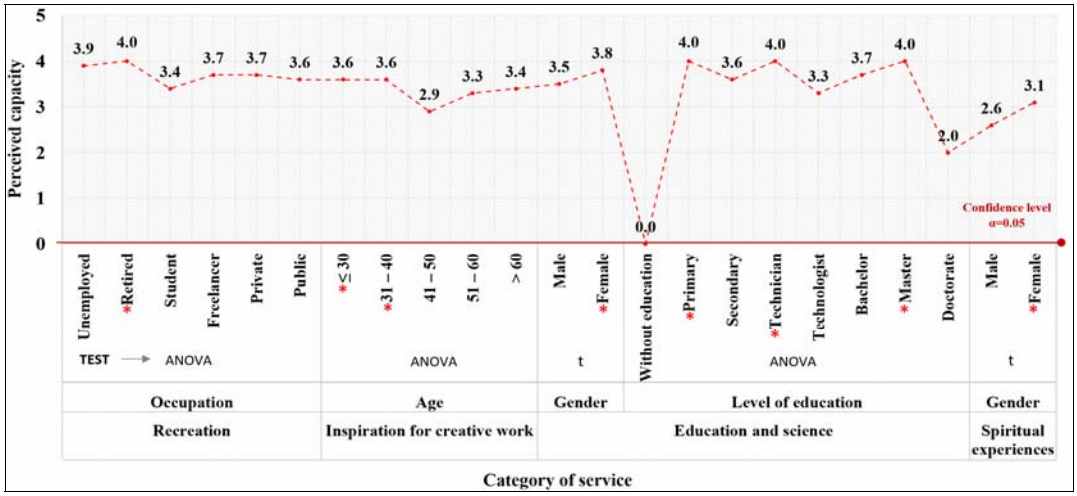


*Note: * significant differences*

Fig. 8. *Modifiers of perceived capacity to provide cultural services*

Figure 9 shows the factors that influenced the perception of tourists in relation to the 4 categories of services. The graph shows all the variables of the categories of recreation, inspiration for creative work, education and science, and spiritual experiences, because they were the categories that presented significant

differences. In this sense, the occupation variable in recreation, the age variable in inspiration for creative work, the gender and level of education variables in education and science, and the gender variable in spiritual experiences showed significant differences.



*Note: * significant differences*

Fig. 9. *Modifiers of perceived capacity to provide cultural services: Chimborazo Mountain*

3.2. Discussion and Limitations

An integrative evaluation of all the landscape's features is important, because it may show the value that people place on its components. In particular, in the areas that may have touristic use, it is very important to capture the view of all the people attending or developing their activity in relation to them. Such a research approach was used in this study and it features one of its merits in relation to spatially-explicit information which is important and difficult to get, lacking in most of data repositories [33], [45]. Another merit of this study is that it provides data for a rather less researched component, which is the cultural ecosystem services [40], by a comparative approach. This is also important in the view according to which protected areas are typically described as places holding a high potential of delivering cultural services [19] even though in some of them people rank their preferences in other orders e.g., [2], [23]. As such, this study showed that tourists and locals of the CR generally use and are aware of the local features provided by the landscape. This study, as well as previous ones [7], have shown also that their opinions may be influenced at least by the proximity to different features.

There are fundamental differences in understanding the landscape values by the locals and tourists. For the locals, the landscape is typically interpreted under a socio-existential perspective, while for the incomers, it may have a rather individual meaning [28]; as such, tourists are known to bring an outsider's view of the landscape features [49] and some additional effort would be needed to better evaluate tourist requirements as a

prerequisite to adapt the local supply accordingly. For instance, Gavilanes et al. [21] have found that in some parts of Ecuador, the natural resources are used by the local inhabitants who obtain many benefits from them. Another problem is that of the locals' willingness to share their landscape with incomers, which may bring contradictions because the locals' view is typically oriented towards utility while the incomers' view is oriented towards conservation [28]. An expectation of this study was to find significant differences between locals and tourists in terms of preferences. It seems, however, that Chimborazo Mountain dominated the preferences in the case of the tourist cohort, by mechanisms similar to those found for the locals [7].

On the other hand, we know that protected areas in Ecuador are important sites for forest conservation and serve a wide variety of uses. An important factor was the Polylepis Forest of CR, as a resource visited by locals and tourists. This forest is home to cultural ecosystem services; they play an important role in helping species and people, with a rich landscape that encourages tourism and recreation [7]. Therefore, Polylepis forests can serve as a natural store of products and services for the future and it is very important to sustainably capture the view of all the people who attend or carry out their activity in relation to them.

4. Conclusions

The results of this research can be seen as important because they map, in a comparative approach, the use and view of two cohorts on the landscape's potential to provide cultural benefits and which can affect the disposition and willingness of people to visit such places. Forest related features from the area received less value from the respondents, even though the local cohort placed more value on them, probably due to their past use in the area. The reported results show that, irrespective of the cohort, most of the cultural use value was associated with the dominant landscape feature from the area, that is Chimborazo Mountain.

In what concerns the comparative analysis of the perception that the two cohorts had, Chimborazo Mountain was identified to be the location with the highest ratings given by both groups. Perception modifiers were heterogeneous among the surveyed stakeholder groups and, taken together with the findings on the use and perception, may help to design and implement tailored strategies to improve the environmental management of CR and to increase the added value of the tourist attractions. As such, the results of this research may help to improve the tourist products offered in the CR.

Acknowledgements

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References

1. Affek A., Kowalska A., 2017. Ecosystem potentials to provide services in the view of direct users. In: Ecosystem Services, vol. 26, pp. 183-196.
2. Agbenyega O., Burgess P., Cook, M. et al., 2009. Application of an ecosystem function framework to perceptions of community woodlands. In: Land Use Policy, vol. 26, pp. 551-557.
3. Boyd J., Banzhaf S., 2007. What are ecosystem services? The need for standardized environmental accounting units. In: Ecological Economics, vol. 63, pp. 616-626.
4. Bratman G., Anderson C., Berman M. et al., 2019. Nature and mental health: An ecosystem perspective. In: Science Advances, vol. 5(7), pp 1-14.
5. Carranza D., Varas K., De Veer D. et al., 2020. Socio-environmental conflicts: An underestimated threat to biodiversity conservation in Chile. In: Environmental Science and Policy, vol. 110, pp. 46-59.
6. Castillo D., Carrasco J., Quevedo L. et al., 2017. Diversity, composition and structure of Andean high forest in Ecuador, South America. In: Bulletin of the Transilvania University of Brasov, Forestry, Wood Industry, Agricultural Food Engineering, Series II, vol. 10, pp. 1-16.
7. Castillo D., Gavilanes A., Ricaurte C. et al., 2019. Perception and use of cultural ecosystem services among the Andean communities of Chimborazo Reserve. In: Environmental Engineering and Management Journal, vol. 18(12), pp. 2705-2718.
8. Chan K., Goldstein J., Satter T. et al., 2011. Cultural services and non-use values, Natural capital: Theory and practice of mapping ecosystem services, pp. 206-228.
9. Chan K., Satterfield T., Goldstein J., 2012. Rethinking ecosystem services to better address and navigate cultural values. In: Ecological Economics, vol. 74, pp. 8-18.
10. Columba K., 2013. Manual de Manejo Operativo de Áreas Protegidas del Ecuador, Ministerio del Ambiente, Ecuador. (Manual for the Operational Management of Protected Areas of Ecuador, Ministry of the Environment, Ecuador). Available at: https://www.ambiente.gob.ec/wp-content/uploads/downloads/2017/09/Manual-para-la-Gestio%CC%81n-Operativa-de-las-A%CC%81reas-Protegidas-de-Ecuador-finalr.pdf. Accessed on: September 15, 2020.
11. Costanza R., 2000. Social goals and the valuation of ecosystem services. In: Ecosystems, vol. 3, pp. 4-10.
12. Costanza R., De Groot R., Sutton P. et al., 2014. Changes in the global value of ecosystem services. In: Global Environmental Change, vol. 26, pp. 152-158.
13. Crossman D., Burkhard B., Nedkov S. et al., 2013. A blueprint for mapping and modelling ecosystem services. In: Ecosystem Services, vol. 4, pp. 4-14.
14. Cuesta F., Peralvo M., Merino A. et al., 2017. Priority areas for biodiversity conservation in mainland Ecuador. In: Neotropical Biodiversity, vol. 3, pp. 93-106.
15. Daily G., 1997. Nature´s services: Societal dependence on ecosystem services. Island Press, Washington, DC, USA.
16. Daw T., Brown K., Rosendo S. et al., 2011. Applying the ecosystem services concept to poverty alleviation: the

need to disaggregate human well-being. In: Environmental Conservation, vol. 38, pp. 370-379.
17. Fisher B., Turner R., Morling P., 2009. Defining and classifying ecosystem services for decision making. In: Ecological Economics, vol. 68, pp. 643-653.
18. Fu B., Xu P., Wang Y. et al., 2020. Critical areas linking the supply and demand of cultural ecosystem services: Accessibility and geological disasters. In: Global Ecology and Conservation, vol. 21, e00839.
19. García A., Quintas C., García M. et al., 2015. Collaborative mapping of ecosystem services: The role of stakeholders′ profiles. In: Ecosystem Services, vol. 13, pp. 141-152.
20. Garrido P., Elbakidze M., Angelstam P. et al., 2017. Stakeholder perspectives of wood-pasture ecosystem services: a case study from Iberian dehesas. In: Land Use Policy, vol. 60, pp. 324-333.
21. Gavilanes A., Castillo D., Morocho J. et al., 2019. Importance and use of ecosystem services provided by the Amazonian landscapes in Ecuador - evaluation and spatial scaling of a representative area. In: Bulletin of the Transilvania University of Brasov, Forestry, Wood Industry, Agricultural Food Engineering, Series II, vol. 12, pp. 1-26.
22. Hartel T., Fischer J., Campeanu C. et al., 2014. The importance of ecosystem services for rural inhabitants in a changing cultural landscape in Romania. In: Ecology and Society, vol. 19, pp. 42.
23. Hartter J., 2010. Resource use and ecosystem services in a forest park landscape. In: Society and Natural Resources, vol. 23, pp. 207-223.
24. Häyhä T., Franzese P., Paletto A. et al., 2015. Assessing, valuing, and mapping ecosystem services in Alpine forests. In: Ecosystem Services, vol. 14, pp. 12-23.
25. Hernández M., Costanza R., 2018. Natural capital and ecosystem services. In the Routledge Handbook of Agricultural Economics. Routledge.
26. INEC 2016. Instituto Nacional de Estadística y Censos. Compendio estadístico (Statistical Compendium). Available at: http://www.ecuadorencifras.gob.ec/documentos/web-inec/Bibliotecas/Compendio/Compendio-2016/Compendio%202016%20DIGITAL.pdf. Accessed on: September 15, 2020.
27. Instituto Geofísico – Escuela Politécnica Nacional del Ecuador, 2016. Equipo Franco-Ecuatoriano colocó un GPS en la cima del volcán Chimborazo. (Franco-Ecuadorian team placed a GPS on top of the Chimborazo volcano). Available at: http://www.igepn.edu.ec/servicios/noticias/1268-equipo-franco-ecuatoriano-coloco-ungps-en-la-cima-del-volcanchimborazo8. Accessed on: September 15, 2020.
28. Kianicka S., Buchecker M., Hunziker M. et al., 2006. Locals' and tourists' sense of place. In: Mountain Research and Development, vol. 26, pp. 55-64.
29. Kirkfeldt T., 2019. An ocean of concepts: Why choosing between ecosystem-based management, ecosystem-based approach and ecosystem approach makes a difference. In: Marine Policy, vol. 106, 103541.
30. Lamarque P., Tappeiner U., Turner C. et al., 2011. Stakeholder perceptions

of grassland ecosystem services in relation to knowledge on soil fertility and biodiversity. In: Regional Environmental Change, vol. 11, pp. 791-804.
31. Likert R., 1932. A technique for the measurement of attitudes. In: Archives of Psychology, vol. 22, pp. 5-55.
32. López F., Rosado D., 2017. Management effectiveness evaluation in protected areas of southern Ecuador. In: Journal of Environmental Management, vol. 190, pp. 45-52.
33. López-Santiago C., Oteros E., Martín B. et al., 2014. Using visual stimuli to explore the social perceptions of ecosystem services in cultural landscapes: the case of transhumance in Mediterranean Spain. In: Ecology and Society, vol. 19(2).
34. MAE 2012. Ministerio del Ambiente del Ecuador. Sistema de Clasificación de los ecosistemas del Ecuador continental (Classification system of the ecosystems of continental Ecuador). Available at: https://www.ambiente.gob.ec/wp-content/uploads/downloads/2012/09/LEYENDA-ECOSISTEMAS_ECUADOR_2.pdf. Accessed on: September 15, 2020.
35. MAE 2014. Ministerio del Ambiente del Ecuador. Actualización del Plan de Manejo de la Reserva de Producción de Vida Silvestre Chimborazo, Informe final de consultoría (Update of the Management Plan for the Chimborazo Wildlife Production Reserve, Final consulting report). https://es.scribd.com/document/433869951/Actualizacion-Del-Plan-de-Manejo-de-La-Reserva-de-Produccion-de-Fauna-Chimborazo. Accessed on: September 15, 2020.
36. Martín-López B., Iniesta I., García M. et al., 2012. Uncovering ecosystem service bundles through social preferences. In: Plos One, vol. 7, e38970.
37. MEA 2005. Millennium Ecosystem Assessment. Ecosystems and human well-being: wetlands and water. Available at: https://sci-hub.tw/10.1016/b978-0-12-409548-9.09206-x. Accessed on: September 15, 2020.
38. Murray J., 2013. Likert data: what to use, parametric or non-parametric. In: International Journal of Business and Social Science, vol. 4, pp. 258-264.
39. Norman G., 2010. Likert scales, levels of measurement and the ‘‘laws’’ of statistics. In: Advances in Health Sciences Education, vol. 15, pp. 625-632.
40. Norton L., Inwood H., Crowe A. et al., 2012. Trialling a method to quantify the ‘cultural services’ of the English landscape using Countryside Survey data. In: Land Use Policy, vol. 29, pp. 449-455.
41. Oteros E., Martín B., González J. et al., 2014. Socio-cultural valuation of ecosystem services in a transhumance social-ecological network. In: Regional Environmental Change, vol. 14, pp. 1269-1289.
42. Penafiel D., Vanhove W., Espinel R. et al., 2019. Food biodiversity includes both locally cultivated and wild food species in Guasaganda, Central Ecuador. In: Journal of Ethnic Foods, vol. 6, pp. 1-13.
43. Plieninger T., Bieling C., Fagerholm N. et al., 2015. The role of cultural ecosystem services in landscape management and planning. In: Current

Opinion in Environmental Sustainability, vol. 14, pp. 28-33.
44. Sandifer P., Sutton A., Ward B., 2015. Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. In: Ecosystem Services, vol. 12, pp. 1-15.
45. Scholte S., Van Teeffelen A., Verburg P., 2015. Integrating socio-cultural perspectives into ecosystem service valuation: a review of concepts and methods. In: Ecological Economics, vol. 114, pp. 67-78.
46. Scolozzi R., Schirpke U., Detassis C. et al., 2015. MappingAlpine landscape values and related threats as perceived by tourists. In: Landscape Research, vol. 40, pp. 1-15.
47. Soe W., Suzuki A., Peh K. et al., 2019. Economic Value of Cultural Ecosystem Services from Recreation in Popa Mountain National Park, Myanmar: A Comparison of Two Rapid Valuation Techniques. In: Land, vol. 8, p. 194.
48. Spangenberg J., Görg C., Truong D. et al., 2014. Provision of ecosystem services is determined by human agency, not ecosystem functions. Four case studies, International Journal of Biodiversity Science. In: Ecosystem Services and Management, vol. 10, pp. 40-53.
49. Stremlow M., 1998. Die Alpen aus der Untersicht: von der Verheißung der nahen Fremde zur Sportarena; Kontinuität und Wandel von Alpenbildern seit 1700, Haupt.
50. Sullivan G., Artino A., 2013. Analyzing and interpreting data from Likert-type scales. In: Journal of graduate medical education, vol. 5, pp. 541-542.
51. Trillo J., 2007. La gestión del uso público en espacios naturales (The management of public use in natural spaces). Miraguano.
52. Van Berkel D., Verburg P., 2014. Spatial quantification and valuation of cultural ecosystem services in an agricultural landscape. In: Ecological Indicators, vol. 37, pp. 163-174.
53. Verma A., 2016. Biodiversity: Its different levels and values. In: International Journal on Environmental Sciences, vol. 7, pp. 143-145.
54. Vihervaara P., Ronka M., Walls M., 2010. Trends in ecosystem service research: early steps and current drivers. In: Ambio, vol. 39, pp. 314-324.
55. Willits F., Theodori G., Luloff A., 2016. Another look at Likert scales. In: Journal of Rural Social Sciences, vol. 31, pp. 6-126.