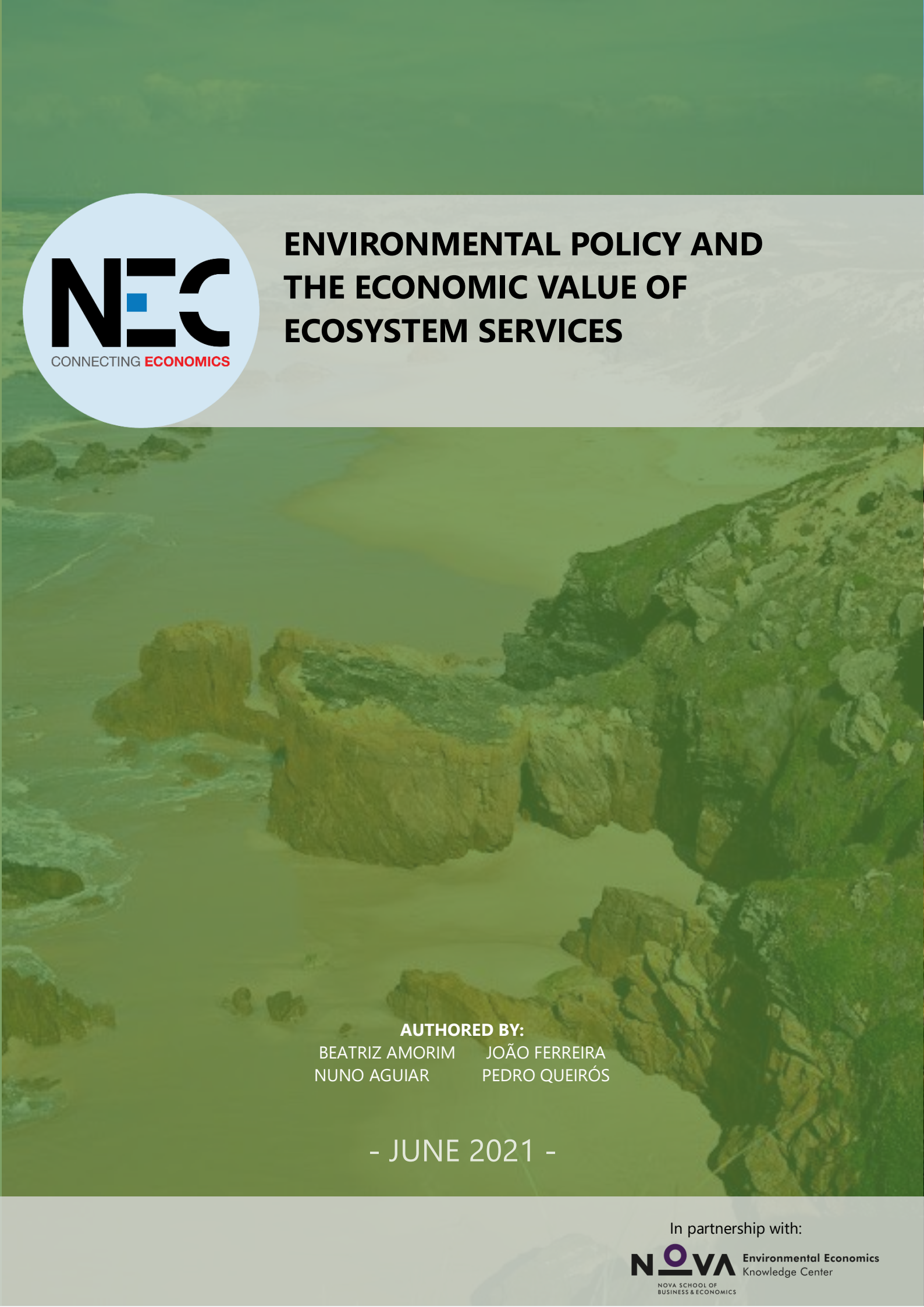

ENVIRONMENTAL POLICY AND THE ECONOMIC VALUE OF ECOSYSTEM SERVICES

AUTHORED BY:

BEATRIZ AMORIM JOÃO FERREIRA

NUNO AGUIAR PEDRO QUEIRÓS

- JUNE 2021 -

In partnership with:

NOVA Environmental Economics Knowledge Center

NOVA SCHOOL OF BUSINESS & ECONOMICS

Nova Economics Club is the Economics club at Nova School of Business and Economics. Since 2012, its focus is to create a bridge between the theory learnt in classes with the work performed by economists on a daily basis.

e-mail: novaeconomicsclub@novasbe.pt
website: www.novaeconomicsclub.pt

Title: *Environmental Policy and the Economic Value of Ecosystem Services*
Authors: *Beatriz Amorim, João Ferreira, Nuno Aguiar, Pedro Queirós*
Partner: *Nova SBE Environmental Economics Knowledge Center*
Advisors: *Antonieta Sá, Carina Silva and Margarida Ortigão*
Date: *June 2021*

This report was elaborated in collaboration with *Nova SBE Environmental Economics Knowledge Center* and is part of the Knowledge Center's wider project.

Acknowledgements

We would like to express our sincere gratitude and appreciation for Professor Antonieta Sá, Carina Silva and Margarida Ortigão for their valuable contributions, support and guidance which have been of utmost importance throughout the making of this report.

ENVIRONMENTAL POLICY AND THE VALUE OF ECOSYSTEM SERVICES

Beatriz Amorim

Nova Economics Club

Nova School of Business and Economics

43099@novasbe.pt

João Ferreira

Nova Economics Club

Nova School of Business and Economics

39188@novasbe.pt

Nuno Aguiar

Nova Economics Club

Nova School of Business and Economics

44743@novasbe.pt

Pedro Queirós

Nova Economics Club

Nova School of Business and Economics

47031@novasbe.pt

Abstract

This report consists of a first approach to the implementation of potential conservation projects for the protection of the Southwest Alentejo and Vicentine Coast's natural resources, with the intent to assess the best ways to design it, not only in terms of financial support and monetary fundraising but also in terms of impacted areas and activities. Taking into consideration a choice experiment outlined by the Environmental Economics Knowledge Center, a mixed logit model was used to study the data. The majority of the variables lacked statistical significance, being unclear if a crowdfunding platform or a tax mechanism would be more suitable. However, it is quite explicit that the program should primarily involve biodiversity conservation, beach and coastal protection and avoid investment in surf activities. Investment in education should also be a priority.

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1. Introduction

Environmental disasters – particularly those resulting from human action – can often be prevented through proper mitigation policies. The implementation costs of such policies might even pale in comparison with the economic and ecological benefits resulting from these programs: however, there are important obstacles to the enactment of appropriate environmental policy. For instance, most ecosystem services (as public goods) are not traded in markets: the non-existence of prices does not allow for their easy valuation, thus creating challenges to an efficient allocation of resources. The economic value of such services can be calculated using different methods (including choice experiments, the approach used in this project). Therefore, ecosystem services are especially hard to manage and protect, even if their relevance is undeniable.

The purpose of Nova SBE Environmental Economics Knowledge Center's project is to estimate the economic value of four ecosystem services in Southwest Alentejo and the Vicentine Coast. That information can be useful for future decision making in case of environmental calamity (e.g., in the event of an oil spill), by allowing public authorities to establish the correct intervention priorities or setting reasonable penalties for those responsible. In fact, information about the economic value of an ecosystem service could be incorporated in the calculation of fines (thus taking into account the environmental costs of the disaster) instead of simply considering the direct monetary costs of the event (e.g., cleaning after an oil spill).

This report will explore – based on survey data collected by the Knowledge Center – how individuals' willingness to contribute to the abovementioned programs is influenced by several factors, namely the choice of payment vehicle or the availability of information regarding missing contributions, among others. The use of Crowdfunding as a payment vehicle is innovative and will be contrasted with a "conventional" approach (taxes).

The next section of the report reviews a series of papers involving choice experiments and different payment vehicles. Given that the key source of data for the report was indeed a choice experiment, an explanation of its essential features can be found on the Survey and Choice Experiment subsection. A concise descriptive analysis follows, as well as sections on Methodology and (an analysis of) Results. The report concludes with a

summary of relevant results and respective implications, as well as a discussion of the "next steps" for the project.

2. Literature Review

This section presents an overview of some studies that analyze choice experiments, the impact of the payment vehicle chosen, among other variables such as income, levels of education, and connection to the place studied.

Hanley and Czajkowski (2019) examine the role of stated preference (SP) methods in environmental policy. Contrasting with revealed preference (RP) methods, where information is gathered by observing individuals' actual market choices, SP methods rely on information on consumer choices that are made in experimentally controlled hypothetical settings. SP methods are commonly used for studying people's preferences and willingness to pay (WTP) for nonmarket goods. Afterwards, they presented the two main approaches to stated preference valuation: contingent valuation (CV) and choice experiments (CE). Summing up, stated preference has been proving its effectiveness to measure WTP for sets of environmental goods that do not currently exist, such as a new forest park. However, a hypothetical bias could exist because sometimes people over or understate their WTP because no actual payment is made or received in exchange for an actual change in the quantity or quality of a good.

Moving to the payment vehicle, Hassan et al. (2018) analyse three different payment vehicles and their performance valuing wetland conservation in Malaysia. The payment vehicles are voluntary donations, income taxes, and reductions in government subsidies. Furthermore, they used stated preference methods to assess people's preferences and their WTP. They conclude that, firstly, donations – although being a common method – give space to free riding, which could not be that severe in Malaysia since there is a strong culture of donating; secondly, income taxes, although a commonly used method in environmental valuation, in this case proved to be not very suitable because many people do not pay income taxes in Malaysia; finally, reduced subsidies proved to be the best method.

Meginnis et al. (2020) evaluate the willingness to pay and willingness to work by conducting a choice experiment on water access and health education in rural Uganda, focusing on interventions designed to reduce cases of disease. They used two payment vehicles: a monthly monetary fee and a weekly labor contribution. They estimated conditional logit and random parameters models and ended up rejecting the conditional logit model in favor of the random parameters (RPL); in addition, they also used the latent class model (LCM). They conclude that, in the RPL model only households with knowledge about water-borne parasites are price sensitive and exhibit willingness to pay values. From the latent class model specification, they found that higher income respondents exhibit higher willingness to pay values for all program attributes; however, lower income participants have higher willingness to work values for certain new water sources.

Huenchuleo et al. (2016) evaluated the willingness to pay for river ecosystem quality improvements in central Chile. They applied the Choice Experiment method to measure preferences on river pollution risk, water quality effects, threatened species, and the yield in local fisheries. In this case, they used an additional annual charge to the electricity bill as payment vehicle. Given that a respondent's preference for non-market goods depends on their attitude towards the goods being valued, they account for these characteristics by conducting the study in two central Chilean watersheds (Mataquito and Itata). They found out that the mean WTP value for an optimistic policy scenario was 13 USD/year per household. In addition, in Mataquito the respondents that believed that the river was already well protected presented a lower WTP for a reduction in the number of threatened species. They also were able to conclude that the Mataquito respondents from rural areas were willing to pay more for reductions in river pollution risk than the urban respondents. In Itata, respondents that believe that the payment vehicle chosen is adequate (55% of the respondents) present a higher WTP for reductions in the number of threatened species. Moreover, both in Mataquito and Itata, people with higher levels of education were more likely to choose higher payments on the choice set scenarios.

Al-Amin et al. (2021) examined the conservation attitude and determinants of payment responses of local inhabitants for wetland conservation in Bangladesh. This wetland

ecosystem had been in severe danger due to changes in environment and anthropogenic impacts. The main contribution of the study consists of the analysis on the patterns of use and livelihood significance of wetland ecosystem services in data-deficit regions of north-eastern Bangladesh through assessing the perceptions of local experts and community people. In this case, the ecosystem services satisfy the commercial and beneficial requirements of the adjacent communities and the WTP was measured by using two payment vehicles.

Kim et al. (2021) evaluated the public value of accomplishing a plan, applying the Contingent Valuation, that is asking randomly chosen people about their WTP for the project. The South Korean government plans to restore the area of Gomsoman Tidal Flat, which was designated as a marine protected area in 2007 and a UNESCO biosphere reserve in 2013. The methodology presented was a CV survey of 1000 households using a one-and-one-half-bounded dichotomous choice question format for a method of WTP elicitation and yearly household income tax for a payment vehicle. The mean household WTP was statistically significantly estimated to be USD 2.7 per year. The yearly national value is worth more than SD 53.9 million and, therefore, it was concluded that the benefits ensuing from the accomplishment are much greater than the cost involved in it.

Atinkut et al. (2020) addressed the current agricultural waste management (AWM) status in Ethiopia since there is an urgent need for sustainable agricultural waste management for the welfare of rural society in Ethiopia, due to rapid population growth and resource constraints. The study also assessed the farmers' WTP and the factors affecting WTP for eco-friendly agricultural waste management. The payment vehicles offered were money and labor days. The mean annual WTP was 6.84 labor days and 8.20 Birr in monetary values. Moreover, the strongly significant WTP factors are age, education, source of income, land, family size, and livestock. The results indicated that the bid value in labor days, environmental perception, government subsidy, farm shortage, economic conditions, and knowledge of agricultural waste strongly influenced the degree of farmers' amount to pay. Thus, the results were useful to understand the farmers' attitudes towards rural environment quality and WTP for eco-friendly AWM, as well as the need for private and public instruments in agricultural waste for development policies and to turn waste into a resource.

3. Data

Survey and Choice Experiment

In order to estimate the economic value of certain ecosystem services, face-to-face surveys were used. These included, for instance, questionaries on personality (Ten Item Personality Inventory – TIPI) and sociodemographic characteristics, besides designed to assess individuals' familiarity with the setting (Southwest Alentejo and the Vicentine Coast, SAVC), their experiences regarding leisure activities associated with the region, and how COVID-19 affected them.

The central part of the surveys was a choice experiment. After being shown a video, the participants were asked to order four ecosystem services (i.e., benefits one may extract from the maritime and coastal environment considered) according to the relative importance they attribute to each. Then, they were shown a series of choice cards. Each of these included three programs designed to protect, at different levels, the four ecosystem services from oil spills (a real risk for the SAVC region). Two of the programs implied a monetary contribution, while the third did not (it represented the *status quo*). A series of follow-up questions sought to assess, for instance, whether the minimum monetary contributions required for the "new" programs had been taken into account or whether the participants preferred to contribute to policies related to other issues (e.g., education or health).

With this rich collection of data, it is possible to analyze individuals' willingness to contribute to environmental policy actions while controlling for a wide range of variables. Moreover, the ways in which different parameters – for instance, an individual's income – affect the decision to contribute can also be assessed.

Descriptive Analysis (according to payment vehicle assignment)

929 individuals were surveyed: 479 were randomly assigned to the crowdfunding version of the survey, while the remaining 450 were presented the tax version. The mean income of the individuals assigned to crowdfunding is higher than that of the other group; the same applies to their average income before COVID-19. Regarding other variables (age, schooling, gender, and connection to Southwest Alentejo and the

Vicentine Coast) there are no statistically significant differences between the two groups; the same applies to measures of extraversion, agreeableness, conscientiousness, and openness, based on the questionary on personality characteristics. Finally, as pertains to an indicator of emotional stability, the individuals assigned to the tax group have lower scores.

The average individual in the sample is 47.6 years old and has an estimated monthly income of approximately 750€.

4. Methodology

The model we specified encompasses several variables we consider to be of paramount importance in defining either the way agents perceive the environment or the way they envision money spending and fundraising for public policy purposes. For that matter, an iterative strategy was adopted, resorting to common knowledge and to the literature's insights in order to build a model that not only was able to aggregate the most interesting variables but also one that was stable and avoided heterogeneity or other specification issues. As such, we have used a mixed logit model, which takes the heterogeneity of the population into consideration and allows to analyze the economic value of key environmental dimensions: biodiversity, beaches, coastal protection and surf. Since the "independence of the irrelevant alternatives" is clearly violated, given that choosing one of the options (bio, coastal, surf…) as an environmental policy priority clearly does not rule out the importance of the other dimensions, allowing the coefficients to be random helps to overcome this assumption. Hence, a mixed logit model should be preferred over a conditional logit one. Since our main topic of interest was the willingness to pay, all the studied variables are interacting with the "bid" variable, which accounts for how much money the respondent desires to allocate to the project. It was also essential to study the collinearity between the baseline variables (without the interaction) so as to assure that the model would not be overly extensive. No problems were found, as evidenced in the annexes.

Accordingly, the adopted specification was:

"**mixlogit** choice bid payveh_bid inc_bid gender_bid age_bid educ_bid incpandemicdifr_bid connect_bid certain_bid emostabtipi_bid extraversiontipi_bid opennesstipi_bid aggreeblenesstipi_bid environmentalfriend_bid attentionindex_bid addexp_bid influence_bid conscientiousnesstipi_bid otherareas_bid credibility_bid if choice_card!=5, rand(bio beach coastal surf) group(group_var) id(id) nrep(50)"

"payveh_bid" is the interaction between a dummy variable that reflects the influence that the chosen payment vehicle (tax or crowdfunding) exerts on the willingness to pay (in which it assumes the value of 1 for a tax system and 0 for a crowdfunding one) and the bidding variable ;

"inc_bid" accounts for the monetary income factor;

"gender_bid" is the interaction between a dummy variable that mirrors the difference that the gender of the respondent has (in which 1 accounts for a female individual and the bidding variable) on how much he/she is willing to bid;

"educ_bid" is related to the number of schooling years;

"incpandemicdifr_bid" expresses the loss of income caused by the pandemic recession in relative terms (i.e., adjusted for the income size the respondent held before the crisis) interacting with the bid variable;

"connect_bid" is the interaction between a dummy variable that relates to if the individual has a connection to the place (works there, lives there, has family there or has visited the place), in which the unitary value is a positive answer, and the bidding factor;

"certain_bid" accounts for the degree of certainty when answering the survey;

"emostabtipi_bid" reflects a personality profile in which the respondent is emotionally stable;

"extraversiontipi_bid" corresponds to a personality profile in which the individual is extroverted and enthusiastic;

"opennesstipi_bid" mirrors a personality profile in which the individual has a vast array of interests, open to new experiences;

"agreeblenesstipi_bid" accounts for individuals who are not overly critical and conflicting and easily blend with others;

"environmentalfriend_bid" reflects the environmental friendliness of the respondents, i.e., whether they regularly by products with less environmental impact, do recycling, watch TV shows and documentaries about the natural world, participate in environmental actions or monetarily contribute for environmental associations/campaigns;

"attentionindex_bid" corresponds to the level of attention of the respondent while learning about the purpose of the program;

"addexp_bid" relates to the budget constraint, i.e., if the agent would be willing to take additional spending;

"*influence_bid"* reflects how believing that the survey answers will influence the program's implementations interacts with the bidding variable;

"conscientiousnesstipi_bid" mirrors a personality profile in which the agent is conscious and sensible;

"otherareas_bid" represents the interaction between how much the respondent agrees that he/she would prefer to allocate money to other areas like education and health and the bidding factor;

"credibility_bid" represents the variable that evaluates the authorities' credibility and the belief that the program will really help the protection of the ecosystem services, in its interaction with the bidding variable.

5. Results and Discussion

In spite of the efforts to try to find the best possible model, one could say that this scrutiny in specific fell short of significance. Nevertheless, there were still interesting results to explore and analyse.

Table 1-Regression results

Choice	Coefficient	$P>\|z\|$	95% CI	
Mean				
Bid	-.127	.000	-.168	-.087
Payment Vehicle	-.002	.406	-.007	.002
Income	.000	.258	-.000	.000
Gender	-.003	.907	-.005	.004
Age	-.000	.333	-.000	.000
Education	.001	.005	.000	.002
Pandemic Income Difference	-.007	.187	-.182	.003
Connection to the place	.000	.993	-.005	.005
Certainty	.003	.052	.000	.007
Personality				
Emotional Stability	-.000	.622	-.002	.001
Extraversion	.000	.655	−.001	.002
Openness	.002	.092	−.000	.004
Agreeableness	.002	.112	−.000	.005
Conscientious	.001	.232	-.001	.004
Environment Friend	-.000	.368	-.001	.000
Attention Index	-.009	.000	-.012	-.006
Budget Constraint	.004	.012	.000	.007
Influence	-.002	.182	-.006	.001
Credibility	.005	.000	.002	.008
Bio	.656	.000	.334	.977
Beach	.446	.001	.178	.714
Costal	.148	.235	-.096	.393
Surf	-.809	.000	-1.084	-.534
Other Areas	.009	.000	.006	.013

Table 2-STATA output

```
Iteration 0:   log likelihood = -2524.5579  (not concave)
Iteration 1:   log likelihood = -2216.5801
Iteration 2:   log likelihood = -2142.7186
Iteration 3:   log likelihood = -2137.1301
Iteration 4:   log likelihood = -2131.3689
Iteration 5:   log likelihood = -2130.9531
Iteration 6:   log likelihood = -2130.9519
Iteration 7:   log likelihood = -2130.9519

Mixed logit model                               Number of obs     =      8,592
                                                LR chi2(4)        =     802.79
Log likelihood = -2130.9519                     Prob > chi2       =     0.0000
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
bid	-.1278598	.020832	-6.14	0.000	-.1686897	-.0870299
payveh_bid	-.0021685	.0026111	-0.83	0.406	-.0072861	.0029491
inc_bid	2.94e-06	2.60e-06	1.13	0.258	-2.15e-06	8.02e-06
gender_bid	-.0003113	.0026597	-0.12	0.907	-.0055243	.0049017
age_bid	-.0000916	.0000946	-0.97	0.333	-.0002771	.0000939
educ_bid	.0016118	.0005797	2.78	0.005	.0004756	.002748
incpandemicdifr_bid	-.0073298	.0055586	-1.32	0.187	-.0182244	.0035648
connect_bid	.0000261	.0027908	0.01	0.993	-.0054438	.005496
certain_bid	.0038427	.0019791	1.94	0.052	-.0000361	.0077216
emostabtipi_bid	-.0005607	.0011378	-0.49	0.622	-.0027907	.0016692
extraversiontipi_bid	.0004598	.0010289	0.45	0.655	-.0015567	.0024763
opennesstipi_bid	.0022308	.0013229	1.69	0.092	-.0003621	.0048237
aggreeblenesstipi_bid	.0023186	.0014588	1.59	0.112	-.0005406	.0051779
environmentalfriend_bid	-.0006175	.0006861	-0.90	0.368	-.0019622	.0007273
attentionindex_bid	-.0093498	.0014583	-6.41	0.000	-.012208	-.0064917
addexp_bid	.0043873	.0017394	2.52	0.012	.0009781	.0077966
influence_bid	-.002624	.0019661	-1.33	0.182	-.0064774	.0012295
conscientiousnesstipi_bid	.0015829	.0013253	1.19	0.232	-.0010147	.0041804
otherareas_bid	.0096931	.0017723	5.47	0.000	.0062195	.0131667
credibility_bid	.0055145	.0013465	4.10	0.000	.0028754	.0081535
bio	.6562401	.1641178	4.00	0.000	.3345751	.9779051
beach	.4464654	.1365694	3.27	0.001	.1787943	.7141365
coastal	.1483607	.1249178	1.19	0.235	-.0964737	.393195
surf	-.8093846	.1402583	-5.77	0.000	-1.084286	-.5344834
SD						
bio	3.17417	.2433054	13.05	0.000	2.6973	3.65104
beach	2.100825	.1860935	11.29	0.000	1.736088	2.465561
coastal	1.768074	.1950756	9.06	0.000	1.385733	2.150416
surf	1.444296	.2111779	6.84	0.000	1.030394	1.858197

```
The sign of the estimated standard deviations is irrelevant: interpret them as
being positive
```

What can be assessed through this study with remarkable significance is the economic value of the various spheres/services of the Southwest Alentejo and Vicentine Coast natural resources: biodiversity conservation, beach, coastal protection or surf activities. This analysis is extremely important, since it may indicate in which dimensions to invest the most according to its value for the individuals. In the results we obtained it is clear that all except one of the dimensions are perceived quite positively by the respondents. The one that is perceived more positively is the biodiversity and the one individuals exhibit a certain disutility when it comes to the program is surf. This can be seen both in the coefficients of the regression output (tables 1 and 2) and in the individual economic

values in euros representing a measure of utility/welfare in euros per person (table 3). The latter correspond to the economic value of the ecosystem services, the willingness to pay. For instance: on each agent is willing to pay or contribute around 6 euros to biodiversity conservation, but isn't willing to pay for surf related investments . In this regard, investment strategies and conservation dynamics directed towards the surf activity would be unpopular and should be avoided.

Table 3- Willigness to pay

Biodiversity	6,55€
Beach	4,46€
Coastal	1,48€
Surf	-8,08€

The payment vehicle choice ("payveh_bid"), between a crowdfunding strategy or a tax one (a dummy variable in which a tax system corresponds to the unitary value) , is not statistically significant. In anticipation, one could theorize that agents might be fonder of taxes, since crowdfunding is still somewhat unknown and unregulated, which could spark suspicion and lead to a overwhelming preference for the well-known and conventional tax regime. On the other hand, having another additional tax to support the state may very well be an aversion factor to many agents, which might have been a significant plus for crowdfunding, considering its optional nature. As it is, the fact that the payment vehicle seems not to be a significant variable in terms of the willingness to pay, despite of failing to cast some light on which would be the options to follow, leaves a certain self-determination for governments to decide which method suits them best, if this non significance is confirmed by further investigation. If one of the modalities had been sizably preferred by respondents, then the authorities would have to follow that, under penalty of failing to attain the desired results.

The loss of income fueled by the economic recession provoked by the covid-19 pandemic ("incpandemicdifr_bid") is also not a relevant factor, which if confirmed, could have been caused by the fact that the pandemic has alerted for the importance of combating climate change and environmental decay, fragilizing income as an explanatory factor.

That sense of urgence could have stirred people's willingness to pay even amid a financial hardship.

Regarding the significant effects detected in our estimation, what may be an expected relationship may be spotted in the fact that when respondents allege they would prefer their contribution to be invested in other areas, such as health and education, they are more likely to contribute more ("otherareas_bid", with a positive coefficient). One would think that it would be fine for someone to consider that financial support should be canalized to basic rights areas such as education and health and still want to support environmental recovery to a certain extent but what triggers perplexity is the fact that the data suggests that the more someone agrees with this stance, the more they feel like contributing. However, if we take into consideration that this question in particular surges in the survey after the respondent has to deal with matters of price and monetary contribution, this may signal that even the individuals that are willing to pay a substantial amount of money are of the opinion that other areas should be targeted as well. This result allows two possible considerations: first, even though environmental policy may be considered as not as important as education and health, it is still regarded as an area worth of receiving robust financial support and attention, which is clearly a positive sign; on the other hand, this alerts for the other size of the coin, which involves fairness, reminding that it is important to combine environmental investment with progress in other areas belonging to the same measures package, so as to ensure that environmental policy should not be seen as a conflicting policy but as a complementary one. Only by doing that it is possible to gather public support. If people that are willing to spend a lot on environment still see other areas as worthwhile investments, one could imagine that the ones who may be willing to spend less may very well turn against this policy orientation, using filibustering tactics or blocking them altogether. Nevertheless, in essence, paying for a better environment is much less divisive that what may have seemed beforehand., which is quintessential if we consider that no policy involving money, especially one specifically directed to one regional area, can be implemented if it triggers nationwide dissent.

The effect of schooling ("educ_bid"), is considerably significant, as the correspondent p-value is below the 10% threshold. The coefficient is positive which is coherent with the

fact that the vast majority of the research in the area signals that more educated agents tend to care more about environmental affairs. This is positive considering that agents who consider education more of a priority tend to donate more. By investing in education parallel to a greener economy, the population would be willing to pay more not only because education favours willingness to pay per se but also because the other priority areas would be satisfied as well, pushing aside possible fairness motivated reluctance. Indeed, education and environmentalism seem to be strong allies.

One of the most riveting features of the attained results was the fact that the income factor ("inc_bid") is not statistically significant. This fact could be motivated by specification dysfunctions. If, however, that is not the case, being motivated by a total lack of relationship between the independent and dependent variables at stake, that would imply that one's income is not markedly involved in the decision of how much to dispend on this specific environmental issue. This property would point out in the direction of a certain income inelasticity of environmental protection, comparing it to other indispensable goods. Unfortunately, no such conclusion can be asserted given the lack of significance, which only allows us to speculate on the topic.

Interestingly, age ("age_bid") is also a non-significant factor, which may clash with the common perception that young people are more environmentally aware and conscious or the fact that ageing population is more at risk from environmental threat (deteriorating health). This should not have to do with a possible misrepresentation of the Portuguese population in terms of age structure, since that the age average of the survey respondents is around 48 years old, matching with the country's official numbers. Further investigation, with other modelling specifications would be required.

Gender ("gender_bid") is non-significant, suggesting that there is no significant relationship between the propensity to pay and the sex of the respondent. This result counters the common view and sometimes academic perception that there are gender differences in public understanding of climate change, in which men are usually more skeptical and resistant. For instance, in 2017, Scientific American, a prestigious American science magazine alerted in one of its headlines that "Men Resist Green Behaviour as Unmanly". However, most of the academic papers, both previous to that and the ones that followed have always indicated very narrow differences between genders. In our

model, there is no way how to assess any attitudinal difference, as the p-value is considerably large.

Another intriguing finding is that connection to the place ("connect_bid") seems not to play any significant role in the predisposition to pay. One could expect that people emotionally linked to the area, having witnessed its resources and what potential degradation may look like would be more favourable to investing in this kind of effort, this fact could be extremely positive in terms of public policy implementation if this non-significance is motivated by the absence of any relationship between variables whatsoever. It would strongly support the fact that public policy authorities should not find any dividing gap between locals and non-locals, quite probably because Costa Vicentina is widely regarded as our country's patrimony and part of our common heritage as a nation, available to be enjoyed by us all.

In terms of public policy, one may consider that the personality profile of the citizens is a superfluous characteristic. However, in a context in which standard variables lack significance, prototypical public policy tools may not only be defective but completely inadequate. In that sense, unorthodox strategies and programs should be resorted to, especially bearing in mind that environmental behaviour and attitude is rarely connected with rationality or common utility maximizing mechanisms but a lot more with a pathos appeal that only personality profiles may be helpful to guideline. In fact, it is more straightforward if policy making agents picture this in the logic of marketing strategies designed by many emerging companies. If your product's attractiveness is hardly related with easily measured and controllable factors, it is the marketeer's mission to make it more alluring by playing with the features that may engage the population, according to their intrinsic manners and identity. Only one of the personality profiles we controlled for significantly influences bidding disposition. And that is "openness" ("openness_bid"), which accounts for people with a vast array of interests, willing to experience new situations, unconventional and creative. As may have been expected, this profile is much more willing to pay for a better environment. It is also quite unfortunate that no scrutiny can be made regarding the environmental friendliness of the agents ("environmentalfriend_bid"), which involves buying products with less environmental impact, recycling habits, participating in nature conservation dynamics or being used to

monetarily contributing to environmental campaigns. Strangely, that variable also holds no significance.

The credibility variable ("credibility_bid") shows that the more respondents believe that the money is going to be used for what is intended for in the moment of payment the more they are willing to give, which is understandable. However, the ones that are paying more attention to the explanation of the survey ("attentionindex_bid"), being more successful on responding to a set of multiple choice questions, are less willing to give, which may be a red flag that the ones that fully understand what is at stake are not so fond of the program at all. Nevertheless, that conclusion is not that clean, since the ones that pay more attention could be the ones with a more frugal character, being more worried on how to spend their money. As such, it would not be a matter of not spending as much because the program is faulty but because they are inherently less willing to spend at all sorts of things. As a sidenote, the ones that are more certain on responding ("certain_bid") are more willing to spend money on the project, which is an encouraging factor.

Do "Missing Contributions" impact program choice?

Crowdfunding platforms frequently allow users to see how much money is still needed to reach the required value. That information, however, can influence the decision to contribute. For example, a high value of missing contributions may preclude some potential donors from donating, as they can assume that the total amount requested will never be reached; however, it could also be the case that a small value of missing contributions disincentivizes donations by, for instance, creating the expectation that the required value will be reached *anyway*, without the need for the potential donor to contribute. Thus, the survey for the Crowdfunding group included an extra choice card, essentially equal to a previous one but with a difference: information regarding missing contributions was available.

An analysis (Table 2) of which program was chosen by individuals in these two different settings revealed that the availability of additional information did not have

statistically significant effects on program choice (i.e., knowledge about missing contributions did not affect program choice).

6. Conclusions

Environmental policy is typically controversial. Take this case as an example: the lack of significance makes it difficult to be based in concrete data and not only there can be different results between individuals and companies but also between regions and between distinct environmental projects studying the same population and topics. Besides, it is also important to acknowledge the gap between beliefs and attitudes, which may disrupt policy intensions and expected results from its actual impact.

However, there are ways to continue further investigation on this matter, in order to search for possible correlations between variables, to face the lack of significant conclusions. As a first approach, this report had the sole purpose of being a first inquiry into this topic. However, additional investigation is required. That is extremely important to assess if the variables we are controlling for really are unconnected/not explanatory or if there is a specification issue leading to that. Additionally, it will also allow to inspect if other factors not yet accounted for could play a determinant role. So, further work will be brought by the Knowledge Center, based on this same survey, incorporating other models and specifications.

In such regard, one could think of potential improvements to this model, such as studying potential interactions between variables, such as education and age ("education_age") or income and education ("income_education"), to surveil potential dynamics of interest for proficient policymaking. This would complexify the model in a good way, bringing a third dimensionality which was not the main purpose of this first inquiry into the main picture. But one could also consider future approaches to this topic, creating other experiments, such as introducing other forms of payment so one could see if there are significant mechanisms unfolding when that option is presented to the public. Finally, one could even consider introducing an apparently non-related but context specific factor, such as a political variable. Dustin R. Turin, the Editor-in-Chief editor for Inquiries Journal wrote, in 2014, that where tackling environmental problems was once primarily scientific and

technocratic in nature it is now almost exclusively a problem of politics. That is quite clear on nowadays' America in which Democrats believe climate change and are more willing to tackle that problem and Trumpism Republicans are more skeptical and even negationist. While this may not be true in Portugal, other similar phenomenon could be taking place.

All in all, we ought to assess the structural perception and relationship between the public and the natural resources. Not only is that of paramount importance because environmental policy must encompass, in its essence, the symbiosis between humans and nature but also because change in measures needs public support. Public support is compulsory if one is working with common financial funds, which is why economic investigation is a key lighthouse. In this case, once again, money leads the way.

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8. Appendix

Table 4

Difference in Means according to **payment vehicle group assignment**

	Difference in Means	
Income	120.5**	(3.05)
Income before COVID	108.9**	(2.90)
Age	0.231	(0.20)
Schooling	0.0114	(0.12)
Gender	0.0271	(0.83)
Connection to SAVC	-0.0245	(-0.78)
Extraversion TIPI	0.145	(1.61)
Agreeableness TIPI	-0.0612	(-0.95)
Emotional Stability TIPI	0.224**	(2.89)
Openness TIPI	-0.00967	(-0.12)
Conscientiousness TIPI	-0.0132	(-0.19)
N	929	

t statistics in parentheses

*p<0.05, ** p<0.01, *** p<0.001

Table 5

Choice Card	Mean	Std. Err.	t stat.
Without Missing Cont.	0.73486		
With Missing Contributions	0.78079		
Difference	-0.04593	0.05004	(-0.9179)

Observations: 479

(obs=10,347)

	bid	tax_ve~n	income~e	gender	age	educ	income~r	connec~V	certai~y
bid	1.0000								
tax_version	-0.0138	1.0000							
income_value	-0.0065	-0.0509	1.0000						
gender	0.0041	-0.0302	0.0467	1.0000					
age	-0.0009	0.0238	-0.1412	0.0004	1.0000				
educ	-0.0049	-0.0130	0.4031	-0.0360	-0.4718	1.0000			
incomepand~r	0.0010	-0.0259	-0.1908	0.0648	-0.0610	0.0398	1.0000		
connectSACV	0.0029	0.0273	-0.2108	-0.0758	0.2012	-0.2484	-0.0309	1.0000	
certainty	0.0030	-0.0508	-0.1156	0.0284	-0.0269	-0.0804	0.0680	-0.0432	1.0000
emo_stab_t~i	0.0061	-0.1090	0.1504	0.0871	-0.0282	0.1006	-0.0933	-0.1464	-0.0456
extraversi~i	-0.0039	-0.0714	0.1544	-0.0648	-0.2454	0.2142	-0.0084	-0.1704	-0.0081
openness_t~i	-0.0026	-0.0186	0.1850	-0.0893	-0.3781	0.3262	0.0061	-0.1936	-0.0896
aggreeblen~i	-0.0002	0.0315	0.0965	-0.1754	0.0291	0.1145	-0.0856	-0.1142	-0.0704
environme~nd	-0.0100	0.0202	0.2822	-0.0338	-0.2334	0.4077	0.0207	-0.2412	0.0392
attentioni~x	0.0041	-0.1105	0.2489	0.0075	-0.2331	0.2294	-0.0372	-0.2683	0.1088
protest1	-0.0076	0.0490	0.2535	0.0381	-0.1780	0.2277	-0.0530	-0.1340	0.0072
influence	-0.0026	0.1333	-0.0164	-0.0081	-0.1187	0.0582	0.0492	-0.0689	0.1020
conscienti~i	0.0009	0.0330	0.0768	-0.1361	0.0569	0.0585	-0.1487	-0.0505	-0.1189
otherareas	-0.0002	-0.0289	-0.0163	-0.0105	-0.0706	-0.0406	0.0240	-0.0500	0.0157
credibility	-0.0046	0.0262	0.0830	0.0064	-0.1350	0.1538	-0.0054	-0.1072	-0.0154

	emo_st~i	extrav~i	openne~i	aggree~i	envir~nd	attent~x	protest1	influe~e	consci~i
emo_stab_t~i	1.0000								
extraversi~i	0.0607	1.0000							
openness_t~i	0.1175	0.5046	1.0000						
aggreeblen~i	0.2787	0.0604	0.2160	1.0000					
environme~nd	-0.0203	0.1589	0.2326	0.0785	1.0000				
attentioni~x	0.1841	0.1370	0.1499	-0.0152	0.1344	1.0000			
protest1	0.0227	0.1458	0.0574	-0.0938	0.3033	0.2022	1.0000		
influence	-0.0842	0.0224	0.0359	-0.0308	0.2214	0.0670	0.2069	1.0000	
conscienti~i	0.2335	0.0236	0.1997	0.4199	0.0300	-0.1110	-0.0759	-0.1051	1.0000
otherareas	-0.1293	-0.0364	-0.0525	-0.1108	0.0604	-0.0320	0.0123	0.1377	-0.0646
credibility	-0.0488	0.1222	0.1274	0.0682	0.3302	0.0420	0.2327	0.3942	0.0790

	othera~s	credib~y
otherareas	1.0000	
credibility	0.0425	1.0000

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