TESE DE DOUTORAMENTO

SOCIAL NORMS, ECONOMIC INCENTIVES AND ENVIRONMENTAL POLICIES

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Social norms, economic incentives and environmental policies

SUMMARY

Human activities are the major causes of the biodiversity loss and ecosystem degradation. Despite the considerable budget invested to conserve ecosystems, these are far from their conservation objectives (Chen et al. 2009). Therefore, it seems clear that an understanding of human behavior is crucial in order to improve general environmental policies. Pretty and Smith (2004) state that economic incentives are important but sometimes they are not powerful enough to achieve certain objectives. Sethi and Somanathan (1996) indicate that social norms can be largely influential in a social setting. Thus, the objective of this thesis is to focus on the analysis of these factors on the fulfillment of certain environmental objectives. Different case studies will be analyzed from both, a global and more local perspective. At a global level, it is analyze a current serious problem such as the climate change. At a more local level, three case studies are presented in order to understand: a) the degree of acceptance of agri-environmental schemes by farmers in Aragon; b) the role of poaching in conservation objectives in shellfish extraction; and c) the impact of common management in conservation outcomes in forest lands of Galicia. This thesis concludes with a summary of conclusions and future orientations.

KEYWORDS

social norms, economic incentives, natural resources, environmental resources.

RESUMO

As actividades dos seres humanos son as principais causas da perda de biodiversidade e da degradación dos ecosistemas. A pesar do importante presuposto investido para conservar os ecosistemas, o obxectivo de conservación está lonxe (Chen et al. 2009). Polo tanto, parece claro que o entendemento do comportamento humano é fundamental, á fin de mellorar as políticas ambientais. Pretty e Smith (2004) destacan como os incentivos económicos son importantes, pero ás veces, non son o suficientemente poderosos para acadar certos obxectivos. Neste senso, Sethi e Somanathan (1996) comentan que as normas sociais poden ser tremendamente influentes nunha contorna social. Así, o obxectivo desta tese é analizar o papel destes factores sobre o cumprimento de determinados obxectivos ambientais a través de

diferentes casos de estudo; tanto dende unha perspectiva global como unha máis local. A nivel global, estudase un grave problema actual, como é o cambio climático. A un nivel máis local, preséntanse tres casos de estudio co fin de entender: a) o grado de aceptación dos programas agroambientais por parte dos agricultores en Aragón; b) o papel do furtivismo nos obxectivos de conservación do marisqueo; e c) o impacto da xestión común nos resultados de conservación nos montes de Galicia. Esta tese conclúe cun breve resumo de conclusións e futuras orientacións.

PALABRAS CHAVE

normas sociais, incentivos económicos, recursos naturais, recursos ambientais.

RESUMEN

Las actividades de los seres humanos son las principales causas de la pérdida de biodiversidad y de la degradación de los ecosistemas. A a pesar del importante presupuesto invertido para conservar los ecosistemas, el objetivo de conservación está lejos (Chen et al. 2009). Por lo tanto, parece claro que la comprensión de la conducta humana es crucial para mejorar las políticas ambientales. Pretty y Smith (2004) afirman que los incentivos económicos son importantes pero a veces, no son lo suficientemente poderosos para lograr ciertos objetivos. En este sentido, Sethi y Somanathan (1996) comentan que las normas sociales pueden ser tremendamente influyentes en un entorno social. Así, el objetivo de esta tesis es analizar el papel de estos factores sobre el cumplimiento de determinados objetivos ambientales a través de diferentes casos de estudio; tanto desde una perspectiva global como una más local. A nivel global, se analizará un grave problema actual, como es el cambio climático. A un nivel más local, se presentan tres casos de estudio con el fin de entender: a) el grado de aceptación de los programas agroambientales por parte de los agricultores de Aragón; b) el papel del furtivismo en los objetivos de conservación del marisqueo; y c) el impacto de la gestión común en los resultados de conservación de los montes de Galicia. Esta tesis concluye con un breve resumen de conclusiones y futuras orientaciones.

PALABRAS CLAVE

normas sociales, incentivos económicos, recursos naturales, recursos ambientales

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RESUMO

RESUMO

INTRODUCIÓN

A Comisión Europea (2014), amosa que o uso non sostible dos recursos naturais e a sobrexplotación seguen sendo unha gran ameaza para a biodiversidade. Este feito é recalcado tamén polo United Nations Environment Programme (UNEP, 2013), afirmando que "a biodiversidade global segue a diminuír a un ritmo alarmante". Esta situación é preocupante dado que segundo o World Wildlife Fund (WWF, 2014) "sostén a saúde do planeta e ten un impacto directo sobre as nosas vidas." Neste senso, Chen et al. (2009) comentan que a actividade humana é a principal causa da perda de biodiversidade e da degradación dos ecosistemas; indicando que, a pesar de todo o presuposto investido para conservar os ecosistemas, o obxectivo de conservación está lexos. Polo tanto, parece claro que unha mellor comprensión do comportamento humano podería ser fundamental no deseño de políticas ambientais máis eficaces. A pregunta é ¿qué factores inflúen no comportamento dos seres humanos?

A teoría económica tradicional sostén que os individuos somos racionais e egoístas; buscando maximizar a nosa propia utilidade. Ademais, en relación aos recursos naturais e ambientais, é importante ter en conta que estes son bens públicos ou recursos de uso común. Neste senso, Hardin (1968) propuxo a "traxedia dos comúns", como o fin dos recursos. Segundo a literatura económica tradicional, cando os seres humanos afrontan un ben público, o resultado máis común é a falta de cooperación e o comportamento free-rider. A vía que se propón para evitar esta situación, é o establecemento de leis e a existencia dunha autoridade que impoña regras aos usuarios dado que, en teoría, estes non son capaces de se auto-limitar. Con todo, na práctica, a pesar da existencia de leis que impoñen incentivos económicos, tales como impostos, subvencións, multas e a existencia de entidades reguladoras, o éxito na xestión dos recursos naturais e do medio ambiente foi limitada. Nesta liña, varios estudos demostraron que as conclusións dos modelos económicos tradicionais non sempre son certas e

que, ademais de incentivos económicos, factores como as normas e influencias sociais tamén importan cando os individuos toman decisións.

Lindbeck (1997) suxire que "os individuos actúan segundo recompensas ou castigos previstos, aínda que estes toman unha forma que difire substancialmente nos dous casos." Castigos e recompensas son incentivos económicos; polo tanto, implican recompensas materiais ou sancións. Sen embargo, é importante ter en conta que tamén son incentivos sociais, que implican recompensas ou castigos sociais. Polo tanto, ambos factores deben ser analizados. Nesta liña, Levitt e Dubner (2006) indican que os economistas cren que os incentivos poden resolver calquer problema. Así, os incentivos poden ser definidas como "un pequeno obxecto con incrible poder para cambiar unha situación", "un medio de fomentar a alguén a facer algo mellor, e menos algo mal". Ademais, estes autores fan fincapé en tres tipos de incentivos: económicos, sociais e morais; subliñando que todos deben ser considerados, xa que poderían ser a chave para mellorar a eficacia das políticas. Neste senso e en relación ás cuestións ambientais, Hovi et al. (2011) salientan que a economía do medio ambiente está cambiando e un dos feitos que axudou a progresar foi a incorporación da psicoloxía nos modelos económicos posto que se crean mellores previsións e políticas (Camerer e Loewenstein, 2004). A idea de que os factores sociais importan foi un tema moi analizado; por exemplo, Fehr e Falk (2002) comentan que hai aspectos non pecuniarios poderosos para ser tidos en conta, xa que, do contrario, os economistas poden estar fallando ao tratar de entender o comportamento humano. Esta idea tamén foi enfatizada por Fehr e Fischbacher (2002), salientando que as preferencias sociais son exhibidas por un gran número de persoas. Aínda mais, Fehr e Gächter (2002) explican que, nalgúns casos, os contratos de incentivos poden reducir a cooperación voluntaria; inclusive unha multa pode diminuír a cooperación voluntaria, ademais da eficiencia. Nesta liña, Levitt e Dubner (2006) explican co seguinte exemplo o efecto contrario que se pode alcanzar considerando unicamente o aspecto económico. Trátase do caso dunha gardaría onde os pais recollen os fillos tarde e na que como medio para evitar esta situación introducen unha multa co fin de incentivalos a ser puntuais. O resultado obtido foi, sen embargo, o contrario cun aumento na frecuencia en que os pais chegaban atrasados.

Por tanto, o obxectivo desta tese é estudar o papel que as normas sociais xunto cos incentivos económicos xogan na toma de decisións dos individuos. Os primeiros xa foron brevemente comentados pero, ¿qué son as normas sociais? As normas sociais son definidas como comportamentos, actitudes e opinións de terceiros que poden ser tremendamente influentes nunha contorna social (Sethi e Somanathan, 1996). Ademais, Baron e Byrne (2004) tamén apuntan a, cómo espera un individuo que sexa o comportamento doutros en situacións específicas. É máis, a maioría das persoas obedéceas a maior parte do tempo. Elster (1989) define as normas sociais como "propensións emocionais e de comportamento dos individuos" que non implican o rexeitamento da elección racional. Elster (1989) tamén sinala que "as accións normalmente son influenciadas tanto pola racionalidade como polas normas."

Así neste traballo, estes factores van ser estudados a través de diferentes casos de estudo sobre os recursos medioambientais e naturais. A razón é que, a pesar da importancia dos factores sociais, pouco se sabe sobre o seu papel na xestión dos recursos. Neste senso, Goldstein et al. (2008) argumentan que hai pouco traballo empírico na literatura sobre o comportamento do consumidor e acerca dos factores que inflúen nun comportamento pro-social ou pro-ambiental. Así, o obxectivo desta tese é analizar o papel destes factores sobre o cumprimento de determinados obxectivos ambientais a través de diferentes casos de estudo; tanto dende unha perspectiva global como unha máis local. A nivel global, estudase un grave problema actual, como é o cambio climático. A un nivel máis local, preséntanse tres casos de estudio co fin de entender: a) o grado de aceptación dos programas agroambientais por parte dos agricultores en Aragón; b) o papel do furtivismo nos obxectivos de conservación do marisqueo; e c) o impacto da xestión común nos resultados de conservación nos montes de Galicia.

CASOS DE ESTUDO

O primeiro caso de estudo ofrece unha revisión das avaliacións existentes de preferencias cara as políticas de mitigación e adaptación ao cambio climático a través dunha meta-análise a nivel internacional. En concreto, analizase o impacto que os valores e normas sociais teñen nas preferencias de cara as políticas de loita contra o cambio climático; empregando unha mostra de 58 estudos internacionais.

Os seguintes tres capítulos da tese están relacionadas coa xestión dos recursos naturais. En concreto, no segundo capítulo, analízanse as decisións que toman os agricultores de Aragón (España), unha área na que o descenso das aves que viven nas estepas de cereal tornouse nunha situación moi preocupante. A preocupación é de tal orde que, a Política Agraria Común (PAC) está intentando resolver esta situación a través da implantación de contratos agroambientais. Así, o obxectivo deste capítulo é avaliar as preferencias dos agricultores en relación a estes contratos, esixindo unha serie de requisitos ambientais, coa fin de protexer ás aves e a biodiversidade. En particular, realizase unha enquisa ás comunidades rurais e a través da estimación dun modelo logit ordenado, clasificándose as diferentes características do contrato, e obténdose a súa valoración económica dacordo coas preferencias dos agricultores.

O terceiro capítulo desta tese está relacionado coa actividade marisqueira en Galicia (España). Este sector está sufrindo dous problemas serios: a explotación excesiva de determinadas especies, debido á escaseza doutras, e o furtivismo. O obxectivo é analizar a través dun experimento de elección as preferencias das mariscadoras con respecto a un programa de conservación proposto; ademais de avaliar, neste contexto, o papel das preferencias temporais, o efecto da co-xestión a través dunha Área Mariña Protexida, o efecto das normas sociais e o impacto do furtivismo.

Finalmente, o último capítulo desta tese trata sobre os recursos forestais. Neste senso, unha das ferramentas empregadas para analizar as decisións individuais son os xogos de bens públicos. Neste capítulo realizase un xogo de ben público modificado cunha mostra de propietarios dun recurso de uso común como son, as comunidades de montes en man común de Galicia (España). Os propietarios teñen unha dotación de diñeiro e teñen que decidir qué importe destinan a un fondo común e qué importe gardan nos seus petos. Como punto de diferenza con estudos anteriores tamén se inclúe unha penalización que ten que ser repartida. O obxectivo é analizar os factores que motivan a repartición do diñeiro nun recurso de propiedade común, así como os factores que motivan a repartición dunha penalización. Ademais, próbanse os principios de acción colectiva propostos por Ostrom (1990) e estúdanse as súas implicacións no xogo do ben público.

PRINCIPAIS RESULTADOS

Centrándose no primeiro capítulo desta tese, realizouse unha meta-análise das políticas de cambio climático. Así, arróxase luz sobre o tipo de políticas que son máis preferidas para os cidadáns. En concreto,os resultados indican que as accións de mitigación son preferibles ás de adaptación. Por outra banda, son máis preferibles as políticas que promoven a prevención de desastres e de ondas de calor. Ademais, o impacto dos valores e normas sociais tamén son tidos en conta; concluíndo que as preferencias cara as políticas de cambio climático están afectadas por actitudes en relación ao tempo e ás normas sociais. En particular, os países cunha orientación a longo prazo teñen unha disposición a pagar maior. Os resultados indican tamén que os aspectos morais debe ser empregados para entender as preferencias sociais cara políticas climáticas.

O segundo capítulo céntrase na perda de biodiversidade en Aragón. A través da enquisa realizada aos propios agricultores atópase que os factores sociais son importantes na determinación das decisións dos agricultores. En particular, a importancia da confianza social e a expectativa de cumprimento por parte doutros veciños melloran a aceptación dos contratos por parte dos agricultores. En relación aos incentivos económicos, a creación dunha multa pode ser unha forma persuasiva para impulsar o cumprimento dos contratos. Ademais, as normas sociais son importantes en termos de preferencias cara o contrato. Así, os agricultores máis involucrados socialmente e máis visibles, están máis preocupados pola multa. Ademais, os que seguen unha norma social de cumprimento valoran positivamente a sanción. Isto pode estar relacionado co feito de que os agricultores queren garantir que os free-riders, poderán ser penalizados, podendo ser entendida a multa como un castigo xusto ou altruísta (Fehr e Gächter, 2002). En xeral, os resultados indican que a presión social e as redes sociais son factores importantes que poden axudar a controlar a actitude dos agricultores no senso de acadar resultados máis sostibles. Polo tanto, reforzase a idea de que as normas sociais son cruciais para a comprensión do comportamento dos individuos, dado que inflúen na valoración dos incentivos económicos (Fehr e Fischbacher, 2002).

O terceiro capítulo refírese ao sector marisqueiro en Galicia. Como se comentou, nesta área de estudo, os usuarios afrontan dous problemas principais: a sobrexplotación (debido á

escaseza dalgunhas especies) e o furtivismo. Os resultados mostran respecto ás preferencias temporais, que os usuarios actuais son impacientes nos seus niveis de extracción. Isto pode ser resultado do ambiente de risco no que están envoltos (Ostrom, 1990). Ademais, verificouse que o furtivismo ten un dobre efecto negativo. En primeiro lugar, contribúe á explotación excesiva dos recursos e, doutra banda, esta actividade ilegal incrementa a impaciencia dos usuarios. Deste xeito, as autoridades teñen que xestionar o problema desta actividade ilegal, xa que podería ter peores consecuencias no futuro. No que se refire ás normas sociais, descubrimos que cando a aplicación da lei é a norma, os esforzos necesarios para o plan de xestión non implican unha redución na utilidade das mariscadoras. Polo tanto, destacase que, ademais dos incentivos económicos, as normas sociais importan (Fehr e Falk, 2002). Outro aspecto importante a ter en conta no deseño de novas políticas eficaces é a eficacia da Área Mariña Protexida, onde os principios propostos por Ostrom (1990) están funcionando. Neste senso, os usuarios implicados nunha Área Mariña Protexida teñen un comportamento máis conservador en termos de preferencias de extracción.

O último capítulo da tese centrase no sector forestal de Galicia. En concreto, realizase un xogo dun ben público cunha mostra de propietarios forestais. Os resultados mostran que, en consonancia coa literatura anterior, os individuos comparten unha cantidade significativa da dotación cos seus veciños. Polo contrario, no caso da sanción, os usuarios prefiren que o fondo común pague a súa parte proporcional da multa. No que se refire aos principios de acción colectiva e atendendo ao papel que desempeñan na toma de decisións dos individuos, cando os propietarios están afrontando a repartición dunha recompensa estes non implican resultados máis cooperativos. Polo contrario, no caso da sanción, fan que os individuos asuman un maior importe da multa. Polo tanto, estes principios poden axudar a promover a cooperación cando os propietarios comúns afrontan incentivos económicos caros.

CONCLUSIÓNS

En xeral, a través da realización desta tese encontrase que as normas sociais son factores que deben ser considerados, xunto cos incentivos económicos. Ámbalas cuestións son cruciais para lograr políticas eficaces na xestión dos recursos naturais e ambientais. Así, na análise de políticas climáticas, as diferenzas culturais desempeñan un papel importante na comprensión

do comportamento das persoas. Por outra banda, tamén se manifesta a importancia das normas sociais. En concreto, pódese concluír que as accións custosas para as persoas poden ser percibidas de forma máis positiva se as normas sociais están presentes. Tamén é importante promover a participación dos usuarios nos problemas de conservación da natureza, xa que se demostra que os individuos poden tomar accións máis responsables cando se senten implicados no proceso de xestión. Polo tanto, unha mellor comprensión dos aspectos culturais e das normas sociais poderían mellorar as estratexias actuais que están a ser aplicadas.

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I. INTRODUCTION

I. INTRODUCTION

I.1 INTRODUCTION

The European Commission (2014) has highlighted that the unsustainable use of natural resources and their overexploitation continues to be a major threat to biodiversity. Recently the United Nations Environment Programme (UNEP, 2013) has remarked that "the world´s biodiversity continues to decline at alarming rates". This is a worrying question and according to the World Wildlife Fund (WWF, 2014) "biodiversity underpins the health of the planet and has a direct impact on all our lives." Chen et al. (2009) pointed out that the activities of humans are the major causes of the biodiversity loss and ecosystem degradation; indicating that despite the considerable budget invested to conserve ecosystems they are far from their objective. Therefore, it seems clear that an understanding of human behavior is crucial in order to improve environmental policies. So, what factors affect human behavior?

Traditional economic theory argues that individuals are rational and selfish; seeking to maximize their own utility. In addition, and with regards to natural and environmental resources, it is important to take into account that these are public goods or common pool resources. Therefore, they have two main properties; a) they are non-excludable and b) non-rival. Thereupon, Hardin (1968) proposed the "tragedy of the commons" as the most common output resulting from their economic exploitation. According to traditional economic literature when humans face a public good, the more typical results found will be non-cooperation and free-rider behavior. In this sense, traditional economic literature proposes as a mean to avoid this situation, the establishment of laws and the existence of an authority which imposes rules to users in order to self-limit their extraction or use. Nonetheless, although the existence of laws which imposes economic incentives, such as taxes, subsidies, fines and authorities that regulate resources exists, the success achieved in the management of natural and environmental resources has been limited so far, as it is evident. Several studies have shown that the conclusions of traditional economic models are not always true and in addition to economic incentives, factors such as social norms or social influences also matter

when individuals make decisions.

I.2 BEYOND ECONOMIC INCENTIVES: THE ROLE OF SOCIAL NORMS

Lindbeck (1997) suggests that "individuals act in accordance with expected rewards or punishment, even though the form these take differs substantially in the two cases." But punishment and rewards are both economic incentives; therefore they imply material rewards or penalties but also social rewards or sanctions. Therefore, not only economic incentives but also social factors should be analyzed. Levitt and Dubner (2006) indicate that economists believe that incentives can solve any problem. Thus, they indicate that incentives can be defined as "a minuscule object with an amazing power to change a situation", "a mean to exhort someone to do something better, and less something bad." However, Levitt and Dubner (2006) classify three types of incentives: economics, socials and morals; highlighting that all should be considered, because they could improve the effectiveness of policies. In this sense, Hovi et al. (2011) stand out that environmental economics is changing and one of the facts is the progress of behavioral economics which is based on the conviction that is important to incorporate psychology in the economic models because they can create better predictions and improving policies advices (Camerer and Loewenstein, 2004). The idea of that social factors matter has been also analyzed by several studies, for example, Fehr and Falk (2002) comment that there are powerful non-pecuniary aspects that should be taking into account by economists. On the contrary, they can fail to understand behavior. Moreover, they show as reciprocity, the desire for social approval and the desire to work on interesting tasks "may backfire the agents' performance or compliance with rules". Fehr and Fischbacher (2002) stress the idea that economists fail whether they do not consider social preferences, which are exhibited by an important number of people. Furthermore, Fehr and Gächter (2002) explain that in some cases, incentive contracts can decrease voluntary cooperation, even a fine can decrease voluntary cooperation but also efficiency. In this line, Levitt and Dubner (2006) explain as in a kindergarten where parents pick up children later introduced a fine and the consequence was the increase of the frequency of parents coming later.

Therefore, through this dissertation the analysis of social norms besides economic incentives in the individuals' decisions will be taken into account in order to improve environmental policies. In spite of the importance of social factors, little is known about the role they play in the management of environmental and natural resource.

What are the social norms? Social norms are defined as behaviors, attitudes and opinions of third parties that they can be largely influential in a social setting (Sethi and Somanathan, 1996). Moreover, Baron and Byrne (2004) also indicate that indicate how you hope that the behavior of others is in specific situations. Thereupon, greater part of people obeys them most of the time. Elster (1989) defined social norms as "emotional and behavioral propensities of individuals", which do not imply the rejection of rational choice. Elster (1989) also highlights that "actions typically are influenced by both rationality and by norms."

It seems clear that social factors, such as social norms could be important to explain individuals' behavior while taking into account the lack of success of the current management strategies of natural and environmental resources. Maybe considering these aspects can give us some insights of how to improve present management conditions. Therefore, how can we measure social norms? Goldstein et al. (2008) employed two field experiments to analyze the effectiveness of signs requesting hotel guest participation in an environmental conservation program. They find that descriptive norms influence the behavior of people. In addition, Cameron and Fehr (2002) highlight some games that can be useful to measure social norms and preferences; thus, the Prisoner's dilemma Game (PG), Public Goods Game (PGG), Ultimatum Game (UG), Dictator Game (DG), Trust Game (TG), Gift Exchange Game (GEG) and Third Party Punishment Game (TPPG) are candidates to be used. The analysis of the results obtained in these games indicates that not all individuals are selfish and that social norms are important. Ostrom (2000) concludes through the analysis of PGG that not everybody acts as a "rational egoist", on the opposite contributions are on average about 40-60% of their endowments. Moreover, when the PGG is conducted with several rounds individuals learn to cooperate. Furthermore, when the game leads communication also makes cooperation increase. Even, it has been found that individuals who are willing to make personal expenses to punish those who are offering amounts below the average contribution. At this regard, Chaudhuri (2011) conducted a survey on the literature of PGG and social

norms finding that the majority of participants are conditional cooperators. More evidence of the power of social norms can be found in other games as DG or UG. With regards to the DG, Engel (2011) conducted a meta-analysis, finding that 129 contributions have been published between 1992 and 2009 with a total of 616 treatments. He found that dictators gave on average 28.35% of their pie; therefore, this is another example against the *homo-economicus.* List (2007) highlights previous literature finding that on average the offer is around 20% of the endowment. In UG, players offer on average around 40 to 50% of the pie, showing that respondents take care of their monetary payoff but also take care of the proposer (Güth and Kocher, 2013).

Therefore, traditional economic literature can show limitations in terms of results, because not all individuals behave in the same way when they face the same objective. Ostrom (2000) remarks that as in terms of evolutionary theory, which supports the assumption that modern humans have inherited propensity to learn social norms, similar to inherited propensity to learn grammatical rules (Pinker, 1994).

Several studies support that the addition of social norms over economic incentives in the design of policies is an important step. Fehr and Fischbacher (2004a) conclude that economic incentives, such as sanctions are important to assure the norm enforcement. However, they are driven by non-selfish motives and one factor that can explain this aspect is the reciprocity (Fehr and Gachter, 2000). Another example is the study elaborated by Fehr and Rockenbach (2003) who analyze the impact of penalties, concluding that when penalties reveal a selfish or greedy behavior can destroy the altruistic cooperation and sanctions perceived as fair leave altruism intact. Fehr and Fischbacher (2004b) also highlight that a third party that can punish in these experiments is important and as they are powerful tools to analyze how important are social norms in this context. Even, Young (1998) states that social norms are so important that can be seen as a property right. Manksi (2000) emphasizes that we are social individuals, so the preferences of individuals "may depend on the actions of others." Specifically, this author finds that the efficiency of conservation investments can be improved by integrating social norms at the neighborhood level with demographic trends, economic conditions, and biological values. Kinzig et al. (2013) has argued that effective policies should

include short terms changes in behavior, but also longer term changes in social norms. Therefore, through this short literature review it seems clear that the study of social norms is crucial to understand people's behavior.

I.3 OBJECTIVES AND MAIN RESULTS

The aim of this Dissertation is to analyze through different case studies the role that social factors besides economic incentives have; specifically, what role can social norms play when individuals have to make decisions with regards to the environmental and natural resources without forgetting economic incentives. Goldstein et al. (2008) discuss that there is little empirical work in the consumer behavior literature about the factors that influence a pro-social or pro-environmental behaviors. Therefore, the goal will be to shed light on how social norms and economic incentives can influence the behavior of current users of natural and environmental resources. To carry out this analysis, this thesis is composed by four chapters that deal with different environmental problems; including climate change, the loss of biodiversity, and the management of shellfish fisheries and common forests.

As a brief summary, the first case study provides a review of existing assessments of preferences for climate change mitigation and adaptation policies through a worldwide meta-analysis. In this study, we analyze the impact of social values and norms on preferences towards climate change adaptation and mitigation policies. In a sample of 58 international studies, we find that mitigation actions are preferred over adaptation actions, and that preferences towards climate change policies are affected by attitudes towards time and social norms. In particular, societies with a long-term orientation display greater support towards climate change policies. These results therefore reveal the role of social factors as being crucial in order to understand the acceptability of climate change policies at a worldwide level.

The next three chapters of the thesis are related to the management of natural resources. Specifically, the second chapter analyzes farmers' decisions. The steady decline of birds living in cereal steppe lands is a worrying situation that the European Common Agricultural Policy is attempting to remedy through the application of agri-environmental schemes (AES).

The aim of this chapter is to assess farmers' preferences towards these AES, which call for a number of environmental requirements in order to protect birds. A face-to-face survey in farming communities in Aragón (Spain) was carried out, and through the estimation of an Ordered Logit model (OL), different contract attributes were ranked, obtaining their economic valuation according to the farmers' preferences. We find that social factors are also important in determining farmers' decisions; in particular the importance of social trust and expectation of compliance by other neighbors encourage farmers to fulfil their contracts and cooperate with AES. These and other results may be used to design more effective AES and help to solve this important biodiversity problem.

The third chapter of this thesis is related to shellfish fisheries. This sector suffers worldwide overexploitation of many species. In this chapter, the aim is to analyze through a choice experiment (CE) the preferences of the own shellfish gatherers with respect to a proposed conservation management program; assessing in this context, the role of time preferences, the effect of co-management through a MPA, the effect of social norms and the impact of poaching in shellfish fisheries. With regards to time preferences, we find that current users are quite impatient in their extraction levels, which can be consequence of the risky environment in which they are involved. Furthermore, we find that poaching has a double negative effect. First, it contributes to the overexploitation of the resource, and second, this illegal activity makes that shellfish gatherers become even more impatient in terms of time preferences of exploitation of the resource. With respect to social norms, we find that when the fulfillment of rules is the norm, the efforts required in the management plan are accepted without producing a reduction in fishers´ utility.

Finally, the last chapter of this thesis deals with forest resources. One of the most used tools to analyze individuals' decisions are the Public Good Games (PGG). In this study we conducted a modified PGG with a sample of users of a common pool resource (CPR). Individuals have an endowment of money and they have to decide the amount to be allocated into a common fund. As a point of difference with previous studies we also include a sanction to be shared out. Our goal is to analyze the factors that motivate the sharing of money in a CPR, but also factors that motivate the distribution of a sanction. In addition, we test the compliance of the principles of collective action proposed by Ostrom

(1990) and their implications in the PGG. We find that in line with previous literature, individuals share an important amount of the endowment with their neighbors. However, and on the contrary, in the case of the sanction, users prefer that the common fund pays their amounts of penalty.

Overall it is found that social norms are factors that should be taking into account together with economic incentives. Both issues are crucial to achieve effective management policies of natural and environmental resources. Thus and with regards to environmental resources, we have found that in the analysis of climate change policies, cultural differences play an important role to understand the behavior of people. In addition, we have found the importance of social norms. Specifically, we can conclude that costly issues for people can be perceived more positively whether social norms are present. It is also important to promote the involvement of users in natural conservation problems because it is shown that individuals may take more responsible actions when they fell that are involved in the management process. Therefore, a better knowledge of cultural aspects and social norms could improve the current strategies that are being implemented.

Currently, chapter 1 is published in *Energy Policy*, chapter 2 has been accepted to be published in the *Journal of Agricultural Economics*; chapter 3 has been presented in the BIOECON conference (2014) and chapter 4 has been submitted for presentation to 21st Annual Conference of the European Association of Environmental and Resource Economists (EAERE).

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II. EMPIRICAL CHAPTERS

CHAPTER 1

THE ROLE OF SOCIAL NORMS ON PREFERENCES TOWARDS CLIMATE CHANGE POLICIES: A META-ANALYSIS

1. THE ROLE OF SOCIAL NORMS ON PREFERENCES TOWARDS CLIMATE CHANGE POLICIES: A META-ANALYSIS

Abstract

This chapter provides a review of existing assessments of preferences for climate change mitigation and adaptation policies through a worldwide meta-analysis. In this study, we analyze the impact of social values and norms on preferences towards climate change adaptation and mitigation policies. In a sample of 58 international studies, we found that mitigation actions were preferred over adaptation actions, and that preferences towards climate change policies are affected by attitudes towards time and social norms. In particular, societies with a long-term orientation display greater support towards climate change policies. These results therefore reveal the role of social factors as being crucial in order to understand the acceptability of climate change policies at a worldwide level.

1.1. INTRODUCTION

The consequences of climate change are numerous and wide-ranging. Changes in temperatures and climate variability impact the environment and human health (United Nations Framework Convention on Climate Change, UNFCC, 2012)[1] and have significant economic impacts around the world (The Nature Conservancy, 2013). A number of recent, severe episodes related to climate change with clear economic implications were hurricane Sandy, which affected USA in 2012, and the typhoon Haiyan that caused more than 6,000 deaths in 2013 in the Philippines, as well as the cold wave sweeping the USA in 2014, with temperatures below 50º. In general terms, the economic sectors that are most affected by this global climate change process are agriculture, forestry, energy and tourism (European Commission, 2012). Recent research has also shown that while no clear action is taken to curb global carbon emissions, climate change impacts could cost between 5 up to 20% of the

[1] United Nations Framework Convention on Climate Change. (UNFCC) http://unfccc.int/files/documentation/text/html/list_search.php?what=keywords&val=&valan=a&anf=0&id=10

annual global gross domestic product of many countries (Hallegatte and Corfee-Morlot, 2011).

Due to these important economic and social consequences of climate change, a large number of policies have been developed around the world aimed at reducing the impact of such an important phenomenon. The most significant international agreement was the Kyoto Protocol, which came into effect in 2005. This treaty encouraged industrialized countries to stabilize emissions of greenhouse gases (GHG). However, and according to Schiermeier (2012), despite the existence of this protocol, global emissions have increased worldwide by 50% since 1990, a trend that has mainly been driven by the economic growth of China and other parts of Asia, South America and Africa. One of the main criticisms is that the Kyoto Protocol has not controlled for the free-rider problem, at the same time as having very few enforcement mechanisms (Helm, 2012).

Based on these considerations, climate change policies have become one of the major concerns and priorities around the world. However, and after many experimental policies and applications, one question remains unsolved: how should effective climate change policies be designed and articulated? This paper sheds light on the role of social norms on preferences (reflected by the willingness to pay [WTP]) for different types of climate control policies. These social factors are generally ignored in the architectural design of effective mitigation and adaptation strategies worldwide. In the following analysis, these factors have a strong explanatory power in terms of understanding acceptability and preferences towards climate change policies.

It should be acknowledged that in order for most climate change policies to be effective, behavioral changes have to take place, including a reduction of energy consumption, awareness of the issues, and a willingness to adopt (and pay) for newer and cleaner technologies. These strategies would go hand in hand with other mechanisms suggested by the UNEP (2009), such as promoting the construction of energy efficient buildings, sustainable transport, renewable energies, and the re-use of industrial and household wastes, among others. Therefore, understanding the role of social norms and the preferences of

decision-makers and end-users is crucial in the process of promoting acceptability for control policies (Pollit and Shaorshadze, 2011).

Given the need to articulate policies to combat the global climate change process, and based on the fact that most require a change in consumption or production technologies, our goal is to identify the type of actions that are most preferred and accepted by citizens, assessing how the public's support for these policies (expressed by willingness to pay (WTP) estimates) is affected by multiple causing factors, including the country's degree of development, the cultural importance of compliance with obligations and rules, time preferences and other social norms. The identification of these factors may allow us to provide policy recommendations to guide future actions in order to improve policy design and increase the public's acceptability of climate control policies.

The rest of the paper is organized as follows: Section 1.2 provides background information on the relationship between behavioral economics and climate change. Section 1.3 presents the data sources used to create the meta-data set; section 1.4 presents the econometric models and research hypotheses. Section 1.5 presents the results, and the paper concludes with the discussion and policy recommendations presented in Section 1.6.

1.2 BEHAVIORAL ECONOMICS AND CLIMATE CHANGE

Brekke and Johansson-Stenman (2008) highlighted the idea that climate change policies can be interpreted as a global public good, given that everyone can obtain benefits from them, while it is not possible to hinder or exclude others from enjoying their benefits. Traditional economic models consider that individuals are purely selfish in terms of consumption of public goods. However, Ostrom (2000) offered a theory against the selfishness hypothesis, concluding that there is a propensity to cooperate due to the growth of shared social norms. Bernheim and Rangel (2007) also support the idea of cooperation with the common goal, providing different views on human motivations. More recently, the field of behavioral economics has provided different explanations for specifically linking people's attitudes to the provision of public goods, showing the cognitive limitations of the traditional economic theory. In summary, studies from behavioral economics have shown that environmental

justice and social norms also affect individual decisions, and therefore should be taken into account in traditional economic models. Furthermore, it is useful to understand that people act in a social context.

In this sense, when dealing with an issue as important as climate change, individuals are influenced by values and beliefs shared in groups for which they feel a sense of belonging (Hoffman, 2011). Brekke and Johansson-Stenman (2008) suggested that what may be rational for a single country (or individual) in isolation is globally suboptimal. In this social setting, one of the problems that can appear is the free-rider problem, and based on this aspect, important concepts such as conditional cooperation, reciprocity, altruism and norms shared by groups come to the fore in the climate debate.

Also, Grothman and Patt (2005) concluded that in the analysis of adaptation policies, issues such as vulnerability and indicators of the perceived adaptive capacity are crucial when making predictions in terms of climate. They also point out the importance of the perception of risk, giving special attention to whether policies solely communicate risks, without giving adaptation options. This can lead towards people simply denying the risk, instead of taking actions that lead towards change.

Therefore, in order to improve the effectiveness of policies, it is very important to take into account social factors that can affect public opinion. Adger et al. (2009) indicate that some limits to adaptation policies are "endogenous to society" and that ethics, knowledge, risk and culture are important issues. More recently, Adger et al. (2013) highlighted that cultural dimensions are quite important, while it is likely that when cultural dimensions are ignored, policies will fail to be effective. For this reason, and due the importance of knowing how individuals assess the application of different programs and policies to combat climate change, we collected multiple valuation studies of preferences around the world and analyzed their results using a meta-regression analysis. We controlled for relevant factors such as traditional economic factors, as well as social norms and cultural values that have been often ignored.

1.3 DATA DESCRIPTION AND DATA TREATMENT

In this study we used a meta-analysis, a technique involving the statistical analysis of a large number of results from individual studies with the aim of combining the main conclusions (Glass et al. 1981; Barrio and Loureiro, 2010). According to Brouwer et al. (1999) this allows us to explain differences in outcomes found in single studies, taking into account the possible differences according to their characteristics, including factors such as the format of the questions or the measurements used. The benefits of this technique compared to qualitative analyses are that it does not prejudge the research results, and that it avoids a subjective weighting of studies in the interpretation of the findings (Brouwer et al. 1999). The potential disadvantages are a potential risk of bias selection of studies, and the possible existence of intra-study correlations between different observations from the same study (Wolf, 1986).

The data collection process and further analysis followed the recommendations of Nelson and Kennedy (2009) and Stanley et al. (2013). Due to the important heterogeneity of the climate control policies and programs in place, we classified them into three main types of actions: mitigation, adaptation or a mixture of both. For this purpose, we grouped the studies using the definitions used by the IPCC (IPCC, 2007)[2]. As a result, mitigation programs contain "*anthropogenic interventions to reduce the sources or enhance the sinks of greenhouse gases;*" while adaptation programs are defined as "*adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.*" Finally, the third type of programs is a mixture of both, containing mitigation and adaptation strategies.

Our data come from an intensive search of studies in different databases, including SCIENCEDIRECT, ECONLIT, and AGECONSEARCH. Specifically, we searched for studies that deal with climate change policies and report WTP estimates for the actions or policies analyzed. The keywords used in the search contained combinations of the terms "climate change," "mitigation", "willingness to pay", and "adaptation." Specifically, we

[2] This information can be found in Klein et al. (2007)

analyzed studies that promote actions to combat climate change[3]. We reviewed a total of 79 studies that estimate WTP to combat climate change through renewable energies, the reduction of emissions of different types of transportation (such as motor vehicles or aircraft), new cleaner products, reduction of energy dependency, support for the Kyoto protocol and deforestation programs, among others, since the 1990s. From these studies, 21 reported incomplete information or did not report WTP in comparable ways, and as a result were dropped from the final data set due to their large number of missing values[4]. It should be noted that in this application, the WTP analyzed were the average WTP estimates for climate change policies provided by each study for a sample of a given country. As a result, the final dataset used for this meta-analysis contained 58 studies from different countries[5]. In general, we found that most research on preferences towards climate change policies was carried out in America, representing more than 52.18% of the observations obtained, followed by Europe (34.15%), Asia (9.03%) and Oceania (4.64%). Moreover, it is important to take into account that most of the studies were from developed countries and higher income groups, as stated by Balderas et al. (2013), and as such, our results should not be directly generalized to the developing world. In some cases, we obtained multiple observations from a single study, with an average of 6.1 observations per study. The collected studies reported their results in different currencies ($US, €, etc.) and at different times. In order to homogenize all this information, valuations were converted to a standard currency, a monthly payment (expressed in Purchasing Power Parity Index (PPP)[6], $US 2012). We used the mean WTP instead of the median estimate as the dependent variable, as used in previous meta-analyses, due to the fact that only a few studies report mean and median estimates (Loomis and White, 1996; Smith and Osborne, 1996; Horowitz and McConnell, 2002). Table 1.1 summarizes the articles and papers from which the observations were collected.

[3] It is important to highlight that many studies value the replacement of traditional energy sources for green energy. However, we only took into account those that valued green energy as a means to combat climate change; or those that directly indicated the benefits of green energy in combating climate change to the respondents.

[4] The eliminated studies are Batley et al. (2001); Carlsson et al. (2013); Diedrich and Goeschl (2011); Farhar and Houston (1996); Jensen et al. (2010); Li et al. (2009); Li et al. (2004); Liao et al. (2010a); Markantonis and Bithas (2010); Mackerron et al. (2009); Mozumder et al. (2011); Oliver et al. (2011); Petrolia et al. (2010); Scarpa and Willis (2010); Strazzera et al. (2012); Willis et al. (2011); Wiser (2007); Zografakis et al. (2010); Zoric and Hrovatin (2012). Cameron and Gerdes (2007) and Cai et al. (2010) were also eliminated due to the lack of data for certain relevant variables.

[5] We have included all the WTP estimates provided for each paper with the aim not to bias the results.

[6] WTP estimates are first converted to dollars with the Purchasing Power Parity (PPP) published by the OECD (2012), and then converted to $2012 currency with the Consumer Price Index obtained from the US Department of Labor (2012).

Table 1.1 Studies included in the meta-analysis

Author/s	Nº obs	Publication year	Type of program	Type of policy	Country
Berk and Fovell	8	1998	disaster and heat wave prevention	mitigation	USA
Layton and Brown	12	2000	ecosystem base programs	adaptation	USA
Roe et al.	1	2001	green energy and high efficiency	mitigation	USA
Berrens et al.	13	2004	other programs	mitigation	USA
Nomura and Akai	3	2004	green energy and high efficiency	mitigation	Japan
Cameron, T.A	6	2005	disaster and heat wave prevention	mitigation	USA
Bergmann et al.	4	2006	ecosystem base programs	mitigation	UK
Viscussi and Zeckhauser	2	2006	disaster and heat wave prevention	adaptation	USA
Zhai et al.	7	2006	disaster and heat wave prevention	adaptation	Japan
Bigerna and Polinoni	3	2007	green energy and high efficiency	mitigation	Italy
Borchers et al.	19	2007	green energy and high efficiency	mitigation	USA
Duffy et al.	2	2007	green energy and high efficiency	mitigation	USA
Hidano and Kato	9	2007	other programs	both	Japan
Whitehead and Cherry	24	2007	green energy and high efficiency	mitigation	USA
Brouwer et al.	1	2008	ecosystem base programs	both	USA
Lee and Cameron	4	2008	other programs	mitigation	USA
Longo et al.	5	2008	green energy and high efficiency	mitigation	UK
Tseng and Chen	3	2008	ecosystem base programs	adaptation	China
Arigoni et al.	12	2009	disaster and heat wave prevention	adaptation	Brazil
Bollino	9	2009	green energy and high efficiency	mitigation	Italy
Cole and Brannlund	3	2009	green energy and high efficiency	mitigation	Sweden
Koundouri et al.	1	2009	green energy and high efficiency	mitigation	Greece
Rajmis et al	3	2009	ecosystem base programs	both	Germany
Soliño et al.	6	2009	green energy and high efficiency	mitigation	Spain
Solomon and Johnson	4	2009	green energy and high efficiency	mitigation	USA
Tseng et al.	2	2009	disaster and heat wave prevention	adaptation	China
Yoo and Kwak	2	2009	green energy and high efficiency	mitigation	Korea
Brännlund and Persson	10	2010	other programs	mitigation	Sweden
Carlsson et al.	9	2010	other programs	mitigation	China, Sweden, USA
Glenk and Fischer	5	2010	disaster and heat wave prevention	adaptation	UK
Hanemann, M. et al.	2	2010	green energy and high efficiency	mitigation	Spain
Kaczan et al.	12	2010	disaster and heat wave prevention	mitigation	Australia
Liao et al.	2	2010b	disaster and heat wave prevention	adaptation	China

Author/s	Nº obs	Publication year	Type of program	Type of policy	Country
Adaman et al	1	2011	green energy and high efficiency	mitigation	Turkey
Akter and Bennett	4	2011	other programs	mitigation	Australia
Chawla et al.	8	2011	disaster and heat wave prevention	adaptation	Switzerland
Chuen et al.	1	2011	disaster and heat wave prevention	adaptation	Malaysia
Hanemann et al.	1	2011	green energy and high efficiency	mitigation	Spain
Hidrue et al.	9	2011	green energy and high efficiency	mitigation	USA
Komarek et al.	24	2011	green energy and high efficiency	mitigation	USA
Layton and Levine	6	2011	ecosystem base programs	both	USA
Shih and Chou	4	2011	green energy and high efficiency	mitigation	USA
Susaeta et al.	5	2011	green energy and high efficiency	both	USA
Ward et al.	4	2011	green energy and high efficiency	mitigation	USA
Achtnicht	16	2012	green energy and high efficiency	mitigation	Germany
Aldy et al	1	2012	other programs	mitigation	USA
Botzen and van der bergh	3	2012	disaster and heat wave prevention	adaptation	Netherlands
Araña and León	3	2012	other programs	mitigation	Spain
Cicia et al.	7	2012	green energy and high efficiency	mitigation	Italy
Gracia et al.	5	2012	green energy and high efficiency	mitigation	Spain
Kraeusel and Möst	4	2012	green energy and high efficiency	mitigation	Germany
Longo et al.	9	2012	green energy and high efficiency	mitigation	Spain
Soliño et al.	8	2012	green energy and high efficiency	mitigation	Spain
Zhang et al.	2	2012	green energy and high efficiency	mitigation	China
Botzen et al.	2	2013	disaster and heat wave prevention	adaptation	Netherlands
Brouwer and Schaafsma	4	2013	disaster and heat wave prevention	adaptation	Netherlands
Kotchen et al.	6	2013	other programs	mitigation	USA
Mueller	21	2013	other programs	mitigation	USA

A regression technique outlined in the following section was used. Three different groups of explanatory variables were included in order to model preferences towards climate change adaptation and mitigation policies. First, we assessed the effect of the geo-physical conditions and site characteristics of the countries where the individual studies were conducted. To do so, we used the number of climatic disasters (*climatic disasters*) that occurred in each country when the study was conducted (The International Disaster Database, 2012). This database contains statistical information on extreme temperatures, droughts and wildfires. We expected

that this variable would have a positive coefficient as it represents the accumulated experience with respect to risky weather events. We also expected that this variable could be a proxy for the vulnerability that citizens may experience, something that has proved to be very relevant in other studies (Grothman and Patt, 2005).

The characteristics of the study are also important in order to explain differences in WTP related to methodological procedures. In this sense, we included the variable *face to face*, identifying studies where the survey was conducted in person. We also considered whether the survey was conducted by *telephone* instead of over the Internet, or by using a combination of different methods *(indirect).* Bowling (2005) states that survey modes can have different effects on the data collected. We also identified whether the respondents were households (*households*) or individuals. In a contingent valuation survey, Lindhjem and Navrud (2009) found that households provided higher WTP estimates than individuals. An additional important explanatory variable is the temporal length of the required payment to support the program or public policy valued. Therefore, we included an indicator reflecting whether the proposed payment was a one-time payment (*one-time*) or a monthly payment (*monthly*), instead of an annual payment. In the previous literature, shorter time periods have shown a positive effect on the acceptance of the proposed policies (Loomis and White, 1996; Aldy et al. 2012).

As previously stated, we specifically account for whether the program or action proposed was a mitigation program (*mitigation)* with respect to adaptation or a potential mix of both. Due to the wide variety of programs analyzed and in order to group the scattered observations, four categories were created that provide additional information. In particular, we included one variable reflecting whether the aim of the climate actions was to prevent disasters or to prevent heat waves (*disasters and heat wave prevention*). A second category contains all of the studies assessing preferences to reduce GHG emissions through green energies or promoting high efficiency products as fuels or appliances (*green energy and high efficiency*). An additional category contains studies assessing the protection of forests or animals and the use of forest resources as a measure to combat climate change (*ecosystem based programs*). Finally, we also included studies that proposed GHG emissions or the ratification of the Kyoto Protocol (*other programs*). In our analysis, we specifically identified

the issue of the payment vehicle. Brouwer et al. (1999) identified the effect of higher prices or taxes (*higher prices/taxes*), the establishment of a *new tax* or a *voluntary* contribution as payment mechanisms. Following previous meta-analyses, we also considered the effect of the year of publication (following Loomis and White (1996); Ojea and Loureiro (2011), among others). For this reason, we used a dummy variable to identify the studies published before 2009 (*before2009*), and also included the sample size of the studies. Specifically, we added a variable that identifies surveys conducted with less than 1000 individuals (*small sample*). Noonan (2003) also studied the effect of sample size, finding that the higher the number of respondents, the lower the WTP obtained. In addition, we considered the effect of the impact factor of the journal where the study was published (*impact factor*) in order to control for quality differences across estimates (Gallet, 2010). In this case, and in order to retain observations in our empirical analysis, we established a zero impact factor for studies that have not yet been published. Finally, we included an indicator denoting whether the purpose of the proposed program had a national or a local-regional scope (*local-regional).* Similar indicators were employed by Noonan (2003). With the aim of identifying the effects of the different valuation methods, we included two indicator variables controlling for whether choice experiments or other methodologies (field experiments, direct market prices, among others) were employed (*choice experiment*, *other methodology*), with the omitted category being the *contingent valuation* category. Florax et al. (2005) found that choice experiments provide lower estimates than contingent valuation.

Another group of variables included consists of the socio-economic characteristics of each specific country. We included a dummy variable identifying the degree of development of different countries. We expected that developing countries would have a lower ability to pay due to income restrictions, in comparison to developed countries. It is nevertheless important to take into account that due to income restrictions, these countries may have a higher willingness to regulate climate change externalities. This variable was collected from World Bank data (WB, 2013).

In this meta-regression we also considered additional context-type variables, as there are other important factors that should be taken into account in order to understand individual behavior, including personal and social norms (Viscusi et al. 2011). In order to consider these

effects, we included the societal political views, using a variable denoting whether the political party in power in each country at the time when each study was conducted was right wing (CIA, 2012) (*right wing*). This political orientation variable has been employed by several authors in order to evaluate climate policies,[7] concluding that people with left-wing tendencies have a higher WTP for environmental programs than those who have a more conservative view (Carlsson et al. 2010; Solomon and Johnson (2009); Wiser (2007); Berrens et al. (2004), among others). Furthermore, we included the percentage of individuals who do not consider it justifiable to cheat on personal taxes (*not cheating*) from the World Values Survey (2012). Using this variable, we expected to represent the relative importance of social trust and cooperation versus free-riding behavior on the contribution to public policies. We also used this database to analyze the role of citizens who affirm to be individualistic. This variable reflects the percentage of individuals in a country that agree with the following sentence "I see myself as an autonomous individual". Therefore, these people feel that they are not related to the society (*individualism*).

We also analyzed the effect of other cultural social norms, in the sense of values shared by society (McBreen et al. 2011). In particular, the influence of culture is crucial in terms of climate change (Adger et al. 2013). With the aim of analyzing the impact of these cultural effects, we used the indexes developed by Hofstede (2001) that measure the dimensions of national cultures in a globally comparable manner[8]. For this study, we only analyzed the effect of four of Hofstede's indexes. Specifically, the "*uncertainty avoidance*" index that represents "*the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity*". In addition, the "*long term versus short term orientation*" index. Hofsetede (2001) defines societies with long term orientation as those that *"show an ability to adapt traditions to changed conditions, a strong propensity to save and invest, thriftiness, and perseverance in achieving results."*

[7] More information on studies that consider these aspects can be found in Johnson and Nemet (2010).

[8] Hofstede conducted a study between 1967 and 1973 for IBM about cultural dimensions. Initially, this study contains four indexes: power distance, individualism versus collectivism, masculinity versus femininity and uncertainty avoidance. Then, in 1991 a new dimension was added, the long-term orientation, and in 2010 a sixth and seventh indexes were created, indulgence versus restraint and pragmatic versus normative. These indexes were built on a scale from 0 to 100. Each of these indexes only takes one value per country, not varying over time. In this regard the author indicates that "These relative scores have been proven to be quite stable over time."(http://geert-hofstede.com/national-culture.html)

The last two of Hofstede's indexes included are the "*masculinity versus femininity*" and "*indulgence versus restraint*" indexes. The first of them represents a "*preference in society for achievement, heroism, assertiveness and material reward for success*", while the "*indulgence versus restraint"* identifies an indulgence society as one *"that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms."*

We did not control for the rest of the indicators provided by Hofstede due to multicollinearity problems among those indexes. Specifically, we detected the presence of high correlation between the indicator *developing* and the "*power distance*" and *"individualism versus collectivism*" indexes, with a correlation coefficient higher than 0.75. Furthermore, with respect to the index "*pragmatic versus normative"* we detected a higher correlation with the he "*indulgence versus restraint*" index, with a coefficient of 0.78. Table 1.2 shows the description of the variables that were used and the respective summary statistics, and Figure 1.1 represents the distribution of these indexes across continents.[9].

SIDADE
NTIAGO
COMPOSTELA

[9] We do not include an income indicator in our regression due to the high correlation between this indicator and the Hofstede indexes. However, we include the indicator variable *developing*, which reflects income and vulnerability differences across countries.

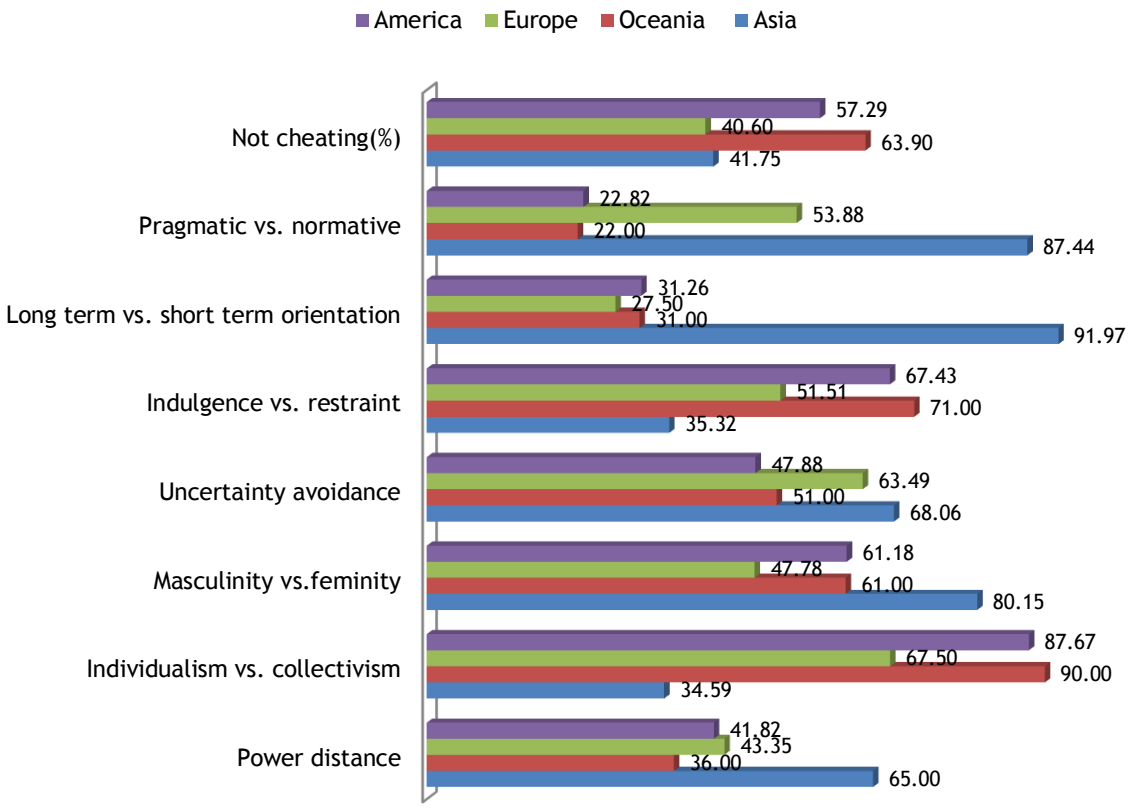
Table 1.2 Variable description and summary statistics

Variable	Description	Mean	Std. Dev.
Logwtp	Logarithm of the willingness to pay	1.410	0.817
	Country characteristics		
Climatic disasters	Number of climatic disasters per country and year studied	2.930	3.224
	Study characteristics		
Face to face	1, if the survey method was face- to-face; 0 otherwise	0.235	0.424
Telephone	1, if the survey method was by telephone; 0 otherwise	0.134	0.341
Indirect*	1, if the survey method was on-line or a combination of different methods; 0 otherwise	0.631	0.483
Households	1, if the respondent was a household; 0 otherwise	0.593	0.492
Individuals*	1, if the respondent was an individual; 0 otherwise	0.407	0.492
Mitigation	1, if the program proposed was a mitigation program; 0 otherwise	0.762	0.426
Adaptation*	1, if the program proposed was an adaptation program ; 0 otherwise	0.172	0.378
Both*	1, if the program proposed was a mixture of adaptation and mitigation program; 0 otherwise	0.065	0.248
One-time	1, if the payment was a one-time payment; 0 otherwise	0.095	0.294
Monthly	1, if the payment was a monthly payment; 0 otherwise	0.598	0.491
Annual*	1, if the payment was an annual payment; 0 otherwise	0.306	0.461
Impact factor	Impact factor of journal	1.878	2.124
Local-regional	1, if the program proposed to the population had a local or regional objective; 0 otherwise	0.423	0.495
National*	1, if the program proposed to the population had a national objective; 0 otherwise 0.	0.576	0.494
Higher prices/taxes	1, if the payment vehicle was higher prices or taxes; 0 otherwise	0.462	0.499
Voluntary	1, if the payment vehicle was a voluntary payment or a donation; 0 otherwise	0.098	0.298
New tax	1, if the payment vehicle was a tax; 0 otherwise	0.120	0.325
Premium*	1, if the payment vehicle was a premium; 0 otherwise	0.049	0.216
Fee*	1, if the payment vehicle was a fee; 0 otherwise	0.065	0.248
Other type of payment*	1, if the payment vehicle was not specified or it was another type ; 0 otherwise	0.139	0.347
Small sample	1, if the size of sample analyzed was less than 1000 surveys; 0 otherwise	0.669	0.471
Sample size-big*	1, if the size of sample analyzed was higher than 1000 surveys; 0 otherwise	0.331	0.471
Before 2009	1, if the study was published before 2009; 0 otherwise	0.462	0.499
Choice experiment	1, if the methodology employed was a choice experiment; 0 otherwise	0.450	0.498
Contingent valuation*	1, if the methodology employed was contingent valuation; 0 otherwise	0.494	0.501
Other methodology	1, if the methodology employed was market values, field experiments, among others; 0 otherwise	0.056	0.229
Disasters and heat wave prevention	1, if the program proposed had as objective to reduce the risk of disasters and to control climate variability; 0 otherwise	0.202	0.402
Ecosystem based programs	1, if the program proposed an ecosystem based approach; 0 otherwise	0.090	0.286
Green energy and high efficiency*	1, if the program proposed had as objective to reduce GHG emissions through green energy or fuels and appliances with high efficiency; 0 otherwise	0.519	0.500
Other programs	1, if the program proposed had as to reduce GHG emissions or to ratify the Kyoto Protocol; 0 otherwise	0.210	0.408

Variable	Description	Mean	Std. Dev.
	Socio-economic characteristics		
Developing countries	1, if the country studied was include in the developing countries classification; 0 otherwise	0.079	0.270
Right wind	1, if the country studied was governed by a right-wing political party in the year studied	0.497	0.501
Left wind*	1, if the country studied was governed by a left-wing political party in the year studied	0.502	0.500
Individualism	The % of people that agree with this sentence "I see myself as an autonomous individual"	67.407	16.288
Uncertainty avoidance**	"The uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact that the future can never be known: should we try to control the future or just let it happen? Countries exhibiting strong UAI maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviour and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles"	55.224	18.052
Masculinity versus femininity	"The masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness and material rewards for success. Society at large is more competitive. Its opposite, femininity, stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented"	58.357	17.189
Indulgence versus restraint	"Indulgence stands for a society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms"	59.169	14.73
Individualism versus collectivism	"The high side of this dimension, called individualism, can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. Its opposite, collectivism, represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we""	75.951	20.569
Power distance*	"This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. The fundamental issue here is how a society handles inequalities among people. People in societies exhibiting a large degree of power distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low power distance, people strive to equalise the distribution of power and demand justification for inequalities of power"	44.243	11.338
Long term versus short term orientation	The extent to which a society shows a pragmatic future-oriented perspective rather than a conventional historical short-term point of view	35.603	20.813
Pragmatic versus normative*	"This dimension describes how people in the past, as well as today, relate to the fact that so much that happens around us cannot be explained"	39.398	22.612
Not cheating	The percentage of citizens that do not justify cheating on taxes	50.715	24.972

***These are the omitted variables**These definitions are available at Hofstede (2012): http://geert-hofstede.com/dimensions.html

Figure 1.1 Social norms and cultural values per continent



1.4 MODEL SPECIFICATION AND RESEARCH HYPOTHESES

With the dataset described above, and in order to provide robust results, we estimated different meta-regression models. Our estimation strategy relied on first presenting a number of reduced form models or baseline models. These were then extended by including additional relevant variables, such as the role of social factors. First, we estimated an Ordinary Least Squares (OLS) and then a Robust OLS, with the aim of controlling for possible influential observations. Using the Szroeter (1978) test, we assessed the presence of heteroskedasticity, finding that the test carries a value of 1.79 for a Chi-squared with 1 degree of freedom and an associated p-value of 0.181. Therefore, we concluded that there is no evidence of this problem existing in our dataset. However, and due to the possible correlation between the variables of our dataset, and with the aim to check the robustness of our results, we also estimated a Generalized Least Squares (GLS) as well as a Random Effects model (RE) assuming the existence of both sampling error variability, and variability for each study included, in other words that intra-study variability and variability exists between the studies.

The dependent variable in our model is a vector of monetary values representing the preferences for the various programs proposed to correct climate change effects, labeled as log(WTP). The independent variables are grouped into the three previously-described categories that include the type of policy characteristics in X_{ci}; the study characteristics in X_{si} and the socio-economic characteristics of the study sample in X_{ei}. The model corresponds to the following equation:

$$\log(WTP_i) = \alpha + \beta_c X_{ci} + \beta_s X_{si} + \beta_e X_{ei} + \varepsilon_i \quad (1.1)$$

Where α is the constant term, the β vector contains the coefficients associated with the respective independent variables and ε is the vector of the error term for the OLS.

In order to test for the correct empirical specification used, we tested for the presence of multicollinearity through the Variance Inflation Factor (VIF) Indicator. Its corresponding mean value of 5.11 shows that there is no serious concern about multicollinearity. Furthermore, we looked at the functional form of our model, conducting a Box-Cox test. This test allowed us to assess the best empirical specification form through the transformation of the data to make the residual sum squares comparable. Specifically, we fit the model with the transformed dependent variable:

$$g(y_i, \theta) \equiv \frac{y_i^{\theta}}{\theta} = x_i \beta + \mu_i \quad (1.2)$$

where β and θ are estimated on the assumption that residuals follow a normal distribution. In this way, when the estimated θ is near 1, we should choose the linear specification, whereas if this value is near 0, the selected functional form should be a log specification. With our data, we obtained a value for $\hat{\theta} = -0.04$ (p-value= 0.003). Therefore, we employed a semi-log specification for the dependent variable[10]. We also conducted a

[10] When taking the log transformation of the dependent variable, we find some missing values (due to the present of zero values), but this question does not affect our analysis due to the small number of cases, and moreover, this procedure reduces the existence of outliers.

Grubbs test with the aim of assessing whether there are outliers, concluding that in our sample there is no presence of extreme values in the dependent variable.

1.4.1 Research Hypotheses

One of the interesting aspects of this paper is that it tests a set of hypotheses on the factors that can affect the WTP for climate change policies. Specifically, we focused our attention on two elements related to behavioural economics. The first issue concerns the question of individualism. We expected that individuals who feel like an autonomous individual (instead of an individual included in a society) would have a lower WTP for a social environmental policy. As previously mentioned, in the literature on climate change it is important to take into account that we are dealing with individuals, but also with groups. In this sense, members of a group are under greater pressure to do the "right thing" than those who think that they are autonomous. Cialdini and Goldstein (2004) stated "*if we engage in behaviors of which others approve, others will approve of us, too*". Otherwise, as previously indicated, climate change can be seen as a global public good and two types of behaviors can arise when facing public policies: free-rider and conditional cooperation. According to Gächter (2006), we should consider that an agent can obtain benefits from a public good, even if this agent has not contributed to the public good in question, and that therefore, everyone has an incentive to hope that others would contribute towards the public good.

In order to assess this expected effect, we tested the following hypothesis, with $\beta_{individualism}$ as the coefficient associated with the individualism variable. We expected this variable to have a negative impact on WTP:

$$H_0 : \beta_{individualism} \geq 0$$
$$H_1 : \beta_{individualism} < 0 \qquad (1.3)$$

Next, we studied the effect of the degree of compliance with taxes on societal policies. Specifically, by using the indicator *not cheating* we identify the percentage of individuals in a given country that do not justify cheating on taxes. We identified this indicator as a measure of the honesty of individuals. Lusk et al. (2007) concluded that more honest individuals are

unlikely to give untruthful responses. Therefore, we focused on testing whether their WTP is lower than those who do justify this behaviour. We identified the variable "*not cheating*" with the coefficient $\beta_{not\,cheating}$.

$$H_0 : \beta_{not\,cheating} \leq 0$$
$$H_1 : \beta_{not\,cheating} > 0 \qquad (1.4)$$

1.5 EMPIRICAL RESULTS

Following equation (1.1), and dropping the individual *i* subscripts for convenience, the empirical estimated model is:

$$\begin{aligned}\ln(WTP) = {} & \alpha + \beta_1 climatic disasters + \beta_2\, face\,to\,face + \beta_3 telephone + \beta_4 households \\ & + \beta_5 one\,time + \beta_6 monthly + \beta_7 mitigation + \beta_8 disasters\,and\,heat\,wave\,prevention \\ & + \beta_9 ecosytems based\,programs + \beta_{10} other\,programs + \beta_{11} higher\,prices\,/\,taxes + \beta_{12} new\,tax \\ & + \beta_{13} voluntary + \beta_{14} small\,sample + \beta_{15} before 2009 + \beta_{16} impact\;factor + \beta_{17} local\,regional \\ & + \beta_{18} choice\,experiment + \beta_{19} other\,methodology + \beta_{20} developing\,countries + \beta_{21} right\,wind \\ & + \beta_{22} not\,cheating + \beta_{23} uncertainty\,avoidance + \beta_{24} long\,term\,versus\,short\,term\,orientation \\ & + \beta_{25} masculinity\,versus\;feminity + \beta_{26} indulgence\,versus\,restraint + \beta_{27} individualism + \varepsilon,\end{aligned} \qquad (1.5)$$

With regard to the results, Tables 1.3 and 1.4 show the output of the baseline models, while Tables 1.5 and 1.6 show the results from the extended models. Overall, the models fit the data quite well with a R^2 of more than 50% for the baseline models and more than 60% for the extended models.

With respect to the results obtained, we will first examine in greater detail the results presented in Tables 1.3 and 1.4 that correspond to the baseline models. In the case of the geo-physical conditions, we found that citizens that have more accumulated experience with respect to risky weather events have a greater WTP. In terms of the study characteristics, we found that surveys conducted via telephone or face-to-face provide lower WTP estimates than those conducted via the Internet or using a combination of different methods (except in Robust OLS). With respect to the payment periodicity, citizens prefer a *one-time* payment instead of annual payments, meaning they prefer short payments in time. This result is in line

with the findings obtained by Loomis and White (1996). Another common result refers to the mode of payment: the results show that people prefer *higher prices/taxes* or the establishment of a *new tax* instead of other type of payments, such as donations, trust funds, etc. This result may be justified, given that the former are universal and avoid the free-rider problem. Brouwer et al. (1999) also found a positive coefficient for income taxes. With respect to the *journal impact factor*, we found that journals with higher impact factors tend to present lower WTP estimates. In addition, attending to the effect of the different methodologies used, we concluded that a *choice experiment* or *other methodology* provide lower estimates than the omitted variable (*contingent valuation*) (the same result was obtained by Florax et al. (2005)). Focusing our attention on the type of programs proposed with the aim of combating climate change, we concluded that *mitigation* programs are preferred over adaptation programs, or even over a policy mix, as observable in Tables 1.3 and 1.4, where the indicator corresponding with the *mitigation* policy is positive and statistically significant over the omitted variable (*adaptation* or a mix of both). These findings may be considered in the future in terms of policy design. Furthermore, people are more likely to pay for programs and policies designed to avoid disasters or to reduce heat waves (*disasters and heat waves prevention*) instead of supporting programs to promote green energies.

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Table 1.3 Baseline meta regression results (1)

	OLS			Robust OLS		
LogWTP	Coefficient	Std. Err.	P>|t|	Coefficient	Std. Err.	P>|t|
	Geo-physical conditions					
Climatic disasters	0.114	0.014	0.000	0.114	0.014	0.000
	Characteristics of study					
Face to face	-0.170	0.092	0.066	-0.170	0.113	0.136
Telephone	-0.455	0.133	0.001	-0.455	0.133	0.001
Households	0.002	0.086	0.978	0.002	0.103	0.982
One time	1.011	0.143	0.000	1.011	0.141	0.000
Monthly	0.093	0.087	0.289	0.093	0.115	0.421
Mitigation	0.418	0.119	0.001	0.418	0.127	0.001
Disasters and heat wave prevention	0.837	0.111	0.000	0.837	0.108	0.000
Other programs	0.040	0.103	0.698	0.040	0.101	0.691
Ecosystem based programs	0.222	0.153	0.149	0.222	0.165	0.181
Higher prices/taxes	0.729	0.090	0.000	0.729	0.118	0.000
New tax	0.346	0.132	0.009	0.346	0.144	0.017
Voluntary	-0.141	0.145	0.332	-0.141	0.122	0.250
Small sample	0.091	0.087	0.296	0.091	0.086	0.291
Before 2009	-0.400	0.080	0.000	-0.400	0.089	0.000
Impact factor	-0.051	0.014	0.000	-0.051	0.016	0.001
Local-regional	0.056	0.074	0.446	0.056	0.078	0.473
Choice experiment	-0.524	0.080	0.000	-0.524	0.082	0.000
Other methodology	-0.652	0.155	0.000	-0.652	0.130	0.000
Constant	0.619	0.169	0.000	0.619	0.174	0.000
N	366			366		
F	23.120			41.380		
Prob > F	0.000			0.000		
Adjusted R2	0.535			0.559		
Root MSE	0.557			0.557		

Table 1.4 Baseline meta regression results (2)

	Random Effects			GLS		
LogWTP	**Coefficient**	**Std. Err.**	**P>|t|**	**Coefficient**	**Std. Err.**	**P>|t|**
	Geo-physical conditions					
Climatic disasters	0.114	0.014	0.000	0.114	0.013	0.000
	Characteristics of study					
Face to face	-0.170	0.092	0.065	-0.170	0.089	0.058
Telephone	-0.455	0.133	0.001	-0.455	0.129	0.000
Households	0.002	0.086	0.978	0.002	0.083	0.977
One time	1.011	0.143	0.000	1.011	0.139	0.000
Monthly	0.093	0.087	0.288	0.093	0.085	0.275
Mitigation	0.418	0.119	0.000	0.418	0.116	0.000
Disasters and heat wave prevention	0.837	0.111	0.000	0.837	0.108	0.000
Other programs	0.040	0.103	0.697	0.040	0.100	0.689
Ecosystem based programs	0.222	0.153	0.148	0.222	0.149	0.137
Higher prices/taxes	0.729	0.090	0.000	0.729	0.088	0.000
New tax	0.346	0.132	0.009	0.346	0.128	0.007
Voluntary	-0.141	0.145	0.331	-0.141	0.141	0.317
Small sample	0.091	0.087	0.296	0.091	0.084	0.282
Before 2009	-0.400	0.080	0.000	-0.400	0.078	0.000
Impact factor	-0.051	0.014	0.000	-0.051	0.014	0.000
Local-regional	0.056	0.074	0.445	0.056	0.072	0.433
Choice experiment	-0.524	0.080	0.000	-0.524	0.078	0.000
Other methodology	-0.652	0.155	0.000	-0.652	0.151	0.000
Constant	0.619	0.169	0.000	0.619	0.164	0.000
σ_μ	0.000					
σ_ε	0.502					
ρ	0.000					
N	366			366		
Log restricted-likelihood				-294.719		
Wald	439.350			464.750		
Prob > Chi2	0.000			0.000		

We reached similar conclusions when considering the extended models (Tables 1.5 and 1.6), although we did observe that the *face to face* and *new tax* indicators are not statistically significant. In addition, we found that the *monthly* indicator is significant at the 10% confidence level depending on the estimated model. Moreover, we also concluded that *ecosystem based programs* are statistically significant, and so individuals also prefer programs that assess the protection of forests or animals and the use of forest resources as a measure to combat climate change.

However, depending on the estimated models, our results varied slightly with respect to the effect of some variables. Specifically, in the extended models we analyzed the role played by the socio-economic variables, finding that the *developing* countries indicator had a negative and statistically significant effect on WTP. As expected, this suggests that people in these countries are less willing to pay to combat climate change, probably due to their income restrictions. It is important to highlight that this result does not mean that poor countries value less the problem of climate change, rather they do not have a purchasing power comparable to developed countries. We also observed that studies conducted in countries with a right-wing political orientation result in lower WTPs than those from countries with a left-wing government, as indicated in previous studies (Carlsson et al. 2010).

Finally, considering the Hofstede indexes, we concluded that the indicator of *long term vs. short term orientation* is statistically significant, and always has a positive coefficient. This result may be explained by the fact that countries that plan more on a long-term basis have a larger WTP to fight climate change. Finally, the *masculinity vs. feminity* index is statistically significant, showing that societies in which masculinity is high are less willing to pay than their counterparts. In this case, some previous studies found that women are usually more egalitarian than men (Eckel and Grossman, 1998; List, 2004, among others).

In conclusion, and with respect to the research hypotheses, the *individualism* indicator carries a negative coefficient, as would be expected. Therefore, countries with more individualistic individuals have a lower WTP for public climate control policies. This can be a consequence of these citizens not feeling any pressure to behave as members of a group, and that as a result they are not conditioned by other individuals will think of them. In addition, and with respect to the second hypothesis, we found a negative relationship between the percentages of citizens who do not justify cheating on taxes (*not cheating*) with the reported WTP for climate change. This may an indication of the fact that honest individuals (or those with strong personal norms) are more likely to respond in a sincere way to surveys, providing lower WTPs.

Table 1.5 Extended meta regression results (1)

	OLS			Robust OLS		
LogWTP	Coefficient	Std.Err.	P>|t|	Coefficient	Std.Err.	P>|t|
Geo-physical conditions						
Climatic disasters	0.105	0.022	0.000	0.105	0.024	0.000
Characteristics of study						
Face to face	-0.122	0.095	0.200	-0.122	0.112	0.279
Telephone	-0.704	0.138	0.000	-0.704	0.149	0.000
Households	-0.045	0.096	0.639	-0.045	0.095	0.635
One time	1.193	0.140	0.000	1.193	0.155	0.000
Monthly	0.165	0.097	0.090	0.165	0.122	0.176
Mitigation	0.299	0.147	0.042	0.299	0.131	0.023
Disasters and heat wave prevention	0.844	0.126	0.000	0.844	0.130	0.000
Other programs	-0.121	0.103	0.243	-0.121	0.119	0.310
Ecosystem based programs	0.379	0.182	0.038	0.379	0.186	0.042
Higher prices/taxes	0.479	0.098	0.000	0.479	0.147	0.001
New tax	0.167	0.139	0.233	0.167	0.195	0.393
Voluntary	0.156	0.167	0.349	0.156	0.179	0.383
Small sample	-0.005	0.097	0.956	-0.005	0.119	0.965
Before 2009	-0.246	0.113	0.030	-0.246	0.159	0.123
Impact factor	-0.036	0.013	0.007	-0.036	0.008	0.000
Local-regional	-0.012	0.079	0.883	-0.012	0.093	0.901
Choice experiment	-0.538	0.092	0.000	-0.538	0.075	0.000
Other methodology	-0.627	0.176	0.000	-0.627	0.213	0.003
Socio-economic characteristics						
Developing countries	-1.497	0.432	0.001	-1.497	0.407	0.000
Right wing	-0.387	0.098	0.000	-0.387	0.124	0.002
Not cheating	-0.005	0.002	0.002	-0.005	0.002	0.032
Uncertainty avoidance	0.000	0.003	0.962	0.000	0.004	0.973
Long-term versus short-term orientation	0.011	0.006	0.041	0.011	0.005	0.019
Masculinity versus femininity	-0.015	0.005	0.003	-0.015	0.004	0.000
Indulgence versus restraint	0.002	0.004	0.654	0.002	0.005	0.666
Individualism	-0.012	0.004	0.002	-0.012	0.004	0.003
Constant	2.586	0.654	0.000	2.586	0.839	0.002
N	342			342		
F	24.400			40.910		
Prob > F	0.000			0.000		
Adjusted R^2	0.650			0.677		
Root MSE	0.479			0.479		

Table 1.6 Extended meta regression results (2)

	Random Effects			GLS		
LogWTP	Coefficient	Std.Err.	P>|t|	Coefficient	Std.Err.	P>|t|
Geo-physical conditions						
Climatic disasters	0.105	0.022	0.000	0.105	0.021	0.000
Characteristics of study						
Face to face	-0.122	0.095	0.199	-0.122	0.091	0.180
Telephone	-0.704	0.138	0.000	-0.704	0.132	0.000
Households	-0.045	0.096	0.639	-0.045	0.092	0.624
One time	1.193	0.140	0.000	1.193	0.135	0.000
Monthly	0.165	0.097	0.089	0.165	0.093	0.076
Mitigation	0.299	0.147	0.041	0.299	0.141	0.033
Disasters and heat wave prevention	0.844	0.126	0.000	0.844	0.121	0.000
Other programs	-0.121	0.103	0.242	-0.121	0.099	0.222
Ecosystem based programs	0.379	0.182	0.037	0.379	0.175	0.030
Higher prices/taxes	0.479	0.098	0.000	0.479	0.094	0.000
New tax	0.167	0.139	0.232	0.167	0.134	0.212
Voluntary	0.156	0.167	0.348	0.156	0.160	0.327
Small sample	-0.005	0.097	0.956	-0.005	0.093	0.955
Before 2009	-0.246	0.113	0.029	-0.246	0.108	0.023
Impact factor	-0.036	0.013	0.006	-0.036	0.013	0.004
Local-regional	-0.012	0.079	0.883	-0.012	0.076	0.878
Choice experiment	-0.538	0.092	0.000	-0.538	0.088	0.000
Other methodology	-0.627	0.176	0.000	-0.627	0.168	0.000
Socio-economic characteristics						
Developing countries	-1.497	0.432	0.001	-1.497	0.414	0.000
Right wing	-0.387	0.098	0.000	-0.387	0.094	0.000
Not cheating	-0.005	0.002	0.001	-0.005	0.001	0.001
Uncertainty avoidance	0.000	0.003	0.962	0.000	0.003	0.960
Long-term versus short-term orientation	0.011	0.006	0.040	0.011	0.005	0.032
Masculinity versus femininity	-0.015	0.005	0.002	-0.015	0.005	0.002
Indulgence versus restraint	0.002	0.004	0.654	0.002	0.004	0.640
Individualism	-0.012	0.004	0.002	-0.012	0.004	0.001
Constant	2.586	0.654	0.000	2.586	0.627	0.000
σ_μ		0.000				
σ_ε		0.423				
ρ		0.000				
N	342			342		
Log restricted-likelihood				-219.056		
Wald	658.870			717.620		
$\text{Prob}>\chi^2$	0.000			0.000		

1.6 CONCLUSIONS

The present study has provided an analysis of existing literature on preferences and of WTP for climate change mitigation and adaptation policies through a meta-regression, offering a summary of the most important results. We acknowledge, however, that other lenses and moral aspects could be used in order to understand social preferences for climate policies.

The main aim of this paper is to contribute towards identifying the main determining factors of climate change policies. We collected information from 58 studies around the world, finding results that can be useful in terms of policy design in order to increase the acceptance and compliance of public climate control policies. We acknowledge that the vast majority of our study sample is skewed toward the developed world, and have controlled for this issue in the estimated models.

There are important lessons from this previous analysis that should be taken into account when designing effective policies to control climate change. Overall, our results show that mitigation actions are preferred over adaptation actions. In addition, policies should encourage the prevention of disasters and heat waves to combat climate change (*disasters and heat wave prevention*) in order to be more preferable. It is also important to note that economic conditions definitely play a role in terms of supporting efforts to combat climate change, and that in developing countries, there is less willingness to pay for climate control policies, however, this does not mean that poor countries value less the climate change problem. Nevertheless, it is important to note that this may imply that these societies may be more willing to regulate by using other mechanisms that do not require higher prices to be paid for goods or services. Also, in terms of time preferences, studies conducted in countries with a significantly long-term orientation have a higher WTP for climate change policies. These policies may be perceived as insurance towards future catastrophic events.

We therefore believe that future studies should consider this set of initial findings in order to articulate more acceptable policies around the world in terms of climate change control. In this sense, particularly important factors are the roles of social norms and perceived risks,

ceteris paribus. It is important to take into account that there are other mechanisms to combat climate change, such as improved efficiency and infrastructures, which are not evaluated in the current set of studies. Here we have analyzed the acceptability in terms of willingness to pay for programs that require an economic sacrifice by consumers.

In conclusion, a relevant finding of our work is that cultural and social dimensions are relevant in promoting the acceptability of climate change policies, as shown in the present analysis. We believe that these cultural and social norm dimensions may be reinforced by promoting informational campaigns in order to raise awareness amongst the public. This would make it possible to generate a solid body of knowledge that would be useful in increasing resilience towards extreme events, and a better use and management of energy and resources in general. Unfortunately, statistical data are very limited in order to reflect and empirically test the importance of environmental awareness at international levels. Future efforts should focus on collecting comparable data at international level in order to better understand the social norms and cultural backgrounds of societies. These data may become very useful and relevant in understanding support towards certain public policies and cooperative behaviors.

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CHAPTER 2

FARMERS' PREFERENCES AND SOCIAL CAPITAL REGARDING AGRI-ENVIRONMENTAL SCHEMES TO PROTECT BIRDS

2. FARMERS' PREFERENCES AND SOCIAL CAPITAL REGARDING AGRI-ENVIRONMENTAL SCHEMES TO PROTECT BIRDS

Abstract

The steady decline of birds living in cereal steppe lands is a worrying situation that the European Common Agricultural Policy is attempting to remedy through the application of agri-environmental schemes (AES). We assess farmers' preferences towards these AES, which call for a number of environmental practices to protect birds. Using a face-to-face survey in farming communities in Aragón (Spain), and through the estimation of an Ordered Logit model (OL), we assess the ranking of AES attributes, and obtain their economic valuation according to the farmers' preferences. We find that social factors are also important in determining farmers' decisions. In particular, the importance of social trust and expectation of compliance by other neighbors encourage farmers to sign up to AES. These and other results may be used to design more effective AES and help to solve this important biodiversity problem.

2.1 INTRODUCTION

In recent years, bird communities living on cereal steppes in the north east of Spain have experienced a steady decline. Currently, these birds are classified in some regional communities, such as Aragón, as endangered species (Gobierno de Aragón, 2012a). Several factors aggravate this situation, including especially: changes in harvesting technologies, using techniques that are more intensive and detrimental for birds; reduction of cropping areas because of abandonment (Plieninger et al. 2013) or conversion to other uses, leaving less food and habitat available for cereal steppe birds (SEO/Birdlife, 2012). Spain is one of the countries in Europe with the largest number of bird species (Fundación Biodiversidad, 2009) with, for example, three-quarters of the world's population of bustards (*Otis tarda*) found in Spain. Of 580 different species, this source notes that around one quarter are threatened or endangered, representing more than 45% of the total in Spain. This is a worrying situation,

and reflects the state of the ecosystems that are essential to maintain a rich diversity of bird species. The European Commission (2014a) also notes that birds are a good indicator of the diversity and integrity of ecosystems. For example, Nguyen (2007) used the bird community composition to evaluate the forest disturbance in areas of Mexico.

To counter this threat to bird biodiversity, and based on the programs developed by Rural Development Program under the fund FEADER for the period 2007-2013, most Autonomous Communities in Spain with Special Protection Areas for birds (SPAs) have applied agri-environmental schemes (AES) to protect endangered bird communities. These measures provide payments to farmers who voluntarily agree to carry out farming practices over a five-year period to protect and preserve bird habitats. Farmers who enter into this agreement have to implement measures to promote the breeding and feeding of birds in rainfed arable land. As compensation, an agri-environmental payment is provided to cover the extra costs derived from fulfilling the contractual requirements as examples of payments for environmental services (PES) (Baylis et al. 2008).

At present, these AES have a number of general requirements, with specific conditions that vary from region to region. In Spain, these contracts require fallow land to be left untouched in order to create and support refuge areas that benefit certain species of birds. There is also a condition that establishes a crop rotation to create a diverse and rich structure of plants and invertebrates, together with the obligation to cultivate fodder or green crops that provide habitat and food for birds. In addition, there are two other contractual requirements: to create and to maintain boundaries to provide food and refuge areas for birds; to restrict harvesting or ploughing until the birds' reproductive cycle is complete (SEO/Birdlife, 2012).

These AES require that farmers change the way they manage their farms in order to preserve the biological diversity associated with agricultural systems (Carricondo et al. 2012). Although AES have been implemented for the last 15 years, bird populations continue to decline and the agricultural systems on which they depend continue to suffer from processes of abandonment, intensification or transformation (SEO/Birdlife, 2012). However, we cannot assert that these measures have failed without some knowledge of the counterfactual, though Carricondo et al. (2012) note that in Aragón the percentage of desirable practices included in

AES is below the average (36%), implying that AES may be not optimally designed for bird protection in this area. These authors suggest that in some Spanish regions, such as Catalonia, the success has been higher than in our study area, despite the high degree of local participation in these AES contracts by farmers in Aragón. We offer some suggestions to improve the effectiveness of these measures; including a focus on areas where there are stronger social relations and the protection of these birds is important, and the use of economic payments that take into account both the productive diversity of each area, and preferences towards participation. Since land abandonment is one of the main factors threating this pseudo-steppe ecosystem, it is important to seek a balance between favourable practices and the economic viability of farms, and also to involve and engage the farming community. Therefore, we analyse farmers' preferences, focusing on the role of social factors and farmers' valuation of AES requirements and other contract conditions.

To do so, we conducted a survey in the region of Aragón, which included a choice experiment (CE) exercise. This methodology has been used successfully in different studies (Adamowicz et al. (1994); Boxall et al. (1996); Roessler et al. (2008)). Specifically, and with respect to agri-environmental measures, CE have been used in a range of contexts by Ruto and Garrod (2009), Espinosa-Goded et al. (2010), Christensen et al. (2011), Broch and Vedel (2012) and Kuhfuss et al. (2013).

The remainder of the paper is organized as follows: Section 2.2 presents a short review of the literature on famers' preferences and the description of CE; section 2.3 analyses the effect of social capital and economic incentives, while Section 2.4 contains the survey description and data. The empirical modelling strategy is described in section 2.5, while Section 2.6 presents the results and the welfare estimates. Section 2.7 concludes.

2.2 FARMERS' PREFERENCES FOR AES

Few studies have focused their attention on understanding farmers' preferences towards agri-environmental measures. Earlier studies, such as those by Wynn et al. (2001) and Vanslembrouck et al. (2002), refer to the important role of considering the characteristics of the required practices, finding that the flexibility of the proposed contracts is one of the most

important and valued characteristics (Wynn et al. 2001). Ruto and Garrod (2009) analyse how policy makers can make variations in AES characteristics to increase the likelihood of enrolment. They show that farmers prefer short-term contracts and have positive preferences for the attribute that reflects the flexibility over which areas of the farm enter into the scheme. In Spain, Espinosa-Goded et al. (2010) investigated farmers' preferences for different contract options, concluding that they have a strong preference for maintaining their current management strategies; however, they also suggest that participation can be increased by modifying certain attributes of the AES. Christensen et al. (2011) explored how to improve existing agri-environmental subsidies, finding that farmers are willing to trade off contractual obligations against the size of the payment. Broch and Vedel (2012) look at the regulatory aspects of AES, specifically analysing the preference heterogeneity in order to improve policies. They include the likelihood of monitoring as one of the contractual characteristics, finding that this increases the level of compensation that farmers would like to receive (€38 per 1 point increase in the likelihood of monitoring). This happens even for those who have a positive attitude towards monitoring. Kuhfuss et al. (2013) address the low degree of participation by French farmers in AES designed to reduce the use of pesticides, and note especially that the reasons that farmers enroll in AES are heterogeneous. They go beyond the individual costs and benefits of participation to consider the collective dimension of these measures by introducing a collective incentive, a monetary bonus paid per hectare enrolled conditional on a 50% participation rate among local farmers. They conclude that introducing the collective dimension enhances the efficiency of schemes, providing that farmers believe that the threshold (50%) can be achieved. In this respect, Parkhurst et al. (2002) analyze the role of an agglomeration bonus; this is an economic incentive that pays an extra bonus in order to maximize habitat protection and at the same time minimizes landowner effects. In addition, it also incentives non-cooperative individuals.

Nevertheless, little attention has been paid to the role that social dimensions may play in farmers' preferences. As Pretty and Smith (2004) note, economic incentives are important, but sometimes not enough to achieve a certain goal. Therefore, our focus is on famers' preferences and to the extent to which they are influenced by economic incentives and social factors.

2.2.1 The choice experiment (CE)

We use a choice experiment (CE) to study farmers' preferences. Farmers were invited to rank two types of agri-environmental contracts with the same attributes, but at different levels. In each choice experiment task, as a third option, farmers were also given the *status quo* option of declining both experimental contracts, and thus decline to participate in the AES designed to protect cereal steppe birds. To select the appropriate attributes, we reviewed the literature and carried out a focus group and pre-test, where a valuation of the different proposed attributes was included.

Table 2.1 contains a detailed description of the attributes and levels included in the choice experiment. These were selected considering the results of the focus group and pre-test.

Table 2.1 Attributes and respective levels

Attributes	Description	Levels			
Payment	Compensation rate (euros per ha crop).	30€/ha	60€/ha	90€/ha	120€/ha
Flexibility	The freedom to decide how much of the total area enrolled in the contract can be excluded without penalty each year after contract agreement. A maximum of 40% can be excluded.	0%	40%		
Fine	Amount of money to be paid if the farmer is caught cheating (in addition to the return of the payment). It will be applied for any infringement of the law[1].	0€/ha	200€/ha		
Cultivate	Obligation to include alfalfa or sainfoin in a variable percentage of the crop area.	0%	20%		
Restriction	Prohibition of working in fallow lands in some months of the year in order to allow nests.	No restrictions	April 1st to August 1st		

There are also a number of further requirements that are constant across contracts requirements and consequently not included in the CE but that they are explained to participants before make their decision about contracts. For example, the cereal stubble must be kept until 31st December, while leaving overwinter stubbles in at least 50% of the land. Also, the use of pesticides in the non-cultivation period is not allowed in any of these contracts. These additional requirements are constant for all contracts, and consequently, not

[1] A fine with almost double of the top compensation rate was designed so that the net payment per ha is negative, in the case of infrigement.

included as attributes of the CE. The attributes are similar to those of the contracts already available, with the exception of the fine, which is proposed as a novelty.

Table 2.2 contains a summary of the perceptions of farmers towards the attributes, where we can see that the payment is the most highly considered (74% of the respondents).

Table 2.2 Valuation of proposed attributes for the total sample (%)

Characteristics	Stated Consideration Level				
	I do not consider it	I do not consider it much	I consider it somewhat	I consider it a lot	This is what I consider the most
Payment	0.57	1.15	4.58	20.06	73.6
Flexibility	9.48	19.25	33.33	30.75	7.18
Fine	26.72	33.91	21.55	13.22	4.6
Cultivate	23.92	34.29	25.07	12.97	3.46
Restriction	15.03	25.43	33.82	19.08	6.65

All of the attributes entered the choice set at two levels, except the payment attribute at four levels. We chose these levels to help the farmers taking part to understand the survey, as they were relatively elderly (mean age=56[2]). From the total number of possible combinations of the attribute levels we selected eight profiles to obtain suitable pairs. We used a generator following Street and Burgess (2007), designed for four attributes with two levels and one attribute with four levels and two alternatives, and obtained a choice of eight pairs with 97.6% efficiency relative to the optimal design, estimating only main effects. We also randomly split the total number of choices into two sets, to reduce the number of choice sets per individual (An example of the choice set is shown in Table 2.3).

Table 2.3 Example of a choice set presented in the survey

CHARACTERISTICS OF CONTRACT	Contract A	Contract B	Does not endorse any contract for bird protection
Payment	120€/ha	30€/ha	
Flexibility	40%	0%	
Fine	0€/ha	200€/ha	
Cultivate	0%	20%	
Restriction	April 1 to August 1	No restrictions	
Which contract do you select? Indicate 1 = most preferred, 2 = average, 3 = least preferred			

[2] According to Gobierno de Aragón (2012b), 20.05% of the population is older than 65 years. The aging process is more prominent in farming areas.

2.3 THE EFFECT OF SOCIAL CAPITAL AND ECONOMIC INCENTIVES

Behavioural economics and social psychology have shown that the utility level of individuals depends not only on their absolute level of wealth, but also on how individuals compare themselves with others and how they evaluate their position in the social groups to which they belong (Kuhfuss et al. 2013). Polman and Slangen (2008) analysed the likelihood of enrolling in agri-environmental schemes, showing that AES based only on farm and farmer characteristics is incomplete since it neglects the effects of motivational issues and social capital.

We analyse farmers' preferences taking into account contract requirements and conditions, but also assess how social capital influences their decisions. Several studies, for example Coleman (1990) and Putnam (1993, 1995, and 2000), conclude that social capital is related to positive outcomes which facilitate cooperation and coordination. Specifically, with respect to natural resource management, Richter and Grasman (2013) highlight the importance of social capital while Pretty and Smith (2004) define social capital as social bonds and norms, highlighting the role that this aspect plays "in collective management programs at different scales". Four components of social capital have been defined by Pretty and Ward (2001): 1) the relations of trust; 2) relations of reciprocity and exchange; 3) common rules, norms and sanctions within the community; 4) the connectedness in networks and groups. Similarly, Halkos and Jones (2012) suggest that the most important elements of social capital are social trust, institutional trust, social norms and social networks. In this sense, relations of trust may reduce the transaction costs and at the same time establish social obligations. Relations of reciprocity and exchange can also create trust, although trust can be easily broken (Pretty and Smith, 2004). In our case, we note that common rules reinforce group interests, whilst sanctions punish those who break the rules.

Apart from social factors, we also analyse the role of economic incentives and the potential for of free-riding behaviour and moral hazard. In addition to the establishment of the economic payment as a compensation for the fulfilment of certain requirements, the proposed contracts also include a fine to reinforce compliance with the requirements established by the AES. In addition, this fine is associated with a likelihood of monitoring of 5% (similar to the practice in past contracts, European Commision, 2014b). Hart and Latacz-Lohman (2005) and Ozanne and White (2008) have studied moral hazard through the effect of monitoring and

compliance in AES, showing that these contracts should be reinforced with monitoring. In the reviewed literature, only Broch and Vedel (2012) study the implications of monitoring. However, and as the probability of monitoring nowadays is regulated and fixed at a 5% level, our novelty is the introduction of the fine to reinforce a sustainable behaviour.

As a hypothesis, we analyse whether social trust can serve as an incentive to reinforce the effect of a fine. Laffont and Martimort (2001) stressed that social behaviour and cultural norms play an important role in societies, although it is also important to recognize the power of individuals' interests. Incentive compatibility constraints and moral hazards are important, and there is a potential for farmers to participate in the AES, but fail to comply with the conditions. To counter this potential, we include the likelihood of monitoring and the fine as ways of controlling their behaviour. Laffont and Martimort (2001) state that monitoring and penalties are costly to implement, while such penalties have a limited effect depending on participants' total assets. We test whether social trust can reinforce the effect of an economic penalty.

To obtain this indicator we questioned farmers directly about whether their neighbors' are likely to fulfil the contract requirements, with a 5-point scale (1 for "no compliance at all" and 5 for "compliance at 100% level"). We then constructed a dummy variable that identifies social trust if the respondent believes that their neighbors are complying at the 100% level (69% of respondents think that their neighbors will comply). We expect that farmers who trust their neighbors' efforts to fulfil their contracts, positively value the existence of a fine, and therefore, the presence of this attribute increases their utility level. Previous literature has suggested that individuals tend to behave in the same way as others, for example, Papyrina (2012) suggests that people prefer to conform to other members of their groups, and Cialdini and Goldstein (2004) stated "*if we engage in behaviours of which others approve, others will approve of us, too*". In the case of deviation, farmers may also see the penalty as fair. Fehr and Gächter (2002) elaborate the idea of altruistic punishment. This is characterized by the fact that individuals sometimes punish others, although the punishment may be costly for them. Therefore, we expect a positive coefficient for this cross-product. In order to properly understand the role played by the contract attributes, we assume that farmers select contracts

that on average are expected to be comparable with those selected by other participants of the same group.

In addition, we also analyse the effect of institutional trust that reflects the degree of deterrence and the effect of the fine. The *institutional trust* measure was obtained from a question formulated in order to discover the opinion about the likelihood of being caught and penalized if somebody infringes the established contractual rules (48% of farmers think that the likelihood of being caught and penalized is high or very high). We expect that farmers who believe that institutions will monitor their behaviour (i.e. high institutional trust) will value the fine as superfluous, and as an unnecessary cost; i.e. in a more negative way. The main reason is that institutional trust can act as a mean of deterrence.

Although social capital also includes the relationships of reciprocity or exchange, we were not able to analyse this aspect due to the lack of specific data. The fourth component is the connectedness in groups; Pretty and Smith (2004) highlight three types of relations proposed by Woolcock (2001): are links between people with similar objectives (bonding); the capacity of groups to make links with others that may have different views (bridging); the ability of groups to engage vertically with external agencies (linking types of social capital). We include these characteristics in our empirical modeling strategy aiming to analyse their role on farmers' decisions.

Specifically, we employ a *trade union* membership variable as an indicator of social networks. We expect that farmers who are members of a trade union (bridging relations) to value the *fine* more positively than their counterparts, as a protection of the interests of their group in addition to the individual interests. For instance, Granovetter (2005) suggests that social networks affect economic outcomes, because of: a) the quantity and quality of information they have; b) the networks as a source of reward and punishment; c) trust in the rest of members to do the "right thing" despite of the presence of incentives to do the opposite. With regards to the bonding relation, we also expect that famers who found out about these policies from other farmers will value less negatively the *fine* attribute than the average.

2.4 SURVEY DESCRIPTION AND DATA

A face-to-face survey was carried out in Aragón, north-eastern Spain, during the summer of 2012, interviewing a sample of 359 farmers, including both farmers with and without experience with these AES. Specifically, around 55% of farmers have previous experience with some of the existing measures in practice. The survey requested information about the farmers' knowledge of AES, their experience with these policies, and the perceived benefits and associated drawbacks. A second block of questions dealt with the characteristics of the contracts. Perceived success indicators were contemplated in the third block, and the fourth block included questions related to the profiles of the farmers and their farms. Finally, socio-demographic characteristics were elicited in the last part of the survey.

In terms of the sample characteristics, the average age of the farmers is over 56. In addition, around 78% have primary education. Only 17% of participants are women[3]. Moreover, 25% of farmers earn an agricultural income less than €20,000/year, 53% of farms have more than 55 hectares and 21% have livestock. Around 40% have their own machinery, and 16% believe that their farms will be abandoned in the future. With respect to the success of the AES, 57% of farmers think that they are very or extremely effective in protecting cereal steppe birds. Finally, 71% of respondents in our sample are engaged in agricultural activity on a full-time basis.

We also consider other indicators to test the effects of social capital. First, we look at the relationships of trust and include an indicator that reflects *social trust*. 69% of respondents trust that their neighbors are fulfilling the contractual requirements at 100%. However, on *institutional trust*, there is low confidence in the effectiveness of the public authorities, and only 48% of farmers indicate that this likelihood is high or very high on a 5-point scale with 1 representing "less than 5%" and 5 "over 60%". The social capital dimension of *common norms, rules and sanctions* is reflected, at least partially, by including a fine as one of the attributes of the contract. The *connectedness in groups* is composed of three indicators: the *bonding* component, where 30% claim to have found out about these contracts through other farmers: the *bridging* indicator, reflected by 22% of the sample belonging to a trade union;

[3] This is a typical characteristic of Spanish farms. According to the data of the National Institute of Statistics, for 2007 only 11.15% of women worked on farms (INE, 2012).

linking relations, where 4% of respondents know about these schemes through bank offices and 54% through agricultural extension offices.

We analyse the role of farms' and farmers' characteristics and social capital on ranking the AES contracts through the interactions of these variables with the different contractual attributes. Specifically, we include the following cross-products. First, with respect to the *payment* attribute, we try to identify differences in preferences of women via the term (*payment*women*), of young respondents (*payment*young*), of farmers with basic level of studies and of those who have large farms (*payment*basic education*, *payment*big farm*). In addition, and with the aim to elicit farmers´ preferences for the rest of contractual attributes, we include some other cross-products in the empirical specification. In particular, in the case of *restriction*, we consider the effect of livestock (*restriction*livestock*). To reflect cultural diversity and analyse participants' awareness, we asked farmers whether they knew popular sayings associated with cereal steppe birds, where 6% of respondents knew popular sayings associated with birds, indicating their awareness of the value of birds or the relationships between birds and climatic episodes. We analyse this indicator together with the restriction variable (*restriction*proverb*). The reason is that we expect that these farmers may have different perceptions towards costly attributes, (such as *restriction*) in order to preserve bird species, valuing this restriction less negatively than their counterparts. Finally, we also assess whether farmers with previous knowledge about AES value in a more negative way the fine (*fine*know*). Table 2.4 shows the complete list of the variables employed in our modelling strategy.

Table 2.4 Description of variables

Variable	Description	Mean	Std.Dev
	Dependent variable		
Ranking	2, for the most preferred contract; 1 for the average contract; 0 for the least preferred contract	1.015	0.815
	Attributes		
Payment	The payment attribute	50.000	44.727
Flexibility	The flexibility attribute	0.333	0.471
Cultivate	The cultivate attribute	0.333	0.471
Fine	The fine attribute	0.333	0.471
Restriction	The restriction attribute	0.333	0.471
	Farm and farmers' characteristics		
Young	1, if the farmer is less than 55 years; 0 otherwise	0.487	0.499
Basic education	1, if the respondents had basic education; 0 otherwise	0.777	0.416
Women	1, if the respondent is a woman; 0 otherwise	0.171	0.377
Livestock	1, if the farmer has livestock; 0 other wise	0.213	0.411
Big farm	1, if the farm size is bigger than 55 hectares; 0 otherwise	0.527	0.409
Know	1, if farmer affirms a clear understanding of these measures; 0 otherwise	0.584	0.492
	Social capital variables		
Proverb	1, if the respondent knew a proverb related to birds; 0 otherwise	0.062	0.241
Social trust	1, if the farmer thinks that their neighbors are fulfilling the requirements of the contracts with a high probability 0 otherwise	0.689	0.463
Other farmers	1, if the farmer had learnt about these contracts through other farmers; 0 otherwise	0.304	0.460
Trade union	1, if the respondent is member of a trade union; 0 otherwise	0.216	0.411
Institutional trust	1, if the respondent thinks that the likelihood of being caught and penalized is high or very high; 0 otherwise	0.483	0.499

2.5 EMPIRICAL MODELS

In order to elicit farmers' preferences, we use a CE framework, which allows individuals to select between *N* alternative options; in our case, two alternatives (two different contracts) that contain a number of attributes at different levels presented to each individual four times. As recommended by Adamowicz, Louviere and Swait (1998), a *status quo* option (neither contract) was also presented to participants to give them the option of not signing up a contract (the opt-out option). Similar exercises have been used to evaluate other agri-environmental measures (see for example, Christensen et al. 2011; Espinosa-Goded et al. 2010; Ruto and Garrod, 2009).

Formally, this attribute-based choice method has its theoretical grounding in consumer theory (Lancaster, 1966), that utilities for goods can be decomposed into separate utilities for

their component attributes and random utility theory (McFadden, 1973; Hanemann and Kanninen, 1999).

We asked each respondent to order/rank the contracts according to their preferences. Therefore, we also estimate an Ordered Logit model (OL)[4]. We detected the presence of heteroskedasticity through the Breusch and Pagan test[5], and therefore apply a correction in the estimation of the model. The basic ordered choice model is based on this regression:

$$U = x'\beta + \varepsilon \tag{2.1}$$

where U is the exact but unobserved dependent variable, x' is the vector of independent variables and β is the vector of regression coefficients which we aim to estimate, and ε is the error term. Since we cannot observe U but only the categories of response:

$$y = \begin{pmatrix} 0 \quad if\ U \le \mu_1, \\ 1 \quad if\ \mu_1 < U \le \mu_2, \\ \ldots \\ N\ if\ U > \mu_{N-1} \end{pmatrix} \tag{2.2}$$

The probabilities which enter the log likelihood function are:

$$\text{Prob}[y_i = j] = \text{Prob}[\text{U is in } j\text{th range}] \tag{2.3}$$

And the functional form of the model is presented below, where the cumulative density function is denoted by F(z):

$$F(z) = \frac{\exp(z)}{1+\exp(z)} = \Lambda(z), \tag{2.4}$$

with $z = x'\beta$

[4] We weighted observations from individuals in order to correct for the panel structure of our data. Specifically, we have 12 observations for each individual, therefore, through the weighting we have specified that these observations are from the same farmer. We also have estimated an RPL and an ECM identifying only the most preferred contract, however, we do not include these model results as the significance of variables was limited.

[5] In the Breusch and Pagan test we obtain a statistic of 21.5 following a Chi-squared of 1 degree of freedom and with a p-value of 0.000.

2.6 RESULTS

In Table 2.5, we show the results obtained for baseline and extended OL, where all of the attributes are statistically significant at the 1% significance level. The *payment* attribute shows the expected and significant positive coefficient - receiving compensation increases respondent's utility and likelihood of accepting the proposed contract. *Fine*, on the other hand, has a large, significant and negative sign, indicating a reduction in the probability of accepting a contract. With regard to the rest of the attributes, *flexibility* has a positive coefficient as expected, with farmers preferring contracts with some flexibility to decide how much land enters into the scheme each year (Wynn et al. (2001) and Ruto and Garrod (2009) reach similar conclusions). Finally, the coefficients associated with *cultivate* and *restriction* have a negative sign. That implies that the obligation to grow certain green crops in their lands, and the prohibition to work their lands some months of the year are both less likely to lead to contract acceptance. These results are logical because both characteristics imply a restriction in their management practices. To conclude the baseline model, we include the Alternative Specific Constant (*ASC*) with the aim to reflect that the status quo option. As expected, the coefficient is negative and statistically significant; therefore, the selection of one of the proposed contracts increases the utility above not choosing either one.

With the objective to obtain more information about farmer preferences, we also estimate an extended OL. In order to test the correct empirical specification used, we have tested for the presence of multicollinearity of our interaction terms through the Variance Inflation Factor (VIF) indicator, obtaining a mean value of 2.74, which denotes a low level of correlation among the variables. Again, all single attributes are statistically significant and carry the expected signs, although their magnitude does change, mostly being reduced, with the exception of ASC and Payment, as expected with the addition of explanatory variables. The addition of the cross products shows that young farmers obtain higher utility from these

contracts than others *(payment*young*). Farmers with just primary school derive less utility (*payment*basic education)* than the average sample, possibly reflecting a reluctance amongst those with less education to change or adopt new practices. In addition, farmers who operate larger farms obtain higher utility compared with the average farmer from the *payment* attribute (*payment*big farm*). This result may be related to the fact that for larger farms the contract restrictions can be less onerous at the margin than for the smaller counterparts. Andreoni and Vesterlund (2001) conclude that gender differences in economic experiments are important factors that should be taken into account when we analyse altruistic decisions, and we also observe that women obtain less utility from the payment (*payment*women*). The livestock and *restriction (restriction*livestock)* interaction is negative, suggesting that prohibiting fallow land working is more constricting for livestock farmers than others, giving that this reduces the amount of fodder, reflecting the fact that limiting use of land during some months of the year adversely affects their livestock operations. Farmers who declare knowledge of proverbs related to birds show an increased antipathy towards *restriction* (*restriction*proverb*). This appears to imply that greater environmental awareness does not imply a reduced requirement for compensation for an AES contract. This can be a consequence of the fact that farmers think that birds have always survived under these conditions and therefore they do not understand the need for introducing restrictions. Farmers who have previous knowledge of AES are more adversely affected by fines than others (*fine*know*). Therefore, it seems that for these farmers with previous experience, the introduction of the fine decreases the likelihood of selecting a contract more than for their counterparts. Although the fine is a new attribute, current contracts have some requirements already in terms of surveillance and monitoring, while that the joint effect of both may proof to be rather dissuasive.

Our results show that, when farmers consider neighbors' compliance with the contractual requirements (*social trust*) jointly with the existence of a penalty in the event of failing to

fulfil the requirements, (*fine*social trust*), their utility level increases – they are more likely to opt for an AES contract. This suggests that social trust reinforces the incentive effect of fines by encouraging similar behaviours amongst other farmers, reinforcing common norms. Fines may also be seen as an effective way of controlling potential selfish behaviour of others (altruistic or fair punishment), reinforcing social trust. Similarly, members of a trade union value fines more positively than their counterparts (*fine*trade union*). This could reflect bridging relations through which these farmers trust in the rest of members of their trade union and they have a social pressure to the right thing despite the existence of incentives to do the contrary. Polman and Slangen (2008) also found that farmers involved in general networks have a higher probability of enrolling in contracts. With respect to the bonding relation, those farmers who have found out about these subsidies from others also value the fine more positively than the mean (*fine*other farmers*). This result also reinforces the output obtained for the interaction between fine and social trust. It seems that social pressure is an important way of controlling behaviour in AES in this sample. Finally, those respondents who think that the likelihood of being caught and penalized is high or very high value the fine more negatively (*fine*institutional trust*), which is to be expected, since the existence of the fine is only relevant if the miscreant is likely to be found out.

Table 2.5 Ordered Logit model results

	Baseline Ordered Logit			Extended Ordered Logit		
	Coefficient	Std. Err.	P|z|>Z*	Coefficient	Std. Err.	P|z|>Z*
Characteristics of AES						
Payment	3.621	0.001	0.000	4.573	0.003	0.000
Cultivate	-9.179	0.074	0.000	-2.654	0.108	0.000
Fine	-53.278	0.067	0.000	-39.942	0.257	0.000
Restriction	-47.138	0.063	0.000	-29.999	0.106	0.000
Flexibility	42.166	0.063	0.000	27.021	0.097	0.000
ASC	-16.454	0.054	0.000	-143.418	0.087	0.000
Farm and farmers characteristics						
Payment*young				0.195	0.002	0.000
Payment*basic education				-0.020	0.002	0.000
Payment*women				-0.284	0.003	0.000
Payment*big farm				0.083	0.002	0.000
Restriction*livestock				-45.674	0.172	0.000
Restriction*proverb				-45.075	0.321	0.000
Fine*know				-59.299	0.194	0.000
Social capital characteristics						
Fine*social trust				76.590	0.160	0.000
Fine*other farmers				27.243	0.175	0.000
Fine*trade union				5.990	0.185	0.000
Fine*institutional trust				-3.713	0.160	0.000
$\mu(1)$	313.654	0.030	0.000	352.263	0.058	0.000
Log-likelihood	-4502.218			-1859.339		
χ^2_5	250.869					
χ^2_{16}				870.463		
McFadden Pseudo R^2	0.027			0.190		
AIC	9018.400			3754.700		
N	4213			2090		

2.6.1 Welfare estimates

After estimating the proposed models, we calculate the welfare estimates. We follow the guidelines proposed by Hanemann (1984). In Table 2.6 we report results for the baseline and extended OL models. From the baseline model, the least valued attribute in absolute terms is the *fine*, indicating that farmers have to be compensated with an additional €14 per hectare when a fine of €200/ha is included in the contract with a probability of monitoring of 5%. With respect to the prohibition of working lands during certain months of the year

(*restriction*), the results show that individuals will accept a compensation payment of an additional €13 per hectare for 5 months cultivation prohibition. In addition, respondents have to be compensated with €2.5/ha for the obligation to include a percentage of 20% of green crops in their lands. Finally, farmers would be willing to trade-off €11/ha in order to have flexibility (40%) over the land allocated to AES.

However, the results from the extended model, show that inclusion of the demographic and social capital interactions generally reduces the underlying valuation of the main attributes – reducing the perceived costs of the fine (especially) and also cultivation and restrictions, and reducing the value of flexibility, as well as reducing the average cost (compensation) of the average (general) AES.

We also find that the current economic compensation paid by the public authorities is well above the monetization of the degree of disutility caused by the restriction established in the AES as reflected in our contract options. On average we estimate that the mean compensation varies between €10/ha to €18/ha, while present payments for such contracts are at least between €60/ha - €120/ha depending on the requirements. It is important to highlight a few reasons that may be behind the discrepancy between these results. First, the payments of these contracts are considered as a fixed source of income for the farmers and as such, these are particularly valued in rural communities where the outside working opportunities and income diversification strategies have been reduced during the current economic crisis. Another important clarification is that we have evaluated preferences towards future contracts (put in place when current contracts will finish), offered as a replacement of the current ones. As a consequence, it may well be that lower compensations may be demanded for future contracts in order to compensate for future efforts versus current efforts. Another important aspect to consider is that our welfare estimates may vary depending on specific conditions, such as the experience of farmers with AES (Espinosa et al. 2010), the quality and productivity of land, whether farmers have livestock, attitudes towards nature conservation, attitudes towards others (Schulz et al. 2014), and others. However, these results carrying lower compensation requirements are in line with the current experience with these AES in Aragon. In this area the allocated budget has been always depleted due to the high demand of enrolment and interest in subscribing AES. A significant issue, as pointed out earlier, is that

farmers from this area are relatively elderly in comparison with other areas of the country, and with higher retirement rates. In this socio-economic context, AES represent an alternative source of income to agricultural activity, particularly when compared with abandonment or retirement. Therefore, we acknowledge that it may be worthwhile to address this gross overpayment with the use of competitive actions, instead of using the "first comes, first serves" allocation rule of current contracts. In this line, Bamière et al. (2013) have compared three types of policies based on incentives (a subsidy per ha, an auction and agglomeration malus); finding that, the auction strategy is more cost-efficient.

Table 2.6 Welfare estimates for the extended models

	Baseline OL				
	Coefficient	**Std. Err.**	**P>|z|**	**95% Confidence Interval**	
Flexibility	11.645	0.018	0.000	11.609	11.680
Restriction	-13.018	0.017	0.000	-13.052	-12.984
Cultivate	-2.535	0.020	0.000	-2.574	-2.496
Fine	-14.713	0.018	0.000	-14.748	-14.679
Average	-18.620	0.025	0.000	-18.671	-18.570
	Extended OL				
	Coefficient	**Std. Err.**	**P>|z|**	**95% Confidence Interval**	
Flexibility	5.813	0.021	0.000	5.771	5.854
Restriction	-9.090	0.021	0.000	-9.131	-9.050
Cultivate	-0.571	0.023	0.000	-0.616	-0.525
Fine	-3.107	0.024	0.000	-3.153	-3.061
Average	-9.966	0.061	0.000	-10.087	-9.845

2.7 CONCLUSIONS

In this study, we examine farmers' preferences for participating in agri-environmental contracts, specifically considering the role of economic incentives (including fines) as well as the roles of social norms and social capital. This social context is an important issue for the effective outcome of conservation policies, particularly when applied in small rural communities. Policy makers could consider that fines may be a persuasive way of encouraging fulfilment of AES contracts. In addition, social norms are important in terms of preferences towards the contracts. In particular, farmers who are more socially involved and therefore more visible, may be more concerned about fines than their counterparts. This may

be because in the event of receiving a sanction, the news will spread quickly in a rural community.

However, we find that when complying with the requirements is the general norm in this group of farmers, the interaction between social trust with the fine attribute has a positive effect on utility, with respect to the utility derived from the fine alone. In practice this may imply that fines are more likely to encourage participation when social trust is present. This may be potentially related to the fact that farmers want to make sure that when their neighbors act as free riders, they may be penalized as well and, therefore the fine may be perceived as a fair or altruistic penalty (Fehr and Gächter, 2002). Therefore, in the presence of a strong social trust, the fine could be a good way to control free-riders. The reason is that, on the one hand, free-riders can be punished, and on the other hand, compliant farmers may feel respected. Furthermore, and given that neighbors are expected to fulfil their contracts, the existence of the fine may ensure that each individual participant has no incentive to deviate from this social agreement, increasing their willingness to accept AES contracts. This result is reinforced by the fact that farmers who have found out about these AES through other farmers or farmers members of trade unions also positively value the fine. Therefore, our results indicate that social pressure and social networks are important factors that can help to cultivate farmers' attitudes towards more sustainable results. As a result, areas with higher social pressure should have a greater degree of acceptance with contracts in the presence of a fine, and perhaps this aspect should be taken into account in the future design of AES. On the other hand, we detected another important result, related to the information sources for the AES. Farmers who have previous knowledge of these measures value the fine more negatively, which means that fines act as a deterrence factor. The same result is obtained for farmers who believe in institutional trust. As with Polman and Slangen (2008), we find that motivational aspects can increase the effectiveness and efficiency of AES. Specifically, social pressure and the existence of prior information about AES are good tools to ensure the correct behaviour of farmers in the presence of a fine.

We also find that the socio-economic and demographic characteristics of farmers are quite relevant in terms of affecting their preferences towards these conservation contracts. In particular, we find that young farmers more positively value the payment with respect to the

average farmer. Furthermore, farmers who own livestock more negatively value the *restriction* attribute than the average, whereas, farmers with a basic education or women derive less utility from the *payment* than the average. Further, owners of large farms more positively value the payment than the average.

In conclusion, these findings are in line with other similar findings in the literature, while they provide additional evidence about the negative impact of the potential fine on farmers' utility as a coercive mechanism. These conclusions may be useful in order to articulate future conservation contracts with adequate economic compensation and economic penalties in the event of the non-fulfilment of contractual requirements. Another important conclusion is that our sample farmers appear to be willing to accept substantially lower economic compensation than that which is currently provided for similar contracts. Therefore, contracts in areas with high demand could be redesigned, allowing for the admittance of a higher number of farmers, while providing lower subsidies. As a limitation of this study, and point for future research, it could be very interesting to compare the cost of establishing a fine (in terms of monitoring and sanctioning) with the social benefits derived from its establishment. The reason is that we have detected that fines can be a good mechanism to control behaviour; nevertheless, we do not know which will be the administration's costs to implement it.

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CHAPTER 3

PROMOTING CONSERVATION IN SHELLFISH FISHERIES: THE ROLE OF ECONOMIC INCENTIVES AND SOCIAL NORMS

3. PROMOTING CONSERVATION IN SHELLFISH FISHERIES: THE ROLE OF ECONOMIC INCENTIVES AND SOCIAL NORMS

Abstract

The shellfish sector suffers from the overexploitation of many species at worldwide level. In this study, our aim is to analyze through a choice experiment (CE) the preferences of shellfish gatherers themselves with respect to a proposed conservation management program, assessing in this context the role of time preferences, the effect of co-management through a Marine Protected Area (MPA), the effect of social norms and the impact of poaching on shellfish fisheries. With regards to time preferences, we find that current users are quite impatient with regard to their extraction levels, which can be a consequence of the risky environment in which they are involved. Furthermore, we find that poaching has a double negative effect. Firstly, it contributes towards the overexploitation of the resource, and secondly, this illegal activity means that shellfish gatherers become more impatient in terms of their time preferences for exploiting the resource. With regard to social norms, we find that when the fulfillment of rules is the general norm, and that the efforts required in the management plan are accepted without producing any reduction in the shellfish gatherers' utility.

3.1 INTRODUCTION

The Food and Agriculture Organization (FAO, 2012) has presented evidence on the overexploitation and depletion of many fish populations, encouraging the need to recover many species. Specifically, the FAO (2006) has estimated that since 1990, 17% of fish stocks have been overexploited worldwide, 7% have been depleted, and 1% are recovering from depletion. Technological progress has been indicated as a major cause, increasing the capacity of fishing vessels to more intensively exploit a greater number of fish resources, contributing to the current fishing crisis (Beddington et al. 2007).

To address this situation of overexploitation, different types of management have been implemented around the world. In particular, Individual Transferable Quotas (ITQs), which require the allocation of units of harvest, and Territorial Use Rights for Fishing (TURFs) which allocate units of space, are the most commonly proposed systems. Specifically, TURFs are defined by Poon and Bonzon (2013) as "*an area-based fishery management approach in which groups, or in rare case individuals, are granted secure, exclusive privileges to fish in a specified area.*" Wiley et al. (2012) have highlighted a number of potential benefits from the TURFs management systems, such as the mitigation of rent dissipation linked to open areas; the maximization of the value of the catches, and other additional benefits compared to ITQs, as a result of which they can promote maximizing the value of the catch instead of competing to capture resources. The characteristics of the resources (sedentary vs. migratory), the number of users, the unemployment rate and the degree of association are elements that may affect TURF's success (Franquesa, 2004). Wiley et al. (2012) emphasize that apart from the establishment of TURFs there are other necessary requirements to obtain successful results, pointing out that outcomes are dependent on the governance structure used to deal with management problems, while an efficient and fairly internal coordination of fishermen together with low transaction costs are also important factors. Furthermore, Ostrom (1990) also argued that in order for collective management to be successful it has to take into account other social issues, such as the leadership, education or social cohesion of members.

In this sense, an FAO report from 2010 indicated that it is very important that managers or responsible agents of fisheries management understand that when stocks are overexploited or when fishermen have an irresponsible attitude towards exploitation, the absence of measures will have consequences in the future, resulting in losses of potential future benefits in the form of food, income, and jobs, among others. De la Torre Castro and Lindström (2010) show that the origin of the problem of fishery management is based on the interactions of human and natural domains. Therefore, it is not only important to consider economic incentives but also the involvement of users in the management process, and to understand the motives that managers may have in carrying out certain types of practices that cause an overexploitation of resources. In particular, Pretty and Smith (2004) state that economic incentives are important, but that sometimes these are not sufficient in order to achieve a certain conservation objective. Pretty (2003) highlights that social links and norms are

important for sustainability. More recently, Jamie (2014) (following Thaler and Sunstein (2008)) suggests that monetary incentives have two drawbacks: they are difficult to implement from a political point of view, and individuals are not affected by the environmental consequences of their actions. Another important point is made by Cardenas (2009) in arguing that sometimes economic incentives and institutional actions can serve to promote personal interest instead of public motivations. Therefore, it seems that both economic incentives and the role of social norms should be analyzed when we deal with public resources.

Our aim in this paper is to use a choice experiment (CE) to analyze preferences towards a particular management program that calls for a trade-off between present and future revenue. Understanding how management policies could be improved is especially relevant due to the failure of those that are currently in use. The CE methodology has been used successfully in a number of studies (Knowler et al. (2009), Agimass and Mekonnen (2011), Pulina and Meleddu (2012), among others). In particular, and in this CE setting, we are also interested in testing the following hypotheses: 1) Following Viscusi et al. (2008) we test whether time preferences are positive. Knowledge of the implicit discount factor is an important issue that affects extraction patterns. To our understanding, only three studies (Curtis (2002), Akpalu (2008) Johnson and Saunders (2014)) have analyzed this question in relation to fisheries 2) In our area of study, poaching has become one of the most important problems; and so, due to the seriousness of the current situation with respect to illegal extraction activity, we analyze the influence of this factor in users' time preferences. Our aim is to know whether shellfish gatherers become more impatient when they take into account the poaching activity surrounding these areas. 3) In this study we also take Marine Protected Areas (MPA) into account, thereby testing Ostrom's theory with respect to the involvement of users in the management process, and whether this implies more effective results in terms of conservation when dealing with common pool resources. At this point, it is important to consider that the main principles of collective action proposed by Ostrom (1990) are applied, at least in theory, within the Marine Protected Area (MPA). In order to test this latter hypothesis, our sampling methodology contains observations from an MPA as well as other selected areas that act as control areas. 4) We also analyze the role of social norms in shellfish gatherers' behavior. With this purpose, we included different questions in our survey in order to understand the

type of social norms that are present among users in this sector, specifically testing whether the presence of a social norm based on cooperation with the law among users makes shellfish gatherers obey the requirements defined in the management plan.

The rest of the paper is organized as follows: the application of CE in fisheries is presented in Section 3.2. Section 3.3 presents the empirical models, while section 3.4 presents the research hypotheses. Section 3.5 contains a description of the survey and the data. Section 3.6 presents the results, while the paper concludes with a final discussion in section 3.7.

3.2 THE APPLICATION OF CHOICE EXPERIMENT (CE) IN FISHERIES

3.2.1 The area of study

This study centers its attention on the shellfishing sector of one Autonomous Community in the North West of Spain, Galicia. This activity is conducted in an artisanal way and has a great social importance. It is an important source of income for more than 3,903 persons, in large part, women (more than 84% in 2013)[1]. At the same time, it is a source of social empowerment for these women (Frangoudes et al. 2008). According to data published by the regional government of Galicia, (Xunta de Galicia, 2013) the main species collected in this sector are two types of clams *(Ruditapes decussatus* and *Venerupis pullastra*) and cockles (*Cardium edule*). Specifically, in 2013 the total economic value of these species amounted more than 33€ million, with a total of 3,639 tons auctioned[2].

In our area of study, Galicia, TURFs have been applied in the shellfish sector since 1992. However, this sector still suffers from overexploitation in addition of being affected by poaching. Poachers are individuals who catch the resource without having legal permission. In addition, they do not respect the months when extraction is banned, or the limits in terms of the catch sizes or number of kilos that can be extracted per day. Freire and García-Allut (2000) analyzed the state of artisanal coastal fisheries, finding symptoms of a general state of overexploitation as a consequence of the mismatch between management and the biological

[1] These data is available on the website of the regional statistics office, (IGE, 2014): http://www.ige.eu/web/mostrar_actividade_estatistica.jsp?idioma=gl&codigo=0301004
[2] These statistics are available on the fishery statistics website at: www.pescadegalicia.com

and socioeconomic context. This is a worrying situation that frequently appears on the front pages of the major national newspapers, showing how poaching causes outbreaks of violence between poachers and guards[3]. Therefore, the "tragedy of the commons" proposed by Hardin (1968) can take place, although there are no open access areas. Furthermore, there are serious conflicts between the users which have been published by the Galician Association of shellfish gatherers (AGAMAR).[4]

Shellfish fisheries are grouped into fishermen's guilds (*Cofradías*). The Galician Federation of Fishermen Guilds (2014) defines these associations as "*public law corporations, endowed with the legal personality and capacity to act in fulfillment of the purposes and the exercise of the functions they are entrusted. These act as bodies for the purposes of consultation and cooperation with the government in promoting the fishing sector and represent the economic and corporative interests of the professionals in the sector, notwithstanding their representation as organizations of employers and fishermen*." In Galicia there are currently 62 fishermen's guilds with a long tradition, according to the Galician Federation. They include all of the shellfish gatherers that are working in a particular geographical area (Franquesa, 2004). It is compulsory for the members to sell the resource at auction at the local market that belongs to the fishermen's guilds, with members also having to pay a monthly fee to support the administrative costs. The author also highlights the importance of fishermen's guilds in order to control and discipline guild members. It is important to denote that it is mandatory to be a member of the fishermen's guilds to work as a shellfish gatherer. Under the fishermen's guilds, this shellfishing sector is regulated by strict laws that limit the quantity of products that can be extracted per gatherer per day, also defining the minimum size requirements. Furthermore, these regulations also limit the amount of catching days per season. It is important to take into account that fishermen's guilds are guided by technical support provided by biologists who work together with the leaders of the shellfish gatherers to produce the yearly management plan. This management plan has to be approved by the assembly of shellfish gatherers and by the fishermen's guilds, and finally by the regional government, the Xunta de Galicia. Macho et al. (2013) note that in Galicia the

[3] This news can be seen in different Spanish newspaper such as: El País, 09-16-2012; La Voz de Galicia, 12-09-2013 and 10-04-2014

[4]The website of AGAMAR includes an article on how the chairman of the shellfish gatherers' association of Vilanova was assaulted by the leader of the fishermen's guild with a rake (11-19-2013).

role of scientific advisors has made it possible to provide accurate information and ensure well-organized fisheries at the same time as supporting decision making processes.

In our area of study there are also two Marine Protected Areas (MPAs). This an interesting aspect to be analyzed, given that co-management is a very relevant aspect, as previously commented by Ostrom (1999) and Dietz et al. (2003), who refer to the importance of bottom-up decision-making[5] strategies that can help to deal with situations of over-exploitation.

3.2.2 CE applications to fisheries

In this study we conducted a face-to-face survey employing the CE methodology. It is important to note that this is a fairly novel technique in the field of fisheries management. To facilitate the first contact with shellfish gatherers we collected information through the websites of fishermen's guilds and groups of shellfish gatherers. After an initial phone call or e-mail we visited the area where they work, and interviewed shellfish gatherers while they were working on the beach, or if they preferred in a common space during their break. One of the first applications was conducted by Aas et al. (2000) who evaluated different management alternatives to the harvesting regulations in Norway. Wattage et al. (2005) pointed out that as the management of fisheries is defined by multiple objectives, more efficient solutions can be found when the preferences of the various stakeholders are known. Moreover, they indicate that CE methodology can provide useful information for the management process. In addition, Knowler et al. (2009) also employed the CE approach to evaluate several programs in India, and Wattage et al. (2011) in analyzing uncertainty regarding the value of the reserved habitats to the fishing industry in Ireland. However, in this latter case, the CE was applied to the residents of the Republic of Ireland and not only to the users. Agimass and Mekonnen (2011) used a CE to evaluate willingness to pay (WTP) for fisheries and watershed management in Ethiopia. Their results show that socioeconomic variables such as education, household income and family size are significant when determining the selection of a management plan. More recently, Pulina and Meleddu (2012) used this methodology to evaluate the

[5] Ostrom (1990) pointed out seven principles of design related to collective action, which are: clearly defined boundaries, congruence between appropriation and provision rules and local conditions, collective-choice arrangements, monitoring, graduated sanctions, conflict-resolution mechanisms, and a minimal recognition of rights to organize. These principles have been used in the MPA in Galicia.

implementation of an MPA in Italy, concluding that these stakeholders prefer to improve sustainable yields, to reduce their internal conflicts and to increase the profits from the fishery. With respect to shellfisheries, studies such as Nunes et al. (2009) have analyzed the importance of conflicting objectives in the sector. Specifically, they studied how the process of gathering shellfish damages areas where birds come to feed. However, in the previous literature, we did not find any other studies that analyzed the established research hypotheses. Therefore, this current application pays special attention to the time preferences of shellfish gatherers, the effect of co-management through a MPA, and the impact that poaching has on local shellfish gathering areas.

In our CE modeling exercise, taking into account the difficult biological situation facing certain species in Galicia, we presented a management plan with the aim of improving and recovering the abundance of the resources. Usually, the local government draws up conservation plans to recover affected species. As a clear and recent example, we may cite the biological situation of the common cockle (*Cerastoderma Edule)*. According to the official statistics[6] elaborated by the regional government, the data show that between 2008 and 2013, the amount of catches decreased by 64%, putting pressure on other species that began to suffer from over-exploitation. The conservation plan presented to shellfish gatherers also implied accepting an agreement that will have a duration of five years, while every year there would be a certain number of months when gathering is prohibited[7]. During these months of prohibition of activity, shellfish gatherers will be compensated with an economic subsidy of €1200/month[8]. The positive effects of this prohibition on catches will not be immediate, i.e. there will be a waiting period to achieve the biological improvement of stocks. In addition, as part of the recovery plan, we include a limitation about the number of shellfish catchers. Finally, it is indicated that in cases when individuals accept to participate and do not obey the rules, they will be sanctioned with the return of the economic subsidy (€1200/month) and 20% more as a fine. We also include a social sanction of publishing the names of individuals who infringe the law. As stated by Alpizar (2014), shame and pride are forms of social sanctions and rewards, respectively, to encourage desired behaviors. Therefore, we consider

[6] These statistics are available on the website of the fisheries statistics office: www.pescadegalicia.com

[7] Depending of the area, some shellfish gatherers do not have extraction ban periods because they have different beaches to work, and while one beach is closed, others are open to work.

[8] We include an economic subsidy with the aim of reducing protest responses. We selected this amount of money to help users to deal with different types of expenses such as insurance, and membership fees for the fishermen's guilds.

that publicizing the name of those who are disobeying the rules can act as a social punishment mechanism.

Participants were given the opportunity to select between three types of management plans containing the same attributes, but presented at different levels. In each choice experiment task, participants were also given a third option to choose not to adopt either Management Plan A, Management Plan B nor Management Plan C.

To select the included characteristics of the management program, we follow the description of current policies while revising the literature. We also conducted a pre-test which included an evaluation of the different attributes that were proposed.

The selected attributes included in the management plan available to shellfish catchers were[9]: 1) the number of years in which users do not perceive any improvement in the resource; denoted as *delay*[10]; 2) the percentage of improvement in the abundance of the resource that will be achieved (*improvement)*; 3) the third characteristic is the *extraction ban* that indicates the number of years for which fisheries will be closed, and therefore extraction will not be allowed. 4) The attribute *coworkers*[11] indicates the maximum number of catchers that could benefit from this plan. Table 3.1 contains a detailed description of the characteristics included in the choice experiment.

[9] The levels chosen for each attribute were pre-tested with a sample of shellfish gatherers and the presence of a biologist. The extraction ban levels are similar to the current management plans. Depending of the area of study, the number of shellfish gatherers working in each area is very different; therefore we chose the same levels for all areas of study and taking into account that in the MPA that we analyze there are around 20 women shellfish gatherers. Moreover, the levels of delay and improvement are an approximation because they vary according to the conditions of each area: the number of workers, the degree of illegal activity and pollution, among others. We explain to participants that this is a hypothetical situation where we only try to understand their preferences.

[10] The time of delay is the waiting time plus the extraction ban. In order to consider non-linear time effects, the variable delay is included considering two out of the three possible levels 0.66 years (8 months), between 0.66 and 1.33 years (8 and 16 months), between 1.33 and 2 years (16 and 24 months) achieved.

[11] It is important to take into account that the number of shellfish gatherers is limited by the regional government (Xunta de Galicia). Therefore, it is necessary to have a license (PERMEX) to work. Each year, the regional government evaluates whether the number of PERMEX can increase.

Table 3.1 Attributes description and levels

Attributes	Description	Levels		
Delay	Number of waiting years until the improvement is noticeable	0.5 (6 months)	1 (12 months)	1.5 (18 months)
Improvement	Percentage of improvement in the abundance of resources	10%	15%	25%
Extraction ban	Number of years with extraction ban	0.16 (2 months)	0.33 (4 months)	0.5 (6 months)
Coworkers	Number of shellfish gatherers that could benefit from the conservation program	20	40	60

After defining the attributes and their levels, we proceeded to design the combination of choices to be presented to the respondents, employing the JMP program from SAS. Specifically, we included four attributes with three levels each. We specified a main effects model with one interaction effect (in order to obtain the discount factor). We obtained a choice of twelve cards with a 93.01% efficiency with respect to the optimal design. Finally we designed twelve choices sets for each respondent. Table 3.2 contains an example of the choice sets included.

Table 3.2 Example of choice set card presented

	Management Plan A	Management Plan B	Management Plan C	Does not endorse any management plan
Delay	0.5 (6 months)	0.16 (2 months)	0.33 (4 months)	
Improvement	10%	15%	25%	
Extraction ban	1.5 (18 months)	0.5 (6 months)	1 (12 months)	
Coworkers	40	20	60	
Which Management Plan do you choose?				

3.3 THEORETICAL BACKGROUND AND EMPIRICAL MODELS

We consider the existence of time preferences using a flexible framework in which hyperbolic discounting can be considered:

$$U(x_0,...,x_T) = \sum_{t=0}^{T} \gamma \delta^t u(x_t) \tag{3.1}$$

where $U(x_0,...,x_T)$ represents the utility obtained with the catch levels in each period *t;* where $u(x_t)$ is the utility obtained with catches in a specific period *t,* γ is the parameter that allows the possibility of an hyperbolic discounting and δ^t the discount factor. We analyze time preferences following Viscusi et al. (2008), who use a CE to estimate discount rates for environmental quality. With this aim, we included two specific attributes in our design: the time of *delay* and the *improvement* level experienced in the resource. Through the cross-product of both characteristics, it is possible to estimate how participants value the improvement in the quantity of a resource that is now available, and how these values vary according to the average waiting time.

Specifically, taking into account time preferences and the characteristics of the management plans, the utility function corresponding with our CE can be expressed as:

$$U_{ij} = \beta_1 improvement_{ij} + \beta_2 extraction\ ban_{ij} + \beta_3 coworkers_{ij} + \beta_4 delay_{ij} + \sum_{t=0.66}^{t=2} \beta_5 delay * improvement_{ij} + \varepsilon_{ij} \qquad \nabla t = 0.66, ..., 2 \qquad (3.2)$$

where i denotes the respondent and j denotes any of the alternatives proposed (management plans). To obtain the discount factors (δ) for the two different time periods, 1.33 and 2 years (16 and 24 months), we apply the following formulation:

$$\delta = \left(1 + \frac{\beta_5 delay * improvement}{\beta_1 improvement}\right)^{1/n} \qquad \nabla t = 1.33, 2 \qquad (3.3)$$

In order to motivate the theoretical model, it is important to take into account that the costs of the program are immediate while the benefits start at least after a period of 0.66 years (8 months[12]). That is, the extraction ban needs to start at the beginning of the conservation plan while the improvement in the abundance of the resource will happen then after some years required for biological growth. To study the tradeoffs between the present value of costs and future improvements, we consider the standard exponential discounting case with a

[12] In our case and as a point of difference with the study of Viscusi et al. (2008), benefits start at least after 0.66 years (8 months) [0.16 years of extraction ban and 0.50 years of delay], because in fisheries it is not possible for benefits to begin immediately.

constant annual discount factor δ. In this setting, there is a time where users cannot work *(extraction ban)* and a *delay* of t years before the improvement begins. With a delay of t years, the discount factor is δ^t. We suppose that the utility function is additively separable and linear in cost *extraction ban* and that the improvement in the level of abundance of resource is given by the *improvement*. Thus, the present value of the 5-year imposition of costs beginning after 0.66 years (8 months) is $extractionban[1+\delta+\delta^2+\delta^3+\delta^4]$. In a similar fashion, the present value of the level of improvement in shellfish then of the time of closure is given by $improvement\delta^t[1+\delta+\delta^2+\delta^3+\delta^4]$. As the terms in brackets are identical, the shellfish gatherer's utility function reduces to ascertaining if the value of costs is greater than the future improvement $(improvement\delta^t)$. The value of $\delta = 1/(1+r)$, where r is the discount rate. Therefore, $1/(1+r)^t$ units of abundance of shellfish will result from improvements that begun immediately (in our case 0.66 years) and will be equivalent to a unit of abundance of shellfish improvement that begins after a period of t years. The cost of imposition will be valuable if the utility of the improvement in shellfish abundance in year t is as least as great as $(1+r)^t$ multiplied by the impact on utility of the annual cost. Therefore, through this application we aim to estimate the average tradeoff of users between the *delay* period and the *improvement* on the level of abundance of shellfish. In this case, we analyze time preferences for two delay periods, 1.33 and 2 years (16 and 24 months).

If we consider the hyperbolic discounting, we need to consider a new parameter $0<\gamma<1$ and $\delta<1$. Therefore the present value of the cost and of the improvement is multiplied by γ given that they include the discount factor and we exclude the initial period. Thus, the present value of the cost is $extractionban[1+\gamma\delta+\gamma\delta^2+\gamma\delta^3+\gamma\delta^4]$ and the improvement is $improvement\gamma\delta^t[1+\delta+\delta^2+\delta^3+\delta^4]$. The parameter γ represents the reduction of the value of all delayed payoffs.

With the goal of testing the robustness of the results and analyzing the formulated research hypotheses, we extend equation (3.2) as follows:

$$
\begin{aligned}
U_{ij} &= \beta_1 improvement_{ij} + \beta_2 extraction\,ban_{ij} + \beta_3 coworkers_{ij} + \beta_4 delay_{ij} \\
&+ \sum_{t=0.66}^{t=2} \beta_5 delay * improvement_{ij} + \beta_6 improvement * poaching_{ij} + \beta_7 delay * lowerincome_{ij} \\
&+ \beta_8 delay * social\,norm\,compliance_{ij} + \beta_9 delay * littlesurveillance_{ij} + \beta_{10} delay * MPA_{ij} \quad \nabla t = 0.66, ..., 2 \\
&+ \beta_{11} coworkers * MPA_{ij} + \beta_{12} coworkers * organized_{ij} + \beta_{13} coworkers * young_{ij} \\
&+ \beta_{14} coworkers * employment_{ij} + \beta_{15} extraction\,ban * \text{experience}_{ij} + \varepsilon_{ij}
\end{aligned}
\tag{3.4}
$$

Where additional included variables are described and summarized in Table 3.3 (Section 3.5). In particular, *poaching* implies that this illegal activity is seen as one of the major disputes in their areas; *MPA* identifies members of MPA; *young* represents individuals younger than 50 years of age; *organized* means that the users work in an organized way; *little surveillance* refers to one of the causes of poaching; *lower income* identifies individuals who earn less than €1000/per month; *employment* represents individuals who think that the generation of more jobs in their area is one of possible solutions to fight against poaching; *experience* represents individuals with less than 5 years of experience as shellfish gatherers; and *social norm compliance* represents the existence of this social norm.

As an empirical strategy and in order to control for the potential heterogeneity of preferences, we estimate a Random Parameters Logit model (RPL)[13]. This model assumes that the functional form of utility and arguments are common among individuals within the sample, but that the parameters vary between individuals and this model does not assume the independence of irrelevant alternatives. Moreover, we assume that the attribute *delay* is random and follows a normal distribution. The reason is that during surveys, we detected different opinions about this characteristic, ranging from very positive to negative.

[13] Previously, we estimated a Conditional Logit model, assuming the independence of the irrelevant alternatives (IIA) property. In order to test whether the CL model is appropriate for our data, we employ the Hausman and McFadden test (1984), obtaining a Chi-square statistic of 19.65 following a Chi-squared of 6 degrees of freedom, with a p-value of 0.003.

3.4 RESEARCH HYPOTHESES

3.4.1 Time preferences

Our aim is to evaluate the effect of the time of delay with respect to the level of improvement that may be obtained in the future. Specifically in this case study, we expect that that cross products of *delay*improvement* are negatively decreasing the utility levels, although less than the *delay*. Our aim is to show that timing is important.

$$H_0 : \sum_{t=0.66}^{t=2} \beta_5 delay * improvement_{ij} \geq 0$$
$$H_1 : \sum_{t=0.66}^{t=2} \beta_5 delay * improvement_{ij} < 0 \qquad \nabla t = 0.66, ..., 2 \qquad (3.5)$$

3.4.2 Illegal activity

A second objective is to test the effect of illegal fishing. We expect that users who are concerned with illegal catching activities will be more impatient, and that therefore they will exhibit lower discount rates. Thus:

$$H_0 : \left(1+\frac{\sum_{t=0.66}^{t=2} \beta_5 \text{delay*improvement}_{ij}}{\beta_1 \text{improvement-}\beta_6 \text{improvement*poaching}}\right)^{1/n} \geq \left(1+\frac{\sum_{t=0.66}^{t=2} \beta_5 \text{delay*improvement}_{ij}}{\beta_1 \text{improvement}}\right)^{1/n}$$
$$H_1 : \left(1+\frac{\sum_{t=0.66}^{t=2} \beta_5 \text{delay*improvement}_{ij}}{\beta_1 \text{improvement-}\beta_6 \text{improvement*poaching}}\right)^{1/n} < \left(1+\frac{\sum_{t=0.66}^{t=2} \beta_5 \text{delay*improvement}_{ij}}{\beta_1 \text{improvement}}\right)^{1/n} \qquad \nabla t = 0.66, ..., 2 \qquad (3.6)$$

3.4.3 Marine Protected Areas: the effectiveness of co-management

We expect that shellfish gatherers belonging to an MPA and who have permission to work in it act in a more sustainable way than the rest of the users. To assess this issue, we analyze the utility changes with respect to two of the attributes that conform the choice experiment for MPA members. We expect that the attribute *coworkers* carries a negative sign, implying that the entrance of more shellfish gatherers, and therefore the possibility of overexploitation is more negatively valued.

$$H_0 : \beta_{11} coworkers * MPA \geq 0$$
$$H_1 : \beta_{11} coworkers * MPA < 0 \quad (3.7)$$

On the contrary, we expect that the *delay* may be less negative than the average for users of MPA because this limitation will imply that the shellfish resource can grow.

$$H_0 : \beta_{10} delay * MPA \leq 0$$
$$H_1 : \beta_{10} delay * MPA > 0 \quad (3.8)$$

3.4.4 Social norms

Social norms are defined by Ostrom (2000) as "shared understandings about actions that are obligatory, permitted, or forbidden." In the questionnaire, we asked about the level of compliance among their coworkers and their own level of compliance. We expect that as the norm was to fulfil the regulation, the obligation to respect it does not imply a negative effect on the utility level compared with the average, because this is seen as a part of their obligations.

$$H_0 : \beta_8 delay * social\ norm\ compliance \leq 0$$
$$H_1 : \beta_8 delay * social\ norm\ compliance > 0 \quad (3.9)$$

With the aim of reflecting the *social norm of compliance*, we present a percentage scale in the survey that goes from 10% to 100% which is related to their level of individual

compliance, but also to the level of compliance of coworkers, where some participants chose higher percentages of compliance. To capture this social norm we also create a dummy variable that identifies those respondents who selected values of 80% or above.

3.5 DATA DESCRIPTION

A face-to-face survey was conducted throughout 2013 and in the winter of 2014. Specifically, we obtained data from the different coastal provinces and one MPA. A sample of 146 shellfish gatherers was interviewed. As mentioned, Marine Protected Areas (MPA) have been created in Galicia with the aim of fighting against overexploitation issues[14]. The MPA that we included in this research is located in the Northwest of Galicia (Spain), in Cedeira. It was created in 2009 (Xunta de Galicia, 2009) with the aim of maintaining biodiversity as well as preserving clean seas in which the exploitation of fishery resources is sustainable. Furthermore, this management tool allows for new socioeconomic opportunities for shellfish gatherers and also for the fishing communities through tourism and marine culture. All these facts are made possible through the recovery of population of exploited resources.

Our survey solicited information about their work history, their working habits, their opinions about current legislation and perceived problems. Finally, socio-demographic characteristics were elicited in the last part of the survey. We observed that more than 93% of respondents were women, as expected in this activity. In addition, the average age of our sample is about 50 years. On average, the number of individuals who live in the same household is around 3.67 persons. With respect to the level of studies we found that 15.40%[15] of the respondents had a higher level of studies. In terms of income, we found that about 72.70% of participants stated that they receive less than €1000 per month for their activity[16]. Furthermore, 22% of respondents are members of trade unions and 16.10% are members of an MPA. About 24.50% of the participants have less than 5 years of experience in their work and around 69.90% think that there is a coworker who acts as a leader in the group. In addition, around 37.76% of respondents work in this activity due to family links or tradition. Another

[14] In Galicia, there are two MPA. Initially, we tried to include both areas as part of our study, although finally we included only one of them due to the impossibility of obtaining collaboration from the second area.
[15] Most of the sample had a basic level of studies, but had a perfect knowledge of their work and the sea.
[16] It is important to consider that they harvest about 15 days per month for a maximum of 4 hours per day. The general comment during the interview was that their income levels have decreased in a very significant way due to the economic crisis.

important aspect is that 83.22% of users affirm that they have taken courses and attended special training sessions on fishery management, but only 51.35% declare that these were useful for their daily fishing activity. In addition, around 37.10% of users believe that their coworkers and neighbors follow a norm of compliance. Around 73.40% of users comment that they work in an organized way. Furthermore, we also asked shellfish gatherers about their opinion regarding the main problems they face, to which they responded that the main problem is poaching (88.55%). We also found that they have concerns regarding pollution of the sea (67.95%) and climate change (52.80%). Around 20.22% also state that tourism activity as a problem. Therefore, it seems clear that they are working within an uncertain environment.

In this sense, the users believe that the current rate of unemployment and the possibility of obtaining higher undeclared income are the main causes of the high level of illegal activity (61.87% and 68.00% respectively). They also mention low penalties, the existence of marginalized groups and limited surveillance (48.83%, 52.51% and 30.71%, respectively) as additional factors that encourage poaching activities. With regard to possible solutions to fight against poaching, these were indicated as the creation of new jobs (38.50%), more surveillance (44.70%), higher penalties (55.42%), controls over intermediaries (53.97%) or punishing poachers by having to carry out social work (49.14%). In addition, it is important to highlight that more than 81.80% of the participants state that poaching generates conflicts in their areas, and around 93% of respondents consider that this illegal activity is harming the resource. With respect to their opinion as to whether this activity is disapproved by society, around 30.80% believe that this is currently the case. (Table 3.3).

Table 3.3 Description of the variables

Variable	Description	Mean	Std. Dev
Choice	Dependent variable	0.250	0.433
	Characteristics of Management Plans		
Delay 0.66	1, if the delay attribute is less than 0.66 years (8 months); 0 otherwise	0.333	0.471
Delay 1.33	1, if the delay attribute is between 0.66 and 1.33 years (8-16 months); 0 otherwise	0.396	0.489
Delay 2	1, if the delay attribute is between 1.33 and 2 years (16 and 24 months); 0 otherwise	0.271	0.444
Delay	Attribute delay	0.956	0.657
Improvement	Attribute improvement (expressed in %)	11.457	8.225
Delay1.33*improvement	Cross product of the attribute of delay and improvement	6.147	8.493
Delay2*improvement	Cross product of the attribute of delay and improvement	3.957	6.991
Extraction ban	Attribute extraction ban	0.237	0.18
Coworkers	Attribute coworkers	27.914	21.112
	User's characteristics		
Young	1, if the respondents age is less than 50 years; 0 otherwise	0.455	0.498
Lower income	1, if the respondents affirm that their monthly income is less than €1000; 0 otherwise	0.727	0.445
Experience	1, if the respondents affirm that they have less than 5 years' experience as a shellfish gatherer; 0 otherwise	0.245	0.43
MPA	1 for respondents who are members of a Marine Protected Area; 0 otherwise	0.161	0.367
Organized	1, if respondents affirm that they work in an organized way; 0 otherwise	0.734	0.442
	User's opinions		
Social norm compliance	Social norm of compliance with law. This variable reflects that respondents answered that the level of compliance with the law is higher that 80% for themselves or their coworkers.	0.371	0.483
Employment	1, if respondents think that the generation of more jobs will be the one of the solutions to poaching; 0 otherwise	0.385	0.487
Little surveillance	1, if respondents think that one of the causes of poaching is the scant surveillance that exists; 0 otherwise	0.307	0.461
Poaching	1, if respondents think that poaching is one of the main disputes in their area; 0 otherwise	0.818	0.386

3.6 RESULTS

Table 3.4 presents the results of the baseline RPL model. As may be seen, all of the attributes included in the choice exercise are statistically significant. The *improvement* attribute carries a positive coefficient, representing an increase in the utility of shellfish gatherers. The possibility of new people entering *(coworkers)* is also perceived as positive on average. On the contrary, the coefficient associated with the *delay* and *extraction ban* both have negative signs, showing reductions in users' utility. One interesting result is that although we indicated that there will be an economic subsidy to compensate for the time when gathering is prohibited, users perceive these restrictions as negative. We believe that in general, shellfish gatherers expect to

obtain more income from their work than the amount of compensation received (€1200/month). Another issue that was mentioned by the shellfish gatherers during the process of collecting the data was that they do not trust free subsidies. With regards to the cross product of the *delay* levels and the *improvement* attributes, (*delay*improvement)* we can see that they bring about a decrease in the utility level. This decrease in utility increases with the time of delay.

Table 3.4 Results from the baselines RPL models

	Baseline			Baseline with the effects of poaching		
Variable	**Coefficient.**	**Std. Err.**	**P>|z|**	**Coefficient.**	**Std. Err.**	**P>|z|**
			Mean			
Improvement	0.103	0.008	0.000	0.126	0.013	0.000
Extraction ban	-0.932	0.247	0.000	-0.938	0.247	0.000
Coworkers	0.048	0.002	0.000	0.048	0.002	0.000
Delay	-0.819	0.223	0.000	-0.815	0.222	0.000
Delay 1.33*improvement	-0.027	0.008	0.001	-0.027	0.008	0.001
Delay 2*improvement	-0.045	0.011	0.000	-0.045	0.011	0.000
Improvement*poaching				-0.028	0.013	0.026
			Std. Dev.			
Delay	2.502	0.187	0.000	2.486	0.187	0.000
Log likelihood	-1597.683			-1595.159		
N	6864			6864		
LR $\chi^2(1)$	596.030			595.560		
Prob > χ^2	0.000			0.000		

With the aim of obtaining more information about the preferences of shellfish gatherers, we also estimate an extended RPL, the results for which are presented in Table 3.5. First, in order to test the correct empirical specification used, we tested for the presence of multicollinearity through the Variance Inflation Factor (VIF) indicator with a mean of 3.27, which denotes that there are no serious correlation problems. All of the attributes are statistically significant and carry the expected signs.

In the extended model we obtain similar conclusions with regards to the attributes included in the CE. In addition and with regards to the *coworkers* attribute, young shellfish

gatherers perceive the entrance of new colleagues *(coworkers*young)* as an element that decreases their utility levels with respect to the average. This may be a consequence of young users thinking about improving their current living conditions and the possibility that the arrival of a new member will decrease their benefits, taking into account the difficult situation that they are facing. On the contrary, users who affirm that they work in an organized way with their partners value more positively the possibility of new people entering, perhaps because they perceive the advantages of working in groups and cooperation (*coworkers*organized*). Moreover, we also find that for individuals who consider that one of the feasible solutions to poaching is the generation of new jobs, this does not imply that users positively value the entrance of new workers (*coworkers*employment*). With respect to the *delay* characteristic, the individuals who make less than €1000 value positively the waiting time, perhaps due to the fact that for these users this is a possibility of future higher income (*delay*lowerincome*). Finally, the shellfish gatherers with less experience positively value the *extraction ban*. This could be a consequence of the fact that they have more awareness (*extraction ban*experience*).

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Table 3.5 Results from the extended RPL model.

	Extended RPL model		
Variable	**Coefficient.**	**Std. Err.**	**P>|z|**
	Mean		
Improvement	0.128	0.013	0.000
Extraction ban	-1.621	0.291	0.000
Coworkers	0.055	0.004	0.000
Delay	-2.523	0.510	0.000
Delay 1.33*improvement	-0.027	0.008	0.001
Delay 2*improvement	-0.045	0.011	0.000
Improvement*poaching	-0.026	0.012	0.034
Delay*lower income	1.682	0.491	0.001
Delay*social norm compliance	0.708	0.421	0.093
Delay*little surveillance	-0.295	0.431	0.493
Delay*MPA	2.111	0.645	0.001
Coworkers*MPA	-0.037	0.005	0.000
Coworkers*organized	0.013	0.004	0.003
Coworkers*young	-0.010	0.004	0.019
Coworkers*employment	-0.011	0.004	0.005
Extraction ban*experience	2.476	0.536	0.000
	Std. Dev.		
Delay	2.382	0.187	0.000
Log likelihood	-1544.843		
N	6864		
LR $\chi^2(1)$	531.710		
Prob > χ^2	0.000		

3.6.1 Hypotheses Results:

3.6.1.1 Time preferences

Attending to the time preferences, we find that the coefficients associated with the cross product *(delay*improvement)* are negative. Therefore they show the negative effect of the waiting time in spite of the improvement. Thus, in Table 3.6 we can observe the variations of the obtained discount factors and discount rates estimated at the maximum levels, depending on the waiting time. The displayed discount factor for 1.33 years (16 months) of delay is estimated as 0.914 (9.4% of discount rates for the baseline and extended models; while they are around 0.937 for a period of 2 years (24 months) (6.7% of discount rate). Therefore, we observe that users are quite impatient if we compare their discount rate with the annual

interest rate in the financial market, which has been around 4% since 2013 (INE, 2014). It is important to consider that following Hotelling's rule, and Johnson and Saunders (2014), individuals with higher discount factors are more inclined towards resource conservation. On the contrary, individuals with lower discount factors and more present bias would be more inclined towards unsustainable levels of resource exploitation. Another important issue is the income level of individuals. It is also crucial to consider the environment in which the users work, the age of the respondents and the current situation of poaching and over-extraction. As previously mentioned, the average age of this sample is around 50 years, and so we believe that a large part of the sample may be considering retirement, and thinking more about the present than the future. The current economic downturn has also reduced their income to a considerable extent (according to comments that users made when we conducted the surveys), and therefore they are seeking to increase their income rapidly. Dupoux and Martinet (2014) suggest that differences in income generate different preferences, either in terms of environmental preferences or in terms of time preferences. In addition, Holden et al. (1998) suggest a link between poverty and discount rates. They state that higher discount rates appeared to be driven up by poverty and liquidity constraints. On the contrary, Moseley (2001) argues that poor individuals may have lower discount rates because they are often willing to sacrifice current consumption to save assets for the future as a survival strategy. Holden (2014) notes that individuals who live in risky environments will not survive if they are too short-sighted and do not plan their survival strategies in a careful way. Finally, taking into account the current risky situation may be logical in order to find higher discount factors. As a consequence, we believe that these may be aspects that explain a certain degree of impatience. When we compare our results with the results obtained in previous studies, we find that Curtis (2002) obtained a mean discount factor through a CE of 0.70 over an eight-year horizon for fishermen in the Irish Sea; Akapalu (2008) found that fishing boat skippers in Ghana show a mean discount factor of 0.43. Johnson and Saunders (2014) found that discount factors vary from ≤ 0.40 to ≥ 1.0.

In addition, as may be seen in Table 3.6, discount factors increase over time. Therefore, there is a possibility of hyperbolic discounting. We have included the parameter γ to allow for this possibility. First, we test whether the differences between them are statistically significant using a t-test of mean differences, obtaining a t-value of 3300 and p-value of 0.000. Thus, our

results confirm the presence of hyperbolic discounting. We calculate the value of the γ parameter following Viscusi et al. (2008). To do this we analyze the utility of the *improvement* after 1.33 years (16 months) ($\gamma\delta^{1.33}improvement[1+\delta+\delta^2+\delta^3+\delta^4]$) and after 2 years (24 months) ($\gamma\delta^{2}improvement[1+\delta+\delta^2+\delta^3+\delta^4]$). Then, we obtain the ratio of these utilities, obtaining a δ of 0.983 and a γ of 0.13[17].

3.6.1.2 Illegal activity

In order to analyze the influence of this problem on the behavior of current users, we include a cross product as the *improvement*poaching*. Our aim is to analyze how discount factors vary with the poaching effects (Table 3.6). We find that users become slightly more impatient, with a decrease in the discount factor (0.894 for 1.33 years of delay and 0.922 for 2 years) and the subsequent increase in discount rates (11.9% and 8.49% respectively). In addition, if we take into account the results of the extended model we also observe that discount factors vary between 0.895 and 0.923 (for 1.33 and 2 years, respectively), while the discount rates are around 11.7% for 1.33 years and 8.3% for 2 years of delay. However, as in the extended model we include more indicators, given that discount factors can be influenced for more issues than poaching (MPA, education, age, among others). In order to analyze whether the marginal impact of these variables is statistically significant, we conduct a test of means between the discount factors, with and without poaching. We obtained t-test values for the baseline model of 175.719 and 175.275, for 1.33 and 2 years of delay respectively, with p-values of 0.000. Similar t-test values were obtained for the extended model. Therefore, we confirm that poaching affects the time preferences of users in a significant way. In this sense, we believe that if the current situation is not improved, this could have severe implications for legitimate users, because, as already mentioned, the results suggest that users may become more aggressive with regard to extraction levels.

[17] We take into account the ratio of the utility of zero delay (in our case less than 0.66 years) to the utility obtained after 1.33 years of delay, which produces: $\frac{0.103}{0.091} = \frac{improvement[1+\gamma\delta+\gamma\delta^2+\gamma\delta^3+\gamma\delta^4]}{\gamma\delta^{1.33}improvement[1+\delta+\delta^2+\delta^3+\delta^4]}$. Then, we substitute for the value of δ of 0.983.

Table 3.6 Estimated discount factors

	Without poaching			
	1.33 years (16 months)		2 years (24 months)	
	Mean	95% Conf. Interval	Mean	95% Conf. Interval
Baseline model with the effects of poaching				
Discount factor	0.914	0.914-0.914	0.937	0.937-0.937
Discount rate (%)	9.406	9.405-9.407	6.717	6.716-6.718
Extended model				
Discount factor	0.914	0.914-0.914	0.937	0.937-0.937
Discount rate (%)	9.445	9.444-9.446	6.732	6.731-6.733
	With poaching			
	1.33 years (16 months)		2 years (24 months)	
	Mean	95% Conf. Interval	Mean	95% Conf. Interval
Baseline model with the effects of poaching				
Discount factor	0.894	0.893-0.894	0.922	0.922-0.922
Discount rate (%)	11.92	11.892-11.948	8.495	8.475-8.515
Extended model				
Discount factor	0.895	0.895-0.895	0.923	0.923-0.923
Discount rate (%)	11.741	11.715-11.766	8.353	8.335-8.371

3.6.1.3 Marine Protected Areas

With respect to the formulated hypothesis, we find that members of an MPA have a greater economic understanding of the implications of the attributes of the program, on average, given that they reduce their utility levels as a consequence of the introduction of *coworkers (coworkers*MPA)*. However, it is important to consider that this result could be influenced by the fact that there are fewer workers in the MPA than in the other areas. On the contrary, they value less negatively the waiting time (*delay*) to allow stocks to recover *(delay*MPA)*.

Our results are in line with those of previous studies. Perez de Oliveira (2013) studied the case of one area in Galicia (Lira), where after years of overfishing, illegal fisheries and the consequences of the Prestige oil spill, a fishermen's organization pioneered the creation of a marine reserve. He found that involving fishermen in this process brought about a better understanding of norms, and improved compliance with current regulations. The same study also concluded that the effectiveness of the marine reserve was very high during the first few years, but that recently this has been undermined due to the reduction of financial support. Moreover, other studies highlight the importance of the involvement of users in management strategies. For

example, Arlinghaus and Mehner (2005) evaluated the preferences of recreational anglers, finding that anglers should be considered in the design and implementation of management programs in order to facilitate their knowledge about the outcomes and risks of policy options. Stewart et al. (2013) analyze stakeholders' perspectives of the stalked barnacles in a national park of Portugal, concluding that the majority of stakeholders believe that the resource was overharvested and that their needs should be considered as part of the legislation process. More recently, Ovando et al. (2013) also analyzed the benefits of "cooperative fisheries," showing that they often coordinate harvesting activities and lead direct conservation actions, such as the establishment of MPAs. Afflerbach et al. (2014) analyzed the functioning of marine reserves together with TURFs, arguing that the success of marine reserves as tools to improve the sustainability of fisheries can be limited without additional management actions such as TURFs.

3.6.1.4 Social norms

With respect to the third hypothesis, the effect of social norms on compliance with rules, we find that the *delay* does not decrease the utility levels compared with the average for those who do comply. This may be a consequence of the fact that shellfish gatherers following the norm do not suffer losses in terms of utility with these restrictions *(delay*social norm compliance)*. Therefore, it seems that social norms are important factors that should be taken into account when proposing management programs that require certain types of conduct.

3.7 CONCLUSIONS

In this study, we model shellfish gatherers' preferences for management plans through a CE, specifically considering the role of economic incentives as well as the role of social norms. We find important conclusions that policy makers may take into account when designing effective conservation recovery programs. Specifically, we observe that shellfish gatherers positively value the *improvement* of the resource and the possibility of the arrival of new *coworkers*. On the contrary, shellfish gatherers negatively value the *delay* and the *extraction ban* even though this latter aspect was compensated with an economic subsidy.

Another important factor that should be taken into account in the design of new effective policies is the effectiveness of the MPA, where the principles proposed by Ostrom (1990) function as tools to preserve the resource. In this sense, shellfish gatherers involved in an MPA behave in a more conservative fashion in terms of their extraction preferences, understanding the effect of the *delay* attribute. Therefore, the involvement of users in the management process may be an effective solution in terms of sustainability. Nevertheless, it is important to take into account in this time of crisis that enforcement and compliance are important factors in order to achieve effective results from marine reserves (Afflerbach et al. 2014). Thus, the reduction of economic subsidies from the public administration could imply the loss of effectiveness from this management system.

Attending to time preferences, we observe that in our sample of shellfish gatherers in Galicia, the discount factor for a delay of 1.33 years (16 months) is about 0.914 (9.4% of discount rate) while for 2 years (24 months) it is around 0.937 (6.7% of discount rate). In this sense, we detected that users become more impatient if they consider poaching. In this case, Ostrom (1990) pointed out that discount rates are affected by the "physical and economic security faced by appropriators."

We also conclude that social norms matter. This is an important result, given that in this area of study, despite the application of TURFs[18], management problems still exist and therefore the consideration of social norms could help management strategies. Specifically, we find that in a small society where the fulfillment of the norm is the general rule, the establishment of restrictions is accepted without producing a decrease in the utility.

In this paper we contribute to the literature on fisheries management by examining one area where TURFs are not as successful as may have been anticipated. Specifically, we conclude that establishing TURFs is not sufficient to achieve successful results. Thus, the key features proposed by Wiley et al. (2012) to obtain effective results, such as a closed group of users, boundary enforcement and providing proper incentives seem to be very important. In our area of study, these are failing, because users are not protected from poachers, and so they do not have incentives to carry out a sustainable behavior. It is important to remember that only 37% of the

[18] We cannot test the effectiveness of the establishment of TURFs in terms of total catching, as there are no data available prior to TURFs.

users believe in higher levels of compliance from their coworkers, and also have to deal with pollution episodes and the impacts of climate change; therefore it seems that this risky environment with regards to their payoffs, without taking the current economic crisis into account, is affecting their conservation preferences. This means their incentives toward sustainable behavior are diminished. Therefore, policymakers should be taking into account the effectiveness of MPA, the time preferences of users and the role that social norms may play in shellfish gatherers' preferences when they design management policies.

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CHAPTER 4

SHARING THE GAINS AND SHARING THE PAINS IN FOREST MANAGEMENT

4. SHARING THE GAINS AND SHARING THE PAINS IN FOREST MANAGEMENT

Abstract

One of the most common tools in economics, to analyze individuals' decisions, is the Public Good Games (PGG). In this study we conducted a PGG with a sample of users of a common pool resource (CPR). Individuals have an endowment of money and have to decide the amount to be allocated into a common fund to preserve and manage the CPR. A key difference from previous studies is the inclusion of a sanction, to be shared out across the group. Our goal is to analyze the factors that motivate the sharing of the contribution to the CPR, as well as factors affecting the willingness to share the sanction. In addition, we test the compliance of the principles of collective action, proposed by Ostrom (1990), and their implications in the management of PGG. We have found that in line with previous literature, individuals are willing to share an important amount of the endowment with their neighbors. However, in the case of the sanction, users prefer that the common fund pays their amount of respective penalties.

4.1 INTRODUCTION

Traditional economic theory argues that individuals are rational and selfish. In terms of environmental resource markets, the most typical result will be non-cooperation and free-riding behavior; thus, zero cooperation is the result predicted for most environmental resource extraction games (Hardin, 1968). However, several studies have shown that deviations from the output of traditional economic theory take place (Gächter and Herrmann, 2006). Specifically, Ostrom (1990) pointed out that communities can govern their natural resources without overharvesting. To test this hypothesis of rational and selfish individuals, some of the most used tools in economic literature have been the Public Good Games (PGG). Ostrom et al. (1992) have argued the possibility that in common pool resources (CPR) individuals reach successful agreements to manage resources efficiently. In this sense, provision of information, communication and the possibility of sanctioning are important factors that can help management strategies. Other studies analyze important factors to sustain cooperation. Fehr and

Fischbacher (2003) stated that individual heterogeneity and the interaction between altruist and selfish people are crucial in cooperation, as well as the environment in which these individuals act. According to their results more altruist individuals can influence selfish ones. More recently, Rustagi et al. (2010) indicate that structural factors, such as the characteristics of the resource, the size of the group and socioeconomic differences, and other social behaviors such as conditional cooperation or costly enforcement of the norm can explain these deviations. Cardenas (2011) emphasizes that it is necessary to take part in the conflict between self-interest and group interest to avoid overexploitation. In this respect, literature has focused significantly on the role that institutions, regulations and economic incentives can play. Nevertheless, studies such as Cardenas (2011) conclude that policymakers should also take into account that their regulations can alter the normative behavior of users, as they combine the valuation of the regulation with their subjective thoughts regarding this mechanism. Janssen et al. (2013) also emphasize that it is important to allow for the enforcement of rules and social norms as they can act as complements or substitutes. Therefore, aspects such as communication, information, sanctioning, social behavior and others factors, including the characteristics of resources, or of the environment, matter.

In this study, we conduct a modified one shot linear Public Good Game (PGG) in a CPR with users of the resource. With this PGG our aim is to analyze forest owners' decisions in a parallel setting to reality. Thus, throughout this game we set out an amount of money that has to be shared out and assume each individual makes a decision freely. In this sense, the PGG has been adapted as much as possible to a real situation familiar for our participants. In addition, we evaluate whether the principles of collective action (Ostrom, 1990) are functioning in our area of study and their derived implications in the PGG decisions. Our objective is to introduce some novelties with regards to previous literature. In this sense we include a sanction to be shared out and compare attitudes with regards to sharing. We did not find any other study which analyzes this kind of economic incentive with CPR owners in a PGG. Furthermore, we also evaluate some aspects that have received little consideration in the literature. In particular, we analyze users' decisions instead of using laboratory experiments with students. We test the effect of different amounts of endowment in a PGG. Next, we test the effects of collective action principles in users' decisions. Throughout this study, we hope to shed light on the kind of economic incentives which are better in terms of promoting more cooperative results (rewards vs.

punishments). Cooperation among users may increase sustainable management and encourage other conservation policies.

4.1.1 Area of study

Our area of study is located in the North West of Spain, Galicia. This is one of the most important forest areas of Europe. This forest surface is about 1.4 million hectares, which represents 48% of the total territory. Furthermore, more than 120,000 hectares correspond to certified forest surface, which places Galicia at the head of Spain in terms of sustainable forest management (Xunta de Galicia, 2014). The main problems of this sector are related to the abandonment of traditional forest practices due to de-population (Gómez- Vázquez et al. 2009) and the presence of forest fires. Barreal et al. (2012) highlight that Spain is one of the five countries with the most fires in the South of Europe. Within Spain, Galicia suffers around 45% of the total country´s wildfires, representing 23% of affected surface. A study conducted by Ponte and Bandín (2008) (members of the police department) indicates that since the 1990s, forest fires in this region have turned into a social disturbance.

Given this context, it is important to analyze the management of Galician forests: 98% of the territory is managed by private owners and 2% is owned by the public sector (Gómez-Vázquez et al. 2009). The private forests are managed both by single owners, as well as collective owners known as communal forests (Comunidade de Montes Veciñais en Man Común, CMVMC). There are around 2,800 communal forests which occupy about 700,000 ha (Xunta de Galicia, 2014). The Spanish Government (2012) defines them as "*private forests, with independence of: origin, productive capacity, current utilization and agrarian vocation, are of the neighbors´ communities. In addition, communal forests are exploited in a community regimen, without allocation of quotas among neighbors. Furthermore, these forests are indivisible, inalienable, imprescriptible and indefeasible goods."* Thus, we are studying a CPR, given that forests in our area of study are excludable.

Communal forests have existed for centuries and have played an important role in agriculture (Caballero, 2014). They were regulated under a common law until the year 1968[1],

[1] This law is available at: https://www.boe.es/diario_boe/txt.php?id=BOE-A-1968-904

when an institutional framework for communal forests was established, without individual quotas of property. These communities are also a signal of identity, of Galician culture and are an economic and productive indicator, due to the creation of jobs and wealth (Xunta de Galicia, 2014). To be a member of the communal forest the individual has to reside in the local community and attend meetings and assemblies, where one member of each household or family is represented and decisions about the CPR are taken collectively. One important issue that has been detected in Galicia is that in areas where communal forests are present, the incidence of forest fires is lower. In this sense, Fuentes-Santos et al. (2013) show that 61.52% of forest fires occur in forests where there exists private land management (which represents about 65% of forests); 15.88% in public land management (roughly 2% of forests) and the rest (22.59%) in collective management (about 33% of forests).

However, conflicts among communal forests also arise. Internal conflicts highlight disagreements among commoners, whereas external conflicts demonstrate conflicts involving various parties: between neighbor communities and government organizations (based on different perspectives between owners and government); with enterprises (cession rights of resources and their uses); but the most important are external socio-economic and environmental conflicts with NGOs (Gómez-Vázquez et al. (2009)).

The remainder of this paper is organized as follows: Section 4.2 presents the PGG, while section 4.3 presents the empirical approach. Data description is in section 4.4. Section 4.5 shows the main results while the paper concludes with a final discussion in section 4.6.

4.2 PUBLIC GOOD GAME

Field experiments have shown that the hypothesis of selfish and rational behavior is not always true. One of the most typical mechanisms to analyze individuals´ decisions with respect to public goods is the PGG or a Voluntary Contribution Mechanism (Isaac and Walker, 1988). Brekke et al. (2011) state that the understanding of how individuals make voluntary contributions is important. This game is played by n individuals. All individuals i receive an endowment e and simultaneously and independently decide whether to keep this endowment for themselves or invest a given amount $g_i \varepsilon [0, e]$ in the CPR. The total amount contributed by all n

participants together equals $g = \sum g_i$, where $0 \leq g_i \leq e$ is multiplied by a number m, with $1 < m < n$, and mg is divided equally among all participants. As $m < n$, the individual´s return, obtained from the amount contributed to the group fund, is smaller than the amount that would have been kept to oneself $(mg_i / n < g_i)$. Therefore, when the PGG is played once, and considering that players are rational and selfish in maximizing utility, contributing nothing is a dominant strategy. However, since $m > 1$the joint group outcome $ne - g + mg$ is maximized when everybody contributes with the endowment full. Every participant would then be better off compared to when all contribute nothing $(me > e)$. Thus, individual rational behavior leads to a Pareto suboptimal outcome, making the PGG a social dilemma (Dawes, 1980). Following Ostrom et al. (1992) and taking into account our study we can express the utility function of users as:

$$\begin{aligned} u_i(g) &= e \quad if \;\; g_i = 0 \\ &= e - g_i + (mg_i / n) \quad if \;\; g_i > 0 \end{aligned} \tag{4.1}$$

A recent paper by Chaudhuri (2011) conducts a survey about the PGG literature. The main conclusions of this study are that the most typical issues analyzed in PGG are conditional cooperation, costly punishments and others means to sustain cooperation. In addition, this author also highlights that until 1995 the main conclusions obtained with respect to the investment in public goods are that in one-shot experiments the contribution is on average 40% and 60% of the optimal level with large variations from 100% to 0%. In addition, when individuals play the game repeatedly, contributions decline over time and more participants choose to "free-ride" (Ledyard, 1995). Fehr and Gintis (2007) find two types of behavior: free-rider or conditional cooperators. The first type corresponds to those who never contribute to a public good, and the second to those who increase their contribution when they expect that others will also contribute. Specifically, Fischbacher et al. (2001) conducted a PGG, finding that around 50% of the subjects can be classified as conditional cooperators. Furthermore, the key factors that favor the cooperation among individuals are communication, the establishment of a threshold and a higher marginal per capita return. Nevertheless, there are others factors that can also influence choices; for example: gender, the size of the group, and reciprocal motivations, among others. Ostrom et al. (1992) stated that information, communication and sanctions can help to reach agreements

efficiently. Andreoni (1995) concludes that studies of preferences for cooperation should also be considered in the analysis.

The possibility of sanctions has been extensively studied in previous literature. Thus, Fehr and Gächter (2000) show through a PGG that cooperators, can be willing to punish free-riders even when this is costly for them. Croson (2007) has studied three theories to explain decisions made in PGG: those of commitment, altruism, and reciprocity; concluding that in the reciprocity model, contributions made by individuals are positively related to the contributions of others, or with their beliefs about those contributions. Janssen et al. (2013) found that distrust in regulations may influence individuals to break the rules. Van Miltenburg et al. (2014) describe that both punishments and rewards are effective means to establish cooperation in social dilemmas.

In this study we conducted a modified one shot PGG where members of communal forests have to make a decision about how to share both: a reward and a punishment. First, our PGG is modified due to the fact that we do not create explicit groups of users, but rather, single users are told to consider the rest of the members (50 members[2]) in their decisions. Therefore, the group under consideration will be composed of all users. A second important aspect to take into account is that the contributions to the fund will allow different management efforts in forests to be carried out, from which the community will benefit, specified as 40% over the initial amount invested[3]. In addition, our PGG is described as a real situation that collective owners can face as owners of the communal forest. According to the last Law of 2012[4] that manages communal forests, the earnings of forest communities have to be split following this rule: at least 40% has to be reinvested while 60% can be reinvested or can be assigned to buy forests; improve the value of the forest in terms of heritage, cultural and environmental issues; use for public services or share out benefits among communal owners. In addition, and as stated, we also include a sanction to be shared out. It is important to highlight that the game is conducted through an interview and no real money is being played. Bethwaite and Tompkinson (1996) also carry out an Ultimatum Game in the same fashion. In addition, we pay special attention to the question of

[2] We have chosen 50 members as we contacted communities with a great variety in terms of the number of users. Therefore, we explained that this is a hypothetical situation. According to Balboa et al. (2006) the average number of owners by communal forest is about 54.
[3] In the case of the "punishment" the return has no sense.
[4] This law is available at: http://www.xunta.es/dog/Publicados/2012/20120723/AnuncioC3B0-050712-0001_es.html

the size of the reward and punishment. Figures 4.1a and 4.1b show the game presented to forest owners. One of the objectives of this paper is to analyze which economic incentives promote more cooperative behavior: a reward or a punishment?

Figure 4.1a: Case A: Reward

Imagine that you are a member of a communal forest that is formed by 50 neighbors. Your community has received a reward by the "Law against fires" as a consequence of the effort that this communal forest organization has made to fight against forest fires and the good condition of the forest. These funds can be used freely by collective owners. Therefore, you can collect your proportional amount or reinvest it in the community fund. The amount that you deposit in the fund will be used to finalize works in the forest from which the community will obtain some benefits equivalent to 40% of the initial amount invested. Using the following table, please indicate your preference:

Reward	*When splitting the reward among 50 members, you have the right to:*	*I take:*	*I deposit in the fund:*
If the reward is €500	*€10*		
If the reward is €5,000	*€100*		
If the reward is €50,000	*€1,000*		

Figure 4.1b: Case B: Punishment

Imagine that you are a member of a communal forest that is formed by 50 neighbors. Your community has been punished by the "Law against fires" as a consequence of an inadequate effort, made by this communal forest organization to fight against forest fires and due to the very poor condition of the forest. This amount of money can be paid by collective owners or a community fund. Therefore, you can pay your proportional amount or you can decide that the community fund pay your amount. In the following table, please indicate your preference:

Punishment	*As there are 50 members, splitting the punishment you should pay:*	*I pay:*	*The fund pays:*
If the punishment is €500	*€10*		
If the punishment is €5,000	*€100*		
If the punishment is €50,000	*€1,000*		

Another important goal is to understand the role that social norms and social factors play when individuals have to make decisions of sharing out an economic incentive. Thus, we also test, whether the principles of collective action proposed by Ostrom (1990) are being complied with, as well as the implications when individuals face decisions. The questions asked to commoners can be seen in Section 4.5.2 (Table 4.3).

4.3 EMPIRICAL APPROACH

4.3.1 Empirical Model

We model individuals' allocations as a function of the size of the reward vs. the punishment, the social characteristics of individuals and the most relevant socio-economic characteristics, among other variables. To that end, we estimate an Ordinary Least Squares (OLS). Using the Szroeter (1978) test, we assessed the presence of heteroskedasticity, finding that the test carries a value of 23.32 for a Chi-squared with 1 degree of freedom and an associated p-value of 0.00 in the case of the reward. Therefore, we conclude that there is some evidence of heteroskedasticity. For the case of punishment, the test carries a value of 0.01 for a Chi-squared with 1 degree of freedom and a p-value of 0.91, indicating no heteroskedasticity. To deal with this problem we estimate an OLS clustered by the communal forests from which respondents are members. The dependent variables in this regression equation are the vectors of the total distributions (rewards and punishments), labeled as (Y); the vector of explanatory variables (X_i) is grouped into four categories that include: the endowment size X_s; the forest and forest management characteristics X_f, and the socio-economic characteristics, X_{se}; the social characteristics of interviewers, X_{sc}; while the vector (L) is the latent indicator that represents the principles of collective action obtained through factor analysis.

The OLS model corresponds to the estimation of the following equation:

$$Y_i = \beta_0 + \beta_s X_{si} + \beta_f X_{fi} + \beta_{se} X_{sei} + \beta_{sc} X_{sci} + \beta L_i + \varepsilon_i, \quad (4.2)$$

where β_0 is the usual constant term, the corresponding β are the coefficients associated with the respective explanatory variables to be estimated, and ε is a vector of error term, independently and identically distributed (i.i.d). We estimate four OLS models to explain the distribution of rewards and punishments with and without the effect of the principles of collective action.

4.3.2 Research Hypothesis

Furthermore, we analyze whether the size of the reward or punishment to share out, influences the decisions of collective owners. We expect that different sizes of the endowment will imply different allocations into the fund. In this sense, Anderson et al. (1998) found that contributions increase with the endowment and Andersen et al. (2011) concluded that stakes matter in the Ultimatum Games. Therefore our aim is to test whether this issue also occurs in our PGG.

$$H_0 : \beta_{se}10 - \beta_{se}100 - \beta_{se}1000 = 0$$
$$H_1 : \beta_{se}10 - \beta_{se}100 - \beta_{se}1000 \neq 0 \qquad (4.3)$$

4.3.3 Factor Analysis

With the aim to incorporate the principles of collective action in the regression models, we conducted a factor analysis to reduce the several variables obtained from the survey of owners to the most relevant variables for our analysis (See Table 4.3).

Factor analysis is a statistical technique used for data reduction purposes and it is commonly used in social sciences (Harman, 1976). Thus, we employ this technique to reduce the set of responses to the principles of collective action to a small number of latent explanatory factors that affect the forest owners' decisions. We assume that there are a number of unobservable factors or latent variables that account for the correlations among the observed variables such that, when latent variables are constants, the partial correlations among observed variables become zero (Loureiro et al. 2013). Therefore, these factors determine the observed variables, which in our particular case study are the responses to the principles of collective action (Table 4.3).

The empirical results that we obtain from this factor analysis will allow us to incorporate latent constructs into the analysis of factors that motivate the allocations of money received by respondents. We extract the initial motivation factors underlying the responses by employing the eigenvalue rule to select the optimal number of factors and to perform confirmatory analysis of

the factors. Then, we estimate the various motivational factors. To conclude, we include the estimated factors into the analysis of the fund allocations.

4.4 DATA DESCRIPTION

A face-to-face and online survey were carried out in north-west Spain, in the region of Galicia, from 2013 until summer 2014, interviewing a sample of 96 forest owners. Two types of surveys were designed with the same questions but one version includes the PGG as a reward and the other as a punishment. The survey requested information about the characteristics of communal forests, from which they are members, with the objective to reflect members' knowledge. In addition, we also included questions related to their opinion of public authorities, and the way in which decisions relating to forest questions are made. Moreover, the survey also included questions to test whether the principles of collective action were functioning. The PGG was presented in another section of the questionnaire and included some questions to understand the degree of effort made by members, to maintain a forest in good condition and therefore assesses their opinion of other forest owners' efforts. It is important to highlight that the PGG was conducted individually. The same strategy was employed by Haughli (2014) with the goal of promoting comprehension amongst participants. Finally, socio-demographic characteristics were elicited in the last part of the survey.

With the data collected in both surveys (the reward and punishment versions) we find that 74.44% of the respondents are men. In addition, the average age of our sample is about 54.75 years, and the number of individuals who live in the same household is around 3.07 persons. With respect to the level of studies we found that 45.88% of the respondents have a basic level of studies or no studies (*primary education*). With respect to income-related questions, we detected that about 31.32% of participants make less than €1,500/monthly (*less €1500)* in these rural communities.

With regards to the characteristics of forests and forest management, more than 34.44% of respondents affirm to be collective owners of forests with less than 100 ha *(forest size*). With respect to the number of members, about 51.11% of the forests have more than 100 communal members (*over 100 members*). In addition, we asked respondents about the degree of forest

conservation in their community, and 48.32% of respondents affirm that the forest conservation status is quite strong. Nevertheless, around 27.77% of respondents think that the future of forestry over the coming 50 years will worsen (*poor future for forestry*). Moreover, we find that 33.33% of users mention that the last fire that they remember was in last 5 years *(last fire*).

Regarding the owners' opinion about the main problems that forests are facing in their areas, 32.58% mentioned the de-population of rural areas as the principal worrying issue. Furthermore, 28.08% stated negligence with respect to the care of forests, and with a similar % forest fires were mentioned by 28.07% of respondents. Moreover, 15.73% indicated low economic profitability as the main issue facing forestry today. In addition, other tree diseases were mentioned by 14.61% of users. Finally, the invasion of non-native species and the over-exploitation or de-forestations were also commented on by 8.97% and 3.36% of the commoners, respectively.

From an economic point of view, 6.23% of users indicate that they are moderately competitive (forests create some additional sources of income but they are not a fixed source of income). Moreover, we find that around 64.44% mention that the last time when they sold timber was at least 5 years ago (*last timber sold*). About 54.44% believe that the public administration is dealing with forest problems badly or quite badly (*poor administration*). With the goal to know more about the effort that they put in forest tasks, we asked about their level of effort compared with the rest of the owners; 32.22% state that their own effort is higher than the rest of the members (*greater effort*); while 20.45% think that the rest of the owners do the necessary tasks to keep the forest in good condition (*commoners do tasks*). We obtain more information about their own work asking about their degree of participation in activities promoted by communal forests; 66.66% of respondents said they participate all or most of the time.

With the aim of obtaining more information about their social characteristics, we included questions to know whether they were born in forest locations, with 72.22% answering in the affirmative (*place born*). About 55.55% responded that their relationships with the rest of owners are very or quite good (*very good relationship*). Furthermore, 58.88% of owners agree with the following sentence: "The majority of my community members can be trusted" (*trust in neighbors*). In addition, 46.66% of individuals indicated that their decisions are made with the

family and not individually *(decisions in family*). To gain insight into their time preferences, we evaluated the degree of agreement or disagreement with the following sentence: "Forest management will have to be undertaken thinking more about present than future generations" (*present before future*). We find that 17.77% agree with this statement. We also find that 13.33% confirm experiencing the following feeling: "Often, I give things without expecting anything in return" (*give free*). While 26.66% affirm feeling the following often or very often: "Sometimes, I think that it is not fair that some people work less and have the same rights as me" (*not fair*). We also asked landowners whether they think that they have a leader to deal with forest issues and 63.33% responded in an affirmative way (*leader*). Furthermore, 28.57% of respondents are members of trade unions (*trade union*). To conclude, around 37.64% of the respondents confirmed occupying or have occupied a position of responsibility in their area, and 26.66% affirmed feeling more connected to left wing parties (*left wing*). It is important to highlight that this description of our sample is based on both versions of the survey (reward and punishment). In Table 4.1, we show the summary statistics for the variables analyzed, differentiating between the reward and punishment versions.

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Table 4.1 Summary statistics

		Reward		Punishment	
Variable	**Description**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Fund	Amount of money allocated or taken from the fund	323.120	402.883	344.573	447.498
	Size of endowment				
***e*10**	1, if the size of the individual reward or punishment is €10; 0 otherwise	0.333	0.473	0.333	0.473
***e*100**	1, if the size of the individual reward or punishment is €100; 0 otherwise	0.333	0.473	0.333	0.473
***e*1000**	1, if the size of the individual reward or punishment is €1000; 0 otherwise	0.333	0.473	0.333	0.473
	Characteristics related to forestry and forest management				
Forest size	1, if the size of forest is equal or less than 100 ha; 0 otherwise	0.490	0.502	0.170	0.378
Poor future for forestry	1, if owners think that over a period of 50 years the future of forestry will be poor; 0 otherwise	0.224	0.419	0.341	0.476
Over 100 members	1, if the numbers of commoners is higher than 100; 0 otherwise	0.633	0.484	-	-
Poor administration	1, if owners think that the management of forestry carried out by the administration is very or quite poor; 0 otherwise	0.510	0.502	0.585	0.495
Last fire	1, if owners remember that the last fire was in last 5 years; 0 otherwise	0.306	0.462	-	-
Last timber sold	1, if the last time that owners sold timber was at least 5 years ago; 0 otherwise	0.735	0.443	-	-
Greater effort	1, if owners think that their own effort is greater than the rest of the owners; 0 otherwise	-	-	0.415	0.495
Commoners do task	1, if owners think than the rest of the owners do the necessary tasks to keep the forest in good condition; 0 otherwise	0.184	0.389	-	-
	Socio-economic characteristics				
Less than €1500	1; if the monthly income obtained is less than €1500; 0 otherwise	0.490	0.502	-	-
Primary education	1, if owners have no studies or have basic studies; 0 otherwise	0.429	0.497	0.439	0.498
	Social characteristics				
Place Born	1, if owners were born in forest locations; 0 otherwise	0.673	0.471	-	-
Very good relationship	1, if owners respond that their relationships with the rest of owners are very or quite good; 0 otherwise	0.490	0.502	0.634	0.483
Decisions in family	1, if owners affirm that their decisions are made with the family and not individually; 0 otherwise	0.531	0.501	0.390	0.490
Trust in neighbors	1, if owners agree with the following sentence: "The majority of my community members can be trusted"; 0 otherwise	0.429	0.497	-	-

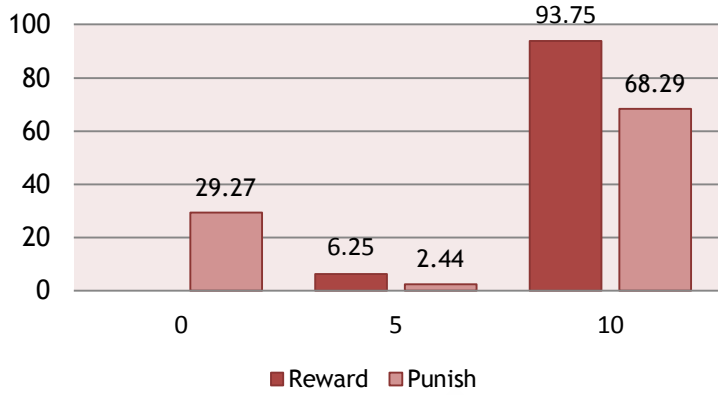
		Reward		Punishment	
		Mean	Std. Dev.	Mean	Std. Dev.
Present before future	1, if owners agree with the following sentence: "Forest management will have to be undertaken thinking more about present than future generations"; 0 otherwise	0.204	0.404	0.146	0.354
Trade union	1, if owners are member of trade unions; 0 otherwise	0.319	0.468	0.243	0.431
Give free	1, if owners do the following action very often: "I often give things without expecting anything in return"; 0 otherwise	0.163	0.371	0.098	0.298
Left wing	1, if owners confirm identifying more with left wing parties; 0 otherwise	0.204	0.404	0.341	0.477
Not fair	1, if owners think often or very often the following: "Sometimes, I think that it is not fair that some people work less and have the same rights as me"; 0 otherwise	0.204	0.404	0.341	0.476
Leader	1, if owners think that they have a leader to deal with forest issues; 0 otherwise	0.571	0.497	0.707	0.457
Factor 1	Rules	-0.193	1.031	0.302	0.874
Factor 2	Penalties	-0.178	1.128	0.279	0.675
Factor 3	Boundaries	-0.374	0.909	0.586	0.847
Factor 4	Monitoring	0.223	1.036	-0.350	0.834

4.5 RESULTS

4.5.1 Public Good Game

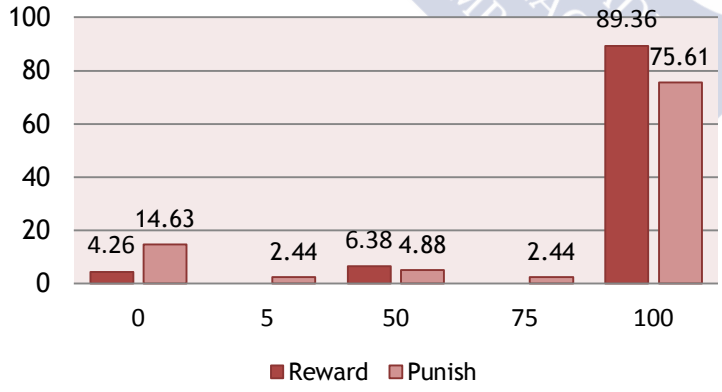
The distribution of reward and punishment is presented in Figures 4.2, 4.3 and 4.4. With regards the reward, the amount of money shared can be considered as a proxy of cooperation (Stoop et al. 2012). Assessing the results, we can see that when the endowment to share out is €10, around 93.75% decide to allocate the full amount to the common fund and the rest (6.25%) decide to keep the €10. Thus, on average the mean contribution is about €9.65. Nevertheless, for a punishment of €10, only 29.27% decide to pay the total amount of the fine from their own pockets, while more than 69% prefer that the community fund pays the penalty. Thus, on average owners allocate about €7.30 to be paid by the fund (See Figure 4.2).

Figure 4.2 Percentage of reward and punishment allocated in a fund account (size of endowment=€10)



However, when the endowment is higher the decision changes. Specifically, for an endowment of €100, 4.26% decide to allocate the money to their pockets while 6.38% decide to split the endowment at 50% and 89.36% allocate €100 to the fund. On average, the contribution to the fund is about €94.18. When the punishment is €100, only 14.63% face the fine directly, while 75.61% also decide that the fund should pay and the rest make different allocations (2.44% allocate €5 and 4.88%, €50). Therefore, the average amount of fine allocated to the fund is €80.25 (See Figure 4.3).

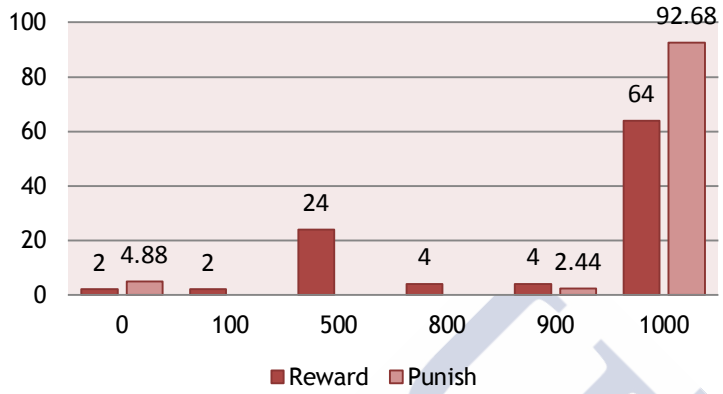
Figure 4.3 Percentage of reward and punishment allocated in a fund account (size of endowment=€100)



This situation changes slightly when the endowment is even higher. In this way, for an amount of €1000, around 2% of individuals keep the total amount in their pockets; another 2% decide to donate €100 to the fund. Furthermore, roughly 24% split the reward at 50% and around 64% decide to send the total amount of money to the fund. On average the mean contribution to

the fund for this endowment is about €836.95. For a punishment of €1000, 4.88% will pay the total amount while 92.68% decide that the fund should pay (€946.10 on average) (See Figure 4.4).

Figure 4.4 Percentage of reward and punishment allocated in a fund account (size of endowment=€1000)



Therefore, we observe that the higher the size of the reward, the higher the amount of money that collective owners keep in their pockets, making these differences statistically significant[5]. Nevertheless, it is important to highlight that they are quite generous because the percentages of money kept by them is quite small. In the survey of literature conducted by Chaudhuri (2011), it was found that average contributions were about 40% to 60% of the optimal level. This is an interesting result in terms of cooperation as we do not have any mechanism to further it (such as penalties, communication, among others). Stoop et al. (2012) have concluded in their study that without any kind of contact among players, cooperation is not guaranteed.

This situation changes drastically when participants have to distribute a fine. Therefore, when forest owners face a fine their behavior changes; this time, the higher the penalty, the higher the amount of money that they prefer the fund to pay. Summarizing, Table 4.2 shows the percentage of money allocated to the fund. In the case of the reward: the higher the endowment, the lower the contribution to the fund. To the contrary: the higher the size of punishment, the higher the allocation to the fund. These differences are statistically significant[6]. Therefore, when

[5] We have conducted a t-test of mean differences in STATA 10.1 S.E. Specifically; the value obtained is -6.464 with a p-value of 0.000 comparing the rewards of size 10 and 100. Comparing the reward of 10 with the reward of 1000 we obtain a statistic of -7.581 with a p-value of 0.000. Finally, the comparison between the reward of 100 and the reward of 1000 reports a statistic value of -6.578 and a p-value of 0.000.

[6] We have conducted a t-test of mean differences in STATA 10.1 S.E. Specifically; the value obtained is -5.722 with a p-value of 0.000 comparing the punishment of size 10 and 100. Comparing the punishment of 10 with the punishment of 1000 we obtain a

we compare the effectiveness of rewards and punishments, we find that rewards imply better results in terms of user generosity. In the next subsection, we present the results obtained with regards to the principle of collective action. In order to understand what drives these allocations we also estimate OLS models.

Table 4.2 % of money allocated to the fund

	Reward	Punishment
e 10	96.60	73.10
e 100	94.18	80.25
e 1000	83.70	94.62

4.5.2 Principles of collective action

The survey results, relating to the principles of collective action, are presented in Table 4.3. With regards to the principle of clearly defined boundaries, it was found that around 80% of respondents believe that in their communities all members know each other; 50% think that residents who are not members of the communal forest know this, while 64.21% consider that neighbors respect community members in practice.

When examining congruence between appropriation and provision rules and local conditions, it is important to note that only 56.52% of commoners think that the rules that they have to follow are appropriate for resource conservation. In addition, the same percentage believes that they are appropriate and that the community can manage forests well. More interesting results are obtained with respect to the law's effectiveness; only 51.09% believe that it is effective. Moreover, 62.37% think that the existing rules respect local traditions, while 70.21% felt these measures could be improved. Analyzing the results for the principle of collective choice arrangements, 89.25% confirm that forest decisions are taken collectively with individuals equally represented. In addition, 64.13% state that there are controls to ensure compliance by the forest community and 56.04% state that there are also controls for outside members (principle of monitoring). With regards to the principle of graduated sanctions, 63.74% of sampled commoners affirm that there are penalties for people who do not comply with the requirements and 46.25% state that these penalties vary depending on the degree of infraction.

statistic of -7.163 with a p-value of 0.000. Finally, the comparison between the punishment of 100 and the punishment of 1000 reports a statistic value of -6.373 and a p-value of 0.000.

Only 32.97% express that there is a quick mechanism to resolve conflicts and 52.17% believe that their rights and decisions are respected by non-members and the administration.

Therefore, and as a conclusion, we observe that principles of collective action are not functioning perfectly in our sample of communal forests. Maybe, the adoption of these principles could be improved as a way to deal with the current management problems.

Table 4.3 Questions to test whether the principles of collective action are functioning

		No	Yes	D/K
Clearly defined boundaries	Do you think that in your community all community members know each other?	19.20	79.79	1.06
	Do you think that the residents who are not community members are clearly not part of the community?	38.30	50.00	11.70
	Do you think that in practice the neighbors do not respect community members to the community?	27.40	64.21	8.42
Congruence between appropriation and provision rules and local conditions	Do you think that the rules of forestry, that have to be complied with, are appropriate to conserve the resource?	34.80	56.52	8.70
	Do you think that these rules are appropriate to manage forests?	37.00	56.52	6.52
	Do you think they are effective?	38.00	51.09	10.90
	Do you believe these rules respect the local traditions and beliefs?	26.90	62.37	10.80
	Would you say that existing standards can be improved?	4.26	70.21	25.50
Collective choice arrangements	In terms of decisions around forestry issues, are these taken collectively, together and equally represented?	8.60	89.25	2.15
Monitoring	Are there controls to ensure compliance by the community?	26.10	64.13	9.78
	Are there controls to ensure compliance by neighbors who are not members of the community?	33.00	56.04	11.00
Graduated sanctions	Are there penalties for owners who do not comply with the obligations laid down in the law?	14.30	63.74	22.00
	If there are sanctions, are they variable depending on the offense committed?	26.30	46.25	27.50

		No	Yes	D/K
Conflict resolution mechanisms	Are there quick mechanisms to solve the conflicts that can arise?	38.50	32.97	28.60
Minimal recognition of rights	Do you think that their rights and decisions are respected by others, who are not members of the community and the administration?	23.90	52.17	23.90

4.5.3 Factor analysis and OLS results

4.5.3.1 Factor analysis

The results from the factor analysis are presented in Tables 4.4 and 4.5[7]. As a first step, we do not impose limits on the number of factors. We employ the Kaiser test (Kaiser, 1960) to determine the relevant number of factors. The Kaiser rule indicates that each observed variable contributes one unit of variance to the total variance in the dataset. Therefore, any component displaying an eigenvalue greater than one, accounts for a greater amount of the variance than had been contributed by a single variable. Any component carrying an eigenvalue less than one, accounts for less variance than that contributed by any one single variable. Table 4.4 results suggest retaining four factors that carry an eigenvalue greater than one.

Table 4.4 Eigenvalues

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	**4.826**	2.458	0.322	0.322
Factor 2	**2.368**	0.434	0.158	0.480
Factor 3	**1.933**	0.871	0.129	0.608
Factor 4	**1.062**	0.066	0.071	0.679
Factor 5	0.997	0.241	0.066	0.746
Factor 6	0.755	0.044	0.050	0.796
Factor 7	0.711	0.087	0.047	0.844
Factor 8	0.625	0.117	0.042	0.885
Factor 9	0.507	0.145	0.034	0.919
Factor 10	0.362	0.056	0.024	0.943
Factor 11	0.306	0.064	0.020	0.964
Factor 12	0.243	0.087	0.016	0.980
Factor 13	0.156	0.079	0.010	0.990
Factor 14	0.077	0.005	0.005	0.995
Factor 15	0.072	.	0.005	1.000

[7] It is important to highlight that in questions to test the principles of collective action, users could respond "Yes", "No" or "Don´t know". We decided to recode the "Don´t Know" responses as "No" so as not to drop more observations due to our limited number of responses.

Moreover, Table 4.5 explains the rotated factor loadings that show the relative contribution of each question in testing the principles of collective action on the retained factors. The values around 0.30 are flagged in bold. These four factors will be used as explanatory variables in the OLS model:

- *Factor 1* is associated with the rules that commoners have to follow. Thus, this factor includes whether these rules are suitable for resource preservation, for correct resource exploitation and whether they are effective. Therefore, it aggregates owners' opinions about rules. We denote this factor as "rules".

- *Factor 2* is associated with penalties and whether current laws could be improved. Thus it sums up if there are punishments for those who infringe the rules and whether they vary according to the degree of offense. Thus, we denote this factor as "penalties".

- *Factor 3* is associated with boundaries. It aggregates owners' opinions about whether they know each other and about neighbors knowing who are not members of the communal forests. We denote this factor as "boundaries".

- *Factor 4* is associated with monitoring. Thus it includes questions that analyze whether there are controls both inside and outside of the forest. This factor is denoted as "monitoring".

Table 4.5 Rotated Factors

Variable	Factor1	Factor2	Factor3	Factor4
Do you think that in your community all community members know each other?	-0.073	-0.064	**0.326**	0.157
Do you think that the residents who are not community members are clearly not part of the community?	-0.112	0.066	**0.416**	-0.001
Do you think that in practice the neighbors do not respect community members to the community?	-0.044	-0.128	**0.339**	0.033
Do you think that the rules of forestry, that have to be complied with, are appropriate to conserve the resource?	**0.350**	0.058	-0.229	-0.071
Do you think that these rules are appropriate to manage forests?	**0.311**	0.080	-0.155	-0.019
Do you think they are effective?	**0.308**	0.060	-0.149	-0.056
Do you believe these rules respect the local traditions and beliefs?	0.197	-0.033	0.017	-0.090
Would you say that existing standards can be improved?	0.047	**0.330**	-0.033	-0.147
In terms of decisions around forestry issues, are these taken collectively, together and equally represented?	-0.024	-0.044	0.098	0.283
Are there controls to ensure compliance by the community?	-0.070	0.055	0.034	**0.472**
Are there controls to ensure compliance by neighbors who are not members of the community?	-0.019	-0.032	0.006	**0.405**
Are there penalties for owners who do not comply with the obligations laid down in the law?	0.049	**0.406**	0.007	0.033
If there are sanctions, are they variable depending on the offense committed?	0.028	**0.357**	-0.226	0.124
Are there quick mechanisms to solve the conflicts that can arise?	-0.067	0.198	0.264	-0.017
Do you think that their rights and decisions are respected by others, who are not members of the community and the administration?	0.058	-0.014	0.187	-0.048

4.5.3.2 OLS results

As we have mentioned previously; in order to understand what drives the allocations of money we estimate OLS models with and without the effect of principles of collective action. In Table 4.6, we summarize our results. The first three columns present the results for the "reward", whilst in the last three columns, the "reward" results take into account the variables related to the principles of collective action. "Punishment" results are presented in following columns next to the model of punishment and principles of collective action. Overall, the models fit the data quite well with R^2 between 88.90 and 94.70%, respectively.

First, we examine and discuss the estimates shown in Table 4.6 for the "reward". With regards to the endowment size, we observe that the coefficients obtained for e*10* and e*100* are

negative and statistically significant, with respect to the omitted category e*1000.* Contributions to the fund are lower for smaller endowment[8] sizes.

We also analyse the effect of different characteristics of owners to understand their decisions. Thus, Bechtel and Scheve (2014) conclude that socio-demographic characteristics play an important role in social dilemmas. With regards to the characteristics of forestry management, we observe that communities with larger hectares, or with higher numbers of members, allocate greater amounts of money to the fund (*forest size, over 100 members*). This may be consequence of the fact that they are richer communities. Furthermore, areas that have sold timber in the last five years also show a positive coefficient (*last timber sold*). Therefore, recent earnings may imply more generous decisions.

With regards to socio-economic characteristics, we observe that people with *primary education* make higher contributions to the fund compared to people with more studies. In addition, we note that people earning less than €1500/monthly contribute less (*less €1500*), which is to be expected for those on lower incomes.

Examining other social characteristics, we observe that neighbors, who believe that the majority of the community can be trusted, make lower allocations to the fund (*trust in neighbors*). Therefore, we find that trust may not necessarily imply higher allocations to the common fund because this also may depend of their economic income. On the contrary, those who state that forest management should be undertaken thinking more in terms of the present generation, show positive contributions to the fund (*present before future*). In this sense, these users prefer to invest in a common fund that can improve the collective good. In the same way, people who identified themselves with the political left wing (*left wing*) make higher contributions, as do those who declare doing favours for their neighbors without expecting anything in return (*give free*). This last indicator could also be considered as a proxy for altruism. Altruism is defined by Batson and Powell (2003) as a motivation for increasing another person's welfare.

[8] We obtained a statistical value of 31.11 with a p-value of 0.000 with a test conducted in STATA 10.1 S.E.

Examining reward results, taking into account collective action principles, (through factor analysis), three indicators lose their significance (*forest size, less €1500, trust in neighbors*), but the remaining variables maintain it, and in addition, we achieve more insights. With regards to the endowment size, the results are similar to those obtained in the baseline model. Furthermore, individuals making decisions with family on forest-related matters, and those who believe their neighbors carry out the necessary tasks to keep forests in good condition, make higher contributions to the fund (*decisions in family*, *commoners do tasks*). Therefore, users' efforts may have a positive effect in terms of donations to the common fund and from which all users can benefit. Factors creating a negative effect, include individuals who believe that the future of forestry will deteriorate and the existence of a leader – these individuals make low contributions (*poor future for forestry*, *leader*). With regards to factors that represent the principles of collective action, we find that factors 2 and 4 are statistically significant and have a negative coefficient; therefore they imply fewer contributions to the fund. These factors are associated with *penalties* and *monitoring*, respectively. Finally, the rest of the indicators, including the baseline reward model, maintain their significance.

Now, we present and discuss the results obtained for the "punishment" regression. With respect to endowment size, we observe that punishment with *e*10 and *e*100 show a negative and statistically significant coefficient with regards to the omitted *e1000*[9]. Therefore, when we are explaining fine payments, the larger the endowment, the greater the amount allocated to the fund. Furthermore, in terms of the characteristics of forests and forest management, we find that owners who believe that the future of forests will worsen (*poor future for forestry*) allocate more punishment to the community fund.

Regarding other socioeconomic characteristics, we find that commoners with lower education levels decide that the fund should pay higher amounts (*primary education*). Assessing other social characteristics, we find that individuals who think more in terms of the present than the future (*present before future*) and those who identify more closely with the left wing political parties (*left wing*) make higher fund allocations for sanctions. To the contrary, those who think there is a leader in their communities make lower allocations to the fund (*leader*).

[9] We obtained a statistical value of 166.33 with a p-value of 0.000 with a test conducted in STATA 10.1 S.E.

The regression model which takes into account the principles of collective action shows more information. With regards to endowment size, results are in line with those obtained in the previous baseline model. Nevertheless, we detect that for three indicators, their coefficients change the sign. Specifically, the introduction of the latent variables which represent the principles of collective action, make people who think in present terms (*present before future*) and those who more closely identify with left wing political parties (*left wing*) are more willing to pay a higher amount of sanction from their own pocket, while those who believe in the existence of a *leader* make higher allocations of the punishment to the fund. The rest of the indicators maintain their statistical significance. Furthermore, participants stating that the administration is not managing forests appropriately, (*poor administration*) make higher allocations to the fund. In this sense, we believe that these users may think that the sanction is not fair, as the administration is not handling forest management well. Moreover, those who confirm making greater efforts than their neighbors (*greater effort*) make higher allocations to the fund. Perhaps these owners do not feel the same degree of responsibility. Additionally, users who make decisions with family on forest-related matters, (*decisions in family*), those having good relationships with their neighbors (*very good relationship*) and owners who state they are trade union members (*trade union*) make higher allocations of punishment to the fund.

With regards to the principles of collective action, we can observe that factors 1, 3 and 4, which represent "rules"; "boundaries" and "monitoring" have a negative coefficient, and share smaller sanction allocations to the fund. Therefore, it seems that the existence of clear rules, boundaries and control make individuals assume higher amounts of fines themselves. On the contrary, factor 2, associated with "penalties" shows a positive coefficient, implying minor allocations to the fund. We interpret this result in the following way: the fact penalties form part of their management strategies means, that when facing a punishment from the outside, one feels less responsible for it.

Table 4.6 OLS models

	Reward			Reward with collective action			Punishment			Punishment with collective action		
Fund	**Coefficient.**	**Std. Err.**	**P>|t|**	**Coefficient.**	**Std. Err.**	**P>|t|**	**Coefficient.**	**Std. Err.**	**P>|t|**	**Coefficient.**	**Std. Err.**	**P>|t|**
Size of endowment												
e10	-793.494	43.667	0.000	-803.052	46.215	0.000	-927.031	35.038	0.000	-934.474	26.931	0.000
e100	-715.793	38.265	0.000	-728.036	38.803	0.000	-852.188	35.391	0.000	-859.211	26.777	0.000
Characteristics related to the forest and forest management												
Forest size	68.439	22.127	0.005	-7.704	39.835	0.849	-2.876	28.962	0.922			
Poor future for forestry	19.549	23.648	0.417	-73.804	28.244	0.018	25.418	12.433	0.059	60.850	11.357	0.001
Over 100 members	81.186	26.729	0.006	96.046	32.876	0.009						
Poor administration	13.114	12.646	0.311	20.816	33.923	0.547	-33.661	25.360	0.204	61.917	10.717	0.001
Last fire	41.447	27.882	0.151	-7.300	23.646	0.761						
Last timber sold	95.465	31.045	0.006	93.084	49.489	0.076						
Greater effort							-4.626	18.428	0.805	30.971	13.059	0.049
Commoners do tasks	23.601	31.149	0.457	148.911	51.240	0.009						
Socio-economic characteristics												
Less than €1500	-38.375	13.623	0.010	2.730	28.374	0.924						
Primary education	156.956	37.598	0.000	165.662	24.387	0.000	57.323	22.908	0.024	98.673	22.306	0.003
Social characteristics												
Place born	-40.718	34.877	0.256	-11.073	28.855	0.706						
Very good relationship	14.099	20.155	0.492	-5.342	25.628	0.837	63.771	43.686	0.165	112.882	21.674	0.001
Family decisions	17.723	13.349	0.198	37.249	12.828	0.009	-35.139	23.520	0.156	212.383	9.515	0.000
Trust in neighbors	-87.129	21.676	0.001	-12.274	48.542	0.803						
Present before future	133.705	19.765	0.000	93.100	45.504	0.056	101.986	46.423	0.044	-212.308	14.209	0.000
Trade union	19.884	15.948	0.226	4.914	33.920	0.886	45.068	28.187	0.131	141.496	15.673	0.000
Give free	176.687	56.246	0.005	292.607	37.809	0.000						
Left wing	157.740	30.965	0.000	215.204	39.431	0.000	105.463	32.169	0.005	-241.378	16.503	0.000
Not fair	18.179	25.191	0.478	-33.853	21.482	0.132	5.507	17.529	0.758	1.029	14.253	0.944
Leader	-37.836	27.278	0.179	-84.560	19.868	0.000	-60.795	31.752	0.075	58.784	6.135	0.000
Factor 1 "Rules"				-30.063	26.679	0.275				-192.570	6.059	0.000
Factor 2 "Penalties"				-25.782	11.603	0.039				202.574	13.415	0.000
Factor 3 "Boundaries"				7.698	14.221	0.595				-47.831	7.267	0.000
Factor 4 "Monitoring"				-26.202	11.016	0.029				-34.053	8.768	0.006
Constant	543.437	47.854	0.000	536.424	64.441	0.000	863.418	54.599	0.000	707.163	32.927	0.000
R-squared	0.889			0.898			0.915			0.947		
Root MSE	144.170		N=111	146.100		N=99	140.570		N=96	123.570		N=57

4.6 CONCLUSIONS

The aim of this paper is to analyze, in the context of a CPR, how common owners make decisions. Through a modified PGG we have analyzed how landowners share out a reward and a punishment. Our interest is to study the differences in behavior when forest owners receive a reward as a consequence of their good actions and whether their behavior is any better, knowing they can be punished.

Evaluating how positive economic incentives are shared (reward), our results are in line with previous studies, finding that on average people make higher contributions to a CPR than suggested by traditional economic theory. Specifically, we find that communal forest owners are quite generous with contributions over 80% of the reward received. Nevertheless, an interesting and novel result is obtained with regards to the sharing of "punishments". In this sense, people are more egoistic and prefer that a common fund pays the majority of the penalties. Therefore, our results imply that the establishment of a reward implies more cooperative behavior than the establishment of a penalty. We also find that endowment size is an important factor to consider. In this sense, Andersen et al (2011) concludes that the size of the stake matters in ultimatum games.

With regards to the principles of collective action, we have included several questions in the survey and through factor analysis we have obtained four main latent indicators: *rules, boundaries, penalties* and *monitoring*. Examining the role they each play in individuals' decisions, we observe that when owners face the sharing of a reward, this does not imply more cooperative results. However, in the case of the punishment, three of the factors: rules, boundaries and monitoring make individuals assume higher amounts of the imposed fine. Therefore, these principles help to promote cooperation when common owners face costly economic incentives.

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4.8 ANNEX

Ostrom (1990) proposed some principles that can be useful to achieve success for CPR management in terms of maintenance and cooperation. Thus, these principles are:

1. *Clearly defined boundaries:* individuals with rights to extract resource units from the common pool resource (CPR) must be defined clearly as the boundaries of the CPR itself. This is the first step in organizing collective action. Without this principle, Ostrom (1990) argued that local users could find outsiders reaping the benefits without making any contributions. Specifically, the questions included in the survey analyze this principle: whether all communal users know each other, whether non-members also know that they are not members and thus hus, if limits are respected.

2. *Congruence between appropriation and provision rules and local conditions*: the rules of appropriation should be related to the local conditions and to provision rules. Specifically, they make reference to time, place, technology and the quantity of units. Questions included are related to whether rules are appropriate to conserve the resource, whether the community has the right to appeal, whether they are effective, the degree of respect towards local traditions, and to conclude their opinion about if they could be improved.

3. *Collective-choice arrangements*: individuals can participate in the modification of operational rules. Ostrom (1990) clarifies that although good rules may exist, this fact does not guarantee that users will follow then. The question that we include to test the existence of this principle is whether decisions related to forests are taken collectively.

4. *Monitoring:* individuals who monitor the CPR are responsible in the presence of appropriators. Thus, questions to analyze are whether there are controls to ensure compliance and if so, whether these are respected.

5. *Graduated sanctions*: those who do not comply with the rules should face graduated penalties depending on the degree of non-compliance. First, we asked whether

there are penalties for individuals who do not comply and if these vary depending on the offense committed.

6. *Conflict resolution mechanisms*: the appropriators and their officials should have reasonable access to resolve conflicts. It is important, when we are dealing with rules expected to be in place for a long period of time, that mechanisms exist that allow the discussion and solution of problems. We asked whether there are quick mechanisms to solve conflicts.

7. *Minimal recognition of rights to organize*: the rights of collective owners are not questioned by external authorities. Users should feel that they are involved in rule design. Ostrom (1990) highlights that when government authorities are the only ones to set rules it is going to be difficult for users to sustain such rules long-term. To examine this issue, we asked their opinion on respecting their rights and decisions.

In our survey and with the aim of testing whether these principles are functioning in our area of study, we have included several questions as can be seen in Table 4.3.

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III. CONCLUSIONS

III. CONCLUSIONS

III.1 MAIN FINDINGS BY CHAPTER

The analysis carried out in this dissertation shows evidence of the importance of economic incentives and social norms to manage environmental and natural resources. Social factors have been studied in recent literature; nevertheless, little is known about their role in policies. Thus, in this work, different case studies have been analyzed with a double objective: first, to assess the importance of social norms besides economic incentives in order to improve environmental policies. Second, direct users and stakeholders (instead of students) participated actively in this research. This aspect allows obtaining important conclusions that help to understand their current management strategies.

Focusing in the first chapter of this dissertation, a meta-analysis about climate change policies has been conducted. In the field of climate change, several studies have analyzed the willingness to pay (WTP) of citizens for policies to combat this global problem. These studies have proposed different kind of policies and different valuations methodologies in different countries. However, a study summarizing their main conclusions was missing. We only have found the review of estimates conducted by Johnson and Nemet (2010). Thus, this chapter sheds light about what kind of policies are more preferable for citizens; finding that mitigation actions are preferred over adaptation actions. Moreover, policies should encourage the prevention of disasters and heat waves to combat climate change in order to be more preferable. In addition, the impact of social values and norms on preferences has also been taken into account; concluding that preferences towards climate change policies are affected by attitudes towards time and social norms. Specifically, countries with a significantly long-term orientation have a higher WTP for climate change policies. Acknowledging that, other lenses and moral aspects should be used in order to understand social preferences for climate policies.

The following chapters adopt local perspectives to deal with various stakeholders in several conservation and management contexts. Specifically, the second chapter is centered in the loss of biodiversity suffered in Aragón (Spain). This area has been suffering a decline in the number of birds living on the cereal steppe despite of the existence of some measures. For example, the European Common Agricultural Policy has tried to remedy this difficult situation through the application of agri-environmental schemes (AES). In this chapter, farmers' decisions towards AES have been analyzed. Through a face-to-face survey to farmers different contract attributes have been ranked, obtaining their economic valuation. It was found that social factors are important in determining farmers' decisions. In particular, the importance of social trust and expectation of compliance by other neighbors encourage farmers to sign up to AES. Specifically, and with regards to economic incentives, the establishment of a fine (not currently in place) may be a persuasive way of encouraging fulfilment of the AES contracts. Moreover, social norms are important in terms of preferences towards the contract. Therefore, farmers more involved at a social level and therefore more visible are more concerned with a fine. In addition, farmers who follow a social norm of compliance value positively the introduction of the penalty as a contract attribute. This may be potentially related to the fact that farmers want to make sure that when their neighbors act as free riders, they may be penalized as well and, therefore the fine may be perceived as a fair or altruistic penalty (Fehr and Gächter, 2002). Overall, results indicate that social pressure and social networks are important factors that can help to control farmers' attitudes towards more sustainable results. Therefore, results obtained reinforce the idea that social norms are crucial in order to understand individuals' behaviour because they influence the valuation of economic incentives (Fehr and Fischbacher, 2002). Thus, they should be considered in the design of environmental policies.

The third chapter deals with the shellfish fisheries sector in Galicia (Spain). In this area of study, users face two main problems: the overexploitation of some resources (due to the scarcity of some species) and poaching. Thus, through a choice experiment (CE) users' preferences have been analyzed with respect to a proposed conservation management program. In this context, the role of time preferences, the effect of co-management through a Marine Protected Area (MPA), the effect of social norms and the impact of poaching in shellfish fisheries is analyzed. With regards to time preferences, it has been found that current

users are quite impatient in their extraction levels, which can be a consequence of the risky environment in which they are involved (Ostrom, 1990). In addition, poaching has a double negative effect. First, it contributes to the overexploitation of the resource, and second, this illegal activity makes that shellfish gatherers become even more impatient in terms of time preferences of exploitation of the resource. Therefore, it seems that policymakers should deal with the problem of poaching to avoid worst consequences in the future. With respect to social norms, when the fulfillment of rules is the norm, the efforts required in the management plan are accepted without producing a reduction in fishers´ utility. This case study also highlights that besides economic incentives, social norms matter (Fehr and Falk, 2002). Another important aspect that should be taken into account in the design of new co-management strategies in effective environmental policies is the effectiveness of the MPA, where the principles proposed by Ostrom (1990) are functioning. In this sense, shellfish gatherers involved and participating in a MPA have a more conservative behavior in terms of extraction preferences. Nevertheless, it is important to take into account that during this time of crisis the enforcement and compliance are important factors to achieve effective results from marine reserves (Afflerbach et al. 2014). Thus, the reduction of economic support from the public administration could imply the loss of effectiveness from this management system.

The last chapter of this thesis deals also with an important problem for Galicia related to the forest sector. Specifically, a public good game (PGG) has been conducted with a sample of users of this common pool resource (CPR). In this context, individuals have an endowment of money and they have to decide the amount to be allocated into a common fund. As a point of difference with previous studies we also include a sanction to be shared out across members. The goal has been to analyze the factors that motivate the sharing of money in a CPR and the factors that motivate the distribution of a sanction. In addition, the compliance of the principles of collective action proposed by Ostrom (1990) have been tested and their implications in the PGG have been investigated. It was found that, in line with previous literature, individuals share an important amount of the endowment with their neighbors. However, and on the contrary, in the case of the sanction, users prefer that the common fund pays their corresponding amounts of penalty. With regards to the principles of collective action and examining the role they each play in individuals' decisions, we observe that when owners face the sharing of a reward, this does not imply more cooperative results. However,

in the case of the punishment, three of the factors: rules, boundaries and monitoring make individuals assume higher amounts of the imposed fine. Therefore, these principles help to promote cooperation when common owners face costly economic incentives.

III.2 GENERAL CONCLUSIONS

In this dissertation, I have focused my analysis on the role that social norms and economic incentives play in the management of environmental and natural resources. The unsustainable use and overexploitation of both resources is still a threat to biodiversity (European Commission, 2014) and in an analysis conducted by United Nations Environment Programme (UNEP, 2013) of the major global environmental questions reaches the same conclusion. It seems that all efforts carried out to promote a sustainable development are failing despite of the higher amounts of money invested (Chen et al. 2009). It is important to emphasize that the great part of environmental assets and natural resources are public goods or common pool resources. Following the traditional economic theory, people will be selfish and rational. Therefore, it appears that these hypotheses are true whether we consider the current situation. Nevertheless, we can think that the major policies have been designed paying attention to economic incentives but little is known about the social behavior of people. At this respect, previous literature has argued through different field and lab experiments that individuals cooperate when they face public goods and that social aspects are very important. Thus, the aim of this dissertation has been to analyze the behavior of individuals facing environmental problems and in various exploitation and conservation contexts. Specifically, the main objective was to analyze the role that economic incentives and social norms play in their decisions.

This work contributes to understand the power of social norms in addition to other social farms in human behavior. To do this, different case studies that deal with current problems have been analyzed. Specifically, the climate change problem, the loss of biodiversity, the shellfish fisheries and the forest sector. The first study has employed a meta-analysis to analyze the climate change issue. The rest of case studies were analyzed through stated preferences methods and a PGG. It is important to highlight that the various case studies have

been conducted with the owners and users of the resources. Thus, the objective has been to obtain general conclusions that could be useful to design future management strategies.

Results suggest that social norms are very powerful in management issues. Specifically, they indicate that aspects that at first are valued as something negative for individuals (for example, fines) become positive when the role of social norms is considered. Moreover and in order to deal with an important problem, such as climate change, policies designed should consider that this is a worldwide phenomenon and that cultural differences among countries matter. Furthermore, to a local level, the importance of social factors is crucial: the importance of social pressure or the involvement of users, and trust.

III.3 FUTURE RESEARCH NEEDS

In the future, studies conducted with users could provide us with additional information to improve the management of resources. Thus, traditional economic games could be adapted to the daily situation of users. Moreover, and with regards to first chapter of this dissertation, it is important to note that economic conditions definitely play a role in terms of supporting efforts to combat climate change. Therefore, it would be interesting to analyze what other mechanisms could be used in developing countries despite of economic incentives. Moreover, a relevant finding of this work has been that cultural and social dimensions are relevant in promoting the acceptability of climate change policies. In this sense, the study of cultural and social norm dimensions may be reinforced by promoting informational campaigns in order to raise awareness. Thus, it would be interesting to incorporate new indicators about the role education and the pressure of social media, to analyze their implications in willingness to pay for climate change.

Attending to the second chapter, it will be interesting to analyse the effects of the proposed measures. Thus, a point for future research, it could be very interesting to compare the cost of establishing a fine (in terms of monitoring and sanctioning) with the social benefits derived from its establishment. Moreover, and with the available data, it would be important to study the economic valuation of the contract attributes for farmers with previous experience. Maybe, those who have already participated in AES show differences with

respect to those with no experience. With regards to the third case study, it would be important to analyse the behaviour of poachers in order to answer several questions: why they conduct this illegal activity? How do they feel? What are they willingness to avoid this situation? In addition, and due to in the survey there are questions about the degree of compliance of the own shellfishers it would be interesting to analyze what factors affect it. To conclude, in the last chapter of study, it will be useful to analyse what factors could improve the degree of compliance with the principles of collective action. Will a better degree of compliance with these principles imply more generous decisions? These and other questions will be analysed in the near future.

III. 4 REFERENCES

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IV. APPENDICES

ANNEX IA: Questionnaire for farmers: type A

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES

DE PROTECCIÓN DE AVES ESTEPARIAS

Tipo A

BLOQUE I: PARTE INTRODUCTORIA

1 (P/NP) ¿Qué nivel de conocimiento tiene Ud. sobre las medidas agroambientales para la conservación de fauna y aves esteparias?

☐ Las conozco bien ☐ Se algo de ellas pero no las conozco bien ☐ No las conozco

Por favor, indique las que conoce:……

Si las desconoce, permítame darle una pequeña introducción a las mismas. "*En los últimos años, como consecuencia de la transformación o abandono de las actividades agrarias tradicionales de secano se ha detectado una disminución de las aves que viven en las estepas. Algunas medidas agroambientales establecen ayudas para compensar a aquellos agricultores que de forma voluntaria se comprometan durante 5 años a realizar una serie de prácticas para favorecer la nidificación y alimentación de las aves esteparias en los cultivos herbáceos de secano. Dependiendo de la zona y la medida elegida, estas prácticas fomentan el cultivo de leguminosas en secano, como la alfalfa y la esparceta, y/o el mantenimiento del rastrojo en los campos de cereal. Además, las labores y aprovechamientos están restringidos durante los periodos de nidificación de las aves.*"

Si ha marcado un nivel de conocimiento muy bajo, pasar a la pregunta 11

2 (P/NP) En caso de conocerlas, ¿puede indicarnos como las ha conocido?

☐ Por otros agricultores ☐ En la radio
☐ Por la Oficina Comarcal Agraria ☐ Otras: _____
☐ A través de la caja rural o banco ☐ Por la cooperativa agraria
☐ Por organizaciones agrarias (UAGA, UPA, ASAJA, ARAGA)

3 (P/NP) En el marco del Programa de Desarrollo Rural 2007-2013 ¿Cuál es su experiencia con las siguientes medidas agroambientales?

MEDIDA		¿Es su explotación elegible? (Si/No/No sabe)	¿ participa? (Si/No)	Superficie acogida (Has)	¿qué prima percibe? €/Ha)
1.1	Mantenimiento del rastrojo				
1.1	Mantenimiento del rastrojo con compromiso adicional de no laboreo entre el 1 abril hasta el 30 septiembre				
1.2	Cultivo de esparceta para el mantenimiento de la fauna esteparia				
1.3	Generación de alimento para la avifauna				
1.8	Creación de corredores biológicos: siembra de alfalfa				

Nota: Si no ha participado en las medidas 1.1 y/o 1.8 pasar a la pregunta 6, después de haber rellenado la tabla.

4 (P) ¿Ha suscrito todos los años el mismo número de hectáreas a las medidas ambientales?

MEDIDA		SI	NO	¿Nos podría indicar qué ha cambiado?
1.1	nimiento del rastrojo con compromiso nal de no laboreo entre el 1 abril hasta el tiembre			
1.8	Creación de corredores biológicos: siembra de alfalfa			

5 (P) ¿Cuáles son los motivos por los que ha solicitado estas medidas? (valorar de 1=’nada importante’ a 5=’muy importante’)

	Nada importante	Poco importante	Algo importante	Bastante importante	Muy importante
Porque mejora la rentabilidad de su explotación	1	2	3	4	5
Porque es un pago seguro, no tiene riesgos	1	2	3	4	5
Porque es fácil cumplir los requisitos	1	2	3	4	5
Porque se ahorra gasoil	1	2	3	4	5
Permiten disminuir el tiempo dedicado a la actividad agraria	1	2	3	4	5
Porque mejoran la fertilidad de la tierra	1	2	3	4	5
Porque de no haberlas, hubiera abandonado la agricultura	1	2	3	4	5
Porque estas medidas son necesarias desde un punto de vista ambiental	1	2	3	4	5
Por otros motivos					

6 (NP) En caso de no participar en ninguna de las medidas anteriormente citadas, ¿podría indicarnos con una X cuál es el motivo?

MOTIVOS	Medida 1.1	Medida 1.8
No me la han concedido/no se ha vuelto a abrir la convocatoria		
No estoy en zona elegible		
Tenía compromisos del programa anterior		
He preferido acogerme a otra(s) medida(s)		
La prima es muy baja		
La prohibición de labores y/o aprovechamiento durante determinados meses es muy restrictiva		
Otros motivos (indicar)		

7 (P/NP) ¿Podría marcar cuáles son para Ud. los mayores inconvenientes que conllevan estas medidas?

INCONVENIENTES	Medida 1.1	Medida 1.8
La prima es muy baja		
Complica las labores de la explotación		
Suponen mucho papeleo		
Tardan mucho en pagar		
Suponen una pérdida de producción importante		
La prohibición de labores/aprovechamiento en determinados meses del año		
Exigen un compromiso demasiado largo, si quieres darte de baja tienes que devolver los pagos recibidos		
Inseguridad sobre la continuidad de estas ayudas		
Otros inconvenientes (indicar)		

8 (P/NP) ¿Le supone un contratiempo mantener el rastrojo hasta el 31 de diciembre?

Si ☐ No ☐ No sabe ☐

En caso afirmativo ¿Qué fechas límite propondría usted para levantar el rastrojo?

_____

9 (P/NP) ¿Le supone un contratiempo el compromiso adicional voluntario de no laboreo de barbechos entre 1 de Abril y 30 de septiembre

Si ☐ No ☐ No sabe ☐

En caso afirmativo ¿Qué fechas límite propondría usted para la restricción de no laborear los barbechos? _____

10 (P/NP) ¿Le supone dificultades el requisito de no realizar pastoreo, ni labores de gestión de la vegetación adventicia en los meses de marzo, abril, mayo y junio?

Si ☐ No ☐ No sabe ☐

En caso afirmativo ¿qué fechas propondría usted como límites para no realizar pastoreo o labores?_____

11 (P/NP) ¿Participa usted actualmente en el *Plan Nacional de Rotación de Cultivos Extensivos de Secano*? Si ☐ No ☐

En caso afirmativo, ¿desde qué año?_____ ¿Con cuántas hectáreas?____

12 (P/NP) En el Programa de Desarrollo Rural 2000-2006 ¿había participado Ud en alguna medida agroambiental?

Si ☐ No ☐

En caso afirmativo, ¿podría indicarnos en cuáles?

Nombre de la medida	**Si/No**	**Año(s)**
1.1 Barbecho medioambiental		
1.2 Mantenimiento del rastrojo y picado de paja		
8.3 Ayudas para el mantenimiento de cultivos alternativos en perímetros de protección prioritaria		
Otras		

⇒ En caso de no conocerlas hasta ahora, pasar seguidamente a la pregunta 23

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES

DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE II: CARACTERÍSTICAS DE LOS CONTRATOS AGROAMBIENTALES

13 (P/NP)¿Conoce la modulación de las ayudas, o número de hectáreas a partir del cual se reduce la prima por Ha a cobrar?

Si ☐ No ☐

14 (P/NP) De acuerdo con la modulación, la prima que percibe el agricultor disminuye a partir de un número de hectáreas. Si se eliminase la modulación, la prima sería la misma con independencia del nº de has solicitadas (ver siguiente cuadro):

		Prima
Medida 1.1	Sin compromiso adicional de no laboreo hasta 31 septiembre	60 €/Ha
	Con compromiso adicional de no laboreo hasta 31 septiembre	72 €/Ha
Medida 1.8	Submedida 1.8.1	90 €/Ha
	Submedida 1.8.2	102 €/Ha
	Submedida 1.8.3	126 €/Ha

En este caso, ¿participaría usted /incluiría más hectáreas?

Medida 1.1: ☐Si , ¿Cuántas más?_____ ☐No ☐No sabe

Medida 1.8: ☐Si , ¿Cuántas más? _____ ☐No ☐No sabe

15 (P) ¿Conoce Ud el sistema de penalización si reduce o abandona el número de hectáreas acogidas?

Si ☐ No ☐ No Sabe ☐

16 (P) Si no existiera penalización, ¿habría Ud. reducido el número de hectáreas suscritas en alguno de los años anteriores?

☐ Si, ¿Cuántas?_____ medida 1.1. y/o _____ medida 1.8
☐No

17 (P) Durante el período vigente de la ayuda que Ud. disfruta en la actualidad, ¿Cuántas inspecciones ha pasado? _____ (Ej: 0, 1,2…..)

18 (P) ¿Ha sufrido alguna penalización derivada de las inspecciones?

No☐ Si☐, Especifique el motivo _____

19 (P) ¿Cuál cree usted que es la probabilidad de que le detecten y penalicen si usted no cumple las medidas?

Muy bajo	Bajo	Medio	Alto	Muy alto
Menor al 5%	Entre el 5-10%	10-25%	25-60%	>60 %

20 (P)¿Cuánto cree usted que cumplen sus vecinos con los requisitos solicitados?

Nada	Algo	Bastante	Mucho	Las cumplen al 100%
1	2	3	4	5

21 (P)¿Cuál es su grado de cumplimiento con las medidas?

Nada	Algo	Bastante	Mucho	Las cumplo al 100%
1	2	3	4	5

22 (P) Si todos sus vecinos cumplieran las medidas al 50%, ¿cómo las cumpliría usted?

Nada	Algo	Bastante	Mucho	Las cumpliría al 100%
1	2	3	4	5

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23 (P/NP) A la hora de escoger entre subvenciones agroambientales de protección de aves, díganos, ¿Cuál de los siguientes atributos tiene Ud. más en cuenta a la hora de elegir dichas ayudas agroambientales? Enumerar en orden de importancia (1 "no lo tengo nada en cuenta" y 5 "es el que más tengo en cuenta")

Atributos	**Descripción**	**Valoración**				
		No lo tengo nada en cuenta	No lo tengo muy en cuenta	Lo tengo algo en cuenta	Lo tengo muy en cuenta	Es el que más tengo en cuenta
Prima	Cuantía de la ayuda (euros por ha de cultivo)	1	2	3	4	5
Flexibilidad	Libertad para decidir la superficie acogida cada año (% admitido de variación respecto a la superficie del primer año, sin penalización alguna).	1	2	3	4	5
Multa	Sanción en caso de incumplimiento de las normas establecidas en la ayuda, que además de la devolución de la prima puede conllevar al pago de una cantidad adicional (euros/ha)	1	2	3	4	5
Cultivo de leguminosas plurianuales	Obligación de incluir el cultivo de alfalfa o esparceta en un porcentaje variable de la superficie declarada	1	2	3	4	5
Restricciones de calendario	Prohibición de realizar labores en el barbecho algunos meses del año	1	2	3	4	5

24. (P/NP) *Como Ud. sabe, las medidas agroambientales y la política agraria en general cambia de forma constante. Para hacer cambios que sean percibidos como positivos por los agricultores, es necesario saber sus preferencias y opiniones ante varias posibles medidas agroambientales que están siendo debatidas en la actualidad, especialmente en épocas de crisis económica donde existe menos presupuesto disponible. Las medidas que se presentan a continuación podrían reemplazar en un futuro próximo las que Ud ha suscrito o que conoce por vía de otros agricultores. A continuación le presentamos varias posibles medidas agroambientales encaminadas a la protección de aves esteparias, que Ud. podría suscribir durante un período de 5 años. Junto con estas medidas, también le describimos las características y requisitos de las mismas. Estos son los únicos requisitos que Ud debe considerar para elegir aquella que sea más favorable de acuerdo a sus preferencias e intereses. No hay otros requisitos adicionales.*

Por lo tanto, lo que le pedimos a continuación es que elija entre varias medidas agroambientales que posiblemente se pondrán en funcionamiento cuando las actuales finalicen. Es por ello, que Ud. puede elegir no participar en ninguno de los contratos ofrecidos si no le resultan rentables o viables, ya que estamos considerando decisiones cercanas pero futuras. Si no eligiera ninguno de los contratos que se le presentan a continuación, entre las opciones dadas, entonces no tendría la ayuda de protección de aves esteparias, pero podría, dependiendo de la disponibilidad presupuestaria, solicitar otras medidas agroambientales y el pago único.

Los siguientes contratos establecen distintos requisitos sobre el cultivo año y vez de cereal/barbecho y le proponen incluir un determinado porcentaje de leguminosa (alfalfa o esparceta). Además, estos contratos también se diferencian en otras características como la prima, la flexibilidad en la superficie acogida, la multa en caso de incumplimiento y la restricción de realizar labores o aprovechamiento en la superficie de barbecho y/o alfalfa en un determinado periodo del año ¿Cuál de ellos escogería?

Para todos los contratos ofrecidos la duración establecida es de 5 años y la probabilidad de inspección en estos contratos es como en la actualidad. Se deben cumplir determinados requisitos:

- Mantener el rastrojo de cereal hasta el 31 de diciembre y dejar la paja en el terreno en al menos el 50% de la superficie

- No utilizar productos fitosanitarios en período de no cultivo

- No laboreo o aprovechamiento de leguminosa en abril, mayo y junio.

Pero como ve, otros requisitos varían. Marque al final del cuadro el contrato que más le gustaría tener de acuerdo a sus preferencias.

CARACTERÍSTICAS DEL CONTRATO	**Contrato tipo A**	**Contrato tipo B**	**No suscribiría ningún contrato de protección de aves**
Prima (*)	30€/ha	60€/ha	
Flexibilidad en la superficie acogida	0%	40%	
Multa adicional por encima de la devolución de la prima	0€/ha	200€/ha	
Cultivar leguminosas (alfalfa o esparceta) en un porcentaje de la superficie acogida	0%	20%	
Prohibición de laboreo o aprovechamiento de barbecho durante …	Ninguna restricción	1 Abril al 1 Agosto	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

25. (P/NP) ¿Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

26. (P/NP) ¿Y de los siguientes que se presentan a continuación?

CARACTERÍSTICAS DEL CONTRATO	Contrato tipo A	Contrato tipo B	No suscribiría ningún contrato de protección de aves
Prima (*)	120€/ha	30€/ha	
Flexibilidad en la superficie acogida	40%	0%	
Multa adicional por encima de la devolución de la prima	0€/ha	200€/ha	
Cultivar leguminosas en un porcentaje de la superficie acogida	0%	20%	
Prohibición de laboreo o aprovechamiento de barbecho durante…	1 Abril al 1 Agosto	Ninguna restricción	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

27. (P/NP) Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

28. (P/NP) ¿Y de los siguientes que se presentan a continuación?

CARACTERÍSTICAS DEL CONTRATO	Contrato tipo A	Contrato tipo B	No suscribiría ningún contrato de protección de aves
Prima (*)	90€/ha	120€/ha	
Flexibilidad en la superficie acogida	0%	40%	
Multa adicional por encima de la devolución de la prima	0€/ha	200€/ha	
Cultivar leguminosas en un porcentaje de la superficie acogida	20%	0%	
Prohibición de laboreo o aprovechamiento de barbecho durante …	1 Abril al 1 Agosto	Ninguna restricción	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

29. (P/NP) Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

30. (P/NP) Y ya para finalizar ¿Qué contrato escogería de los siguientes que se presentan a continuación?

CARACTERÍSTICAS DEL CONTRATO	**Contrato tipo A**	**Contrato tipo B**	**No suscribiría ningún contrato de protección de aves**
Prima (*)	60€/ha	90€/ha	
Flexibilidad en la superficie acogida	40%	0%	
Multa adicional por encima de la devolución de la prima	0€/ha	200€/ha	
Cultivar leguminosas en un porcentaje de la superficie acogida	20%	0%	
Prohibición de laboreo o aprovechamiento de barbecho durante…	Ninguna restricción	1 Abril al 1 Agosto	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

31. (P/NP) Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

32 (P) En el caso de que siempre haya elegido como más preferida la opción "Ningún contrato", ¿Cuáles son sus motivos?

_____

33 (P) ¿Qué habría hecho en la superficie acogida actual de no existir estas medidas agroambientales?

☐ Mantendría el mismo plan de cultivos que el que venía desarrollando. En este caso, ¿mantendría Usted el mismo calendario de labores?

Si☐ No☐

☐ Cambiaría el plan de cultivos: Cómo?_____
☐ Mantendría la tierra arada para cobrar el pago único pero no cultivaría
☐ Abandonaría completamente la actividad agraria

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE III. INDICADORES DE ÉXITO DE LAS AYUDAS

34 (P/NP)¿Conoce algunas de las especies de aves que hay en la zona donde se ubica su explotación?

No ☐ Si ☐ , ¿puede nombrarme algunas?

_____

35 (P/NP) Conoce algún refrán, dicho o canción sobre las aves esteparias?
Si ☐ No ☐

En caso afirmativo, ¿nos podría indicar cuál conoce?

_____

_____

36 (P/NP) Desde el año 2000 ¿Ha observado un cambio en la presencia de aves en sus parcelas o colindantes?

Si ☐ No ☐

En caso afirmativo, ¿qué tipo de cambio ha observado?

☐ He observado un mayor número de aves
☐ He observado nuevas especies ¿cuáles? _____
☐ He observado un menor número de aves
☐ Están desapareciendo alguna(s) especie(s) ¿cuál(es)? _____
☐ Otros cambios (indicar):_____

37 (P/NP) ¿Cree usted que estas medidas son efectivas para la protección y conservación de las aves esteparias? 1=”nada efectivas” a 5=”muy efectivas”

Nada efectivas	No muy efectivas	Algo efectivas	Muy efectivas	Extremadamente efectivas	No sabe
1	2	3	4	5	6

38 (P/NP) Podría describir otros beneficios que a su juicio tienen estas medidas agroambientales (Ej. erosión, prevención de incendios, etc)

_____

_____

39 (P/NP) Por favor, si tiene alguna sugerencia para mejorar estas medidas, indíquelo:

_____

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE IV: PREGUNTAS SOBRE SU EXPLOTACIÓN

40 (P/NP) Tamaño total de su explotación: _____ Has

41 (P/NP) Puede indicarnos su plan de cultivo de cultivos, incluyendo barbecho:

Cultivos herbáceos	superficie (has)		Rendimientos (kg/ha)		marcar con X si está acogida a:			Uso ganado (Si/No)
	secano	regadío	secano	regadío	Medida 1.1	Medida 1.8	Otras medidas	

42 (P/NP) ¿Tiene ganado propio en su explotación? Si ☐ No ☐

	Vacuno	Ovino - caprino
N° cabezas		

43 (P/NP) ¿Qué porcentaje de las tierras de secano que trabaja es arrendado?_____

44 (P/NP) Si tiene tierras arrendadas ¿cuál es el precio que paga por ellas? _____ €/ha

45 (P/NP) ¿Podría indicarnos cuál es el número de miembros de su familia, incluido Ud., que trabajan en la explotación? _____ ¿y el nº total de empleados?_____

46 (P/NP) ¿Contrata maquinaria para la realización de labores en su explotación?

No ☐ Si ☐, ¿Para que labores? _____

47 (P/NP) ¿Cuántas personas viven en su hogar?_____

a. ¿Cuántos entre 18-65? _____
b. ¿Cuántos menores de 18? ____
c. ¿Y mayores de 65?_____

48 (P/NP) ¿Nos podría indicar qué parte de los ingresos de su hogar vienen de las siguientes fuentes?

_____ % Venta de la producción y actividad agraria
_____ % Prestación de servicios a otros agricultores
_____ % Ayudas agroambientales
_____ % Pago único y otras ayudas
_____ % Ingresos de otros trabajos/ocupaciones
_____% Pensiones

49 (P/NP)¿Nos podría indicar cuál es la renta agraria que obtiene Ud en término medio al año de su actividad y producción agraria?

☐ menos de 10.000 € ☐ entre 30.000 € y 40.000 €
☐ entre 10.000 € y 20.000 € ☐ entre 40.000 € y 50.000 €
☐ entre 20.000 € y 30.000 € ☐ más de 50.000 €

50 (P/NP)¿Se encuentra parte o toda su explotación incluida en Zona de Especial Protección para las Aves (ZEPA)?

Si ☐ No ☐

51 (P/NP) ¿Tiene o ha tenido expectativas de transformación a regadío en sus parcelas de secano?

Si ☐ No ☐

52 (P/NP)¿Nos podría indicar en qué municipio está su explotación?

_____

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BLOQUE V: OTRAS PREGUNTAS SOBRE UD

53 (P/NP) ☐ Mujer ☐ Varón

54 (P/NP) ¿Podría indicar cuantos años de experiencia tiene en la agricultura?
_____

55 (P/NP) ¿Podría indicar su nivel de estudios?

☐Educación Básica ☐Bachillerato/FP ☐Universidad ☐Otras

56 (P/NP) ¿Es usted agricultor a tiempo completo? Si ☐ No ☐

De no ser agricultor a tiempo completo, ¿con qué actividad combina el trabajo agrario?_____

57 (P/NP) ¿Recibe la calificación de explotación prioritaria?

Si ☐ No ☐ No sabe ☐

58 (P/NP) ¿Pertenece a algún sindicato, asociación o cooperativa?

☐No ☐ Si, ¿A cuál?

59 (P/NP) ¿Podría indicarnos cuál es su año de nacimiento? _____

60 (P/NP) ¿Dentro de cuantos años cree que va a retirarse de la actividad agraria?
_____

61 (P/NP) ¿Qué cree usted que pasará con su explotación cuando usted deje la actividad agraria?

☐ Abandono ☐ Transferencia a un familiar
☐ Arrendamiento ☐Venta
☐ No sabe ☐Otros: _____

ANNEX IB: Questionnaire for farmers: type B

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

Tipo B

BLOQUE I: PARTE INTRODUCTORIA

1 (P/NP) ¿Qué nivel de conocimiento tiene Ud. sobre las medidas agroambientales para la conservación de fauna y aves esteparias?

☐ Las conozco bien ☐ Se algo de ellas pero no las conozco bien ☐ No las conozco

Por favor, indique las que conoce:……

Si las desconoce, permítame darle una pequeña introducción a las mismas. "*En los últimos años, como consecuencia de la transformación o abandono de las actividades agrarias tradicionales de secano se ha detectado una disminución de las aves que viven en las estepas. Algunas medidas agroambientales establecen ayudas para compensar a aquellos agricultores que de forma voluntaria se comprometan durante 5 años a realizar una serie de prácticas para favorecer la nidificación y alimentación de las aves esteparias en los cultivos herbáceos de secano. Dependiendo de la zona y la medida elegida, estas prácticas fomentan el cultivo de leguminosas en secano, como la alfalfa y la esparceta, y/o el mantenimiento del rastrojo en los campos de cereal. Además, las labores y aprovechamientos están restringidos durante los periodos de nidificación de las aves.*"

Si ha marcado un nivel de conocimiento muy bajo, pasar a la pregunta 11

2 (P/NP) En caso de conocerlas, ¿puede indicarnos como las ha conocido?

☐ Por otros agricultores ☐ En la radio
☐ Por la Oficina Comarcal Agraria ☐ Otras: _____
☐ A través de la caja rural o banco ☐ Por la cooperativa agraria
☐ Por organizaciones agrarias (UAGA, UPA, ASAJA, ARAGA)

3 (P/NP) En el marco del Programa de Desarrollo Rural 2007-2013 ¿Cuál es su experiencia con las siguientes medidas agroambientales?

MEDIDA		¿Es su explotación elegible? (Si/No/No sabe)	¿ participa? (Si/No)	Superficie acogida (Has)	¿qué prima percibe? €/Ha)
1.1	Mantenimiento del rastrojo				
1.1	Mantenimiento del rastrojo con compromiso adicional de no laboreo entre el 1 abril hasta el 30 septiembre				
1.2	Cultivo de esparceta para el mantenimiento de la fauna esteparia				
1.3	Generación de alimento para la avifauna				
1.8	Creación de corredores biológicos: siembra de alfalfa				

Nota: Si no ha participado en las medidas 1.1 y/o 1.8 pasar a la pregunta 6, después de haber rellenado la tabla.

4 (P) ¿Ha suscrito todos los años el mismo número de hectáreas a las medidas ambientales?

MEDIDA		SI	NO	¿Nos podría indicar qué ha cambiado?
1.1	Mantenimiento del rastrojo con compromiso adicional de no laboreo entre el 1 abril hasta el 30 septiembre			
1.8	Creación de corredores biológicos: siembra de alfalfa			

5 (P) ¿Cuáles son los motivos por los que ha solicitado estas medidas? (valorar de 1=’nada importante’ a 5=’muy importante’)

	Nada importante	Poco importante	Algo importante	Bastante importante	Muy importante
Porque mejora la rentabilidad de su explotación	1	2	3	4	5
Porque es un pago seguro, no tiene riesgos	1	2	3	4	5
Porque es fácil cumplir los requisitos	1	2	3	4	5
Porque se ahorra gasoil	1	2	3	4	5
Permiten disminuir el tiempo dedicado a la actividad agraria	1	2	3	4	5
Porque mejoran la fertilidad de la tierra	1	2	3	4	5
Porque de no haberlas, hubiera abandonado la agricultura	1	2	3	4	5
Porque estas medidas son necesarias desde un punto de vista ambiental	1	2	3	4	5
Por otros motivos					

6 (NP) En caso de no participar en ninguna de las medidas anteriormente citadas, ¿podría indicarnos con una X cuál es el motivo?

MOTIVOS	Medida 1.1	Medida 1.8
No me la han concedido/no se ha vuelto a abrir la convocatoria		
No estoy en zona elegible		
Tenía compromisos del programa anterior		
He preferido acogerme a otra(s) medida(s)		
La prima es muy baja		
La prohibición de labores y/o aprovechamiento durante determinados meses es muy restrictiva		
Otros motivos (indicar)		

7 (P/NP) ¿Podría marcar cuáles son para Ud. los mayores inconvenientes que conllevan estas medidas?

INCONVENIENTES	Medida 1.1	Medida 1.8
La prima es muy baja		
Complica las labores de la explotación		
Suponen mucho papeleo		
Tardan mucho en pagar		
Suponen una pérdida de producción importante		
La prohibición de labores/aprovechamiento en determinados meses del año		
Exigen un compromiso demasiado largo, si quieres darte de baja tienes que devolver los pagos recibidos		
Inseguridad sobre la continuidad de estas ayudas		
Otros inconvenientes (indicar)		

8 (P/NP) ¿Le supone un contratiempo mantener el rastrojo hasta el 31 de diciembre?

Si ☐ No ☐ No sabe ☐

En caso afirmativo ¿Qué fechas límite propondría usted para levantar el rastrojo?

_____

9 (P/NP) ¿Le supone un contratiempo el compromiso adicional voluntario de no laboreo de barbechos entre 1 de Abril y 30 de septiembre

Si ☐ No ☐ No sabe ☐

En caso afirmativo ¿Qué fechas límite propondría usted para la restricción de no laborear los barbechos? _____

10 (P/NP) ¿Le supone dificultades el requisito de no realizar pastoreo, ni labores de gestión de la vegetación adventicia en los meses de marzo, abril, mayo y junio?

Si ☐ No ☐ No sabe ☐

En caso afirmativo ¿qué fechas propondría usted como límites para no realizar pastoreo o labores?_____

11 (P/NP) ¿Participa usted actualmente en el *Plan Nacional de Rotación de Cultivos Extensivos de Secano*? Si ☐ No ☐

En caso afirmativo, ¿desde qué año?_____ ¿Con cuántas hectáreas?____

12 (P/NP) En el Programa de Desarrollo Rural 2000-2006 ¿había participado Ud en alguna medida agroambiental?

Si ☐ No ☐

En caso afirmativo, ¿podría indicarnos en cuáles?

Nombre de la medida	**Si/No**	**Año(s)**
1.1 Barbecho medioambiental		
1.2 Mantenimiento del rastrojo y picado de paja		
8.3 Ayudas para el mantenimiento de cultivos alternativos en perímetros de protección prioritaria		
Otras		

⇒ En caso de no conocerlas hasta ahora, pasar seguidamente a la pregunta 23

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE II: CARACTERÍSTICAS DE LOS CONTRATOS AGROAMBIENTALES

13 (P/NP)¿Conoce la modulación de las ayudas, o número de hectáreas a partir del cual se reduce la prima por Ha a cobrar?

Si ☐ No ☐

14 (P/NP) De acuerdo con la modulación, la prima que percibe el agricultor disminuye a partir de un número de hectáreas. Si se eliminase la modulación, la prima sería la misma con independencia del nº de has solicitadas (ver siguiente cuadro):

		Prima
Medida 1.1	Sin compromiso adicional de no laboreo hasta 31 septiembre	60 €/Ha
	Con compromiso adicional de no laboreo hasta 31 septiembre	72 €/Ha
Medida 1.8	Submedida 1.8.1	90 €/Ha
	Submedida 1.8.2	102 €/Ha
	Submedida 1.8.3	126 €/Ha

En este caso, ¿participaría usted /incluiría más hectáreas?

Medida 1.1: ☐Si , ¿Cuántas más?_____ ☐No ☐No sabe

Medida 1.8: ☐Si , ¿Cuántas más? _____ ☐No ☐No sabe

15 (P) ¿Conoce Ud el sistema de penalización si reduce o abandona el número de hectáreas acogidas?

Si ☐ No ☐ No Sabe ☐

16 (P) Si no existiera penalización, ¿habría Ud. reducido el número de hectáreas suscritas en alguno de los años anteriores?

☐ Si, ¿Cuántas?_____ medida 1.1. y/o _____ medida 1.8
☐No

17 (P) Durante el período vigente de la ayuda que Ud. disfruta en la actualidad, ¿Cuántas inspecciones ha pasado? _____ (Ej: 0, 1,2…..)

18 (P) ¿Ha sufrido alguna penalización derivada de las inspecciones?

No☐ Si☐, Especifique el motivo _____

19 (P) ¿Cuál cree usted que es la probabilidad de que le detecten y penalicen si usted no cumple las medidas?

Muy bajo	Bajo	Medio	Alto	Muy alto
Menor al 5%	Entre el 5-10%	10-25%	25-60%	>60 %

20 (P)¿Cuánto cree usted que cumplen sus vecinos con los requisitos solicitados?

Nada	Algo	Bastante	Mucho	Las cumplen al 100%
1	2	3	4	5

21 (P)¿Cuál es su grado de cumplimiento con las medidas?

Nada	Algo	Bastante	Mucho	Las cumplo al 100%
1	2	3	4	5

22 (P) Si todos sus vecinos cumplieran las medidas al 50%, ¿cómo las cumpliría usted?

Nada	Algo	Bastante	Mucho	Las cumpliría al 100%
1	2	3	4	5

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23 (P/NP) A la hora de escoger entre subvenciones agroambientales de protección de aves, díganos, ¿Cuál de los siguientes atributos tiene Ud. más en cuenta a la hora de elegir dichas ayudas agroambientales? Enumerar en orden de importancia (1 "no lo tengo nada en cuenta" y 5 "es el que más tengo en cuenta")

Atributos	**Descripción**	**Valoración**				
		No lo tengo nada en cuenta	No lo tengo muy en cuenta	Lo tengo algo en cuenta	Lo tengo muy en cuenta	Es el que más tengo en cuenta
Prima	Cuantía de la ayuda (euros por ha de cultivo)	1	2	3	4	5
Flexibilidad	Libertad para decidir la superficie acogida cada año (% admitido de variación respecto a la superficie del primer año, sin penalización alguna).	1	2	3	4	5
Multa	Sanción en caso de incumplimiento de las normas establecidas en la ayuda, que además de la devolución de la prima puede conllevar al pago de una cantidad adicional (euros/ha)	1	2	3	4	5
Cultivo de leguminosas plurianuales	Obligación de incluir el cultivo de alfalfa o esparceta en un porcentaje variable de la superficie declarada	1	2	3	4	5
Restricciones de calendario	Prohibición de realizar labores en el barbecho algunos meses del año	1	2	3	4	5

24. (P/NP) *Como Ud. sabe, las medidas agroambientales y la política agraria en general cambia de forma constante. Para hacer cambios que sean percibidos como positivos por los agricultores, es necesario saber sus preferencias y opiniones ante varias posibles medidas agroambientales que están siendo debatidas en la actualidad, especialmente en épocas de crisis económica donde existe menos presupuesto disponible. Las medidas que se presentan a continuación podrían reemplazar en un futuro próximo las que Ud ha suscrito o que conoce por vía de otros agricultores. A continuación le presentamos varias posibles medidas agroambientales encaminadas a la protección de aves esteparias, que Ud. podría suscribir durante un período de 5 años. Junto con estas medidas, también le describimos las características y requisitos de las mismas. Estos son los únicos requisitos que Ud debe considerar para elegir aquella que sea más favorable de acuerdo a sus preferencias e intereses. No hay otros requisitos adicionales.*

Por lo tanto, lo que le pedimos a continuación es que elija entre varias medidas agroambientales que posiblemente se pondrán en funcionamiento cuando las actuales finalicen. Es por ello, que Ud. puede elegir no participar en ninguno de los contratos ofrecidos si no le resultan rentables o viables, ya que estamos considerando decisiones cercanas pero futuras. Si no eligiera ninguno de los contratos que se le presentan a continuación, entre las opciones dadas, entonces no tendría la ayuda de protección de aves esteparias, pero podría, dependiendo de la disponibilidad presupuestaria, solicitar otras medidas agroambientales y el pago único.

Los siguientes contratos establecen distintos requisitos sobre el cultivo año y vez de cereal/barbecho y le proponen incluir un determinado porcentaje de leguminosa (alfalfa o esparceta). Además, estos contratos también se diferencian en otras características como la prima, la flexibilidad en la superficie acogida, la multa en caso de incumplimiento y la restricción de realizar labores o aprovechamiento en la superficie de barbecho y/o alfalfa en un determinado periodo del año ¿Cual de ellos escogería?

Para todos los contratos ofrecidos la duración establecida es de 5 años y la probabilidad de inspección en estos contratos es como en la actualidad. Se deben cumplir determinados requisitos:

- Mantener el rastrojo de cereal hasta el 31 de diciembre y dejar la paja en el terreno en al menos el 50% de la superficie

- No utilizar productos fitosanitarios en período de no cultivo

- No laboreo o aprovechamiento de leguminosa en abril, mayo y junio.

Pero como ve, otros requisitos varían. Marque al final del cuadro el contrato que más le gustaría tener de acuerdo a sus preferencias.

CARACTERÍSTICAS DEL CONTRATO	**Contrato tipo A**	**Contrato tipo B**	**No suscribiría ningún contrato de protección de aves**
Prima (*)	60€/ha	90€/ha	
Flexibilidad en la superficie acogida	0%	40%	
Multa adicional por encima de la devolución de la prima	200€/ha	0€/ha	
Cultivar leguminosas (alfalfa o esparceta) en un porcentaje de la superficie acogida	0%	20%	
Prohibición de laboreo o aprovechamiento de barbecho durante …	1 Abril al 1 Agosto	Ninguna restricción	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

25. (P/NP) ¿Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

26. (P/NP) ¿Y de los siguientes que se presentan a continuación?

CARACTERÍSTICAS DEL CONTRATO	Contrato tipo A	Contrato tipo B	No suscribiría ningún contrato de protección de aves
Prima (*)	90€/ha	120€/ha	
Flexibilidad en la superficie acogida	40%	0%	
Multa adicional por encima de la devolución de la prima	200€/ha	0€/ha	
Cultivar leguminosas en un porcentaje de la superficie acogida	0%	20%	
Prohibición de laboreo o aprovechamiento de barbecho durante…	Ninguna restricción	1 Abril al 1 Agosto	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

27. (P/NP) Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

28. (P/NP) ¿Y de los siguientes que se presentan a continuación?

CARACTERÍSTICAS DEL CONTRATO	Contrato tipo A	Contrato tipo B	No suscribiría ningún contrato de protección de aves
Prima (*)	120€/ha	30€/ha	
Flexibilidad en la superficie acogida	0%	40%	
Multa adicional por encima de la devolución de la prima	200€/ha	0€/ha	
Cultivar leguminosas en un porcentaje de la superficie acogida	20%	0%	
Prohibición de laboreo o aprovechamiento de barbecho durante …	Ninguna restricción	1 Abril al 1 Agosto	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

29. (P/NP) Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

30. (P/NP) Y ya para finalizar ¿Qué contrato escogería de los siguientes que se presentan a continuación?

CARACTERÍSTICAS DEL CONTRATO	Contrato tipo A	Contrato tipo B	No suscribiría ningún contrato de protección de aves
Prima (*)	30€/ha	60€/ha	
Flexibilidad en la superficie acogida	40%	0%	
Multa adicional por encima de la devolución de la prima	200€/ha	0€/ha	
Cultivar leguminosas en un porcentaje de la superficie acogida	20%	0%	
Prohibición de laboreo o aprovechamiento de barbecho durante…	1 Abril al 1 Agosto	Ninguna restricción	
Indicar 1=más preferido, 2=siguiente, 3= menos preferido			

(*) La prima se especifica por superficie cultivada, ya sea cereal y/o leguminosa

31. (P/NP) Cuántas hectáreas estaría usted dispuesto a suscribir, para el contrato que Ud ha señalado como más preferido? _____ Hectáreas

32 (P) En el caso de que siempre haya elegido como más preferida la opción "Ningún contrato", ¿Cuáles son sus motivos?

_____

33 (P) ¿Qué habría hecho en la superficie acogida actual de no existir estas medidas agroambientales?

☐ Mantendría el mismo plan de cultivos que el que venía desarrollando. En este caso, ¿mantendría Usted el mismo calendario de labores?

Si☐ No☐

☐ Cambiaría el plan de cultivos: Cómo?_____
☐ Mantendría la tierra arada para cobrar el pago único pero no cultivaría
☐ Abandonaría completamente la actividad agraria

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE III. INDICADORES DE ÉXITO DE LAS AYUDAS

34 (P/NP)¿Conoce algunas de las especies de aves que hay en la zona donde se ubica su explotación?

No ☐ Si ☐ , ¿puede nombrarme algunas?

_____

35 (P/NP) Conoce algún refrán, dicho o canción sobre las aves esteparias?

Si ☐ No ☐

En caso afirmativo, ¿nos podría indicar cuál conoce?

_____

_____

36 (P/NP) Desde el año 2000 ¿Ha observado un cambio en la presencia de aves en sus parcelas o colindantes?

Si ☐ No ☐

En caso afirmativo, ¿qué tipo de cambio ha observado?

☐ He observado un mayor número de aves
☐ He observado nuevas especies ¿cuáles? _____
☐ He observado un menor número de aves
☐ Están desapareciendo alguna(s) especie(s) ¿cuál(es)? _____
☐ Otros cambios (indicar):_____

37 (P/NP) ¿Cree usted que estas medidas son efectivas para la protección y conservación de las aves esteparias? 1=”nada efectivas” a 5=”muy efectivas”

Nada efectivas	No muy efectivas	Algo efectivas	Muy efectivas	Extremadamente efectivas	No sabe
1	2	3	4	5	6

38 (P/NP) Podría describir otros beneficios que a su juicio tienen estas medidas agroambientales (Ej. erosión, prevención de incendios, etc)

_____

_____

39 (P/NP) Por favor, si tiene alguna sugerencia para mejorar estas medidas, indíquelo:

_____

_____

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE IV: PREGUNTAS SOBRE SU EXPLOTACIÓN

40 (P/NP) Tamaño total de su explotación: _____ Has

41 (P/NP) Puede indicarnos su plan de cultivo de cultivos, incluyendo barbecho:

Cultivos herbáceos	superficie (has)		Rendimientos (kg/ha)		marcar con X si está acogida a:			Uso ganado (Si/No)
	secano	regadío	secano	regadío	Medida 1.1	Medida 1.8	Otras medidas	

42 (P/NP) ¿Tiene ganado propio en su explotación? Si ☐ No ☐

	Vacuno	Ovino - caprino
N° cabezas		

43 (P/NP) ¿Qué porcentaje de las tierras de secano que trabaja es arrendado?_____

44 (P/NP) Si tiene tierras arrendadas ¿cuál es el precio que paga por ellas?_____ €/ha

45 (P/NP) ¿Podría indicarnos cuál es el número de miembros de su familia, incluido Ud., que trabajan en la explotación? _____ ¿y el nº total de empleados?_____

46 (P/NP) ¿Contrata maquinaria para la realización de labores en su explotación?

No ☐ Si ☐, ¿Para que labores? _____

47 (P/NP) ¿Cuántas personas viven en su hogar?_____

d. ¿Cuántos entre 18-65? _____
e. ¿Cuántos menores de 18? ____
f. ¿Y mayores de 65?_____

48 (P/NP) ¿Nos podría indicar qué parte de los ingresos de su hogar vienen de las siguientes fuentes?

_____ % Venta de la producción y actividad agraria
_____ % Prestación de servicios a otros agricultores
_____ % Ayudas agroambientales
_____ % Pago único y otras ayudas
_____ % Ingresos de otros trabajos/ocupaciones
_____% Pensiones

49 (P/NP)¿Nos podría indicar cuál es la renta agraria que obtiene Ud en término medio al año de su actividad y producción agraria?

☐ menos de 10.000 € ☐ entre 30.000 € y 40.000 €
☐ entre 10.000 € y 20.000 € ☐ entre 40.000 € y 50.000 €
☐ entre 20.000 € y 30.000 € ☐ más de 50.000 €

50 (P/NP)¿Se encuentra parte o toda su explotación incluida en Zona de Especial Protección para las Aves (ZEPA)?

Si ☐ No ☐

51 (P/NP) ¿Tiene o ha tenido expectativas de transformación a regadío en sus parcelas de secano?

Si ☐ No ☐

52 (P/NP)¿Nos podría indicar en qué municipio está su explotación?
_____

ENCUESTA SOBRE MEDIDAS AGROAMBIENTALES DE PROTECCIÓN DE AVES ESTEPARIAS

BLOQUE V: OTRAS PREGUNTAS SOBRE UD

53 (P/NP) ☐ Mujer ☐ Varón

54 (P/NP) ¿Podría indicar cuantos años de experiencia tiene en la agricultura?
_____

55 (P/NP) ¿Podría indicar su nivel de estudios?

☐Educación Básica ☐Bachillerato/FP ☐Universidad ☐Otras

56 (P/NP) ¿Es usted agricultor a tiempo completo? Si ☐ No ☐

De no ser agricultor a tiempo completo, ¿con qué actividad combina el trabajo agrario?_____

57 (P/NP) ¿Recibe la calificación de explotación prioritaria?

Si ☐ No ☐ No sabe ☐

58 (P/NP) ¿Pertenece a algún sindicato, asociación o cooperativa?

☐No ☐ Si, ¿A cuál?

59 (P/NP) ¿Podría indicarnos cuál es su año de nacimiento? _____

60 (P/NP) ¿Dentro de cuantos años cree que va a retirarse de la actividad agraria?
_____

61 (P/NP) ¿Qué cree usted que pasará con su explotación cuando usted deje la actividad agraria?

☐ Abandono ☐ Transferencia a un familiar
☐ Arrendamiento ☐Venta
☐ No sabe ☐Otros: _____

ANNEX II: Questionnaire for shellfish gatherers

Ola. O meu nome é María e esta enquisa vai formar parte da tese que estou a realizar na Universidade de Santiago de Compostela co fin de avaliar as súas opinión sobre os problemas que teñen no seu sector na actualidade, motivo polo que me gustaría contar coa súa opinión se fose tan amable de responderme a unhas preguntas sobre esta tema. Moitas gracias

1. ¿Cómo chegou a ser mariscador/a?

	Marque cunha X
Tradición familiar	
Expectativa de conseguir altos beneficios	
Porque non tiña outra opción	
De casualidade	
Outros (especificar)	

2. ¿Canto tempo leva dedicándose a este oficio?(nº anos)

3. ¿Cre vostede que estarían mellor si fosen menos persoas vivindo do mar na súa zona?

Si ☐ Non ☐ Non sei ☐

4. ¿Cre vostede que a súa maneira de traballar no mar respeta as crenzas e tradicións locais?

Si ☐ Non ☐ Non sei ☐

5. ¿Qué eventos ou actividades cre vostede que afectan ou están afectando ao entorno natural da súa zona?

	Marque cunha X
Cambio climático	
Turismo	
Furtivismo	
Contaminación	
Outros (especificar)	

6. ¿Cantos días traballa ao mes?(unha aproximación)

7. ¿Cantas horas traballa ao día?(unha aproximación)

8. ¿Organizase o traballo co resto de mariscadoras da súa zona?

Si ☐ Non ☐ Non sei ☐

9. En caso afirmativo, ¿Cree vostede que é vantaxoso organizarse o traballo?

Si ☐ Non ☐ Non sei ☐

10. ¿Qué especies captura e cantos kg medios ao día?

ESPECIE	Nº kg medios que captura por día

11. ¿Chega sempre a cubrir os topes máximos establecidos de kg permitidos para cada especie?

Practicamente sempre	A maioría das veces	Algunhas veces	Poucas veces	Rara vez

12. ¿Cal é o fin primordial das especies que captura?

	Marque cunha X
Consumo no fogar	
Venda directa vía lonxa	
Pasan á depuradora	
Ambas	
Outros (especificar)	

13. ¿Cal cre que é a **porcentaxe de cumprimento coa normativa** do resto de pescadores/mariscadoras/percebeiros dentro de esta confraría na seguinte escala?

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

14. ¿Cal cre que é a **porcentaxe de cumprimento coa normativa** do resto de pescadores/mariscadoras /percebeiros noutras confrarías veciñas na seguinte escala?

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

15. ¿Cales son os conflitos que existen na súa zona?

	Marque cunha X
Furtivismo	
Paro	
Contaminación de empresas	
Outros (especificar)	

16. Con respecto ao furtivismo, ¿cree vostede que esta actividade ilegal dana o recurso?

Si ☐ Non ☐ Non sei ☐

17. ¿Por qué cree vostede que a xente furtiva?

	Marque cunha X
Escasa vixilancia	
Alto nivel de paro na zona	
Escaso coñecemento do dano que causa	
Posibilidade de altos ingresos non declarables	
Existencia de grupos marxinais na zona	
Baixa penalización	
Non está mal visto pola sociedade	
Outros (especificar cales)	

18. ¿Cales cree vostede que son as posibles solucións ao furtivismo?

	Marque cunha X
Máis vixilancia	
Multas máis elevadas	
Pena de cárcere	
Traballos voluntarios en favor da comunidade	
Máis oportunidades de emprego	
Controis ás depuradoras	
Controis aos establecementos hoteleiros	
Outros (especificar)	

19. ¿Cree vostede que está mal visto pola sociedade ser furtivo?

Penso que non está mal visto	Penso que á sociedade é lle indiferente	Penso que está mal visto

20. ¿Considera que as normas de capturas ás que están sometidos son sinxelas e fáciles de cumprir?

Si ☐ Non ☐ Non sei ☐

21. ¿Cree que esas normas son cribles e apropiadas?

Si ☐ Non ☐ Non sei ☐

22. ¿Cree vostede que as normas con respecto aos topes de extracción e vedas son eficaces?

Si ☐ Non ☐ Non sei ☐

23. ¿Cal cre vostede que **o porcentaxe de cumprimento da normativa referente á extracción do recurso**?

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

24. ¿Qué tipo de condutas son sancionables e cal é a sanción en caso de que se incumpran as normas?

	Si/Non	*Tipo de sanción*
Incumprir días de marisqueo		
Incumprir topes de Kg		
Incumprir tallas		
Outras(especificar)		

25. ¿Poderíanos dicir cantas veces son sancionados/as os seus compañeiros/as por termino medio nun ano?

26. ¿Existe vixilancia na zona para evitar o furtivismo?

Si ☐ Non ☐ Non sei ☐

27. ¿Cal diría vostede que é a súa **porcentaxe de cumprimento coa normativa** na seguinte escala?

10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

28. Se tódolos/as seus compañeiros/as tiveran un porcentaxe de cumprimento coa normativa do 50%, ¿cambiaría o seu nivel de cumprimento?

	Marque cunha X
Si, melloraría o meu nivel de cumprimento	
Si, diminuiría o meu nivel de cumprimento	
Non me importa o nivel de cumprimento dos demais, seguiría igual	

29. A continuación, imaxine que **vive nunha zona na que na que as praias están sen traballar** e se está pensado como organizar o actividade marisqueira. Para iso **estanse deseñando uns plans de** xestión que permitan mellorar temporalmente a abundancia do recurso. Estes plans consistirían no seguinte:

- Terían unha duración de 5 anos, nos que cada ano habería un número de meses nos que estaría prohibida a súa actividade. **Cada mes de veda tería unha subvención de 1200€.**

-É importante ter en conta que os efectos destas políticas non terían porque darse inmediatamente, é dicir, **vai a pasar un período de tempo ata que se note a maior abundancia de recurso.**

-Ademais, **no caso de que vostede aceptara unha das políticas e non respectase os tempos de veda sería sancionado, tendo que devolver a subvención recibida máis un 20% a maiores desta subvención, facéndose público o seu incumprimento ó resto de compañeiros.**

A continuación móstranselle unha serie de cadros para que elixa en cada un deles o escenario que lle pareza máis apropiado e que sexa máis preferido para vostede.

Este sería o primeiro escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	6	2	4	
Porcentaxe de melloría na abundancia do recurso	10%	15%	25%	
Anos que van pasar ata notar a melloría	1 ano e medio	Medio ano	1 ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	40	20	60	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Este sería o segundo escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	4	2	6	
Porcentaxe de melloría na abundancia do recurso	10%	15%	15%	
Anos que van pasar ata notar a melloría	Medio ano	1 ano	1 ano e medio	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	20	40	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

O terceiro escenario correspóndese co cadro seguinte, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	4	6	2	
Porcentaxe de melloría na abundancia do recurso	10%	15%	25%	
Anos que van pasar ata notar a melloría	1 ano e medio	1 ano	1 ano e medio	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	20	60	40	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Agora presentamos o cuarto escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	4	2	2	
Porcentaxe de melloría na abundancia do recurso	10%	15%	10%	
Anos que van pasar ata notar a melloría	1 ano	Medio ano	1 ano e medio	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	40	60	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Este sería o quinto escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	4	4	2	
Porcentaxe de melloría na abundancia do recurso	25%	15%	10%	
Anos que van pasar ata notar a melloría	1 ano	Medio ano	1 ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	20	40	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Este sería o sexto escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	2	6	4	
Porcentaxe de melloría na abundancia do recurso	15%	10%	10%	
Anos que van pasar ata notar a melloría	1 ano	Medio ano	Medio ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	20	60	40	
Elixa o PLAN que lle pareza mellor para os seus intereses				

O sétimo escenario correspóndese co cadro seguinte, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	4	6	2	
Porcentaxe de melloría na abundancia do recurso	10%	15%	25%	
Anos que van pasar ata notar a melloría	1 ano e medio	1 ano	Medio ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	60	40	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Agora presentamos o oitavo escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	6	2	4	
Porcentaxe de melloría na abundancia do recurso	15%	10%	15%	
Anos que van pasar ata notar a melloría	Medio ano	1 ano	Medio ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	20	40	60	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Este sería o noveno escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	2	4	6	
Porcentaxe de melloría na abundancia do recurso	15%	10%	25%	
Anos que van pasar ata notar a melloría	1 ano e medio	1 ano	Medio ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	40	60	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Agora presentamos o décimo escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	2	6	4	
Porcentaxe de melloría na abundancia do recurso	15%	10%	25%	
Anos que van pasar ata notar a melloría	1 ano e medio	1 ano	Medio ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	60	20	40	
Elixa o PLAN que lle pareza mellor para os seus intereses				

O undécimo escenario correspóndese co cadro seguinte, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	6	2	4	
Porcentaxe de melloría na abundancia do recurso	25%	10%	15%	
Anos que van pasar ata notar a melloría	1 ano e medio	Medio ano	1 ano	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	40	40	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

Finalmente, presentamos o último escenario, por favor, díganos que opción elixiría:

	Plan de Xestión A	**Plan de Xestión B**	**Plan de Xestión C**	**Non escollería ningún plan**
Número de meses de veda	2	6	4	
Porcentaxe de melloría na abundancia do recurso	25%	10%	15%	
Anos que van pasar ata notar a melloría	1 ano	Medio ano	1 ano e medio	
Número de persoas que se poderían acoller (imaxinando que o número máximo de persoas que poderían traballar sería 60 e o número mínimo de persoas serían 20)	60	40	20	
Elixa o PLAN que lle pareza mellor para os seus intereses				

30. Agora gustaríanos coñecer si, ¿realizou cursos formativos para explotar mellor o recurso?

Si ☐ Non ☐ Non sei ☐

En caso afirmativo, díganos o seguinte:

31. ¿Cre vostede que estes cursos foron de utilidade para mellorar o seu coñecemento sobre a forma de traballar o mar?

Si ☐ Non ☐ Non sei ☐

32. ¿Forma vostede parte da confraría?

Si ☐ Non ☐ Non sei ☐

33. ¿Cre vostede que existe unha persoa líder na xestión dos recursos da súa zona?

Si ☐ Non ☐ Non sei ☐

34. ¿Cre vostede que a súa familia espera que vostede cumpra a normativa ao 100%? Marque cunha X

Penso que non o esperan en absoluto	Penso que non o teñen en conta	Penso que o pensan claramente

35. ¿Cre vostede que os seus veciños esperan que vostede cumpra a normativa ao 100%? Marque cunha X

Penso que non o esperan en absoluto	Penso que non o teñen en conta	Penso que o pensan claramente

USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

INDICADORES SOCIOECONÓMICOS

- Ano de nacemento: |___ |___| ___| ___|

- Lugar de residencia (concello):

Muller ☐ Home ☐

- Número de persoas no seu fogar (incluíndose vostede): ____ ____

Nº de persoas no fogar menores de 16 anos: ____
Nº de persoas no fogar de entre 16 a 30 anos: ____
Nº de persoas no fogar maiores de 30 anos: ____

- Número de persoas no seu fogar que obteñen ingresos, tanto por traballo como por pensións:___

- Por favor indique cunha X o seu nivel educativo:

	Marque cunha X
Sen estudios	
Estudios primarios(EXB/Bacharelato elemental ou similares	
FPI/FPII ou similares	
Bacharelato superior/BUP/COU ou similares	
Universitarios	

- Por favor indique cunha X os ingresos brutos mensuais que aproximadamente obtén polo seu traballo:

	Marque cunha X
Menos de 1.000 €	
1.001 -1.800 €	
1.801- 2.500 €	
2.501- 3.000 €	
Máis de 3.000 €	

- ¿Pertence vostede a algún sindicato, asociación ou cooperativa?

Si ☐ Non ☐ Non sei ☐

¿A cal?

- ¿Dispón vostede dunha segunda vivenda?

Si ☐ Non ☐ Non sei ☐

- No último ano, ¿cantos días puido coller de lecer ou descanso? Marque cunha X

	Marque cunha X
Ningún, traballei tódolos días que puiden	
Un mes	
Quince días	
Unha semana	
Outros (especificar)	

- ¿A qué dedica o seu tempo libre e de vacacións?

	Marque cunha X
Actividades Informáticas	
Cursos varios	
Lectura	
Ver TV/DVD/videos	
Escoitar a radio	
Ir ao cine	
Viaxar por España	
Viaxar por Galicia	
Viaxar ao estranxeiro	
Labores da casa	

- No caso de necesitar acudir ao médico, ¿dispón dun seguro médico privado a maiores da Seguridade Social?

Si ☐ Non ☐ Non sei ☐

- ¿Podería por favor indicarnos o nome da rúa onde vive? (o nome unicamente)

ANNEX III. A: Questionnaire for forest owners: Punishment

1. Aproximadamente, ¿cantas hectáreas de monte forman parte da comunidade de montes en man común á que vostede pertence?

	Marque cunha X
Menos de 30 ha.	
Entre 31 e 50 ha.	
Entre 51 e 70 ha.	
Entre 71 e 100 ha.	
Entre 101 e 150 ha.	
Entre 151 e 250 ha.	
Entre 251 e 300 ha.	
Máis de 300 ha.	

2. ¿Naceu no lugar onde están os montes da comunidade?

Si ☐ Non☐ Non sei ☐

3. ¿Os montes da comunidade encóntranse onde vive actualmente ou están onde ten a súa segunda vivenda?

	Marque cunha X
Os montes da comunidade encóntranse onde vivo actualmente	
Os montes da comunidade encóntranse onde teño a miña segunda vivenda	

4. Cando foi a última vez que venderon madeira?

5. Na súa opinión, a conservación dos montes na súa comunidade é …

Moi mala	Bastante mala	Normal	Bastante boa	Moi boa

6. Na súa opinión e no caso de que teña montes propios, a conservación dos seus montes é …

Moi mala	Bastante mala	Normal	Bastante boa	Moi boa

7. ¿Cal é a principal actividade económica que se leva a cabo no monte da comunidade?

	Marque cunha X
Gandería	
Madeira	
Actividades agrícolas	
Recolección de froitas, setas..	
Caza	
Produción de biomasa	
Enerxía eólica	
Produción de mel	
Outras actividades, diga cales	
Ningunha	

8. Dende un punto de vista económico, vostede diría que os montes da súa zona son:

NON COMPETITIVOS (o monte non crea traballo nin riqueza)	MODERADAMENTE COMPETITIVOS (o monte xera algunhas fontes de ingresos adicionais, pero non é unha fonte estable de ingresos)	COMPETITIVOS (o monte é o sustento de moitas familias)

9. ¿Cómo cre vostede que a administración (Xunta de Galicia) xestiona os problemas dos montes?

Moi mal	Bastante mal	Nin ben nin mal	Bastante ben	Moi ben

10. Na súa opinión, ¿cál é o principal problema ao que se enfronta o sector forestal na súa zona? Escolla unicamente unha opción.

Neglixencia (os montes non están ben coidados)	
Incendios	
Sobre-aproveitamento ou deforestación	
Baixa rendibilidade económica	
Despoboamento nas zonas rurais	
Talas ilegais	
Invasión de especies non nativas	
Enfermidades e pestes dos árbores	
Outros (dicir cales)	

11. No caso de que na pregunta anterior escollese como problema principal os incendios, indique en qué ano foi o último incendio na súa zona:

12. ¿Cómo cre van estar os montes da súa zona dentro de 50 anos?

13. Os traballos que se fan no monte da comunidade son encargados ao exterior ou son feitos polos propios membros?

_____

- En caso de que sexa feitos polos propios membros, ¿Canto colabora cos demais comuneiros?

Moito	Bastante	Normal	Máis ben pouco	Pouco

14. Na súa opinión, ¿Existe unha persoa líder dentro da súa zona á hora de ocuparse dos temas forestais?

Si ☐ Non ☐ Non sei ☐

15. ¿Cómo considera a relación que ten cos demais comuneiros?

Moi boa	Bastante boa	Normal	Máis ben mala	Mala

16. ¿Cantas veces se pode chegar a reunir cos comuneiros cada ano para tratar temas do monte?

17. A decisión que vostede toma nas asembleas, ¿ Cómo a toma?

	Marque cunha X
As decisións son cousa miña aínda que o monte é de meus pais	
As decisións tómanse entre toda a familia porque aínda non se repartiu	
As decisións tómoas unicamente eu posto que o monte é meu	
As decisións tómoas en conxunto cos meus fillos posto que eu xa son maior	

18. ¿Cantos membros forman parte da comunidade de montes á que vostede pertence?

19. ¿Cantos anos fai que vostede é o encargado/a de tomar as decisións (votar nas asembleas) con respecto aos temas da comunidade de montes?

20. ¿Cre vostede que na súa comunidade están ben claros os límites acerca de quen forma parte da comunidade de montes e quen non?

Si ☐ Non ☐ Non sei ☐

21. ¿Cre que tódolos comuneiros e os veciños próximos coñecen estes límites?

Si ☐ Non ☐ Non sei ☐

22. ¿Cre que na practica estes límites se respectan?

Si ☐ Non ☐ Non sei ☐

23. ¿Cre que as normas de aproveitamento forestal que teñen que cumprir son apropiadas para conservar o recurso?

Si ☐ Non ☐ Non sei ☐

24. ¿Cre que estas normas son apropiadas para que a comunidade poida aproveitar dun xeito correcto o recurso?

Si ☐ Non ☐ Non sei ☐

25. ¿ Cre son eficaces?

Si ☐ Non ☐ Non sei ☐

26. ¿E cre que respectan as crenzas e tradicións locais?

Si ☐ Non ☐ Non sei ☐

27. ¿Diría vostede que se poden mellorar as normas existentes?

Si ☐ Non ☐ Non sei ☐

28. En caso afirmativo, ¿En qué se poderían mellorar?

29. As decisións en torno a temas forestais ¿tómanse de forma colectiva, entre todos e igualmente representados?

Si ☐ Non ☐ Non sei ☐

30. ¿Existen controles para asegurar o cumprimento das normas forestais por parte da comunidade?

Si ☐ Non ☐ Non sei ☐

31. ¿Existen controles para asegurar que os veciños que NON forman parte da comunidade respeten os montes en man común?

Si ☐ Non ☐ Non sei ☐

32. ¿Existen sancións para as persoas que non cumpran as obrigacións establecidas na lei?

Si ☐ Non ☐ Non sei ☐

33. No caso de que existan sancións, ¿son variables dependendo da infracción cometida?

Si ☐ Non ☐ Non sei ☐

34. ¿Existen mecanismos rápidos para solucionar os conflitos que poidan xurdir?

Si ☐ Non ☐ Non sei ☐

35. ¿Qué é o que se fai para resolvelos conflitos?

36. ¿Cre que os seus dereitos, as súas decisións son respectadas por outros que non sexan membros da comunidade e pola administración?

Si ☐ Non ☐ Non sei ☐

37. ¿Asiste a tódalas reunións que se organizan na comunidade por diferentes temas?

Sempre	Case sempre	A veces	Case nunca	Nunca

38. ¿Qué actividades se propoñen ou promoven dende a propia comunidade para mellorar o estado do monte ou contribuír ao benestar do pobo?

39. ¿Canto participa vostede nestas actividades?

Sempre	Case sempre	A veces	Case nunca	Nunca

40. ¿Pensa que tódolos comuneiros realizan as tarefas necesarias para manter o monte en bo estado?

Si ☐ Non ☐ Non sei ☐

41. ¿Forma vostede parte da xunta directiva da comunidade de montes?

Si ☐ Non☐ Non sei ☐

- En caso afirmativo, ¿dende cando?_____

42. Podería indicarnos o nome da comunidade de monte en man común á que pertenza:
_____

43. ¿Cre vostede que, con respecto ás tarefas que son necesarias levar a cabo na comunidade, vostede se esforza máis que o resto de membros?

Si ☐ Non☐ Non sei ☐

44. ¿Considera que o grado de esforzo dos demais comuneiros é suficiente?

Si ☐ Non☐ Non sei ☐

45. ¿É o seu grado de esforzo?

Si ☐ Non☐ Non sei ☐

46. ¿Cantos días lle dedica ao ano para manter o monte en bo estado?

47. ¿Qué diría vostede acerca das seguintes afirmacións? Valore marcando cunha X:

- Na maior parte dos comuneiros da miña zona pódese confiar

Estou moi de acordo	Estou de acordo	Nin de acordo nin en desacordo	Estou bastante en desacordo	Estou moi en desacordo

- A xestión do monte tiña que facerse pensando máis nas xeracións presentes que futuras

Estou moi de acordo	Estou de acordo	Nin de acordo nin en desacordo	Estou bastante en desacordo	Estou moi en desacordo

48. Agora imaxine que vostede pertence a unha comunidade de montes que está formada por 50 veciños. A súa comunidade acaba de recibir unha sanción en virtude da nova Lei de Incendios polo *mal estado do monte* como consecuencia do pouco esforzo realizado polos propietarios en termos de limpeza e por tanto alto perigo de incendios. Entón, agora vostede ten que tomar unha decisión acerca de cómo repartir esta sanción entre os membros. É dicir, ten que indicar canto diñeiro paga vostede e canto diñeiro ten que pagar a comunidade. Pero ten que ter en conta, que a comunidade ten un fondo que pode cubrir o pago desta multa. Entón, este pago pode facelo vostede directamente, ou facer que o fondo que hai dispoñible na comunidade se faga cargo da súa parte, independentemente do que decidan facer os outros.

A continuación, móstraselle unha táboa na que ten que indicar a súa decisión de pago:

Importe da sanción	A ser 50, se repartimos a partes iguais, a cada veciño corresponderíalle:	O que pago eu	O que paga o fondo da comunidade
Se a sanción fose de 500 €	10 €	….	….
Se a sanción fose de 5.000 €	100 €	….	….
Se a sanción fose 50.000 €	1000 €	.....	....

49. A continuación preséntanselles unhas afirmacións para que vostede valore. Só ten que indicar cunha X o que vostede pensa:

	Nunca	Máis dunha vez	A miúdo	Moi a miúdo
Axudo a alguén que ten problemas co coche ou tractor (cambiar unha roda, chamar a un mecánico, etc.)				
Prestei un obxecto de valor a un veciño que non coñecía demasiado				
Axudo aos meus veciños cos seus traballos				
Sen que ninguén me diga nada, aviso a un veciño se vexo que o seu ganado, os seus animais se escapan ou corren perigo				
Dalgún xeito, a veces penso que non é xusto que algunhas persoas traballen menos e teñan os mesmos dereitos ca min				
Moitas veces dou cousas e non espero nada a cambio				
Eu colaboro nas tarefas do monte en todo o que podo se os demais tamén colaboran				
Eu colaboro nas tarefas do monte polo meu propio ben				

INDICADORES SOCIOECONÓMICOS

- Ano de nacemento: |___ |___| ___| ___|
- Lugar de residencia (concello):

- Código Postal: |___ |___| ___| ___|
- Sexo:

Muller ☐ Home ☐

- Número de persoas no seu fogar (incluíndose vostede): ____ ____

Nº de persoas no fogar menores de 16 anos: ____
Nº de persoas no fogar de entre 16 a 30 anos: ____
Nº de persoas no fogar maiores de 30 anos: ____

- Por favor indique cunha X o seu nivel educativo:

	Marque cunha X
Sen estudios	
Estudios primarios(EXB/Bacharelato elemental ou similares	
FPI/FPII ou similares	
Bacharelato superior/BUP/COU ou similares	
Estudios Universitarios	

- ¿Cal é a súa profesión?

_____

- Por favor indique cunha X os ingresos brutos mensuais do seu fogar:

	Marque cunha X
Menos de 500 €	
501 - 1000 €	
1.001 -1.500 €	
1.501- 1.800 €	
1.801- 2.500 €	
2.501- 3.000 €	
3.001- 3.500 €	
Máis de 3.500 €	

- ¿Cal é actualmente a súa situación laboral?

	Marque cunha X
Asalariado	
Autónomo	
Desempregado, busca 1er emprego	
Desempregado, traballei antes	
Estudante	
Labores do fogar	
Xubilado / pensionista	
Outros (ESPECIFICAR):	

- ¿Pertence vostede a algún sindicato, asociación ou cooperativa?

Si ☐ Non ☐ Non sei ☐

¿A cal?

- ¿Tivo ou ten vostede algún cargo de responsabilidade na zona onde vive?

Si ☐ Non ☐ Non sei ☐

¿Cal?

- Pregunta optativa: Se vostede tivera que clasificarse dentro dunha determinada tendencia política, diría que é:
  - De esquerdas
  - De dereitas
  - De centro
  - Non ten ideoloxía política
  - Outro:

ANNEX III.B: Questionnaire for forest owners: Reward

1. Aproximadamente, ¿cantas hectáreas de monte forman parte da comunidade de montes en man común á que vostede pertence?

	Marque cunha X
Menos de 30 ha.	
Entre 31 e 50 ha.	
Entre 51 e 70 ha.	
Entre 71 e 100 ha.	
Entre 101 e 150 ha.	
Entre 151 e 250 ha.	
Entre 251 e 300 ha.	
Máis de 300 ha.	

2. ¿Naceu no lugar onde están os montes da comunidade?

Si ☐ Non☐ Non sei ☐

3 ¿Os montes da comunidade encóntranse onde vive actualmente ou están onde ten a súa segunda vivenda?

	Marque cunha X
Os montes da comunidade encóntranse onde vivo actualmente	
Os montes da comunidade encóntranse onde teño a miña segunda vivenda	

3. Cando foi a última vez que venderon madeira?

4. Na súa opinión, a conservación dos montes na súa comunidade é …

Moi mala	Bastante mala	Normal	Bastante boa	Moi boa

5. Na súa opinión e no caso de que teña montes propios, a conservación dos seus montes é …

Moi mala	Bastante mala	Normal	Bastante boa	Moi boa

6. ¿Cales son as actividades económicas que se levan a cabo no monte da comunidade?

	Marque cunha X
Gandería	
Madeira	
Actividades agrícolas	
Recolección de froitas, setas..	
Caza	
Produción de biomasa	
Enerxía eólica	
Produción de mel	
Outras actividades, diga cales	
Ningunha	

7. Dende un punto de vista económico, vostede diría que os montes da súa zona son:

NON COMPETITIVOS (o monte non crea traballo nin riqueza)	MODERADAMENTE COMPETITIVOS (o monte xera algunhas fontes de ingresos adicionais, pero non é unha fonte estable de ingresos)	COMPETITIVOS (o monte é o sustento de moitas familias)

8. ¿Cómo cre vostede que a administración (Xunta de Galicia) xestiona os problemas dos montes?

Moi mal	Bastante mal	Nin ben nin mal	Bastante ben	Moi ben

9. Na súa opinión, ¿cál é o principal problema ao que se enfronta o sector forestal na súa zona? Escolla unicamente unha opción.

Neglixencia (os montes non están ben coidados)	
Incendios	
Sobre-aproveitamento ou deforestación	
Baixa rendibilidade económica	
Despoboamento nas zonas rurais	
Talas ilegais	
Invasión de especies non nativas	
Enfermidades e pestes dos árbores	
Outros (dicir cales)	

10. Por favor, indique en qué ano foi o último incendio na súa zona:

11. ¿Cómo cre que van estar os montes da súa zona dentro de 50 anos?

12. Os traballos que se fan no monte da comunidade son encargados ao exterior ou son feitos polos propios membros?

_____

- En caso de que sexa feitos polos propios membros, ¿Canto colabora cos demais comuneiros?

Moito	Bastante	Normal	Máis ben pouco	Pouco

13. Na súa opinión, ¿Existe unha persoa líder dentro da súa zona á hora de ocuparse dos temas forestais?

Si ☐ Non ☐ Non sei ☐

14. ¿Cómo considera a relación que ten cos demais comuneiros?

Moi boa	Bastante boa	Normal	Máis ben mala	Mala

15. ¿Cantas veces se pode chegar a reunir cos comuneiros cada ano para tratar temas do monte?

16. A decisión que vostede toma nas asembleas, ¿ Cómo a toma?

	Marque cunha X
As decisións son cousa miña posto que o comuneiro son eu	
Nas miñas decisións sempre teño en conta o que pensa a familia	

17. ¿Cantos membros forman parte da comunidade de montes á que vostede pertence?

18. ¿Cantos anos fai que vostede é o encargado/a de tomar as decisións (votar nas asembleas) con respecto aos temas da comunidade de montes?

19. ¿Cre vostede que na súa comunidade tódolos comuneiros se coñecen?

Si ☐ Non ☐ Non sei ☐

20. ¿Cre vostede que os veciños que non son comuneiros teñen claro que non forman parte da comunidade?

Si ☐ Non ☐ Non sei ☐

21. ¿Cre que na practica os veciños non comuneiros respectan á comunidade?

Si ☐ Non ☐ Non sei ☐

22. ¿Cre que as normas de aproveitamento forestal que teñen que cumprir son apropiadas para conservar o recurso?

Si ☐ Non ☐ Non sei ☐

23. ¿Cre que estas normas son apropiadas para que a comunidade poida aproveitar dun xeito correcto o recurso?

Si ☐ Non ☐ Non sei ☐

24. ¿ Cre son eficaces?

Si ☐ Non ☐ Non sei ☐

25. ¿E cre que respectan as crenzas e tradicións locais?

Si ☐ Non ☐ Non sei ☐

26. ¿Diría vostede que se poden mellorar as normas existentes?

Si ☐ Non ☐ Non sei ☐

27. En caso afirmativo, ¿En qué se poderían mellorar?

28. As decisións en torno a temas forestais ¿tómanse de forma colectiva, entre todos e igualmente representados?

Si ☐ Non ☐ Non sei ☐

29. ¿Existen controles para asegurar o cumprimento das normas forestais por parte da comunidade?

Si ☐ Non ☐ Non sei ☐

30. ¿Existen controles para asegurar que os veciños que NON forman parte da comunidade respeten os montes en man común?

Si ☐ Non ☐ Non sei ☐

31. ¿Existen sancións para as persoas que non cumpran as obrigacións establecidas na lei?

Si ☐ Non ☐ Non sei ☐

32. No caso de que existan sancións, ¿son variables dependendo da infracción cometida?

Si ☐ Non ☐ Non sei ☐

33. ¿Existen mecanismos rápidos para solucionar os conflitos que poidan xurdir?

Si ☐ Non ☐ Non sei ☐

34. ¿Qué é o que se fai para resolvelos conflitos?

35. ¿Cre que os seus dereitos, as súas decisións son respectadas por outros que non sexan membros da comunidade e pola administración?

Si ☐ Non ☐ Non sei ☐

36. ¿Asiste a tódalas reunións que se organizan na comunidade por diferentes temas?

Sempre	Case sempre	A veces	Case nunca	Nunca

37. ¿Qué actividades se propoñen ou promoven dende a propia comunidade para mellorar o estado do monte ou contribuír ao benestar do pobo?

38. ¿Canto participa vostede nestas actividades?

Sempre	Case sempre	A veces	Case nunca	Nunca

39. ¿Pensa que tódolos comuneiros realizan as tarefas necesarias para manter o monte en bo estado?

Si ☐ Non ☐ Non sei ☐

40. ¿Forma vostede parte da xunta directiva da comunidade de montes?

Si ☐ Non☐ Non sei ☐

- En caso afirmativo, ¿dende cando?_____

41. Podería indicarnos o nome da comunidade de monte en man común á que pertenza:
_____

42. ¿Cre vostede que, con respecto ás tarefas que son necesarias levar a cabo na comunidade, vostede se esforza máis que o resto de membros?

Si ☐ Non☐ Non sei ☐

43. ¿Considera que o grado de esforzo dos demais comuneiros é suficiente?

Si ☐ Non☐ Non sei ☐

44. ¿É o seu grado de esforzo?

Si ☐ Non☐ Non sei ☐

45. ¿Cantos días dedica ao ano para temas relacionados co monte?

46. ¿Qué diría vostede acerca das seguintes afirmacións? Valore marcando cunha X:

- Na maior parte dos comuneiros da miña zona pódese confiar

Estou moi de acordo	Estou de acordo	Nin de acordo nin en desacordo	Estou bastante en desacordo	Estou moi en desacordo

- A xestión do monte tiña que facerse pensando máis nas xeracións presentes que futuras

Estou moi de acordo	Estou de acordo	Nin de acordo nin en desacordo	Estou bastante en desacordo	Estou moi en desacordo

47. Agora imaxine que vostede pertence a unha comunidade de montes que está formada por 50 veciños. A súa comunidade acaba de recibir unha subvención declarable en virtude da Lei de prevención e defensa contra incendios polo *bo estado do monte* como consecuencia do esforzo realizado polos propietarios. Estes cartos poden ser empregados libremente por vostedes, é dicir, poden cobralos de xeito individual pero tamén poden reinvestilos na Comunidade de Montes. Da parte que lle corresponde a vostede, ten que decidir libremente canto diñeiro garda no seu peto e canto deixaría (de ser o caso) para un fondo da comunidade de montes. A cantidade que vostede deixe no fondo será empregada en realizar traballos de mantemento do monte co cal se prevé obter uns beneficios que lle reportarán o 40% do total que vostede deixou para ese fondo (ou investiu) no fondo.

A continuación, móstraselle unha táboa na que ten que indicar a súa decisión de reparto:

Importe da subvención	A ser 50, se repartimos a partes iguais, a cada veciño corresponderíalle:	Para min	No fondo reinvestiría
Se a subvención fose de 500 €	10 €	….	….
Se a subvención fose de 5.000 €	100 €	….	….
Se a subvención fose 50.000 €	1000 €	.....	....

48. A continuación preséntanselles unhas afirmacións para que vostede valore. Só ten que indicar cunha X o que vostede pensa:

	Nunca	Máis dunha vez	A miúdo	Moi a miúdo
Axudo a alguén que ten problemas co coche ou tractor (cambiar unha roda, chamar a un mecánico, etc.)				
Prestei un obxecto de valor a un veciño que non coñecía demasiado				
Axudo aos meus veciños cos seus traballos				
Sen que ninguén me diga nada, aviso a un veciño se vexo que o seu ganado, os seus animais se escapan ou corren perigo				
Dalgún xeito, a veces penso que non é xusto que algunhas persoas traballen menos e teñan os mesmos dereitos ca min				
Moitas veces dou cousas e non espero nada a cambio				
Eu colaboro nas tarefas do monte en todo o que podo se os demais tamén colaboran				
Eu colaboro nas tarefas do monte polo meu propio ben				

INDICADORES SOCIOECONÓMICOS

- Ano de nacemento: |___ |___| ___| ___|
- Lugar de residencia (concello):

- Código Postal: |___ |___| ___| ___|
- Sexo:

Muller ☐ Home ☐

- Número de persoas no seu fogar (incluíndose vostede): ____ ____

Nº de persoas no fogar menores de 16 anos: ____
Nº de persoas no fogar de entre 16 a 30 anos: ____
Nº de persoas no fogar maiores de 30 anos: ____

- Por favor indique cunha X o seu nivel educativo:

	Marque cunha X
Sen estudios	
Estudios primarios(EXB/Bacharelato elemental ou similares	
FPI/FPII ou similares	
Bacharelato superior/BUP/COU ou similares	
Estudios Universitarios	

- ¿Cal é a súa profesión?

_____

- Por favor indique cunha X os ingresos brutos mensuais do seu fogar:

	Marque cunha X
Menos de 500 €	
501 - 1000 €	
1.001 -1.500 €	
1.501- 1.800 €	
1.801- 2.500 €	
2.501- 3.000 €	
3.001- 3.500 €	
Máis de 3.500 €	

- ¿Cal é actualmente a súa situación laboral?

	Marque cunha X
Asalariado	
Autónomo	
Desempregado, busca 1er emprego	
Desempregado, traballei antes	
Estudante	
Labores do fogar	
Xubilado / pensionista	
Outros (ESPECIFICAR):	

- ¿Pertence vostede a algún sindicato, asociación ou cooperativa?

Si ☐ Non ☐ Non sei ☐

¿A cal?

- ¿Tivo ou ten vostede algún cargo de responsabilidade na zona onde vive?

Si ☐ Non ☐ Non sei ☐

¿Cal?

- Pregunta optativa: Se vostede tivera que clasificarse dentro dunha determinada tendencia política, diría que é:

  - De esquerdas
  - De dereitas
  - De centro
  - Non ten ideoloxía política
  - Outro:

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The role of social norms on preferences towards climate change policies: A meta-analysis

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HIGHLIGHTS

- Effective policy design is required in order to curb climate change.
- Using a meta-analysis, we find that mitigation actions are preferred over adaptation actions.
- Economic conditions play a crucial role for supporting efforts to combat climate change.
- Cultural and social dimensions are relevant for the acceptability of climate policies.
- Understanding social norms and cultural variables may help with the climate change debate.

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ABSTRACT

The present study provides a review of existing assessments of preferences for climate change mitigation and adaptation policies through a worldwide meta-analysis. In this study, we analyze the impact of social values and norms on preferences towards climate change adaptation and mitigation policies. In a sample of 58 international studies, we found that mitigation actions were preferred over adaptation actions, and that preferences towards climate change policies are affected by attitudes towards time and social norms. In particular, societies with a long-term orientation display greater support towards climate change policies. These results therefore reveal the role of social factors as being crucial in order to understand the acceptability of climate change policies at a worldwide level.

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1. Introduction

The consequences of climate change are numerous and wide-ranging. Changes in temperatures and climate variability impact the environment and human health (United Nations Framework Convention on Climate Change, UNFCC, 2012)[1] and have significant economic impacts around the world (The Nature Conservancy, 2013). A number of recent, severe episodes related to climate change with clear economic implications were hurricane Sandy, which affected USA in 2012, and the typhoon Haiyan that caused more than 6000 deaths in 2013 in the Philippines, as well as the cold wave sweeping the USA in 2014, with temperatures below 50°. In general terms, the economic sectors that are most affected by this global climate change process are agriculture, forestry, energy and tourism (European Commission, 2012). Recent research has also shown that while no clear action is taken to curb global carbon emissions, climate change impacts could cost between 5% and 20% of the annual global gross domestic product of many countries (Hallegatte and Corfee-Morlot, 2011).

Due to these important economic and social consequences of climate change, a large number of policies have been developed around the world aimed at reducing the impact of such an important phenomenon. The most significant international agreement was the Kyoto Protocol, which came into effect in 2005. This treaty encouraged industrialized countries to stabilize emissions of greenhouse gases (GHG). However, and according to Schiermeier (2012), despite the existence of this protocol, global emissions have increased worldwide by 50% since 1990, a trend that has mainly been driven by the economic growth of China and other parts of Asia, South America and Africa. One of the main criticisms is that the Kyoto Protocol has not controlled for the free-rider

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[1] United Nations Framework Convention on Climate Change (UNFCC), http://unfccc.int/files/documentation/text/html/list_search.php?what=keywords&val=&valan=a&anf=0&id=10.

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problem, at the same time as having very few enforcement mechanisms (Helm, 2012).

Based on these considerations, climate change policies have become one of the major concerns and priorities around the world. However, and after many experimental policies and applications, one question remains unsolved: how should effective climate change policies be designed and articulated? This paper sheds light on the role of social norms on preferences (reflected by the willingness to pay [WTP]) for different types of climate control policies. These social factors are generally ignored in the architectural design of effective mitigation and adaptation strategies worldwide. In the following analysis, these factors have a strong explanatory power in terms of understanding acceptability and preferences towards climate change policies.

It should be acknowledged that in order for most climate change policies to be effective, behavioral changes have to take place, including a reduction of energy consumption, awareness of the issues, and a willingness to adopt (and pay) for newer and cleaner technologies. These strategies would go hand in hand with other mechanisms suggested by the UNEP (2009), such as promoting the construction of energy efficient buildings, sustainable transport, renewable energies, and the re-use of industrial and household wastes, among others. Therefore, understanding the role of social norms and the preferences of decision-makers and end-users is crucial in the process of promoting acceptability for control policies (Pollit and Shaorshadze, 2011).

Given the need to articulate policies to combat the global climate change process, and based on the fact that most require a change in consumption or production technologies, our goal is to identify the type of actions that are most preferred and accepted by citizens, assessing how the public's support for these policies (expressed by willingness to pay (WTP) estimates) is affected by multiple causing factors, including the country's degree of development, the cultural importance of compliance with obligations and rules, time preferences and other social norms. The identification of these factors may allow us to provide policy recommendations to guide future actions in order to improve policy design and increase the public's acceptability of climate control policies.

The rest of the paper is organized as follows: Section 2 provides background information on the relationship between behavioral economics and climate change. Section 3 presents the data sources used to create the meta-data set; Section 4 presents the econometric models and research hypotheses. Section 5 presents the results, and the paper concludes with the discussion and policy recommendations presented in Section 6.

2. Behavioral economics and climate change

Brekke and Johansson-Stenman (2008a, 2008b) highlighted the idea that climate change policies can be interpreted as a global public good, given that everyone can obtain benefits from them, while it is not possible to hinder or exclude others from enjoying their benefits. Traditional economic models consider that individuals are purely selfish in terms of consumption of public goods. However, Ostrom (2000) offered a theory against the selfishness hypothesis, concluding that there is a propensity to cooperate due to the growth of shared social norms. Bernheim and Rangel (2007) also support the idea of cooperation with the common goal, providing different views on human motivations. More recently, the field of behavioral economics has provided different explanations for specifically linking people's attitudes to the provision of public goods, showing the cognitive limitations of the traditional economic theory. In summary, studies from behavioral economics have shown that environmental justice and social norms also affect individual decisions, and therefore should be taken into account in traditional economic models. Furthermore, it is useful to understand that people act in a social context.

In this sense, when dealing with an issue as important as climate change, individuals are influenced by values and beliefs shared in groups for which they feel a sense of belonging (Hoffman, 2011). Brekke and Johansson-Stenman (2008a, 2008b) suggested that what may be rational for a single country (or individual) in isolation is globally suboptimal. In this social setting, one of the problems that can appear is the free-rider problem, and based on this aspect, important concepts such as conditional cooperation, reciprocity, altruism and norms shared by groups come to the fore in the climate debate.

Also, Grothmann and Patt (2005) concluded that in the analysis of adaptation policies, issues such as vulnerability and indicators of the perceived adaptive capacity are crucial when making predictions in terms of climate. They also point out the importance of the perception of risk, giving special attention to whether policies solely communicate risks, without giving adaptation options. This can lead towards people simply denying the risk, instead of taking actions that lead towards change.

Therefore, in order to improve the effectiveness of policies, it is very important to take into account social factors that can affect public opinion. Adger et al. (2009) indicate that some limits to adaptation policies are "endogenous to society" and that ethics, knowledge, risk and culture are important issues. More recently, Adger et al. (2013) highlighted that cultural dimensions are quite important, while it is likely that when cultural dimensions are ignored, policies will fail to be effective. For this reason, and due the importance of knowing how individuals assess the application of different programs and policies to combat climate change, we collected multiple valuation studies of preferences around the world and analyzed their results using a meta-regression analysis. We controlled for relevant factors such as traditional economic factors, as well as social norms and cultural values that have been often ignored.

3. Data description and data treatment

In this study we used a meta-analysis, a technique involving the statistical analysis of a large number of results from individual studies with the aim of combining the main conclusions (Glass et al., 1981; Barrio and Loureiro, 2010). According to Brouwer et al. (1999) this allows us to explain differences in outcomes found in single studies, taking into account the possible differences according to their characteristics, including factors such as the format of the questions or the measurements used. The benefits of this technique compared to qualitative analyses are that it does not prejudge the research results, and that it avoids a subjective weighting of studies in the interpretation of the findings (Brouwer et al. 1999). The potential disadvantages are a potential risk of bias selection of studies, and the possible existence of intra-study correlations between different observations from the same study (Wolf, 1986).

The data collection process and further analysis followed the recommendations of Nelson and Kennedy (2009) and Stanley et al. (2013). Due to the important heterogeneity of the climate control policies and programs in place, we classified them into three main types of actions: mitigation, adaptation or a mixture of both. For this purpose, we grouped the studies using the definitions used by the IPCC[2]. As a result, mitigation programs contain "*anthropogenic interventions to reduce the sources or enhance the sinks of greenhouse gases*;" while adaptation programs are defined as "*adjustment in natural or human systems in response to actual or expected*

[2] This information can be found in Klein et al. (2007).

climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities." Finally, the third type of programs is a mixture of both, containing mitigation and adaptation strategies.

Our data come from an intensive search of studies in different databases, including SCIENCEDIRECT, ECONLIT, and AGECONSEARCH. Specifically, we searched for studies that deal with climate change policies and report WTP estimates for the actions or policies analyzed. The keywords used in the search contained combinations of the terms "climate change," "mitigation", "willingness to pay", and "adaptation." Specifically, we analyzed studies that promote actions to combat climate change[3]. We reviewed a total of 79 studies that estimate WTP to combat climate change through renewable energies, the reduction of emissions of different types of transportation (such as motor vehicles or aircraft), new cleaner products, reduction of energy dependency, support for the Kyoto protocol and deforestation programs, among others, since the 1990s. From these studies, 21 reported incomplete information or did not report WTP in comparable ways, and as a result were dropped from the final data set due to their large number of missing values[4]. It should be noted that in this application, the WTP analyzed were the average WTP estimates for climate change policies provided by each study for a sample of a given country. As a result, the final dataset used for this meta-analysis contained 58 studies from different countries[5]. In general, we found that most research on preferences towards climate change policies was carried out in America, representing more than 52.18% of the observations obtained, followed by Europe (34.15%), Asia (9.03%) and Oceania (4.64%). Moreover, it is important to take into account that most of the studies were from developed countries and higher income groups, as stated by Balderas et al. (2013), and as such, our results should not be directly generalized to the developing world. In some cases, we obtained multiple observations from a single study, with an average of 6.1 observations per study. The collected studies reported their results in different currencies ($US, €, etc.) and at different times. In order to homogenize all this information, valuations were converted to a standard currency, a monthly payment (expressed in Purchasing Power Parity Index (PPP)[6], $US 2012). We used the mean WTP instead of the median estimate as the dependent variable, as used in previous meta-analyses, due to the fact that only a few studies report mean and median estimates (Loomis and White, 1996; Smith and Osborne, 1996; Horowitz and McConnell, 2002). Table 1 summarizes the articles and papers from which the observations were collected.

A regression technique outlined in the following section was used. Three different groups of explanatory variables were included in order to model preferences towards climate change adaptation and mitigation policies. First, we assessed the effect of the geo-physical conditions and site characteristics of the countries where the individual studies were conducted. To do so, we used the number of climatic disasters (*climatic disasters*) that occurred in each country when the study was conducted (The International Disaster Database, 2012). This database contains statistical information on extreme temperatures, droughts and wildfires. We expected that this variable would have a positive coefficient as it represents the accumulated experience with respect to risky weather events. We also expected that this variable could be a proxy for the vulnerability that citizens may experience, something that has proved to be very relevant in other studies (Grothmann and Patt, 2005).

The characteristics of the study are also important in order to explain differences in WTP related to methodological procedures. In this sense, we included the variable *face to face*, identifying studies where the survey was conducted in person. We also considered whether the survey was conducted by *telephone* instead of over the Internet, or by using a combination of different methods *(indirect)*. Bowling (2005) states that survey modes can have different effects on the data collected. We also identified whether the respondents were households (*households*) or individuals. In a contingent valuation survey, Lindhjem and Navrud (2009) found that households provided higher WTP estimates than individuals. An additional important explanatory variable is the temporal length of the required payment to support the program or public policy valued. Therefore, we included an indicator reflecting whether the proposed payment was a one-time payment (*one-time*) or a monthly payment (*monthly*), instead of an annual payment. In the previous literature, shorter time periods have shown a positive effect on the acceptance of the proposed policies (Loomis and White, 1996; Aldy et al., 2012).

As previously stated, we specifically account for whether the program or action proposed was a mitigation program (*mitigation*) with respect to adaptation or a potential mix of both. Due to the wide variety of programs analyzed and in order to group the scattered observations, four categories were created that provide additional information. In particular, we included one variable reflecting whether the aim of the climate actions was to prevent disasters or to prevent heat waves (*disasters and heat wave prevention*). A second category contains all of the studies assessing preferences to reduce GHG emissions through green energies or promoting high efficiency products as fuels or appliances (*green energy and high efficiency*). An additional category contains studies assessing the protection of forests or animals and the use of forest resources as a measure to combat climate change (*ecosystem based programs*). Finally, we also included studies that proposed GHG emissions or the ratification of the Kyoto Protocol (*other programs*). In our analysis, we specifically identified the issue of the payment vehicle. Brouwer et al. (1999) identified the effect of higher prices or taxes (*higher prices/taxes*), the establishment of a *new tax* or a *voluntary* contribution as payment mechanisms. Following previous meta-analyses, we also considered the effect of the year of publication (following Loomis and White (1996), Ojea and Loureiro (2011), among others). For this reason, we used a dummy variable to identify the studies published before 2009 (*before2009*), and also included the sample size of the studies. Specifically, we added a variable that identifies surveys conducted with less than 1000 individuals (*small sample*). Noonan (2003) also studied the effect of sample size, finding that the higher the number of respondents, the lower the WTP obtained. In addition, we considered the effect of the impact factor of the journal where the study was published (*impact factor*) in order to control for quality differences across estimates (Gallet, 2010). In this case, and in order to retain observations in our empirical analysis, we established a zero impact factor for studies that have not yet been published. Finally, we included an indicator denoting whether the purpose of the proposed program had a national or a local-regional scope (*local-regional*). Similar indicators were employed by Noonan (2003). With the aim of identifying the effects of the different valuation methods, we included two indicator variables controlling for whether choice experiments or other methodologies (field

[3] It is important to highlight that many studies value the replacement of traditional energy sources for green energy. However, we only took into account those that valued green energy as a means to combat climate change; or those that directly indicated the benefits of green energy in combating climate change to the respondents.

[4] The eliminated studies are Batley et al. (2001), Carlsson et al. (2013), Diedrich and Goeschl (2011), Farhar and Houston (1996), Jensen et al. (2010), Li et al. (2009), Li et al. (2004), Liao et al. (2010a), Markantonis and Bithas (2010), Mackerron et al. (2009), Mozumder et al. (2011), Oliver et al. (2011), Petrolia et al. (2010), Scarpa and Willis (2010), Strazzera et al. (2012), Willis et al. (2011), Wiser (2007), Zografakis et al. (2010), Zoric and Hrovatin (2012). Cameron and Gerdes (2007) and Cai et al. (2010) were also eliminated due to the lack of data for certain relevant variables.

[5] We have included all the WTP estimates provided for each paper with the aim not to bias the results.

[6] WTP estimates are first converted to dollars with the Purchasing Power Parity (PPP) published by the OECD (2012), and then converted to $2012 currency with the Consumer Price Index obtained from the US Department of Labor (2012).

Table 1
Studies included in the meta-analysis.

References	N° obs	Type of program	Type of policy	Country
Berk and Fovell (1998)	8	Disaster and heat wave prevention	Mitigation	USA
Layton and Brown (2000)	12	Ecosystem base programs	Adaptation	USA
Roe et al. (2001)	1	Green energy and high efficiency	Mitigation	USA
Berrens et al. (2004)	13	Other programs	Mitigation	USA
Nomura and Akai (2004)	3	Green energy and high efficiency	Mitigation	Japan
Cameron (2005)	6	Disaster and heat wave prevention	Mitigation	USA
Bergmann et al. (2006)	4	Ecosystem base programs	Mitigation	UK
Viscusi and Zeckhauser (2006)	2	Disaster and heat wave prevention	Adaptation	USA
Zhai et al. (2006)	7	Disaster and heat wave prevention	Adaptation	Japan
Bigerna and Polinori (2007)	3	Green energy and high efficiency	Mitigation	Italy
Borchers et al. (2007)	19	Green energy and high efficiency	Mitigation	USA
Duffy et al. (2007)	2	Green energy and high efficiency	Mitigation	USA
Hidano and Kato (2007)	9	Other programs	Both	Japan
Whitehead and Cherry (2007)	24	Green energy and high efficiency	Mitigation	USA
Brouwer et al. (2008)	1	Ecosystem base programs	Both	USA
Lee and Cameron (2008)	4	Other programs	Mitigation	USA
Longo et al. (2008)	5	Green energy and high efficiency	Mitigation	UK
Tseng and Chen (2008)	3	Ecosystem base programs	Adaptation	China
Arigoni et al. (2009)	12	Disaster and heat wave prevention	Adaptation	Brazil
Bollino (2009)	9	Green energy and high efficiency	Mitigation	Italy
Cole and Brännlund (2009)	3	Green energy and high efficiency	Mitigation	Sweden
Koundouri et al. (2009)	1	Green energy and high efficiency	Mitigation	Greece
Rajmis et al. (2009)	3	Ecosystem base programs	Both	Germany
Soliño et al. (2009)	6	Green energy and high efficiency	Mitigation	Spain
Solomon and Johnson (2009)	4	Green energy and high efficiency	Mitigation	USA
Tseng et al. (2009)	2	Disaster and heat wave prevention	Adaptation	China
Yoo and Kwak (2009)	2	Green energy and high efficiency	Mitigation	Korea
Brännlund and Persson (2010)	10	Other programs	Mitigation	Sweden
Carlsson et al. (2010)	9	Other programs	Mitigation	China, Sweden, USA
Glenk and Fischer (2010)	5	Disaster and heat wave prevention	Adaptation	UK
Hanemann et al. (2010)	2	Green energy and high efficiency	Mitigation	Spain
Kaczan et al. (2010)	12	Disaster and heat wave prevention	Mitigation	Australia
Liao et al. (2010b)	2	Disaster and heat wave prevention	Adaptation	China
Adaman et al. (2011)	1	Green energy and high efficiency	Mitigation	Turkey
Akter and Bennett (2011)	4	Other programs	Mitigation	Australia
Chawla et al. (2011),	8	Disaster and heat wave prevention	Adaptation	Switzerland
Chuen et al. (2011)	1	Disaster and heat wave prevention	Adaptation	Malaysia
Hanemann et al. (2011)	1	Green energy and high efficiency	Mitigation	Spain
Hidrue et al. (2011)	9	Green energy and high efficiency	Mitigation	USA
Komarek et al. (2011)	24	Green energy and high efficiency	Mitigation	USA
Layton and Levine (2011)	6	Ecosystem base programs	Both	USA
Shih and Chou (2011)	4	Green energy and high efficiency	Mitigation	USA
Susaeta et al. (2011)	5	Green energy and high efficiency	Both	USA
Ward et al. (2011)	4	Green energy and high efficiency	Mitigation	USA
Achtnicht (2012)	16	Green energy and high efficiency	Mitigation	Germany
Aldy et al. 2012	1	Other programs	Mitigation	USA
Botzen and van der Bergh (2012)	3	Disaster and heat wave prevention	Adaptation	Netherlands
Araña and León (2012)	3	Other programs	Mitigation	Spain
Cicia et al. (2012)	7	Green energy and high efficiency	Mitigation	Italy
Gracia et al. (2012)	5	Green energy and high efficiency	Mitigation	Spain
Kraeusel and Möst (2012)	4	Green energy and high efficiency	Mitigation	Germany
Longo et al. (2012)	9	Green energy and high efficiency	Mitigation	Spain
Soliño et al. (2012)	8	Green energy and high efficiency	Mitigation	Spain
Zhang and Wu (2012)	2	Green energy and high efficiency	Mitigation	China
Botzen et al. (2013)	2	Disaster and heat wave prevention	Adaptation	Netherlands
Brouwer and Schaafsma (2013)	4	Disaster and heat wave prevention	Adaptation	Netherlands
Kotchen et al. (2013)	6	Other programs	Mitigation	USA
Mueller (2013)	21	Other programs	Mitigation	USA

experiments, direct market prices, among others) were employed (*choice experiment*, *other methodology*), with the omitted category being the *contingent valuation category*. Florax et al. (2005) found that choice experiments provide lower estimates than contingent valuation.

Another group of variables included consists of the socio-economic characteristics of each specific country. We included a dummy variable identifying the degree of development of different countries. We expected that developing countries would have a lower ability to pay due to income restrictions, in comparison to developed countries. It is nevertheless important to take into account that due to income restrictions, these countries may have a higher willingness to regulate climate change externalities. This variable was collected from World Bank data (World Bank, 2013).

In this meta-regression we also considered additional context-type variables, as there are other important factors that should be taken into account in order to understand individual behavior, including personal and social norms (Viscusi et al., 2011). In order to consider these effects, we included the societal political views, using a variable denoting whether the political party in power in each country at the time when each study was conducted was right wing (Central Intelligence Agency (CIA), 2012) (*right wing*).

This political orientation variable has been employed by several authors in order to evaluate climate policies,[7] concluding that people with left-wing tendencies have a higher WTP for environmental programs than those who have a more conservative view (Carlsson et al., 2010; Solomon and Johnson, 2009; Wiser, 2007; Berrens et al., 2004, among others). Furthermore, we included the percentage of individuals who do not consider it justifiable to cheat on personal taxes (*not cheating*) from the World Values Survey (2012). Using this variable, we expected to represent the relative importance of social trust and cooperation versus free-riding behavior on the contribution to public policies. We also used this database to analyze the role of citizens who affirm to be individualistic. This variable reflects the percentage of individuals in a country that agree with the following sentence "I see myself as an autonomous individual". Therefore, these people feel that they are not related to the society (*individualism*).

We also analyzed the effect of other cultural social norms, in the sense of values shared by society (Mc Breen et al., 2011). In particular, the influence of culture is crucial in terms of climate change (Adger et al., 2013). With the aim of analyzing the impact of these cultural effects, we used the indexes developed by Hofstede (2001) that measure the dimensions of national cultures in a globally comparable manner[8]. For this study, we only analyzed the effect of four of Hofstede's indexes. Specifically, the "*uncertainty avoidance*" index that represents "*the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity*". In addition, the "*long term versus short term orientation*" index. Hofstede (2001) defines societies with long term orientation as those that *"show an ability to adapt traditions to changed conditions, a strong propensity to save and invest, thriftiness, and perseverance in achieving results."*

The last two of Hofstede's indexes included are the "masculinity versus femininity" and "indulgence versus restraint" indexes. The first of them represents a "preference in society for achievement, heroism, assertiveness and material reward for success", while the "indulgence versus restraint" identifies an indulgence society as one "that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms."

We did not control for the rest of the indicators provided by Hofstede due to multicollinearity problems among those indexes. Specifically, we detected the presence of high correlation between the indicator *developing* and the "*power distance*" and *"individualism versus collectivism*" indexes, with a correlation coefficient higher than 0.75. Furthermore, with respect to the index "*pragmatic versus normative"* we detected a higher correlation with the he "*indulgence versus restraint*" index, with a coefficient of 0.78. Table 2 shows the description of the variables that were used and the respective summary statistics, and Fig. 1 represents the distribution of these indexes across continents.[9]

[7] More information on studies that consider these aspects can be found in Johnson and Nemet (2010).

[8] Hofstede conducted a study between 1967 and 1973 for IBM about cultural dimensions. Initially, this study contains four indexes: power distance, individualism versus collectivism, masculinity versus femininity and uncertainty avoidance. Then, in 1991 a new dimension was added, the long-term orientation, and in 2010 a sixth and seventh indexes were created, indulgence versus restraint and pragmatic versus normative. These indexes were built on a scale from 0 to 100. Each of these indexes only takes one value per country, not varying over time. In this regard the author indicates that "These relative scores have been proven to be quite stable over time."(http://geert-hofstede.com/national-culture.html).

[9] We do not include an income indicator in our regression due to the high correlation between this indicator and the Hofstede indexes. However, we include the indicator variable *developing*, which reflects income and vulnerability differences across countries.

4. Model specification and research hypotheses

With the dataset described above, and in order to provide robust results, we estimated different meta-regression models. Our estimation strategy relied on first presenting a number of reduced form models or baseline models. These were then extended by including additional relevant variables, such as the role of social factors. First, we estimated an Ordinary Least Squares (OLS) and then a Robust OLS, with the aim of controlling for possible influential observations. Using the Szroeter (1978) test, we assessed the presence of heteroskedasticity, finding that the test carries a value of 1.79 for a Chi-squared with 1 degree of freedom and an associated *p*-value of 0.181. Therefore, we concluded that there is no evidence of this problem existing in our dataset. However, and due to the possible correlation between the variables of our dataset, and with the aim to check the robustness of our results, we also estimated a Generalized Least Squares (GLS) as well as a Random Effects model (RE) assuming the existence of both sampling error variability, and variability for each study included, in other words that intra-study variability and variability exists between the studies.

The dependent variable in our model is a vector of monetary values representing the preferences for the various programs proposed to correct climate change effects, labeled as log(WTP). The independent variables are grouped into the three previously-described categories that include the type of policy characteristics in X_{ci}; the study characteristics in X_{si} and the socio-economic characteristics of the study sample in X_{ei}. The model corresponds to the following equation:

$$\log(WTP_i) = \alpha + \beta_c X_{ci} + \beta_s X_{si} + \beta_e X_{ei} + \varepsilon_i, \quad (1)$$

where α is the constant term, the β vector contains the coefficients associated with the respective independent variables and ε is the vector of the error term for the OLS.

In order to test for the correct empirical specification used, we tested for the presence of multicollinearity through the Variance Inflation Factor (VIF) Indicator. Its corresponding mean value of 5.11 shows that there is no serious concern about multicollinearity. Furthermore, we looked at the functional form of our model, conducting a Box–Cox test. This test allowed us to assess the best empirical specification form through the transformation of the data to make the residual sum squares comparable. Specifically, we fit the model with the transformed dependent variable:

$$g(y_i\theta) \equiv y_i^{\theta}/\theta = x_i'\beta + \mu_i \quad (2)$$

where β and θ are estimated on the assumption that residuals follow a normal distribution. In this way, when the estimated θ is near 1, we should choose the linear specification, whereas if this value is near 0, the selected functional form should be a log specification. With our data, we obtained a value for $\widehat{\theta} = -0.04$ (p-value = 0.003). Therefore, we employed a semi-log specification for the dependent variable[10]. We also conducted a Grubbs test with the aim of assessing whether there are outliers, concluding that in our sample there is no presence of extreme values in the dependent variable.

4.1. Research hypotheses

One of the interesting aspects of this paper is that it tests a set of hypotheses on the factors that can affect the WTP for climate

[10] When taking the log transformation of the dependent variable, we find some missing values (due to the present of zero values), but this question does not affect our analysis due to the small number of cases, and moreover, this procedure reduces the existence of outliers.

Table 2
Variable description and summary statistics.

Variable	Description	Mean	Std. Dev.
Logwtp	Logarithm of the willingness to pay	1.410	0.817
Country characteristics			
Climatic disasters	Number of climatic disasters per country and year studied	2.930	3.224
Study characteristics			
Face to face	1, if the survey method was face- to-face; 0 otherwise	0.235	0.424
Telephone	1, if the survey method was by telephone; 0 otherwise	0.134	0.341
Indirect[a]	1, if the survey method was on-line or a combination of different methods; 0 otherwise	0.631	0.483
Households	1, if the respondent was a household; 0 otherwise	0.593	0.492
Individuals[a]	1, if the respondent was an individual; 0 otherwise	0.407	0.492
Mitigation	1, if the program proposed was a mitigation program; 0 otherwise	0.762	0.426
Adaptation[a]	1, if the program proposed was an adaptation program; 0 otherwise	0.172	0.378
Both[a]	1, if the program proposed was a mixture of adaptation and mitigation program; 0 otherwise	0.065	0.248
One-time	1, if the payment was a one-time payment; 0 otherwise	0.095	0.294
Monthly	1, if the payment was a monthly payment; 0 otherwise	0.598	0.491
Annual[a]	1, if the payment was an annual payment; 0 otherwise	0.306	0.461
Impact factor	Impact factor of journal	1.878	2.124
Local-regional	1, if the program proposed to the population had a local or regional objective; 0 otherwise	0.423	0.495
National[a]	1, if the program proposed to the population had a national objective; 0 otherwise 0.	0.576	0.494
Higher prices/taxes	1, if the payment vehicle was higher prices or taxes; 0 otherwise	0.462	0.499
Voluntary	1, if the payment vehicle was a voluntary payment or a donation; 0 otherwise	0.098	0.298
New tax	1, if the payment vehicle was a tax; 0 otherwise	0.120	0.325
Premium[a]	1, if the payment vehicle was a premium; 0 otherwise	0.049	0.216
Fee[a]	1, if the payment vehicle was a fee; 0 otherwise	0.065	0.248
Other type of payment[a]	1, if the payment vehicle was not specified or it was another type; 0 otherwise	0.139	0.347
Small sample	1, if the size of sample analyzed was less than 1000 surveys; 0 otherwise	0.669	0.471
Sample size-big[a]	1, if the size of sample analyzed was higher than 1000 surveys; 0 otherwise	0.331	0.471
Before 2009	1, if the study was published before 2009; 0 otherwise	0.462	0.499
Choice experiment	1, if the methodology employed was a choice experiment; 0 otherwise	0.450	0.498
Contingent valuation[a]	1, if the methodology employed was contingent valuation; 0 otherwise	0.494	0.501
Other methodology	1, if the methodology employed was market values, field experiments, among others; 0 otherwise	0.056	0.229
Disasters and heat wave prevention	1, if the program proposed had as objective to reduce the risk of disasters and to control climate variability; 0 otherwise	0.202	0.402
Ecosystem based programs	1, if the program proposed an ecosystem based approach; 0 otherwise	0.090	0.286
Green energy and high efficiency[a]	1, if the program proposed had as objective to reduce GHG emissions through green energy or fuels and appliances with high efficiency; 0 otherwise	0.519	0.500
Other programs	1, if the program proposed had as to reduce GHG emissions or to ratify the Kyoto Protocol; 0 otherwise	0.210	0.408
Socio-economic characteristics			
Developing countries	1, if the country studied was include in the developing countries classification; 0 otherwise	0.079	0.270
Right wind	1, if the country studied was governed by a right-wing political party in the year studied	0.497	0.501
Left wind[a]	1, if the country studied was governed by a left-wing political party in the year studied	0.502	0.500
Individualism	The % of people that agree with this sentence "I see myself as an autonomous individual"	67.407	16.288
Uncertainty avoidance[b]	"The uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact that the future can never be known: should we try to control the future or just let it happen? Countries exhibiting strong UAI maintain rigid codes of belief and behavior and are intolerant of unorthodox behavior and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles"	55.224	18.052
Masculinity versus femininity	"The masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness and material rewards for success. Society at large is more competitive. Its opposite, femininity, stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented"	58.357	17.189
Indulgence versus restraint	"Indulgence stands for a society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms"	59.169	14.73
Individualism versus collectivism	"The high side of this dimension, called individualism, can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. Its opposite, collectivism, represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we""	75.951	20.569
Power distance[a]	"This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. The fundamental issue here is how a society handles inequalities among people. People in societies exhibiting a large degree of power distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low power distance, people strive to equalize the distribution of power and demand justification for inequalities of power"	44.243	11.338
Long term versus short term orientation	The extent to which a society shows a pragmatic future-oriented perspective rather than a conventional historical short-term point of view	35.603	20.813
Pragmatic versus normative[a]	"This dimension describes how people in the past, as well as today, relate to the fact that so much that happens around us cannot be explained"	39.398	22.612
Not cheating	The percentage of citizens that do not justify cheating on taxes	50.715	24.972

[a] These are the omitted variables.
[b] These definitions are available at The Hofstede Centre (2012): http://geert-hofstede.com/dimensions.html.

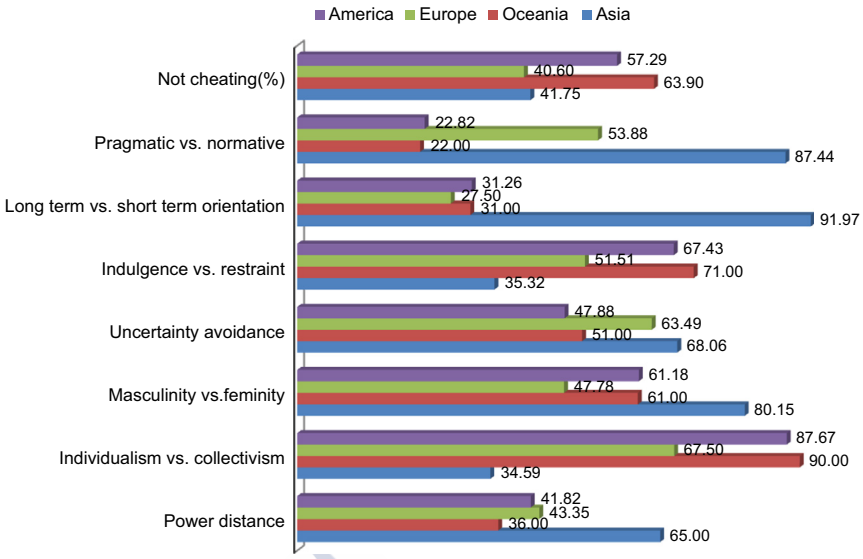

Fig. 1. Social norms and cultural values per continent.

change policies. Specifically, we focused our attention on two elements related to behavioral economics. The first issue concerns the question of individualism. We expected that individuals who feel like an autonomous individual (instead of an individual included in a society) would have a lower WTP for a social environmental policy. As previously mentioned, in the literature on climate change it is important to take into account that we are dealing with individuals, but also with groups. In this sense, members of a group are under greater pressure to do the "right thing" than those who think that they are autonomous. Cialdini and Goldstein (2004) stated "*if we engage in behaviors of which others approve, others will approve of us, too*". Otherwise, as previously indicated, climate change can be seen as a global public good and two types of behaviors can arise when facing public policies: free-rider and conditional cooperation. According to Gächter (2006), we should consider that an agent can obtain benefits from a public good, even if this agent has not contributed to the public good in question, and that therefore, everyone has an incentive to hope that others would contribute towards the public good.

In order to assess this expected effect, we tested the following hypothesis, with $\beta_{individualism}$ as the coefficient associated with the individualism variable. We expected this variable to have a negative impact on WTP:

$$H_0 : \beta_{individualism} \geq 0$$
$$H_1 : \beta_{individualism} < 0 \quad (3)$$

Next, we studied the effect of the degree of compliance with taxes on societal policies. Specifically, by using the indicator *not cheating* we identify the percentage of individuals in a given country that do not justify cheating on taxes. We identified this indicator as a measure of the honesty of individuals. Lusk et al. (2007) concluded that more honest individuals are unlikely to give untruthful responses. Therefore, we focused on testing whether their WTP is lower than those who do justify this behavior. We identified the variable "*not cheating*" with the coefficient $\beta_{not\ cheating}$.

$$H_0 : \beta_{not\ cheating} \leq 0$$
$$H_1 : \beta_{not\ cheating} > 0 \quad (4)$$

5. Empirical results

Following Eq. (1), and dropping the individual i subscripts for convenience, the empirical estimated model is

$$\begin{aligned}\ln(WTP) = \alpha &+ \beta_1 \text{ climatic disasters} + \beta_2 \text{ face to face} \\ &+ \beta_3 \text{ telephone} + \beta_4 \text{ households} \\ &+ \beta_5 \text{ one time} + \beta_6 \text{ monthly} + \beta_7 \text{ mitigation} \\ &+ \beta_8 \text{ disasters and heat wave prevention} \\ &+ \beta_9 \text{ ecosystems based programs} \\ &+ \beta_{10} \text{ other programs} + \beta_{11} \text{ higher prices/taxes} \\ &+ \beta_{12} \text{ new tax} + \beta_{13} \text{ voluntary} + \beta_{14} \text{ small sample} \\ &+ \beta_{15} \text{ before 2009} + \beta_{16} \text{ impact fact} \\ &+ \beta_{17} \text{ local} - \text{regional} + \beta_{18} \text{ choice experiment} \\ &+ \beta_{19} \text{ other methodology} + \beta_{20} \text{ developing countries} \\ &+ \beta_{21} \text{ right wind} + \beta_{22} \text{ not cheating} \\ &+ \beta_{23} \text{ uncertainty avoidance} \\ &+ \beta_{24} \text{ long term versus short term orientation} \\ &+ \beta_{25} \text{ masculinity versus femininty} \\ &+ \beta_{26} \text{ indulgence versus restraint} + \beta_{27} \text{ individualism} + \varepsilon, \end{aligned} \quad (5)$$

With regard to the results, Table 3 shows the output of the baseline models, while Table 4 shows the results from the extended models. Overall, the models fit the data quite well with a R^2 of more than 50% for the baseline models and more than 60% for the extended models.

With respect to the results obtained, we will first examine in greater detail the results presented in Table 3 that correspond to the baseline models. In the case of the geo-physical conditions, we found that citizens that have more accumulated experience with respect to risky weather events have a greater WTP. In terms of the study characteristics, we found that surveys conducted via telephone or face-to-face provide lower WTP estimates than those conducted via the Internet or using a combination of different methods (except in Robust OLS). With respect to the payment periodicity, citizens prefer a *one-time* payment instead of annual payments, meaning they prefer short payments in time. This result is in line with the findings obtained by Loomis and White (1996). Another common result refers to the mode of payment: the results

Table 3
Baseline meta-regression results.

LogWTP	OLS			Robust OLS			Random Effects			GLS		
	Coefficient	Std. Err.	P > |t|	Coefficient	Std. Err.	P > |t|	Coefficient	Std. Err.	P > |t|	Coefficient	Std. Err.	P > |t|
Geo-physical conditions												
Climatic disasters	0.114	0.014	0.000	0.114	0.014	0.000	0.114	0.014	0.000	0.114	0.013	0.000
Characteristics of study												
Face to face	−0.170	0.092	0.066	−0.170	0.113	0.136	−0.170	0.092	0.065	−0.170	0.089	0.058
Telephone	−0.455	0.133	0.001	−0.455	0.133	0.001	−0.455	0.133	0.001	−0.455	0.129	0.000
Households	0.002	0.086	0.978	0.002	0.103	0.982	0.002	0.086	0.978	0.002	0.083	0.977
One time	1.011	0.143	0.000	1.011	0.141	0.000	1.011	0.143	0.000	1.011	0.139	0.000
Monthly	0.093	0.087	0.289	0.093	0.115	0.421	0.093	0.087	0.288	0.093	0.085	0.275
Mitigation	0.418	0.119	0.001	0.418	0.127	0.001	0.418	0.119	0.000	0.418	0.116	0.000
Disasters and heat wave prevention	0.837	0.111	0.000	0.837	0.108	0.000	0.837	0.111	0.000	0.837	0.108	0.000
Other programs	0.040	0.103	0.698	0.040	0.101	0.691	0.040	0.103	0.697	0.040	0.100	0.689
Ecosystem based programs	0.222	0.153	0.149	0.222	0.165	0.181	0.222	0.153	0.148	0.222	0.149	0.137
Higher prices/taxes	0.729	0.090	0.000	0.729	0.118	0.000	0.729	0.090	0.000	0.729	0.088	0.000
New tax	0.346	0.132	0.009	0.346	0.144	0.017	0.346	0.132	0.009	0.346	0.128	0.007
Voluntary	−0.141	0.145	0.332	−0.141	0.122	0.250	−0.141	0.145	0.331	−0.141	0.141	0.317
Small sample	0.091	0.087	0.296	0.091	0.086	0.291	0.091	0.087	0.296	0.091	0.084	0.282
Before 2009	−0.400	0.080	0.000	−0.400	0.089	0.000	−0.400	0.080	0.000	−0.400	0.078	0.000
Impact factor	−0.051	0.014	0.000	−0.051	0.016	0.001	−0.051	0.014	0.000	−0.051	0.014	0.000
Local-regional	0.056	0.074	0.446	0.056	0.078	0.473	0.056	0.074	0.445	0.056	0.072	0.433
Choice experiment	−0.524	0.080	0.000	−0.524	0.082	0.000	−0.524	0.080	0.000	−0.524	0.078	0.000
Other methodology	−0.652	0.155	0.000	−0.652	0.130	0.000	−0.652	0.155	0.000	−0.652	0.151	0.000
Constant	0.619	0.169	0.000	0.619	0.174	0.000	0.619	0.169	0.000	0.619	0.164	0.000
σ_μ							0.000					
σ_ε							0.502					
ρ							0.000					
N	366			366			366			366		
F	23.120			41.380								
Prob > *F*	0.000			0.000								
Adjusted R^2	0.535			0.559								
Root MSE	0.557			0.557								
Log restricted − likelihood										−294.719		
Wald							439.350			464.750		
Prob > χ^2							0.000			0.000		

show that people prefer *higher prices*/*taxes* or the establishment of a *new tax* instead of other type of payments, such as donations, trust funds, etc. This result may be justified, given that the former are universal and avoid the free-rider problem. Brouwer et al. (1999) also found a positive coefficient for income taxes. With respect to the *journal impact factor*, we found that journals with higher impact factors tend to present lower WTP estimates. In addition, attending to the effect of the different methodologies used, we concluded that a *choice experiment* or *other methodology* provides lower estimates than the omitted variable (*contingent valuation*) (the same result was obtained by Florax et al. (2005)). Focusing our attention on the type of programs proposed with the aim of combating climate change, we concluded that *mitigation* programs are preferred over adaptation programs, or even over a policy mix. As observable in Tables 3 and 4, the indicator corresponding with the *mitigation* policy is positive and statistically significant over the omitted variable. These findings may be considered in the future in terms of policy design. Furthermore, people are more likely to pay for programs and policies designed to avoid disasters or to reduce heat waves (*disasters and heat waves prevention*) instead of supporting programs to promote green energies.

We reached similar conclusions when considering the extended models (Table 4), although we did observe that the *face to face* and *new tax* indicators are not statistically significant. In addition, we found that the *monthly* indicator is significant at the 10% confidence level depending on the estimated model. Moreover, we also concluded that *ecosystem based programs* are statistically significant, and so individuals also prefer programs that assess the protection of forests or animals and the use of forest resources as a measure to combat climate change.

However, depending on the estimated models, our results varied slightly with respect to the effect of some variables. Specifically, in the extended models we analyzed the role played by the socio-economic variables, finding that the *developing* countries indicator had a negative and statistically significant effect on WTP. As expected, this suggests that people in these countries are less willing to pay to combat climate change, probably due to their income restrictions. It is important to highlight that this result does not mean that poor countries value less the problem of climate change, rather they do not have a purchasing power comparable to developed countries. We also observed that studies conducted in countries with a right-wing political orientation result in lower WTPs than those from countries with a left-wing government, as indicated in previous studies (Carlsson et al., 2010).

Finally, considering the Hofstede indexes, we concluded that the indicator of *long term vs. short term orientation* is statistically significant, and always has a positive coefficient. This result may be explained by the fact that countries that plan more on a long-term basis have a larger WTP to fight climate change. Finally, the *masculinity vs. feminity* index is statistically significant, showing that societies in which masculinity is high are less willing to pay than their counterparts. In this case, some previous studies found that women are usually more egalitarian than men (Eckel and Grossman, 1998; List, 2004, among others).

In conclusion, and with respect to the research hypotheses, the *individualism* indicator carries a negative coefficient, as would be expected. Therefore, countries with more individualistic individuals have a lower WTP for public climate control policies. This can be a consequence of these citizens not feeling any pressure to

Table 4
Extended meta-regression results.

LogWTP	OLS			Robust OLS			Random effects			GLS		
	Coefficient	Std. Err.	$P>\|t\|$	Coefficient	Std. Err.	$P>\|t\|$	Coefficient	Std. Err.	$P>\|t\|$	Coefficient	Std. Err.	$P>\|t\|$
Geo-physical conditions												
Climatic disasters	0.105	0.022	0.000	0.105	0.024	0.000	0.105	0.022	0.000	0.105	0.021	0.000
Characteristics of study												
Face to face	−0.122	0.095	0.200	−0.122	0.112	0.279	−0.122	0.095	0.199	−0.122	0.091	0.180
Telephone	−0.704	0.138	0.000	−0.704	0.149	0.000	−0.704	0.138	0.000	−0.704	0.132	0.000
Households	−0.045	0.096	0.639	−0.045	0.095	0.635	−0.045	0.096	0.639	−0.045	0.092	0.624
One time	1.193	0.140	0.000	1.193	0.155	0.000	1.193	0.140	0.000	1.193	0.135	0.000
Monthly	0.165	0.097	0.090	0.165	0.122	0.176	0.165	0.097	0.089	0.165	0.093	0.076
Mitigation	0.299	0.147	0.042	0.299	0.131	0.023	0.299	0.147	0.041	0.299	0.141	0.033
Disasters and heat wave prevention	0.844	0.126	0.000	0.844	0.130	0.000	0.844	0.126	0.000	0.844	0.121	0.000
Other programs	−0.121	0.103	0.243	−0.121	0.119	0.310	−0.121	0.103	0.242	−0.121	0.099	0.222
Ecosystem based programs	0.379	0.182	0.038	0.379	0.186	0.042	0.379	0.182	0.037	0.379	0.175	0.030
Higher prices/taxes	0.479	0.098	0.000	0.479	0.147	0.001	0.479	0.098	0.000	0.479	0.094	0.000
New tax	0.167	0.139	0.233	0.167	0.195	0.393	0.167	0.139	0.232	0.167	0.134	0.212
Voluntary	0.156	0.167	0.349	0.156	0.179	0.383	0.156	0.167	0.348	0.156	0.160	0.327
Small sample	−0.005	0.097	0.956	−0.005	0.119	0.965	−0.005	0.097	0.956	−0.005	0.093	0.955
Before 2009	−0.246	0.113	0.030	−0.246	0.159	0.123	−0.246	0.113	0.029	−0.246	0.108	0.023
Impact factor	−0.036	0.013	0.007	−0.036	0.008	0.000	−0.036	0.013	0.006	−0.036	0.013	0.004
Local-regional	−0.012	0.079	0.883	−0.012	0.093	0.901	−0.012	0.079	0.883	−0.012	0.076	0.878
Choice experiment	−0.538	0.092	0.000	−0.538	0.075	0.000	−0.538	0.092	0.000	−0.538	0.088	0.000
Other methodology	−0.627	0.176	0.000	−0.627	0.213	0.003	−0.627	0.176	0.000	−0.627	0.168	0.000
Socio-economic characteristics												
Developing countries	−1.497	0.432	0.001	−1.497	0.407	0.000	−1.497	0.432	0.001	−1.497	0.414	0.000
Right wing	−0.387	0.098	0.000	−0.387	0.124	0.002	−0.387	0.098	0.000	−0.387	0.094	0.000
Not cheating	−0.005	0.002	0.002	−0.005	0.002	0.032	−0.005	0.002	0.001	−0.005	0.001	0.001
Uncertainty avoidance	0.000	0.003	0.962	0.000	0.004	0.973	0.000	0.003	0.962	0.000	0.003	0.960
Long-term versus short-term orientation	0.011	0.006	0.041	0.011	0.005	0.019	0.011	0.006	0.040	0.011	0.005	0.032
Masculinity versus femininity	−0.015	0.005	0.003	−0.015	0.004	0.000	−0.015	0.005	0.002	−0.015	0.005	0.002
Indulgence versus restraint	0.002	0.004	0.654	0.002	0.005	0.666	0.002	0.004	0.654	0.002	0.004	0.640
Individualism	−0.012	0.004	0.002	−0.012	0.004	0.003	−0.012	0.004	0.002	−0.012	0.004	0.001
Constant	2.586	0.654	0.000	2.586	0.839	0.002	2.586	0.654	0.000	2.586	0.627	0.000
	OLS			**Robust OLS**			**Random Effects**			**GLS**		
σ_μ						0.000						
σ_ε						0.423						
ρ						0.000						
N	342			342			342			342		
F	24.400			40.910								
Prob > *F*	0.000			0.000								
Adjusted R^2	0.650			0.677								
Root MSE	0.479			0.479								
Log restricted-likelihood										−219.056		
Wald							658.870			717.620		
Prob > χ^2							0.000			0.000		

behave as members of a group, and that as a result they are not conditioned by other individuals will think of them. In addition, and with respect to the second hypothesis, we found a negative relationship between the percentages of citizens who do not justify cheating on taxes (*not cheating*) with the reported WTP for climate change. This may be an indication of the fact that honest individuals (or those with strong personal norms) are more likely to respond in a sincere way to surveys, providing lower WTPs.

6. Conclusions

The present study has provided an analysis of existing literature on preferences and of WTP for climate change mitigation and adaptation policies through a meta-regression, offering a summary of the most important results. We acknowledge, however, that other lenses and moral aspects could be used in order to understand social preferences for climate policies.

The main aim of this paper is to contribute towards identifying the main determining factors of climate change policies. We collected information from 58 studies around the world, finding results that can be useful in terms of policy design in order to increase the acceptance and compliance of public climate control policies. We acknowledge that the vast majority of our study sample is skewed toward the developed world, and have controlled for this issue in the estimated models.

There are important lessons from this previous analysis that should be taken into account when designing effective policies to control climate change. Overall, our results show that mitigation actions are preferred over adaptation actions. In addition, policies should encourage the prevention of disasters and heat waves to combat climate change (*disasters and heat wave prevention*) in order to be more preferable. It is also important to note that economic conditions definitely play a role in terms of supporting efforts to combat climate change, and that in developing countries, there is less willingness to pay for climate control policies, however, this does not mean that poor countries value less the climate change problem. Nevertheless, it is important to note that this may imply that these societies may be more willing to regulate by using other mechanisms that do not require higher prices to be paid for goods or services. Also, in terms of time

preferences, studies conducted in countries with a significantly long-term orientation have a higher WTP for climate change policies. These policies may be perceived as insurance towards future catastrophic events.

We therefore believe that future studies should consider this set of initial findings in order to articulate more acceptable policies around the world in terms of climate change control. In this sense, particularly important factors are the roles of social norms and perceived risks, *ceteris paribus*. It is important to take into account that there are other mechanisms to combat climate change, such as improved efficiency and infrastructures, which are not evaluated in the current set of studies. Here we have analyzed the acceptability in terms of willingness to pay for programs that require an economic sacrifice by consumers.

In conclusion, a relevant finding of our work is that cultural and social dimensions are relevant in promoting the acceptability of climate change policies, as shown in the present analysis. We believe that these cultural and social norm dimensions may be reinforced by promoting informational campaigns in order to raise awareness amongst the public. This would make it possible to generate a solid body of knowledge that would be useful in increasing resilience towards extreme events, and a better use and management of energy and resources in general. Unfortunately, statistical data are very limited in order to reflect and empirically test the importance of environmental awareness at international levels. Future efforts should focus on collecting comparable data at international level in order to better understand the social norms and cultural backgrounds of societies. These data may become very useful and relevant in understanding support towards certain public policies and cooperative behaviors.

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Appendix

See Table 1.

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