Shared ecological knowledge and wetland values: a case study

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Keywords

Wetlands; ecosystem services; ecological functions; public goods; multiple motivation analyses; environmental awareness; perceived utility

Highlights

- ✓ We analyze citizens' shared ecological knowledge (SEK) of wetlands functions to describe its nature, its relation with the official knowledge, the relation between the motivations outlined by SEK and those expected by the standard economic model.
- ✓ Wetlands functions' SEK is related to wetlands living proximity and unexpectedly diminishing for some long since acquired critical services
- ✓ There is a separation between official knowledge and SEK on crucial aspects like wetlands' climate change role.
- ✓ Economic preferences are driven by multiple motivations well rooted in SEK social nature and not by simply consequential motivations.
- ✓ This approach helps to transfer a socio-cultural complex capital into a public decision making processes.

Abstract

The estimation of wetlands’ non-use values to build up a total economic evaluation can be based on stated preference methods, which derives from the standard economic model that assumes a rational assessment of the consequence of preferences on personal utility. The paper describes the citizens’ shared ecological knowledge (SEK) of wetlands functions. It descibes SEK nature, SEK relation with the official knowledge, the relation between the motivations outlined by SEK and those expected by the standard economic model. The results demonstrate that economic preferences are driven by multiple motivations well rooted in the SEK’s social nature, and not by simply consequential motivations. In this case study, social knowledge of wetlands' ecological functions is proportionally related to people's living proximity to those wetlands. Unexpectedly, SEK of historically well-known and critically important services like hydraulic and hydrologic services has also been diminishing. Furthermore, there is a partial or clear-cut separation between official knowledge and SEK on crucial aspects like wetlands’ climate change role. This approach helps to construct a motivational framework to derive values that are useful as long as they allow accounting for a complex socio-cultural capital in the public decision making process.

Introduction

In the first half of the 20th century wetlands were perceived by several social groups as noxious areas hampering economic development and landscape exploitation (Boyer and Polasky 2004). These beliefs brought about the destruction of a great part of these ecosystems, but in recent decades their perception has changed dramatically. The Ramsar Convention on wetlands (1971) was an example of this change.

Wetlands perform multiple functions that in turn produce multiple benefits (Table 1; see Brander *et al.* 2006; Costanza et al. 1997; Millennium Ecosystem Assessment 2003-2005). Wetlands may also produce some benefits competing with those produced by engineering systems, e.g. wastewater treatment systems (Kadlec and Knight 1996; Mannino *et al.*, 2008). Despite this official scientific and normative ecological knowledge, the number of wetlands is still diminishing, partly because the wetland functions they generate are not associated with some recognizable monetary values (TEEB 2009). For these reasons the economic valuation of environmental resources is an increasingly common practice, meant as the monetary quantification of the benefits (or costs) resulting from the preservation (or the destruction) of an environmental resource (Adams 1993; Hanemann 1999).

This paper comes from a wider research work used by the Province of Rome (Italy) to define a set of total economic values for a corresponding set of ecological systems (wetlands, woods, rural landscape) of its territory. Total economic value is the total amount of resources that citizens would be willing to forego for an increased amount of ecosystems services (Turner at al. 2003). The non-market components of the total economic values were estimated by means of stated preference methods like contingent valuation, that is one of the widely usable method to estimate the individuals willingness to pay (WTP) for ecosystem services in a credible proposed market (Bateman et al., 2002; Pagiola et al., 2004). These total economic benchmark values have been made public (http://websit.provincia.roma.it:8080/Benicomuni) to stimulate their use by community (public/private, economic/social) actors in all allowed negotiations or transactions.

This work focuses on the analyses of the citizens' shared knowledge of wetlands ecological functions used in a contingent valuation approach, because this kind of knowledge - overlapped with the official (e.g. scientific/normative) knowledge – is supposed to inform the individual preferences expressed by WTP, as assumed by the utilitarian philosophy that underpins the standard economic model.

We examined in depth this aspect because we assumed that the use of monetary estimates in public decision making about land use policy– especially in a concrete case,- is only sustainable as long as it is explicitly connected to the socio-cultural complex capital which generate them.

Shared knowledge is defined as a cumulative body of knowledge and beliefs shared in the community by cultural transmission that, for these reasons, become social memory (Berkes et al., 2000; Davidson-& Berkes, 2003).

Even if not always with brilliant results (Diamond, 2005), social memory has historically, and all over the world, structured the local communities' decision making processes in ecosystems and landscape management (Franco et al., 2007; Horstman & Wightman, 2001). Therefore its loss represents a problem.

The shared ecological (or cultural: Orcherton, 2012) knowledge is a dynamic entity able to register changes and based on what has been learnt from trial and error management practices. For all these reasons this kind of social capital is more and more used by means of participatory approaches even in rural development programs (Anegbeh et al., 2004) or in natural resource research and programs (Castello et al., 2009; MacDonald & Weber, 1998; Rist et al., 2010; Shen & Tan, 2012).

The aim of the paper is to analyze: (i) the nature of the community citizens' knowledge of wetland ecological functions; (ii) the relation of the citizens shared knowledge with the scientific official knowledge, (iii) the relation between the motivations outlined by this shared knowledge and those expected by the standard economic model in ecological services' preference; (iiii) the role of the obtained results in land use policy decision making.

Materials and Methods

The Rome region occupies the flat area of the Tiber Valley and the Tyrrhenian Sea, and was characterized by a widespread coastal wetland system that disappeared after the "great reclamation" during the first half of the XIX century. A recent national wetlands inventory (http://sgi2.isprambiente.it/zoneumide/) led by the Mediterranean Wetland Initiative identified 24 wetlands covering 9302.79 ha. These wetlands were mainly classified as inland type, with a mean and median values of 387 and 65 hectares respectively.

Considering that the aim of this research was not site-specific, our survey regarded the whole province system of wetlands.

The survey was carried out during the summer of 2010: 81 respondents were interviewed in the pre-test and 537 in the true test.

A questionnaire was designed (i) to depict the relation between sample individuals profile and shared knowledge / awareness about wetlands ecological functions, (ii) to reduce the biasing factors of the CV method, e.g. starting point, scenario rejection, free-riding (Franco & Luiselli, 2013).

The 1st section of the questionnaire proposed the rationale for the interview to reduce interviewee weariness, expressed by the research aim of the interview and the importance of the respondent role in this research. Then a complete yet simply defined definition of wetland, with a follow up phase to clarify possible doubts (that nobody had).

In the 2nd questionnaire section the interviewers proposed a list of careful syntheses of the range of wetland functions loading services and associated socio/economic benefits as classified by scientific / normative ecological knowledge (Brander et al., 2006; Costanza et al. 1997; Leschine et al. 2004; Millenium Ecosystem Assessement 2003-2005). The wetland ecological services were carefully described as separated statements that respondents were asked to comment on a five point Likert scale. The statements were formatted in an easily understandable way, balancing simplicity, clarity and time requested to the respondent (Table 1).

In this way we defined a robust scenario for each respondent to activate a personal cognitive map of wetlands ecological knowledge and correspondent benefits.

Given that in this region wetlands no longer have detectable direct economic use values, we must assume that: (i) the relationship between the individual level of agreement / disagreement and the knowledge uncertainty about the stated functions / benefit represents the individual level of information motivating the citizen behavioural preferences; (iii) the individual motivations for the ecological functions monetary valuing assessed by the CV are located inside these benefits categories. That is, the more uncertain is the judgment about an ecosystem service - among the listed ones - the less informed is the resultant WTP, and vice-versa. Indeed, the economic standard model postulate that individuals can express a WTP having a well informed preference, like in other less egoistic (Schwartz, 1993) or simplistic models (Spash et al., 2009).

In our case the very few “simple” disagreement judgments were actually based on uncertain answers (I’m not sure, but; perhaps, but I do not know; etc), therefore we merged these few response to the general uncertain class (I do not know).

During the last interview part, the questionnaire was used to register the demographic, socio-economic, cultural and geo-spatial attributes of the respondents. Data were grouped into ordinal scale intervals and used as independent variables: **age** (17-30, 30-44, 45-64, >64); **schooling** (none, lower school, junior high school, high school, Bachelor’s degree, Master’s degree, PhD); **employment** (Housewife-student-unemployed, workman-pensioner, white collar, manager. self-employed – professional); **income** (t € / year: 0-10, 10-20, 20-30, 30-40, 40-60, >60); respondents’ **family** (1, 2-4, > 4); . **association** belonging (none, other, rural union, environmental, fishing-hunting); sex; respondents’ **residence** (urban, urban fringe, rural); **distance** of the respondents’ domicile from the nearest wetland. We selected this minimum number of variables to balance the criteria of simplicity, clearness, and admissible interview time and: (i) to analyze the demo-socio-economic and cultural effects on individual and communities shared ecological knowledge / awareness, (ii) to account, regarding the overall contingent valuation approach, for the economic standard model theoretic expectations (Franco & Luiselli, 2013). In fact, we expect that these characteristics help to represent the nature and the strength of the motivations that hold up a stated preference (Ajzen 1991; Ryana and Spash, 2011; Spash et al., 2009).

We used a robust survey approach (Tolley and Fabian 1998) with face-to-face structured interviews (Bernanard, 1996) and interviewers training to maximize the homogeneity of the information, the research neutrality, and to reduce the interviewees’ distrust. To include the elderly / rural population component, we did not use an internet approach, even if it has been shown of comparable efficiency (Lindhjema & Navrudb, 2011),.

We explored the possible role of shared ecological knowledge on wetland ecological services preference, so we did not use other techniques (open and semi-structured interviews, stakeholders focus groups and workshop) used in shared ecological knowledge research (Palomo et al., 2011; Gómez-Baggethun et al., 2012) for other purpose, like building participatory process for managing purpose.

We carried out the survey by evenly distributing the interviews in different places (marketplaces, mainstreets, railways stations, etc.) of the towns (Ladispoli and Cerveteri) nearest to wetlands residual patches, during all daytime periods and intercepting Rome's commuting flux in the city railway stations.

We assessed the sample's statistical representativeness and we filtered out free riders and/or outliers by an interactive cross validation reliability procedure fully reported elsewhere (Franco & Luiselli, 2013).

Statistical models

We used logit models in order to analyze complex interactions among dependent variables (respondents' judgment about wetlands functions) and partially autocorrelated predictors (Hosmer and Lemeshow 1989). We used only sufficiently non-autocorrelated ($r<0,70$) predictors in univariate logit models, by means of backward logistic regression modeling, with a uniband option and iterations stopped at $P < 0.001$ (Luiselli 2006a). Models robustness was evaluated by F-test values ($\alpha = 5\%$), with the higher the F-value the better the fit to a data set (i.e., the better the model). We also used the second order (AICc; Burnham and Anderson 2002; Hamer et al. 2006) Akaike Information Criterion (Akaike 1973) which allows models' ranking by means of their relative likelihood and not by any threshold (alpha-level, Vapnik 2000). Analyses were carried out with STATISTICA (StatSoft release 10), SPSS (release 10.0, Norman, 1999) and writing the functions for calculating means and medians in logit functions in R (R Development Core Team 2008).

Results

The sample resulted statistically representative of the considered universe (Rome county), as reported elsewhere (Franco & Luiselli, 2013). Graphic analyses (Figure 1) and Friedman's ANOVA (Table 2) verified the citizens' knowledge distribution of the stated functions/benefits. Total dis-agreement, that anyhow imply a clearly focused knowledge and motivation, was negligible for all the stated functions/benefits.

The sharing of the knowledge agreement was nearly total in a first group of functions: habitat/biodiversity, recreational and commodities production. A second group of functions registered an uncertainty rate of around 25% (water depuration, hydrologic control) and 40% (hydraulic risk control). The degree of knowledge sharing within this group did not result statistically different (see *b-c* columns in Table 2). The climate change mitigation function (see *d* column in Table 2) showed the statistically lower degree of shared knowledge: around 50% of respondents were unaware of the wetlands role in the climate change issue (Figure 1).

The complex interactions between social ecologic knowledge, *e.g*. the sharing rate of a clear agreement and/or disagreement *versus* the uncertainty to the stated ecological function / benefit, and the individual profiles (defined by the demo-socio-economic, cultural and geo-spatial predictors) are reported in Table 3, and the key results are listed below.

Given the statistical strength of the well-known direct relationship between Schooling and income, these predictors were selected by the regression models for almost all the considered wetlands functions, but, more meaningfully, with increasingly stronger positive relationships from the 1st to the 3rd group of wetlands functions, as outlined by the relative F-values.

A similar, but negative, relation was systematically detected among the first function group (habitat/biodiversity, economic goods and recreation / culture functions) and the respondents residence distance from wetlands.

Associationism was selected in all of the 2nd group models and in one (wetland commodities) of the 1st group. In the 2nd and 3rd functions group was selected a systematic inverse relation between EK and sex and age.

DISCUSSION

We verified that a first group of wetlands functions (habitat/biodiversity, economic goods and recreation / culture functions) showed an almost complete sharing of knowledge and related social memory among citizens. The universality of this sharing was not evidently determined by individual schooling (and the related income) level, and tended to decrease as distance increased from the wetland.

Another group of wetland functions (water depuration, hydrologic control, environmental risk control) had a decreasing shared knowledge, however increasingly related with schooling (and related income) and inversely with both age and sex. This last relation reflects, in the not-urban areas, the decreasing rate of schooling in the elderly classes, mostly for women, and their subsequently reluctance to give judgments with insufficient background information (e.g. Alberini et al., 2005).

Lastly, the recently recognized wetlands function related to climate change mitigation was only partially shared among some citizens and clearly does not belong to the community' social memory.

To interpret this clear pattern we should consider the underlying element that differentiates the three groups of functions, i.e. the different role of social effects on valuing behaviour. The theory of planned behaviour (Ajzen 1991) helps in differentiating this aspects as: (i) attitude toward a behaviour, referred to the degree to which a person has a favorable / not favorable evaluation of the behaviour in question; (ii) subjective norms, referred to the perceived social pressure to perform a specific behaviour; (iii) perceived behavioral control, referred to the believed ease of performing the behaviour.

The habitat / biodiversity function is likely perceived in an instantaneous way by means of psychological deep mechanisms (Kaplan and Kaplan 1982) which identify “nature” as a symbolically high valued entity (Shama 1995) especially for those people having cosmopolitan traits (Buijs et al. 2006). It is very unlikely that the expressed universal agreement behaviour could be connected to the individual rational updated scientific knowledge. Instead, it emerges that this valuing comes from ethical attitude and subjective norms, where uncertainty or disagreement would be perceived in contrast with the common sense. The same seems to be the origin of the strong agreement on the cultural and recreational wetlands functions, even because wetlands are rare in the region and because they are not a generalized recreational option. From the valuing behaviour point of view, even the total agreement with the wetland's commodities functions can be found in the social memory role. It is important to note that the valuing behaviour of habitat/biodiversity and recreational/cultural functions seems to be generally applied to systems perceived as "natural" (woods and rural landscape; Franco and Luiselli, 2011). In the case of the wetland's commodities function, the presence of the predictor 'associationism' suggests that this aspect is actively maintained into the social memory by ethical (rights-based) motivations, like that of belonging to NGO. A remarkable aspect is that all this shared knowledge connected to social influence in valuing behavior was spatially dependent: indeed, it does not belong to the whole county social memory, but tends to diminish when moving away from each wetland.

In the second group of functions we found that the shared knowledge is coupled of individual gains of knowledge more (pollution control) or less (environmental risk control) recently stratified, either of technical/cognitive or ethical/philosophical nature. Here, the valuing behaviour seems more influenced by individual cognitive awareness based on personal experience/knowledge or training, indicated by the relation with the education / income predictor. The ethic valuing attitude seems still present, as can be deduced by the constant presence of the associationism as a predictor underlining the sense of responsibility towards own community or group. Besides, the cultural link maintaining alive the social memory of peculiar wetland services - the hydraulic and hydrologic functions, so strongly reassessed by official knowledge in the last decades - in regions historically linked to a wetland and his management (*e.g.* Venice Lagoon; Franco *et al.*, 2007), seems to have been lost in the Roman littoral. This is probably due to the dramatic ongoing change of the socio-cultural fabric in the last decades (V.A., 2010).

In the last group of functions we found functions with widespread uncertainty, like climatic change mitigation. Despite the dominant role of this issue in the official knowledge, the awareness and valuation of these functions results not socially shared and attain to who had the opportunity to acquire the education level needed to filter and select information.

Summarizing, we detected a decrease in uncertainty from the functions clearly present in the social shared knowledge and memory, which share wide ethic-aesthetic attitudes, to those characterized by an increasing degree of direct experience or expert knowledge.

Conclusions

Some wetlands' ecological functions are well rooted in the communities shared knowledge that greatly influences the individual valuing behaviour with attitude and subjective norms effects. These functions represent the general social expectations of "nature" (biodiversity, cultural value) which have a strong ethic and aesthetic implications. The valuing behaviour of the other functions is less and less rooted in social memory, therefore less and less connected to subjective norms, and increases with personal awareness, linked to individual training and experience.

In this region it appears that the wetlands social shared ecological knowledge tends to decrease moving away from wetlands. Furthermore, the historical awareness about some services, mostly for some critical ones like the risk (hydraulic, hydrologic) control, is dramatically fading in the local communities. This could be linked to the ongoing rapid change of the socio-economic structure of local communities.

From our results it clearly emerges a partial or sometimes clear-cut separation between official knowledge and socially shared knowledge on crucial themes like the hydrologic and climate change role of wetlands. Functions that should be well recognized for their international relevance do not enter at all in the shared community knowledge. This implies that a great effort on environmental education on these issues should be quickly developed in the next years to bridge present social knowledge gaps' on crucial issues of the next future public decision making.

Furthermore, the standard economic model does assume that preference is based on individual knowledge, so that the consequences of actions determine whether they are preferred or otherwise. Considering the relation between knowledge uncertainty and motivations, our findings are coherent with other studies (Ryana and Spash, 2012) showing how economic choices are greatly influenced by the socio-cultural context. Our results suggest that a great part of the motivations to pay for the wetland services in this European province comes from a social shared knowledge, spatially related to wetlands, which seems to influence in a not rational way the valuing behavior.

Given our results, in our view the monetary estimates of ecosystem services' value, such as those obtained by contingent valuation, are useful tools in public decision making when: 1) they inform the decision making process by facilitating the expression of the cultural capital held by society, without distorting it, and 2) they are explicitly rooted in normative values (Farley, 2012).

Regarding point 1, the WTP monetary estimate is an unbiased representation of the social capital in public decision making in cases where the social knowledge/awareness of the ecological service is widely shared. In cases where the social knowledge/awareness of the ecosystem service is significantly less shared, the resulting WTP figures tend to underestimate the best possible value for good public decisions, e.g. coming from the entirety of the best scientific knowledge and the shared ecological knowledge.

In this concrete case study, for instance, policy makers are now aware that: (i) the total economic value of wetlands is generally underestimated due to the lack of social knowledge about the climate change mitigation service wetlands provide; (ii) there is a social awareness gap on a crucial environmental issue; (iii) other methods should be possibly coupled with contingent valuation in the case of an isolated monetary estimation of this specific ecosystem service.

Furthermore, the conditions 1) and 2) reported above can be obtained even using additional motivational predictors in the estimating multivariate models (Spash, 2009), or analyzing the shared knowledge along the respondents' profiles distribution among the listed ecosystem services as motivational interpretative keys. We believe that this last approach coupled with a robust methodological design to avoid information bias (Price, 1999) and the selection of the "true no-bidders" respondents is a more intuitive but robust alternative for concrete policy case purpose (Franco & Luiselli, 2013). In our case these considerations are corroborated by the fact that: (i) a part from 'Bids' none of the candidate predictors (including motivational ones) were used by the statistical selection process, which produced parsimonious and robust statistical models; (ii) the willingness to pay estimates were significantly different for wetlands compared to the other assessed ecosystems; (iii) the single monetary estimates were characterized by a significantly different pattern of motivations, attitudes and shared ecological knowledge (Official Research Report, available at: www.provincia.roma.it/sites/default/files/vta roma web_0.pdf).

The multiple motives that compose the valuing behaviors are based on the social capital represented by the shared knowledge distribution among citizens of the multiple and interconnected ecosystems services (Franco et al. 2007; IFEN 2000; Luginbüil 2001; Spash 2009; Turner et al. 2003). Fully accounting for these relationships in using ecosystem services monetary estimates is very useful in informing public decisions dealing with land use policies.

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Figure 1 Percent distribution of the shared knowledge expressed by a 4 four point Likert scale (total agreement, agreement, partial disagreement / uncertainty, total disagreement) to stated wetlands ecological functions/benefits.

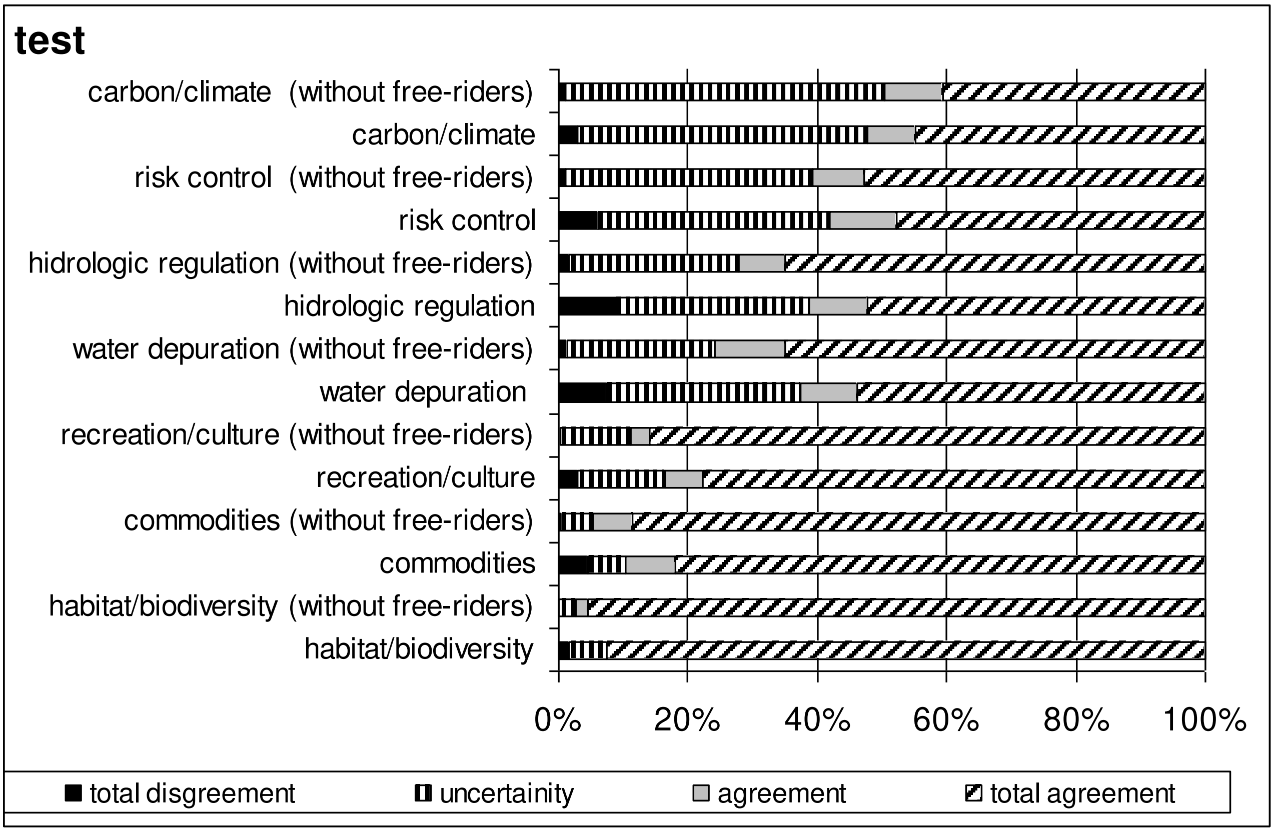

Table 1 Description of the first two sections of the questionnaires. The second section lists the wetlands ecological functions / benefits as stated by scientific / normative ecological knowledge to what respondents were asked to comment on.

Section 1	
Wetlands	
This survey is part of a wider research project on the of the Rome County and the Lazio Region.	
Wetlands are low depth water areas like lagoons, deltas, marshes, ponds, etc	Follow up
Section 2	
Express your opinion about these statements **wetlands**	
1. Wetlands are important as water reservoirs and circulation control	Total agreement; Agreement; Uncertainty; Total disgreement
2. Wetlands contribute to control green house gases based on C (like CO2) and climate change sequestering organic matter (that is plant, animal, litter, sediments)	Total agreement; Agreement; Uncertainty; Total disgreement
3. Wetlands contribute to reduce environmental risks acting as a barrier against wind, waves, fires and erosion	Total agreement; Agreement; Uncertainty; Total disgreement
4. Wetlands have a water purifying function	Total agreement; Agreement; Uncertainty; Total disgreement
5. Wetlands contribute to biodiversity offering a habitat of several plants and animals (fishes, shellfish, water birds, mammals, reptilians)	Total agreement; Agreement; Uncertainty; Total disgreement
6. Wetlands have a recreational function (visits, wildlife watching, and game)	Total agreement; Agreement; Uncertainty; Total disgreement
7. Wetlands yield several categories of economic goods (wood, cane, fish, game, etc.).	Total agreement; Agreement; Uncertainty; Total disgreement

Table 2 Significant differences (Friedman's ANOVA) in the ecological knowledge uncertainty of the stated functions / benefits of wetlands**.** The uncertainty, inversely proportional to the agreement sharing, increase from group a to d.

Wetlands' stated ecological functions / benefits	***Statistical grouping***			
	a	**b**	**c**	**d**
Habitat- biodiversity	X			
Economic goods	X			
Recreational	X			
Environmental control		X		
Floods control		X	X	
Water riserve			X	
Climate control				X

Table 3 F-values, P-values and model selection scores for the shared ecological knowledge of each wetland function, and the predictors used. Results are ranked for likelihood (**boldface**) and significance (*italic*). Higher likelihood and significant scores are reported, in one case significant but not likelihood score.

1st group

Habitat				*Economic goods*				*Recreation – culture*			
Function - Predictor	*F-value*	*P*	*AIC*	*Function - Predictor*	*F-value*	*P*	*AIC*	*Function - Predictor*	*F-value*	*P*	*AIC*
schooling	***9.953***	***0,0001***	***-1.906***	***schooling***	***13.748***	***0,00001***	***-0,809***	***income***	***4.556***	***0,046***	***-1.334***
distance*	***9.148***	***0,0001***	***-1.906***	***income***	***9.816***	***0,00001***	***-0,795***	***distance****	***4.749***	***0,009***	***-1.144***
income	***4.040***	***0,018***	***-1.887***	***association***	***3.965***	***0,0195***	***-0,773***	*school degree*	*17.921*	*0,00001*	*-0,191*
				Family**	***3.287***	***0,038***	***-0,771***	*employment*	*0,0011*	*0,999*	*-0,0031*
				distance *	***2.318***	***0,0099***	***-0,767***				

2nd group

Pollution control				*Environmental risks control*				*Hydrologic control*			
Function - Predictor	*F-value*	*P*	*AIC*	*Function - Predictor*	*F-value*	*P*	*AIC*	*Function - Predictor*	*F-value*	*P*	*AIC*
schooling	***40.478***	***0,000001***	***-0,234***	***schooling***	***46.745***	***0,00001***	***-0,332***	***schooling***	***42.232,00***	***0,00001***	***-0,17***
income	***12.970***	***0,00001***	***-0,13***	***income***	***17.378***	***0,00001***	***-0,234***	***income***	***17.844,00***	***0***	***-0,1***
association	***6.153***	***0,0023***	***-0,105***	***Age***	***12.577***	***0,00001***	***-0,217***	***association***	***4.024,00***	***0,018***	***-0,03***
Age	***5.747***	***0,0032***	***-0,103***	***association***	***10.369***	***0,0001***	***-0,209***				
Sex	***4.414***	***0,012***	***-0,099***	***Sex***	***3.032***	***0,049***	***-0,182***				

3rd group

Climate change			
Function - Predictor	*F-value*	*P*	*AIC*
schooling	***43.801***	***0,00001***	***-0,196***
income	***12.727***	***0,00001***	***-0,09***
occupation	***10.299***	***0,00001***	***-0,082***
Assoc	***6, 207***	***0,0021***	***-0,067***
Age	***4.866***	***0,008***	***-0,062***
Sex	***3.827***	***0,022***	***-0,058***

age (17-30, 30-44, 45-64, >64); **schooling** (none, lower school, junior high school, high school, Bachelor's degree, Master's degree, PhD); **employment** (Housewife-student-unemployed, workman-pensioner, white collar, manager. self-employed – professional); **income** (t € / year: 0-10, 10-20, 20-30, 30-40, 40-60, >60); respondents' **family** (1, 2-4, > 4); . **association** belonging (none, other, rural union, environmental, fishing-hunting); sex; respondents' **residence** (urban, urban fringe, rural); **distance** of the respondents' domicile (0-24, 25-44, 45-59, 60-100, > 100 km).