

RESCLIMA: Two decades of research in educational and social responses to climate change

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Abstract

RESCLIMA is a research line conceived more than two decades ago in the Research Group on Social Pedagogy and Environmental Education (SEPA-interea) at the Universidade de Santiago de Compostela. RESCLIMA, which stands for *Educational and Social Responses to Climate Change*, is a basic research line that uses the social representations theory as one of its theoretical reference frameworks to study how society represents climate change and the relationship between science and common culture in these representations. This is done by exploring the complex logic that governs the construction of common knowledge and the role that scientific culture plays in this process.

This chapter is devoted to gather the vast history of RESCLIMA along with the main achievements in the field of education for climate change, as well as its extensive international collaboration network. Since most of the research outputs are in Galician, Spanish or Portuguese languages, this chapter aims to share our trajectory to the English-speaking community. Along this historical account, readers will go through ideas, innovations, and organizations that have shaped the research line to its current state.

Keywords: Climate change, social representations, environmental education, interdisciplinary research, innovative pedagogy

1. Introduction

The abatement of anthropogenic climate change requires profound changes to the current production-consumption model on a planetary scale. For these changes to gain social acceptance, it will be necessary to align them with profound transformations in consumption practices, the redefinition of work and its schedules, and the organization of urban environments, among other factors. A cultural shift is essential for these transformations, where citizens actively support and participate in adaptation and mitigation strategies, embracing profound changes in the currently dominant lifestyles.

The RESCLIMA research line, acronym for *Educational and Social Responses to Climate Change*, emerged with the intention of linking and coordinating an interdisciplinary network of universities, educational, and environmental institutions at the Spanish and international levels, in order to generate basic and applied knowledge on the social, educational and communicative dimensions of climate change. This network has been articulated through a sequence of projects coordinated by the research group on Social Pedagogy and Environmental Education (SEPA-interea) at the Universidade de Santiago de Compostela (USC), working on the links between education and the climate crisis for more than two decades.

Specifically, SEPA-interea has focused on analyzing patterns and processes of social representation of climate change. This involves studying how these representations are constructed and how they evolve in different population groups. This evolution is linked to social interactions and the processes through which various agents and mediating devices (media, school curricula, social networks, social movements, etc.) transpose and disseminate scientific information to society. This approach pays special attention to unveiling the complex relationships that occur between scientific culture and common culture, taking the theory of social representations as the main analytical framework. The goal is to leverage the generated knowledge to enhance educational and communication processes, aiming to make the climate crisis a relevant and significant concern for individuals and communities.

1.1. Social representations as theoretical framework

RESCLIMA begins with a straightforward premise: it is crucial to investigate the underlying reasons for the significant disparities between the scientific community's warnings regarding the depth and severity of the climate crisis, as the most acute manifestation of the eco-social crisis, and the indolent and procrastinating reaction of modern societies. The understanding of the dynamics between scientific knowledge and common culture, specifically how the former is integrated and embraced in the latter, can provide insights into the root causes of this imbalance. Climate education predominantly adheres, whether implicitly or explicitly, to the limiting perspective of scientific or climate literacy based on the information deficit theory (Raps 2016; Simis et al. 2016; Lucas and Davison 2019). In simpler terms, this viewpoint assumes that people lack the necessary scientific information to comprehend and evaluate the phenomenon, rendering them unable to mobilize in response.

However, the information deficit approach to climate literacy is both reductionist and limited, lacking robust scientific support. This perspective is questionable for at least two reasons. First, psychological and educational research suggests that, in general, there is no significant direct relationship between increased scientific literacy and the development of pro-environmental attitudes and behaviors (Kollmuss and Agyeman 2002; Wibeck 2014; Moloney et al. 2014). While acknowledging a connection between the level of climate literacy in the population and civic

engagement in democratic societies, researchers like Drummond and Fischhoff (2017) or Kahan et al. (2012) emphasize that personal positions on socially controversial issues, where science is central, become even more polarized among those with higher levels of education. Additionally, other variables related to procedural, cultural, and situational factors also need consideration. According to Stern (2016), Hornsey et al. (2016) and Ballew et al. (2020), variables such as identity (cultural, religious), economic status, personal and family experiences of extreme weather events, ideological position, or emotional relevance significantly influence people's assessments, attitudes, and behaviors regarding the climate crisis.

The second reason is pragmatic. Given the urgency of transitioning to decarbonized societies, there is insufficient time to attain a generalized mastery of climate science among the population, which could guarantee, if necessary, the acceleration of essential social, economic, and cultural transformations. The timing of the climate emergency calls for immediate transformations involving all societies and individuals, irrespective of their degree of access to climate science. As warned by the Intergovernmental Panel on Climate Change (IPCC 2018: 24), "Education, information, and community approaches, including those informed by indigenous knowledge and local knowledge, can accelerate wide-scale behavior changes consistent with adapting to and limiting global warming to 1.5°C. These approaches are more effective when combined with other policies and tailored to the motivations, capabilities, and resources of specific actors and contexts (high confidence). Public acceptability can enable or inhibit the implementation of policies and measures to limit global warming to 1.5°C and to adapt to the consequences. Public acceptability depends on the individual's evaluation of expected policy consequences, the perceived fairness of the distribution of these consequences, and perceived fairness of decision procedures (high confidence)."

Therefore, in contrast to the limited approaches to scientific literacy, which often exhibit a mechanistic bias, RESCLIMA operates on different assumptions. The main one is that the logic that constructs common culture tends to impose itself on the epistemological logic of scientific culture when it comes to understanding and representing complex, controversial scientific objects such as climate change. This dynamic is challenging to evade because common culture comprises tools accessible to most of the population, encompassing both individuals and social groups with the qualifications to master scientific culture. There are variables linked to personal subjective and inter-subjective, cultural and contextual factors that need to be taken into consideration. Hence, it's crucial to move beyond information deficit theories and the simple transfer of information. Understanding how scientific culture permeates society, how certain social collectives appropriate it, and the social representations emerging at the interface between scientific and common culture is essential.

In this context, RESCLIMA is grounded in the theory of social representations, providing a robust theoretical framework for exploring and modeling the intricate relationships between scientific culture and common culture (De Rosa 2013; Sammut et al. 2015). Climate change offers unique characteristics that make it an ideal subject for analyzing the representation of socially relevant and controversial scientific phenomena. Anthropogenic climate change stands out as the *perfect storm* among current global socio-environmental challenges. Its complexity and the significant epistemic uncertainty in climate science render it a social object prone to transformation and modeling by common culture. Viewing climate change as a biophysical experiment, a systemic alteration of the biosphere inadvertently set in motion by our species since the mid-18th century, creates an opportune juncture to examine the interconnectedness of scientific and common cultures. Furthermore, it serves as a valuable opportunity to develop and test social and educational responses to mitigate the threats posed by the climate crisis on humanity.

Understanding the connections between the two epistemic universes, assuming that there is an epistemology of common culture, is scarce, but increasingly necessary to address socially controversial issues that involve -and going beyond- the scientific sphere.

Scientific representations are transferred to society through many channels in which the mediating work of social agents and institutions is fundamental: new and classic media, politicians and political agendas, social networks, educational systems, disseminators and opinion makers, social movements, etc. Laypeople must add the creative capacity of common culture to the processes of institutionalized mediation between the scientific representation of climate change and society, which sets its own *epistemology* in motion to integrate scientific elements (concepts, theories, images, etc.) into the ways of rationalizing reality that can be identified with common sense (*profane theories*). Understanding how the population perceives and represents climate change, as well as the risks and challenges it poses at global and local levels, is a fundamental basis on which communicators, educators and decision-makers must work. If a phenomenon - even if it is a threat that can be objectified by science - is not represented, understood and valued by the population, it will be difficult to gain sufficient social demand that stimulates the implementation of response policies that will, in turn, find the social consensus necessary for their effective application. Regardless of whether climate risks and the human responsibility for their generation can be delimited and analyzed by science, they will only be *real* - that is, relevant and significant - for the population if they are socially constructed, assumed and perceived as such.

The fifth report by the IPCC (2014) recognized the knowledge gap regarding the social factor of climate change and recommended the deployment of research programs that analyze cross-cultural differences in people's perception and reaction to the climate threat. In this sense, any educational program focused on mitigation and adaptation to climate change must have at least three aims: 1) to understand how climate change is perceived by the target population; 2) to represent it as a global problem with individual and social implications; and 3) to empower individuals and human collectives so that they are active agents in the response strategies that must inevitably lead to the decarbonization of our societies (González-Gaudiano and Meira 2009). Thus, it is necessary to know how the population understands the nature and scale of the threat and to what extent it is willing to assume changes in substantial aspects of lifestyles associated with the dominant production and consumption model, mainly in the most developed societies. Changes that challenge the conception of the energy model or the equal distribution of resources and environmental burdens, in addition to the socio-economic implications that such changes may entail for a human development model that aspires to be environmentally sustainable and socially just.

1.2. Objectives of the research line

The primary objective of RESCLIMA is to generate comprehensive knowledge, both foundational and practical, on the social representations of climate change. This serves as a socio-scientific basis for developing communication and education resources, aiming to help contemporary societies comprehend and recognize the potential threats posed by climate change. Additionally, the goal is to inspire active participation, leading to the demand for and commitment to adaptation and mitigation policies and actions. At the same time, it is crucial to scrutinize the processes of scientific transposition, interpretation, and negotiation of meanings. This analysis helps in understanding how social representations are internalized and expressed. It also sheds light on the mechanisms for the diffusion and adoption of certain non-scientific theories in various societies and groups.

Specifically, in its current stage, RESCLIMA aims to: (1) Identify structural elements in the social representation of climate change by assessing its universal or idiosyncratic nature; (2) Analyze the influence of various socio-demographic and cultural variables on the social representation of climate change; (3) Investigate the relationship between social representations of climate change and population behavior; (4) Examine the role of different media and mediators in constructing social representations of climate change; (6) Identify communication and education patterns that are more consistent with the threats posed by climate change, to promote significant and accelerated changes in the lifestyles of the population.

In addition, and thanks to the collaboration with other research groups developing similar research lines in other universities, both in Spain and other countries, a comparative approach to the social representations of climate change in the Ibero-American and Southern-European cultural space has been sought in order to consolidate a transcultural line, this being another of the main aims of the line of research.

2. RESCLIMA: milestones, repercussions, and challenges of a consolidated research line

2.1. A journey through the history of RESCLIMA

As previously mentioned, the current research network formed around RESCLIMA is the result of a research line that has been developed within the SEPA-interea research group for more than two decades. In a simplified overview, RESCLIMA's trajectory can be delineated into four main stages: its beginnings in the early years of this century, a second stage characterized by waves of public opinion surveys, a third stage defined by the expansion and internationalization of the project, and the current stage, distinguished by its thematic convergence with other research lines within the SEPA-interea group.

2.1.1. Loading the backpacks: Precedents (1999-2007)

To comprehend the origin of RESCLIMA, it is essential to highlight key events that shaped its subsequent trajectory. Firstly, the **Research Group on Social Pedagogy and Environmental Education (SEPA-interea)** was established in 1999, affiliated with the Pedagogy and Didactics Department of the USC. This group, as previously noted, played a pivotal role in initiating RESCLIMA and remains its core driving force and advocate. Secondly, the active involvement of group members in the establishment of the ***Sociedade Galega de Educación Ambiental*¹ (SGEA)**, in 2001, was also noteworthy. This independent non-profit association focuses on promoting environmental education in Galicia, advancing a collective and plural perspective to construct a fairer, more respectful, and environmentally responsible society. Concurrently, SEPA-interea members initiated the publication of early studies exploring perceptions and social representations of various global environmental degradation issues, including the depletion of the ozone layer, loss of biodiversity, and global warming. These initial studies signaled that the global impact of climate change possessed unique characteristics, making it especially promising for examination through the theory of social representations. Simultaneously, it emerged as a significant subject for the field of environmental education, which had previously received limited attention.

¹ In English, it can be translated as: Galician Society for Environmental Education.

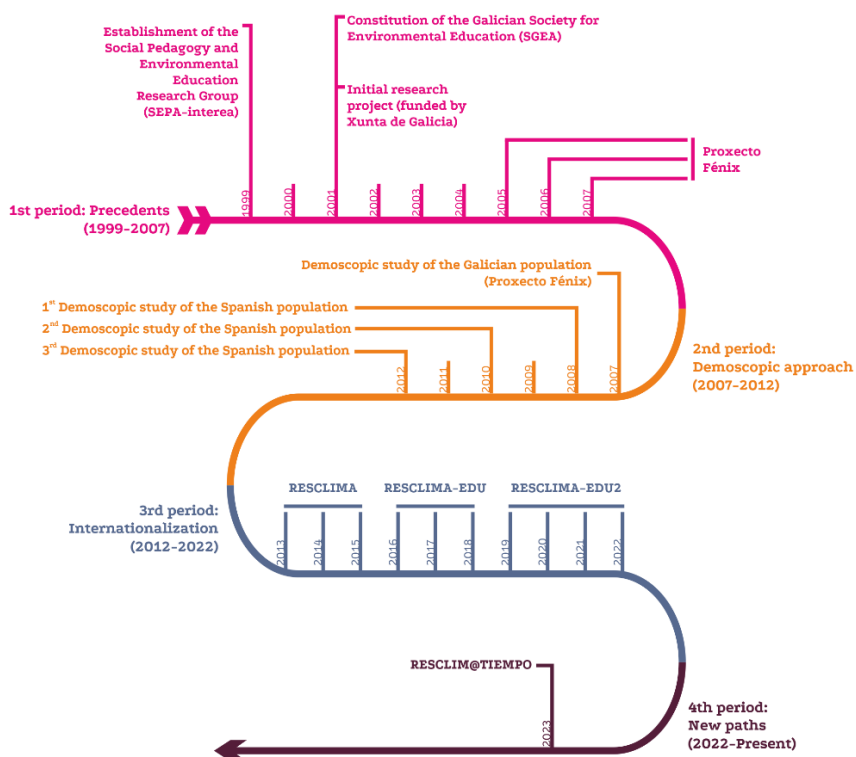


Fig. 1. RESCLIMA timeline

Between 2001 and 2002, the first competitive research project, *El análisis de las representaciones sociales de los problemas ambientales como base para el desarrollo de materiales y programas de Educación Ambiental en Galicia*², was conducted. This project marked the initial exploration of the theory of social representations to analyze how society internalizes and reinterprets environmental issues. Additionally, it laid the groundwork for designing the first methodological approaches to explore these issues, primarily among groups of university students. This phase gave rise to the initial versions of data collection instruments and techniques, which evolved in subsequent phases of RESCLIMA.

Another significant milestone during this period was the participation of RESCLIMA members in the establishment of the permanent seminar *Respuestas desde la Comunicación y la Educación al Cambio Climático*³ in 2004, coordinated by the National Centre for Environmental Education

² In English, it can be translated as: The analysis of social representations of environmental problems as a basis for the development of environmental education materials and programs in Galicia. Project funded by the Department of the Environment of the Autonomous Government of Galicia. Code: 2001-PG167.

³ In English, it can be translated as: Responses from Communication and Education to Climate Change.

For more information, see: <https://www.miteco.gob.es/es/ceneam/grupos-de-trabajo-y-seminarios/respuestas-desde-la-educacion-y-la-comunicacion-al-cambio-climatico.html>

(CENEAM)⁴ and the Spanish Office for Climate Change (OECC)⁵. This seminar, which has remained active to the present day, aimed to monitor the development of Article 6 of the United Nations Framework Convention on Climate Change (UNFCCC) in Spain, related to the promotion of education, awareness, access to information, and participation in matters related to climate change. The seminar encourages the exchange of ideas and experiences, fostering collaboration among individuals working in these areas. More recently, its scope expanded to assess the effectiveness of activities outlined in the Action for Climate Empowerment of the convention. As will be explained below, the dynamic nature of this seminar and the transdisciplinary and inter-institutional collaborations it facilitated are the origins of several RESCLIMA initiatives.

During the initial phase of RESCLIMA, another key milestone was the active involvement of its members in conceptualizing and advancing the *Proxecto Fénix*⁶, facilitated through the SGEA. In late 2005, the SGEA proposed revisiting the initiatives promoted with the Galician Environmental Education Strategy to officials at the Galician Department of the Environment. This strategy, originally endorsed in 2000 by the Galician autonomous government and informed by contributions from various SEPA-interea group experts, aimed at providing renewed impetus. The project's title was indicative of its purpose, i.e., to rejuvenate and act as a catalyst for revitalizing the sector. Over the subsequent years, *Proxecto Fénix* unfolded with a dual focus on assessing and invigorating environmental education in Galicia (Meira and Pardellas 2010). The project embraced a broad and inclusive concept of environmental education, viewing it as a tool to shape a Galician society aspiring to be both environmentally sustainable and socially just. Simultaneously, it recognized environmental education as a specialized educational practice meant to convey, educate, guide, and foster individual and social values and practices aligned with these aspirations.

A primary objective was to pinpoint the weaknesses and strengths of the field, ultimately proposing strategic lines for future action to enhance the role of environmental education as an instrument for social change. The project aimed to present a comprehensive overview of the state of environmental education in Galicia, involving and coordinating various stakeholders in the field. Furthermore, it sought to provide these stakeholders with diagnostic information to guide, adjust and optimize policies and practices related to environmental education.

2.1.2. The beginning of the journey: Demoscopic approach (2007-2012)

To address the challenge of uncovering the social representations of climate change within Galician and Spanish society, with the aim of contributing to the development of a more effective, well-directed, and well-grounded environmental education and communication policy, a series of public opinion studies were conducted in this stage. Initially, these studies were conducted at the regional level in Galicia and subsequently expanded to the national level in Spain.

As part of the *Proxecto Fénix* framework, and with a dual objective of diagnosing the environmental cultural profile of Galician citizens and establishing indicators to discern potential trends in its evolution in subsequent studies, a public opinion study was conducted in 2007. The

⁴ The CENEAM (*Centro Nacional de Educación Ambiental*) is a public centre dependent on the Spanish government that offers resources and support to public and private groups that develop environmental education programmes and activities.

⁵ The OECC (*Oficina Española del Cambio Climático*) is a collegiate body under the Spanish Ministry of the Environment responsible for developing policies related to climate change.

⁶ In English, it can be translated as: Phoenix Project.

goal was to provide a comprehensive social overview that could shed light on the changes occurring in the environmental culture of Galician society. Additionally, the study sought to assess the impact and influence of educational-environmental initiatives and programs on this evolution. This study formed an integral part of a broader series of initiatives aimed at shaping an environmental education strategy, not only considering the environmental challenges within its territorial sphere but also delving into how these issues were perceived and valued by the citizens it aimed to engage. This public opinion study identified five dimensions of analysis, which also served to structure the designed questionnaire: (1) identification and relevance attributed to environmental problems; (2) information and knowledge about the environment and the environmental crisis; (3) attitudes and assessments of the environmental crisis and policy responses; (4) habits, behaviors and practices related to the environment; and (5) perceptions and assessments in relation to their experiences in contact with environmental education initiatives, resources and experiences (Meira 2010). Although the initial purpose of this study was to serve as an initial milestone for longitudinal monitoring of the evolution of the environmental culture of Galician society, the initiative could not be extended over time.

During this phase, a series of three biannual public surveys were conducted, supported by **Fundación MAPFRE**⁷ through a partnership with USC. These surveys aimed to delve into the representations, assessments, and behaviors of the Spanish population concerning climate change. This sequence provided a chronological snapshot, tracking how the Spanish population was shaping its understanding of the climate crisis. The longitudinal study consisted of three waves of fieldwork conducted in the spring of 2008, 2010, and 2012 (Meira et al. 2009; 2011; 2013). It explored various socio-cultural dimensions, including beliefs regarding the causes and consequences of climate change, the perceived level of threat, the information resources used by the population, knowledge and attitudes toward policy responses, and associated behaviors. Additionally, the study investigated the willingness of individuals to act on climate-related issues. The objective was to create a comprehensive picture of how the Spanish population's views on climate change evolved over time.



Fig. 21. Covers of the three reports produced with funding from Fundación MAPFRE.

The same questionnaire was administered across all three waves to representative samples of the Spanish population. However, in each wave, specific items were introduced to examine specific issues. These studies aimed to contribute valuable insights from the social sciences

⁷ The MAPFRE Foundation is a non-profit organization founded in 1975 by the Spanish insurance company MAPFRE.

perspective for the formulation of more effective public policies in the climate change domain. Additionally, they sought to provide guidance for enhancing resources and educational and communication programs on climate risks. The findings played a pivotal role in shaping the content of the biannual status reports submitted by the Spanish Government as part of the monitoring process for the UNFCCC. Unfortunately, the continuity of the planned biannual polling cycle was disrupted in 2012 due to a lack of sustained funding for the fieldwork of these public opinion studies.

Almost a decade later, a new polling study was conducted in 2020, thanks to funding from the *Fundación Biodiversidad*⁸ of the Ministry for Ecological Transition and the Demographic Challenge, in collaboration with the research consulting firm *Ideara Investigación*. The results of this study were published in a report titled *La sociedad española ante el cambio climático: Percepción y comportamientos de la población*⁹ (Meira et al. 2021). The questionnaire was carefully crafted to facilitate a longitudinal comparison with previous public opinion studies. It included specific questions addressing the unique context of the first months of 2020, influenced by events such as COP25 in Madrid, heightened public attention to the climate crisis spurred by Greta Thunberg's impact, and the COVID-19 pandemic. Noteworthy progress in Spain during this period included the government's initiatives to declare a climate crisis emergency and initiate the drafting process for the *Climate Change and Energy Transition Law*, which was subsequently approved in May 2021.

2.1.3. Opening new paths: Internationalization of the research line (2012-2022)

The third phase of RESCLIMA played a vital role in its consolidation and methodological refinement. This stage saw the expansion of the research line on an international scale, with a heightened focus on the educational system as a critical domain for the transmission of scientific culture. The research conducted during this period was structured around three consecutive national competitive projects, secured through the Spanish Government's R&D&I plans.

The first research project funded by state resources was granted in 2012, covering the three-year span from 2013 to 2015. Titled *La relación entre ciencia y cultura común en las representaciones sociales del cambio climático: Aportes a la educación y comunicación sobre los riesgos climáticos*¹⁰ (**RESCLIMA**), the project concentrated on exploring the social representations of university students, a population group with a privileged situation in relation to scientific culture. One of the pivotal areas of investigation was the examination of how the affiliation of university degrees to the fields of social sciences and humanities versus the physical and natural sciences and technologies influenced social representations of climate change.

The advancement of this project propelled the research line to an international level. A network was established, integrating research groups and scholars from universities and organizations across four Ibero-American countries: Brazil, Spain, Mexico, and Portugal. Their shared interest lay in investigating the social dimensions of climate change, primarily with the goal of addressing this global crisis through the lenses of education and communication. This process of

⁸ Spanish public foundation aiming to preserve biodiversity and ecosystems and promote a change in economic, social, and cultural models.

⁹ In English, it can be translated as: Spanish Society and Climate Change: Perception and Behavior of the Population.

¹⁰ In English, it can be translated as: The relationship between science and common culture in social representations of climate change: Contributions to climate risk education and communication. Project funded by the Ministry of Economy and Competitiveness. Code: EDU2012- 33456.

internationalization facilitated the inclusion of a cross-cultural perspective in studying the social representations of climate change, allowing exploration of both universal and idiosyncratic aspects. In this phase, four Spanish institutions, in collaboration with the USC—Universidade da Coruña, Universidad Autónoma de Madrid, Universidad de Granada, and Universidad de Valladolid— joined forces with three foreign universities: Universidad Veracruzana (Xalapa, Mexico), Universidade Federal do Paraná (Curitiba, Brazil), and Universidade do Minho (Braga, Portugal).

The second project, titled *La alfabetización climática en Educación Secundaria: análisis transcultural de las representaciones sociales del Cambio Climático en estudiantes, docentes y material curricular*¹¹ (**RESCLIMA-EDU**), unfolded between 2016 and 2019. This initiative not only sustained but also deepened the transnational and transcultural perspective of RESCLIMA. In addition to the aforementioned institutions, the Italian Centre for Environmental Education Research of the Università degli Studi di Parma (Italy) and the Universidade de Aveiro (Portugal) joined the collaborative efforts.

On this project, the research focused on the integration of the climate crisis into the official curricular frameworks of the involved countries, with a specific emphasis on its treatment in secondary education. The particular interest in this educational stage stems from the assumption that students in this phase possess the cognitive and moral maturity levels necessary to comprehend and evaluate the complexity of the climate crisis. Additionally, secondary education offers adolescent students their initial opportunity in their academic journey to delve into climate science in some depth. Notably, for many students, compulsory secondary education may represent their final chance to do so. A mixed methodological design was developed to address these considerations, relying on the triangulation of quantitative and qualitative methods and techniques such as questionnaires, semantic differential scales, and content analysis in curricular materials. The objective was to comprehensively understand how the curriculum incorporates and evolves concerning climate change. Simultaneously, the study assessed how climate change is addressed in textbooks, which serve as the primary didactic resource in formal educational settings.

Finally, the project entitled *Educación para el cambio climático en educación secundaria: investigación aplicada sobre representaciones y estrategias pedagógicas en la transición ecológica*¹² (**RESCLIMA-EDU2**) was initiated in 2019 and scheduled to continue until December 2022. For the first time, the administration of this project was collaboratively managed with the Universidad de Granada, a step taken to decentralize the coordination of the RESCLIMA network. Concurrently, the national network expanded with the involvement of researchers from the Universitat de les Illes Balears and the Universitat Autònoma de Barcelona.

In this third project, which maintained an in-depth exploration of the social representations of secondary school students (aged 12-16), emphasis was placed on analyzing curricular practices in relation to climate change at this educational stage. Additionally, the project explored the design and experimentation of innovative educational resources and processes, aiming to

¹¹ In English, it can be translated as: Climate Literacy in Secondary Education: cross-cultural analysis of the social representations of Climate Change in students, teachers and curricular material. Project funded by the Ministry of Economy and Competitiveness. Code: EDU2015-63572-P.

¹² In English, it can be translated as: Climate change education in secondary education: applied research on representations and pedagogical strategies in ecological transition. Project funded by the Ministry of Science, Innovation and Universities. Code: RTI2018-094074-B-I00.

position the climate emergency as the driving force behind educational action. A noteworthy aspect was the execution of a research-action experience involving teachers from compulsory secondary education centers. The objective was to design innovative teaching-learning processes centered on the climate emergency, engaging the entire educational community, including teachers, students, families, and local governments. It is important to highlight that the project had to adapt its initially proposed design due to the application of health emergency restrictions in response to the COVID-19 pandemic in 2020.

Concerning the international projection and the application of a cross-cultural analysis perspective that has characterized RESCLIMA, this phase underscored the commitment to decentralize and broaden the scope of national and international working groups. The adaptation of designs and instruments to diverse cultural and educational contexts, the training of participating teaching and research staff, and the refinement of project methods enabled collaborating institutions to expand the project's horizons. This evolution and consolidation are evidenced by various indicators:

- Ongoing adaptation of the RESCLIMA questionnaire to explore social representations in student groups from different levels and educational systems. This phase involved the incorporation of new items to explore emotional responses to the climate emergency.
- The Institute for Research in Education at the Universidad Veracruzana (Mexico), a longstanding partner of RESCLIMA, adapted the project's designs and instruments to suit its contextual reality, initiating new lines of research related to the perception of climate change risks and the reduction of community vulnerability to its consequences.
- Protocols for assessing the convergence between climate policies and education policies were applied more comprehensively. This involved strengthening the nascent incorporation of the climate emergency (beyond climate change) in school curricula and textbooks, transferring models developed for the Spanish context to other countries.
- The identification and analysis of good educational practices linked to climate change continued through an ethnographic approach.

Finally, in this phase, the number of international collaborators integrating the lines of educational research and action associated with RESCLIMA in their academic and research contexts increased. Researchers from the Universidad Autónoma de la Ciudad de México, Universidad Nacional Autónoma de México, Universidad Distrital Francisco José de Caldas (Colombia), Consejo Nacional de Investigaciones Científicas y Técnicas (Argentina) and Université du Québec à Montréal (Canada) have collaborated during this development phase.

2.1.4. Where are we heading next? (2022-Present)

In 2023, a new project has secured funding under the state research plan, titled *Educar a tiempo ante la emergencia climática y la transición socioecológica: realidades y desafíos para la educación en contextos escolares y sociales*¹³ (RESCLIM@TIEMPO). Once again, this project is dedicated to collaborative research in coordination with the Universidad de Granada. The RESCLIM@TIEMPO project maintains a commitment to cross-cultural analysis, with international collaboration from six European and American countries (Brazil, Canada, Colombia, Italy, Mexico,

¹³ In English, it can be translated as: Educating in time in the face of the climate emergency and the socio-ecological transition: realities and challenges for education in school and social contexts. Project funded by the Ministry of Science and Innovation. Code: PID2022-136933OB-C21.

and Portugal) and the possibility of incorporating new countries into the project during its execution.

In this new stage, the exploration of the social dimension of climate change is further expanded by incorporating colleagues from another research line within the SEPA-interrea research group. Their research focuses on the theme of educational and social times, delving into the analysis of school time, personal, family, and community leisure time, as well as the challenges of reconciling everyday life and its impact on overall quality of life. The synergy between these two research lines introduces fresh scientific challenges associated with the role of *time* as a determining factor in the climate emergency and socio-ecological transition. Moreover, the empirical exploration extends significantly to contexts beyond the curriculum by addressing leisure contexts. The coordination of the research lines aims to strengthen the exploration of social representations of the climate emergency and its temporal dimensions, pivoting on the fields of education for climate change and leisure education. Figure 3 illustrates the primary research lines that converge in RESCLIM@TIEMPO, contributing from their respective domains to the study of educational responses to the challenge of the climate emergency.



Fig. 3. Simplified outline of the research lines converging in RESCLIM@TIEMPO

Educational time and social time are subject to varied perceptions and representations among the involved social and institutional agents, including teachers, students, families, and citizen groups. These perceptions are influenced by the daily circumstances wherein these agents must reconcile individual responsibilities with family, recreational, transport, rest, and other time-related considerations. Consequently, delving into the investigation of their daily realities is crucial to generate alternatives aimed at education. This involves a comprehensive and inclusive approach that spans generational aspects and considers various stakeholders, such as the education system, families, public and private facilities, and services.

While previous projects focused on analyzing social representations and the influence of common culture versus scientific models among middle and high secondary school, and university students, addressing aspects related to territorial, curricular, and personal/identity spheres, this new stage introduces the dimension of *time*. The focus now extends to teachers, families, entities, and the community, adopting a more qualitative approach. It also broadens the quantitative exploration and hypothesis testing to include practicing and trained teachers of compulsory secondary education and initial vocational training.

The overarching goal remains the urgent need to accelerate educational responses to the climate emergency. Bearing this objective in mind, a series of goals have been formulated to be addressed during the implementation of the project: (i) Investigate ongoing educational practices and their contribution to expediting responses to the climate emergency. (ii) Assess the

appropriateness of current crisis education approaches in driving the socio-ecological transition, identifying potential modifications to enhance their socio-cultural impact. (iii) Develop strategies to integrate diverse educational practices in school, community, and social settings to hasten the socio-ecological transition in various social contexts and times, encompassing family and leisure settings. (iv) Research in disruptive training with technological support that encompasses emotional, attitudinal, behavioral, and cognitive dimensions. (v) Define the pedagogical quality requirements that educational programs, resources, and materials must meet to achieve effective and tangible socio-ecological changes, both at local and global levels.

2.2. RESCLIMA in numbers

2.2.1. Scientific production

The findings of RESCLIMA have been widely shared through a range of publications, including articles, books, book chapters, proceedings, Master Theses, PhD Theses, and monographs in influential journals dedicated to the intersection of education and climate change. The project's robust scientific activity and the growth of its affiliated research group network have contributed to a consistent upswing in scientific output over its course (See Figure 4).

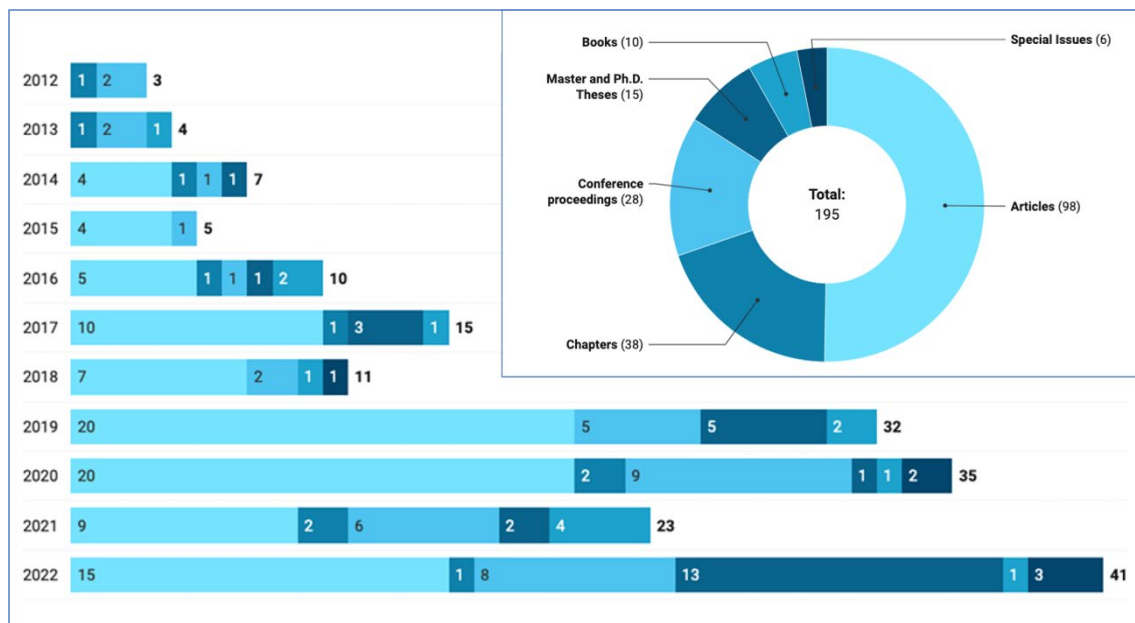


Fig. 4. Scientific publications timeline

Among RESCLIMA's scientific output, special attention should be given to five monographs addressing education and climate change in both national and international education journals: (1) *Research Agendas to Adapt or Mitigate Climate Change: Who owns this area of Knowledge?* in *PsyEcology* (Meira et al. 2018); (2) *Education for a Culture of Sustainability: Eco-citizenship, Public Policies, and Social Participation* in *Pedagogía Social. Revista Interuniversitaria* (Meira and Torales 2020); (3) *Education and Communication for Climate Change* in the *Revista Mexicana de Investigación Educativa* (Gutiérrez et al. 2020); (4) *Environmental Education and Climate Justice* in *Revista Ambiente & Educação* (Pedruzzi et al. 2022); (5) *Climate Emergency and Education* in *Revista Galega de Educación* (Meira and Pardellas 2022).

In terms of the scientific and academic impact of this production, it is noteworthy that the research results have been incorporated as reference articles in the technical document of Group III of the 5th IPCC report (2014), emphasizing the significance of social dimensions in Climate

Change mitigation (cited on pp. 156 and 267). Moreover, at the governmental level, RESCLIMA's findings have informed the diagnostic processes and the formulation of environmental and educational policies related to climate change. These contributions are documented in the Monitoring Reports of the *National Plan for Adaptation to Climate Change*, the formulation of the *Environmental Education Action Plan for Sustainability (PAEAS)* in 2021, and in the reports submitted by the Spanish Government to the UNFCCC from 2009 to 2022.

2.2.2. Academic dissemination

In addition to dissemination through scientific publications, RESCLIMA has maintained an intense activity of dissemination and knowledge transfer in the national and international academic context (see Figure 5). This activity has focused on two audiences: (1) The scientific and academic community, through communications, posters, thematic tables and guest speeches at conferences and seminars; (2) Undergraduate, Master and PhD students at Spanish and foreign universities, through training courses, summer courses, workshops, educational outings and student meetings, among other socio-educational initiatives.



Argentina (1), Brazil (18), Canada (11), Cape Verde (1), Chile (2), Colombia (3), Costa Rica (1), Czech Republic (2), Dominican Republic (1), Guinea-Bissau (4), Mexico (37), Morocco (3), Mozambique (1), Portugal (22), São Tomé and Príncipe (3), Spain (93), Sweden (3) and USA (3)

Fig. 5. Academic dissemination carried out within RESCLIMA framework involves a wide range of initiatives worldwide, such as invited lectures, conference presentations, and the organization of scientific and outreach events. Additionally, the research line includes the provision of courses and workshops for graduate and PhD students.

Among these dissemination activities, a central aspect of the research line is the coordination of its members through the regular organization of the **RESCLIMA International Seminar**. Prior to these international events, from 2005 to 2008, four editions of the *Seminario Compostela de Investigación en Educación Ambiental e para a Sostenibilidade*¹⁴ took place. This initiative emerged from the need identified by the Inter-University PhD Program in Environmental Education¹⁵ to convene periodic meetings. These gatherings aimed to facilitate scientific exchange among emerging researchers, fostering the sharing and feedback process through a structured evaluation of the PhD research lines and projects within the participating universities.

¹⁴ In English, it can be translated as: Compostela Seminar on Research in Environmental Education and Sustainability.

¹⁵ Doctoral program (*Doctorado Interuniversitario en Educación Ambiental*) organized by nine Spanish universities -including the USC- and the CENEAM, initiated in the academic course 2000/2001 and lasting until 2012.

Another significant precursor was the organization of the *Seminário Internacional sobre Educação, Meio Ambiente e Mudanças Climáticas*¹⁶ in 2013. Co-hosted in Curitiba (Brazil) by the Education, Environment, and Society group of the Universidade Federal do Paraná and the SEPA-interea group, this seminar received support from the *Spanish-Brazilian Inter-University Cooperation Program*. The seminar had dual objectives: first, to share research advancements on the social and cultural dimensions of climate change in Spain and Brazil; and second, to engage in a dialogue with key stakeholders in society and institutions in the State of Paraná (Brazil). The aim was to explore the potential role of education in shaping and implementing public policies in response to the climate crisis.

The inaugural international seminar held under the RESCLIMA banner, titled *Investigar el cambio climático en la interfaz entre la cultura científica y la cultura común*¹⁷, took place on December 2014, at the Faculty of Education Sciences of the USC. The event brought together experts from Brazil, Spain, Mexico, and Portugal. Conceived as an academic forum within the RESCLIMA research line, the seminar aimed to investigate into the interactions between scientific culture and common culture. The overarching goal was to contribute to the development of more effective educational and communication programs and initiatives related to climate change. The first seminar specifically explored how scientific education influences the formation of social representations of climate change among various student groups, primarily university students. A comparative perspective underscored that the structures and content of representations related to this scientific concept showed minimal divergence among students with varying access to climate sciences. This observation indicated that some lay conceptions regarding the causes and consequences of climate change are shared even by those who possess, or should possess, fundamental scientific knowledge about the physics and chemistry of the atmosphere and its relationship with climate dynamics.



Fig. 6. Posters from the I, IV, and V RESCLIMA International Seminars

Following this inaugural seminar, five additional scientific meetings occurred biennially; three at the USC, one at the Universidad Veracruzana, and the fifth, and most recent, at the Universidad de Granada. These successive RESCLIMA Seminar editions addressed various topics associated with: the evolution of the research line, encompassing the treatment of climate change and the climate emergency in official curricular frameworks; the analysis of the processes shaping social representations of climate change across different population groups; the identification of

¹⁶ In English, it can be translated as: International Seminar on Education, Environment and Climate Change.

¹⁷ In English, it can be translated as: Researching climate change at the interface between scientific culture and common culture.

cultural and psychological barriers to acknowledging climate change as a socially relevant issue; the exploration of the link between knowledge (scientific and common) and individual and collective action; the examination of the motivations and organizational dynamics of pro-climate movements; and the formulation of a basic and applied educational research agenda to support more effective climate education, among other themes.

2.3. The companions along the journey

2.3.1. Overview of the collaborations

As previously mentioned, RESCLIMA has fostered numerous collaborations with a diverse array of institutions, networks, groups, cooperatives, and entities involved in research, social action, and education. Within this rich tapestry of partners, academic and research collaborations have flourished with 23 universities, 7 research centers and groups, and 7 academic networks and societies (Fig. 7). These collaborations have materialized through various activities, including co-supervision of theses, student and researcher exchanges, joint participation in projects, organization and involvement in academic, scientific, and educational events, as well as the development of training programs, among other initiatives.

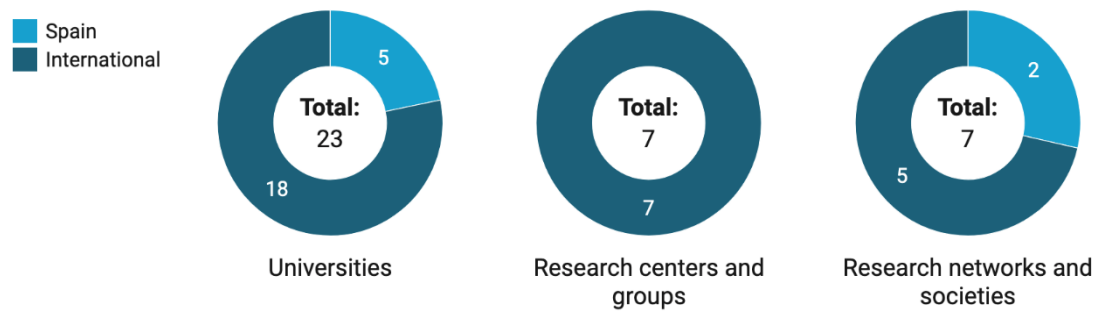


Fig. 7. Academic and scientific collaborations

Moreover, extending beyond the academic realm, RESCLIMA has formed collaborations with public and private social entities and institutions, encompassing town councils, state offices and agencies, non-profit cooperatives, collectives and associations, companies, and foundations, among others. These partnerships have facilitated the outreach of RESCLIMA to diverse audiences through alternative formats and various types of actions (Fig. 8).

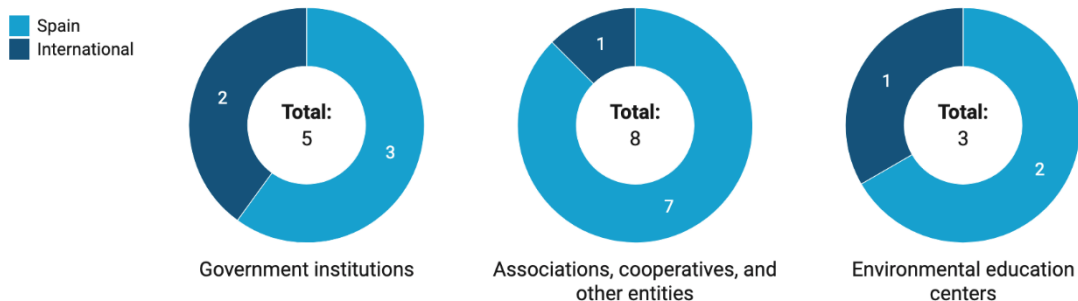


Fig. 8. Collaborations beyond the academic sphere

These collaborations have played a pivotal role in shaping reports, plans, and proposals for environmental education, influencing the formulation of educational and environmental policies

at both the state and autonomous community levels. Notably, the collaboration with the OECC has been instrumental in RESCLIMA inception and development, fostering the growth and broadening of its research endeavors and the application of its findings. This partnership has effectively bridged scientific work with society, contributing research outcomes for the preparation of reports presented by the Spanish Government at the Conference of the parties (COP) of the UNFCCC and guiding the formulation of the *Spanish Climate Change and Clean Energy Strategy* for 2020.

In the realm of scientific knowledge transfer and societal engagement, several members of the RESCLIMA team have served as expert advisors in crafting the *Environmental Education Plan for Sustainability* (2021-2025). This collaborative effort emerged as a joint initiative of the Ministry of Ecological Transition and Demographic Challenge and the Ministry of Education and Vocational Training, taking shape during the 2019-2020 period with the coordination of groups specializing in environmental education professionals, equipment and non-university education, and educational community. Presently, members of RESCLIMA continue to contribute to the monitoring of this plan, collaborating with the commissions established for this purpose by the CENEAM. Furthermore, at the local level, collaboration agreements have been established between RESCLIMA and the municipal governments of Santiago de Compostela and Donostia/San Sebastián. These agreements aim to implement climate education initiatives targeting adult audiences within the framework of municipal socio-cultural centers. These initiatives are rooted in the knowledge generated through scientific studies conducted within the project.

2.3.2. Network participation

As previously mentioned, RESCLIMA is closely linked to the ongoing activities of the Permanent Seminar on Responses from Education and Communication to Climate Change promoted by CENEAM. This seminar, in operation since 2004, functions as a networking model, characterized by its diverse membership spanning the business sphere, environmental movements, academic and scientific realms, and public administrations. Many ideas and concerns that have guided, and continue to guide, RESCLIMA have originated from the collaborative work within this seminar. A noteworthy outcome of this synergy is the publication of the guide *Comunicar el Cambio Climático. Escenario social y líneas de acción*¹⁸. The inception of this guide, as well as the institutional framework enabling its development, emerged from the recommendations of the 2nd Seminar in 2005 (Meira 2008).

RESCLIMA researchers also collaborate actively in the *Rede Lusofona de Educação Ambiental*¹⁹ (**RedeLuso**), established in 2005 in Portugal during the Portuguese Association of Environmental Education (ASPEA) conferences. RedeLuso's primary objectives include strengthening collaborative research, training, and information processes in environmental education, promoting scientific communication on environmental education through educational channels, and fostering lifelong learning that emphasizes the Portuguese-speaking identity²⁰ in the multicultural landscape of environmental education. Notably, RESCLIMA participated in the regular organization of the different editions of the *Congresso Internacional de Educação*

¹⁸ In English, it can be translated as: Communicating Climate Change. Social scenario and lines of action.

¹⁹ In English, it can be translated as: Portuguese-speaking Network for Environmental Education.

²⁰ Galician -the native language of Galicia and official in Galician territory- and Portuguese are variants of the same linguistic diasystem, **configuring a shared cultural framework** in the countries and communities in which both are spoken.

*Ambiental dos Países e Comunidades de Língua Portuguesa*²¹, contributing significantly to its scientific programs and presenting the results of their latest studies.

Within the Portuguese-speaking sphere, RESCLIMA is also an active participant in the *Rede Internacional de Pesquisa em Educação Ambiental e Justiça Climática*²² (REAJA). This network concentrates its educational research and action initiatives on analyzing the unequal social impact of climate change and devising strategies to minimize its effects on the most vulnerable social groups through the development of protective public policies. In 2021, the network involved research groups from 16 universities in five countries (Brazil, Cuba, Mexico, Portugal, and Spain), in addition to four non-governmental and three governmental organizations.

The SEPA-interea research group also plays a dynamic role in the Ibero-American Society of Social Pedagogy (SIPS), demonstrated by organizing the 33rd Inter-University Seminar on Social Pedagogy in 2021 under the theme *Educación Ambiental y Cultura de la Sostenibilidad: construyendo la transición ecológica*²³. At a local level, the membership of the Network of Research in Education and Training for Citizenship and the Society of Knowledge (RINEF-CISOC) is noteworthy. RINEF-CISOC brings together eight research groups from the Galician university system, aiming to contribute to the development of educational research for societal benefit and foster new interpretations of social reality to enhance the quality of education in the service of people's well-being, the promotion of a culture of sustainability, and human development.

2.4. What have we learned?

Several key considerations emerge from the experience gained over the course of this journey with other researchers and research groups regarding the development of enduring projects and research lines:

- A stable and committed working group is indispensable. SEPA-interea research group played a pivotal role in establishing an operational core responsible for managing and organizing the research line. Originating in a local-regional context, the research line extended its reach to national and international contexts.
- Collaborative work networks at local, national, and international levels are paramount. Different tiers of collaboration allowed the consolidation of the research line in various contexts and among diverse audiences, broadening the scope of scientific, academic, and social impact.
- The formation of multidisciplinary and committed teams facilitates access to diverse funding sources, enabling sustained efforts over time and the expansion of collaborative networks. Throughout this journey, funding has been diverse, including public institutions and private companies, foundations, etc.
- The organizational decentralization facilitates the distribution of workloads and diversification of objectives to contextualize mitigation and adaptation responses. An illustrative example is the University of Veracruz in Mexico, which has oriented its work towards education for risk

²¹ In English, it can be translated as: International Congress on Environmental Education in Portuguese-speaking Countries and Communities.

²² In English, it can be translated as: International Research Network in Environmental Education and Climate Justice.

²³ In English, it can be translated as: Environmental Education and Culture of Sustainability: Building the Ecological Transition.

reduction and community resilience, aligning the responses with its specific cultural and geographical context.

2.4.1. A picture of the Spanish society

The series of polling studies conducted within the RESCLIMA framework have provided insights into the representation of climate change in Spanish society, drawing on representative samples of individuals aged 18 and older. One key contribution of these studies lies in the identification of distinct population segments characterized by variations in knowledge, beliefs, assessments, and attitudes toward climate change. This identification carries direct implications for shaping environmental education and communication initiatives aimed at mitigating the causes and minimizing the impact of climate change.

The public surveys conducted between 2008 and 2020 (Meira et al. 2009; 2011; 2013; 2020) enabled the delineation of population segments based on their stances on climate change. Figure 9 illustrates the four primary population groups identified in each study. It is noteworthy that the naming of these groups varies, as the categorization of clusters occurs *post hoc*, reflecting the profiles resulting from each wave rather than being predefined. During the public opinion survey sequence from 2008 to 2012, a significant finding was the rise in social disaffection towards climate change. This shift could be attributed to the impact of the economic crisis, which overshadowed climate concerns amid more immediate social and economic challenges. In the 2012 wave, this trend starts to reverse, with nearly 6 out of 10 individuals falling into the two clusters emphasizing the greatest social relevance of the climate crisis. These clusters include the *worried* characterized by fear of climate change consequences and a tendency toward one-off behavioral changes, and the *alarmed*, exhibiting a higher willingness to mobilize civic action for more robust response policies and to modify lifestyles to reduce greenhouse gas emissions, even if it involves accepting additional costs associated with that transition.



Fig. 9. Segmentation of the Spanish population in relation to climate change in different opinion polls. Adapted from the report by Meira et al. (2021)

The 2020 survey was conducted between March and May of that year, with fieldwork beginning shortly before the declaration of the state of health emergency due to COVID-19 and ending two months after an interruption caused by the more stringent restrictive measures imposed at the outset. This traumatic event experienced by Spanish society undoubtedly had a notable effect on the responses obtained. Compared to previous waves, the differences between clusters are more subtle and less marked in the 2020 wave, mainly between the *committed*, *worried* and *hopeful* groups. This homogeneity indicated that the climate crisis had begun to penetrate

Spanish society to a greater extent and with greater intensity (more relevance and significance). This result was in line with the momentum of the climate crisis as a public priority in recent years, mainly since the achievement of the Paris Agreement in 2015 and the social and media impact of the social movements focused on the climate crisis that emerged in 2018 and 2019. As a result, *skeptical Spain*, the group that gives the least relevance to climate change and the least predisposed to take highly committed pro-environmental actions, seemed to be losing social weight. However, one of the greatest findings refers to the largest group, characterized as *concerned Spain*, because it shows a large mismatch between its concern about the risks posed by climate change (a high valuation of its threat potential) and its reduced predisposition to change its attitudes and behaviors. The continuity over time of this population group is verified by examining the results of the 2012 wave, which also showed the existence of an aggregate population with a similar profile.

2.4.2. Unraveling the social dimension of climate change

During the 2012-2022 period, within the framework of the projects granted by the Spanish State, specific studies have been carried out with samples of secondary and university students, focusing on the analysis of social representations and the weight of common culture against the possibilities of access -curricular and extracurricular- to the evidence and conclusions derived from the diagnosis carried out by the climate sciences. The main conclusions drawn from the studies carried out in this line of research are listed below:

- The existence of cross-cultural patterns in social representations of climate change is confirmed, associated with the combination of cognitive-internal processes (which individually process new scientific information or information related to the aim of scientific representation) and social-external processes (in which that information is mediated and interacted upon). This conclusion shows that the theory of social representations is a valuable methodological tool for analyzing and understanding how contemporary societies shape the threat of climate change, integrate it into the framework of common culture, and consequently assess its risks and guide its behavior.
- The threat potential that people attribute to climate change is relatively low, in contrast to the high degree of scientific consensus on the risks it poses and the urgency of action. This mismatch is a major challenge for social research and climate change education.
- Social representations of climate change are built on pre-existing representations of environmental issues (ozone layer depletion, acid rain, generic conceptions of pollution), with previous social representations being *recycled* to represent climate change as a new aim. Likewise, previous representations are also altered, constituting a key reversal process in the construction of the common culture.
- Climate change is not present in the curricular frameworks of Spanish secondary education as a social challenge that requires an urgent and structural response. The official curricular frameworks and the educational materials that develop them do present content on climate change, but they are associated with the physical-natural sciences and pay little attention to the social dimensions of the problem (ethical, emotional, economic, social, cultural), and they do not relate to each other and do not facilitate the problematization of the climate crisis. In a negative symmetry, the educational dimension occupies a secondary role in climate change policy responses in all national and international contexts explored in RESCLIMA. Furthermore, most of the programs geared towards the education system take a scientific literacy approach, with the social dimensions taking a back seat. Training experiences directly related to climate change are specific within the education system and do not generate significant changes in the

social representations of climate change. This shortcoming is more pronounced in secondary education.

- University students show similar results in the mastery of climate science as those in compulsory secondary education and baccalaureate, so that university education does not seem to include the topic of climate change in its contents in a relevant way. It can be concluded that the educational system does not have a significant influence on the social representations of climate change in the student body, being easily penetrated by the profane beliefs and theories cultivated in common culture.

- Traditional media are the main sources of scientific information on climate change, although digital media are gaining more and more weight among teenagers and young people. The media do not limit themselves to conveying scientific information on climate change, but also transpose the common culture that is being built around the same object. Audiovisual globalization is forging a homogeneous cross-cultural representation of climate change that is evident in the public discourses and iconography on climate change that predominate in the media and social networks.

- Personal assessment of climate change policy responses show particularities that vary according to gender, age, political position, religion, social status, among other socio-demographic variables. This allows us to speak of social representations in the plural, although a central core can be identified that gives them a certain cohesion and universality. A common pattern is that policies and response measures tend to receive greater social support when they do not imply significant changes in existing lifestyles, while those that require major changes in food or energy consumption patterns tend to receive minority support.

- Climate change is perceived as a distant threat in time and space, with a similar pattern in all the countries and groups studied, considering it to be important but of little relevance to day-to-day life, i.e., judging that there are more pressing problems in the short and medium term. However, as discussed in the previous section, the public relevance of climate policies and social movements is increasing the consideration of climate change as a priority problem for society.

2.5. Transferring knowledge out of the academia

In recent years, RESCLIMA has intensified its actions aimed at instrumentalizing the applicability of the knowledge generated within the framework of the project so that it can be used by society to promote policy responses to mitigate the causes and minimize the consequences of anthropogenic climate change. Many initiatives have been carried out along these lines, such as the development of teaching materials, the design and implementation of community education activities, in-service teacher training and participation in the creation of theatrical products to communicate the climate emergency. These initiatives have been characterized by diversifying the usual avenues of academic transfer to have a greater and more relevant impact on the social contexts to which we belong, and which are the source of our research.

2.5.1. Educational resources

Among the educational resources produced by the group, the publication in 2011 of the guide entitled *Conoce y valora el cambio climático. Propuestas para trabajar en grupo*²⁴, aimed at both secondary school students and adults, which proposes activities with a group and pedagogical

²⁴ In English, it can be translated as: Know about and appraise climate change. Proposals for group work.

perspective to address issues related to the social and human dimensions of climate change. It has been designed with the participation of experts in environmental education and communication integrated in the Permanent Seminar on Responses from Education and Communication to Climate Change of the CENEAM (Meira 2011). This guide has subsequently been translated or adapted for use in the Portuguese and Mexican contexts thanks to the collaboration with the ASPEA in 2012 and the Universidad Veracruzana in 2018, respectively.



Fig. 10. Logos of some of the projects that have sprouted from the research conducted at RESCLIMA

Another of the most noteworthy resources saw the light of day in 2022, where a course was designed for the ongoing training of primary education teachers entitled *Las escuelas actúan: la emergencia climática en Educación Primaria*²⁵. This online course was integrated into the offer of the National Institute of Educational Technologies and Teacher Training (INTEF)²⁶, under the Ministry of Education and Vocational Training of Spain. The approach of this course aims to highlight the need to incorporate climate emergency into the curricular praxis, as one of the priorities of the new Spanish Organic Law on Education (LOMLOE); as well as to contribute to the ongoing training of primary education teachers in climate change education by using learning situations designed from problems linked to the social and environmental realities of the educational centers in which they teach.

2.5.2. From transition towns to transition universities: USC en Transición

*USC en Transición*²⁷ was an initiative that sought to adapt the philosophy of the transition movement to the university context. This movement aims to organize community processes to address the effects of climate change, prioritizing the search for methods and actions that help to reduce dependence on fossil energy and reduce the ecological footprint to achieve higher levels of energy autonomy and increase self-sufficiency. This transition university initiative began in the 2010/2011 academic year, with the main aim of energizing the USC university community to implement small-scale changes that would contribute to promoting more sustainable lifestyles in and from the university space to reduce the university's ecological footprint and

²⁵ In English, it can be translated as: Schools Act: The Climate Emergency in Primary Education.

²⁶ INTEF (*Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado*) is a Spanish governmental body responsible for the ongoing training of teachers in non-university educational stages with the aim of improving teachers' professional skills.

²⁷ In English, it can be translated as: USC in Transition.

debt. However, in the 2014/2015 academic year the initiative lost momentum and was cancelled due to lack of institutional and financial support from the university government.

Based on the experience of revitalizing the transition university project at USC, and thanks to funding from Fundación MAPFRE, the project entitled *Communities in Transition and Environmental Education project. Analysis of three pioneering universities: Santiago de Compostela, Minho and Edinburgh* was carried out in 2013. Thanks to this project, a cross-cultural study was undertaken in these three universities, pioneers in the implementation of initiatives inspired by the principles and methodologies of transition communities. Like the USC experience, the transition initiatives of the Universidade do Minho and the University of Edinburgh did not survive beyond 2015, which is a fairly consistent indication of the existence of a *glass ceiling* in university environmental sustainability strategies, showing the difficulty of subverting the established academic, corporate, organizational and cultural structures and dynamics that perpetuate unsustainability, beyond occasional adjustments in secondary aspects of management (González-Gaudio et al. 2015; Pardellas et al. 2017).

2.5.3. Descarboniza! Que non é pouco...

*Descarboniza! Que non e pouco...*²⁸ is a socio-educational intervention program that began in 2017 through a collaboration agreement with the city council of Santiago de Compostela to launch a pilot experience of community environmental education focused on climate change in three socio-cultural centers owned by the municipality. This initiative was created with the aim of organizing and energizing groups of adults to collectively reflect on climate change and try to establish meaningful connections between this issue and everyday life at a personal and community level. Through a series of participatory sessions, the aim is to promote the transition to low-carbon lifestyles, involving the members of the group in the search for solutions in which they are the leading players.

The program, which is still ongoing, has enabled the creation and dynamization of dozens of groups and hundreds of participants, with a remarkable particularity: it has managed to involve older people, who are rarely the target of environmental education actions and initiatives, in pro-climate actions. In the 2018-2019 academic year, thanks to funding from the *Fundación Biodiversidad*, the city council of Donostia/San Sebastián joined the initiative to work in parallel with that of Santiago de Compostela, seeking to integrate education for climate change mitigation and adaptation into the socio-cultural and community leisure policies and facilities of both municipalities (Iglesias et al. 2020; Pardellas and Meira 2020). Currently, the program is also being implemented in the Autonomous Community of La Rioja through the *Environmental Education Plan for Sustainability* of this Spanish region.

Descarboniza! Que non é pouco... can be considered a good practice, with a methodological model and teaching materials that can be easily transferable and adaptable to other socio-community contexts. The program continues to grow thanks to *Feitoría Verde*²⁹, a non-profit cooperative that currently manages this program and is made up of people trained in RESCLIMA.

²⁸ In English, it can be translated as: Decarbonize! 'Cause that's no small feat... It comes from a wordplay using the title of a surrealist comedy film called *Amanece que no es poco* (1988), directed by Jose Luis Cuerda.

²⁹ Feitoría Verde is a non-profit cooperative working in the field of environmental education and sustainability culture. For more information, see: <https://feitoriaverde.com/>

The close collaboration of the SEPA-interea group with this cooperative has allowed the seed of *Descarboniza!* to lead to new initiatives as described below.



Fig. 11. Projects promoted by Feitoria Verde arising from *Descarboniza! Que non é pouco*.

One of these initiatives is *Del Des-Equilibrio a la Des-Carbonización*³⁰ which, in 2021, still immersed in the health crisis caused by COVID-19, proposed to address the health and climate crises simultaneously. This educational proposal is based on an intergenerational approach to simultaneously address the needs and interests of young people and the elderly, in an intervention that combines emotional education with environmental education. The aim of the project is to promote joint decarbonization actions between young people and the elderly that have a projection in the immediate social context.

Another example is the *Mulleres fronte a emerxencia climática*³¹, created in 2022 from the need to address the climate emergency by articulating a non-mixed space with older women interested in the intersections between the climate crisis and gender equity issues. This initiative is articulated through an eco-feminist ethical-political framework that seeks to make visible that gender and climate emergency cannot and should not be understood separately.

2.5.4. Dramatizing the climate emergency: As Fillas Bravas e o mito de Casandra

From the experiences gathered in the social participation groups of the program *Descarboniza! Que non é pouco...*, whose composition included a large majority of older women, the idea was launched to create *As Fillas Bravas e o mito de Casandra*³², a play with a touch of humor and female empowerment in which three older women try to understand climate change and confront it by applying their life experience linked to the rural world. In the framework of the RESCLIMA-EDU2 project, this initiative was co-produced by the Galician theatre company Chévere and SEPA-interea, which participated in the design and development of the script. It was launched in September 2020 - in the midst of the pandemic emergency - and has since been performed in more than 40 Galician towns and cities (Iglesias et al. 2022).

The play is based on the myth of Cassandra, the Trojan princess characterized in Greek mythology as having the gift of knowing the future, but who is punished by Apollo so that no one believes in her predictions. This myth adapts very well to climate change today, since, despite warnings from the scientific world about its consequences and associated risks, society has not yet adopted responses proportional to the seriousness of the threat. The play incorporates a gender perspective through the characters of three empowered, autonomous, creative women involved in the transformation of the rural community to which they belong in the dramatic fiction.

³⁰ The project name comes from a wordplay, but it can be translated in English as: From Im-balance to De-carbonization.

³¹ In English, it can be translated as: Women facing the climate emergency.

³² In English, it can be translated as: The Brave Daughters and the myth of Cassandra.

2.5.5. Do desequilibrio aos sonhos compartilhados, narrativas de futuro sostenible

The educational initiative *Do desequilibrio aos sonhos compartilhados, narrativas de futuro sostenible*³³ aims to stimulate the imagination about sustainable futures that can inspire the necessary changes in the face of the climate emergency. It was created from the collaboration between Feitoria Verde, the theatre group Chévere and the RESCLIMA team. This experience took place between 2021 and 2022 and was funded by the Daniel and Nina Carasso Foundation through a tender call.

Based on the premises that it is urgent to take the initiative in the fight against climate change and that it is necessary to carry out educational interventions with immediate impact, a creative methodology has been used to stimulate the creation of stories that allow possible scenarios of social transformation to be visualized and anticipated in the participants. This initiative also uses an intergenerational perspective to build narratives about possible sustainable futures that combine the energy of pro-climate youth movements with the knowledge and experience of older people about low-emission practices. This strategy seeks to promote the imagination of utopian scenarios that serve to trigger the cultural changes demanded by the environmental challenges that societies are facing. This approach aims to improve the results of conventional educational activities promoted in environmental education, which are not enough to build alternative narratives in terms of sustainability.

2.6. Conclusions and future perspectives

This chapter characterized the inception and evolution of a research line focused on providing educational and social responses to the pressing issue of the climate emergency. It is crucial to underscore the socio-educational significance that higher education institutions hold in the quest for effective mitigation and adaptation strategies to climate change, with emphasis on the imperative for research outcomes to resonate across diverse audiences. As centers of education and research, they possess the means, knowledge, and human resources needed to guide and accompany society in the urgent transition towards decarbonization. This is the overarching goal that encouraged the creation of RESCLIMA, which the research line still persistently aims to pursue, especially in the current critical juncture.

Nowadays, RESCLIMA immediate actions revolves around the thematic convergence of two primary research strands within the SEPA-interea group: the core work of RESCLIMA, focused on educational responses to climate change, and the exploration of the intersection between educational and social timeframes. This upcoming phase will be articulated through the research project RESCLIM@TIEMPO, as detailed in Section 2.4 of this chapter. However, regardless of ongoing research, taking measures to combat climate change is more urgent than ever. RESCLIMA takes on the necessity of contributing to the design of better informed and more effective educational responses - especially in the short term - to what probably is, in our view, the greatest socio-environmental challenge facing humanity during this century and, possibly, for centuries to come. After repeated warnings about the insufficiency of current climate policies, which divert us from the route that would allow us to meet the modest goals of the 2015 Paris Agreement by the end of the century; and given the evidence that the most negative consequences of climate change are accelerating and intensifying, at RESCLIMA we intend to continue contributing, to the extent of our possibilities, to generate basic and applied knowledge

³³ In English, it can be translated as: From instability to shared dreams, narratives towards sustainable futures.

so that educational responses to climate emergencies have a better pedagogical and social basis and can be more effective.

From this standpoint, we understand that the fundamental imperative in the short term is to *accelerate*, both in terms of providing support and instigating social and pedagogical momentum for mitigation and adaptation policies. Both the mitigation pillar and the adaptation pillar, also viewed through the lens of climate justice, necessitate a cultural shift where citizens actively participate, supporting the implementation of profound changes in lifestyles and in the dominant forms of production and consumption associated with these lifestyles. This transition must be more extensive and rapid in industrialized societies, with proportionally higher greenhouse gas emission rates, which must, consequently, reduce them to a greater extent. The pressing need to swiftly reduce emissions should elevate the climate emergency to a key educational priority. This might involve considering the implementation of a *climate emergency curriculum* to expedite our response, as suggested by González-Gaudiano et al. (2020). Among other courses of action, placing the climate emergency at the core of curricular practices and social education programs in all educational contexts and settings is crucial. Promoting climate literacy is imperative, especially to qualify strategic agents (technicians, professionals, decision-makers). However, this effort remains insufficient without civic and social cooperation that prioritizes educational goals over climate priorities, aiming to reconcile both of them.

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