

# Ideological Knowledge Representation: Framing Climate Change in EcoLexicon

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## Abstract

Culture is underrepresented in terminological resources and ideology is an especially complicated cultural aspect to convey. This complexity stems from the intertwined relationships among the discourse community of politicians, the media and the general public, as well as their interactions with scientific knowledge. Nevertheless, terminological resources should provide the necessary information to understand the political perspective taken in discourse on scientific issues with a high political profile. As in all specialized domains, environmental concepts and terms are subject to dynamism and variation (León-Araúz, 2017). Cognitive term variants (e.g., *climate change*, *climate crisis*) are of particular interest because of their presence in political discourse and their potential to influence climate actions. They can be used to reflect multidimensionality, imprecision or ideological attachment. This paper describes a method based on framing in Communication Studies to extract ideological knowledge from corpora. We used Spanish and English parliamentary debates (ParlaMint 2.1) and annotated the interventions that included a term variant of *climate change* according to an adapted version of the frames proposed by Bolsen and Shapiro (2018). The results showed how climate change discourse changes across the ideological spectrum and we give a proposal on how to represent that knowledge in an environmental TKB on the environment.

**Keywords:** ideology, framing, knowledge extraction and representation, climate change

## 1. Introduction

EcoLexicon<sup>1</sup> is a multilingual and multimodal terminological knowledge base (TKB) on the environment (Faber, León-Araúz and Reimerink, 2016; León-Araúz, Reimerink and Faber, 2019). Although TKBs are supposed to represent objective scientific knowledge, environmental concepts and terms are especially affected by dynamism and variation (León-Araúz, 2017). On top of that, certain environmental concepts, such as CLIMATE CHANGE, have a high profile in political and media settings. Although political discourse has not traditionally been considered specialized language, politicians use scientific terms and this can even influence both lay users' and scientists' discourse. For instance, Bush's administration started to use *climate change* instead of *global warming* in order to soften the message (Lakoff 2010). This political strategy also influenced the way in which even scientists referred to the phenomena. Another example is the term *climate emergency*, which is now widely used in the scientific community after the climate emergency declaration in 2019<sup>2</sup>. Therefore, as a descriptive resource, an environmental TKB should provide the necessary information to understand the political perspective taken in discourse on the environment or to choose the most adequate term variant to write or translate an environmental text with a specific ideological goal in mind.

This paper shows how ideological knowledge can be extracted from political discourse and included in EcoLexicon in the concept, graphics and term modules starting from the concept CLIMATE CHANGE. Section 2 summarizes the findings of the ideological knowledge annotation and extraction process where ideological knowledge was extracted from English

and Spanish parliamentary debates (ParlaMint 2.1). Section 3 shows our proposal for the representation of ideological knowledge in EcoLexicon. Finally, in Section 4 conclusions are drawn and future research is discussed.

## 2. Background

### 2.1 Theoretical background

We applied the notions of framing and cognitive term variation to analyze climate change in political discourse. Framing is a fundamental concept in Communication Studies (Stecula and Merkley, 2019) and, in this context, it can be defined as "the process by which people develop a particular conceptualization of an issue and reorient their thinking about an issue" (Chong and Druckman, 2007). For instance, when politicians discuss climate change in the context of economic development, they may frame it through the lens of "economic opportunity" rather than "environmental regulation." This framing strategically shifts the focus from the potential costs and restrictions associated with environmental policies to the economic benefits, such as job creation in renewable energy sectors. Over time, the ways climate change has been framed in the media have changed from the scientific uncertainty and economic costs frames, to scientific consensus and economic benefits frames (Nisbet, 2009; Stecula and Merkley, 2019). Apart from the latter, other frames have emerged that have proven to improve climate change communication to inform the public and engage them for action (Armstrong et al., 2018; Bolsen and Shapiro, 2018). According to Armstrong et al. (2018), climate change communication must focus on: providing more accurate information; adapting the message to the intended audience; frame for solutions; frame for self-efficacy and hope (related to the willingness to engage); and frame for values. Moreover, the *public*

<sup>1</sup> <https://ecolexicon.ugr.es>

<sup>2</sup> [climateemergencydeclaration.org](https://climateemergencydeclaration.org)

*health* and *economic benefits* frames seem useful to engage a wide audience beyond ideological divisions (Nisbet, 2009; Stecula and Merkley, 2019), as both frames make the consequences of climate change tangible and close to home.

Other than general frames, term selection can also reflect different ideologies of the speakers. Especially, cognitive variants are often the result of the cognitive intention of the speaker and may influence the way a concept is perceived by the recipient (Cabr , 2008). They can be used to deliberately reflect multidimensionality, imprecision or ideological attachment. For instance, *climate change*, *climate crisis*, *climate emergency* or *climate breakdown* can all be regarded as term variants of the same concept, each seeking a different reaction. But it could also be argued that they do not always label exactly the same concept. In cognitive variants, conceptual and denominative variation can occur at the same time or be the consequence of the other (Le n-Ara z, 2017).

## 2.2 Ideological knowledge extraction

To analyze climate change in political discourse, we used the English and Spanish parliamentary debates of the ParlaMint 2.1 corpus (Erjavec et al., 2023), which is a collection of 17 multilingual comparable corpora consisting of parliamentary debates. They contain rich metadata about the speaker (e.g. name, gender, date of birth, party), speech (e.g. session), time period (in most cases, from 2015 to mid-2020), etc. We constrained the queries to lower houses and main political parties.

To select the sample, we searched for paragraphs containing the following structures: *climate + noun* in English (e.g. *climate change*, *climate emergency*) and *noun + clim tico* in Spanish (e.g. *cambio clim tico* [climate change], *crisis clim tica* [climate crisis]), since the concept CLIMATE CHANGE is usually conveyed by means of multiword terms which include this modifier in both languages, even though different nominal heads can intervene (Cabezas-Garc a and Le n-Ara z, 2023). We extracted approximately 500 excerpts with a reference to any of the variants of climate change for each language and then annotated them with an adapted version of the climate change communication frames defined by Bolsen and Shapiro (2018, Table 1).

Frame name	Definition	Frame in communication
Scientific consensus/ Uncertain science	Emphasis on science of climate change and the degree with which a consensus exists.	(+) A consensus of climate scientists (97%) believes in human-caused climate change. (-) There is disagreement and debate over the fundamental science among scientists.
Economic consequences	Focus on the economic effects or impacts of climate change or policy action (e.g. growth, prosperity, investments, costs, competition).	(+) Action to address climate change will have positive economic benefits. (-) Action to address climate change will have negative economic consequences.
Environmental	Focus on the	(+) Climate change will

Environmental consequences	environmental effects or impacts of climate change or policy action (e.g. air pollution coastal flooding, extinction of species, droughts, fires).	have net positive effects. (-) Climate change will have negative effects.
Morality /ethics	Focus on the moral/ethical considerations related to action on climate change.	(+) Current generations have a moral obligation to future generations to act.
Disaster	Focus on the catastrophic effects/impacts that will result from climate change; threat appeals.	(-) Climate change will lead to disastrous effects if left unchecked.
Political conflict	Focus on conflict among elites; who is winning or losing the debate.	Stating the political strategy behind policies, the winners/losers, and nature of political debates.
National security	Focus on a threat to energy, water, food security, or to the nation state (e.g. migration).	(-) Climate change presents a national security threat.
Public health	Focus on the impact of climate change on human health (e.g. air pollution, malnutrition, disease).	(-) Climate change will have negative effects on the quality of public health.
Self-efficacy	Focus on the difficulty or ease of making behavioural changes to address climate change.	(+) Individuals' actions can make a positive difference. (-) Individuals' actions are unlikely to matter.
External efficacy	Focus on the responsiveness of politicians, industry leaders, and elites in taking action.	(+) Policy action can make a positive difference. (-) Policy action is unlikely to matter.
Response efficacy	Focus on the potential for success from policy action to address climate change.	(+) Policy action can make a positive difference. (-) Policy action is unlikely to matter.
Political consensus	Focus on consensus among elites	Stating the need for collaboration across the political spectrum
Call for action	Focus on the need to something or more	Those present are encouraged to take action
Neutral	Mention of climate change without focus	Climate change is mentioned but not framed in any specific way

Table 1: Climate change frames proposed in Bolsen and Shapiro (2018) adapted for political discourse.

During the annotation process three new frames emerged: political consensus, call for action, and neutral. *Political consensus* is the opposite of the *political conflict* frame, as it focuses on the joint effort of several political parties, or government and opposition, in addressing climate change. *Call for action* is found in the parliamentary debates where the speaker encourages parliament or the government to start addressing climate change or to do more than has been done so far. These excerpts did not fit well in the *political conflict* frame, as they normally include everyone present, nor did they fit in

the *morality/ethics* frame as there was no reference to future generations nor vulnerable areas or countries. The *neutral* frame was necessary to annotate excerpts that mention climate change but do not frame it in any way (see Table 1).

Table 2 shows examples of excerpts from the English parliamentary debates and their annotation according to frame.

Frame	Excerpt
Scientific consensus (+)	Climate change is not a new concept. For millennia the earth has oscillated through periods of warmth and of cold, but for the first time in Earth's history natural trends are changing. Unlike in times gone by, however, human beings have their finger on the scale: we have tipped the balance. Our impact on the environment is often hidden, out of sight and out of mind, but international scientists are clearly telling us that our actions have dire consequences—consequences that we are starting to see and feel.
Economic consequences (+)	I had not intended to speak today because I thought this was going to be a packed debate; that was my misjudgment. This is a crucial debate, however, and I want to add a few words. One of the frustrations that many of us feel is that tackling fuel poverty by investing in energy efficiency can really be a win-win situation in getting people's fuel bills down, tackling climate change and creating jobs. The creation of those jobs has led to the conclusion that by investing in tackling energy efficiency problems we can actually raise more money than we need to invest.
Environmental consequences (-)	Nevertheless, I am sure my hon. Friend will recognise that the greater threat to animals in peril is habitat decline, whether because of direct human intervention or climate change. Deforestation not only destroys critical habitats for biodiversity but causes 10% of global greenhouse gas emissions. As Members will see later this month in "Blue Planet II", significant impacts on the polar ice caps are threatening wildlife directly, while ocean acidification threatens the food web itself.
Political consensus	In recent years, Members of Parliament have worked hard on this issue in an attempt to safeguard our wildlife and oceans for future generations. I pay tribute to their efforts, and I am grateful to colleagues from all parties for their support for the Bill. Packaging pollution first came to my attention more than 10 years ago, while I was working as an adviser to Ministers in the Welsh Government. Back then, the impact that packaging and plastic pollution were having on wildlife, natural resources and climate change was becoming increasingly evident.
Call for action	Let us see this as a wake-up call. If a pandemic can seriously disrupt the labour market, and we have to provide serious income protection to see it through, let us think about what a technological revolution will do as it displaces, relocates and significantly changes the shape of the labour market. Let us make sure that we have the social protections needed now to face the next revolution, not just the current crisis. Let us not let the global pandemic distract us from the urgency of the climate emergency. Let us make sure that our recovery is a green recovery.

Table 2: Examples of annotation according to frame of English parliamentary debate excerpts.

From the comparative corpus analysis, the following results emerged (see figures 1-6). Figure 1 shows the frames used by all political parties who refer to climate change in UK parliament. The Conservative party shows a preference for the *response efficacy* + frame, which makes sense if we take into account that they have been governing and therefore defend their policies regarding climate change. Labour, on the other hand, frames climate change mostly as *response efficacy* - and *political conflict*, as does the Scottish National party. Both the Conservatives and Labour also use the *morality/ethics* frame. Figure 2, on the other hand, shows that the frames used in Spanish parliament are mostly *response efficacy* + by the left (PSOE and Unidas Podemos) as well as by the right (Partido Popular and Ciudadanos). The next most important frame is *political conflict*, where the few interventions of the far-right (Vox) emerge. Also prevalent are *call for action* and *response efficacy* - where Unidas Podemos stands out.

In figures 3 and 4, the parties and their use of frames are shown. In UK parliament (figure 3), the Conservative party uses the *economic consequences* - and *economic consequences* + the most, which is not surprising taking into account their political focus on the economy. The *response efficacy* + and *response efficacy* - frames perfectly show how the Conservatives and Labour have contrary opinions on the policies regarding climate change, the former use *response efficacy* + more often, whereas the latter prefer *response efficacy* -. The Liberal Democrats show a preference for the *call for action* and *disaster* frames, whereas the Green party prefers the *response efficacy* - frame.

In Spanish parliament (figure 4), almost all parties use the *call for action* frame, especially Unidas Podemos, except for Partido Popular. The same can be said for the *environmental consequences* - frame. Of course, the far-right Vox party show a preference for the *political conflict* frame and do not mention *call for action* or *environmental consequences*, partly because Vox have very few interventions on climate change in the corpus. They are also the only party that still bring up the *scientific consensus* - frame.

In figures 5 and 6 the basic terms *climate change* and *cambio climático* have been omitted to focus on the other term variants. In UK parliamentary debates (figure 5), the term variant *climate emergency* is used to evoke all frames, whereas *climate cataclysm* is only used to evoke the *disaster* and *political conflict* frames. Another term variant that is used in most frames is *climate crisis*, although not to evoke the *economic consequences* +, *political consensus*, and *self-efficacy* frames, as these frames seek to look at the possible positive side of the issue.

In Spanish parliament (figure 6) *emergencia climática* is used to evoke all frames, except *political conflict*. *Crisis climática*, on the other hand, is often used for the *call for action*, *response efficacy* + (contrary to the most similar variant in the UK *climate crisis*), and *national security* frames. It is also used to evoke the *scientific consensus* - frame, as is *apocalipsis climática*. The variant *amenaza climática* (climate threat or menace) is only used for the *national security* frame.

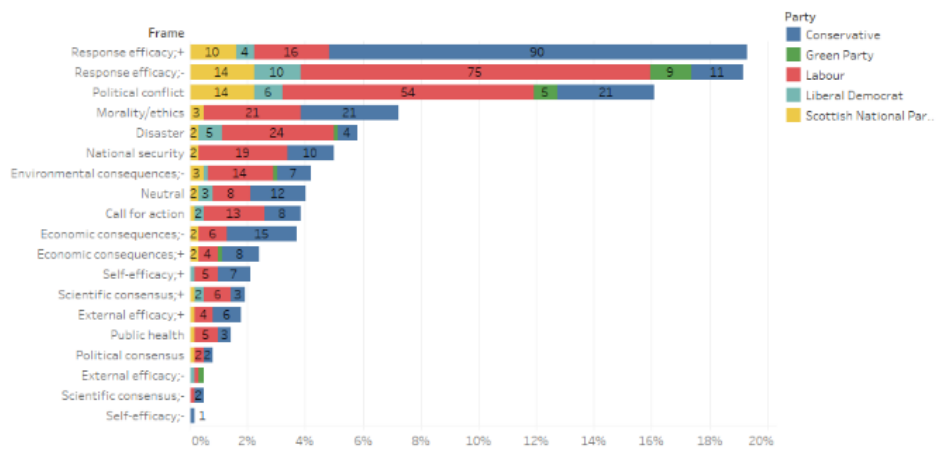


Figure 1: Frames in UK parliament.

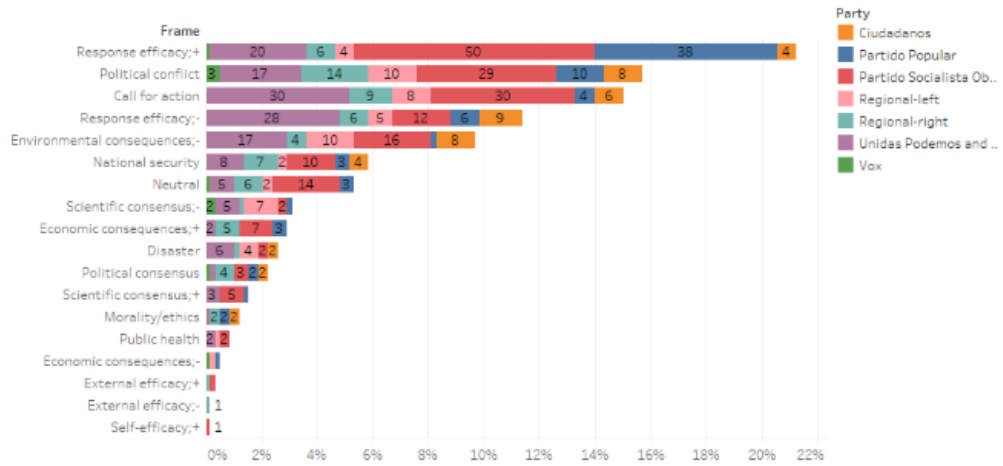


Figure 2: Frames in Spanish parliament.

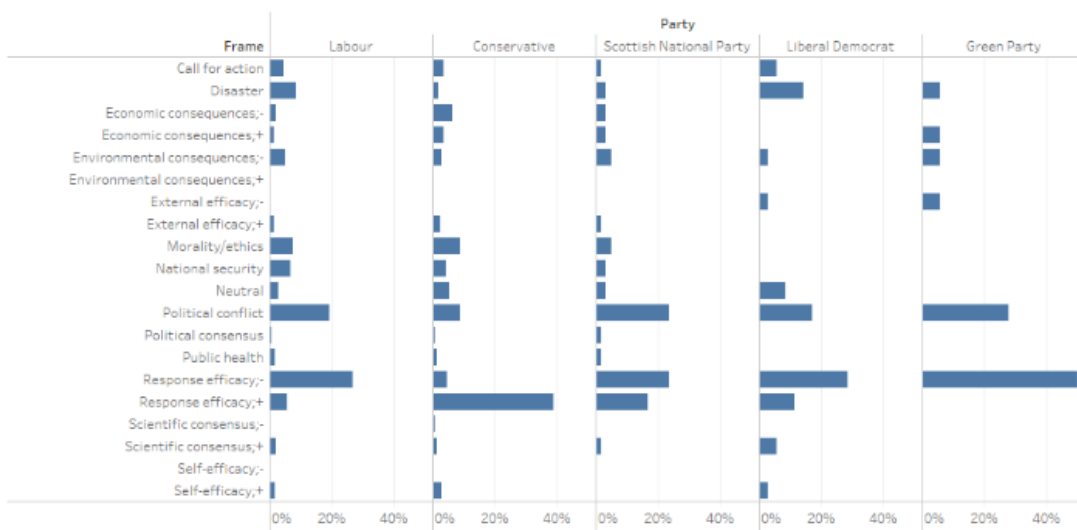


Figure 3: Frames and parties in UK parliament.

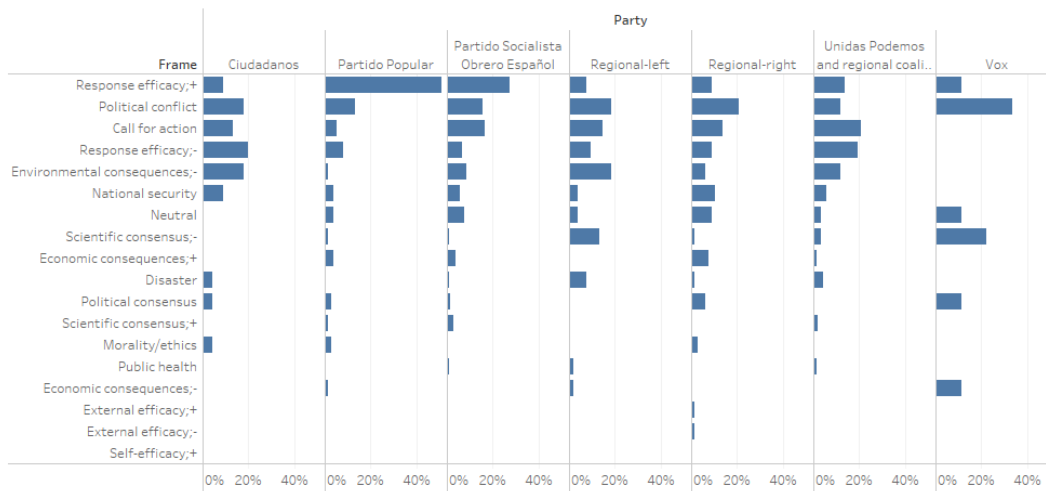


Figure 4: Frames and parties in Spanish parliament.

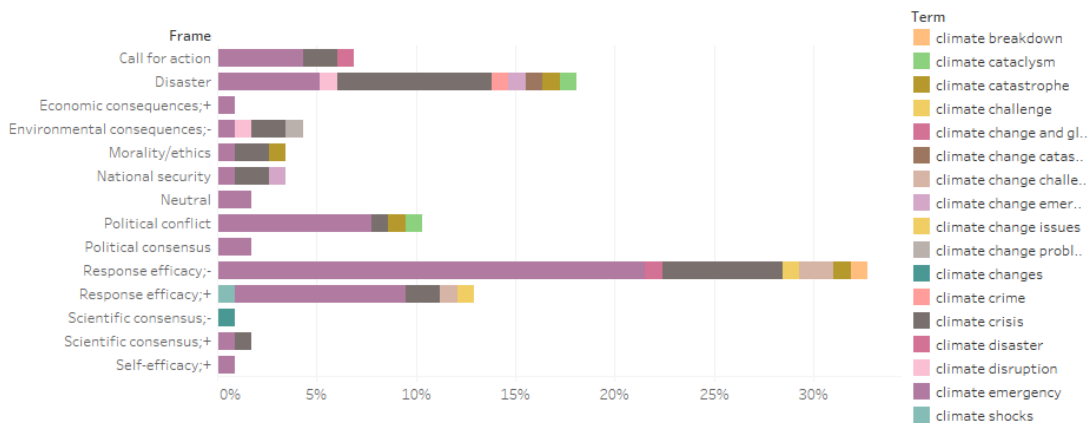


Figure 5: Term variants and frames in UK parliament.

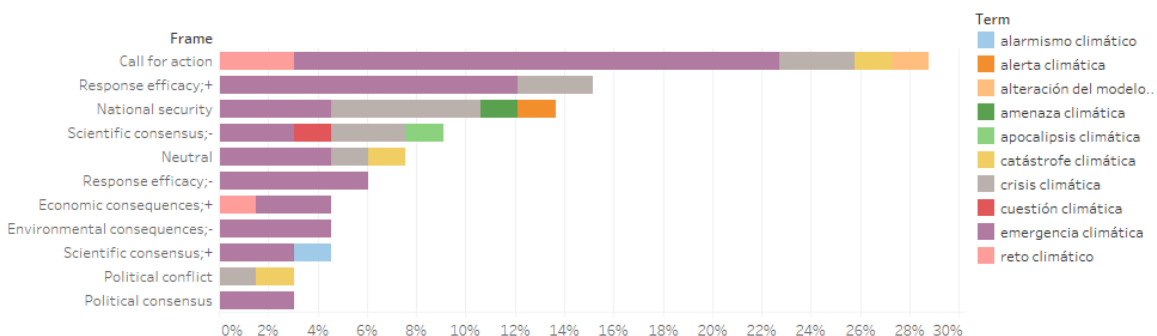


Figure 6: Term variants and frames in Spanish parliament.

From a diachronic perspective, the data<sup>3</sup> show that the term variants other than *climate change* and *cambio climático*, changed over time. As for UK parliament, in 2015 there was a clear preference for

*climate disruption*, which changed to *climate shocks* in 2016 and *climate disaster* in 2018. In 2019, the UK government officially declared a *climate emergency*, which turned into the preferred variant from then onwards. A similar development can be seen in Spanish parliament, from *reto climático* (climate challenge; a slightly optimistic perspective)

<sup>3</sup> For space reasons, no other figures supporting the analysis are provided.

in 2015 to *crisis climática* (climate crisis) in 2018 and *emergencia climática* (climate emergency) from 2019.

When combining the data for left-wing and right-wing parties, left-wing parties in the UK (Labour, Green party, and Scottish National party) use *climate crisis* more often than the right (Conservatives and Liberal Democrats), although it is the second most used variant for both sides of the political spectrum. The right, on the other hand, use *climate change challenges* in third place, and much more often than the left. Both the Spanish right (Partido Popular, Ciudadanos, regional right, and Vox) and left (PSOE, Unidas Podemos, regional left) also use *crisis climática* (climate crisis) in second place after *emergencia climática*, although the right shows a much higher preference. On the other hand, the Spanish left uses more variants than the Spanish right, such as *amenaza climática*, *apocalipsis climático*, *alerta climática*, *alarmismo climático*. Sometimes they do it to seeking a reaction and others paraphrasing the provoking words of right-wing MPs.

### 3. Ideological Knowledge Representation

In this section, we provide a proposal on how to include ideological information in EcoLexicon. We focus on its three basic modules: (i) the concept module (which includes definitions and conceptual networks), (ii) the graphics module, and (iii) the term module.

#### 3.1 Concept module

The concept module of EcoLexicon intends to provide the necessary information for TKB users to understand the concept and learn how it interrelates with others in the environmental domain. This includes the contextualization of concepts within a specific subdomain (e.g., Coastal Engineering, Renewable Energies, Geology, etc.), which means that concepts are shown in dynamic conceptual networks where their relational behavior changes according to the specificities of each subdomain (e.g. SAND is only a type of filter in the Water Treatment subdomain).

The results of our study show that climate change is an extremely complex process, which includes a large number of interacting causes and consequences, and that the ideological stance taken by the speaker influences how the concept is conceptualized. As explained in Section 2, the media have framed climate change in varying ways, and some frames are more appropriate than others to engage an audience into climate change mitigation. Although TKBs are supposed to be a reflection of the scientific reality they represent and objectively describe the language used at different levels of specialization, our opinion is that (1) reality is not objective or even stable, since there are many specialized concepts that are ill-defined, fuzzy and contested; and (2) a stand must be taken when representing scientific concepts with a high profile in political and media settings. If we intend to engage

the users into climate change mitigation, we must go beyond the mere description of majority views.

Based on the existing research in climate change communication, our proposal focuses on the following:

1. Reflection of scientific consensus (Bolsen and Shapiro, 2018; or weight of evidence frame (Nisbet, 2009))
2. Adaptation to the intended audience (inter alia Armstrong et al., 2018)
3. Use of frames beyond ideological divisions (Nisbet, 2009; Stecula and Merkley, 2019)
4. Use of frames on solutions, self-efficacy, hope, and values (Armstrong et al., 2018)

Currently, CLIMATE CHANGE is defined in EcoLexicon as: “long-term changes in temperature, precipitation, wind, and all other aspects of the Earth’s climate in response to physical feedbacks, chemical feedbacks, and changes in terrestrial and aquatic systems caused by humans and nature.”

Other sources define climate change in similar terms, but add or highlight certain facets. Table 2 shows extracts from the webpages of the United Nations, the World Bank, the World Health Organization, and the Natural Resources Defense Council. As can be seen by the facets (human causes, effects on human health) that are highlighted by these organizations and the frames that are used in some (public health and scientific consensus), they go beyond the basic, objective definition of the concept, which shows their underlying intention.

Organization and Facets/frames	Definitional excerpt
United Nations  Time: long-term Cause: natural, <b>human activities</b> Effect: droughts, water scarcity, fires, rising sea levels, flooding, melting polar ice, storms, declining biodiversity	Climate change refers to <b>long-term</b> shifts in temperatures and weather patterns. Such shifts can be <b>natural</b> , due to changes in the sun’s activity or large volcanic eruptions. But since the 1800s, <b>human activities</b> have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas. The consequences of climate change now include, among others, intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity.
World Bank  Effect: increase temperature, rising sea levels, reduction of snow/ice, change in circulation and weather patterns Cause: heat caused by greenhouse gases, human activities Time: long-term	Observed changes over the 20th century include increases in global air and ocean <b>temperature</b> , rising global <b>sea levels</b> , long-term sustained widespread <b>reduction</b> of snow and ice cover, and changes in atmospheric and ocean <b>circulation</b> as well as regional <b>weather patterns</b> , which influence seasonal rainfall conditions. These changes are caused by extra <b>heat</b> in the climate system due to the addition of <b>greenhouse gases</b> to the atmosphere. These additional greenhouse gases are primarily input by <b>human activities</b> such as the burning of fossil fuels (coal, oil, and natural gas), deforestation, agriculture, and land-use changes. Climate change is the significant variation of average weather conditions becoming, for example,

	warmer, wetter, or drier—over several decades or longer. It is the <b>longer-term</b> trend that differentiates climate change from natural weather variability.
World Health Organization  Effect: negative for human health Cause: burning fossil fuels Frame: solution, response efficacy, self-efficacy	Climate change is impacting human lives and health in a variety of ways. It threatens the essential ingredients of good health – clean air, safe drinking water, nutritious food supply and safe shelter – and has the potential to undermine decades of progress in <b>global health</b> . Greenhouse gas emissions that result from the extraction and <b>burning of fossil fuels</b> are major contributors to both climate change and air pollution. <b>Many policies</b> and <b>individual measures</b> , such as transport, food and energy use choices, have the potential to reduce greenhouse gas emissions and produce major health co-benefits, particularly by abating air pollution.
Natural Resources Defense Council  Time: acceleration Frame: scientific consensus	The global climate continues to <b>change rapidly</b> compared to the pace of the natural variations in climate that have occurred throughout Earth's history. Trends in globally averaged temperature, sea level rise, upper-ocean heat content, land-based ice melt, arctic sea ice, depth of seasonal permafrost thaw, and other climate variables provide <b>consistent</b>

	<b>evidence</b> of a warming planet. These observed trends are robust and confirmed by multiple, independent <b>research groups</b> around the world.
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Table 2: Definitional excerpts on *climate change* from organizations.

Based on the above, the EcoLexicon definition of *climate change* will be adapted as shown in Figure 7. Because temperature, precipitation, and wind are all part of climate, and will thus be defined in the latter, we decided to omit them in the definition of *climate change*. Added information includes the facet time (“acceleration”); a focus on “human activities” as the major cause of climate change; frames such as *human health* (“problems for human health”), *national security* (“migration”), *response efficacy* (“policies”), *self-efficacy* (“individual measures”), and *solutions* (“transport, food, and energy use choices”). Apart from that, the concept note (Table 3) will provide information on how climate change is framed by different ideological stances. Our aim here is to provide the necessary information for TKB users not to be manipulated by certain discourse on the one hand, and on the other hand provide information for professional writers or translators to frame the concept in a certain way depending on the audience they are addressing.

New definition	Facets (frames)
Long-term changes in the Earth's climate in response to physical feedbacks, chemical feedbacks, and changes in terrestrial and aquatic systems. Although it can be the result of natural causes such as changes in the Sun's activity or large volcanic eruptions, the acceleration of the past two centuries is due to human activities, mostly the burning of fossil fuels that increase greenhouse gas emissions. Its effects include intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity, which will lead to problems for human health and migration. Policies and individual measures, such as transport, food and energy use choices, can reduce greenhouse gas emissions and mitigate the process.	Process: change Time: long-term, <b>acceleration</b> Cause: <b>human</b> , nature Effect: droughts, water scarcity, etc. ( <b>disaster</b> ); health problems, migration ( <b>human health</b> , <b>natural security</b> ) Policies ( <b>response efficacy</b> ; <b>solutions</b> ) Individual measures ( <b>self-efficacy</b> ; <b>solutions</b> )

Figure 7. New definition for CLIMATE CHANGE in EcoLexicon.

<p>In political discourse (ES+UK), climate change is mostly portrayed as part of the <b>Response efficacy+ frame</b>, which means that politicians, regardless of their ideology, believe that policy action can make a positive difference to address it.</p> <p>In Spain, <b>Political conflict and Call for action</b> are the next frames most frequently activated, whereas in UK these are <b>Political conflict and Response efficacy-</b> frame. This means that UK politicians are more divided across the political spectrum. Left-wing parties evoke the <b>Response efficacy+</b> frame more frequently and right-wing parties evoke the <b>Response efficacy-</b> frame more frequently. <b>Morality</b> seems to drive UK political discourse much more often than in Spanish political discourse (...)</p>
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Table 3: Extract of the concept note for CLIMATE CHANGE.

### 3.2 Graphics module

The intended purpose of the graphics module of EcoLexicon is to facilitate knowledge acquisition for lay users of the TKB (Reimerink and León-Araúz, 2018; Cabezas-García and Reimerink, 2022). Therefore, the selection of images is directly related to the definitions of the concepts included in the TKB. This provides the user with an enhanced representation of the different facets of each concept. Previous research (Reimerink and León-Araúz, 2018) has shown that certain image types are more adequate to represent certain concept types: color photographs are indicated for natural entities, drawings with explanatory labels for entities and their parts, and flow charts with explanatory labels and arrows for processes. Very often, a sole image is not enough to represent a concept, thus for EcoLexicon, the number of images included depends on the complexity of the concept.

Climate change is an extremely complex process, which includes a large number of interacting causes and consequences. Here, we will focus on how images can be selected to engage the user into climate change mitigation, in the same way as for the definition of the concept. In the media, imagery has been mostly based on the *political conflict* frame, showing pictures of political opponents, or the *distancing* frame, where sad consequences of climate change of distant habitats were depicted (O'Neill, 2013). Including pictures of politicians does not seem to be very useful for explaining climate change to TKB users. However, the negative environmental consequences for flora and fauna should have a place in an environmental TKB. To engage the users into climate change mitigation, we again focus on: scientific consensus; adaptation to the intended audience; use of frames beyond ideological divisions; and use of frames on solutions, self-efficacy, hope and values. Figure 8 shows a map with the temperature change in the last 50 years. It provides accurate scientific information on one of the consequences of climate change and can be easily understood by a lay user. An image such as figure 8 helps users be aware of the existence and extent of climate change.

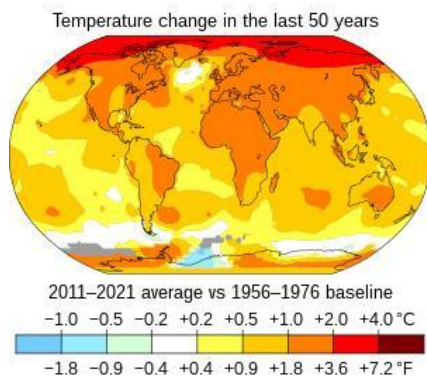


Figure 8: Temperature change as a consequence of climate change: scientific consensus frame (Source: [https://en.wikipedia.org/wiki/Climate\\_change](https://en.wikipedia.org/wiki/Climate_change)).

Figure 9 shows several of the consequences of climate change as well. It will make the user aware of the increased possibility of extreme weather events, wild fires, storms, etc. However, it represents the *disaster* frame, which might lead to feelings of helplessness and inaction. It should therefore be accompanied by images that frame for *efficacy*, *self-efficacy* and *hope* (see figure 10). Figure 10 makes explicit reference to vulnerable populations and the effect climate change can have on them. This image does not only focus on the increased risk for these populations, it also explains how the problems can be addressed: “Adaptation plans that consider these communities and improve access to health care help address social inequity.” This comment is a good example of the *response efficacy* + frame. The image also gives ways for the general public to engage in mitigating the consequences: “Checking on elderly neighbours and proper emergency communication can save lives.” Therefore, it also conveys the *self-efficacy* frame.



Figure 9: Consequences of climate change: *disaster* frame (Source: <https://www.noaa.gov/education/resource-collections/climate/climate-change-impacts>).

Furthermore, the selection of images that can be relevant to local populations is also encouraged (Cabezas-García and Reimerink, 2022). Figure 11 shows a field destroyed by a brush fire in the drought-ravaged village of Xinyao in the Jiangxi province, China.

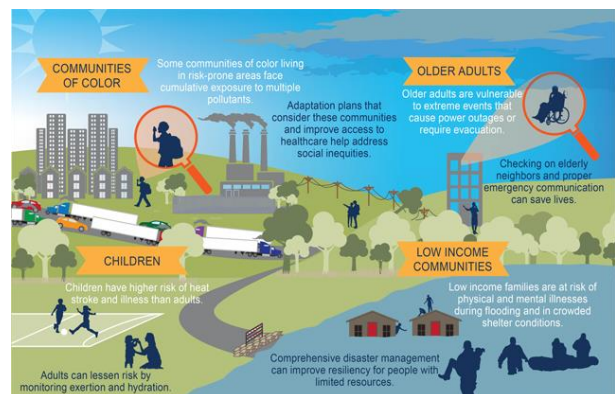


Figure 10: Climate change impact on vulnerable populations: *response efficacy* and *self-efficacy* frames (Source: <https://www.hhs.gov/climate-change-health-equity-environmental-justice/climate-change-health-equity/index.html>).



Figure 11: Consequences of climate change: *distancing/approaching* frame (Source: <https://www.nytimes.com/2022/10/05/climate/climate-change-europe-drought.html>).

Depending on where the user comes from, this can be considered a *distancing* frame or not. The best option would be to adapt the images that come up with TKB searches for climate change according to where the user comes from, for example by making



them register before accessing the TKB. In that way, if the user is from China, figure 11 would be shown. If, however, the user is from California, an image of a recent forest fire in California would be a better option. In that way, we can adapt the information shown to each user (Cabezas-García and Reimerink, 2022).

### 3.3 Term module

In León-Araúz, Cabezas-García and Reimerink (2020) we proposed a set of descriptive fields that should be included as part of the description of individual terms (i.e. term level) (Table X).

Data category	Values
Term type	Picklist ( <i>main term, variant</i> ); single value, mandatory
Formation device	Picklist ( <i>borrowing, adapted borrowing, calque, blending, acronym, abbreviation, formula, symbol, eponym, culture-specific</i> ); multiple values, optional
Source	Free text (e.g. UN, corpus EurLex); multiple values; optional
Use_geographical	Free text (e.g. Spain, Mexico, Australia, etc.); multiple; optional
Use_status	Picklist ( <i>admitted, deprecated, standardized, non-recommended</i> ); single value, optional
Use_register	Picklist ( <i>scientific name, jargon, formal specialized, formal semi-specialized, informal</i> ); single value; optional
Use_context	Free text; multiple values; optional
Use_translation context	Free text; multiple values; optional
Notes	Free text; multiple values; optional

Table 4: New fields and values for term entries in EcoLexicon.

Ideology information will be included in the term note. For example, the term variants of *climate change* will include a term note which explains all the relevant ideological information found to help the end user understand the ideological implications of each variant. Table 5 shows the term note for *climate catastrophe* with detailed information on which parties use the term to evoke a specific frame.

In political discourse (UK), the term is mostly used to convey the **Disaster, Morality, Political conflict, and Response efficacy- frames**. Although it is not frequently used, the Green Party applies the term when framing for **Response efficacy-**, whereas the Liberal Democrats use it to frame for **Disaster**, and the Labour Party for **Morality and Political conflict**.

Table 5: Term note for *climate catastrophe*.

The term note for *climate emergency* (Table 6) explains the origins of the term and its relation to a specific event in politics.

In political discourse (UK), the term is used across the **whole political spectrum since 2019** when the UK Parliament declared a climate emergency, therefore prioritizing climate action in government policy.

Table 6: Term note for *climate emergency*.

## 4. Conclusions and Future Research

In this paper, we have shown a method for the annotation and extraction of ideological knowledge from corpora and a way to represent this knowledge in terminological resources. Although terminological knowledge bases (TKBs) are supposed to convey scientific knowledge objectively, political and media discourse can frame scientific knowledge to influence the audience. The choice of a frame or a term variant when talking about concepts with a high profile in political and media settings may form the public's opinion on the topic. TKBs must convey this ideological knowledge to help end users understand how framing may influence their opinions, and how to choose a frame or term variant when writing or translating a media or political text. Apart from conveying this knowledge, framing can and should be used in TKBs to frame a concept such as climate change in a way that will help users change their behavior and, particularly, engage in climate change mitigation.

Future research will be dedicated to analyze other environmental concepts with a high profile in political and media settings (e.g., *greenwashing*). Along these lines, frames will need to be adapted to account for concepts different from *climate change*. Furthermore, the political spectrum in other parliaments present in the ParlaMint 2.1 corpus will be explored with a view to including ideological information present in other parliaments and languages used in EcoLexicon.

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