

Citizens' Perceptions on Water Conservation Policies and the Role of Social Capital

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Abstract Planning and implementing environmental policies for the sustainable management of water resources is a challenging task. In order to improve the effectiveness of these policies it is essential to explore their social implications. The present article aims to investigate environmental policies focusing on domestic water conservation and their interconnection with social capital elements. In particular, by means of an empirical study conducted in an insular community of Greece, citizens' perceptions are explored concerning the restrictions imposed from different environmental policy instruments for water consumption and their perceived level of effectiveness. Furthermore, the influence of social capital parameters on these perceptions is investigated. Aggregated indicators of social capital are estimated with Confirmatory Factor Analysis measuring social and institutional trust, participation in social networks and compliance with social norms. Through the results of ordinal regression models it is evident that significant connections exist between elements of social capital and perceptions of citizens towards water consumption policies.

Keywords Water consumption policies · Non-economic social costs · Social capital · Citizens' perceptions

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1 Introduction

In the context of environmental policy there is an increasing demand for the implementation of measures focusing on the conservation and protection of water resources. At the household level, a variety of policies aiming to promote a shift in citizens' behavior, in order to either minimize household water consumption or to reduce the environmental impacts from household activities, have been implemented by most countries.

The policy instruments used to influence household water consumption patterns can be categorized into three broad groups: (1) economic instruments, (2) regulatory standards or limitations and (3) social instruments. Economic market-based instruments of often negative incentives are widely implemented in this field (Johansson et al. 2002; Rogers et al. 2002; Bakker 2001; Randolph and Troy 2008). Indicative examples include the water consumption taxes, where higher levels of consumption incur higher fees, and the removal of water subsidies. Although, economic instruments are often assumed to be more cost efficient and less intrusive than regulatory instruments, they do not always represent a sufficient step in influencing household water consumption. For example, the successful uncoupling of water consumption and economic growth at the household level in Germany and the Netherlands is attributed more to information and appropriate technology than to user fees (Geyer-Allély and Zacarias-Farah 2002). Regulatory standards or limitations are implemented especially in cases where there are significant drought problems or in order to maintain a certain level of water quantity and quality (Bruch et al. 2007; McKay and Moeller 2002). Regulatory standards are not considered effective because are difficult to implement or enforce, thus most countries have generally preferred to influence household consumption through imposing regulatory standards or requirements further upstream in the product chain (e.g. building codes). Social or communicative instruments can generally be described as tools influencing consumer knowledge, environmental awareness, and willingness to act towards a sustainable management of water resources (Syme et al. 2000). Indicative examples include environmental education campaigns, seminars and the distribution of leaflets promoting environmentally responsible behavior. Social instruments may also include co-operative management frameworks which have been proposed aiming to support citizens' and stakeholders' cooperation (Kumar 2000; Johnson et al. 2002). It is not clear, however, whether policy instruments and public participation may also result in behavior change by consumers. It is important to analyze how information and price signals affect consumer preferences and to give more attention to the different economic, demographic, and social drivers that influence household water consumption (Geyer-Allély and Zacarias-Farah 2002; Mosterta et al. 2008). Such an approach will assist in identifying where policy is likely to be the most cost efficient, equitable, and environmentally effective.

According to the relevant literature, citizens' environmental behavior in relation to water consumption depends on several factors, connected with both social and environmental aspects (Portnov and Meir 2008; Jorgensen et al. 2009). Specifically, regarding social factors, it has been proven that age is positively connected with water consumption, thus older people tend to consume more water (Keshavarzi et al. 2006; Levallois et al. 1998). Furthermore, women present higher consumption levels although this behavior may be connected with their everyday household activities

(Corral-Verdugo et al. 2003). Income is also a significant parameter as it has been claimed that lower income households consume less water and are more willing to voluntarily reduce consumption (Gregory and Di Leo 2003; de Oliver 1999; Corral-Verdugo et al. 2003; Aitken et al. 1994; Portnov and Meir 2008). Finally, it has been observed that lower educational level is connected with lower water consumption (Gregory and Di Leo 2003) while the size of the household is also an important influential factor (Wentz and Gober 2007).

Apart from the above connections, individuals' behavior is significantly connected with the proposed changes imposed by a policy and the level of social acceptability for these changes (Randolph and Troy 2008; Menegaki et al. 2007). In this context, it is important to investigate perceptions of citizens on the social costs of a proposed environmental policy along with the factors influencing these perceptions. Recent findings have highlighted that these perceptions will significantly depend on the social capital of a community (Jones 2010). Social capital elements have been introduced in the literature of environmental policy for over a decade and have been successfully utilized as explanatory factors in order to understand citizens' behavior (Jorgensen et al. 2009) and their perceptions of environmental policies (Jones 2010; Jones et al. 2009). Social capital may be divided in four main factors: social trust, institutional trust, social networks and compliance with social norms (Narayan and Cassidy 2001; van Oorschot et al. 2006; Jones 2010). However, to date there are no available studies connecting perceptions of water consumption policies with social capital elements.

The aim of the present paper is to investigate citizens' perceptions of water conservation policies and the influence of social capital on these perceptions. Specifically, citizens' opinions concerning social costs imposed from different policies aiming to minimize water consumption are investigated in an insular community of Greece. In addition, elements of social capital are utilized, as explanatory factors for the perceived social costs of policy instruments. The paper concludes by highlighting the importance of social capital parameters for the formation of water consumption policies and the need to take them into consideration during decision-making processes.

2 Social Costs of Environmental Policies and the Role of Social Capital

A significant parameter revealing citizens' attitudes towards an environmental policy are the restrictions perceived from the implementation of the policy. These restrictions may be characterized as the Non-Economic Social Costs (NESoCs) of environmental policy instruments (Jones et al. 2009). They are defined as "*the limitations imposed on citizens during the application of an environmental policy in their everyday lives*" (Jones et al. 2009; Jones 2010). Indicative examples of these costs are the reduction of water provision in case of drought and the limitation of activities in a protected area of high biodiversity value. The term 'non-economic' is utilized to distinguish it from 'social costs' analyzed in environmental economics literature (Coase 1960). Higher restrictions, thus higher NESoCs, are expected from policies aiming to significantly change the socio-political culture of a community and current habits. Such policies refer mainly to market based instruments of negative incentives and also environmental regulations. On the contrary, 'softer' policy tools,

based on voluntary participation, are expected to impose lower restrictions (Jones et al. 2009; Jones 2010). Examples of such instruments are market-based tools of positive incentives (e.g. funding) and environmental education campaigns. Instruments imposing high levels of social costs are expected to be accompanied by intense protests and the unwillingness of citizens to cooperate with a proposed policy during its implementation.

In order to better understand citizens' perceptions towards environmental policies and specifically social costs, elements of social capital have been recently utilized as explanatory parameters (Jones et al. 2009; Jones 2010). Social capital refers to social factors of a community significantly influencing the behavior of its members regarding collective issues. In the relevant literature, four main dimensions of social capital are identified (Coleman 1990; Putnam et al. 1993): a. social trust, referring to trust between individuals; b. institutional trust, referring to trust in institutions connected with the functioning of a community (e.g. government, justice system); c. compliance with social norms referring to the tendency among members of a community to comply with norms for the protection of the common good (e.g. paying taxes) and d. formal social networks referring mainly to the membership of individuals in organized collectivities (e.g. Non-Governmental Organizations). Each of these factors is connected with the social costs of environmental policies.

Social trust is linked with the belief that fellow citizens act for the protection of the common good and in consequence influence individual behavior and habits concerning natural resources and the level of acceptance of an environmental policy (Pretty 2003; Wagner and Fernandez-Gimenez 2008; Jorgensen et al. 2009). For example, individuals who consider that their fellow citizens will comply with a new environmental regulation concerning water consumption will perceive less social costs from a proposed policy (Jones 2010) and will be more willing to save water (Jorgensen et al. 2009). Similarly, compliance with social norms is also a significant parameter influencing citizens' perceptions and their tendency for environmentally responsible behavior and water conservation practices (Corral-Verdugo and Frias-Armenta 2006). The tendency of a community to act for the common good and comply with formal and informal norms will also influence the level of social costs perceived and also their decision to accept and cooperate with an environmental policy (Jones et al. 2009). In addition, institutional trust is dependent on the effectiveness of institutions (Kim 2005). High levels of trust may imply positive perceptions concerning the effectiveness of a proposed environmental policy (Beierle and Cayford 2002; Cvetkovich and Winter 2003; Jorgensen et al. 2009). Thus, during the implementation of water conservation policies citizens will be less willing to save water in the case that they do not trust the institution responsible for the environmental management (Jorgensen et al. 2009). The above elements of social capital are expected to influence citizens' perceptions especially in the case of highly restrictive instruments (e.g. norms and regulations) (Jones et al. 2009; Jones 2010). This is mainly due to the dependence of these instruments on institutions functioning as managing actors (e.g. government) and also due to the belief that fellow citizens will comply with new regulations and free-riding incidents will remain at a low level.

Regarding social networks, these are connected with the level of environmental awareness and activation of citizens also influencing attitudes towards environmental

policies (Cramb 2005; Wakefield et al. 2006). However, the type and density of these networks may differentiate their influence. For example, the existence of clientelistic networks or participation in groups promoting non-responsible environmental habits may have negative implications. These structural elements of social capital are expected to significantly influence perceptions for 'softer' environmental policy instruments (Jones et al. 2009). Less restrictive instruments may refer to communicative tools, co-management projects or funding policies where high levels of participation and environmental awareness are essential for their implementation (Resurreccion 2006; Berkes 2009).

The above assumptions indicate that social capital may influence the perceived levels of social costs of environmental policies. However, there are currently no available empirical studies investigating these issues specifically for water conservation policies. Consequently, an empirical study was conducted adopting a multi-dimensional definition of social capital and investigating its influence on citizens' perceptions for different types of water conservation policies.

3 Methods

3.1 Aim of Research

Through an empirical study four main issues were investigated exploring citizens' perceptions of water consumption policies: a. current behavior and habits concerning water consumption; b. non-economic social costs of water consumption policies and exploration of their differences; c. citizens' perceptions of the effectiveness of the proposed policies and their connection with non-economic social costs and d. the influence of social capital parameters on these social costs.

3.2 Description of Research Area

In order to investigate these issues an empirical survey was conducted in the city of Mytilene which is the capital of Lesbos, an island situated in the North-Aegean Sea in Greece. Its' estimated population, according to the 2001 census, is 29,000 inhabitants. The management of water resources in the area is the responsibility of the local authorities and in particular of the Municipality of Mytilene. Similar to other Greek islands (e.g. Genius et al. 2008), the area currently faces drought problems, mainly during the summer months where high temperatures are recorded (Mean annual temperature: 17.6°, average temperature of the warmest month (July): 26.5°, average annual rainfall: 682 mm) (Dimitrakopoulos et al. 2006). To confront water shortages during these periods, the authorities often suspend the water supply for approximately 2 h in different parts of the city. Furthermore, due to these measures, tanks have been installed in most buildings of the area in order to store water. However, the quality of the tank water may be significantly reduced depending on how long it remains in the tank. Based on these circumstances it is essential to investigate environmental policies that may encourage citizens to be more environmentally responsible.

3.3 Questionnaire and Data Analysis

A questionnaire was created and distributed to a representative sample of citizens to explore their perceptions on water consumption policies. Four main sets of questions were created. In the first part, demographic data of the sample were collected. In the second section, habits of individuals concerning water consumption, were investigated. These questions measured the frequency of the following actions: 'Turning off water while brushing teeth', 'Reuse of towels', 'Letting the tap run when requiring cold water', 'Having plants with low water needs' and 'Washing car with a hosepipe'. All behaviors were measured on a 4 point Likert scale (1: Never, 2: Sometimes, 3: Most times, 4: Always).

A third set of questions presented five potential policies aiming to minimize water consumption. The selection of the specific policies was conducted to include different types of instruments such as command and control, market-based or softer instruments and explore differences of their NESoCs. Regarding command and control tools, three policies were proposed: 'Consumption limits depending on number of household members', 'Prohibition of washing cars with hosepipes' and 'Prohibition of washing external areas with hosepipe'. Additionally, one market-based instrument of negative incentives was included referring to a revenue tax. Finally, a less restrictive instrument was presented concerning funding for improving water systems in households in order to repair and avoid leaks. The restrictions were measured on a 5 point Likert scale where 1 represented the lowest and 5 the highest restrictions imposed from the proposed policies. In the same part of the questionnaire the expected level of effectiveness of these policies was also investigated. This investigation was conducted to observe possible connections of NESoCs with efficiency. These questions were measured on a four point Likert scale (1: Very effective, 2: Quite effective, 3: Not very effective, 4: Not at all effective).

The final set of questions aimed to measure social capital. These variables were included in the questionnaire in order to be utilized as explanatory factors for the perceived social costs of the proposed environmental policies. They were divided in four sections representing different elements of social capital. Furthermore, due to the numerous variables utilized for the estimation of social capital parameters, an Explanatory Factor Analysis was conducted aiming to concentrate these variables in four factors. In the fragments, the Cronbach's alpha reliability indicator is provided. Firstly, social trust was measured through three questions, according to the relevant literature (Jones et al. 2008; Narayan and Cassidy 2001; Woodhouse 2006) ('Most people can be trusted or you can't be too careful', 'Most people are fair or try to take advantage of you' and 'How much do you trust your neighbors') (Cronbach's alpha: 0.81). All questions were measured on a 0–10 Likert scale with lower valuations representing lower levels of trust. Secondly, institutional trust was measured for the Ministry of Environment and the European Union which are responsible for water management in Greece and also for funding environmental projects (Cronbach's alpha: 0.70). These questions were also measured on a 0–10 Likert scale with lower valuations representing lower levels of trust. Thirdly, social networks were measured through membership and voluntary participation in non-governmental organizations, with dichotomous format questions (Cronbach's alpha: 0.60) (Beugelsdijk and Van Schaik 2005; Newton and Norris 2000; van Oorschot et al. 2006). Finally, compliance with norms was investigated for two environmental

Table 1 Sample characteristics

	Category	<i>N</i>	%
Gender	Male	65	43.2
	Female	85	56.8
Education	Up to 6 years	15	9.9
	Up to 9 years	24	15.9
	Up to 14 years	69	45.7
	Up to 16 years	29	19.2
	More than 16 years	14	9.3
Income (€)	No income	10	6.8
	Up to 12,000	59	39.9
	12,000–30,000	60	40.5
	30,000–60,000	13	8.8
	More than 60,000	6	4.1
Age		34 (mean)	

issues connected with water consumption (washing car and external places with a hosepipe, Cronbach's alpha: 0.72). The format of the question was: 'How wrong do you regard the following actions?' and were measured on a 5 point Likert scale where 1 represented 'completely justifiable' and 5 'completely unjustifiable' action.

3.4 Sample

The questionnaire was completed through face-to-face interviews and a sampling technique based on geographical criteria was implemented in order to contact individuals from all areas of the city. The final sample of the survey was 152 with a response rate of approximately 75%. From the sample, 43.2% were male and 56.8% female (Table 1). Regarding educational level, highest percentages were observed among citizens who have completed secondary and post-secondary education (Up to 14 years of education, 45.7%) followed by citizens who have completed 9 years of education (15.9%). Regarding annual income level, most citizens are included in the first and second category (up to €12,000: 39.9%; €12,000–€30,000: 40.5%; €30,000–€60,000: 8.8%; over €60,000: 4.1%). Finally, the average age of the sample was 34 with the target group being citizens of 18–70 years of age. In order to assure the representativeness of the sample the relevance of the sampled population was tested throughout the survey with the characteristics of the real population based on the available data from the 2001 census.

4 Results

4.1 Environmental Behavior for Water Consumption

Several behaviors concerning water consumption were investigated during the survey. From the results of the study (Table 2) it is observed that the highest frequency was presented for 'Turning off water while brushing teeth' and the lowest for 'Having plants with low water needs' (40.8% and 12.5% respectively responded that they always proceed to these actions). Furthermore, the majority of respondents declared that they 'always' or 'most times' reuse towels (38.8% and 28.3% respectively) and

Table 2 Environmental behavior

		Brushing teeth	Reuse towels	Cool water	Plants	Washing car
Environmental behavior (%)	Always	40.8	38.8	15.1	12.5	37.2
	Most times	25	28.3	23	16.9	13.8
	Sometimes	16.4	21.1	28.9	27.2	20
	Never	17.8	11.8	32.9	43.4	29.0
Environmental behavior and demographic data (mean)						
Total sample		2.88	2.95	2.20	1.98	2.58
Gender	Male	2.78	2.91	2.21	2.03	2.62
	Female	2.98	2.99	2.18	1.95	2.54
Educational level	Up to 6 years	3.00	2.87	2.07	1.33	3.07
	Up to 9 years	2.37	2.29	2.45	1.57	2.83
	Up to 14 years	2.88	2.94	2.18	2.22	2.60
	Up to 16 years	3.10	3.31	2.10	2.07	2.21
	More than 16 years	3.14	3.42	2.21	2.08	2.33
Income level	No income	1.29	1.05	0.82	0.94	1.19
	Up to 12,000	1.13	1.05	1.07	1.18	1.26
	12,000–30,000	1.09	1.02	1.10	1.08	1.23
	30,000–60,000	1.22	0.78	0.99	0.72	1.46
	More than 60,000	3.50	3.16	1.67	1.67	2.33

only 15.1% declared that they ‘always’ let the tap run when requiring cool water’. In addition, 37.2% always wash their car with a hosepipe indicating a high frequency of non-responsible environmental behavior.

In the second part of Table 2 mean scores of environmental behavior (measured on a 4-point Likert scale) are presented for different demographic categories. Statistically significant positive correlations are presented between educational level and three environmental behaviors: reuse of towels ($r = 2.77, p < 0.01$), having plants with low water needs ($r = 0.26, p < 0.01$) and washing car with a hosepipe ($r = -0.20, p < 0.05$). In these cases individuals with higher environmental education present also more responsible environmental behavior. Furthermore, income level is positively correlated only in the case of reusing towels ($r = 1.65, p < 0.05$). Finally, no statistically significant differences are observed between male and female respondents.

4.2 NESoCs of Water Resources Policies

In order to measure the restrictions imposed from environmental instruments five different policies were presented to respondents. All restrictions were measured on a 5 point Likert scale where higher valuation indicates a more positive perception. As observed in Table 3, the most restrictive instrument is a market based policy (revenue tax) which has an average mean score 2.53. After the tax revenue, all command and control instruments follow referring to consumption limits based on the number of household members (2.67) and prohibition of washing cars and external areas with hosepipes (3.91 and 3.19 respectively). Finally, the highest mean score, representing the lowest restriction, refers to funding for the improvement of domestic water systems to repair and avoid leaks (4.11).

Table 3 NESoCs of water policies

	Mean NESoCs
Revenue tax	2.53
Specific consumption per household members	2.67
Prohibition of washing external areas with hosepipe	3.19
Prohibition of washing cars with hosepipes	3.91
Funding for repairing and avoiding leaks	4.11

4.3 Effectiveness of Environmental Policies

Citizens' perceptions concerning the effectiveness of the proposed policies were also explored. According to the results of the study the most effective policy is 'funding for improving domestic water systems for repairing and avoiding leaks' (average mean 3.25). On the contrary, the least effective instrument is the revenue tax (average mean 2.43). Frequencies, mean scores and standard deviation (st.dv.) for all environmental policies are presented in Table 4. By conducting further statistical analysis, it is observed that the perceived level of effectiveness is correlated with the respective NESoCs of policies ($p < 0.05$) with the exception of the first instrument. In particular, citizens who perceive higher costs from an environmental policy also consider that it will be less efficient. Correlation coefficient is higher in the case of the revenue tax ($r = 0.29$) and the prohibition of washing external areas with a hosepipe ($r = 0.30$).

4.4 Social Capital and NESoCs

The final aim of the study was to investigate the influence of social capital on the social costs of the proposed policies. In order to explore this influence, ordinal regression models were conducted for each policy. The models were constructed with a logit function and a pseudo R^2 square is provided for each model. The results of the ordinal regression are presented in Table 5. It is observed that institutional trust positively influences four NESoCs. In particular, it is a statistically significant explanatory variable in the case of limitation of consumption depending on number of household members, washing of cars and external areas with a hosepipe and

Table 4 Perceived level of effectiveness and correlations with NESoCs

	Very	Quite	Not very	Not at all	Mean (st.dv.)	Correlation with NESoCs
Consumption limits based on number of household members	24.7	38.0	21.3	16.0	2.71 (1.01)	0.10
Prohibition of washing cars with hosepipes	40.4	28.5	16.6	14.6	2.95 (1.07)	0.26*
Prohibition of washing external areas with hosepipe	33.3	28.7	23.3	14.7	2.81 (1.06)	0.30*
Revenue tax	17.8	28.1	33.6	20.5	2.43 (1.01)	0.29*
Funding for domestic water systems for repairing and avoiding leaks	46.3	37.6	9.4	6.7	3.25 (0.89)	0.27*

* $p < 0.05$ (Spearman correlation coefficient)

Table 5 Ordinal regression

	Consumption limits	Washing cars	External areas	Revenue tax*	Fund
Trust	0.13	-0.09	-0.17	0.33***	0.07
Norms	0.24	0.25	0.73*	0.38***	-0.05
Institution	0.59*	0.47**	0.79*	0.43*	0.08
Networks	0.15	0.12	-0.28	-0.06	0.40**
Behavior	0.28	0.83*	0.80*	0.08	0.13
R^2	0.14	0.21	0.38	0.13	0.06

The influence of social capital on NESoCs

* $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$

also the implementation of a revenue tax ($p < 0.05$). Furthermore, social norms is explanatory variable in the prohibition of washing external areas with a hosepipe ($p < 0.05$). In the case of the revenue tax, social trust and social norms also tend to be explanatory factors, however at a 10% level of significance. Regarding funding for improving domestic water systems for repairing and avoiding leaks, a significant difference is observed as social networks are the only explanatory variable for NESoCs ($p < 0.05$).

Apart from social capital elements an additional parameter, measuring environmental behavior, was also included in the models. A new variable was created through Explanatory Factor Analysis (EFA) including all behaviors examined in the survey. During the EFA, the Likert scale was reversed in the case of 'washing car with a hosepipe' and 'having plants with low water needs' (Cronbach's alpha reliability test 0.70, KMO measure: 0.69, components < 0.58). As observed in Table 5, only in the case of washing cars and external areas with a hosepipe may the specific variable be regarded as explanatory at a 1% level of significance.

5 Discussion and Conclusions

The present paper investigates perceptions of citizens of different water policies and explores the influence of social capital on these perceptions. Several issues may be discussed based on the results of the empirical survey. Firstly, low frequencies of environmentally responsible behavior are evident. This fact may be attributed to the lack of information aimed at citizens for water conservation techniques leading to a significant lack of awareness. However, future research should be conducted to further examine the possible influence of training and awareness on citizens' perceptions and behavior. Concerning the influence of demographic data on environmental behavior it was observed that citizens with higher environmental education level present more responsible environmental behavior, similar to previous findings (Gregory and Di Leo 2003). However, no statistically significant correlations were observed with other demographic characteristics.

Regarding citizens' perceptions on environmental policies for household water consumption, two main issues were examined: the restriction imposed on citizens from different types of policies and their effectiveness. This investigation is important as the perceived effectiveness of an environmental policy is also connected with the

level of social acceptability (Menegaki et al. 2007). Through the measurement of non-economic social costs it was observed that the highest costs were presented in the market-based instrument of revenue tax followed by all command and control instruments. The least restrictions were observed in the case of the softer instrument based on voluntary participation. Thus, a main issue arising is that the restrictions that citizens perceive from market-based instruments (Johansson et al. 2002; Rogers et al. 2002; Bakker 2001; Randolph and Troy 2008) may be significantly higher compared to all other policy instruments. This finding is in line with previous results (Jones 2010) and may be attributed to the fact that economic-based instruments are accompanied by significant changes in the everyday lives of individuals and with additional economic charges (Jones et al. 2009). Furthermore, it is interesting to observe that the level of restriction imposed on citizens is correlated with the perceived level of effectiveness. Thus, instruments accompanied by higher restrictions are also regarded as less effective.

A final aim of the study was to explore the influence of social capital factors on citizens' perceptions for different types of environmental policies. Through the analysis conducted it was observed that in the case of the market-based policy (revenue tax), presenting also the highest cost, three elements of social capital tend to explain individuals' perceptions, with institutional trust being the most important. This finding reveals the importance of institutional trust and its connection with citizens' perceptions regarding the effectiveness of the financial and environmental management of a market-based policy (Beierle and Cayford 2002; Jorgensen et al. 2009; Jones 2010). In addition, the influence of social trust and compliance with social norms reveals that those who tend to doubt that their fellow citizens will comply with a new policy and will find ways of avoiding paying the tax also perceive higher costs.

In the case of command and control instruments explored in the study, institutional trust is also an important explanatory variable revealing its strong connection with the efficiency of the management actors (Beierle and Cayford 2002; Jorgensen et al. 2009; Jones 2010). Citizens who tend to distrust these actors and consider the proposed policy as ineffective also consider that it will impose higher costs on them. However, neither social trust nor social norms are explanatory variables in most command and control instruments indicating that perceptions of the actions of fellow citizens are not an important influential parameter for the policies investigated in the study.

Concerning, funding for improving domestic water systems, a significant difference was observed as social networks was the only explanatory variable. The main characteristics of the particular instrument is that it provides positive market-based incentives and also that its effectiveness is based on the voluntary participation of citizens. The influence of social networks on the perceived NESoCs may be explained from the significant connections of networks with the level of environmental awareness and activation (Cramb 2005; Wakefield et al. 2006). Thus, citizens who are active in their community also perceive lower costs from policies which necessitate citizens' participation (Jones 2010).

Concluding, a main contribution of the present study is that it underlines, both theoretically and empirically, the multiple connections of social capital with citizens' perceptions for water conservation policies. Furthermore, it is emphasized that the influence of social capital on citizens' perceptions will differ depending on the characteristics of the policy instrument proposed (Jones et al. 2009). In cases where

an environmental policy of high NESoCs, such as water taxes, is implemented in societies with low levels of institutional trust there is a higher probability that significant protests will occur accompanied by a low level of compliance after the policy implementation. Similarly, in the case of 'softer' instruments (Syme et al. 2000), dependent on citizens' participation, more structural elements will influence citizens' reactions and consequently the effectiveness of the policy. Thus, in communities with dense social networks, the provision of information concerning sustainable household water consumptions practices or funding opportunities is expected to be more successful as it will be transmitted rapidly to various social groups resulting in increased participation (Resurreccion 2006; Berkes 2009).

These findings are useful especially during decision-making processes and highlight the importance of exploring social factors prior to the implementation of a policy. Through the exploration of social capital and the identification of possible obstacles, measures may be taken in order to confront such issues and thus significantly increase the effectiveness of water consumption policies. This may be achieved by creating policies combining the aims of water conservation with the strengthening of weak social capital elements. A useful proposition is the increase of information towards citizens concerning the financial management of water taxes. This information increases the feeling of transparency in a community and consequently the level of trust towards the institution responsible for environmental and financial management. To proceed thus it is necessary to apply social assessment techniques prior to policy implementation and identify the elements which may significantly influence the level of effectiveness of a proposed policy.

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