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THE DIFFERENTIATING ROLE OF EDUCATION IN THE ECONOMIC VALUATION OF THE ECOSYSTEM SERVICES OF THE WARAIRA REPANO NATIONAL PARK (CARACAS, VENEZUELA)

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INTRODUCTION

National parks are large natural or near-natural areas that according to the IUCN (2008) “have been established to protect large-scale ecological processes... and also provide the basis for spiritual, scientific, educational, recreational and visiting opportunities that are environmentally friendly.” and culturally compatible” (p.19). All these functions, essential for the development of the life of all living beings, make efficient management of the area essential, in order to guarantee its existence for all generations.

However, due to the importance attributed to these areas, authors such as Díaz-Martín et al. (2014) and recently, Frontado (2019), maintain that the management of national parks faces great difficulties such as the poor or erroneous addressing of their main problems, lack of monitoring and control mechanisms, as well as the little promotion of channels that facilitate the participation of local actors in its management.

A reflection of the situation described in the previous paragraph is represented by the Waraira Repano National Park (PNWR), since according to Díaz-Martín et al., (2014), Venezuela is going through a complex social and economic situation that has become more acute. due to a political crisis, which has affected the management of protected areas; which Frontado (2019) has confirmed by revealing the scarce allocation of resources and the little development of plans and research on the PNWR. However, added to this is the fact that national parks, for many years, were considered places with access only for scientists and researchers, distancing “ordinary” citizens from their creation objective, which weakened the link and people’s belonging to the area, and therefore their commitment to conservation, because what is not known is not valued (Frontado, 2019, as cited in the Ministry of Popular

Power for the Environment – INPARQUES, 2009 and García, 2017).

From the point of view of classical economics, knowing to value implies understanding that there are benefits provided by ecosystems such as tourism, food, wood, among others; that can be quantified in market terms. However, other ecosystem goods and services such as oxygen production and scenic beauty are not valued based on said economy, so their weight in political and especially management decision-making has led to their degradation and depletion (Lomas et al., 2005).

The economic valuation of ecosystem goods and services requires the application of specific methods, which, according to Herruzo (2002), are procedures that allow their value and the externalities generated by their management to be quantified in monetary terms.

In the case of the PNWR, the citizen, beyond recreation, sports and clean air, knows little about the goods and ecosystem services that this area provides. In fact, in the words of Frontado (2019), he is also unknown as an actor in the management of the park, which has caused a dismissal of its value that is reflected in the deterioration of the area. For this reason, over the years, exercises have been carried out to publicize the value of the park as natural capital, through various methods.

However, some valuation methods are not comprehensive and present biases, some of which are difficult to resolve, an example being contingent valuation, which according to Lomas et al. (2005), is a method subject to emotionalities that presses the willingness to pay (WTP) of citizens to preserve an asset without taking into account the set of physical-social systems that are proposed in other disciplines.

This is how Frontado, in 2019, carried out the economic valuation of the PNWR using the

multi-criteria analysis method, incorporating the “community of extended peers” as the foundation of postnormal science (Kuhn, 1962; and Funtowicz and Ravetz, 1993), with the purpose of taking into account the opinion of the actors involved in the use of the area, who from their perspectives know parts of the valued good, interrelating all the visions and thus achieving comprehensiveness and obtaining more precise or perhaps less biased answers because It was based on more accurate knowledge.

The total Economic Value resulting from the research by Frontado (2019) was US\$ 11,222,263,794.17. However, despite obtaining a significant value, it represented, like any valuation, an approximation to the real value that the protected area could have, due, among other things, to the lack of knowledge of all the services provided by the park, on the part of the actors involved. They participated in the research, since since there was no prior teaching process (not raised in the methodology), they responded from the partiality of the actions or activities that relate them to the park.

Now, it would be enough to evaluate whether the fact of knowing to value generates a disconnection between citizens and their partiality from the activities that relate them to the park. Therefore, this research aims to answer: what are the ecosystem services most recognized by management actors in the Waraira Repano National Park, before and after a training process? What is the Total Economic Value (TEV)? determined for the Waraira Repano National Park, before and after each ranking process? And how does the training process influence decision-making when economically valuing the Waraira Repano National Park?

To answer the research questions, the objective was to analyze the influence of education as a differentiating tool in decision-

making during the process of valuing the ecosystem goods and services of the Waraira Repano National Park, through the methodology of multicriteria analysis.

For Martin (2006), facilitating an educational process, focused not only on teaching but also on humanizing, such as the one proposed in this study, is important for a science such as economics, since educating to know (recover the non-instrumental relevance of knowledge), to manage (act with skill in daily affairs), to value (appreciate and give value to things and actions, favoring the development of moral judgment and aesthetic judgment), and to participate (promote scenarios in which it is possible to learn to take part in the decisions that social life entails) actions aimed at the conservation of the ecosystem resources of the PNWR can be guided.

METHOD

The present research adopted a quantitative approach based on the positivist paradigm. It is framed in the scientific method reflected in the use of the multi-criteria analysis tool (ANP) for the analysis.

Through the positivist paradigm in its epistemological dimension, a position of distancing was assumed with respect to the object of study (PNWR) to approach it with greater objectivity, as Guba and Lincoln (2002) maintain. For its part, through the positivist paradigm, in its ontological dimension, there was an approach to hypothetical deductive reality, with an objective perception that sought to explain and predict the facts (Ocaña, 2010). That is, what was the perception of the management actors interviewed based on the object of study.

The methodological framework, through a rigorous analytical approach, sought to explore how education stands as a differentiating tool in this process of economic

valuation, transcending conventional limits and highlighting its influence on the perception, appreciation and decision-making related to the environmental aspects and their interaction with society. To this end, the research design was non-experimental and longitudinal, since the information was collected as mentioned by Arias (2012) directly from the management actors related to the object of study without altering the existing conditions, and in two periods. different with the same actors to analyze the changes observed once the training/education process has been carried out (Hernández, Fernández and Baptistas, 2014).

The context that delimited the research focused primarily on the sample, which following the methodology set forth by Saaty (2001) statistically required no less than 4 and no more than 16 experts to achieve convergence, with 8 being a sensible number. To this end, the selected sample was non-probabilistic for convenience (Hernández, 2021), being made up of 8 actors with specific knowledge about the national park. Additionally, the currency used for economic quantification was the American dollar (US\$), due to the multiple fluctuations in the existing exchange system in the country. The Total Economic Value (VET) scheme was made up only of legal activities considered within the Planning Plan and Regulation of Use of the PNWR (G.O. No. 4,548E of March 26, 1993).

After the selection of the sample and based on a previous diagnosis carried out by Frontado (2019) where the Total Economic Value (TEV) scheme of the PNWR was determined, the ecosystem services were prioritized through a closed and self-administered questionnaire, following the Network Analysis Process or ANP, using the free educational software Super Decisions, with the intervention of management actors.

Next, an in-person training program of

4 academic hours was developed, framed in the knowledge of the ecosystem goods and services of the PNWR, describing its functions and highlighting its importance in an impartial manner, to educate management actors.

Once the training was completed, the ranking questionnaire was applied again to the management actors, using the same ANP model. The last phase of the research being the determination of the Total Economic Value (TEV) of the PNWR for both hierarchies, comparing and analyzing the results of Total Economic Value obtained before and after the training process.

RESULTS

HIERARCHIZATION OF ECOSYSTEM SERVICES, BELONGING TO THE VET SCHEME OF THE WARAIRA REPANO NATIONAL PARK BEFORE THE TRAINING PROCESS

Starting from the Total Economic Value (VET) Scheme determined by Frontado (2019) as it is considered the most current survey related to the Waraira Repano National Park, the paired comparison was carried out, using the free educational software Super Decision®, obtaining as general results of prioritization those shown in Figure 1, with “water supply” being the ecosystem service most recognized by the 8 management actors with 18.75%.

Once this result was obtained, the anchoring value and the Total Economic Value (TEV) of the national park were calculated, for which the physical quantification was carried out, the value of which was 2,104,830,000 m³ of water; and since the average value of a cubic meter of water (\$/m³) for Latin America is, according to Bausson (2017), \$1, an economic quantification of \$2,104,830,000 was obtained.

From the economic quantification of the

water supply as an anchor value, the economic value of the rest of the hierarchical ecosystem services was obtained and as a sum, the VET of the park before the training process of the actors was 11,222,263,794, 17 US\$.

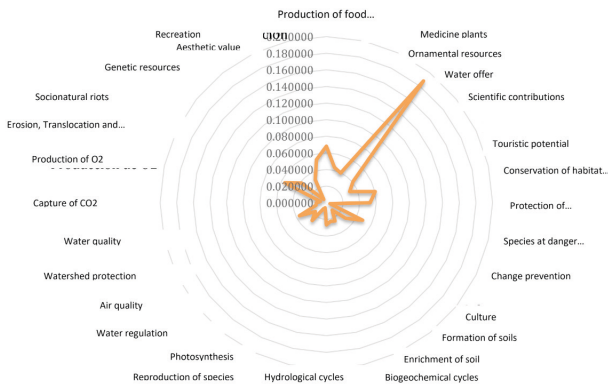


Figure 1. General results of the prioritization of criteria to prioritize the ecosystem services provided by the Waraira Repano national park before the training process.

Note: The graph is the result of the paired comparison, using the free educational software Super Decision© based on the answers offered by the 8 management actors before the training process. Own preparation using Excel*.

HIERARCHIZATION OF ECOSYSTEM SERVICES, BELONGING TO THE VET SCHEME OF THE WARAIRA REPANO NATIONAL PARK BEFORE THE TRAINING PROCESS

After the training process that was given to the 8 management actors, the hierarchization of ecosystem services was carried out again, obtaining the results shown in Figure 2, where although the ecosystem service “water supply” continues to be recognized with a high value (8.75%), is surpassed by the “CO2 capture” service with 9.53%.

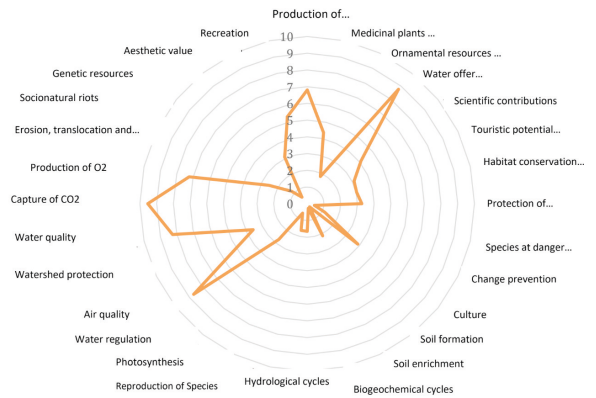


Figure 2: General results of the prioritization of criteria to prioritize the ecosystem services provided by the Waraira Repano national park post training process.

Note: The graph is the result of the paired comparison, using the free educational software Super Decision© based on the responses offered by the 8 management actors after the training process. Own preparation using Excel*.

Once the criterion “CO2 capture” was obtained as the one with the highest ranking by the experts, this service was quantified both physically (868.59 t CO2 equi/ha) and economically (6,324,516,690.86 US\$) and from the latter, Considered as the anchor value, the Total Economic Value (TEV) of the Waraira Repano National Park was calculated, after the formation process, resulting in a value of 132,698,709,899.08 US\$.

DISCUSSION

Prior to the training process in which the 8 actors participated, the result obtained in the hierarchy showed a value that was somewhat contradictory to what was expected, since when considering the Waraira Repano national park as the vegetal lung of the city of Caracas, it was thought that the most recognized service would be the “production of oxygen (O2)”. However, this service, which was even surpassed by “recreation”, allows us to see that the actors related the protected area

with the possibility of doing outdoor activities and breathing fresh air, which can indirectly be associated with the production of oxygen, but reinforced the possibility that the actors, due to lack of knowledge, did not associate fresh and clean air with this service.

This assumption could be corroborated during the training process, where the training focused on the importance of ecosystem services, their functions and how they relate to each other; It was recognized by the participants that they were unaware of the existence of several of the services, and of many others that they took for granted and did not consider as such.

The inclination towards the “supply of water” as an ecosystem service of greater value was, in turn, given by the needs of the environment, where the scarcity of the resource makes citizens see the streams of the national park as an option to survive. Furthermore, the problem of water scarcity being one of the most important for the country today, means that others of equal or even greater importance are relegated, such as climate change, which is closely related to water resources.

After the training process, greater clarity could be observed in the participants about ecosystem services, which in turn were linked to the needs of the environment and the local and global sustainability problems that we have today. This was corroborated once the second ranking exercise was carried out, where although the water resource was highly recognized, the highest valued ecosystem service was “CO2 capture”, bringing to light important issues such as climate change and global warming. Furthermore, the VET obtained after the second ranking was much higher, which, although it is an approximation to the real value that the protected area could have, is subject to the deficiencies that exist, in terms of the availability of updated data on

the variables associated with the ecosystem services provided by the national park.

The above means that although the VET in the second case was higher, the anchoring value is not comparable to the first because in both cases they are subject to the availability of information to be able to carry out the different physical and economic quantifications. However, a more conscious hierarchization, thanks to the training process, did allow for greater recognition of those services that are more predominant today, understanding the problems that exist.

In addition, the training process also allowed the hierarchy to be more equitable, which is interpreted as the recognition of the importance of all services equally, understanding in turn that everyone depends on everyone else because they share functions among themselves.

CONCLUSIONS

The training process represented a key factor when making a more conscious hierarchy of the ecosystem goods and services provided by the Waraira Repano National Park. This is because before it, the management actors took for granted or were unaware of many of the services and the importance of their functions, so they only valued those inherent to their daily activities or their direct relationship with the protected area. And although the VET of the park had a significant value of 11,222,263,794.17 US\$, this was surpassed in the second ranking exercise, yielding a value of 132,698,709,899.08 US\$, which suggests that education had a differentiating role that allowed management actors to make a connection between their importance, not only for the economy but also for the subsistence of different species, including humans.

However, the VET obtained in both cases reveals the need for the conservation of the

protected area and also allows laying the foundations to generate plans and programs that facilitate obtaining income to improve its management in order to conserve the integrity of the park. as required by the different legal instruments associated with its management. However, there is still a lack of updated information, research and

inventories on the physical-natural variables related to the national park that allow us to have data to make more assertive assessments, which is why we must insist on increasing education and research programs. in matters of national parks, since you cannot value what is unknown.

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