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Impact of climate change on environmental concerns, attitudes and behaviors

Impacto das mudanças climáticas nas preocupações ambientais, atitudes e comportamentos

Impacto del cambio climático en las preocupaciones, actitudes y comportamientos medio ambientales

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ABSTRACT The increasing frequency of anomalous weather phenomena since 2022 has significantly heightened environmental concerns in Spain. However, the growing worry about the effects of climate change has not been sufficient to generate a positive impact on sustainable behaviors. Among the three dimensions of sustainable behavior, the one related to financial support has dropped sharply, the one related to support for activism tends to decrease, and only the one related to consumption has increased. The reasons we found for this poor trend are: the politicization of environmental issues, which distances conservative citizens from sustainability. The decrease in purchasing power explains the sharp decline in financial support for the environment, but we also find that other behaviors and attitudes are declining among those with lower purchasing power, widening the gap between wealthier citizens who are increasingly involved in sustainability and impoverished citizens who disengage and become indifferent. Another contributing factor is that young people are less involved in ecology, and media messages focus on the problems rather than the effects of actions. The study is based on secondary analysis of the Spanish ISSP Environment III and IV surveys (2010-2023), an analysis of search terms related to climate change in Google Trends (2004-2024), and a press review of climate change articles in Spain (2014-2023).

Keywords: climate change; sustainability; ecological behaviors; environmental concerns, climate experiencies.

RESUMO O aumento progressivo de fenômenos meteorológicos extremos a partir de 2022 disparou a preocupação ambiental na Espanha. No entanto, o aumento da preocupação com os efeitos das mudanças climáticas não foi suficiente para gerar um impacto positivo nos comportamentos sustentáveis. Das três dimensões do comportamento sustentável examinadas, a predisposição para apoio econômico caiu fortemente, o apoio ao ativismo diminuiu um pouco e apenas aumentou o relacionado a um consumo mais ecológico. As razões que encontramos para essa má evolução são: a politização da temática ambiental, que afasta da sustentabilidade os cidadãos conservadores. A diminuição do poder aquisitivo explica a queda drástica no apoio econômico ao meio ambiente, mas também diminuem outros comportamentos e atitudes entre aqueles com menor poder aquisitivo, ampliando a brecha entre cidadãos mais ricos, cada vez mais envolvidos com a sustentabilidade, e cidadãos empobrecidos que se desvinculam e se desinteressam. Contribui também o fato de que os jovens se envolvem menos com a ecologia e de que as mensagens midiáticas focam nos problemas e não nos efeitos das ações. O estudo é baseado em uma análise secundária das pesquisas espanholas de ISSP Environment III e IV (2010-2023), uma análise dos termos de busca sobre mudanças climáticas no Google Trends (2004-2024) e uma contagem hemerográfica de artigos sobre mudanças climáticas na Espanha (2014-2023).

Palavras-chave: mudanças climáticas; sustentabilidade; comportamentos ecológicos; preocupações ambientais; experiências climáticas.

RESUMEN El progresivo aumento de fenómenos meteorológicos extremos a partir de 2022 ha disparado la preocupación medio ambiental en España. Sin embargo el aumento de la preocupación por los efectos del cambio climático no resultó suficiente para generar un impacto positivo en los comportamientos sostenibles. De las tres dimensiones del comportamiento sostenible examinadas, la predisposición al apoyo económico cae fuertemente, el apoyo al activismo cae algo y solo aumenta la relacionada con un consumo más ecológico. Las razones que encontramos para esta mala evolución son: la politización de la temática medioambiental, que aleja de la sostenibilidad a ciudadanos conservadores. La disminución del poder adquisitivo explica la drástica caída del apoyo económico al medio ambiente, pero también disminuyen otros comportamientos y actitudes entre quienes tienen menos poder adquisitivo, ampliando una brecha entre ciudadanos pudientes crecientemente implicados en la sostenibilidad y ciudadanos empobrecidos que se desvinculan y despreocupan. También contribuye que los jóvenes se implican menos en la ecología y que los mensajes mediáticos focalizan los problemas y no los efectos de las actuaciones. El estudio está basado en un análisis secundario de las encuestas españolas de ISSP Enviromment III y IV (2010-2023), un análisis de términos de búsquedas sobre cambio climático en Google Trends (2004-2024) y un recuento hemerográfico de artículos sobre cambio climático en España (2014-2023).

Palabras clave: cambio climático; sostenibilidad; comportamientos ecológicos; preocupaciones medio ambientales; experiencias climáticas.

1. Introduction

Empirical studies on environmental attitudes and behaviors, reviewed in the background, confirm that climate concern is widespread, but this concern does not lead to a significant increase in sustainable behaviors. However, since 2022, the rise in temperatures, extreme weather events, and ocean warming have become so evident that the perception of climate change as something not of the future but already here has greatly increased. This study aims to confirm whether this shift in the climatic scenario impacts the environmental attitudes and behaviors of Spanish society.

The set of hypotheses examined is as follows: climate change is already felt and affecting our daily lives, leading to greater ecological concern and increased interest and seguimiento of this topic, with more favorable attitudes, but having a lesser impact on behaviors.

The Spanish case is highly relevant for analyzing this issue; it is one of the European countries with the greatest climatic impact since 2022, and with the highest levels of perception that climate change affects them, according to the March 2024 Eurobarometer. Also, because as of today, very few countries have data allowing the examination of the impact of the new climatic situation on awareness. In Spain, this is possible with the 2023 ISSP Environment IV Survey, whose Spanish fieldwork was fortunately much delayed. It includes a previous wave that allows tracking the evolution of variables suitable for responding to the hypotheses. Evolutionary data from press articles on climate change and a trend analysis using the Google Trends analytical tool (Google search big data) are also used.

2. Background

2.1 Environmental concerns, priorities, and behaviors.

The majority of the population recognizes the environmental challenge posed by climate change. There is evidence over the past decades confirming that public environmental concern levels are high, both in Spain (González & Amérigo, 1998; Corraliza *et al.*, 1995; Berenguer & Corraliza, 2000; Ramos & Callejo, 2022; Valencia *et al.*, 2010), and in Europe (Gooch, 1995; Eurobarometer, 2024), in the United States of America (Scott & Willits, 1994; Dietz *et al.*, 1998) and other countries.

In Spain, data on environmental concern covered 79% of the population at the turn of the century (Berenguer & Corraliza, 2000), while the CIS barometer of November 2023 estimates 77.1%.

Despite this, a significant gap has been observed between environmental concerns and ecological behaviors; concern is widespread, while sustainable behaviors are very sparsely implemented. This gap has been observed in previous studies for decades, across all countries. (Black *et al.,* 1985). See also, for example, ISSP Environmental I, II and III from 2000, 2010 and 2023.

It also happens that the perception of environmental danger or threat (to the planet, humanity, or individuals) is always much higher than sustainable behaviors (Arikan & Günay, 2021). Concern is also higher than other indicators, such as levels of interest and seguimiento of environmental topics or the perception of the priority or relevance of the environmental problem. This is reflected, for example, by all waves of the Surveys on Social

Perception of Science and Technology conducted in Spain biannually since 2002 (Díaz Catalán & Cabrera, 2022), where interest and seguimiento levels are always lower than concern levels.

A gap is also observed between concern and the perception that the environment is a priority issue (Meira *et al.*, 2011; Crawley *et al.*, 2022). This problem is hardly a priority for European citizens, and it becomes less of a priority as countries' GDP increases. This finding coincides with another broader transnational study (Sandvik, 2008). Sandvik describes this as 'the inconvenient truth': people living in rich countries do not face their responsibility for climate degradation.

In this study, we consider to what extent experiencing the effects of climate change as never before allows for an increase in the perception of priority and, above all, drives progress towards sustainable behaviors. In recent years, there has been an unprecedented accumulation of climate change effects. Record global warming, melting ice caps, rising ocean temperatures, increased incidence and intensity of extreme weather phenomena: record temperatures, heatwaves, droughts, torrential rains, hurricanes, fires... (IPCC Synthesis Report, 2023). Specifically in Spain, AEMET reports the intensification of extreme meteorological phenomena linked to climate change, whose growth considerably increases from 2019 but even more so from 2022 (Morata Gasca *et al.*, 2024).

These phenomena have had a media impact and have reached the public. The message is that climate change is already affecting us. This opens the door to the hypothesis of a change of scenario in public opinion (if the message had resonated with the population), which should lead, in addition to an increase in concern and perception of danger, to an increase in sustainable attitudes and behaviors, and in the perception of the problem's priority.

2.2 The impact of climatic experiences and other variables on sustainable attitudes and behaviors

There is background information on the impact of climatic experiences on environmental attitudes and behaviors. Most studies reveal that these experiences have positive effects on sustainable behaviors and contribute to greater environmental awareness, but other studies find no effects; most frequently, these effects are confirmed but are small (Valkengoed & Steg, 2019; Sisco, 2021). A meta-analysis (Sisco, 2021) reveals that a wide number of factors and variables influence whether or not effects are found: affective activation, topic relevance, psychological distance, media attention to climatic events, pre-existing climatic attitudes, and the attribution of events to climate change. According to these precedents, it could be thought that the new scenario we will examine in Spain could hypothetically have a moderate positive impact.

However, given that this experiential effect, if confirmed, could be small and may also coexist with other inertias, it is necessary to pay attention to the evolution of other factors and variables that also determine and predict sustainable behaviors, and which are necessary to understand to explain or control the recent evolution of environmental concern, attitude, and behavior. Some of these trends include, for example, political polarization, changes in value priorities, and demographic and generational dynamics, among others. The factors that have best and most explained ecological atti-

tudes and behaviors, and whose dynamics could interact with the impact of climate experience, are the following:

Political ideology. The evidence overwhelmingly and convincingly links environmental sensitivities to the left and less environmental sensitivity to conservative positions. As an example, we will cite the study led by Stephen D. Fisher within the European framework (Fisher *et al.*, 2022). Using European Social Survey data, a relationship was found between self-placement on the left-right spectrum and climate attitudes. In contrast, voters of right-wing parties, both populist and conservative, tend to be less concerned about climate change. This pattern is consistent across Western Europe. Given the increasing political polarization, it is worth considering to what extent political orientation modulates the perception of climate experience in our case study.

Postmaterialism. After the end of World War II, the economic prosperity of advanced industrial societies led to a shift in value priorities towards post-material sensitivities, among which ecological concern became paradigmatic (Inglehart, 1977; Inglehart, 2018). However, in the last decade, a counter-trend towards traditional, more authoritarian, and more material values, less aligned with environmental sensitivities, has been gaining strength. The rise of populism and the worsening economic expectations of the middle and lower classes seem to be behind this (Norris & Inglehart, 2019). Another question we raise is to determine to what extent this counter-trend could hinder the expansion of sustainability, due to a supposed retreat or loss of influence of post-material values.

Age. For decades, a link between ecological sensitivities and age has been observed in Spain and other Western societies, in the sense that young people are the most ecological and older people the least. This is confirmed by the various waves of European and global values surveys, where the link between age and attitudes is observed over time. The explanation has been linked to generational change, due to the fact that new cohorts have been socialized in an increasingly post-materialistic cultural context (Inglehart, 2018). However, more recent surveys reveal a weaker link between youth and ecology, especially in behaviors. This is reflected in CIS surveys in Spain (Valencia, *et al.,* 2010; Cicuendez, 2024) and the 2024 Eurobarometer for Europe as a whole. Young people are no longer the age group that most often engages in sustainable behaviors and attitudes. Another issue to consider in the examination of the Spanish case is the impact of demographic dynamics and intergenerational change, due to their interrelation with ecology, values, and political positions.

Socioeconomic position and education level. In the same Eurobarometer (Eurobarometer, 2024), it can be seen across Europe that higher socioeconomic position tends to improve attitudes favorable to environmental care. This is a recurring trend in other surveys. The level of education, correlated with socioeconomic position, has been an important predictor of environmental sensitivities and behaviors, resulting in all types of environmental surveys showing that high educational levels are related to more favorable attitudes and behaviors, while low levels are associated with less favorable ones. A comprehensive and recent study (Hoekstra 2024) confirms that less educated citizens are more skeptical about climate change. It also questions the

explanatory power of the knowledge deficit theory, which usually explains educational differences, as it finds that less educated people feel a lack of social recognition, which generates opposition to the beliefs and lifestyles of the more educated in all kinds of topics, including climate change. That education level has been an important predictor until now is indisputable, but perhaps its effect on information has been overestimated, and it has been less taken into account that it co-varies with other predictors, such as age, socioeconomic variables, or post-materialist values, so the causal relationship with ecological attitudes and behaviors is complex and not so clear. Nevertheless, the fact that the education level of the population has increased considerably in Spain in the last 10 years could perhaps facilitate ecological behaviors.

Environmental information and communication. To assess the role of information, the aforementioned cognitive deficit theory and other approaches akin to the idea that information is correlated with attitudes and behaviors have traditionally been applied, leading to the assumption that more information leads to better attitudes and behaviors (Lorenzoni *et al.,* 2007). However, it has been found that the mere dissemination of information on climate change does not necessarily lead to rational and coherent behavioral changes, revealing that people filter information before adopting new behavior patterns (Huertas & Corraliza, 2016). On the other hand, studies on climate change communication indicate that it is much more effective to focus on the effectiveness of measures than on highlighting the importance and magnitude of problems, especially in individuals with less involvement (Ibáñez *et al.*, 2007). Furthermore, communications tending to generate skepticism are much more effective than those aimed at strengthening beliefs in climate change (Rode *et al.*, 2021). This is a factor that could be working against the increase in ecological behaviors if it is confirmed that the main information focuses on problems.

3. Objectives

We propose three objectives for our research, which focuses on the question of whether climate experience is improving sustainable behaviors in Spain.

1. Confirm that the effects of climate change in recent years have impacted public opinion. This includes both the hypothetical increase in media articles and active engagement with these topics.

2. Estimate the impact of climate change on concerns, perceptions, attitudes, and behaviors, by comparing data from indicators of these aspects in a sample before 2019 and another after 2022.

3. Explain and contextualize the findings, considering the previously discussed variables and factors.

- The possible negative influence of political polarization.
- The possible negative influence of the loss of purchasing power, at least to explain the decrease in economic support.
- Others, to a lesser extent: the decrease of post-materialism, age, studies, information, and communication.

4. Data and Methods

The methodological approach used was quantitative and based on secondary information sources. For the first objective (confirmation that the effects of climate change have impacted Spanish public opinion), a count of articles addressing climate change in some of the most important Spanish newspapers was conducted through online searches in the National Newspaper Archive. Also for the first objective, given the difficulty of having fine and reliable time series through surveys, an analysis of the evolution of Google searches related to climate change and environmental concerns was carried out.

The daily press count considered, on the one hand, that newspapers with both left and right editorial lines were represented, and on the other hand, that the newspaper archive count in the National Digital Newspaper Archive was possible over a period as close as possible to the last 10 years. The newspapers finally considered were the national editions of: El País, ABC, El Mundo, La Razón, and La Vanguardia, during the period between 2014 and 2024. The search required that the articles deal with the topic "climate change" and that this term appear in the texts as an essential requirement.

Google searches were conducted using the "Google Trends" analytical tool, in Spain, during the period from 2000 to 2024. This was done on October 31, 2024 (The DANA catastrophe in Valencia had not yet occurred). This is a big data analysis of Google searches. The selected search terms were: "climate change", and five other terms related to the effects of climate change in Spain and relevant for shaping public opinion: "heat", "heatwave", "drought", "torrential rains", "sea temperature".

Regarding the methodology of the evolution, Google Trends ensures that its data reflect changes in the relative interest in search terms over time, instead of showing the absolute growth in the number of searches, which could be influenced by the increase in internet and Google users over the years. To avoid this bias, it uses a process of normalization and scaling of search data. The 5 key points of this process are explained below:

1. Data Normalization: Google Trends normalizes search data so that results are comparable over time and across different regions.

2. Search Proportion: Instead of showing the absolute number of searches, it displays data as a proportion of total searches. For example, if a search term accounts for 1% of all searches in one week and then 2% in another week, Google Trends will reflect this relative change regardless of the absolute number of users.

3. Result Scaling: Search results are scaled on a scale of 0 to 100, where 100 represents the peak popularity of the search term in the selected period.

4. Temporal Grouping: Data is grouped into different time intervals. This helps smooth variations and provides a clearer view of long-term trends.

5. Data Sampling: Google Trends uses a sample of search data, not the totality. The absolute growth in the number of users does not affect the results.

For the second objective (estimating the impact of climate change on concerns, perceptions, attitudes, and behaviors, by comparing data from indicators of these aspects in a sample before 2019 and another after 2022), the most suitable comparison available is in the ISSP environmental survey in

the Spanish waves of 2010 and 2023, which includes a wide range of comparable indicators on concerns, perceptions, attitudes, and behaviors. These are representative samples of Spanish society over 18 years of age that include numerous identical and comparable questions, carried out by the CIS (n = 2560 in 2010 and n = 2264 in 2023). Random error limit: +/-2.1% in 2023 and +/-1.98% in 2010. In both cases, the universe is the population residing in Spain aged 18 and over. Multi-stage random sampling stratified by Autonomous Communities and 7 habitat groupings. The 2010 survey was conducted through personal interviews at home, while the 2023 survey was self-administered after prior household selection (1857 online and 397 on paper).

For explanations and interpretations of the results (third objective), the two waves of the ISSP survey were mainly used, complemented with secondary data from various other sources.

To simplify the analysis of sustainable behaviors, a sustainable behavior index was created, with identical design in both survey waves. The eight indicators of ecological behaviors included in both surveys and listed in Table 3 were used. They obtain a Cronbach's alpha value of 0.76 in 2014 and 0.67 in 2023, which ensures acceptable reliability as indicators of sustainable behavior. Using principal components analysis, forcing a single factor, the index was obtained with a KMO value of 0.745 for 2010 and 0.742 for 2023 (guaranteeing the goodness of fit of the constructed factors). This index correlates with the following variables, detailed below:

- **Economic level**: Extraction of a single factor from qualitative variables using SPSS Homals: optimal scaling with all multiple nominal variables and a single dataset.
- **Education**: The original variable STUDIES (recoding done by the CIS of the original question on education level) is recoded as follows: Other studies (old code 9) = 0 (closely associated with no studies but with an even lower economic level). No studies = 1, Primary = 2, First stage secondary = 3, Professional qualification = 4 (old code 5), Second stage secondary = 5, (old code 4) Vocational Training = 6, Higher education = 7.
- The **post-materialism index** follows classic Inglehart criteria. (Obtaining four variables for each of the 4 values in the response options. 2 if mentioned first, 2 if mentioned second, 0 if not mentioned. With the 4 items, an index is obtained using principal components.
- **Ideology**: left-right scale, with the original values from the questionnaire. Non-response has been recoded with value = 5.5.
- **Age** with original questionnaire values, and non-response transformed into the mean of the distribution for each year.
- **Woman** = 1, not woman = 0.
- **Concern**: Very high = 5. High = 4, Medium = 3, Medium low = 2, Low = 1.
- **Environmental Priority**: 2 = priority concern, 1 = second most important concern, 0 = lower priority.

5. Results 1: Evolution of seguimiento, concern, attitudes, and behaviors

5.1 Press coverage

The results of the press count confirm that the Spanish press has increasingly published articles on climate change. This was especially true between 2019 and 2021. Although during the last two years of the period (2022 and 2024) the intensity of information is clearly higher than before 2019 (Table 1).

The boom in publications during 2019 is explained by the climate summit held in Madrid (COP 25), although it is also the year of global mega-fires, the IPCC special report on oceans and cryosphere highlighting global warming in oceans and polar regions. And in Spain, until then, a record for the highest annual average temperatures was broken.

After an exploratory and qualitative review of the articles, it is confirmed that information on the relevance and magnitude of the problems predominates overwhelmingly, with hardly any attention paid to measures and their effectiveness, which in the literature is associated with increased concern but not with behavioral change.

5.2 Google search trends related to climate change

On the other hand, the historical search series offered by Google Trends reveal that searches increased from 2019 in Spain, but more intensely in 2022 and subsequent years. Media dissemination, along with environmental experience, is behind the intensification of searches, and these reflect growing interest and concern, as the concomitance between climatic events and the increase in thematic searches can be observed.

See Figures 1 to 6 on the evolution of search terms about climate change and related aspects. It can be seen that in 2022 and thereafter, searches skyrocket far beyond previous periods, in line with AEMET records on anomalous meteorological phenomena, which is why 2022 marks a before and after in climate change for public opinion.

5.3 Evolution of environmental indicators in surveys, 2010 - 2023

Figure 7 presents the results of the comparison of the two waves of the ISSP survey for Spain on the environment. Waves from 2010 and 2023.

Firstly, the significant increase in environmental concern should be highlighted, which is consistent with climatic evolution, press dissemination, and the previously presented monitoring data.

However, the priority of this concern, although it increases somewhat, remains very low in relation to other concerns (Figure 8). Citizens prioritize the economy, health, education, or poverty, ahead of the environm ent, so that those who consider it one of the priorities are barely 11.2% of the Spanish population. Or 5.0% among those who indicate it as their main concern.

The perception of danger to the environment also increases (Figure 9). Especially the proportion of extreme danger, which rises 10% since 2010. The sum of very dangerous + extremely dangerous consideration also increases, although only by 4% and covers 76% of the population in 2023.

However, surprisingly, the perceived impact on individuals' lives is not increasing (Figure 10).

TABLE 1 – Counts of articles on climate change in Spanish press

Spanish Press	Number of articles on climate change					
YEAR	El País	La Razón	ABC	El Mundo	La Vanguardia	Average
2014	84	70				77
2015	310	163				237
2016	252	174		10	389	206
2017	407	252		465	547	418
2018	451	239		454	527	418
2019	983	620	592	881	892	661
2020	657	506	264	565	597	432
2021	799	860	420	724	845	608
2022	707	691	405	747	750	550
2023	821	582	310	691	596	500
2024	639	522	337	567	620	537

SOURCE: National Digital Newspaper Archive. Prepared by author.

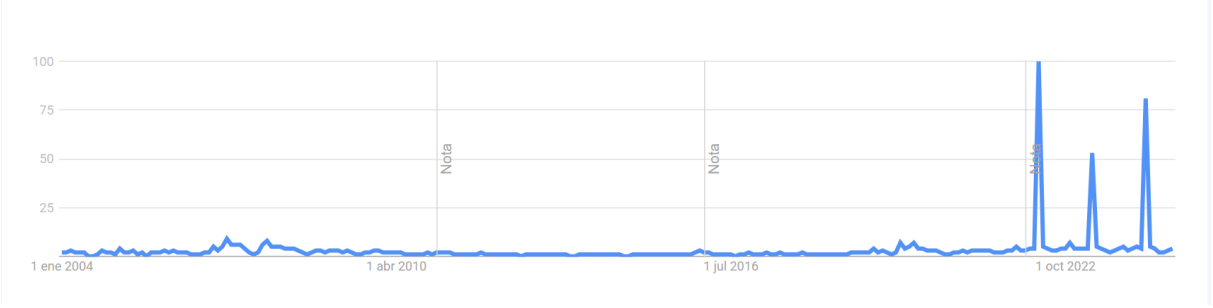

FIGURE 1 – Search term: Climate Change.
SOURCE: Data obtained from Google Trends. Prepared by autor.

FIGURE 2 – Search term: Heat.
SOURCE: Data obtained from Google Trends. Prepared by author.

FIGURE 3 – Search term: Heatwave.
SOURCE: Data obtained from Google Trends. Prepared by author.

FIGURE 4 – Search term: Drought.
SOURCE: Data obtained from Google Trends. Prepared by author.

FIGURE 5 – Search term: Torrential Rains.
SOURCE: Data obtained from Google Trends. Prepared by author.

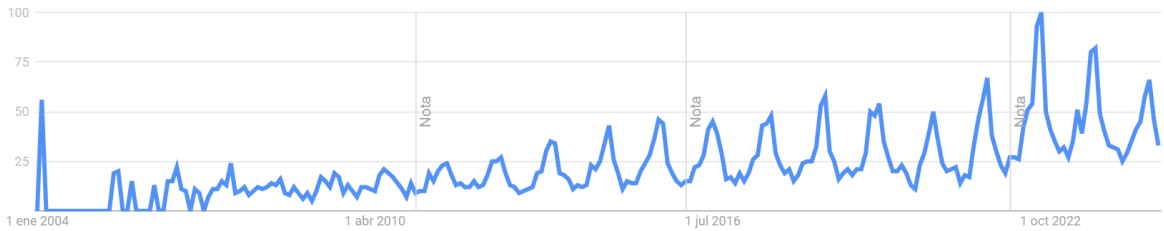

FIGURE 6 – Search term: Sea temperature.
SOURCE: Data obtained from Google Trends. Prepared by author.

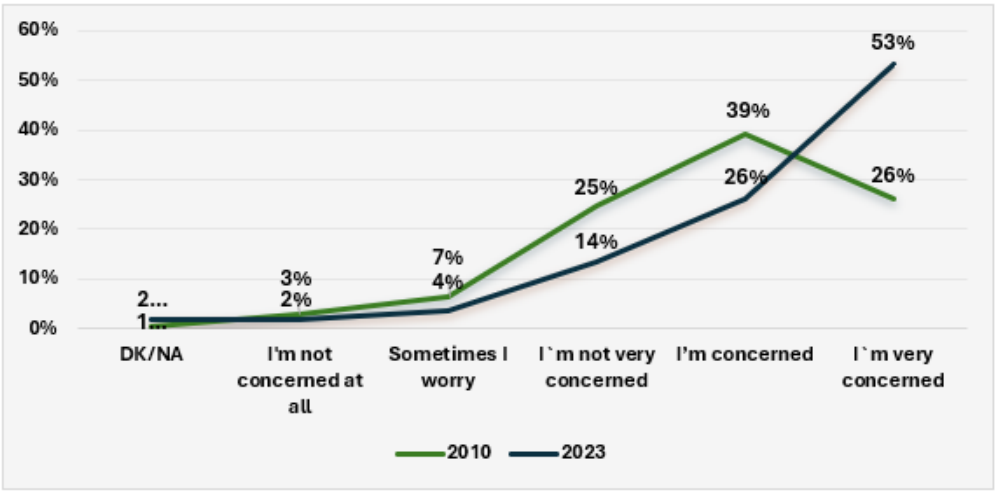

FIGURE 7 – Concern about Environmental Issues
SOURCE: ISSP Environment III and IV for Spain (n2010 = 2560 and n2023 = 2254) Prepared by author.

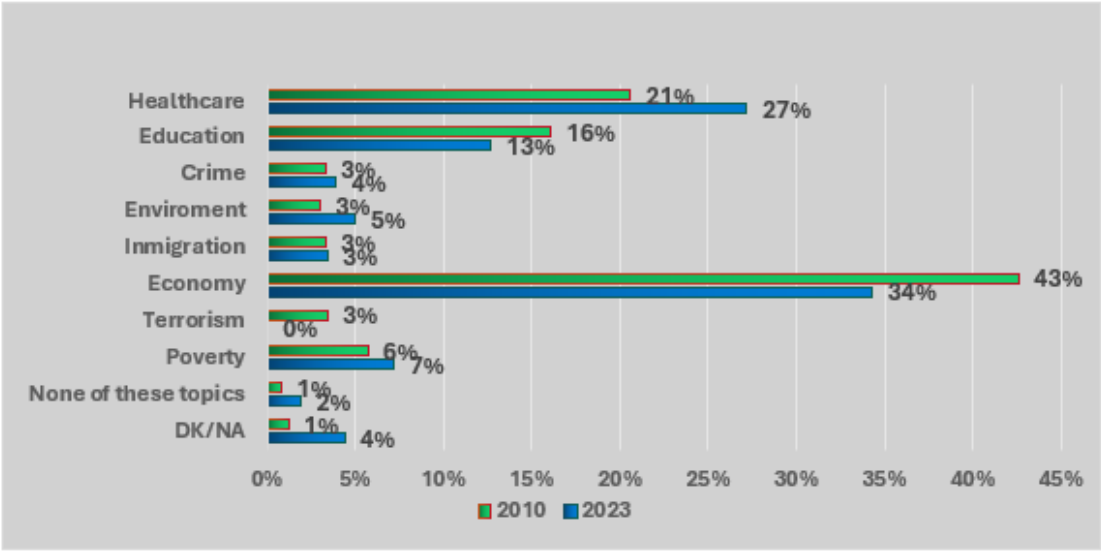

FIGURE 8 – Most important issue for Spain today
SOURCE: ISSP Environment III and IV for Spain (n2010 = 2560 and n2023 = 2254) Prepared by author.

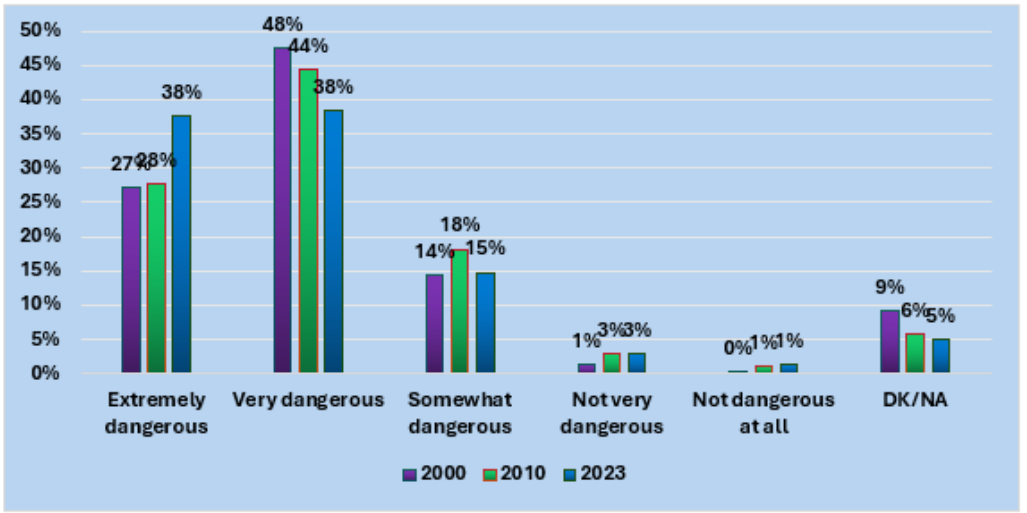

FIGURE 9 – Perception of the level of danger represented by the temperature increase
SOURCE: ISSP Environment III and IV for Spain (n2000=998 n2010=2560 and n2023=2254) Prepared by author.

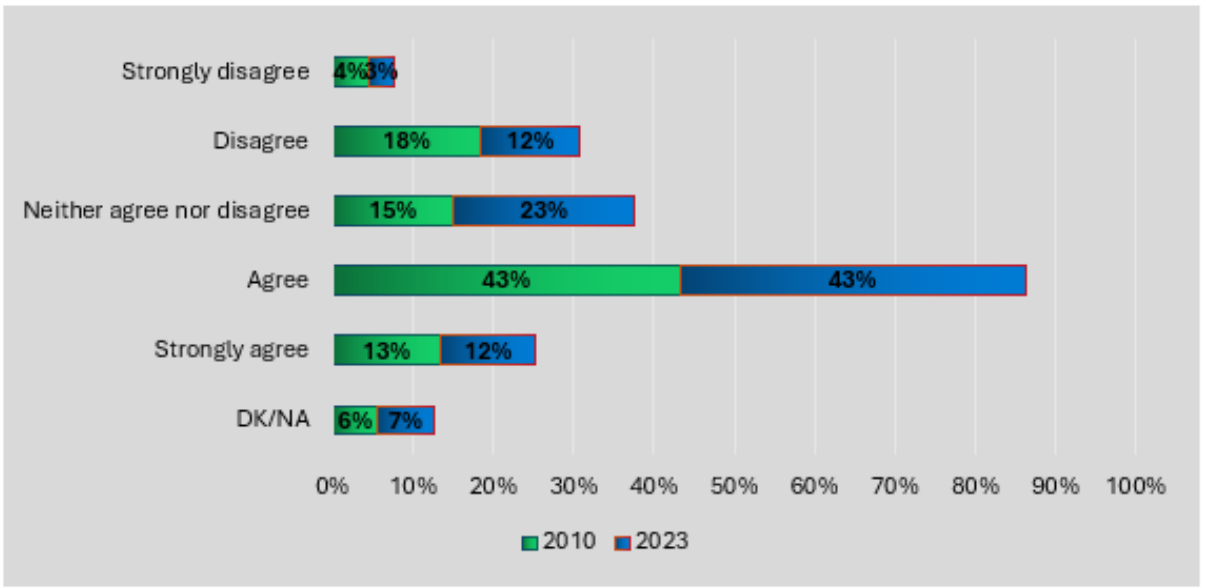

FIGURE 10 – Perception of direct effect on daily life due to environmental problems
SOURCE: ISSP Environment III and IV for Spain (n2010 = 2560 and n2023 = 2254) Prepared by author.

TABLE 2 – Evolution of economic support to protect the environment

EVOLUTION ECONOMIC SUPORT YEARS NIVEL PERCEPCIÓN	2000			2010			2023		
	PAY HIGER PRICES	PAY MUCH MORE TAXES	CUTS IN LIVING STANDARD	PAY HIGER PRICES	PAY MUCH MORE TAXES	CUTS IN LIVING STANDARD	PAY HIGER PRICES	PAY MUCH MORE TAXES	CUTS IN LIVING STANDARD
Strongly against	14%	19%	14%	18%	24%	17%	19%	25%	20%
Quite against	26%	34%	27%	28%	34%	26%	29%	28%	22%
Neither in favor not against	28%	19%	23%	25%	20%	23%	27%	23%	26%
Quite in favour	28%	20%	30%	23%	18%	28%	16%	15%	23%
Strongly in favour	4%	2%	2%	3%	2%	3%	2%	2%	3%
DK/NA	0%	6%	4%	3%	2%	3%	7%	7%	6%

SOURCE: ISSP Environment II, III and IV for Spain (n2000 = 998 n2010 = 2560 and n2023 = 2254) Prepared by author

Although more than half of the population recognizes the effects, what is relevant and most striking is that the perception of the effect on daily life slightly decreases.

It can be interpreted that the climatic impacts they are experiencing (temperature increase, droughts, torrential rains, sea warming, etc.) are not having significant implications for their lifestyles, which is different from denying that they are noticing them.

The willingness to make economic efforts to protect the environment also decreases. The three available indicators show this negative trend (Table 2).

The biggest drop (8.6%) is in the percentage of individuals willing to pay much higher prices for the environment. But there is also a 3.1% drop in those in favor of paying much more taxes for the environment, and a 5.4% drop in those who would accept cuts in their living standards for the same. Since 2000, a long-term downward trend is also observed, which seems to be related to the 2011 economic crisis (global financial crisis and cutbacks), as well as the strong inflation during 2022 and 2023.

Another behavioral dimension is related to ecological activism (Figure 11). The level of associationism remains unchanged, at 3.5%. What does increase (9.6%) is the signing of petitions related to the environment, which is indicative of increased citizen awareness, but also due to the increased use of social networks. In 2023, the correlation between signing petitions and concern for climate change is r = 0.182, while with internet use it is 0.153, a small difference suggesting that the surge in signatures is almost as related to digitalization as it is to ecology.

We also find signs of an increase in participation in protest acts (0.9%) and in donations to environmental groups (1.6%). However, when subjected to significance tests, neither of these increases is significant, so we cannot rule out that these small

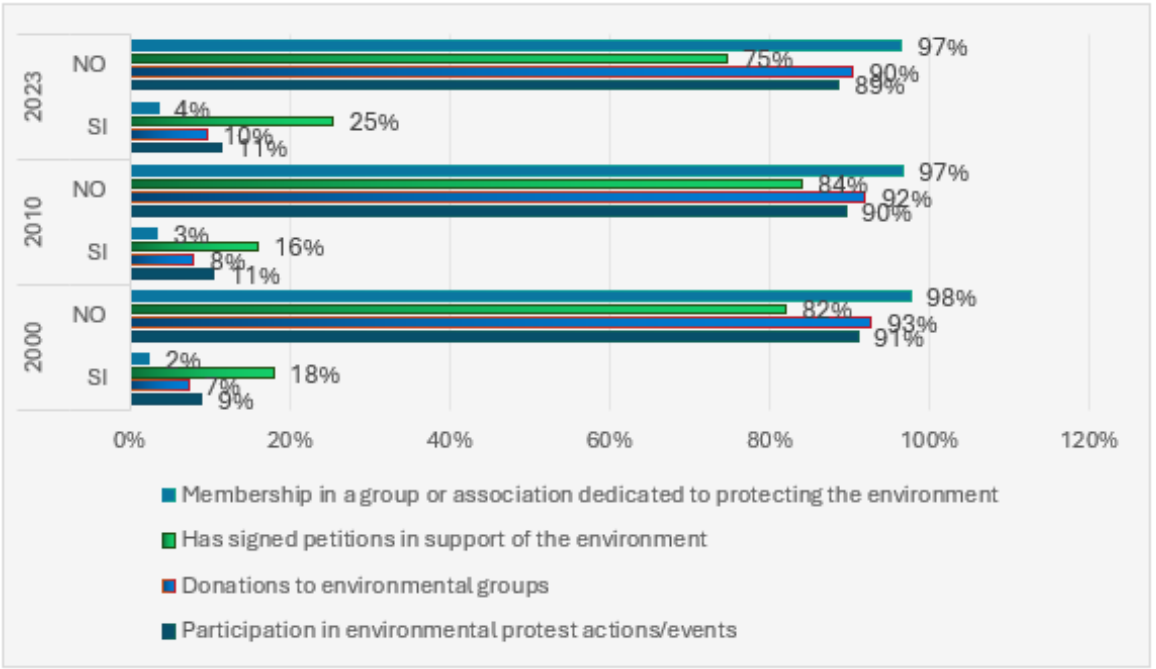

FIGURE 11 – Indicators related to support for environmental activism
SOURCE: ISSP Environment II, III and IV for Spain (n2000 = 998 n2010 = 2560 and n2023 = 2254). Prepared by author.

differences are not due to random sampling error. These increases are not confirmed between 2010 and 2023[1].

Regarding recycling, an advance is also observed, although the increase in the last measurement among those who recycle daily experiences a slowdown compared to that observed between 2000 and 2010. Nevertheless, the advance is confirmed (Figure 12).

In summary: the sharp increase in concern, the increase in the perception of danger, and the modest increase in the priority of concern do not prevent a lower perception that environmental problems impact the lives of citizens. Nor the lower predisposition to make economic efforts for the environment. But it is concomitant with an increase in household recycling. Nor does support for ecological activism seem to clearly increase, with some exceptions. (Membership in ecological associations does not increase, nor does participation in protests, nor does the contribution of donations, although the signing of petitions does increase).

These results are not consistent with the significant increase in citizen concern in the face of the avalanche of meteorological anomalies attributed to climate change and do not support the hypothesis of a shift towards more sustainable behavior.

[1] Protests: ChiSquare=0,985, df=1, p=0,321. Donations: ChiSquare=3,725, df=1, p=0,0536.

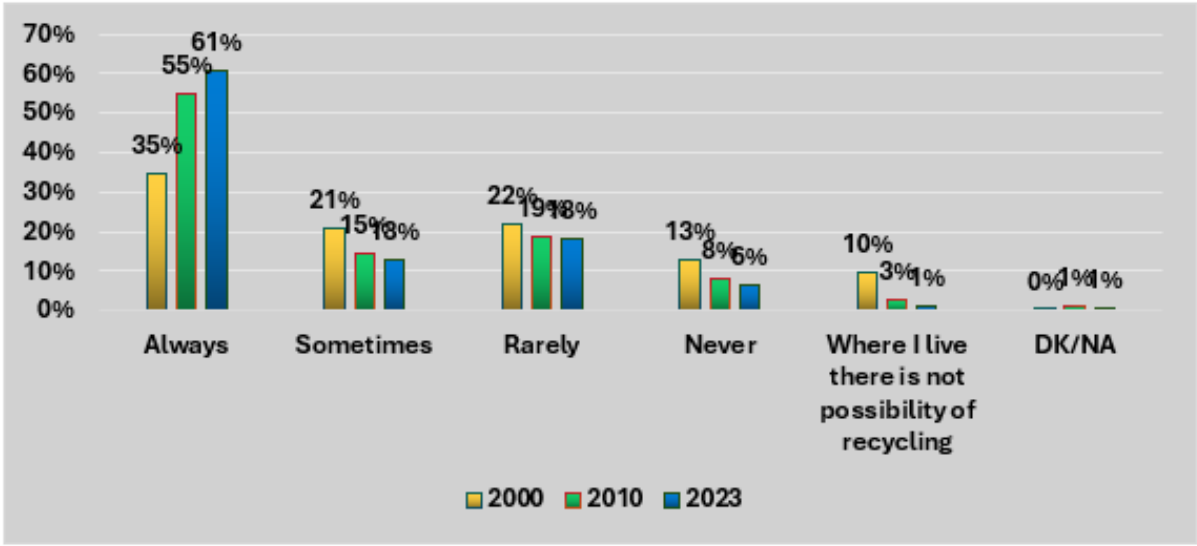

FIGURE 12 – Frequency of separating waste for recycling

SOURCE: ISSP Environment II, III and IV for Spain (n2000 = 998 n2010 = 2560 and n2023 = 2254). Prepared by: author.

6. Results 2: Explaining the limited progress towards sustainability.

To seek explanations for such limited progress towards sustainability, we have explored data from the two files, and some gaps have been complemented with secondary data. Below we present the most relevant findings.

We begin by examining the relationships between behavior and related predictors, according to bibliographic background and the possibilities of the two surveys. The analysis of the differences between the two measurements allows us to ascertain whether the scenario in which ecological behaviors evolve is maintained or has changed, since the changes refer to some of the explanations we seek. The sustainable behavior index is explained in the methodology. As for the predictive variables, a wide range of variables available in the survey has been explored, but we refer to a limited set of those examined, which we will focus on and are presented in Table 3[2].

We find significant differences in the correlations of the two measurements, which indicates that a change has occurred in the scenario where sustainable behaviors operate (Table 4). The big difference is that political ideology (left-right scale) is the predictor of behavior that has increased the most, in the sense that the greater the adherence to the left, the greater the sustainable behavior, and vice versa, the greater the conservatism, the lower

[2] See in the data and methods the operationalization of the variables of the tables throughout this section.

TABLE 3 – Correlations between the Sustainable Behavior Index and other related variables

Related Variables	Sustainable Behaviour Index	
	2010 ***R Pearson***	**2023** ***R Pearson***
Economic level	*.280***	*.201***
Education	*.323***	*.110***
Pos-materialism	*.221***	*.160***
Ideology	*-.185***	*-.321***
Age	*-.151***	*.069***
Sex	*-.065***	*.001*

**. Correlation is significant at the 0.01 level (2-tailed)

SOURCE: ISSP Enviromnent III and IV for Spain. Prepared by author.

TABLE 4 – Correlations between political ideology (left-right scale) and various indicators of environmental sensitivity

Indicators of enviromental sensitivity	Political Ideología	
	2010 ***R Pearson***	**2023** ***R Pearson***
Concern	*-.069***	*-.274***
Enviromental priority	*-.055***	*-.106***
Effect on my life	*-.091***	*-.215***
Warming Danger	*-.095***	*-.286***
Sustainable behavior	*-.185***	*-.321***

**. Correlation is significant at the 0.01 level (2-tailed)

SOURCE: ISSP Enviromnent III and IV for Spain. Prepared by author.

the sustainability. This significant advance occurs in a context of great political polarization, which fully enters the environmental issue. This occurs concomitantly with a predictive loss of the rest of the socio-demographic, socio-economic and value variables. The influence of education, which has traditionally presented a significant explanatory value, is now much smaller. The importance of socioeconomic position decreases somewhat (those most involved have always tended to be the wealthiest, and this is still the case, but with less intensity). The importance of post-material values also decreases (this classic cleavage also declines), the effect of age almost disappears (previously ecological behaviors were associated with young people, now they are not) and the weak effect of gender that was observed in 2010 disappears completely (being sustainable was somewhat more masculine than feminine). Everything diminishes while the influence of political ideology increases.

Concern, the perception of priority, the perception that climate change has effects on daily life, and the danger of global warming showed very weak signs of politicization in 2010 (skewed very slightly to the left) with an intensity close to zero, which coincides with previous evidence (Meira *et al.*, 2011). However, in 2023 they already show higher correlations. Thus, ideological factors permeate not only behaviors but also perceptions and attitudes.

To better understand the effect of politics on the evolution of ecological attitudes and behaviors, the population has been classified into progressives, moderates, and conservatives[3], in Table 5, in order to compare the evolutions of conservatives and progressives.

In the conservative segment, drops are observed in all types of behaviors, even in recycling, with the sole exception of signing petitions, which experience a much more moderate increase than in other segments. Beyond behaviors, concern also falls among conservatives, as do perceptions that climate change has an effect on their lives and of the danger of global warming. Among progressives, almost all behaviors increase, except willingness to pay more. Concern also increases, as do perceptions of the priority of the environmental problem, of danger, and of its effect on their lives. In short, we are witnessing a polarization of behaviors and sensitivities; they advance among progressives but recede among conservatives.

During the period studied, several events have eroded the purchasing power of middle and low incomes. From early 2020 to mid-2024, the loss of purchasing power, measured by the increase in the CPI, is estimated at almost 20%, with the pandemic period 2020-21 and another of high inflation 2022-23 (Cardoso, 2024). High inflation affected the lowest income tercile more significantly (Report on the financial situation of households and businesses. 1st Semester of 2023. Bank of Spain).

To examine the effect on environmental behaviors and sensitivities, we have cross-referenced the available indicators with socioeconomic quintiles in 2014 and 2023. What we find confirms the hypothesis of economic impact, adding nuances of great interest (Table 6).

Economic support behaviors decrease in all segments except the highest quintile, although the decline is not as pronounced among the middle and upper-middle segments as in the low and lower-middle. But there are also variations in other behaviors such as recycling, which decreases in the low and lower-middle quintiles, remains stable in the middle, and increases in the two highest. In the lowest quintile, all behaviors decrease, as do concern and all perceptions. Conversely, the highest quintile emerges as a leader in sustainability. All behaviors increase in this segment, including those related to economic support (which increase significantly), and also other sensitivities. Which does not prevent their carbon footprint from being higher (López *et al.*, 2016; Recalde *et al.,* 2017).

These results are compatible with the explanation that the loss of purchasing power and the increase in social inequalities have negatively impacted ecological behaviors, especially those related to economic support, though not exclusively. On the other hand, the results indicate that a significant economic gap is emerging in environmental behaviors and sensitivities, as the wealthier segments

[3] Conservatives: positions 6 to 10 on the ideological position scale. Moderates: position 5 and ns/nc. Progressives: 4 or less. Age: no response = mean, rest same. Sex: woman = 1, man = 0.

TABLE 5 – Evolution of environmental sensitivities by political ideology

Political Ideology	Progressives		Moderates		Conservatives	
Enviromental Sensitivities	**2010**	**2023**	**2010**	**2023**	**2010**	**2023**
Behaviors						
In favor of paying more	34%	28%	23%	13%	25%	10%
In favor of rasing taxes	28%	30%	15%	10%	19%	7%
In favor of lowering living standards	41%	38%	25%	19%	31%	16%
Recycle daily	59%	69%	51%	58%	58%	51%
Members of organizations	4%	5%	3%	3%	3%	3%
Sign petitions	24%	37%	12%	18%	13%	18%
Make donatives	11%	14%	6%	7%	8%	6%
Participate in protests	18%	17%	7%	9%	8%	5%
Other indicators						
Concerned about environment	70%	90%	61%	82%	67%	63%
1st or 2nd most important problem	10%	16%	9%	9%	6%	6%
Notice effect on their life	63%	67%	54%	48%	54%	47%
Notice warm danger	77%	88%	70%	72%	69%	62%

SOURCE: ISSP Enviromnent II, III and IV for Spain. Prepared by author.

formally lead the path of sustainability, despite having a larger carbon footprint, while the less affluent segments are disengaging and becoming less concerned.

Another line of explanation deals with the impact of counter-trends in values (Norris & Inglehart, 2019); a return to materialistic values and a loss of social influence of post-materialism, traditionally associated with ecological sensitivity. The warning sign is given by the drop in the correlation between the post-materialism index and the sustainable behavior index, when ecology is one of its emblematic sensitivities. The regression of post-materialism is reflected in the surveys analyzed, with a 4.9% loss observed between the 2010 and 2023 surveys (the sum of the two priority post-materialist response options falls from 36.2% to 31.3% while the materialist priority of containing inflation soars). In Table 7, we can see the evolution of environmental indicators among materialists and post-materialists. The classification of materialists, mixed, and post-materialists is based on the division into terciles in the factorial scores of the post-materialism index.

Post-materialists are the ones who show the greatest increase in recycling and petition signing, but remain constant in association membership and donations, decrease in protests and economic support. Although their concern and the priority of

TABLE 6 – Evolution of environmental sensitivities by purchasing power

PURCHASING POWER	Low		Low-Medium		Medium		High-Medium		High	
ENVIROMENTAL SENSITIVITIES	**2010**	**2023**	**2010**	**2023**	**2010**	**2023**	**2010**	**2023**	**2010**	**2023**
Behaviors										
In favor of paying more	20%		21%	0%	22%	3%	32%	16%	40%	69%
In favor of rasing taxes	13%		16%	1%	16%	3%	24%	13%	32%	67%
In favor of lowering living standards	25%	1%	25%	4%	23%	15%	36%	30%	45%	77%
Recycle daily	52%	43%	51%	53%	50%	50%	58%	76%	64%	80%
Members of organizations	1%		2%	0%	2%	1%	3%	3%	10%	12%
Sign petitions	9%	7%	11%	10%	10%	20%	19%	28%	31%	62%
Make donatives	4%	1%	4%	2%	7%	4%	12%	7%	15%	33%
Participate in protests	5%	2%	9%	4%	9%	6%	11%	10%	20%	34%
Other indicators										
Concerned about environment	62%	57%	59%	77%	62%	84%	72%	90%	73%	96%
1st or 2nd most important problem	10%	3%	9%	7%	10%	9%	8%	13%	7%	24%
Notice effect on their life	57%	39%	55%	48%	53%	51%	54%	62%	64%	74%
Notice warm danger	71%	59%	69%	73%	68%	75%	77%	81%	75%	92%

SOURCE: ISSP Enviromnent II, III and IV for Spain. Prepared by author.

TABLE 7 – Evolution of environmental sensitivities by values

Values	Materialists		Mixed		Posmaterialists	
Enviromental Sensitivities	**2010**	**2023**	**2010**	**2023**	**2010**	**2023**
Behaviors						
In favor of paying more	21%	14%	27%	15%	36%	25%
In favor of rasing taxes	16%	13%	21%	16%	27%	23%
In favor of lowering living standards	25%	22%	31%	25%	40%	31%
Recycle daily	53%	58%	54%	59%	58%	65%
Members of organizations	3%	3%	3%	3%	4%	5%
Sign petitions	12%	20%	16%	26%	23%	31%
Make donatives	7%	8%	6%	9%	12%	12%
Participate in protests	7%	8%	10%	13%	16%	14%
Other indicators						
Concerned about environment	61%	77%	64%	82%	73%	84%
1st or 2nd most important problem	7%	10%	9%	8%	11%	16%
Notice effect on their life	54%	51%	56%	54%	62%	61%
Notice warm danger	68%	73%	73%	77%	78%	79%

SOURCE: ISSP Enviromnent II, III and IV for Spain. Prepared by author.

their concern increase, perceptions of danger and effect on their lives do not advance. The results evidence the disengagement between values and ecology already observed in the correlations.

Regarding the age variable, we have detected interesting trends both in older people and in young people. In Table 8, we present three age groups: young people up to 34 years old, intermediate ages from 35 to 64, and 65 and over. Among young people, what increases is activist support: signing petitions above all, and slightly participating in protests and making donations. But they do not recycle more than in 2010, nor are they more associated, and they are much less favorable to economic support. In the overall balance, young people show a decrease in behavior. However, their concern increases less than in other age groups, the priority does not advance, and perceptions of danger and effect on their lives decrease. The opposite is observed among older people, who show an increase in all types of behaviors, a spectacular increase in concern and perceptions of priority, danger, and effect on their lives. Both movements, the descending trend among young people and the ascending trend among older

TABLE 8 – Evolution of environmental sensitivities by age groups

AGE GROUPS	Up to 34 years		35 to 64 years		65 and more	
Enviromental sensitivities	**2010**	**2023**	**2010**	**2023**	**2010**	**2023**
Behaviors						
In favor of paying more	29%	17%	30%	17%	16%	23%
In favor of rasing taxes	21%	14%	23%	16%	12%	21%
In favor of lowering living standards	34%	26%	34%	25%	20%	27%
Recycle daily	43%	43%	59%	63%	58%	72%
Members of organizations	3%	4%	4%	4%	1%	3%
Sign petitions	18%	25%	19%	27%	7%	21%
Make donatives	6%	8%	10%	10%	4%	10%
Participate in protests	13%	16%	12%	10%	5%	12%
Other indicators						
Concerned about environment	66%	73%	70%	82%	54%	85%
1st or 2nd most important problema	10%	10%	9%	10%	5%	16%
Notice effect on their life	54%	45%	61%	56%	50%	61%
Notice warm danger	78%	75%	74%	76%	59%	76%

SOURCE: ISSP Enviromnent II, III and IV for Spain. Prepared by author.

people, are linked to the generational shift: young people today are not as involved in the environment as in the past, and vice versa, people who developed values and sensitivities much more oriented towards ecology during their childhood and youth are now reaching retirement age.

Indicators of sustainable behavior are not very strong in the consumption dimension. To remedy this weakness, we have examined some secondary data, which suggest that sustainable consumption is expanding, with limitations and with motivations that are not purely ecological.

Ecoembes data[4] aligns with survey trends, confirming the expansion of recycling. This is aided by strong communication campaigns and the expansion of infrastructure and services.

The consumption of organic food has followed a growing trend from 2022 to 2023 (Palomar *et al.,* 2023), amidst high inflation and despite higher prices. It continues to rise sharply in 2024 and is expected to continue increasing at a rate of 7% an-

[4] According to website information, available on: https://www.ecoembes.com/es/el-proceso-de-reciclaje/datos-de-reciclaje-de-envases-domestico-en-espana

nually (Palomar, *et al.,* 2024). Not only ecological motivation is at play, but also health and well-being, whose interest surpasses ecological concerns (Díaz Catalán & Cabrera, 2022).

The number of photovoltaic installations in homes has experienced spectacular growth, rising from 424 annually in 2016 to 111,795 in 2023[5], partly due to aid from Next Generation funds and sharp increases in energy prices. This has allowed 5% of households to have photovoltaic installations in 2024[6]. But installations are not accessible to everyone, but mainly to those who live in a detached house and can make an investment.

In terms of energy consumed in households, a decrease in fossil fuels and a gradual relative increase in renewables can be observed in the period 2010-2022[7]. Apart from ecology, this is also an economic decision and an investment effort despite public subsidies. This interpretation is supported by another previous study revealing that economic motivation is much more important than climate awareness for regulating energy consumption (Meira *et al.*, 2011).

In recent years, we have seen a significant expansion of electrified vehicles, mostly hybrids (going from 4.8% of new registrations to 12% in 2023)[8]. This has been motivated by circulation restrictions in low-emission zones. Second-hand vehicles, mostly combustion, have grown much more (in 2023 there were 1,940,488 compared to 949,359 registered), so the wealthier drive new eco-labeled vehicles and live in central or residential areas with solar panels, while the less affluent continue with old combustion vehicles in the peripheries, in more polluting and less efficient homes, living with the feeling that ecology is not for them.

As additional considerations for interpreting the results, we add the following.

The type of information that has predominated in the media has focused on the increased intensity and frequency of extreme weather phenomena and the poor prospects for future evolution. However, in previous studies (Ibáñez *et al.*, 2007), information focused on problems has not proven clearly effective in modifying behaviors, especially among those without solid awareness, with communication of the positive effects of actions being much more effective. Therefore, it is likely that behaviors will improve with this type of institutional campaign.

As previously observed (Huertas & Corraliza, 2016), the dissemination of information about climate change has not led to rational and coherent changes in behavior, so it can be assumed that they have re-elaborated the information to reduce dissonance. On the other hand, skeptical and denialist messages, which have also been abundant as a media counter-narrative, are already known to be much more effective than those dedicated to strengthening beliefs in climate change (Rode *et al.*, 2021). This can largely explain the drop in behaviors, attitudes, and concern among conservative citizens.

[5] Association of Renewable Energy Companies (APPA). Self-consumption report, 2023. Available on: https://www.informeautoconsumo.es/wp-content/uploads/2024/01/Informe-Autoconsumo-Fotovoltaico-2023.pdf

[6] Solar Report 2024. Available at: https://energiaestrategica.es/autoconsumo-espana-5-por-ciento/

[7] Report and data only on the web, retrieved 13/10/2024: https://informesweb.idae.es/consumo-usos-residencial/informe.php

[8] Electrified Vehicle. ANFAC annual report, 2023. Available at: https://anfac.com/publicaciones/informe-anual-de-vehiculo-electrificado-2023/

7. Conclusions

The Spanish press has increasingly published articles on climate change between 2014 and 2023, an indicative fact of the media impact on public opinion.

On the other hand, internet searches for related topics increase especially from 2019 in Spain, but do so with particular abruptness in 2022 and 2023, coinciding with the greater frequency and intensity of extreme weather events. Media pressure, along with meteorological experience (heatwaves, torrential rains, drought...) are behind the intensification of searches and these reflect the growing interest and concern of internet users.

Furthermore, a significant increase in environmental concern is observed between 2010 and 2023. The perception of danger due to global warming also slightly increases. Both increases are consistent with meteorological evolution, media dissemination of climate change, and data on related search term tracking.

However, the evolution of other indicators does not increase according to the expectations of the aforementioned aspects. These are as follows:

The perception that the environmental problem is a priority increases very little, and very few prioritize this problem. The perception that environmental problems have a direct effect on their lives decreases. Behaviors also do not clearly increase. An increase in recycling activity is observed, as well as the signing of petitions. But neither associationism nor participation in protests nor donations to associations increase. The predisposition to financial support to protect the planet also strongly decreases. That is, of the three dimensions of behavior, economic support falls sharply, support for activism decreases somewhat, and only consumption-related behavior increases, moving towards sustainable behaviors in a limited way and combining non-ecological motivations.

The environmental issue has become highly politicized in the last decade and, unfortunately, has polarized along ideological lines: Sustainable behaviors, as well as concerns and attitudes, advance among progressives, while they decline significantly among conservatives.

The decrease in the purchasing power of middle and lower socioeconomic segments is behind the sharp drop in the predisposition to financially support the environment, but it is also related to the relaxation of other ecological behaviors and sensitivities, which decrease in the priority of concerns for the less affluent. The consequence is that we are witnessing the advance of a significant socioeconomic gap in terms of sustainability and related sensitivities. The wealthiest (quintile with greater purchasing power) are those who advance most towards sustainability and ecological sensitivities, while the low and lower-middle segments disengage and recede. In these more disadvantaged segments, daily priorities are different.

Other explanatory factors include: the lesser cultural influence of post-materialistic values, which, in addition to diminishing, relate less to ecological sensitivities. The emergence of a youth less involved in ecology. Or that messages focus on the negative effects of climate change but not the positive effects of sustainable actions.

In summary, the experience of climate change and its media impact succeed in increasing public concern, but do not substantially modify perceptions and behaviors.

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