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# DEFINING AND MEASURING ENVIRONMENTAL CONSCIOUSNESS

## DEFINICIÓN Y MEDICIÓN DE LA CONCIENCIA AMBIENTAL

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**Abstract**
Based on a review of the main analytical approaches found in the literature, in this paper we establish a multidimensional and behaviour-oriented definition of environmental consciousness. We propose a method to operationalize this definition with the final aim of obtaining summary measures (or indexes) of this phenomenon which can be applied to different social contexts and time periods. The data obtained from a survey on environmental attitudes and behaviour conducted in 2004 among Andalusians (Ecobarómetro de Andalucía 2004) is used as an empirical basis for the proposed operationalization. The resulting measures are then employed to identify social groups according to the diverse forms of their environmental consciousness and to explore their basic socio-demographic profiles.

**Keywords**
Environmental Concern, Environmental Attitudes, Pro-environmental Behavior.

**Resumen**
A partir de las principales aproximaciones analíticas presentes en la literatura, en este trabajo establecemos una definición de conciencia ambiental multidimensional y orientada a la conducta; proponemos un método para su operacionalización con el objetivo de elaborar medidas sintéticas de este fenómeno en distintos contextos sociales. La operacionalización propuesta utiliza como base empírica los resultados del Ecobarómetro de Andalucía (EBA 2004). Los indicadores resultantes son utilizados seguidamente para identificar distintos grupos sociales según la naturaleza de su conciencia ambiental.

**Palabras clave**
Actitudes ambientales, Comportamiento proambiental, Preocupación ambiental.

## Introduction

A brief review of the literature on environmental consciousness is sufficient to confirm the widespread academic and political interest in the issue of environmental concern (or environmental consciousness).[1] Given this enormous interest, the ambiguity inherent in measuring this phenomenon is paradoxical (Ungar 1994). Particularly surprising are the difficulties that empirical studies encounter when attempting to approach this question from a global perspective that integrates the diverse psychological constructs (or dimensions) associated to the notion of environmental consciousness in both a theoretical and analytical manner.[2] The aim of this paper is to present a definition of environmental consciousness grounded in the principal analytical approaches found in the literature. Based on this definition we propose an operationalization that permits summary measures of this phenomenon to be developed in different social contexts. The proposed operationalization is empirically based on the results of the *Ecobarómetro de Andalucía* (EBA 2004); a survey on environment-related attitudes and behaviours among Andalusians.[3] However, we believe that our analytical proposal is applicable to similar studies carried out in other social contexts.

### What do we understand by environmental consciousness?

In this paper we employ the concept of environmental consciousness to refer to specific psychological factors related to individuals' propensity to engage in pro-environmental behaviours (Zelezny and Schultz 2000:367).[4] We therefore depart from a multi-dimensional and behaviour-oriented definition of environmental consciousness, which in addition to considering different types of pro-environmental behaviours, incorporates other factors or psychological constructs that are habitually associated to them: beliefs, values, attitudes, knowledge and others. From an analytical perspective, an ecologically conscious individual or pro-environmentalist is someone who engages in a wide range of pro-environmental behaviours as well as holding certain values and attitudes that different theories have associated to this type of conduct.

Understood in this manner, environmental consciousness is equivalent to what can be considered the attitudinal (or psychological) dimension of pro-environmental behaviour.

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[1] For a selection of some of these references see *Environment and Behaviour* (http://eab.sagepub.com/) or different monographic issues of the *Journal of Social Issues* 2000, 56(3); 1995, 51(4); 1994, 50 (3). (http://www.spssi.org/jsi.html).

[2] Notwithstanding, see the scale of environmental attitudes towards specific problems proposed by Moreno et al. (2005) or Xiao and Dunlap (2007).

[3] See www.juntadeandalucia.es/medioambiente/ecobarometro/indecobar.html

[4] We follow Stern et al.'s intent-oriented definition of environmentally significant behaviour, that is, behaviour that is undertaken with the intention to change, normally to benefit, the environment (Stern 2000).

That is, it encompasses the main endogenous factors that have an influence on this type of behaviour. However, we should bear in mind that pro-environmental behaviour is equally influenced by other non-attitudinal factors (exogenous or situational).[5] Thus, although this paper attempts to contribute to our knowledge about pro-environmental behaviour, we do not offer an explanation (at least an integral one) for it.

As mentioned above, in order to operationalize the concept of environmental consciousness, we incorporate some of the main contributions of the different theoretical approaches to the study of this phenomenon. Specifically, our paper seeks to integrate the most widespread theories of environmental concern from a sociological perspective as well as theories of environmental behaviour found in environmental (social) psychology. The result is a proposal for operationalization covering four dimensions: affective, cognitive, dispositional and active as will be discussed below.

## Environmental consciousness: the affective dimension

The longest-standing and most widely-disseminated line of research on environmentalism (or environmental concern) is that proposed by Dunlap and van Liere (Dunlap et al. 2000; van Liere and Dunlap 1981; Dunlap and van Liere 1978). According to this approach, environmentalism is a question of values or general (primitive) beliefs on the relationship between human beings and the environment. Environmental consciousness is addressed in terms of the level of endorsement for the so-called new environmental (or ecological) paradigm (NEP). This paradigm associates environmentalism to a general eco-centric worldview that emphasizes humanity's need to establish a balance with nature, the existence of limits to growth for human societies and question humanity's right to rule over the rest of nature.[6] Dunlap and van Liere (1978) developed a 12-item scale (and a revised version with six items) to measure these three facets of the new paradigm or worldview. In their empirical studies, these authors provided evidence for the high internal consistency between the different items and their validity for discriminating between environmentalists and the general public.[7]

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[5] Stern (2000) considers that individual behaviour is a function of four types of variables: personal (what we refer to here with the concept of "environmental consciousness"), interpersonal, contextual and structural. Berenguer (2000) refers to these last three as situational, distinguishing between social and non-social situational variables. As Berenguer also points out, the theories on pro-environmental behaviour have progressively incorporated situational variables in their explanatory models.

[6] The eco-centric worldview arose as an alternative paradigm to the dominant view emphasizing abundance and progress, devotion to growth and prosperity, faith in science and technology, the commitment to a free market or *laissez faire* economy and others (see Dunlap and Van Liere 1978).

[7] The authors later revised the scale to include a total of 15 items (see Dunlap et al. 2000).

The NEP scale has become the most widely-used tool for measuring the ecological worldview in survey-based empirical studies, as well as a popular measure of environmentalism, which is interpreted as an indicator of pro-environmental orientation.[8] The results of this line of research highlight the endurance of these beliefs among citizens in the mid-term (Dunlap 2002:195) as well as their relationship to given socio-demographic traits. Specifically, education, age and political ideology are consistently identified as factors correlated to environmental concern (see Van Liere and Dunlap 1980 or Gómez and Paniagua 1996 for the Spanish case). According to these studies, young people, the well educated and, in ideological terms, people who consider themselves to be on the left, are most concerned about the environment. Correlations detected with other value scales, such as Inglehart's postmaterialism scale (1991), situate the most environmentally concerned sectors in the social centre.[9] In line with these studies, environmental consciousness is more pronounced (or is shaped in a more mature manner) in the social centre. From this social centre, pro-environmental values, attitudes and behaviours spread outwards to other social groups on the social periphery in an unequal or partial manner. The close relationship between individuals' social status, level of information and social participation underline the decisive role that ideology as well as attitudinal and behavioural variables related to political or civil competence play as determinants of environmental consciousness (see, for example, Dahl 1992).

As regards the measurement of environmental consciousness, and as Dunlap et al. (2000) have argued, the fact that the NEP scale is viewed not only as a measure of endorsement for a general paradigm or worldview but also as a measure of attitudes, reflects the ambiguity inherent in measuring this phenomenon and the need to ground the NEP scale in social-psychological theories of attitude structure. The empirical studies that use the NEP scale highlight that not everyone who endorses this paradigm consistently engages in behaviours that are coherent with it. Nonetheless, it would be reasonable to argue that although people may be less prone to engage in such behaviours than to endorse pro-environmental principles and values, it is also more likely that those who do express their support will have a greater propensity to undertake pro-environmental actions than those who do not (Dunlap and Van Liere 1978). In part, this may explain the existence of positive, albeit low, correlations between values and behaviours. Indeed, since the nineties, wide consensus has been reached regarding the need to delimit the validity of the NEP scale to the study of "primitive beliefs" on the nature of human-environment relations. Items on this type of scale would reflect what could be strictly considered the affective dimension of environmental consciousness.

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[8] Another widely-used scale is the Environmental Concern Scale proposed by Weigel and Weigel (1978), which focuses on attitudes towards specific environmental problems.

[9] According to Galtung's "centre-periphery" theory (1964) on the formation and change of attitudes in societies, the social centre comprises a set of dominant social positions in each society at each moment in history; not only in economic terms, but also in terms of prestige and power.

However, the use of the NEP scale as the sole indicator of this affective dimension has at least two drawbacks. First, several studies have shown that environmental concern can be based on direct personal experience of the environment, without the need to share the symbolic representations of the global problems that the scale refers to (Gooch 1995). Indeed, the endorsement of a pro-environmental worldview may be influenced by the greater or lesser dissemination of environmental issues in the media and on political agendas, thus reflecting, through a socially desirable response, the general discourses in the sphere of public opinion; discourses which gradually spread outwards to wider sectors of society, but which in reality have little impact on the personal attitudes that guide specific behaviours.[10] Second, and in line with the above, the degree of endorsement for this environmental paradigm is more clearly observed when people express their opinions about specific environmental problems, that is, environmental problems which are more directly related to personal experience.[11] One possible way to measure the extent to which pro-environmental values are shaped by specific problems is to assess support for the pro-environmental policies to solve them *vis-à-vis* other non-environmental solutions. This type of measurement would involve verifying that support for general pro-environmental discourses goes beyond the sphere of alternative public policies.

Bearing in mind these considerations, our proposal for the operationalization of the affective dimension of environmental consciousness includes indicators to measure endorsement of a general pro-environmental worldview as well as two additional indicators related to two facets of this dimension: support for pro-environmental solutions to specific problems and the perception that the environment is under serious threat. By doing so, the affective dimension of environmental consciousness would reflects concern for the environment (perceived environmental degradation) as well as endorsement of a pro-environmental worldview in terms of both global and specific problems.

## Environmental consciousness: dispositional and cognitive dimensions

Social psychologists have incorporated the affective dimension (chiefly focusing on these primitive beliefs or worldviews) in explanatory models of pro-environmental behaviour. It is widely held in the field of social psychology that these primitives beliefs have an influence on a more specific, wider set of attitudes towards environmental issues and a larger (direct) impact on pro-environmental behaviour (Dunlap *et al.* 2000). In line

[10] Dunlap (1995) acknowledges the impact of the thematic cycles that characterize these agendas on temporary variations in the level of concern for environmental issues (see also Scott and Willits 1994).

[11] The problem with these approaches is that they assess endorsement of an eco-centric worldview from a general, abstract and hypothetical perspective and do not take into account the fact that environmental problems mean different things for different people and that the measure can mask specific types of responses since not everyone is concerned about the same aspects of the environment (Berenguer 2000:31). For more on the importance of the specialization of environmental concern see for example Dunlap and Jones 2007; Moreno et al. 2005; Corraliza and Berenguer 1998; Ungar 1994; Weigel and Weigel 1978.

with these studies, we consider that a pro-environmental worldview (as reflected in the affective dimension) is a defining component of environmental consciousness, albeit not the only one. And as we will see, it is not always the most important component of the psychological factors associated to pro-environmental behaviour. Following Berenguer (2000), we acknowledge that a strong point of the analyses of these primitive beliefs or general values is the importance they assign to them in the formation of pro-environmental attitudes (and behaviours) within value (beliefs) - attitude (personal) - behaviour hierarchical models. At the same time, we believe that the relationship between the affective dimension and the active dimension (that is, pro-environmental behaviour) is mediated by a series of intermediate attitudinal constructs.

Given that a review of the diverse lines of research currently being conducted in this field goes beyond the scope of this paper, we limit our study to selecting the major attitudinal factors that have been recurrently identified as being the most significant in the literature on environmental psychology with the aim of including them in our operationalization of environmental consciousness.[12]

One of the most widely-followed theories in this regard emphasizes the role of personal norms as the main attitudinal variables that mediate between beliefs and behaviours. These personal norms are considered to be the fundamental attitudinal basis for a predisposition towards certain behaviours. The most relevant of these are the personal moral norm (or the sense of individual responsibility) and feelings of self-efficacy (García-Mira *et al.* 2004).

The moral dimension of pro-environmental behaviour has been operationalized by determining the level of personal obligation towards behaviour (Schwartz 1977). This personal norm is understood as the degree to which a person assumes responsibility for environmental problems and considers that it is essential to take action (or assume the costs), independently of what others do. On the other hand, feelings of self-efficacy (or internal efficacy) are understood as a set of beliefs or judgements regarding one's capacity to undertake individual action (or about what one can do to solve the problem). Feelings of high self-efficacy are essential for making rational decisions regarding the development of pro-environmental behavioural patterns (see Garrido et al. 2004; Geller 1995; Axelrod and Lehman 1993).

Departing from this perspective, we hypothesize that people who identify with ecological beliefs about human-environment interaction (or better yet, those who show high values in the affective dimension of environmental consciousness), express feelings of moral obligation and perceive themselves to be capable of engaging in pro-environmental behaviours to a greater extent than others. At times, these attitudes are reflected in the willingness to assume personal costs derived from particular environmental policies; for

[12] See Corral (2001) or Berenguer (2000) for a review of the different explanatory models of pro-environmental behaviour. Among the attitudinal models of pro-environmental behaviour that integrate values, attitudes and behaviours, Stern and Dietz's proposal (Stern 2000; Dietz et al. 1998) is especially relevant.

example, paying higher taxes for environmental protection. When this willingness is not combined with a sense of duty to act individually, people tend to externalize responsibility for improving the environment and adopt a passive pro-environmental role.

In order to interpret the different levels of personal responsibility and self-efficacy (or the role they play in guiding behaviour), we must bear in mind two questions: the importance of available information and the type of behaviour. Information is essential for triggering the personal norms that guide our conduct and for increasing feelings of self-efficacy.[13] At the same time, we can expect to find different attitudes (and levels of information) depending on the nature of the behaviour (Stern et al. 2000).

In short, in addition to the attitudinal variables considered in pro-environmental behavioural theories, we consider two further dimensions in our operationalization of environmental consciousness: the dispositional dimension and the cognitive dimension. In turn, the dispositional dimension encompasses two distinct facets or components. On the one hand, this dimension includes personal attitudes towards individual action (or personal involvement) from the perspective of feelings of self-efficacy and the perception of individual responsibility. Secondly, pro-environmental attitudes are also reflected in the willingness to assume the costs of different environmental policy measures. On the other hand, the cognitive dimension measures individuals' level of information (and knowledge) about environmental problems; a factor that we consider to be key to activating both the personal norms that guide behaviour and the process to internalize pro-environmental values and beliefs.

**Environmental consciousness: the active dimension**

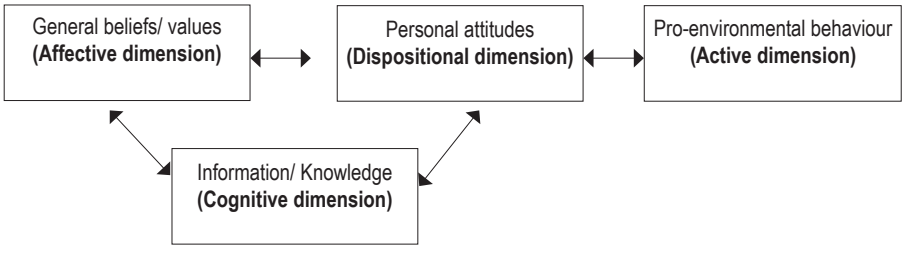
As Stern (2000) has argued, empirical evidence clearly indicates the existence of different types of pro-environmental behaviours which are influenced by different combinations of explanatory factors. In our operationalization of the behavioural dimension of this phenomenon, we distinguish between three types of behaviours, or, as we have said, three facets: environmental activism (which includes collective behaviours such as belonging to an environmental group, environmental protests, collaborating as environmental volunteers, etc.) and individual behaviours which, as several authors have suggested, should be differentiated into low-cost behaviours (such as recycling) and others which involve higher costs ("green" consumerism, reducing car use, etc.).[14] According

[13] As Stern (2000:414) has pointed out, personal pro-environmental norms and the willingness to engage in behaviours that are coherent with them are influenced (and can be modified) by the available information. Thus, for example, individual perceptions on personal responsibility and feelings of self-efficacy can be modified through the dissemination of scientific evidence on environmental degradation (its consequences and causes) as can the perception that the political system is subject to public influence or the perception that public authorities take the environmental issue seriously.

[14] See, for example, Carabias (2002) or Stern (2000). The cost is contingent upon the social context and

to this perspective, and in line with our definition, environmental consciousness is characterized by the extent to which a person engages in pro-environmental behaviours of diverse kinds, particularly those which are more costly.

**Diagram 1.**
*Dimensions of environmental consciousness*




To recapitulate, our proposal to operationalize environmental consciousness combines the endorsement of pro-environmental values and the perception about environmental conditions (affective dimension) with level of information (cognitive dimension), attitudes towards action (dispositional dimension) and engagement in pro-environmental behaviours (active dimension). As can be seen in Diagram 1, the relationship between these different dimensions is bidirectional.[15] For example, engagement in specific pro-environmental behaviour can be reinforced or mitigated by certain attitudes such as the sense of individual responsibility which, in turn, can encourage or discourage the extension of pro-environmental involvement to other behaviours.

As regards the cognitive dimension, it is equally reasonable to think that specific information or knowledge is mutually dependent on both personal attitudes and general beliefs about how the world operates, since certain values or attitudes can make one more receptive to environmental information, while the acquisition of new information or knowledge can modify these attitudes and beliefs.

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the time period. Thus, for example, the cost of recycling in Spain has diminished in the last decade as systems to sort recycled waste have become more widespread.

[15] Although it is not our objective to empirically verify the causal relations that exist between the different psychological constructs (or dimensions) of environmental consciousness, further insight on our measures can be gained by approaching our operationalization in terms of the relations among them.

## The empirical operationalization of environmental consciousness using principal components analysis

Based on the results of a survey on environmental attitudes and behaviours among Andalusians conducted by the IESA-CSIC, we use a categorical principal components analysis (CATPCA) to develop a measure of environmental consciousness that encompasses the different dimensions of this phenomenon (see Appendix 1).[16] The advantage to using this survey is that it includes indicators for the four dimensions of environmental consciousness considered in this study (see Moyano and Jiménez 2005).[17]

The indicators used in the CATPCA are shown in Table 1. In total, we have considered nine indicators: three for the affective dimension and two for each of the three remaining dimensions. This choice of indicators is based on a previous work using the same survey in which these indicators were shown to be reliable for measuring the different dimensions and facets of environmental consciousness studied here (Jiménez and Lafuente 2006).[18]

[16] The categorical principal components analysis suits the objectives of our study as it is a data reduction technique which permits a small number of non-correlated variables or components (summarized measures of environmental consciousness in our case) that represent the majority of the information found in the original variables to be extracted from an original set of ordinal variables (indicators of the different dimensions of environmental consciousness in our case). This technique facilitates the interpretation of the data by summarizing the information and permits subsequent multivariate analyses.

[17] The EBA has been conducted annually since 2001 using a representative sample of the entire population of Andalusia over the age of 18. The 2004 sample comprised 1305 cases. For the frequencies of each variable, the expected maximum absolute error of the survey results is ± 2.8%, for a confidence level of 95%.

[18] The tests run in this paper allowed us to determine the number of facets that can be distinguished in each dimension of environmental consciousness as well as the indicators of each. To do so, four CATPCA were conducted (one per dimension) based on a theoretical grouping of indicators. Additionally, the results permitted us to select the most relevant indicators of each facet following a statistical criterion. Specifically, we have selected the indicators which provide the most information, that is, those which carry a larger weight in the variance explained by each facet of environmental consciousness.

Table 1.
*Indicators used in the CATPCA*

| DIMENSION | FACETS | INDICATORS (EBA 2004) |
|---|---|---|
| AFFECTIVE | Perceived severity of environmental conditions | Assessment of global environmental conditions |
| | Support for general worldview | Level of agreement with the statement: "We are too concerned about the environment and not about prices or the current job situation" |
| | Support for specific pro-environmental measures | Endorsement of different measures to improve water management |
| COGNITIVE | Information and knowledge | Extent to which respondents consider themselves to be informed about environment-related issues<br><br>Index of specific environmental knowledge |
| DISPOSITIONAL | Attitude towards individual pro-environmental behaviour (personal moral norm and self-efficacy) | Level of agreement with the statement: "It is very difficult for a person like me to be able to do anything for the environment" |
| | Attitude regarding the personal costs of pro-environmental measures | Level of agreement with the pro-environmental proposal to "pay more for water" |
| ACTIVE* | Engagement in low-cost individual behaviours | Index of the extent of recycling (glass, paper, plastic) |
| | Engagement in collective pro-environmental actions | Index of activism (petitioning on environmental issues, taking part in demonstrations, doing volunteer work, collaborating in organizations, making donations) |
| * For technical reasons we have not included an indicator on high-cost individual behaviour. | | |

The results, which will be discussed below, validate our concept of environmental consciousness. According to this concept, engagement in environmental behaviours is related to general beliefs, knowledge and a positive disposition towards environmental policy measures and individual action. However, the results also suggest that a second component must be considered[19], that is, a second measure of environmental consciousness where certain types of behaviour are only found to be positively related to the willingness to accept personal costs derived from pro-environmental measures (one of the facets of the dispositional dimension of environmental consciousness). These results indicate that environmental consciousness, as it is understood here, can also be manifested in a partial or diffuse manner in certain social contexts. As we will see below, the existence of this second component or measure of environmental consciousness is coherent with the theory that pro-environmental values (and practices) diffuse from the centre to the social periphery. This measure also serves to explain, together with studies that emphasize the importance of extra-psychological or situational factors, the weakness of correlations between indicators of the affective dimension (such as the NEP scale) and engagement in this type of behaviour. This weak correlation is not only a result of the lack of coherence between expressed values and actual behaviour, but also because such values are not found to be a necessary condition for carrying out certain pro-environmental behaviours.

Following these results, we consider two (complementary) measures of environmental consciousness.[20] In order to characterize both measures in the most succinct manner possible, Table 2 shows the variables for which positive values have been obtained, that is, the factors associated to the two ways in which environmental consciousness is expressed, namely mature environmental consciousness and diffuse environmental consciousness. The analysis includes a list of variables collected in the survey, in addition to those used in the components analysis.

Specifically, our first measure of environmental consciousness relates all of the indicators included in our definition of this phenomenon. The fact that all of the indicators contribute relatively high values to the explained variance supports our theoretical operationalization of environmental consciousness (see Appendix 3). Nonetheless, note the greater weight assigned to the endorsement of pro-environmental values, the perception of being informed, feelings of high self-efficacy and engagement in collective behaviours.

[19] Eigenvalue greater than one.

[20] The first component summarizes 25% of the general information, while the second component does so for 13%. On the whole, the model accounts for 38% of the explained variance (see Appendix 2).

Graph 2.
*Characterization of positive values in the two measures of environmental consciousness*

| Operationalization | | Mature environmental consciousness | Diffuse environmental consciousness |
|---|---|---|---|
| **DIMENSION** | **Facets** | | |
| **AFFECTIVE** | **Perceived severity of the environmental situation**<br><br>**Endorsement of general pro-environmental worldview**<br><br>**Endorsement of water policy paradigms** | **High**<br>Negatively assess the environmental situation (at all geographical levels)<br><br>**Complete**<br>Agree with view on limits, priority given to environment over production, distrust in science as the solution (greater reticence regarding experiments with animals)<br><br>**New water culture**<br>Endorsement of measures to manage water supply | **Environmental farsightedness**<br>(Only negative at global level)<br><br>**Incomplete**<br>Greater trust in science and less ethical reservations regarding experiments with animals (not significant). Endorsement (with lower correlation coefficients) of other pro-environmental discourses<br><br>**Traditional water culture**<br>Mixture of measures to increase supply (traditional vision) and efficient water management |
| **COGNITIVE** | **Environmental information**<br><br>**Specific knowledge** | **Positive values**<br><br>Perception of having environmental information<br><br>High level of specific knowledge | **Negative values**<br><br>Perception of not having environmental information<br><br>Low level of specific knowledge |
| **DISPOSITIONAL** | **Willingness to assume costs**<br><br>**Feelings about individual action**<br><br>**Attitude towards low-cost and high-cost individual pro-environmental behaviours and collective pro-environmental behaviours** | **Active pro-environmental attitude**<br><br>High level of willingness<br><br>Feelings of high self-efficacy and individual responsibility<br><br>Positive disposition towards all behaviours | **Passive pro-environmental attitude**<br><br>High level of willingness<br><br>(No correlation)<br><br>Positive disposition towards low-cost individual behaviours (recycling, saving water), negative disposition towards collective behaviours and negative tendency towards high-cost individual behaviours – only 'green' consumerism significant |

| | | | |
|---|---|---|---|
| **ACTIVE** | | **Extensive behaviour** | **Low-cost behaviour** |
| | **Low-cost individual behaviour** | Recycling and saving water | Recycling and saving water |
| | **High-cost individual behaviour (lifestyle)** | Saving energy, 'green' consumerism and reduced car use | No correlation |
| | **Collective behaviour** | All types of collective behaviours | Tendency to not engage in behaviours (no correlation) |

In the second measure, only three of our indicators are found to be relevant (they contribute the greater part of the explained variance): those related to specific knowledge, the willingness to assume costs derived from pro-environmental measures and recycling. In this case, certain behaviours (i.e. low-cost, individual behaviours such as recycling) are not necessarily associated to the presence of coherent pro-environmental values, the negative perception of environmental conditions, a high level of information and knowledge about environmental problems or positive attitudes towards individual action.[21]

As we have said, these results not only indicate that pro-environmental values are a necessary yet insufficient condition for engaging in environmental behaviours, but that for certain behaviours (with a high level of social acceptance and low cost) are not found to be a necessary condition. As shown in Table 2, there exists a diffuse environmental consciousness in which the perception of environmental conditions is encompassed within a general tendency to view the environment as being under a greater threat in wider geographical areas or as not having a direct effect on people; a tendency known in the field of environmental psychology as "environmental farsightedness" (García-Mira and Real 2001; Uzzell 2000). In the same manner, both diffuse environmental consciousness and mature environmental consciousness endorse general pro-environmental discourses on global problems, although in a less intense manner. However, these values are not expressed in pro-environmental behaviours regarding specific problems such as those related to water. Thus, while mature environmental consciousness reflects the endorsement of what has come to be called the new water culture (which emphasizes water supply management), diffuse environmental consciousness continues to maintain cultural elements related to the traditional view of water (and solutions based on increasing supply or building reservoirs). Other indicators used to measure environmental concern in the EBA 2004 survey obtain different values in our two measures. Thus, for example, the positive values in our first indicator appear to be associated to the belief that the environment is one of the most important problems today (in Andalusia), while the diffuse environmental consciousness measure does not discriminate (or is not correlated) with this indicator in a significant manner.

[21] However, as indicated in Table 2 and as can be seen in Appendix 2, the dispositional dimension of diffuse environmental consciousness is more appropriately characterized as being passive rather than negative.

## The spread of environmentalism among Andalusians

Having constructed and defined the two measures of environmental consciousness, we will now explore the spread of environmental consciousness among Andalusians. To do so, we have performed a cluster analysis to classify our sample into different groups according to the values obtained in each of the two measures.[22]

As a result of the analysis, the sample has been divided into three groups. The first group comprises 29% of those surveyed and is characterized for obtaining positive values in the mature environmental consciousness measure. The second group includes 25% of the respondents. This group is characterized for obtaining positive values in our second measure, thus we consider that it represents diffuse environmental consciousness. The third group comprises the remaining 46% of those surveyed and is characterized by negative values obtained in the two measures of environmental consciousness. Thus we interpret that this last group encompasses the sector of Andalusians that are farthest from pro-environmental positions.

The results indicate that among Andalusians there exists a sector with a relatively greater pro-environmental orientation. This sector accounts for almost 30% of the total population. In line with the centre-periphery theory, these individuals represent the social centre; a social sphere which experiences a more marked change in attitudes. A somewhat smaller sector (25% of the population) surrounds this social centre and like the above sector, endorses pro-environmental measures and engages in low-cost behaviours such as recycling in spite of lacking environmental information. Indeed, as we indicate below, this group shows the highest percentage in terms of recycling. Thus, we can label this group "recyclers". In contrast to these two groups, or what we can call the farthest periphery in terms of a change in environmental attitudes, the largest group (45%) is characterized for not holding environmental beliefs, low levels of concern for the environment, not endorsing pro-environmental public policy measures, expressing negative attitudes towards pro-environmental behaviours and lower engagement in environmental behaviours.[23]

To conclude this part of our analysis, we summarize the main characteristics that define each of the groups. The pro-environmental group is characterized by interiorizing eco-centric values, perceiving the environmental situation in a critical manner, showing

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[22] Cluster analysis is a multivariate technique that allows individuals to be classified into groups to ensure that the groups are as homogeneous as possible and distinct from one another (see Appendix 2).

[23] When comparing the three groups and accounting for some of the indicators of the different dimensions of environmental consciousness, we find that the principal differences are due to collective behaviours and the level of knowledge about environmental issues. These two variables present the highest association coefficient (Cramer's V) with the dependent variable: 0.382 in the case of collective behaviours and 0.460 for level of information about environmental issues.

concern for environmental issues, engaging in pro-environmental behaviours, positively valuing this behaviour as a means to improving the environment and greater knowledge and information about environmental issues. These factors translate into a higher level of both collective and individual behaviours than among the population as a whole regardless of the effort required to engage in them. In the diffuse pro-environmental group, the endorsement of general values is weaker and does not materialize into support for proposals to solve the problem of water supply through more efficient water management. At the same time, this group expresses a high level of trust in science to solve environmental problems. However, the members of this group are critical about environmental conditions, especially at the global level. As regards attitudes, this group tends to view pro-environmental behaviours in a positive manner, although its members normally assume a passive role as reflected in their low sense of moral obligation and self-efficacy. On the other hand, however, they are willing to assume personal costs derived from environmental policies. Their level of knowledge about environmental issues is quite low, although they consider themselves to be somewhat better informed than would be expected given their level of knowledge. The most common behaviours that this group engages in is the recycling of household waste and other low-cost behaviours such as saving household water, while the percentage of those who take part in collective actions is practically null. In general, the non-environmental group obtains lower values for all of the indicators of the facets of environmental consciousness. This group differs from the diffuse pro-environmentalists in that they assess the environmental situation at the global level more positively, endorse pro-environmental discourses to a lower degree and are less willing to engage in pro-environmental behaviours.

We will now address the question of the discrepancies and similarities between the three groups in socio-demographic terms and in terms of socio-political attitudes (see Appendix 3). In socio-demographic terms, the pro-environmental core of Andalusian society is, on the whole, comprised of young people (70% are younger than 44 years of age) who have a higher than average educational level (60% have completed secondary or university-level studies), higher incomes, higher employment rates, and although not statistically significant, live in large cities. The members of this group also tend to show a greater interest in politics and a higher rate of membership in associations. These results are in line with those obtained in other empirical studies on the social bases of environmentalism and support the centre-periphery theory to explain the change in attitudes. The socio-demographic differences between the two remaining groups (diffuse pro-environmentalists and non-proenvironmentalists) are more difficult to determine. Nonetheless, we have observed that the diffuse pro-environmental group has a somewhat higher educational level than the non-proenvironmental group (non-significant differences) and that cognitive resources play an important role in the process of change and spread of pro-environmental attitudes and behaviours from the social centre to the periphery. Moreover, the greater presence of women in the diffuse pro-environmental group suggests the existence of a relationship between recycling and the role women hold in the domestic sphere (although the contrast is not significant, the percentage of

respondents dedicated to household tasks is relatively higher). On the other hand, the non-environmentalists differ from the other two groups in that they are located farther to the right on the ideological self-positioning scale, thus providing evidence for the relationship between progressive values and environmentalism.

## Conclusions

In this paper we have defined environmental consciousness as a multidimensional, behaviour-oriented concept (i.e., the propensity to engage in pro-environmental behaviours). When understood in this manner, environmental consciousness can be considered to be equivalent to the attitudinal (or psychological) dimension of pro-environmental behaviour. Departing from this definition, we have proposed an operationalization which, on the basis of different theoretical explanations, integrates the psychological constructs of the dimensions that comprise it (affective, cognitive, dispositional and behavioural). Although not confirmed empirically, we believe that a causal relationship exists between these dimensions. Specifically, we believe that these dimensions are in line with a value (beliefs)-attitude (personal)-behaviour hierarchical model where the relationship between the affective dimension and the active dimension (that is, pro-environmental conduct) is mediated by the attitudinal and cognitive dimension.

This operationalization has proven to be a valid procedure for obtaining summary measures that permit us to measure the different ways in which environmental consciousness materializes in a variety of social contexts. For the specific case of the population of Andalusia, the procedure has generated two (complementary) measures of environmental consciousness. Our first measure relates all the indicators established under our definition of environmental consciousness, while emphasizing the relationship between the affective dimension (concern for the environmental, the endorsement of general beliefs or an eco-centric worldview, the belief that the environmental situation is bad and the need to develop measures for the specific problem of water management), the cognitive dimension (high level of information and knowledge about the issue), the dispositional dimension (feelings of self-efficacy and individual responsibility, positive attitude towards a wide range of pro-environmental behaviours and assuming the personal costs of environmental measures) and engagement in pro-environmental behaviours (both high- and low-cost individual behaviours and collective behaviours). In the second measure, only three of our indicators are found to be relevant: those related to the cognitive dimension, the willingness to assume costs derived from pro-environmental measures and engagement in low-cost behaviours. In this case, recycling (a widespread, low-cost individual behaviour) is found to be related to high values in some facets of the dispositional dimensional (assuming costs) and with low values in the cognitive dimension (specific knowledge). This result suggests that environmental consciousness is manifested through engagement in certain types of individual behaviours (low-cost) and the acceptance of environmental policy measures (what we call a passive pro-environmental

disposition) at low levels in the cognitive dimension. These results provide additional evidence for the weak correlation that is usually found between values and behaviours.

Using these measures, we have analyzed the spread of environmental consciousness among our reference population and differentiated three social sectors: pro-environmental, diffuse and non-proenvironmental. In line with the centre-periphery theory on the change of attitudes, these three groups can be interpreted as concentric circles in which the majority non-proenvironmental sector (45%) occupies the most peripheral position, while the mature environmental consciousness group (30%) is located in the centre. The rest of the population of Andalusia (25%) is located in between these two positions.

To verify the consistency of our proposal for the empirical operationalization of environmental consciousness, we have replicated the analysis with data drawn from the Ecobarómetro 2007 survey. Two dimensions (or measures) of environmental consciousness were obtained from the categorical principal components analysis, permitting a similar interpretation to that obtained when using data from the 2004 survey: the mature environmental consciousness measure, which accounts for 25% of the variance and the diffuse environmental consciousness measure with 12% of explained variance. These two measures also permit the sample to be classified into three groups using cluster analysis: mature environmentalists, diffuse environmentalists and non-environmentalists. However, important variations occur between both years in terms of the weight assigned to some of the original variables in the diffuse dimension. This may be due to the low variance accounted for by this dimension. In other words, its low capacity to summarize the information of the original variables makes this dimension very sensitive to small variations in the data of both samples (data from the Ecobarómetro 2004 and the Ecobarómetro 2007). Consequently, there are large variations in the percentage size of each of three groups obtained with the cluster. In short, this verification suggests that the proposal for operationalization is valid for characterizing a population, but is not valid for a direct comparison of the results of different measures.

A possible way to compare the spread of environmental consciousness among Andalusians over the period studied is to aggregate the data from 2004 and 2007. Thus, to define the measures of environmental consciousness we use data from 2004, while the data from 2007 are treated as supplementary objects (the supplementary objects do not intervene in the definition of the dimensions, but they are assigned a value in each dimension). Once the cluster analysis is performed using the values obtained in each dimension of environmental consciousness, we use discriminant analysis to predict the group to which the population surveyed in 2007 will belong.[24] In this way we are able to confirm the evolution of different environmentalist profiles taking into account the measures of environmental consciousness defined in 2004.

[24] Discriminant analysis is a useful tool for locating new cases in classifications that have been well defined previously.

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# APPENDIX 1

## CATEGORICAL PRINCIPAL COMPONENTS ANALYSIS

When reducing the information of the selected indicators in the two components or measures of environmental consciousness, each category of original variables is assigned a different value in component 1 and component 2. The explanatory capacity of the model and the relationship between the original indicators and the two components of environmental consciousness can be interpreted from the following table.

| Explained variance and components loadings | | | | | |
|---|---|---|---|---|---|
| **Variables** | **Variance accounted for (1)** | | | **Component Loadings (2)** | |
| | Components | | ***Total*** | Components | |
| | **1** | **2** | | **1** | **2** |
| Assessment of the environmental situation in the world (1 very bad – 5 very good) | **.141** | .009 | .150 | .376 | .097 |
| We are too concerned about the environment and not about prices or the current job situation (1 completely disagree – 5 completely agree) | **.344** | .061 | .405 | .587 | .246 |
| Support for different water management measures (high values correspond to measures to increase supply – low values correspond to measures to lower demand) | **.202** | .025 | .229 | .451 | -.159 |
| Level of knowledge about different environmental problems (1 no knowledge – 3 expert knowledge) | **.121** | **.520** | .641 | -.348 | .721 |
| Degree to which respondents consider themselves to be informed about issues related to the environment (1 not well informed – 5 very well informed) | **.360** | .048 | .408 | -.600 | .219 |
| Pay higher prices for water (1 completely in favour – 5 completely against) | **.192** | **.232** | .424 | .438 | .481 |
| It is very difficult for a person like me to do anything about the environment (1 completely disagree – 5 completely agree) | **.410** | .001 | .411 | .640 | .029 |
| Recycling level index (1 does not recycle any type of waste – 4 recycles three types of waste | **.153** | **.211** | .364 | -.391 | -.459 |
| Activism index (1 not activist – 3 habitual activist) | **.346** | .053 | .400 | -.589 | .231 |
| Eigenvalue (3) Variance Accounted For %) | **2.271 (25%)** | **1.160 (13%)** | **3.431 (38%** | Variable Principal Normalization | |

1 Amount of variance that each variable explains in each of the components. **The highest values are shown in bold type.**
2 Degree and manner in which the transformed variables are correlated with each of the components.
3 The sum of the contribution of each variable (Eigenvalue) represents the information from the original values summarized by each component.

# APPENDIX 2

## TWO-STEP CLUSTER ANALYSIS

A two-step cluster analysis was performed to classify our sample according to the values of the environmental consciousness measures. This method of analysis was used because it allows large data sets to be treated and automatically identifies the adequate (optimal) number of groups by assigning similar data to the same group.

**Auto-Clustering**

| Number of Clusters | Schwarz's Bayesian Criterion (BIC) | BIC Change[a] | Ratio of BIC Changes[b] | Ratio of Distance Measures[c] |
|---|---|---|---|---|
| 1 | 1,921.156 | | | |
| 2 | 1,522.405 | -398.751 | 1.000 | 1.058 |
| 3 | 1,146.992 | -375.413 | .941 | 2.943 |
| 4 | 1,038.369 | -108.623 | .272 | 1.120 |
| 5 | 944.509 | -93.860 | .235 | 1.091 |
| 6 | 860.863 | -83.646 | .210 | 1.592 |
| 7 | 819.005 | -41.859 | .105 | 1.498 |
| 8 | 800.609 | -18.396 | .046 | 1.085 |
| 9 | 785.886 | -14.724 | .037 | 1.346 |
| 10 | 782.319 | -3.566 | .009 | 1.043 |
| 11 | 780.096 | -2.223 | .006 | 1.040 |
| 12 | 779.052 | -1.045 | .003 | 1.372 |
| 13 | 786.063 | 7.011 | -.018 | 1.007 |
| 14 | 793.235 | 7.172 | -.018 | 1.038 |
| 15 | 801.195 | 7.960 | -.020 | 1.099 |

a. The changes are from the previous number of clusters in the table.

b. The ratios of changes are relative to the change for the two cluster solution.

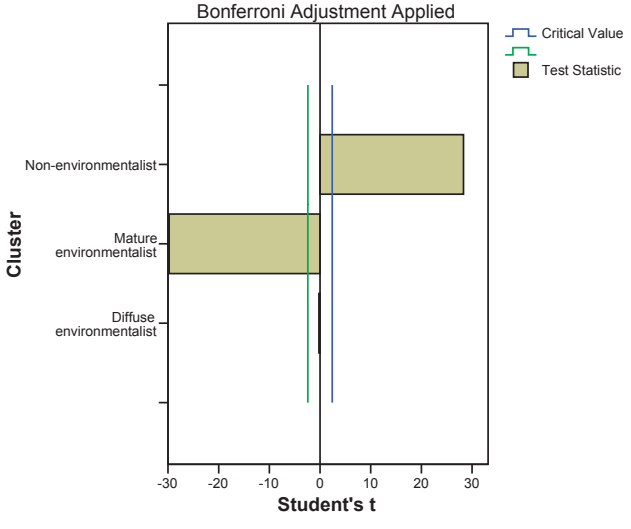
c. The ratios of distance measures are based on the current number of clusters against the previous number of clusters.

**Cluster Distribution**

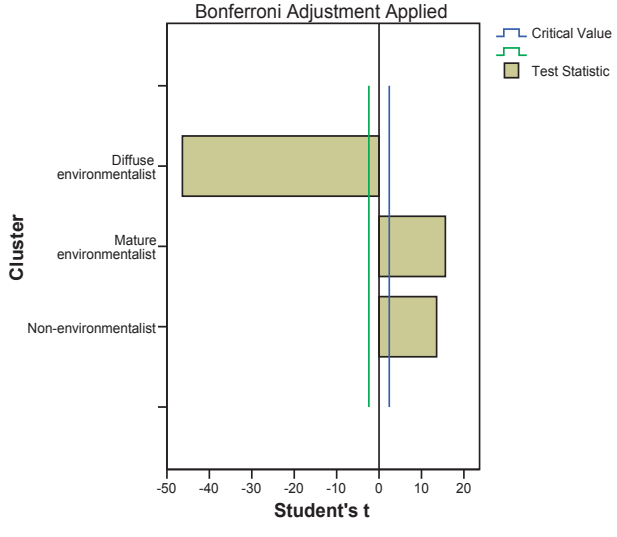
| | | N | % of Combined | % of Total |
|---|---|---|---|---|
| Cluster | 1 | 605 | 46.4% | 46.4% |
| | 2 | 373 | 28.6% | 28.6% |
| | 3 | 327 | 25.1% | 25.1% |
| | Combined | 1305 | 100.0% | 100.0% |
| Total | | 1305 | | 100.0% |

The differences between groups in terms of the values obtained for the two measures of environmental consciousness are shown in the following graphs by means of multiple comparisons using the Student's t-test and the Bonferroni Adjustment.

**Mature environmental consciousness**




**Difusse environmental consciousness**



# APPENDIX 3
## CHARACTERIZATION OF ENVIRONMENTAL GROUPS

| **Test of independence Chi-square (1)** | **Variables** | | **Comparisons column proportions or column means (2-3)** | | | |
|---|---|---|---|---|---|---|
| | | | Group A NON-ENVIRON (% column) | Group B DIFFUSE (% column) | Group C MATURE (% column) | TOTAL (% column) |
| Chi-square 10.068<br>Df 2<br>Sig .007 | SEX | Male | 48.5 | 43.6 | 55.5<br>B | 49.3 |
| | | Female | 51.5 | 56.4<br>C | 44.5 | 50.7 |
| Chi-square 61.063<br>Df 6<br>Sig .000 | AGE | Under 30 years old | 28.0 | 27.7 | 34.1 | 30.1 |
| | | From 30 to 44 years old | 26.0 | 19.4 | 36.2<br>AB | 28.4 |
| | | From 45 to 59 years old | 17.1 | 23.6 | 20.7 | 18.7 |
| | | 60 years or older | 28.9<br>C | 29.3<br>C | 9.0 | 22.7 |
| Chi-square 176.77<br>Df 8<br>Sig .000 | EDUCATIONAL LEVEL | No studies or compulsory education incomplete | 44.4<br>C | 37.8<br>C | 12.5 | 33.3 |
| | | Completed compulsory education | 29.6 | 33.2 | 26.8 | 29.6 |
| | | Secondary | 19.1 | 18.5 | 31.7<br>AB | 22.7 |
| | | University | 6.9 | 10.5 | 29.1<br>AB | 14.4 |
| Chi-square 21.657<br>Df 6<br>Sig .001 | HABITAT | Less than 5,000 inhab. | 23.3<br>C | 21.6 | 14.9 | 20.4 |
| | | From 5,000 to 20,000 inhab. | 25.7 | 22.8 | 19.9 | 23.3 |
| | | From 20,001 to 100,000 inhab. | 18.1 | 22.6 | 24.8<br>A | 21.2 |
| | | More than 100,000 inhab. | 32.9 | 32.9 | 40.4 | 35.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chi-square 61.872<br>Df 8<br>Sig .000 | ACTIVITY | Employed | 38.2 | 38.2 | 54.7<br>AB | 43.1 |
| | | Unemployed | 9.1 | 9.5 | 10.6 | 9.7 |
| | | Retired or pensioner | 24.6<br>C | 20.6<br>C | 8.3 | 18.8 |
| | | Works in household or engages in unpaid labour | 16.3 | 19.4 | 13.2 | 16.2 |
| | | Student | 8.1 | 8.0 | 11.4 | 9.0 |
| | | Disabled | 3.7 | 4.3 | 1.8 | 3.3 |
| Chi-square 64.783<br>Df 6<br>Sig .000 | INCOME | Less than 750 euros | 22.4<br>C | 22.2<br>C | 7.9 | 18.1 |
| | | From 751 to 1,250 € | 25.4 | 26.1 | 25.1 | 25.5 |
| | | More than 1,251 euros | 15.8 | 16.6 | 32.0<br>AB | 20.8 |
| | | DK/NA | 36.4 | 35.2 | 35.0 | 35.7 |
| Chi-square 57.927<br>Df 4<br>Sig .000 | MEMBERSHIP IN ASSOCIATIONS | 1 | 12.6 | 10.3 | 16.6<br>B | 13.2 |
| | | 2 or more | 5.7 | 9.5 | 19.3<br>AB | 10.7 |
| | | None | 81.7<br>C | 80.2<br>C | 64.1 | 76.1 |
| Chi-square 75.778<br>Df 2<br>Sig .000 | INTEREST IN POLITICS | Little or none | 84.5<br>C | 81.7<br>C | 61.3 | 76.9 |
| | | Quite or very | 15.5 | 18.3 | 38.7<br>AB | 23.1 |
| POSITION ON IDEOLOGICAL SCALE | | 0 far left–10 far right | 4.56<br>**BC** | 4.07 | 4.09 | 4.28 |
| POSITION ON ENVIRONMENTAL CONCERN SCALE | | 0 not at all concerned–10 very concerned | 5.48 | 5.79 | 6.41<br>**AB** | 5.84 |

1. The Chi-square tests are only applicable to the categorical variables. Statistical significance at a level of 0.005.
2. The comparison test for proportions can only be used with categorical variables, while the comparison test of means can only be used with a categorical variable in the columns and a scale variable in the rows.
3. The results are based on bilateral tests with a significance level of 0.005. The significant differences among percentages or the averages of each pair of categories are marked in the cross cells indicating the letter of the column that is being compared. The totals have been omitted from all the contrast tests.