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Utilisation de l'évaluation contingente pour un programme de conservation et de restauration : le cas du système national d'aires protégées de la République dominicaine

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Introduction

1 The Dominican Republic (DR) is a developing Caribbean insular country that shares Hispaniola Island with the Republic of Haiti. It has a surface area of 48,670 km^2, representing approximately two-thirds of the island, and its population is about 10.5 million inhabitants (ONE, 2015). Figure 1 shows the location of the DR in the Caribbean. The National System of Protected Areas of the Dominican Republic (SINAP by its acronym in Spanish) consists of 128 conservation units covering a land area of 1,245,032.00 hectares, equivalent to 12,450.32 km^2 25.8% of the country's surface (MIMARN, 2020).

Figure 1. The Dominican Republic in the Caribbean

2 The importance of the SINAP stands out in the diversity of the ecosystems that it protects, the high endemism of flora and fauna species, and its role in protecting the main hydrographic basins of the entire island of Hispaniola (Victor Gómez-Valenzuela, Bonilla Duarte, & Alpízar, 2018; Perdomo, Arias, León, & Wege, 2010; Powell, Ottenwalder, & Incháustegui, 2000). According to previous estimates, at least 9 of the main hydrographic basins of both the Dominican Republic and the Republic of Haiti are born in SINAP, including the binational basin of the Artibonite River, the central hydrographic basin of Haitian territory, which is born in the Nalga de Maco National Park in the northwest of the Dominican Republic. Just over one million hectares of the protected area of SINAP correspond to the country's main hydrographic basins, representing about 80% of the area protected by the system (Victor Gómez-Valenzuela et *al.,* 2018).

3 Thus, this paper aims to answer the following research question: What is the Dominican's willingness to pay (WTP) for a Special Ecosystem Conservation and Restoration Program for the National System of Protected Areas (SECRESP)? The contingent valuation method (CVM) was selected to answer this question, a method recognized in this field. Over the last 30 years, scientific rigor, and respect in both the academic and decision-making community have analyzed social preferences regarding the WTP of the society for conservation issues (Arrow et *al.,* 1993; Carson, 2012).

4 According to the International Union for Conservation of Nature and Natural Resources (IUCN), a protected area can be understood as a "clearly defined geographical space, recognized, dedicated and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, Shadie, & Stolton, 2008). National systems of protected area complex entities which include different ecosystem. They play several socioeconomic and environmental roles at different governance scales with multistakeholder interactions (Plummer & Fennell, 2009). In many countries, protected areas play an ecological,

political, and socioeconomic role, especially in rural zones, including poverty alleviation and promoting economic diversification from the benefit of tourism activities (Brockington & Wilkie, 2015; Chape, Harrison, Spalding, & Lysenko, 2005; Nigel, Ali, Kettunen, & Mackinnon, 2017).

1. The SINAP and its conservation problematic

5 Therefore, SINAP has national but international importance due to its regional relevance at the Caribbean level because of the ecosystem services provided for the little more than 20 million inhabitants of the two countries in the island, especially provisioning ecosystem services like clean water, fibers, wood, fishing, and more.

1.1. Economic context

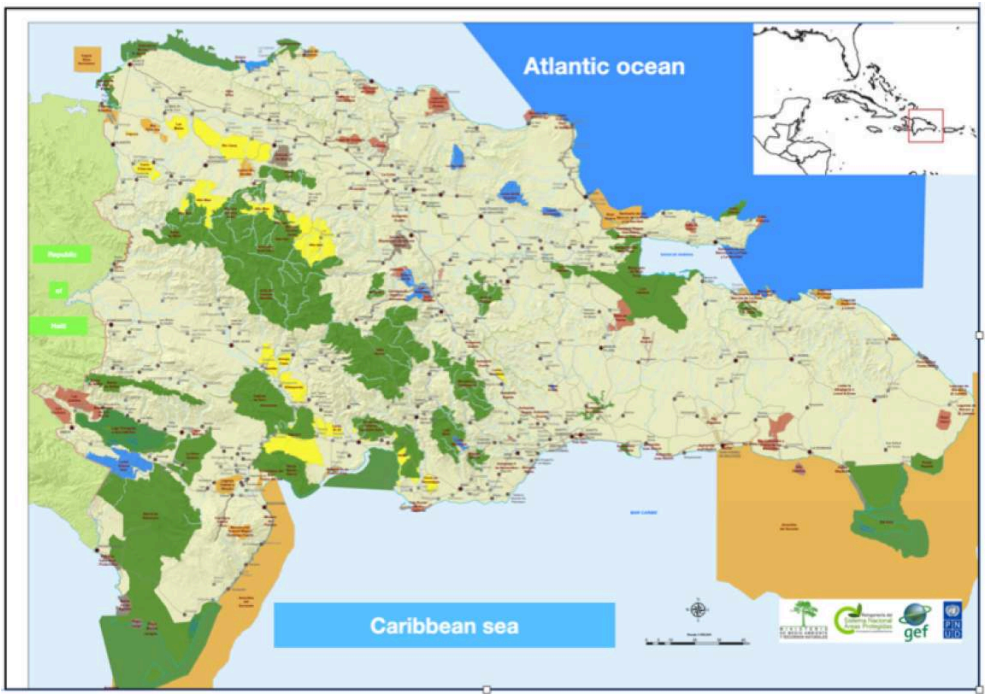
6 The DR is an upper-middle-income country and is the largest economy of Central America and the Caribbean, with a gross domestic product (GDP) of over US $88.9 billion in 2019. The DR has been considered a high human development country by the United Nations Development Program (UNDP, 2018). Over the last two decades and until 2019, previous to the Great global Lockdown of 2020 caused by the COVID-19 pandemic (IMF, 2020), the DR has been one of the fastest-growing economies in Latin America, with an average annual GDP growth rate of 5.7% between 2010 and 2019 (TWB, 2020). With a fall in regional trade of 23% compared to 2019 and the collapse of tourist activity in the Caribbean at the order of 38%, the regional and national outlook is complicated for the short and medium-term (ECLAC, 2020). The impact of the COVID-19 pandemic will undoubtedly affect and condition the aggregated economic growth rate for the next decade, despite its fast recovery expected since 2021. From the perspective of new growth approaches that may gain weight in the post-COVID-19 world, one condition is the sustainable transition to greener growth approaches (Hanna, Xu, & Victor, 2020). Tourism, as a sensitive sector, will be deeply affected. It will need a new business model or at least reorientation toward a sustainable transition approach to achieve sustainable development goals (Higgins-Desbiolles, Carnicelli, Krolikowski, Wijesinghe, & Boluk, 2019; Salvatore, Chiodo, & Fantini, 2018). It will also need environmentally friendly management practices in which protected areas and the ecosystem services provided will be essential.

1.2. The conservation problematic

7 A well-defined legal framework for protected areas already exists in the Dominican Republic, constituted by Law 64-00 on Environment and Natural Resources, and the Law 202-04, known as the sectoral law of protected areas, which institutes the SINAP. In the Dominican States' Political Constitution, protected areas are considered a national heritage (see Art. 16 in the Constitution). The State and "public powers" are committed to protecting ecosystems, avoiding environmental deterioration, and safeguarding natural resources and the environment (see Art. 67 in the Constitution).[1] As indicated, SINAP represents around 25.7% of the country's surface, depending on the specified source. The SINAP also plays an indirect role by supporting ecosystem services, vital economic activities in rural areas and the coastal zone, particularly fishing and tourism

(Gómez Valenzuela, Bonilla Duarte, & Alpízar, 2018a). To better understand the SINAP's surface display, Figure 2 shows the protected areas distributed all over the country.

Figure 2. The national system of protected areas of the Dominican Republic



8 There is no strict correspondence between the management categories of the IUCN and those used in the SINAP. However, it is possible to classify Dominican protected areas with relative ease in each of the six categories, as indicated in Table 1, which does not include the marine surface with which the estimated protected surface would be greater than 61 thousand square kilometers (Gómez Valenzuela et *al.*, 2018a).

Table 1. SINAP's management categories

Management categories	**Conservation units**	**Land surface in ha**
Categories Ia & Ib	**14**	**42, 139.18**
Scientific reserves	8	22,252.20
Marine mammals' sanctuaries	4	2,068.04
Biological reserves	2	17,818.94
Category II	**31**	**864,585.60**
National parks	29	864,442.73
Submarine National parks	2	143.87
Category III	**31**	**66,171.85**

Natural monuments	29	66,171.85
Marine sanctuaries	2	N/A
Category IV	**21**	**30,280.62**
Wildlife refuges	21	30,280.62
Category V	**16**	**32,285.89**
Panoramic roads	9	20,504.98
National recreation areas	4	9,426.42
Ecological corridos	3	2,354.49
Category VI	**15**	**209,567.86**
Forest reserves	15	209,567.86
Totals	**128**	**1,245,032.00**

Source: Gómez-Valenzuela et al. (2018a) & MIMARN (2020)

9 Concerning the conservation problematic, a first issue in relation to the SINAP´s conservation problematic is the significant percentage of protected areas and ecosystems threatened by the expansion of the agricultural frontier and human settlements, which correspond around the 42% of the already protected surface under socioeconomic pressure including activities that are not compatible with conservation objectives (Victor Gómez-Valenzuela et *al.,* 2018). Similarly, related issues, like irregular immigration, low investment in conservation, climate change, and biodiversity loss, turn most protected areas into just drawings on paper (Dudley et *al.,* 2008).

10 In the DR, there is a strong background of social conflicts associated with protected areas due to several causes, including community-based conflict, illegal occupation of protected areas and problematic definition of the limits and surroundings of the protected areas (Holmes, 2014; Pasachnik, Carreras De León, & León, 2016; Rocheleau & Ross, 1995). One of the most recent conflicts is related to the declaration of Loma Miranda as "protected" in a mining concession (Víctor Gómez-Valenzuela, Alpízar, Bonilla, & Franco-Billini, 2020).

11 As an aftermath, the SINAP is affected by deterioration and degradation of its ecosystem all over the country, and it has been under a situation of decreasing and low investment for decades (Pasachnik et *al.,* 2016). Based on available data and the most recent estimations, the investment average per protected hectare was less than the US $4.00/hectare between 2002 and 2014 (Gómez Valenzuela, Bonilla Duarte, & Alpízar, 2018b). These values are far from the international recommendation for a minimum optimal management scenario of US $9.00 per hectare (Bruner, Gullison, & Balmford, 2004), indicating a financial gap for a minimal optimal management scenario of around the US $5.00 per hectare (Gómez Valenzuela et *al.,* 2018b).

2. Material and methods

12 The Contingent Valuation Method (CVM) is a declared and direct preference valuation technique based on the construction of hypothetical markets (Carson et *al.,* 1994). The CVM determines the economic value that society gives to certain ecosystem goods and services. Real markets cannot allocate an efficient price for nonuse values, which need a direct economic valuation approach using a hypothetical market. Contingent valuation creates a hypothetical scenario in which respondents declare their preferences for a good or service, specifically for services using no market to be exchanged, and by using detailed questionnaires to estimate the WTP for such goods or services (Hanley, Wright, & Adamowicz, 1998; Johnston et *al.,* 2017).

13 The foundations of CVM are sustained on an interpretation of welfare economics, in terms that a person can make an economic tradeoff in reaction to a change in the availability, quality, quantity or prices of public goods to ensure that their welfare remains unchanged or less affected (McFadden, 1994). Based on these foundations, CVM allows an economic tradeoff to be made in support of a natural place, a protected area, or to preserve endangered species even if that person will never visit the protected site (Carson, 2012; Carson, Flores, Martin, & Wright, 1996; Hanemann, 1994).

14 By using polls and sampling technics, a hypothetical market is created in the frame of a survey that asks about changes in the maximum WTP changes for services provided by ecosystems, specifically for conservation or ecological restoration programs, or to support protected areas (Adams et *al.,* 2008; Bishop et *al.,* 2017; Gürlük, 2006; Loomis, Kent, Strange, Fausch, & Covich, 2000; Resende, Fernandes, Andrade, & Néder, 2019). CVM has not been without legitimate academic criticism. However, there is a robust scholarly consensus about its legitimacy, even in developing countries like the DR (Carson, Flores, & Meade, 2001; Diamond & Hausman, 1994; Portney, 1994; Whittington, 1998).

2.1. Questionary design, variables, and sampling

15 The CVM was intended to estimate the WTP of the Dominican society for an hypothetical Special Ecosystem Conservation and Restoration Program for the National System of Protected Areas called SECRESP. The questionnaire is a fundamental component in a contingent valuation approach because it helps to understand the structure of the social preference in support of the feasibility of the elicited, contingent object (Carson & Louviere, 2011; Johnston et *al.,* 2017; Whittington & Pagiola, 2012). In this case, the SECRESP questionnaire was designed to encompass key socioeconomic and demographic variables distributed in several sections. It was chosen as a closed-ended question or referendum format ("yes" or "no") to estimate the WTP for the SECRESP (Carson & Louviere, 2011; Louviere, Hensher, & Swait, 2010).

16 SINAP's CVM questionnaire was structured in four sections. The first section is about the level of knowledge of the SINAP. It aimed to evaluate respondents' level of knowledge and information concerning SINAP by itself, considering it a complex construct formed by several protected areas. The second section, about WTP, was initiated with the presentation of the SECPRESP. Once its benefits and restrictions were presented, the participants were asked about their WTP for it in a referendum format ("yes" or "no") by paying a monthly amount of money of the defined and previously

tested bid vector (Carson & Louviere, 2011; Louviere et *al.,* 2010). The final bid vector in the SINAP's scenarios, after its validation in a pilot survey, was DOP $30.00; DOP $60.00; DOP $90.00; DOP $120.00 and DOP $150.00. Next, the different amounts were randomly distributed among respondents.

17 The third section, about the attractiveness of protected areas, was the shortest and aimed to understand amenities preferences associated with the use of protected areas (Resende et *al.,* 2019; Tao, Yan, & Zhan, 2012; Voltaire, Pirrone, & Bailly, 2013). A first question asked the preferred activities to be performed in protected areas, such as trekking, controlled camping, fauna and vegetation watching, environmental education, research, and enjoying a quiet place. A second question asked for infrastructure and services available in protected areas such as roads and access roads, surveillance and security, trails and marked routes, guided visits, viewpoints, information centers, and essential first aid services.

18 The fourth and final section focused on the socioeconomic and demographic characteristics, including gender, marital status, educational level, income level, employment status (employed, unemployed, retired), social interests, places of residence, and family size, necessary for modelling and understanding social preferences associated to the WTP of respondents (DeShazo & Fermo, 2002; Hanemann, 1994; Johnston et *al.,* 2017; Louviere et *al.,* 2010; Voltaire et *al.,* 2013; Whittington, 1998). Table 2 shows some selected socioeconomic variables used in the SINAP's contingent valuation.

Table 2. Selected socioeconomic variables in SINAP valuation

Variables	**Categories used**
Gender	0—Male
	1—Female
Marital status	1—Single
	2—Married
	3—Separated
	4—Widow
Employment status	1—Employed
	2—Unemployed
	3—Retired
Educational level	1—Primary education (K8)
	2—Secondary education (K12)
	3—Vocational education

	4—College-university education
	5—Illiterate
Place of residence	1—Urban zone
	2—Rural areas
Homeownership	1—Own
	2—Rented
	3—Loaned
Monthly family income	1—=DOP$10k ... 14—=DOP$151k
Social or political affiliations	—
	2Environmental organization
	3—Sport club
	4—Cultural club
	5—The community group
	6—Private group
	7—Another type of organization

19 The interviewers shared information about the SINAP using visual support like maps and photos. They also asked for the age of the interviewees since only adults could participate. In addition, several payment vehicles were presented, such as the electric bill, water bill, municipal service bill, and others. A probabilistic random sample design was followed, considering the four macro-regions and the random distribution of the bid vector(Johnston et *al.,* 2017; Scheaffer, Mendenhall III, Ott, & Gerow, 2011). Dominican citizens composed the sample frame over 18 years of age and active workers, with at least the primary economic responsibilities representative of the head of household and representative of the four macro-regions of the Dominican territory. The total sampling reached 1,557 individuals equally distributed among the four regions. The fieldwork of the survey was conducted during the first semester of 2013 and concluded in August 2013. The WTP estimates have been updated for inflation and were changed into the exchange rate of US dollars in August of 2020, based on data of the Central Bank of the DR (BCRD, 2020).

2.2. Modeling the WTP

20 The analysis for the SECRESP's WTP was developed considering two approaches as a robust check, which were a parametric and a non-parametric estimation of the WTP (Crooker & Herriges, 2004; Kriström, 1990).

A parametric approach

21 One fundamental assumption for calculating the average WTP has been the yes/no survey responses to individually and randomly assigned bids. They result from utility maximization, implying that the estimation of the WTP supposes the calculation of the utility function parameters. In the case of unobservable factors such as the measurement error and response uncertainty, a random utility framework was used by capturing the preferences from individuals up to a measurement error. The added error term completed the random utility formulation, implying that after paying the bid, an individual would say yes to the bid only if the utility in favor of the SECRESP is higher than the utility in a situation with no SECRESP and no-bid, in the following terms:

$V(q_{yes\ SECRESP}, income - D0\$bid) + \varepsilon \geq V(q_{no\ SECRESP}, income) + \varepsilon$ (1)

22 In the parametric approach to estimate the WTP, it is assumed that in the random component of respondents' utility (i.e., the in the equation), one sticks to a known probability distribution, which typically follows a normal or logistic distribution. Thus, the probability of an affirmative response to a suggested bid is given by:

$P[yes] = P[Vq_{yes\ SECRESP}, (income - bid\$) - V(q_{no\ SECRESP}, income) + \varepsilon_1 - \varepsilon_2 \geq 0]$ (2)

23 Therefore, it is assumed that a linear formulation of the utility function as $V_j=\alpha_j + \beta_j q_i + \mu_j Income_j$, and a logistic probability distribution of the error term, presents as follows:

$$P[yes] = P\left[\alpha_j + \beta_j\left(q_{yes\ SECRESP} - q_{no\ SECRESP}\right) - \mu * bid\$ + \varepsilon_{yes\ SECRESP,j} - \varepsilon_{no\ SECRESP,j} > 0\right] = \frac{1}{1 + e^{-\left(\frac{\alpha}{\tau}+\frac{\beta}{\tau}\left(q_{yes\ SECRESP} - q_{noSECRE\ SP}\right)-\frac{\mu}{\tau}bid\$\right)}} \quad (3)$$

24 The right side of Equation 3 is a logistic *cumulative density function* named logistic survival function. A Maximum Likelihood estimation is used to estimate the average parameters of the utility function that most likely defines the pattern of yes/no responses in the survey. In Equation 3, the expressions ∝β and μ represent the coefficients to be estimated using a logit regression (is a scale parameter). In this case, the parameter ∝ will be stretched to encompass socioeconomic variables and related characteristics of the individuals considered, which could affect the structure of the preference for implementation of the SECRESP in favor of SINAP. Coefficients corresponding to the different questionnaire sections were also estimated, precisely the level of knowledge of SINAP as a construct and the socioeconomic variables considered in this study (Carson, 2012; Loomis et *al.,* 2000; Ramajo-Hernández & Saz-Salazar, 2012). The estimation of the average of the WTP for the ∝β and μ parameters was performed by using the following equation:

$$E[WTP] = \frac{\alpha+\beta(q_{yes\ SECRESP} - q_{no\ SECRESP})}{\mu} \quad (4)$$

25 In Equation 4, is the marginal utility of the SECRESP, and is the marginal utility of income as disutility or welfare losses from having to pay the bid. The parameter is a constant that the following equation could substitute:

$$E[WTP] = \frac{\alpha_0+\alpha_1*X_1+\alpha_2*X_2+\beta(q_{yes\ SECRESP} - q_{no\ SECRESP})}{\mu} \quad (5)$$

26 In Equation 5, X_1 and X_2 represent explanatory variables. For instance, if X_1 is a dummy variable equal to 1 for capturing a female participant or preference, then setting $X_1 = 1$ in Equation 5 will result in the average WTP average for female respondents. In the parametric approach already outlining the analysts, it is necessary to assume a given probability distribution and the references as a parametric approach (Hanemann, 1994; Loomis et *al.,* 2000; McFadden, 1994).

A non-parametric approach

27 The non-parametric approach initiates by recognizing that the sequence of yes/no responses toward increasingly more significant bids takes the shape of a monotonically, nonincreasing sequence of proportions (the proportion of respondents positively answering to a bid). It can be considered by itself as an empirical survival function. Next, the empirical survival function can estimate the WTP without assumptions about the empirical distribution of the function and only the area under the curve. Thus, it is the reason for naming this approach non-parametric (Crooker & Herriges, 2004; Kriström, 1990).

3. Results and discussion

28 The central objective of this work is the estimation of the analysis of the social preference of the Dominican society expressed in its WTP for the SECRESP in favor of the SINAP. The richness of the generated data derived from the survey design, as the socioeconomic variables of Table 4, has been considered for communication elsewhere, harnessing only those variables, which were found statically significant, are considered. In this section, let us start with the non-parametric results. Table 3 shows the proportion of "yes" responses expressed in Dominican pesos favoring the SECRESP. The proportion of "yes" responses constitutes the foundation to estimate the WTP under the survival (Kriström, 1990).

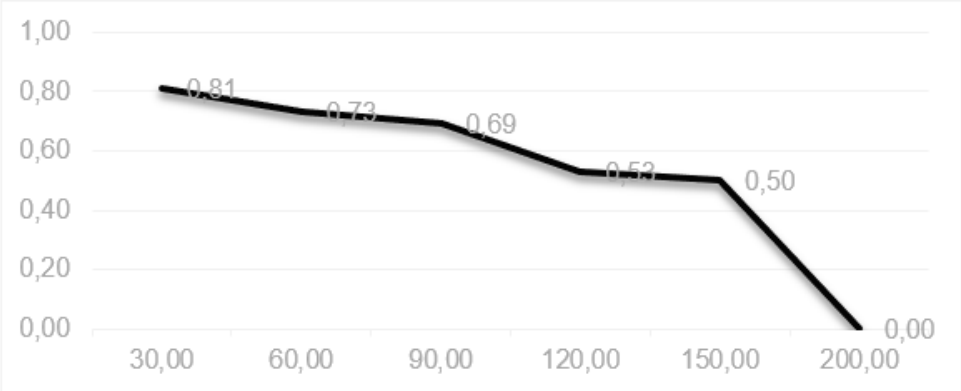
Table 3. The proportion of positive answers to the CVM survey

The suggested amount is $ DOP	Number of “yes” answers	the proportion of positive answers
30.00	254	0.81
60.00	227	0.73
90.00	215	0.69
120.00	165	0.53
150.00	156	0.50
200.00	0	0.00

29 Based on the results of Table 3, it is possible to generate a probabilistic survivor function, assuming the reasonable top amount of payment would be DOP 200.00, which

operates as a "truncating point" (Bengochea-Morancho & Fuertes-Eugenio, 2005). Then as shown in Figure 3, the probabilistic survivor function for SINAP is a monotonically nonincreasing curve. The bid vector in Dominican pesos on the horizontal axis and the probability on the vertical axis are defined based on the available data.

Figure 3. Probabilistic survival function based on the available data



30 Based on Figure 3, the non-parametric WTP can be estimated as the area below the survivor curve, approximated as DOP 118.70 or the US 2.83 per family per month (Bengochea-Morancho & Fuertes-Eugenio, 2005; Creel & Loomis, 1997). This estimate updated for the accumulated inflation to August of 2020 represents the US 3.16 and considers the average exchange rate of DOP 58.46, representing an updated WTP of DOP 184.73.[2]

31 The parametric approach estimates the parameter of the utility function using the probability of positive responses as the dependable variable. Thus, a positive and significant coefficient implies that an increase in the corresponding exogenous variable would increase the likelihood of a positive response. In the estimated parametric model, independent variables include the intercept and the bid so that the estimated parameters are, and the mean WTP is given by Equation (4).

32 Because $q_{yes\ SECRESP} -$ $_{no\ SECRESP} = 1$ (with or without project dummy), it is estimated jointly with the constant, and EWTP= gives the average. In the model, the socioeconomic characteristics of respondents, shown in Table 4, were added as independent variables, and the mean WTP is given by Equation 5, again with . Table 4 shows the results of the estimated model with only the significant variables.

Table 4. Parametric estimation of the WTP

Coeff.	**Independent variables**	**Dependent variable: WTP/probability of paying the suggested bid**
A	Intercept	3.043234(0.3095) ***
μ	Suggested bid of $DOP (|$30.00|$60.00|$90.00|$120.00|$150.00|$200.00|)	−0.013012(0.0013) ***
α_1	Level of knowledge of SINAP	−0.256375(0.1164) **

α_2	Gender	0.1866604(0.1169)
α_3	Urban zone	−0.347876(0.1563) **
α_4	House ownership 1=own	−0.211002(0.0818) **
α_5	SINAP and research activities	−0.190527(0.0861) **
No. Observations	1,557	
LR chi2(5)	125.01	
Prob 〉 chi2	0.0000	
Log-likelihood	−932.653	
Predictive power	68%	
Standard errors are between parentheses. Significant level of p-values given by p: **p<0.05; ***p<0.01		

33 In general terms, the parametric model of the WTP in Table 4 behaved as expected, indicated by the negative and statistically significant (p-value at 1%) coefficient for the marginal (dis)utility of (reduced) income (), which reflects a decreasing demand curve, according to the economic theory that the probability of saying yes to increasingly higher bids goes down (Bengochea-Morancho & Fuertes-Eugenio, 2005; Harrison & Kristrom, 1995; McFadden, 1994). Thus, the negative sign of the model indicates that respondents have a clear understanding of the implications of implementing the SECRESP in terms of effort cost. It also indicates that, depending on the size of the required contribution, respondents may not be interested in implementing SECRESP, meaning that the amount in Dominican pesos increases the probability that respondents would support SECRESP.

34 The model in Table 4 is statistically significant and has a good predictive capacity (approx. 68%). Based on the results shown in Table 4, and according to Equation 5, and by using the same inflation calculation and exchange rate updated in parentheses, the average of the WTP is DOP 144.00 (the US 3.44 US 3.84). In the case of women, the WTP = DOP 154.00 (US 3.68 US 4.10). In the urban area, it is DOP 140.00 (the US 3.34 US 3.73). For those who know SINAP has a higher WTP of DOP 152.00 (the US 3.63 US 4.05), it is the same as those who own a house, which can be taken as an approximation of socioeconomic level, extending the idea that the higher the level of economic income increases the WTP.

35 As shown in Table 4, respondents who said they already have information about SINAP and know it as a construct are willing to pay more for the SECRESP . This preference is statically significant at a 5% p-value, points out an opportunity for social dissemination of the ecosystem values and services provided by SINAP, and mobilizes public support for its conservation and strength in institutional and financial terms. Women are also more willing to pay, although their preferences are not statically significant (), and this

reflection could be extended to young people. It is not unusual to find that women and young people show a greater willingness to protect the environment (Kamri, 2013; L. Nandagiri, 2015; Martín-López et *al.,* 2012).

36 Another find is about the effect of location, indicating for this case that an urban resident is willing to support the SINAP through SECRESP, and this preference is statically significant at 5% (), showing a higher commitment of urban population with conservation issues, considering an administrative construct as SINAP. It may be partly due to the income effect in the DR, considering that urban zones such as the Santo Domingo metro area have higher levels of income, better public services and lower levels of monetary poverty compared to the rest of the country (MEPyD, 2016). In addition, partially related to the income issues, the finding of the higher and significant WTP of those respondents who own a house () could be more open to prefer a monetary charge on payment service bills such as water and sanitation or the electricity bill. A final finding is about those respondents with a higher WTP for the SECRESP considering the SINAP's potential for research activities (), and this preference is statically significant at 5%. This finding is consistent with the idea of research as a type of land-use for protected areas, revealing the potential of the information in them as the quasi-option value of their biodiversity (Craft & Simpson, 2001; Harrington, 1996).

37 The aggregate WTP for the SECRESP is around the DOP 382.6 million per month (around US 9.2 million at US 41.81). The aggregate WTP represents an annual DOP 4,591.5 million, equivalent to the US 109.8 million at the defined exchange rate without applying a social discount rate. The above estimations are based on the parametric analysis of DOP 144.00, and the number of households estimated around 2,657,134 (ONE, 2019). Updating the previous values for inflation, changes in the exchange rate and households' number, the WTP for the SECRESP would be around the US 3.84. The number of households in the DR in 2020 been estimated at 3,287,016 units (ONE, 2019). Thus, the aggregate WTP for the SECRESP would be around US 126.2 million. These values represent around DOP 7,387.9 million without considering the application of a social discount rate.

38 Therefore, capturing the positive WTP of Dominican society for a conservation program that supports SINAP points out in the right direction for the design of public policies on conservation and sustainable development. However, the economic valuation is a tiny step because of the vast social and economic challenges faced by the SINAP, starting with degradation for around 42% of its protected surface. Also, a SINAP conservation and restoration program acquires greater importance considering a regional public goods perspective due to the significance of Dominican protected areas for the stability of the ecosystem services of Hispaniola Island. These are shared with the Republic of Haiti, which implies understanding the tensions and interactions along the border of two countries with cultural and socioeconomic differences (López-Hoffman, Varady, Flessa, & Balvanera, 2010; Norman et *al.,* 2012).

39 The above perspective validates the premise of the SINAP as a complex system with multiple stakeholders and different levels and scales of governance ranging from local communities, national policy level, binational and international issues to the sustainable management of ecosystem services (Cumming & Allen, 2017; de Groot, Alkemade, Braat, Hein, & Willemen, 2010). The Dominican protected areas located along the border with Haiti, such as the Nalga de Maco National Park, and the Sierra de Bahoruco National Park, are the primary source of water resources for the Republic of

Haiti. They also play a vital role as providers of several direct-use values as goods and ecosystem services to alleviate poverty in the two sides of the borders, turning the SINAP into a construct of regional values that supply international ecosystem services (López-Hoffman et *al.,* 2010; Zanchi & Brady, 2019).

40 Thus, the conservation issues in Hispaniola Island and the SINAP role in conservation turns into a complex problem and raises the value of SINAP as a regional public good asset (Arriagada & Perring, 2011). Due to the severe degradation of environmental issues in the Republic of Haiti and its associated systemic poverty, it is also shared along the border between the two countries (Zanchi & Brady, 2019). This complex situation is also characterized by the potentially dangerous combination of socioeconomic, demographic, and migratory factors, with repercussions for the entire Caribbean that turn the challenge of conservation and assessment of the SINAP of the DR into a regional challenge for sustainable conservation development. The sanitation of the land tenure regime in protected areas can be approached from a medium and long-term perspective, starting with creating an extraordinary real estate jurisdiction. In addition to the sanitation of land ownership incorporates legal instruments and market incentives based on a mixed policy approach to deal with the SINAP's complexity issues related to sustainable management goals (Edmondson, Kern, & Rogge, 2019; Türkeli, 2020). Such instruments should be part of a complex mixed policy approach defined with a clear perspective of short, medium and long-term achievements (Türkeli, 2020).

41 Some of them could be tax incentives for ecotourism infrastructures, trusts for rural development and reconversion of conservation zones in areas compatible with sustainable production and conservation activities as they occur with instruments such as biosphere reserves (Folke, Biggs, Norström, Reyers, & Rockström, 2016; Van Cuong, Dart, & Hockings, 2017). Determining the WTP of Dominican society is only a modest step that points the way to sustainable development based on the adaptive management of high-value, social, economic, and environmental ecosystems.

Concluding remarks

42 The contingent valuation results show a WTP of the Dominican society favoring SINAP, which can gradually overcome the estimated financial gaps for the system. Thus, it can conclude that Dominican society positively values its protected areas, and it has a clear WTP for their conservation and restoration. This WTP is higher in urban areas and in people familiar with protected areas, which initially opens opportunities for environmental education, emphasizing Dominican-protected ecosystems' values.

43 The CVM has proven to be an instrument that has made it possible to capture Dominican social preferences for SINAP as an administrative construct that contributes to conservation's social objectives. By extension, it can operate as a public policy instrument for development. One of the areas in which new opportunities for collaboration can be found is in the Dominican tourism sector, historically the main generator of foreign exchange. The relationship between tourism and SINAP has been somewhat overlapping, latent and implicit, especially in public policy. However, protected areas have been indispensable for tourism by considering the dependence on tourism of protected ecosystems' environmental and aesthetic values. This unique relationship has been more explicit in the coastal and marine areas of the north,

northeast and east of the country, where Dominican tourism has grown at the expense of the environment. This overlapping and latent relationship should give way to a more open, formal, and explicit relationship which allows the expansion of possibilities for tourism in protected areas. It will enable a significant effort to improve and invest in conservation infrastructure and services.

44 This new relationship between tourism and protected areas must be mutually beneficial. It must incorporate access rights to the Dominican population and local communities as beneficiaries of tourism and the more traditional investors. One way to make this relationship more socially efficient would-be using market instruments. Such instruments may include guarantee funds that support public-private partnerships, investment trusts for ecotourism and sustainable tourism, and tax incentives that stimulate quality, inclusive and socially responsible tourism investment based on strict conservation standards. Two aspects here will be crucial and complementary. The first one recognizes the property rights of generations of Dominicans who carry out their lives within or near protected areas. The second of these is the development of capacities for the management and sustainability of protected ecosystems, which will require investment in infrastructure, technical capabilities, training and professionalization of human resources, and the creation of optimal working conditions for personnel in the protected areas.

45 Finally, understanding the importance of protected area systems as a policy instrument to achieve sustainable development goals, support climate transitions, and fight against rural poverty requires a radical change of mentality. The CVM has shown that the Dominican society is willing to pay for their protected areas, especially for its restoration and conservation. This willingness to support protected areas as a national heritage will be crucial for supporting the tourism sector and aid in helping to overcome the challenges derived from the COVID-19 pandemic, as well as for laying down the foundation for a social-engaged agenda of sustainable development for the present and future Dominican generations to come.

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NOTES

1. Source: Political Constitution of the Dominican Republic. In: https://poderjudicial.gob.do/documentos/PDF/constitucion/Constitucion.pdf Accessed: October 27, 2020

2. Inflation calculator source: https://www.bls.gov/data/inflation_calculator.htm Accessed: Nov-10-2020.

ABSTRACTS

The Dominican Republic has a national system of protected areas integrated for 128 conservation units, covering a land area of 1.2 million hectares, representing around one-quarter of the country's surface. This study aims to understand the willingness to pay (WTP) of the Dominican society for a Special Ecosystem Conservation and Restoration Program for the National System of

Protected Areas. It was selected the contingent valuation method to estimate the WTP at the national level. The aggregate WTP of the Dominican society is approximately US 126.2 million at the present value. It concluded that Dominican society positively values its protected areas. The WTP is higher in urban areas and among people familiar with protected areas, presenting opportunities for environmental education, emphasizing Dominican-protected ecosystems' values.

La República Dominicana posee un sistema nacional de áreas protegidas integrado por 128 de unidades de conservación, que cubre una superficie de 1.2 millones de hectáreas, lo que representa alrededor de una cuarta parte de la superficie del país. Este estudio tiene como objetivo comprender la disposición a pagar (DAP) de la sociedad dominicana por un Programa Especial de Conservación y Restauración de Ecosistemas del Sistema Nacional de Áreas Protegidas. Se seleccionó el método de valoración contingente para estimar la DAP a nivel nacional. La DAP agregada de la sociedad dominicana es de aproximadamente US$126.2 millones a valor presente. Se concluye que la sociedad dominicana valora positivamente sus áreas protegidas. La DAP es mayor en áreas urbanas y entre personas familiarizadas con las áreas protegidas, presentando oportunidades para la educación ambiental, enfatizando los valores de los ecosistemas protegidos dominicanos.

La République dominicaine dispose d'un système national d'aires protégées composé de unités de conservation, qui couvre une superficie de, 1.2 million d'hectares, ce qui représente environ un quart de la superficie du pays. Cette étude vise à comprendre le consentement à payer (CAP) de la société dominicaine pour un programme spécial pour la conservation et la restauration des écosystèmes du système national d'aires protégées. La méthode d'évaluation contingente a été choisie pour estimer le CAP au niveau national. Le CAP total de la société dominicaine est d'environ US$126.2 millions de dollars en valeur actuelle. Il est conclu que la société dominicaine valorise positivement ses aires protégées. Le CAP est plus élevé dans les zones urbaines et parmi les personnes familiarisées avec les aires protégées, offrant des opportunités d'éducation environnementale, mettant l'accent sur les valeurs des écosystèmes protégés dominicains.

INDEX

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Keywords: protected areas systems, contingent valuation, Dominican Republic
Mots-clés: systèmes d'aires protégées, évaluation contingente, République Dominicaine

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