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The importance of ecosystem services in coastal agricultural landscapes: Case study from the Costa Brava, Catalonia

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ABSTRACT

Agricultural landscapes are increasingly valued by society for their potential to provide multiple benefits and values, such as landscape beauty or habitat for biodiversity. Yet, Mediterranean agricultural landscapes are still following a pattern of changes under the narrow focus of increased agricultural productivity, while other benefits and values are depleted. In this study, we assess the importance and multiple benefits Mediterranean agricultural landscapes provide using the ecosystem services approach. Our research aims at assessing different social perceptions concerning the importance of coastal agrarian landscapes for human wellbeing. Using a case study from a coastal agricultural landscape at the Costa Brava, Girona (Spain), we combined non-monetary and monetary methods to assess social perception and the willingness to pay for ecosystem services' delivery. Our study involved different social groups including local residents and tourists visiting the area. Results show that provisioning services and non-productive ecosystem services, such as supporting and cultural services are seen as almost equally important and trade-offs emerge between their prioritizations. A strong preference for cultural ecosystem services, especially aesthetic value (non-monetary valuation) and environmental education (monetary valuation), can be observed. Our results suggest that different preferences are influenced by the respondents' place of residency and place of visit.

1. Introduction

Agriculture is the most important land use in Europe (Rounsevell et al., 2003; Lazrak et al., 2010). In the Mediterranean basin, agricultural land is primarily managed for the production of crop, livestock, forage, and fibre. Yet, agricultural land provides other benefits to humans than material goods (Sayadi et al., 2009; Power, 2010) that are increasingly described as ecosystem services (TEEB, 2010). Besides for the generation of agricultural products, i.e. provisioning services, the ecosystem service literature highlights the importance of agricultural landscapes for the generation of regulating services, such as flood control, carbon storage, water quality control and pollination (Klein et al., 2007; Aizen et al., 2009; Gallai et al., 2009; Smith et al., 2008), supporting services like habitat for flora and fauna, the maintenance of genetic resources for potential future agricultural uses (Daily, 1997; Perfecto and Vandermeer, 2008), as well as cultural ecosystem services. The latter include for example scenic beauty, education, recreation, tourism, and place identity (Van Berkel and Verburg, 2014). In agricultural landscapes, communities and ecosystem services are strongly interdependent, for instance the maintenance of the agriculture production shapes the landscape providing beauty and identity values, which at the same time are essential for leisure, ecotourism or sense of place of the population. As such ecosystem services provided to society can be understood as social–ecologically co-produced (Blondel, 2006; Anderson et al., 2007; Plieninger and Bieling, 2012; Fischer et al., 2012).

Since the 1950s, agricultural landscapes in the Southern

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European Mediterranean region changed drastically, driven by (mass) tourism, urbanization, in combination with an intensification and homogenization of agricultural production. Rural areas are increasingly becoming residential areas and destinations for (nature) tourism (Paquette and Domon, 2001). In the light of an ever stronger disconnection between locations of production and consumption of agricultural produces, agriculture is no longer the sole or predominant economic base for the rural economy. Where traditional agriculture, in Southern Europe dominated by small-scale mosaic farming (Pinto-Correia and Kristensen, 2013), is replaced by agro-industrial practices, farmers and employees in the agricultural sector are becoming a minority (Surová et al., 2011). This new socioeconomic trend in agricultural landscapes affects the relationship between people and the environment (Fischer et al., 2012) and leads to degradation of ecological functions and loss of ecosystem services (Foley et al., 2005; Meeus et al., 1990; Plieninger and Bieling, 2012). This stands in sharp contrast to European policy goals, especially *The EU Biodiversity Strategy to 2020* (Target 2), highlighting the importance to maintain ecosystem services and to restore multi-functional landscapes "that are capable of delivering benefits to both biodiversity, the land user, and to society at large" (European Commission, 2011).

Analysing social perceptions and preferences regarding the demand for ecosystem services in an agricultural landscape can help to visualize this contrast (Anton et al., 2010) and help to adapt agricultural and management practices, to local users' and society's needs (Surová et al., 2011). Local assessments of ecosystem services support an understanding of the multi-functional and multi-beneficial character of agricultural landscapes, and may indicate potential losses in ecosystem services caused by changing agricultural practices. Understanding these trade-offs between traditional and industrial agriculture has been described as one of the major challenges of land-use planning in agricultural landscapes (Ruiz and Domon, 2012; Seppelt et al., 2011). The maintenance and restoration of multifunctional agricultural landscapes at a local scale is essential for the persistence of rural communities. Yet, it requires a sufficient recognition of different social groups and an explicit understanding of their relationships with and the benefits they obtain from the landscape (Martín-López et al., 2012; Plieninger et al., 2013). Few studies have focused on the relationships between rural non-farming populations and agricultural landscapes (Vouligny et al., 2009). Our study addresses this gap by assessing social preferences for the delivery of ecosystem services, using monetary and non-monetary valuation methods that help identifying potential trade-offs across the interests of different social groups (Foley et al., 2005). Our goal is to provide better understanding of the relationship and to account for social perception between rural non-farming populations and the agricultural landscape through the lens of ecosystems, in order to support the maintenance and restoration of multifunctional rural landscapes. The three specific objectives consist in: (1) the characterization of beneficiaries, (2) the non-monetary prioritization of ecosystem services, and (3) an assessment of the monetary willingness-to-pay for ecosystem services.

2. Methods

2.1. Study area

The assessment was carried out for the *Plana de l'Empordà* a plain region that forms the coastal hinterland of the Costa Brava (coast) in the province of Girona, located in the north east of Catalonia (Spain) (Fig. 1). The study area was selected because it is

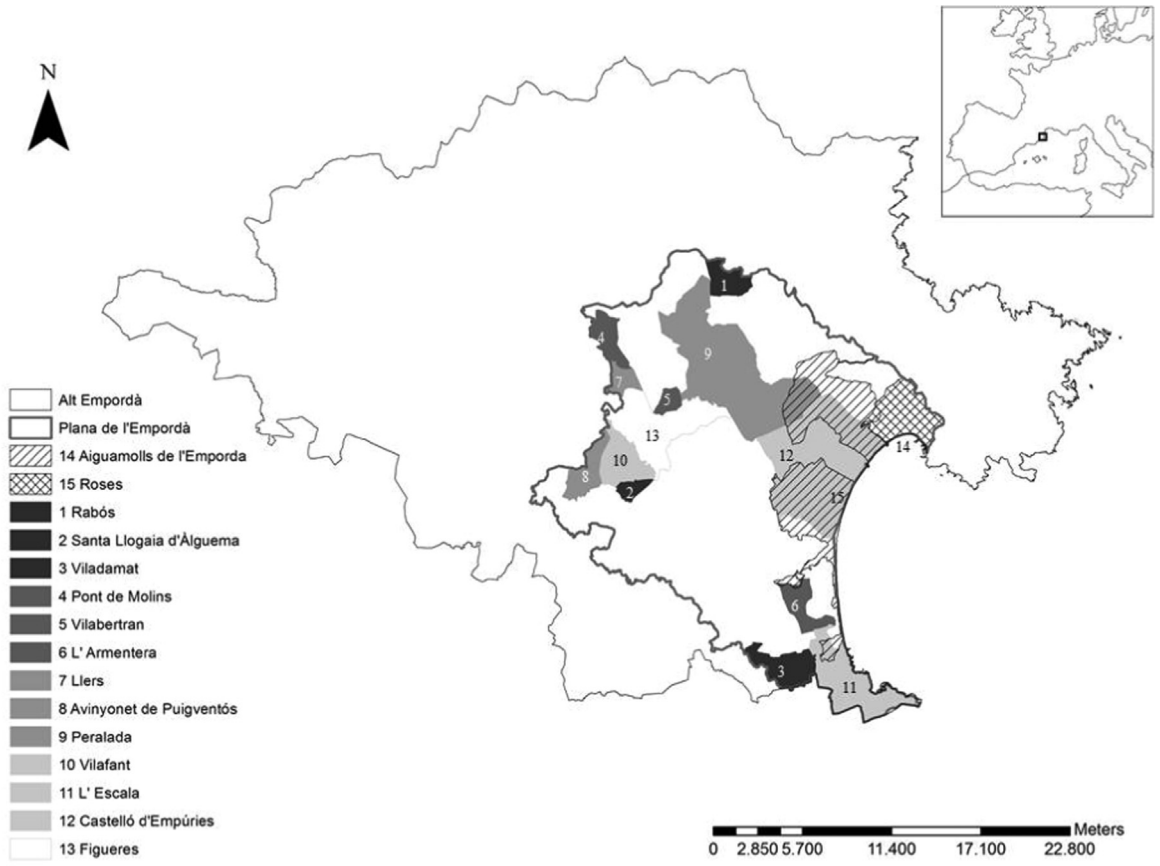

Fig. 1. Study area Plana de l'Empordà, Costa Brava (Spain): location, protected areas and sample points.

a socially diverse territory where agricultural practices, conservation, tourism and residential uses coexist, and as an example for a Mediterranean agricultural landscape undergoing an intensification of different land-uses.

Pintó (2010) describes the Plana de l'Empordà as a landscape unit with homogeneous physical and cultural landscape attributes, predominantly characterized by agricultural land cover (79.8%). Only 10.7% of the surface is made by non-cultivated vegetation, while urban areas occupy 8.7% of the area (Observatori del Paisatge de Catalunya, 2010). The study area of 415 km^2 includes 50 municipalities and about 130,000 inhabitants, 14% of the study area, including Mediterranean mountains, wetlands, coastline and agricultural landscapes, are protected. Among the protected areas, *Aiguamolls de l'Empordà Natural Park* (PNAE) is the largest. Created in 1983, it is among the most visited natural parks in Catalonia and is composed by a combination of wetlands and grasslands, known as *closes* (Llausàs et al., 2009). The coastline, together with coastal wetlands, makes about 0.8% of the study region. It is – especially in summer-times – highly frequented by tourists and embeds with the municipality of Roses the main touristic centre in the region. The agricultural production in the study area is characterized by two major types of crops: irrigated herbaceous, such as corn, and dry herbaceous, such as barley, occupying 36.2% and 33.2% of the agricultural area, respectively. Other important crops are olives (4.4%) and grapes (3.8%) predominantly in the northern part, and fruit trees (5.7%) in the southern part of the plain. Only about 0.7% of the population living in the study area is engaged in the agriculture sector (IDESCAT, 2013). Between 1989 and 2009, farming has undergone a concentration process in which smaller where increasingly replaced by larger farms. However, the total area of farmland in the region has not been strongly affected by this process and remained relative stable (Agenda 21 Alt Empordà) because it has become a process of concentration of farms in favour of larger ones and the loss of the family dimension of farms, especially small and medium-sized farms.

2.2. Data collection

Different social values highly depend on the beneficiaries' preferences, which can be assessed through surveys to these beneficiaries (Dramstad et al., 2006). We conducted a face-to-face survey among 241 respondents (100% response rate), a sample size comparable to that of other ecosystem services perception exercises using surveys (Bieling et al., 2014: 262 respondents; Castro et al., 2011: 340 respondents; García-Llorente et al., 2012: 381 respondents; Langemeyer et al., 2015: 198 respondents). Considering the total population of the study area, 130,000 inhabitants, the sampling error was estimated as $\pm 6.1\%$ for both, locals and nonlocals, at a 95% confidence level. Sampling covered 14 different locations, including urban areas, rural villages, beaches and the *Aiguamolls de l'Empordà Natural Park*. The population sample included stratified randomly selected local residents and tourists, in an attempt to include the utmost possible diversity of people benefitting from the ecosystem services provided by the agricultural landscape in the study area. We divided the sample into seven classes of beneficiaries groups due to the sampling locations and depending if they were locals or tourists. We consider the tourists encountered at the *Aiguamolls de l'Empordà* Natural Park as "park tourists", and the tourists met at the beach in Roses, as "beach tourists". Individuals living in the study area were not considered as tourists and excluded from the tourist sample. The beneficiaries groups we distinguished are the following: (1) Tourists-*Aiguamolls de l'Empordà* Natural Park (19.16%); (2) Tourists – Roses (18.75%); (3) locals residents from villages of fewer than 500 inhabitants (12.5%); (4) local residents from villages of 500–1000 inhabitants (12.5%); (5) local residents from villages of 1000–5000 inhabitants (12.5%); (6) local residents from towns of 5000–20,000 inhabitants (12.5%); and (7) local residents from towns of more than 20,000 inhabitants (12.5%).

We randomly selected municipalities from diferent sizes and respondents from each group. All respondents were at least 18 years old. The survey was conducted from March to May 2013. The questionnaire included 15 questions, divided into three sections in line with the three specific objectives: (1) socio-demographic information, (2) perception of the importance of the ecosystem services, and (3) monetary valuation.

In the first section, we assessed the respondents' socio-demographic characteristics (e.g., age, gender, level of studies, profession, residency, origin, i.e. place they were raised), and attitude towards environmental issues, i.e. asking if they belonged to an environmental NGO.

In the second section, respondents were asked to value the importance of different types of ecosystem services after they were given a general explanation of the aim of the study and ecosystem service concept, and an explanation on each ecosystem service included in the survey, for example "Habitat for wildlife means the capacity of agricultural landscapes of the region to have the natural conditions in order that wild flora and fauna, such as birds, mammals or plants, are able to live and reproduce". The socio-cultural valuation was conducted using a Likert-scale ranking design (Bernard, 1999), where the perceived importance of ecosystem services for society and human wellbeing were stated on a scale from 1 to 4 (1=very low and 4=very high) (Kelemen et al., 2014; Langemeyer et al., 2015). The Likert-scale ranking approach included nine types of ecosystem services proposed by Power (2010) for their relevance in agricultural landscapes, based on the classification from the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005) (Table 1).

In the third section, referring to the previous list of ecosystem services, respondents were asked: "*would you be willing to pay an amount of money in the form of an annual donation to a local environmental organization to conserve these ecosystem services*" (Castro et al., 2011). If respondents answered "*yes*", we asked them to define a maximum amount of money (€) they are willing to pay for the ecosystem service conservation. Finally, respondents were asked to select from the list of services (Table 1) for which specific ecosystem services they were willing to pay and how they would distribute the stated amount of money among the services.

2.3. Data analysis

We used a two-part econometric model, termed a hurdle model (Deb and Trivedi, 2002; Saez et al., 2006), suitable to combine the two decision processes involved in (1) the perception

Table 1
Ecosystem services from agricultural landscapes included in the study (proposed by Power (2010) based on the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005)).

Supporting services	Habitat for wildlife
Provisioning services	Agriculture production
Regulating services	Water regulation and flood control Pollination Carbon storage
Cultural services	Aesthetic value Cultural identity Recreation and tourism Environmental education

and Likert-scale ranking approach, and (2) the monetary valuation approach. The first part of the decision process was modelled using a binomial link (specifically a logistic regression),

$$\mu_{1,i} = Prob\left(Y_i \geq 1 \middle| \eta_{1,i}\right)$$

$$\log\left(\frac{\mu_{1,i}}{1-\mu_{1,i}}\right) = \eta_{1,i} \qquad Var(Y_i) = \varphi\mu_{1,i}(1-\mu_{1,i}) \quad \varphi = 1$$

where the subscript i denoted respondent; μ denoted the (conditional) mean; the subscript 1 denoted the first part of the decision process; Y is the dependent variable, in this first part, the willingness to pay of the respondent (yes or not); ϕ was a dispersion parameter; and η contained both, the intercept, and the explanatory variables.

In this part we assumed that the dispersion parameter was equal to the unit. This was so because the information available in this first part did not allow the simultaneous identification of the parameters associated to the conditional mean and the parameters associated to the conditional variance.

In the second part the distribution of use (conditional to some use) was modelled as a truncated Poisson model:

$$f\left(Y_i \middle| \eta_{2,i}, Y_i > 0\right) = \frac{\Gamma(Y_i+\psi_{2i})}{\Gamma(\psi_{2i})\Gamma(Y_i+1)}\left(\frac{\mu_{2,i}}{\mu_{2,i}+\psi_{2i}}\right)^{Y_{it}}\left[\left(\frac{\mu_{2,i}+\psi_{2i}}{\psi_{2i}}\right)^{\psi_{2i}} - 1\right]^{-1}$$

$$\mu_{2,i} = \exp(\eta_{2,i}) \qquad \psi_{2i} = (1/\varphi)\mu_{2,i}$$

where $\Gamma(.)$ denoted the gamma function and the subscript 2 denoted the second part of the decision process. In this second part we used, as dependent variable the amount of money prepared to pay from the respondent.

It is important to point out that, although we divided the model into two parts, both enter the same likelihood function multiplicatively and are jointly estimated.

Note that in the two parts we used nonlinear models. Therefore, the estimates of the parameters could not be interpreted directly. For this reason, we transformed them using the antilogarithm (i.e., odds ratio (OR) in the first part, relative risk, (RR) in the second). Both, the ORs and RRs can be interpreted using (OR-1) *100 (or (RR-1)*100), and the result is interpreted as the increase (if positive) or decrease (if negative) risk (percentage) relative to the reference category (if the variable is categorical) or for each unit of the explanatory variable (if it is continuous).

We worked with 95% confidence (i.e. $p < 0.05$).

All analyses were conducted using the free software R (version 3.0.3) (R Core Team, 2014).

3. Results

3.1. Characterization of beneficiaries

Most of the respondents (63.1%) were middle-age adults (31–60). Of the beneficiaries 22.4% originated from farming families, yet only 4.6% of them stated they were still working in agriculture, while most respondents were employed in the service sector (65.7%) (see Table 2). Of the respondents 24.5% originated from the study area, 25.7% from the wider *Alt Empordà* County, 15.8% from the Girona province, 25.3% from other parts of Catalonia and 8.7% from abroad (including other Spanish regions). We distinguished respondents into *locals* (respondents living within the study area) and *tourists* (respondents living outside the study area). From the 241 useful questionnaires, 37.5% were filled out by tourists and 62.5% by locals.

Table 2
Socio-demographic characteristics of the participants (N=241).

Respondents profile	N	%
Origin (i.e. place they were raised)		
Survey location	59	24.50
Alt Empordà County	62	25.70
Girona region	38	15.80
Rest of Catalonia	61	25.30
Outside Catalonia	21	8.70
Age		
Youth (18–30 years old)	58	24.10
Middle-age (31–60 years old)	152	63.10
Elderly (> 60 years old)	31	12.90
Education level		
University degree	89	36.90
Professional studies	60	24.90
Basic studies	83	34.40
No studies	9	3.70
Occupation		
Industry	10	4.50
Retired	25	10.37
Unemployed	11	4.56
Services	158	65.56
Student	16	6.64
Agriculture	11	4.56
Others	10	4.15
Gender		
Male	110	45.60
Female	131	54.40
Farm relationship		
Comes from farming family	54	22.40
Does not come from farming family	187	77.60
Environmental sensitivity		
Member of an NGO	10	4.15
No member of an NGO	231	95.85

3.2. Prioritization of ecosystem services

The results of the prioritization of ecosystem services relevance using a Likert-scale design are shown in Table 3 ("Non-monetary valuation"). Respondents assigned medium (2=medium) to very high (4=very high) non-monetary values to all ecosystem services. Although no significant explicative variables and differences among beneficiaries groups were found, some clear trends can be described from the results: When we look at the total average values, we can see that the agriculture production service is at the top of the ranking, followed by aesthetic values. Water regulation and flood control as well as tourism and recreation are found at the end of the ranking. Local residents of the smallest villages assigned the highest values to agriculture production, followed by habitat for wildlife, aesthetic value and identity. Regulating services, such as water regulation and flood control and carbon storage were valued higher by park tourists compared to the other respondent groups. Environment education and tourism & recreation were higher scored by the local population of the largest towns and by park tourists. All scores provided by the park tourists are higher than those of beach tourists; whereby the biggest differences in the perceived importance between the two groups are given for environmental educational and for recreation and tourism.

3.3. Willingness to pay for maintaining ecosystem services

We found that 48.33% of the respondents would be willing to pay (WTP) for ecosystem services conservation of the study area. Results show that locals have a lower willingness to pay for ecosystem services than tourists. And locals from the largest villages had lower willingness to pay for ecosystem services than locals from the smallest villages (Table 4). The amount of money the

Table 3
Monetary and non-monetary values of ecosystem services. Mean values for prioritization the importance of single ecosystem services within the agricultural landscape of the study area (1=low; 2=medium; 3=high; 4=very high), named "Non-monetary valuation" and mean normalized values for money allocation (NV) and mean scores for willingness to pay for each ecosystem services (€) by respondent groups, named "Monetary valuation". NV measures the percentage of respondents willing to pay (within each social group) that would allocate money to that specific ecosystem service.

		Local residents from villages of fewer than 500 inhabitants	Local residents from villages of 500–1000 inhabitants	Local residents from villages of 1000–5000 inhabitants	Local residents from towns of 5000–20,000 inhabitants	Local residents from towns of more than 20,000 inhabitants	Park tourists	Beach tourists	Total average value
Habitat for wildlife									
Non-monetary valuation		3.23	2.80	2.73	3.00	2.70	2.98	2.91	2.91
Monetary valuation	NV	0.50	0.44	0.36	0.71	0.39	0.46	0.57	0.49
	€	10.70	5.04	13.25	8.90	6.14	15.72	15.41	10.74
Pollination									
Non-monetary valuation		2.90	2.60	2.73	2.80	3.03	2.65	2.62	2.76
Monetary valuation	NV	0.00	0.19	0.27	0.50	0.39	0.25	0.19	0.25
	€	0.00	3.08	10.00	3.85	5.53	16.33	5.00	6.25
Carbon storage									
Non-monetary valuation		2.70	2.33	2.63	2.77	2.67	3.08	2.78	2.71
Monetary valuation	NV	0.50	0.56	0.64	0.57	0.44	0.33	0.38	0.49
	€	10.07	5.14	12.64	4.75	5.09	14.00	7.00	8.47
Water regulation and flood control									
Non-monetary valuation		2.23	1.93	2.30	2.50	2.33	2.69	2.42	2.34
Monetary valuation	NV	0.10	0.31	0.27	0.57	0.44	0.17	0.14	0.28
	€	12.5	5.05	10.00	6.50	8.53	9.50	5.66	8.25
Recreation and tourism									
Non-monetary valuation		2.07	2.23	1.76	2.50	2.56	2.84	2.44	2.34
Monetary valuation	NV	0.20	0.38	0.27	0.64	0.33	0.08	0.14	0.29
	€	12.5	5.70	9.33	6.88	4.70	5.50	5.66	7.18
Agriculture production									
Non-monetary valuation		3.50	2.93	3.06	3.10	3.26	3.22	3.04	3.16
Monetary valuation	NV	0.50	0.81	0.82	0.64	0.78	0.58	0.38	0.64
	€	17.00	7.86	10.72	6.55	9.09	12.50	5.75	9.93
Aesthetic value									
Non-monetary valuation		3.20	2.96	3.06	3.17	3.00	3.19	2.87	3.06
Monetary valuation	NV	0.00	0.31	0.27	0.57	0.39	0.04	0.19	0.25
	€	0.00	4.05	7.00	4.00	4.46	6.00	5.00	4.36
Identity									
Non-monetary valuation		3.03	2.20	2.73	2.97	2.86	2.61	2.31	2.67
Monetary valuation	NV	0.00	0.06	0.18	0.50	0.28	0.00	0.14	0.16
	€	0.00	5.5	9.00	7.00	4.05	0.00	5.65	4.46
Environmental education									
Non-monetary valuation		2.7	2.63	2.67	3.20	3.10	3.17	2.73	2.89

Table 3 (*continued*)

		Local residents from villages of fewer than 500 inhabitants	Local residents from villages of 500–1000 inhabitants	Local residents from villages of 1000–5000 inhabitants	Local residents from towns of 5000–20,000 inhabitants	Local residents from towns of more than 20,000 inhabitants	Park tourists	Beach tourists	Total average value
Monetary valuation	NV	0.60	0.50	0.73	0.71	0.78	0.67	0.71	0.66
	€	13.4	5.78	10.56	12.50	17.41	16.62	15.13	13.06

respondents were prepared to pay for sustainable ecosystem services varied within respondent's groups in comparison with locals from the smallest villages (reference group). However, we are able to identify two main trends: tourists and especially park tourists have a high willingness to pay more, while locals from bigger cities tend to be less willing to pay, especially locals from towns bigger than 20,000 inhabitants. We found five positively significant variables that explained the probability of beneficiaries groups to be willing to pay any amount of money for the protection of ecosystem services: origin – survey location, Girona region and rest of Catalonia – education level – university degree and professional studies. Two significant variables were negatively related: age and family farming.

Mean values shown in Table 3 ("Monetary valuation") allow us to compare results across beneficiaries groups, regarding the ecosystem services they would allocate their money to (expressed as normalized value), and the amount of money allocated to each ecosystem service (in €). All beneficiaries groups, but especially locals from the largest villages and tourists, showed strong willingness to pay for environmental education. Agriculture production together with environmental education were the services for which respondents were willing to provide the largest amounts of money. Habitat for wildlife and pollination appeared important within the WTP exercise, especially for tourists and local residents from villages with 1000–5000 inhabitants. The results also indicate that agriculture production was highly valued by local residents from villages with 500–5000 inhabitants. Aesthetic value and identity were among the least valued ecosystem services – at the same level as all regulating services (pollination, carbon storage and water regulation and flood control).

4. Discussion

4.1. Monetary and non-monetary values

Several important findings emerged from this research: both monetary and non-monetary valuation approaches allow us to comprehend the equilibrium of preferences for material goods (provisioning services) and non-material ecosystem services (support, regulating and cultural services) provided by the study area that non-farming population perceived important. Such understanding is crucial because of trade-offs that often emerge between agricultural production and other ecosystem services (Rodríguez et al., 2006) and calls for a careful balancing between different ecosystem services in agricultural land-uses. The contingent valuation method used has a weakness that must be highlighted: although respondents were informed about the aim of the study and ecosystem services concept at the beginning of the survey, for most of them there was a learning process during the interview on the ecosystem services approach, thus the order of the questions might influence their choices. In that sense, the design of valuation survey instruments is crucial and the combination of individual and groups interviews can help to understand the importance of the mentioned weakness to the results (Kaplowitz, 2000).

Consistent with previous studies (e.g. Martín-López et al., 2013; Langemeyer et al., 2015), we observed divergent results from monetary and non-monetary assessments for some specific ecosystem services. Monetary values were high where beneficiaries obtained personal benefits, for example in form of income from tourism, while non-monetary values were higher for intangible benefits for instance in form of aesthetic values. In contrast with previous observations (Langemeyer et al., 2015) monetary values were higher than non-monetary values for environmental education. We assume this may result from the fact that paying for

Table 4
Variables explaining willingness to pay (WTP) for ecosystem services by ecosystem services beneficiaries groups. Variables explaining behaviour of respondent's groups willingness to pay (or not) and the amount of money respondents would be prepared to pay. Odds Ratio (OR) is calculated as (exp(Mean) − 1)*100 and express the probability (%) of willingness to pay of a respondent group, or a variable, compared to the reference (ref); and the probability (%) of a respondent group to pay a unit more, or less, compared with the reference group (ref).

Respondent's groups		Variables explaining behaviour of respondent's groups willingness to pay (or not)		Variables explaining behaviour of respondent's groups regarding the amount of money prepared to pay	
		Mean	Odds Ratio (OR)	Mean	Odds Ratio (OR)
Local residents		−27.024	−93.29%		
Tourists		Ref		Ref	
Park tourists				0.7524	112.21
Beach tourists				0.5327	70.35
Local residents from villages of fewer than 500 inhabitants		Ref		Ref	
Local residents from villages of 500–1000 inhabitants				−0.363	−30.44
Local residents from villages of 1000–5000 inhabitants				0.1861	20.45
Local residents from towns of 5000–20,000 inhabitants				−0.9618	−61.78
Local residents from towns of more than 20,000 inhabitants		−6.3	−99.82	−6.7805	−99.89
Age		−0.0061	−0.61		
Comes from farming family		−0.1983	−17.99		
Origin	Survey location	0.1103	11.66		
	Alt Empordà County	Ref			
	Girona region	0.3643	43.95		
	Rest of Catalonia	0.357	42.90		
Educational level	University degree	0.2233	25.02		
	Professional studies	0.0608	6.27		
	Basic studies	Ref			

activities related to environmental education is increasingly becoming an accepted practice, for instance paying the entrance to a Natural Park or paying for bird watching, in a highly commodified landscape as the Costa Brava constitutes.

The combined monetary and non-monetary assessment means a consideration of different value dimensions (Martín-López et al., 2012) and allows identifying potential conflicts of interests between beneficiaries groups within a study area. Under both valuation approaches 'agriculture production' is the highest valued ecosystem service. This implies that the landscape in our case study is seen from a strong agricultural perspective (Sayadi et al., 2009), and confirms previous observations in agricultural landscapes (Hartel et al., 2014; Martín-López et al., 2012; Agbenyega et al., 2009). The high emphasis on provisioning ecosystem services could be the consequence of their value being more tangible and identifiable by societies, whereas the economic value of cultural, regulating, and supporting services are more difficult to quantify (Rodríguez et al., 2006).

Conflicts due to changes in agrarian practices and diverse perception towards agrarian landscapes can emerge between social groups, as Ventura et al. (2000) described in the study area because of water management. We can observe potential conflicts between beneficiaries groups: a trade-off emerges for example between rural residents with a strong production oriented landscape perception and urban residents and visitors with a high cultural view on agricultural landscapes (this corresponds with findings by López-Santiago et al. (2014); Martín-López et al. (2012)).

4.2. Social perspectives behind the valuation of ecosystem services

Previous studies highlighted the influence of the place of residency and places visited on the appraisal of ecosystem services (Castro et al., 2011; Bieling et al., 2014; Van Berkel and Verburg, 2014). Especially aesthetics and identity (under the socio-cultural valuation approach) were stronger valued by rural residents. By showing that the place of residence and the place to visit highly influence the perceptions of the respondents towards the importance of ecosystem services, our results support the theory that different beneficiaries groups look at landscapes in different ways, i.e. appreciating different aspects and expecting different functions (Rogge et al., 2007). People establish different relations to places, depending on their cultural values, interests and individual experiences (Kianicka et al., 2006).

Overall, results indicate an influence on value by the size of the municipalities beneficiaries live in, constituting a rural–urban gradient (this corresponds with findings by Martín-López et al. (2012) and Svobodova et al. (2011) on the perception of ecosystem services. For example, provisioning services were stronger perceived by residents from the smallest villages (< 500 inhabitants), which can be explained by their direct importance for the local economy, where agricultural production is very present in everyday experiences. Locals, living in closer connection with agrarian landscapes stronger recognize capacity of agricultural land as wildlife habitat and for biodiversity (Sayadi et al., 2009; Plieninger et al., 2013; Hartel et al., 2014). This observation underlines previous findings, that ecosystem services are often higher valued – and thus better protected – when they are directly experienced and sustain local livelihoods (Buijs et al., 2006; Martínez-Alier, 2002). Barthel et al. (2010), argue that nature experiences strongly support the development of environmental stewardship.

Notwithstanding, we found that visitors, especially park tourists, showed greater appreciation than residents for several regulating ecosystem services, including pollination and carbon storage, and stated a stronger willingness-to-pay for their conservation. As a reason for this, we assume that protected areas attract

visitors with stronger environmental awareness and a positive attitude towards nature conservation. Regulating services may require a stronger understanding of ecological processes to fully appreciate their importance (MacDonald et al., 2013:1; Elmqvist et al., 2013). In this context it is striking that the level of education a respondent held was one of the most important socio-demographic factors affecting the valuation results, where respondents with higher education level had more probability to recognize regulating ecosystem services.

A potential reason for the low value of regulating services in general may result from a bias in the methods we applied; given that monetary and non-monetary valuation are both social science methods based on stated preferences (Camps-Calvet et al., 2015), which may not sufficiently capture important indirect values described for the study area, such as water storage for crop irrigation or the biodiversity of coastal wetlands (Ribas i Palom, 2008).

4.3. Cultural ecosystem services in the agricultural landscape

Cultural ecosystem services have been described as widely provided by agricultural landscapes in Europe (Daniel et al., 2012; Schaich et al., 2010). Our results show that cultural ecosystem services are highly important for all beneficiaries groups and manifest the respondents' strong intangible, i.e. non-material, attachment to the landscape.

On the one hand, aesthetics is among the most valued ecosystem services, whereby Gobster et al. (2007) hypothesized that landscapes perceived as aesthetically pleasing are more likely to be conserved.

On the other hand, environmental education is considered to be a very important ecosystem service. Educational values are assumed to be determined by the "*presence of features with special educational and scientific value/interest*" (De Groot et al., 2010:264). In this sense, the presence of the *Aiguamolls de l'Empordà* Natural Park within the study area might be an important asset both for appreciation of the landscape for research programmes as well as for environmental education, for example for children.

4.4. Contributions for Mediterranean agricultural landscapes

Mediterranean countries are experimenting great land use changes, and intensive agricultural practices are replacing traditional agricultural landscapes (Van Vliet et al., 2015; Ales et al., 1992; Pavón et al., 2003; Serra et al., 2008). At the same time, Mediterranean coastal regions are receiving visitors from all over the world with high expectations for traditional and attractive landscapes. In this context, the existence of different perceptions regarding agricultural landscape management (Anton et al., 2010) may lead to disagreements in conservation measures (Tella and Forero, 2000; Calvete et al., 2004) and social conflicts (Comins et al., 1993; Ventura et al., 2000).

The identification of potential trade-offs between the interests of different societal groups is a topic of great interest (Foley et al., 2005), and may support the planning and management of agricultural landscapes in Europe, in the light of the common agricultural policy (CAP) and targets formulated in the EU biodiversity strategy to 2020 (European Commission, 2011). In Mediterranean coastal areas, diverging interests between tourism and locals drive the aforementioned policy-making challenge (Castro et al., 2011; Langemeyer et al., 2015). To avoid social conflicts, policy-makers and planners should include perception of landscape preferences across respondents groups into regional planning, in order to produce landscapes with a multifunctional performance; i.e., landscapes preserving cultural values for residents and tourists, while delivering supporting ecosystem services, both provisioning and non-provisioning. In order to sustain the balance of production goals and non-production needs we propose a twofold monetary compensation system from urban (and touristic) communities to the rural areas. As such, our research might provide some useful insights for the future CAP-design, as a system of incentives for the maintenance of traditional landscapes, yet also for farmland management practices in line with nature conservation goals, ultimately enhancing a broad and balanced delivery of ecosystem services. Our study shows that already half of the non-farming population is willing to participate in a voluntary payment for ecosystem services conservation (nearly 50% of the respondents), being especially higher for visitors. Yet, the lacking willingness to contribute to conservation measure by the other half of the non-farming population might indicate a still lacking recognition of the multiple benefits conserved and generated in agricultural areas, beyond food production (Calvet-Mir et al., 2012) and farmers potential role as stewards of ecosystem services. Our study shows that most benefits provided by agricultural areas are not marketable goods. Thus, to enhance the recognition of farmers as potential stewards for ecosystem services and consider the multiple ecosystem services agricultural areas provide in the CAP, further research is needed that applies non-monetary valuation techniques (Kelemen et al., 2014) in addition to the assessment of marketable goods.

5. Conclusions

In conclusion, we found differences among respondents' perception of ecosystem services depending on their perspectives on and relationship with the landscape and with regard to socio-demographic factors, being residency and educational level among the most relevant. The value for maintaining traditional landscapes was highlighted together with the landscape's importance for crop production, indicating the need for a careful balance in agricultural land-uses. Results highlighted that the delivery of the provisioning services are not necessarily compromising other services, such as aesthetic and identity values. Sustaining rural landscapes requires enhancing their capacity to simultaneously achieve production goals and social non-material needs. People with close ties to the agricultural landscape are more likely to perceive their multiple benefits and to conduct practices and management that serve the objective to simultaneously enhance multiple ecosystem services. The current trend of increasing disconnection of large parts of the Mediterranean society from agricultural origins may in turn foster unsustainable practices and the depletion of ecosystem services. In the current momentum of the *EU Biodiversity Strategy to 2020*, our results provide evidence for the strong recognition of the multi-functionality of coastal agricultural landscapes and the related values, where different types of ecosystem services are considered important at the same time and at similar levels, and call for an integrated approach to agricultural land-use planning.

We also encourage deeper studies of socioeconomic assessment of ecosystem services in rural areas including farmers and exploring possible conflicts of interests between farming and non-farming populations.

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