Do we 'like' or 'unfollow'? A social media-based analysis of public perceptions on global change

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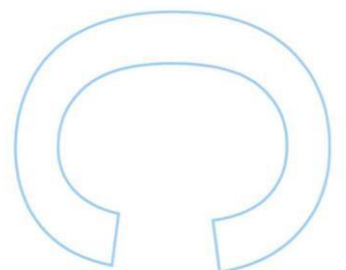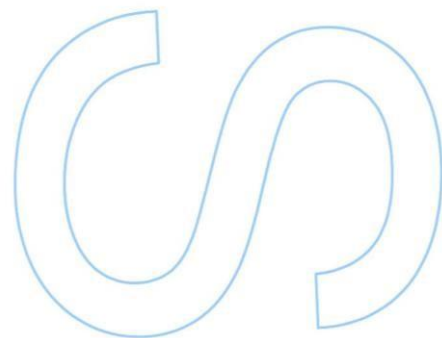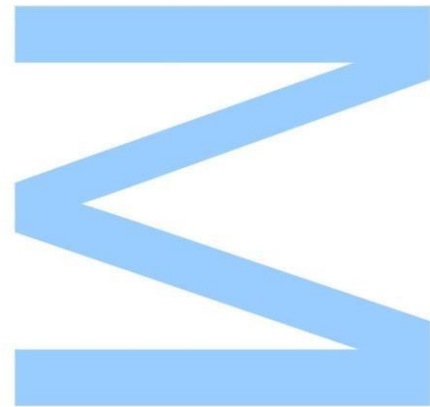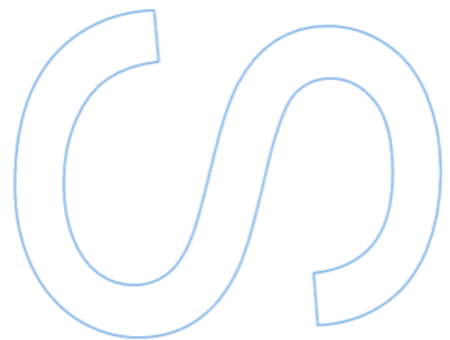Centro de Investigação em Biodiversidade e Recursos Genéticos
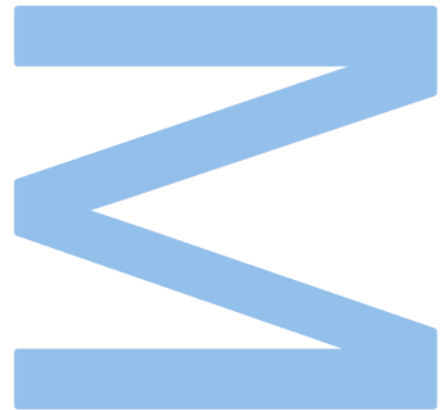2021/2022

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I, Bruna Maria da Silva Fonseca, enrolled in the Master Degree Biodiversity, Genetics and Evolution at the Faculty of Sciences of the University of Porto hereby declare, in accordance with the provisions of paragraph a) of Article 14 of the Code of Ethical Conduct of the University of Porto, that the content of this dissertation reflects perspectives, research work and my own interpretations at the time of its submission.

By submitting this dissertation, I also declare that it contains the results of my own research work and contributions that have not been previously submitted to this or any other institution.

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04/01/2023

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Abstract

Global change is currently a hot topic in media networks, especially its causes (e.g. anthropogenic emissions of greenhouse gases, misuse of land and water, landscape disturbance) and its present and future impacts. Social media are gaining progressively more attention and as such, science communication is also focusing more on the use of social media platforms to present scientific findings to the general public. Social media has been a growing place for scholars to share and discuss ideas with colleagues. However, this communication often falls into a 'bubble' and does not reach the general public. Scientific findings reach wider audiences through online newspapers or organisations, but the role of public figures in science dissemination is increasing. Environmental organisations are using this strategy to keep people interested and engaged. Still, data from social media regarding public engagement in environmental subjects is still very scarce, as it is usually focused on specific events and engagement is studied directly through local surveys. This study aimed to 1) determine public perception of global change, their interest in such matters and knowledge gaps; 2) identify which environmentally-related posts are preferred by the general public, looking at their content; 3) identify the best communication options for science and 4) analyse the sensibility of public figures to environmental themes. This was achieved through a quantification of environmentally-related posts from public figures in Portugal, an analysis of public interactions with environmentally-related posts from public figures and an online survey available internationally. This study addressed a total of 28 questions. I found that the public is very interested in matters regarding global change, however there is not much knowledge on it; that themes such as climate change and human-related ones are of most concern, while biodiversity is not considered so important, probably due to the different media coverage of these issues; that the category "Consumption" was mostly posted by public figures, however not the one most chosen by the public; that the public preferred a combination of positive and negative contents when following a page, rather than fully positive or fully negative, as it is believed fear is not a good way to keep the public engaged; that the public preferred posts with non-human related content than human-related content; that scientific publications and Instagram are the preferred ways to obtain news about the environment, especially in the form of video.

Key words: Environment, emotions, social platforms, public figures, online perception

Resumo

As alterações globais são atualmente um tema muito recorrente nas redes sociais, especialmente as suas causas (emissões de gases de estufa, uso indevido da terra e da água, perturbação da paisagem, etc.) e seus impactos no presente e no futuro. As redes sociais estão a alcançar cada vez mais atenção, e então, como tal, a comunicação científica também está a apostar mais no uso de plataformas sociais para apresentar descobertas científicas ao público em geral. As redes sociais têm sido um lugar crescente para os académicos partilharem e discutirem ideias com colegas. No entanto, esta comunicação muitas vezes cai numa "bolha" e não chega ao público em geral. As descobertas científicas alcançam um público mais amplo por meio de jornais ou organizações on-line, mas o papel das figuras públicas na divulgação da ciência está a aumentar. As organizações ambientais estão a usufruir dessa estratégia para manter as pessoas interessadas e envolvidas nesses temas. Ainda assim, os dados das redes sociais sobre o envolvimento do público em questões ambientais são muito escassos, pois geralmente são focados em eventos específicos e o envolvimento é estudado diretamente por meio de questionários locais. Este estudo visa 1) determinar a percepção pública da mudança global, o seu interesse em tais assuntos e quais são as lacunas de conhecimento; 2) identificar quais publicações relacionadas com o meio ambiente são preferidas pelo público em geral, observando o seu conteúdo; 3) identificar as melhores opções de comunicação para a ciência e 4) analisar a sensibilidade das figuras públicas aos temas ambientais. Isto foi conseguido através de uma quantificação de publicações relacionadas com o ambiente de figuras públicas em Portugal, uma análise das interações do público com publicações relacionadas com o ambiente de figuras públicas e um inquérito online disponível internacionalmente. Este estudo continha 28 questões. Descobri que o público está muito interessado em assuntos relacionados à mudança global, porém não há muito conhecimento sobre o assunto; que temas como a mudança climática e temas relacionados aos humanos são os mais preocupantes, enquanto que a biodiversidade não é considerada tão importante, provavelmente devido à diferente reportagem dessas questões; que a categoria "Consumo" foi a mais publicada por figuras públicas, porém não a mais escolhida pelo público; que o público preferiu uma combinação de conteúdo positivo e negativo ao seguir uma página, em vez de totalmente positivo ou totalmente negativo, pois acredita-se que o medo não é uma boa maneira de manter o público envolvido; que o público preferia publicações com conteúdo não humano do que conteúdo humano; que as

publicações científicas e o Instagram são as formas preferidas de obter notícias sobre o meio ambiente, principalmente na forma de vídeo.

Palavras-chave: Ambiente, emoções, plataformas sociais, figuras públicas, percepção online

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1. Introduction

1.1.   Global change

Over the last 100,000 years that we have steadily increased the amount of the terrestrial biosphere allocated to agriculture and grazing, mostly at the cost of deforestation and conversion of wildlands (Cherlet et al., 2018). Following the Industrial Revolution in the beginning of the last century and the more recent globalisation of economy and societal movements, modifications have accelerated at a rhythm never experienced before and attained at a global scale. We have radically modified the face of Earth over the last 120 years. The phenomenon is now called Global Change and addresses the planetary-scale changes in the Earth systems, including land, oceans, atmosphere, polar regions, life, the planet's natural cycles and deep Earth processes, as well as the large-scale changes in society and the subsequent effects on the environment. These effects encompass, amongst many others, the atmospheric and ocean circulations, the carbon, nitrogen and water cycles, and the losses in sea ice, food webs and biological diversity.

1.1.1   Climate change

Amongst the multiple facets of Global Change, anthropogenic-induced climate change is projected to emerge as the primary danger to natural and societal systems in this century, affecting the structure, composition, and function of ecosystems on a worldwide scale (Pecl et al., 2017). Climate change happens when there are changes in temperature, precipitation, among other weather occurrences, over several years. Billions of tons of carbon dioxide and other greenhouse gases are emitted into the atmosphere as a result of present human activities, including the burning of fossil fuels, the clearing of forests, the raising of livestock, and many more. (Figure 1; USGCRP, 2014).
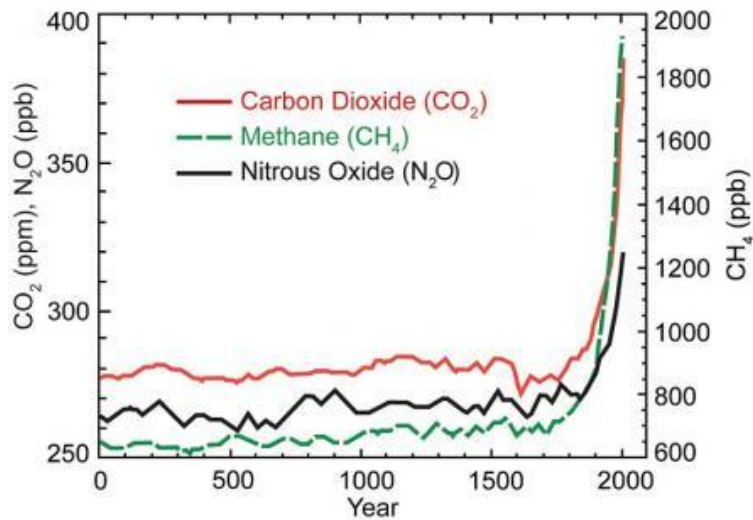
Figure 1. Increase in greenhouse gas (GHG) concentrations in the atmosphere over the last 2,000 years (USGCRP, 2009).

These continued emissions will affect Earth's climate and the changes include: 1) the ongoing increase in the average temperature (Figure 2a; IPCC, 2013); 2) the alteration of precipitation patterns (Fig. 2b); the further melting of glaciers and permafrost (Fig. 3a; NRC, 2011); 3) the sea-level rise (Fig. 3b,c; USGCRP, 2014); and 4) the increased acidity of oceans due to the absorption of the increasing carbon dioxide in the atmosphere (Fig. 3d,e; IPCC, 2014).
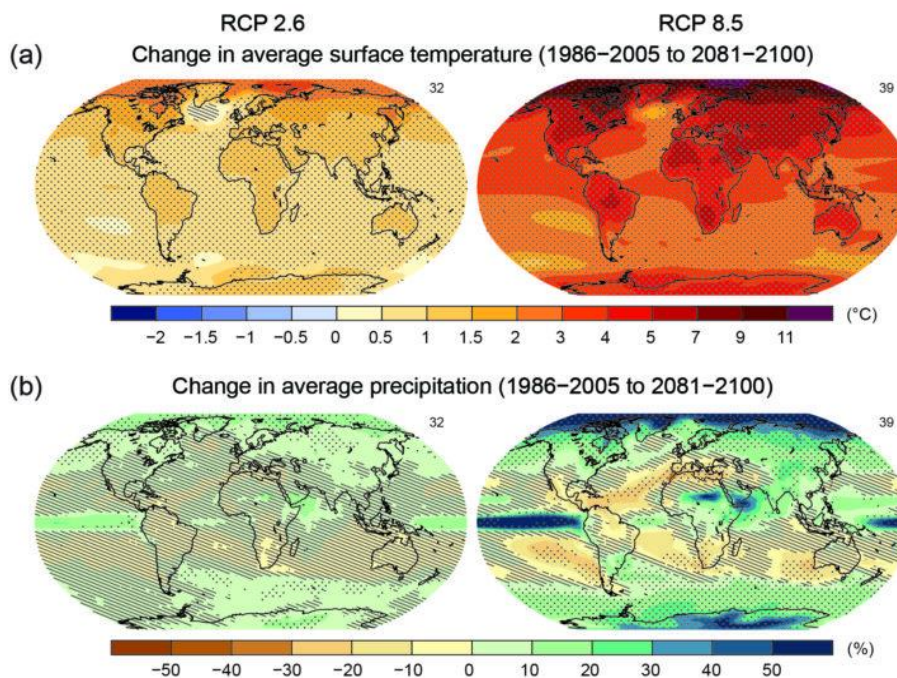
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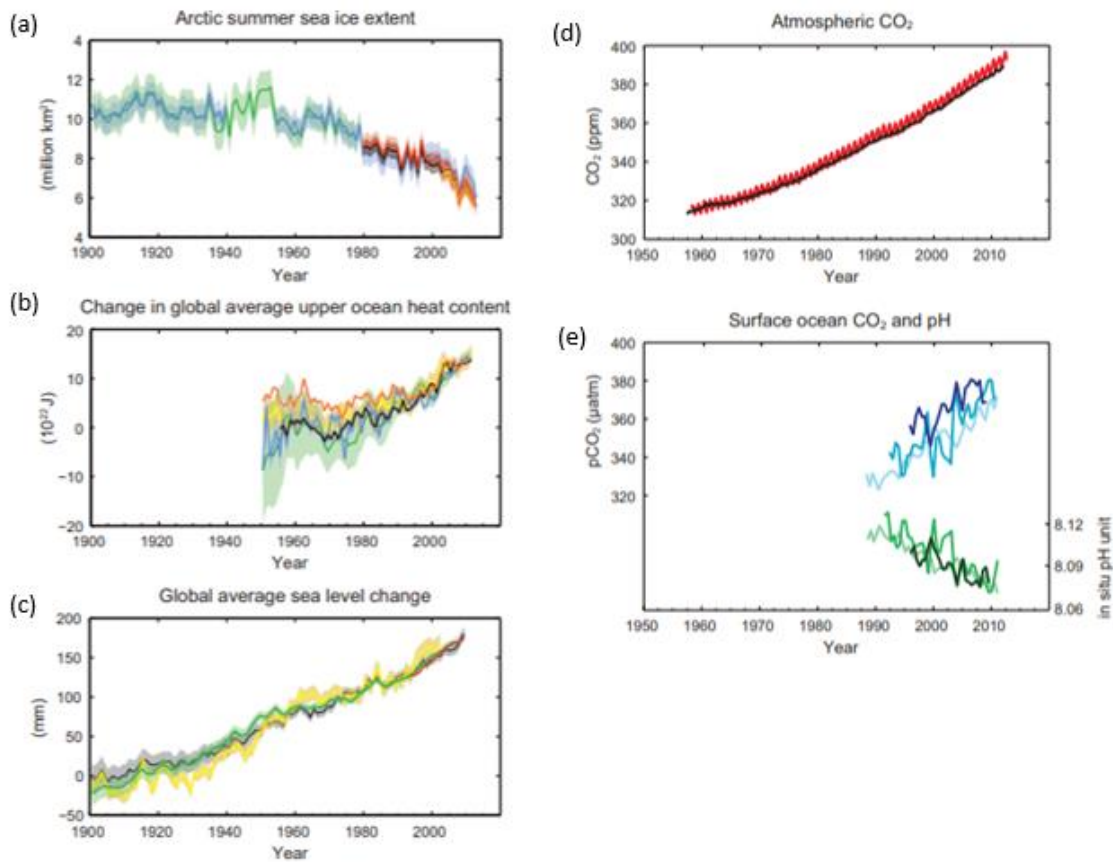
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These changes will have certain impacts on the biosphere. Predicted impacts include, for instance: 1) increased frequency of catastrophes, which can be a gateway to pandemic-events; 2) changes in the ecosystems, composition and function-wise, such as wildfires, storms, insect outbreaks and invasive species; and 3) increased danger to human health, such as heat strokes (CCSP, 2008) or respiratory problems as a result of bad air quality (USGCRP, 2016). These pressures on ecosystems and biodiversity (including genetic diversity, species' adaptation to changes, the habitat and landscapes), will hinder the possibility of many species to keep up with climate change.

1.1.2 Biodiversity decline

The 2019 global assessment on biodiversity and ecosystems services (IPBES, 2019) indicated that a substantial proportion of examined species are endangered and that overall trends are worsening, with extinction rates sharply rising in the last century. The numbers are staggering: 1) from 10% up to over 60% of the species are currently endangered; 2) the rate of extinction since the 1500s increased in all vertebrate groups and is now more than the double in amphibians and mammals; and 3) since the 1980s that amphibians, mammals, birds, corals, and cycads have all experienced a decline in species survival rates (Figure 4). Moist primary forests across the globe are in decline and many are predicted to disappear in the following 30 years (Figure 5).
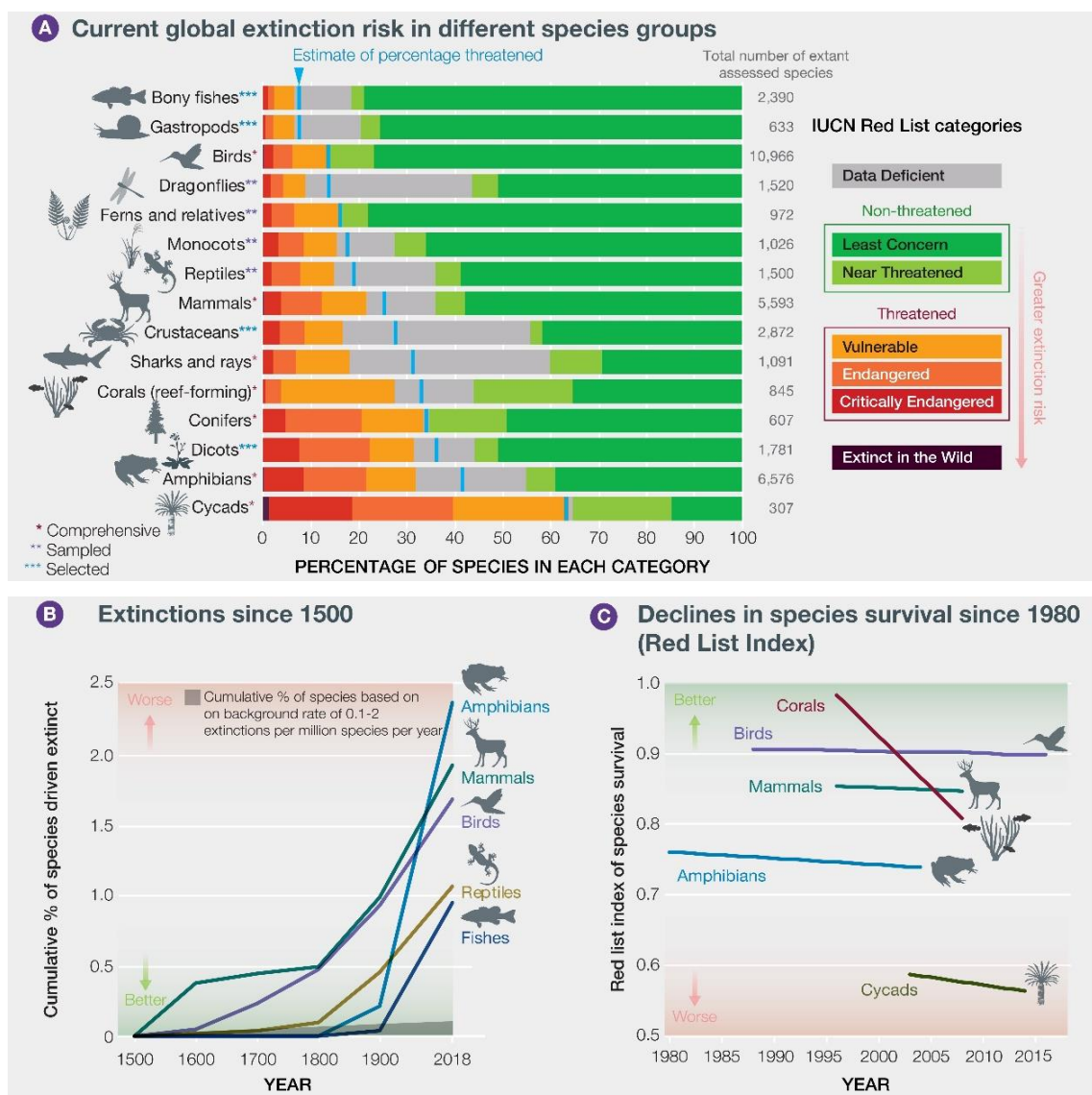
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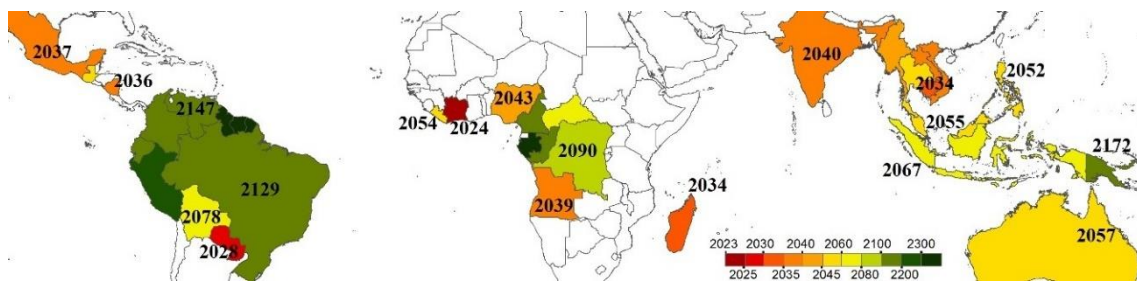
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1.2. Future predictions of energy consumption and its impact on the environment

The predicted global energy demands will continue growing, rising nearly 50% until 2050 with almost all the increase occurring in non-OECD countries (EIA, 2019). For instance, fast population growth and access to abundant domestic resources are key determinants of energy demand in Africa, where energy use is predicted to increase about 110%. Although renewable energy will likely become the leading source of primary energy consumption by 2050 and end-use fuel composition will progressively shift toward electricity, consumption will increase in all primary energy sources and the industrial sector is projected to continue being the largest consumer of energy, representing more than half of global energy consumption.
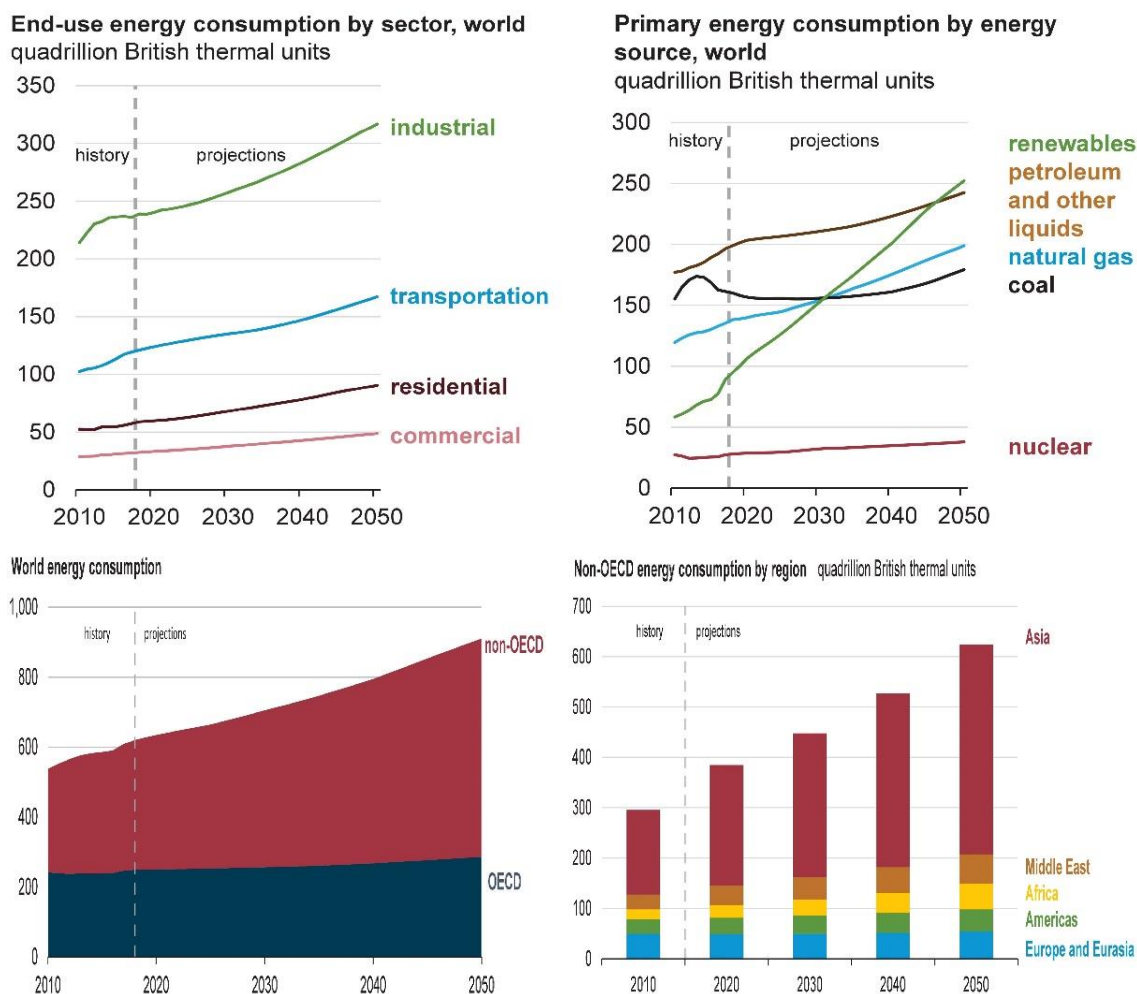
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1.3. The need for increasing public engagement on actions that minimise global change impacts

With the aggravation of one of the biggest components of global change - climate change - the need for public engagement, behavioural transformation and adaptation is massively increasing. The current global focus is on the reduction of the impacts of climate change, which can come either from behavioural transformations in the attitude of the general public or organisational changes in the agriculture and industry sectors. These can come in the form of reduction of greenhouse gas emissions, changes in land use, changes in the consumption of certain products, all by adopting more environmentally sustainable alternatives. However, the general public in certain countries, like the UK for example, believes that crime, economy, and health are of much bigger concern than climate change (Hayward et al., 2007). This is because these factors

are more present in their daily lives and have an immediate effect (Hayward et al., 2007). According to a Ipsos Global Trends Survey from 2020, less than two-thirds of the United States, Japan and the Netherlands population agree that the climate change we are currently witnessing is mainly due to human activity (Fig. 7). Additionally, more than a third (37%) globally say that they are "*tired of the fuss that is being made about the environment*" (Trumbo & Shanahan, 2000; Capstick & Pidgeon, 2014). As such, increasing public sensibility towards climate change impacts is not an easy task. To this respect, the media have the ability to influence people's perceptions (Trumbo & Shanahan, 2000).
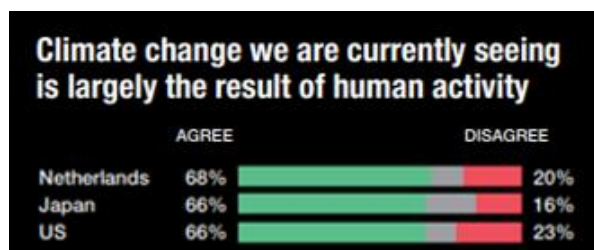
Figure 7. Ipsos Global Trends Survey. 22,614 adults aged 16-74 across 33 countries, interviewed June – July 2019 for the question: "Do you agree that the climate change we are currently seeing is largely the result of human activity," (Ipsos, 2020).

We can see this influence of the media in other changes that are happening in the world, such as biodiversity loss. For instance, in a study by Courchamp et al. (2018), it was found that people have a perceived idea of the conservation status of many charismatic animals that does not match their actual status (Fig. 8). The authors state that the way these animals are exposed in our culture (i.e., they seem to be abundant due to their omnipresence, as they are very popularized animals in toys industries, television, books, and so on) is the cause for the public misunderstanding. Thus, the daily information that we see may be leading to a false perception about reality and the media play an important part in correcting these biases. Through the process of perception, people select, organize, interpret, retrieve, and respond to information from their environment, which ultimately shapes their attitudes and behaviours.
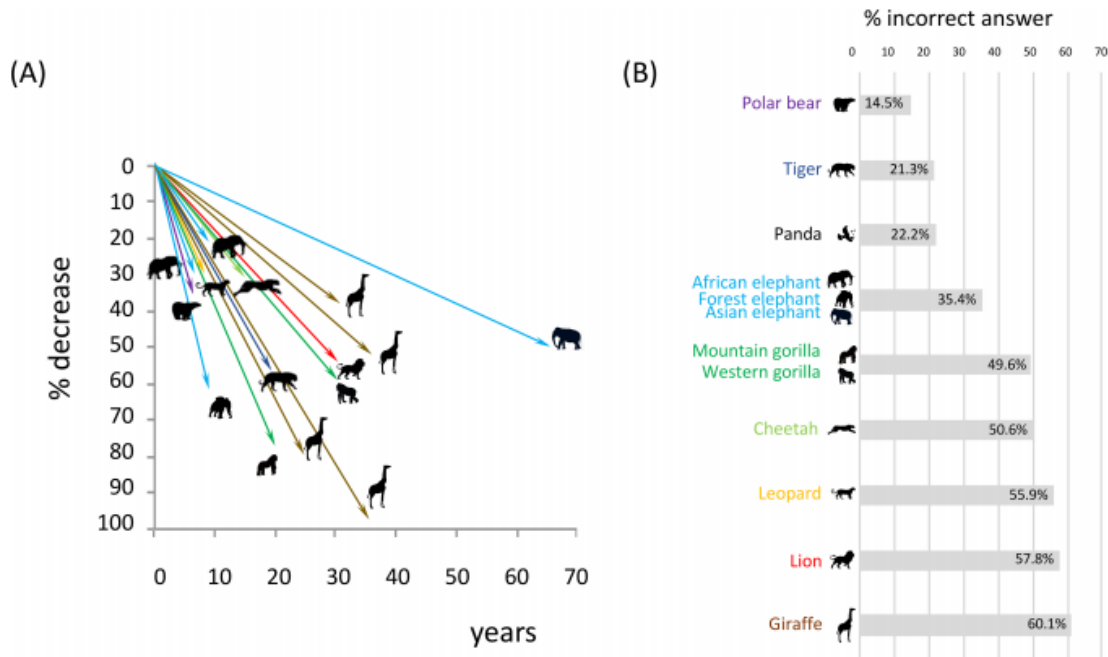
Figure 8. (A) Recent, dramatic declines of the most charismatic animals (Tigers, African lions, African elephants, savannah elephants, Central African forest elephants, Asian elephant, giraffes, Masai giraffes (*Giraffa camelopardalis tippelskirchi*), reticulated giraffes (*G. c. reticulata*), Nubian giraffes (*G. c. camelopardalis*), leopards, cheetahs, southern Beaufort Sea polar bears, Grauer's gorillas, Western lowland gorillas). (B) Percentage of incorrect answers to the question, "Is this species endangered," reflecting biased knowledge of conservation status of the most charismatic species. (Courchamp et al., 2018).

The biased perceptions about the global status of biodiversity and extinction rates, the ongoing misinformation about the causes and effects of climate change, or even the apathy towards the detrimental consequences of global change all need to be quickly and thoroughly addressed, at the imminent risk of environmental and ecological collapse. (Cherlet et al., 2018).

Impacts of global change will last and possibly intensify as long as there is an increase in the global demand for energy and raw materials or as long as charismatic species have a significant cultural and economic presence in developed nations without being adequately informed about the immediate threats they face (Fig. 9).
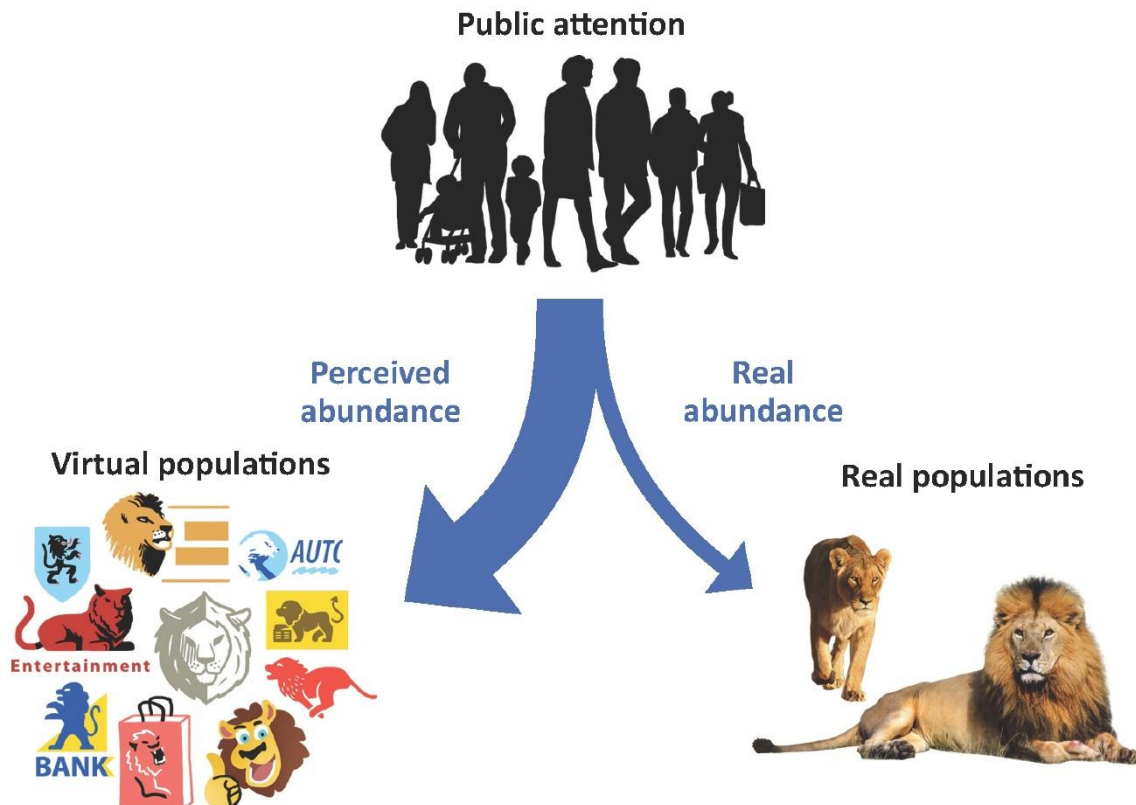
Figure 9. Biased perceptions in developed countries about the status of charismatic animals. Differences in perceived and real abundance between virtual populations (represented by iconic logos of commercial companies) and natural populations (represented by clip art of real animals), whereby abundance of virtual animals in culture alters the perception of actual rarity in real animals [adapted from Courchamp et al., 2018].

Addressing and mitigating the impacts of Global Change may involve two basic strategic approaches: 1) proactively concentrate on the causes of global change and make plans to address and tackle the behaviours that are triggering the changes in first place; and 2) reactively assuming that global change is inevitable and plan to adjust to its effects by adopting methods that minimise the negative impacts. However, while the implementation of the reactive strategy is in the hands of technicians, managers, and mostly politicians, the proactive strategy can be implemented by the civil society and potentially has more benefits in the long-term. Nonetheless, both roles should be implemented by both parties. Modifying the actions that are causing Global Change requires first the understanding that some of the current daily-life actions may be unsustainable for the planet, followed by the development of new sets of actions that potentially demand fewer resources and thus have less impact than those current actions.

In plain simple words, we need better informed societies that are ready to meet the challenges of long-term sustainability and the coexistence and cherishing of the planet with all its current life forms. In fact, there is growing interest from the media to discuss

and to drive societal changes (Fig. 10) and this opportunity should not be dismissed. In order to assure future advantages and complete the Sustainable Development Goals by 2030, we should start taking advantage of this chance (UN Act Now, 2020).

Figure 10. Media coverage of global change impacts throughout 2019 and 2020. The impacts of sea-level rise and climate change depicted by The Guardian, Financial Times, The Economist, and Time magazine.

A commonly used strategy in the communication of global change is fear. On many occasions, the media focuses on disasters, often presenting the information in a dramatic

and hyperbolic way (Carvalho & Burgess, 2005). This is because it is believed that the shocking effect of the message will capture better the people's attention. However, people find it very difficult to be continuously worried when it feels that the impacts are very distant in time and most scenarios are still hypothetical (Lorenzoni et al., 2007). Additionally, the continued use of fear desensitises the public to these issues, and causes a sense of fatalism which leads them to believe their changes will not make a significant difference (O'Neill & Nicholson-Cole, 2009). As such, fear-based approaches can represent a barrier to proper public engagement. Other critics to how environmental issues are portrayed include the ambiguous presentation, the non-correlation of causes and impacts, the absence of solutions, and the lack of human-related impacts (Remillard, 2011). For example, it was reported that negative framing of sharks through videos resulted in more negative attitudes toward the species, while positive framing led to positive attitudes in terms of acceptance and conservation behaviours (Beall et al., 2022).

So far, the perception that people have of global change has been studied either directly through surveys (O'Neill et al., 2013; Leviston et al., 2014; Metag et al., 2016) or through specific events with keywords on a chosen social media platform (Cody et al., 2015; Papworth et al., 2015). Much evidence on this has focused on climate change, however, global change as an integrative concept has not been receiving much attention in the scientific research. Social media platforms allow people to discuss with multiple individuals from different areas of the world and different fields of work, which might or might not change perceptions.

Moreover, online environmental activism not only depends on scientists or newspapers but especially on public figures, i.e. individuals considered well-known by the civil society, more so than the average person. They may be a great way to attract public attention and promote discussions and eco-friendly behaviours (Park, 2018), as well as make an impact political-wise (Brockington, 2014). However, this involvement and impact has not been studied for social media platforms nor have studies dived into the analysis of public figures' demographics and its relation to environmental awareness. A few studies have only focused on specific cases, such as the history of certain celebrities in a platform (Alexander, 2013) or specific events (Park, 2018) and what kind of discussion spikes within the public. Considering that these public figures are a great way to attract a wide audience and promote discussions and changes, it is no surprise that environmental organisations start forming associations with them (Doyle et al., 2017). This partnership then leads to public figures becoming global change ambassadors (GCA) - people who actively endorse projects and organisations' messages and shares them to the public.

1.4. The rise of social media platforms to communicate science to the public

Science usually reaches the general public when journalists write articles based on published research papers or through press-releases issued by scientific institutions. However, news about the environment are more likely to be searched online, regardless of people's age (Fletcher et al., 2016). As such, many scientists are now resorting to blogging instead of relying on journalists to disseminate the findings of their work. Blogging about own research gives them the autonomy over how it is communicated to the public and gives them the opportunity to share opinions with peers (Brossard, 2012).

Despite social media being a great way for scientists to communicate with each other, and while it has facilitated communication with the public, information needs to be carefully presented. For instance, to be able to communicate science with the public in an effective way, scientists need to make sure that the results of their research are made comprehensible to people that are not generally connected to science. Usually, artwork and infographics can help with this comprehension (Corbett & Clark, 2017). Additionally, it helps the viewers to acquire an emotional connection with what they are seeing and most importantly, helps reach a wider audience that otherwise would be difficult to engage with (Nurmis, 2016).

The use of social media for science communication provides multiple advantages over traditional methods, such as the ability to: 1) reach wider audiences, in almost real-time, and with reduced costs; 2) facilitate interactions between activists, scientists and the general public; and 3) promote easier access to fundraising campaigns, which are an important contribution to scientific projects (Taylor et al., 2001; Brunsting & Postmes, 2002). This online activism is crucial to get the involvement of non-activists (Postmes & Brunsting, 2002).

1.4.1. The importance of public figures

Individuals who are considered to be public figures are characterised as well known to a certain audience, with their activities usually known as well and with more power to influence certain changes than the average individual (Olmedo et al., 2020). These figures are often involved in marketing strategies, such as the advertisement of certain products as they are able to persuade, change attitudes and entice other people to buy those products (Muda et al., 2012). When it comes to the spread of environmental awareness, the use of public figures takes many forms such as endorsing non-

governmental organisations' (NGOs) messages, creating their own institutions, and participating in political events (Doyle et al., 2017). This endorsement by public figures has made it possible to reach audiences that otherwise would not be possible, by making distant issues seem important in our everyday lives (Anderson, 2013) and displaying complex contents in an emotional and appealing way (Doyle et al., 2017). They catch people's attention and are more likely to promote discussion and pro-environmental behaviours (Park, 2018) as fans are prone to adopt certain figure's attitudes to maintain a certain level of relationship with them (Brown et al., 2003). Additionally, public figures attract decision-makers and politicians, which would be very unlikely to happen otherwise (Brockington, 2014). Finally, since these public figures are a way to attract a wider audience, while promoting discussions and behavioural changes, environmental organisations have an interest in forming associations with them (Doyle et al., 2017). This affiliation leads to public figures becoming global change ambassadors (GCA), thereby being actively involved in projects, and endorsing organisations' messages, sharing them to the public.

1.5. Research needs

With this study it is expected to achieve a better understanding on how environmentally-related subjects should be presented to the general public and what are the most effective ways to keep the people engaged in the thematic of global change.

As has been mentioned before, research has not yet dived deep into certain aspects of scientific communication such as the public perception and interest in global change, their preferred contents and feeling, the best communication options and which public figures are more likely to support a scientific project in Portugal.

To sum up, it is expected that we further understand how we can optimise scientific communication, especially in a social media context. It is important to give scientists and professionals working with scientific communication the tools so they can have full control over how their work is presented to the public and what are the most effective ways to keep people interested and engaged. This will allow them to not be so dependent on journalists or newspapers and still be able to reach a wide audience.

2. Objectives

This study will focus on the general public's perceptions of global change by analysing social media platforms and direct answers through surveys with the aim to 1) determine public perception of global change, their interest in such matters and knowledge gaps; 2) identify which environmentally-related posts are preferred by the general public, looking at their content; 3) identify the best communication options for science and 4) analyse the sensibility of public figures to environmental themes. Through the analysis of these two big data sources, I aim to answer the following questions, organised in four main categories:

1. Public perception and interest

1.1. What is the level of interest about global environmental changes?

1.2. What is the level of perceived knowledge about global environmental changes?

1.3. Which of the United Nations-Sustainable Development Goals list concern the public the most?

1.4. Which of the IUCN Global Threats to nature concern the public the most?

1.5. Does the public think that the consequences of global threats to nature may affect their daily life now or in the future?

1.6. Does the public think that presently there is sufficient information about global threats to nature in the news?

1.7. Does the public think that current climate disasters are generally caused by Climate Change?

1.8. When seeing news about climate disasters, does the public think that the media generally relates them with Climate Change?

1.9. When seeing news about climate disasters, does the public think that the media presents the available solutions to mitigate the problem?

1.10. Does the public have any frequent contact with non-governmental organizations working on environmental issues?

1.11. If yes, do they usually receive information online or do they attend locally-organised activities?

2. Preferred contents and feelings

2.1. Which type of content inspires the public the most?

2.2. Which type of content is more attractive to the public and that will likely keep them following a particular page?

2.3. What categories have the most interactions?

2.4. Do posts with solutions have more interactions than posts without solutions?

2.5. Do posts that focus more on humans have more interactions than posts that focus on non-human factors?

2.6. Do positive posts have more interaction than negative posts?

3. Best communication options

3.1. What is the public's preferred way to obtain news about the environment?

3.2. If using social media, what is the preferred platform to obtain news about the environment?

3.3. When receiving news about environmental issues, what is the favourite media-support type?

4. Ambassadors

4.1. What does the public feel when entertainment or sports celebrities talk about environment issues?

4.2. What do they feel when politicians or corporation leaders talk about environment issues?

4.3. Which celebrity can the public relate as being concerned about environmental issues?

4.4. How frequently does the ambassador post about global changes?

4.5. Does the ambassador display originality in the posts?

4.6. Does the ambassador provide links to external information?

4.7. Does the ambassador attempt to provide solutions?

4.8. Which categories are most frequently published?

3. Methods

3.1. Data collection

In this study, two major data sources were used to answer the questions mentioned in Chapter 2. Objectives: social media data and survey data. These two sources allowed an analysis of the human responses to environmental related issues due to their nature of human interaction.

3.1.1. Social media data

Social media data were collected from four social media platforms: Instagram, Facebook, Twitter and TikTok. These platforms are currently the most popular social media for sharing pictures, videos and text related media. Therefore, these data allowed to examine profiles of several Portuguese public figures (n=126) from January 2020 to December 2021. Public figures were chosen based on their levels of influence, interest in the environment, and overall popularity status. This information was obtained according to marketing studies (Marktest, 2020), news sites (Dnotícias, 4gnews, JRA, NovaGente) and personal choice. Then, public figures were selected for analyses if they were present in at least two out of the four social media networks considered.

In total, 105,682 environmental and non-environmental related posts were analysed from the two years considered, where 990 were environmental related, according to categories previously established: Nature, Biodiversity, Consumption, Food, Pollution, Climate change, Disasters, Politics, Sustainability events, Recycling, and Combined (used when more than one category was present in one single post).

To study each environmental related post in terms of its content and interactions, I looked at the visual content (images, videos, infographics, etc.) and descriptive content. To then see the interactions, I compiled the number of likes, shares and comments from each post analysed. Posts were then categorized according to their characteristics (Table 1). I manually analysed all of these contents so no automatization procedure (API) was adopted, nor artificial intelligence.

Table 1. Characteristics of the posts analysed for the social media platforms.

Variables		Definition
Originality	0	Possible ambassador does not write an original text (not copy pasted from other sources)
	1	Possible ambassador writes an original text (not copy pasted from other sources)
Marketing	0	Possible ambassador does not advertise a product
	1	Possible ambassador advertises a product
External links	0	Possible ambassador does not repost someone else's work (news article, scientific paper, hyperlink, tweet, picture, etc.)
	1	Possible ambassador reposts someone else's work (news article, scientific paper, hyperlink, tweet, picture, etc.)
Solutions	0	Possible ambassador does not present solutions (presentation of eco-friendly products or services, etc.)
	1	Possible ambassador presents solutions (presentation of eco-friendly products or services, etc.)
Format	Text	Post only has text
	Photo	Post only has photo
	Video	Post only has video
	Infographics	Post only has infographics
	Hybrid	Post has a mixture of the above
Visual	Real	Photo/Video is non altered
	Non-real	Photo/Video is altered (animation, photoshop, drawing)
	Both	
Scale	Local	Region within a country
	Regional	One country

	Global	More than one country
	General	Not specific to a country
Type	Negative	Current disasters and their consequences on human life, on infrastructure for human use, on biodiversity and nature, negative forecasts, presentation of graphs, art, and information on the negative impact of humans on the planet, consequences of loss of biodiversity
	Positive	News that give hope, that show progress and improvements, successful conservation projects, sustainable measures implemented, sustainable solutions/measures to mitigate and prevent future catastrophes, positive predictions, general information on biodiversity and its importance, general information about anything (educational, usually presents solutions or speak on their theory)
Human	Non-human related	Anything that doesn't focus on humans, or mostly focuses on animal suffering, consequences on biodiversity, etc. Positive impacts on biodiversity, on the environment (when the post is mostly focused on that) Includes posts about wildlife rehab centres, conservation groups, wildlife magazines, etc.
	Human related	Posts that mostly show the impacts on humans, such as: texts drawing attention to the consequences that humans are currently suffering from or may suffer from in the future, images in which the focus is on the people, anything that directly or indirectly involves human impacts, thus including resources of human use such as destroyed houses, closed roads, destroyed crops and how this will result in: loss of money, lack of food, deaths etc. Also includes positive news about positive human impacts, positive individual changes (mostly centred around human culture, like products etc.)

3.1.2. Survey data

An online survey was conducted at an international level with a set of questions designed to analyse the questions established for this study (see Annex 1). Three versions of the survey were available, in order to reach as many people as possible globally: Portuguese, English and French. The fact that this survey was online, increased access to data that otherwise would not be possible remotely. Typeform was used to make this survey and all questions were mandatory (no option of "I don't know" was provided). The surveys allow researchers to generalize responses as sample sizes can usually be bigger and therefore, statistics are more accurate (Stern et al., 2014). Most universities require an approval of the surveys by the review board on ethics committee. This was done with the University of Porto and the University of Trás-os-Montes and Alto Douro.

All versions of the survey were available from September 30th 2021 to February 28th 2022. They were disseminated on social media platforms, through communication with family and friends, and by email. The targeted people were about 30,000 by email. In total, 1,047 responses were obtained, 61 in the French version, 814 in the Portuguese version, and 172 in the English version.

3.2. Data analyses

The analysed data came from two different sources (social media platforms and surveys) (Table 2).

Table 2. Questions and respective data sources.

	Questions	Source
1	*Public perception and interest*	
1.1	What is the public's level of interest about global environmental changes?	Inquiry
1.2	What is the level of perceived knowledge about global environmental changes?	Inquiry
1.3	Which United Nations-Sustainable Development Goals concern the public the most?	Inquiry
1.4	Which IUCN Global Habitat Threats to nature concern the public the most?	Inquiry

1.5	Does the public think that the consequences of global threats to nature (e.g. biodiversity loss, climate disasters, food shortage) may affect their daily life now or in the future?	Inquiry
1.6	Does the public think that presently there is sufficient information about global threats to nature in the news?	Inquiry
1.7	Does the public think that current climate disasters (e.g. floods, storms, hurricanes, fires) are generally caused by Climate Change?	Inquiry
1.8	When seeing news about climate disasters, does the public think that the media generally relates them with Climate Change?	Inquiry
1.9	When seeing news about climate disasters, does the public think that the media presents the available solutions to mitigate the problem?	Inquiry
1.10	Does the public have any frequent contact with non-governmental organizations working on environmental issues?	Inquiry
1.11	If yes, do they usually receive information online (e.g. Facebook, Instagram) or attend locally-organised activities?	Inquiry
2.	*Preferred contents and feelings*	
2.1	Which type of content inspires the public the most?	Inquiry
2.2	Which type of content is more attractive to the public and that will likely keep them following a particular page?	Inquiry
2.3	What categories have the most interactions?	Social media
2.4.	Do posts with solutions have more interactions than posts without solutions?	Social media
2.5.	Do posts that focus more on humans have more interactions than posts that focus on non-human factors?	Social media
2.6.	Do positive posts have more interaction than negative posts?	Social media
3.	*Best communication options*	
3.1	What is the preferred way to obtain news about the environment?	Inquiry
3.2	If using social media, which is the preferred platform to obtain news about the environment?	Inquiry
3.3	When receiving news about environmental issues, what is the favourite media-support type?	Inquiry

4.	Ambassadors	
4.1	What does the public feel when politicians or corporation leaders talk about environment issues?	Inquiry
4.2	What does the public feel when entertainment or sports celebrities talk about environment issues?	Inquiry
4.3	Which celebrity can the public relate as being concerned about environmental issues?	Inquiry
4.4	How frequently does the ambassador post about global changes?	Social media
4.5	Does the ambassador display originality in the posts?	Social media
4.6	Does the ambassador provide links to external information?	Social media
4.7	Does the ambassador attempt to provide solutions?	Social media
4.8	Which categories are most frequently published?	Social media

Data retrieved from the survey were then entered in a database (Excel format) where they were analysed.

3.3. Statistical analyses

All questions from the data sets were analysed statistically through a Goodness of Fit test, more specifically a chi-square test. This method was adopted as the answers simply needed to be verified if they were significant or not.

4. Results

4.1. Socio-demographic analyses

The socio-demographic analyses were conducted taking into consideration the nationality, the age, the sex, the level of education and the annual income of each person who responded to the survey. These analyses showed that there were significant differences in all aspects considered. According to the nationality, Portugal shows 80.5% of the population answering the survey (GFT, $\chi = 20104.87$, df=31; $p << 0.001$); in terms of age, there were also significant differences (GFT, $\chi = 626.23$, df=5; $p << 0.001$) where

people born between 1990s and 2000s responded to the surveys the most (67%); women had a higher rate than men (61.4%) (GFT, χ= 67.04, df=1; p<<0.001); in terms of education, the survey was mostly answered by people with tertiary education level (GFT, χ= 706.87, df=2; p<<0.001); income also played a difference with people with lower income having more responses than people with higher income (GFT, χ=858.08, df=4; p<<0.001).
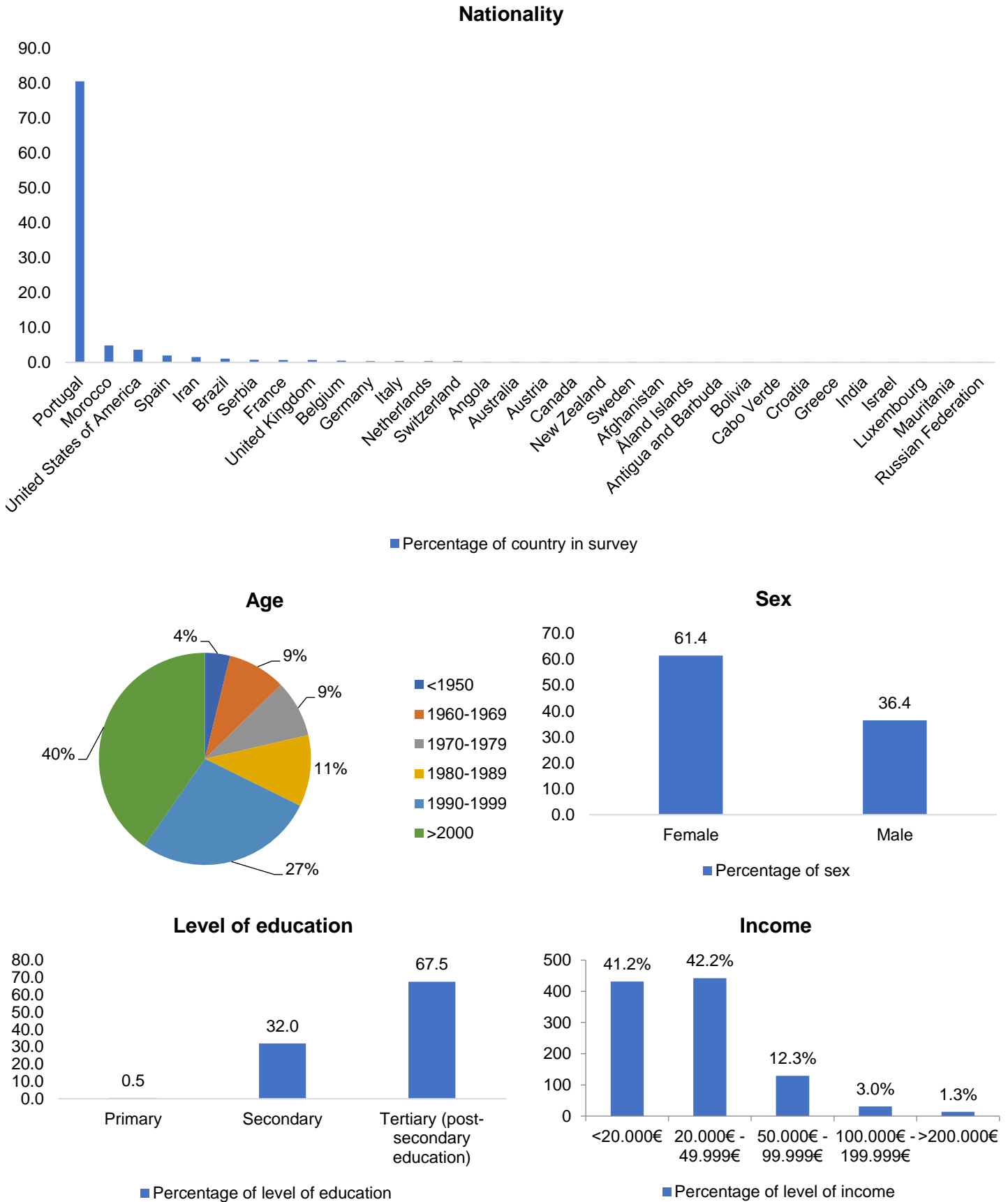
Nationality

■ Percentage of country in survey

Age

- ■ <1950
- ■ 1960-1969
- ■ 1970-1979
- ■ 1980-1989
- ■ 1990-1999
- ■ >2000

Sex

■ Percentage of sex

Level of education

■ Percentage of level of education

Income

■ Percentage of level of income

Figure 11. Socio-demographic values evaluated in survey; Nationality, age, sex, level of education, and annual income.

4.2. Public perception and interest

From the survey data obtained, while people are very interested in themes about global environmental changes (56%; question 1.1 on Figure 12), the level of perceived knowledge is not that high, with answers 3 and 4 representing the vast majority of the responses (80%) (question 1.2. on Figure 12).

1.1. What is the level of interest about global environmental changes?
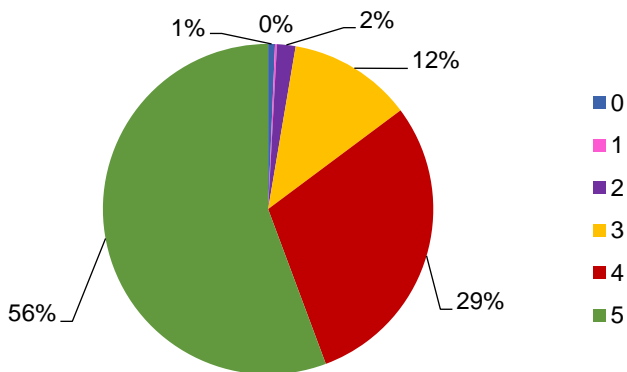
1.2. What is the level of perceived knowledge about global environmental changes?
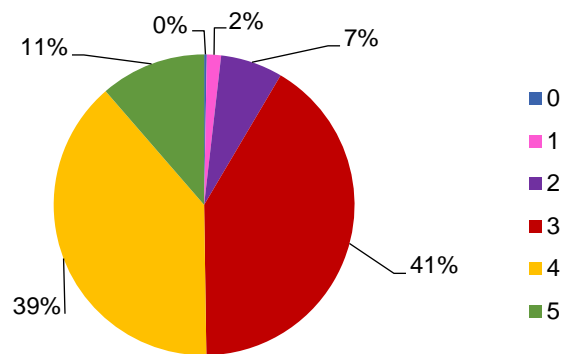
Figure 12. Levels of interest (Left image: 0: n= 7; 1: n= 2; 2: n=19; 3: n= 127; 4: n= 309; 5: n= 583) and perceived knowledge (Right image: 0: n= 3; 1: n= 16; 2: n= 70; 3: n= 432; 4: n= 407; 5: n= 119) about global environmental changes obtained from the surveys.

From the United Nations Sustainable Development Goals (question 1.3.), Climate Action (n= 455), followed by No poverty (n= 374) and Zero hunger (n= 350) are the subjects that concern the public the most (Figure 13).

1.3. UN Sustainable Development Goals
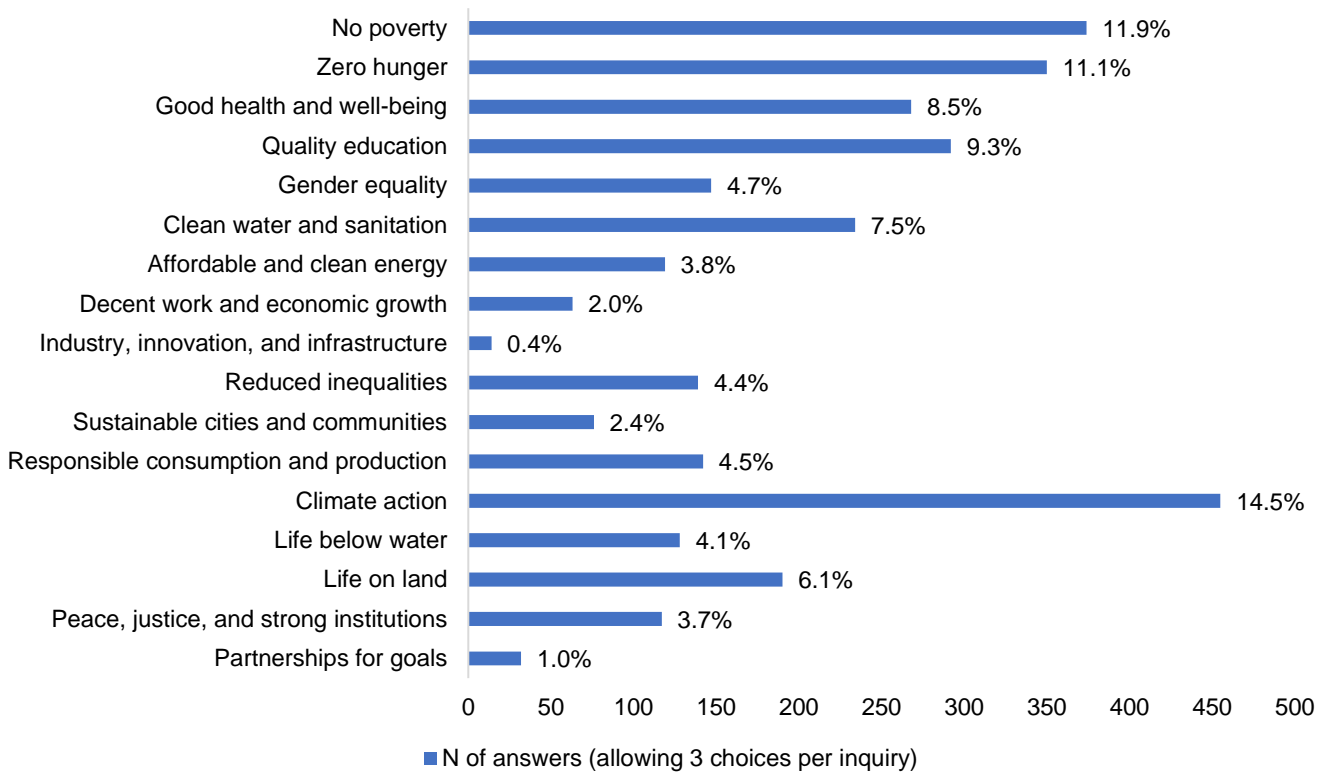
Figure 13. Number of answers reporting interest in each of the United Nations Sustainable Development Goal in order to see what goals concern the public the most.

From the IUCN Global Habitat Threats to nature (question 1.4.), Climate Change (n= 665) and Pollution (n= 663) were the ones that concern the public the most, while Fire occurrence (n= 118) and Transportation and service corridors development (n=33) having the least concern (Figure 14).

1.4. What global threats to nature concerns the public the most?
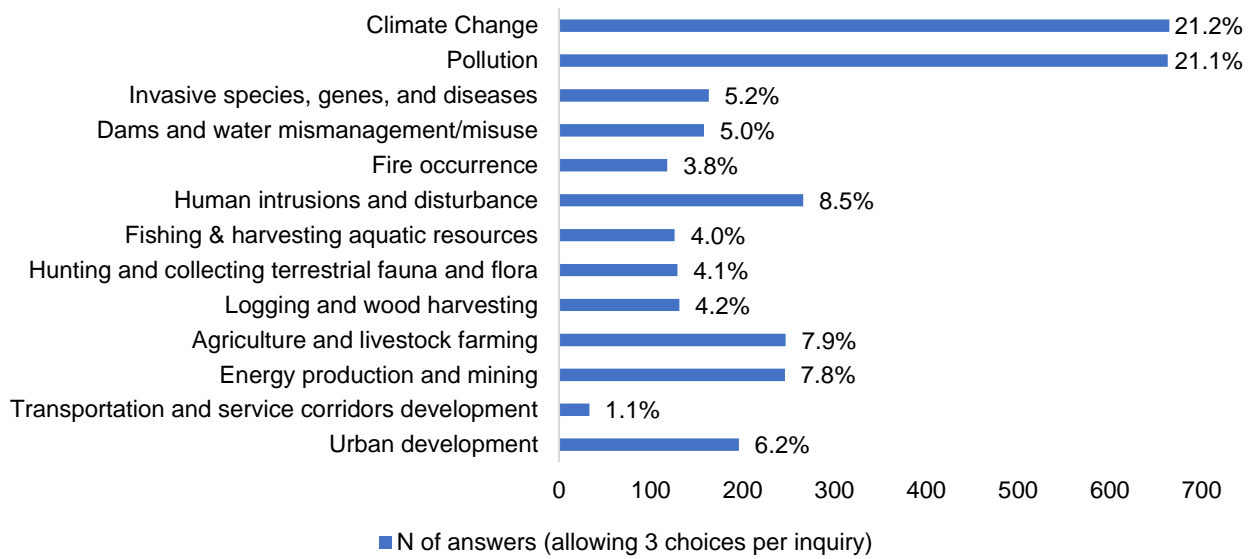
Figure 14. Number of answers reporting interest in each of the IUCN Global Habitat Threats in order to see what global threats to nature concern the public the most.

From the following questions asked on the survey (questions 1.5 to 1.10; Figure 15), all exhibited significant differences in replies, except question 1.8 (GFT, χ= 2.89, df=1; p= 0.089) which suggests that it is unclear if the public thinks that the media relates climate disasters with climate change. Replies to questions 1.5 and 1.7 suggest that the public is conscious of the consequences of global threats now and in the future, and that current climate disasters are caused by Climate Change. Apparently, the public considers the currently available information in the news about these threats insufficient. It also considers that the media does not document the current available solutions to mitigate the problem adequately (questions 1.6 and 1.9). The public also does not have any frequent contact with non-governmental organizations (NGOs) (question 1.10; Figure 15). When there is frequent contact with NGOs, it is more online (n=167) than local activities (n=33) (question 1.11; Figure not shown).

Public perception
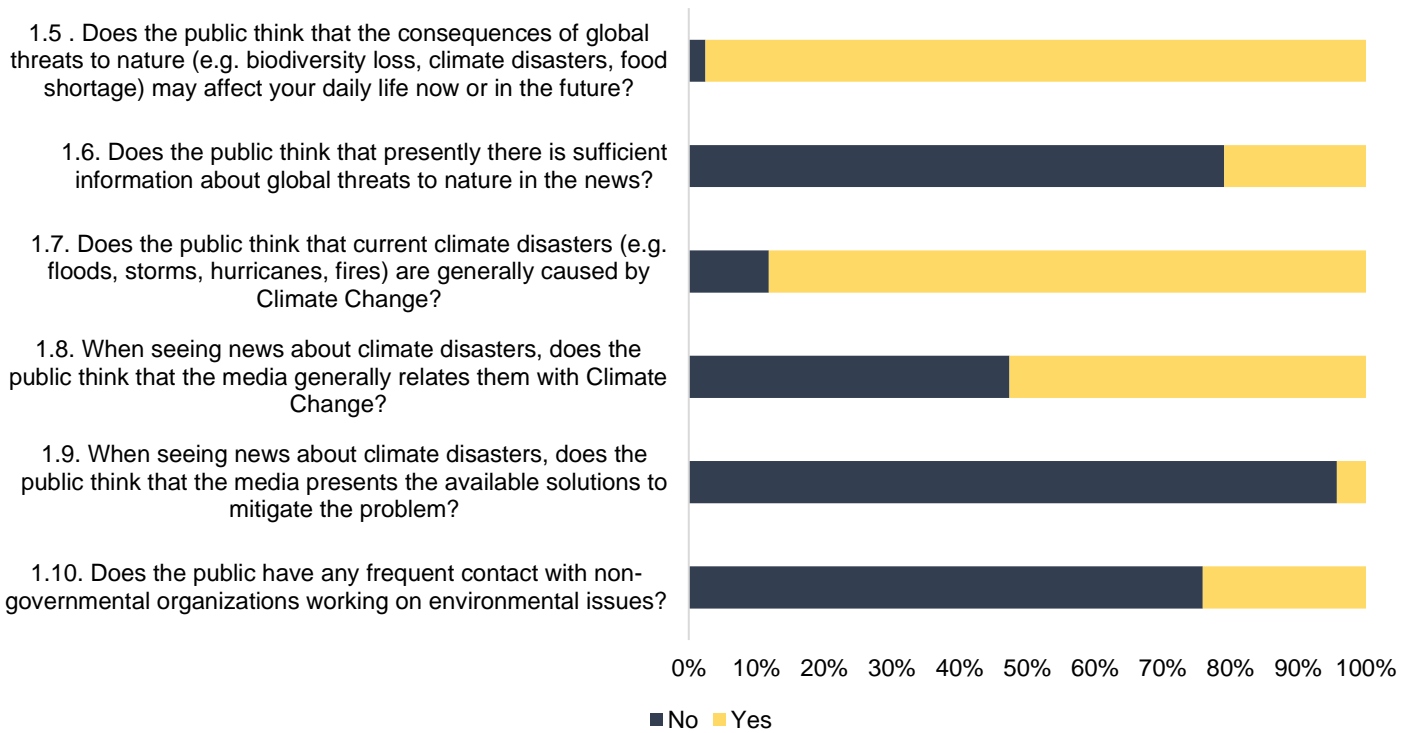
Figure 15. Public perception on multiple questions about public perception and interest obtained from the surveys (N= 1047).

4.3. Preferred contents and feelings

Apparently, the public prefers Natural (N=4605) over Cultural or Urban categories as type of contents that inspire the most, but choose the Cultural (N=2780) over Urban (N=2038) categories (question 2.1; Figure 16).
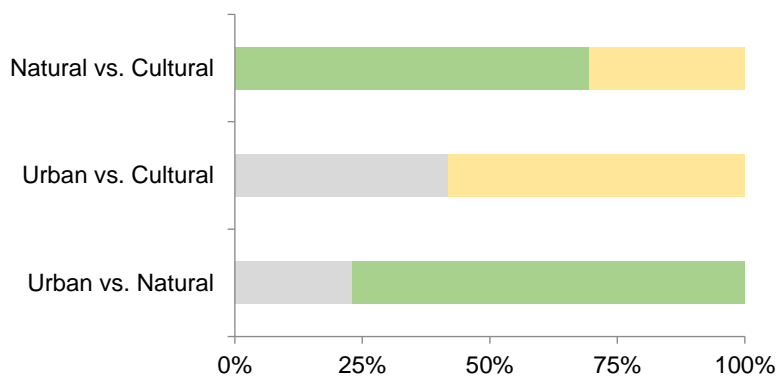
Figure 16. Type of content that inspires the public the most (obtained from surveys).

Half of the repliers suggested that the public prefers social media posts that exhibit a combination of all studied variables (Actions and initiatives; Natural features; Initiatives and Natural features; Threat activities and impacts; Combination of all) and that posts with single contents are the least preferred (Natural features with 9% and Threat activities and impacts with 8%) (question 2.2; Figure 17).

2.2. Which type of content is more attractive to the public and that will likely keep them following a particular page?
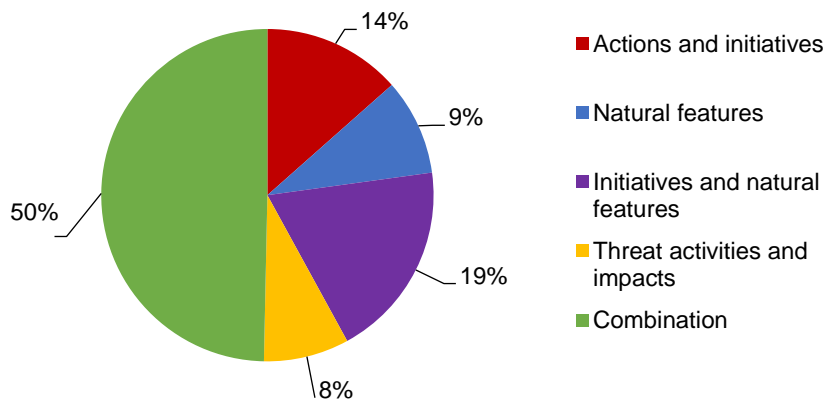
Figure 17. Type of content more attractive to the public and that will likely keep them following a particular page: Actions and initiatives (n=141); Natural features (n=98); Initiatives and natural features (n=201); Threat activities and impacts (n=87); Combination (n=520).

The interactions of posts like the number of likes and the number of comments on each post (question 2.3.) have categories such as Nature, Biodiversity and Pollution as the ones with the most interactions on most platforms, with Consumption with high numbers as well. On Twitter, the posts with the most interactions are related to politics (Figure 18).
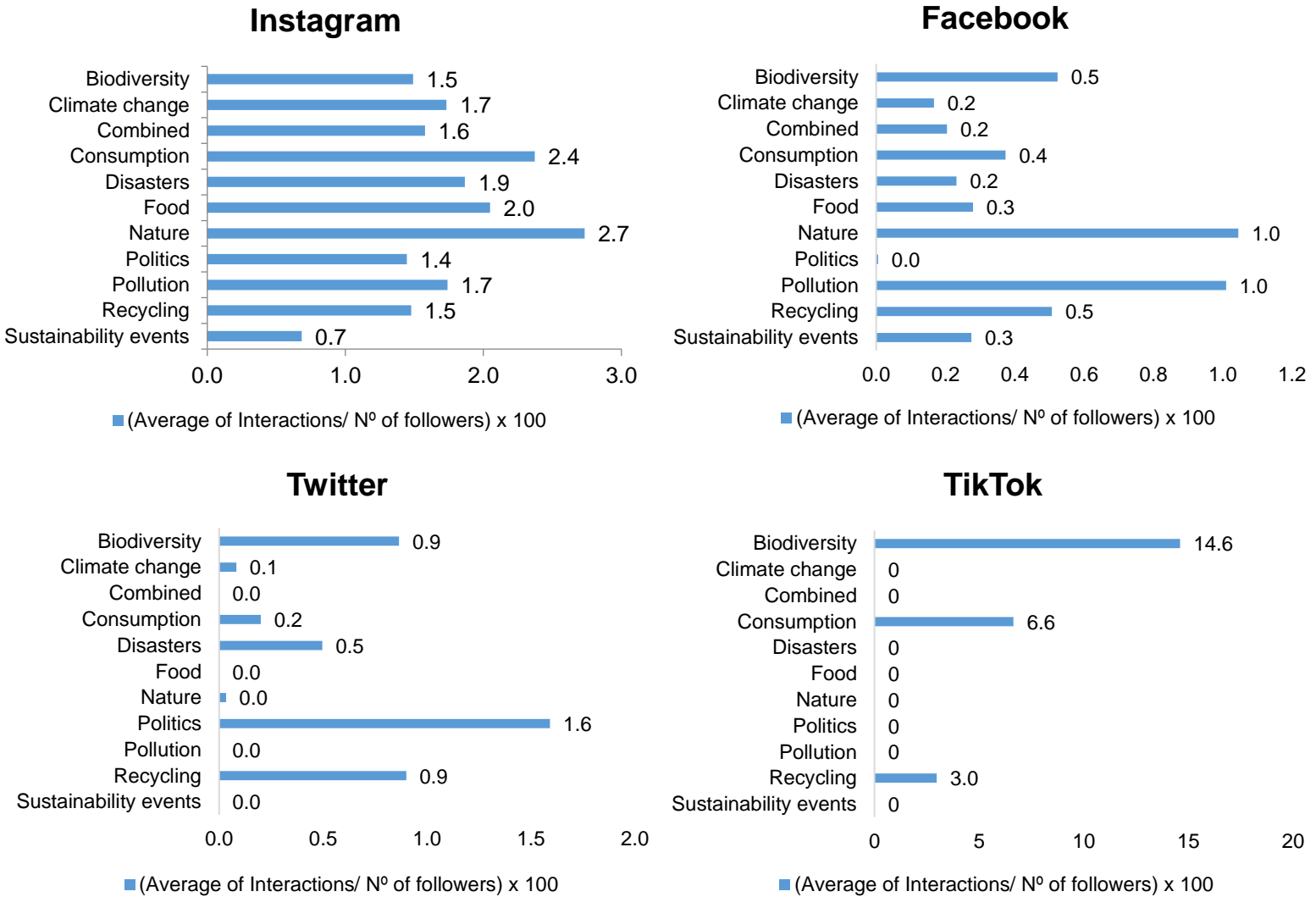
Figure 18. Percentage of the average of interactions divided by the number of followers of each public figure analysed.

Posts on Instagram, Facebook and TikTok from public figures tend to present solutions for environmental issues, but not on Twitter (question 2.4; Figure 19, left). Posts on Facebook, Twitter, TikTok presenting those solutions do not necessarily generate more interactions with the public, but they do so on Instagram (non-significant differences) (Figure 19, right).
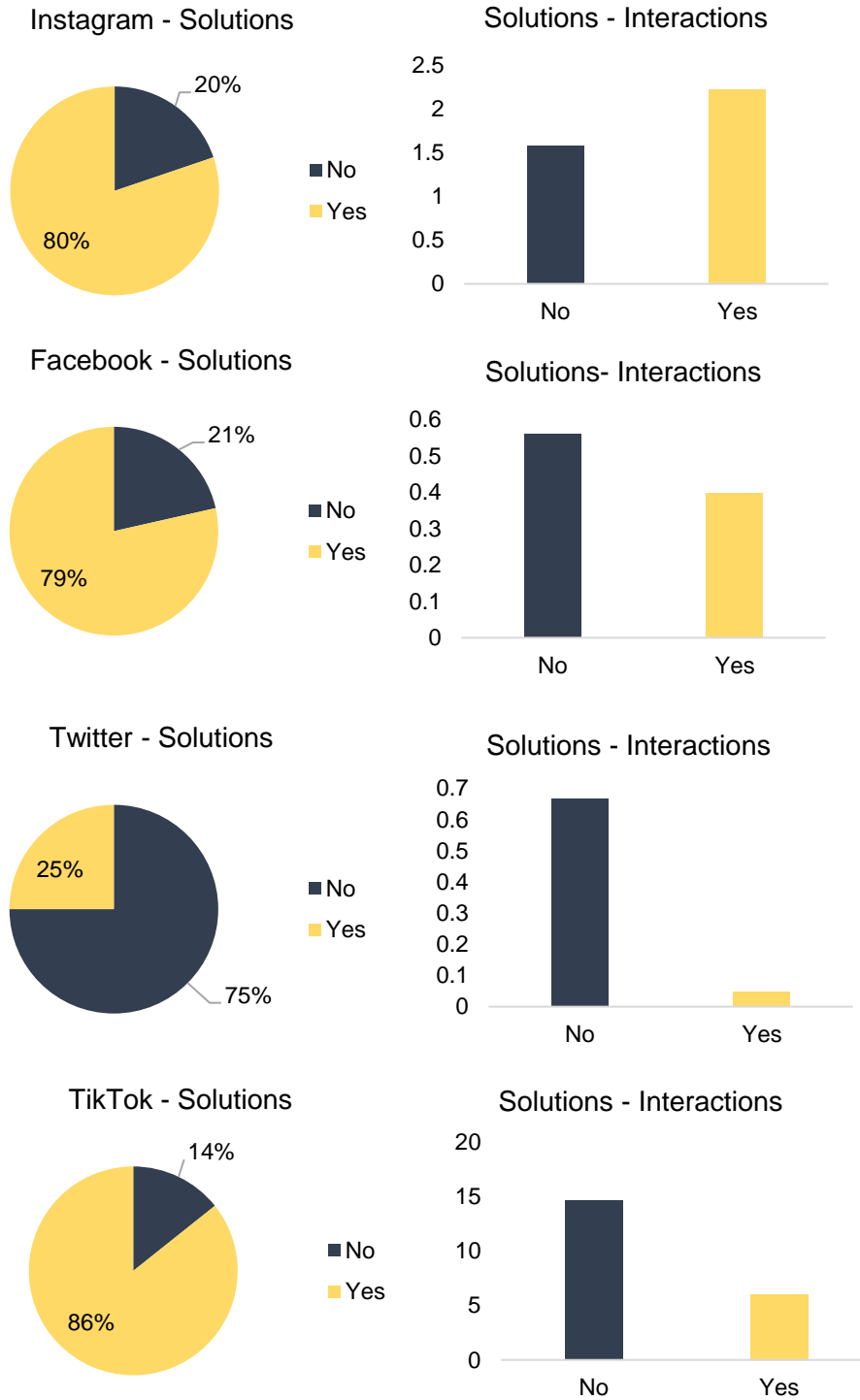
Instagram - Solutions

Solutions - Interactions

Facebook - Solutions

Solutions- Interactions

Twitter - Solutions

Solutions - Interactions

TikTok - Solutions

Solutions - Interactions

Figure 19. Frequency of posts with solutions in all social networks (left) and interactions of posts with solutions for the respective social network (right).

Posts on Instagram, Facebook and TikTok from public figures tend to be less human-related, but not on Twitter (question 2.5 Figure 20, left). Posts related to humans tend generate more interactions with the public only on Instagram, and less so in the other social media analysed (non-significant differences) (question 2.5; Figure 20, right).
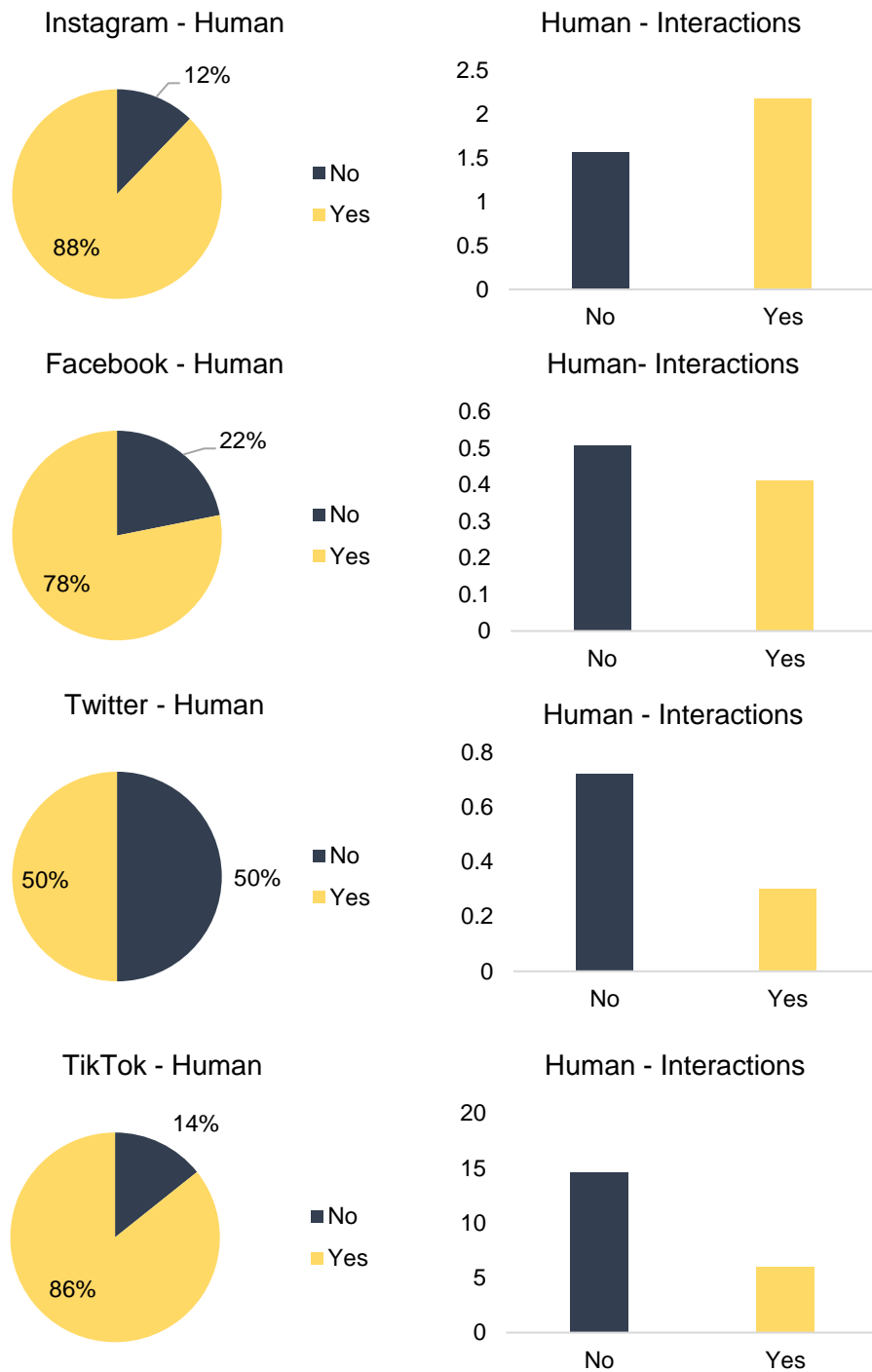
Figure 20. Frequency of posts with human impacts for all social networks (left), and interactions with humans impacts for the respective social network (right).

On Instagram and Facebook, posts from public figures were more positive related than negative, with Twitter showing more negative themes (question 2.6; Figure 21, left). The interactions, although not significant, show that more positive posts tend to have more

interactions than negative ones, except on Twitter (question 2.6; Figure 21, right). All posts on TikTok were positive (Figure not shown).
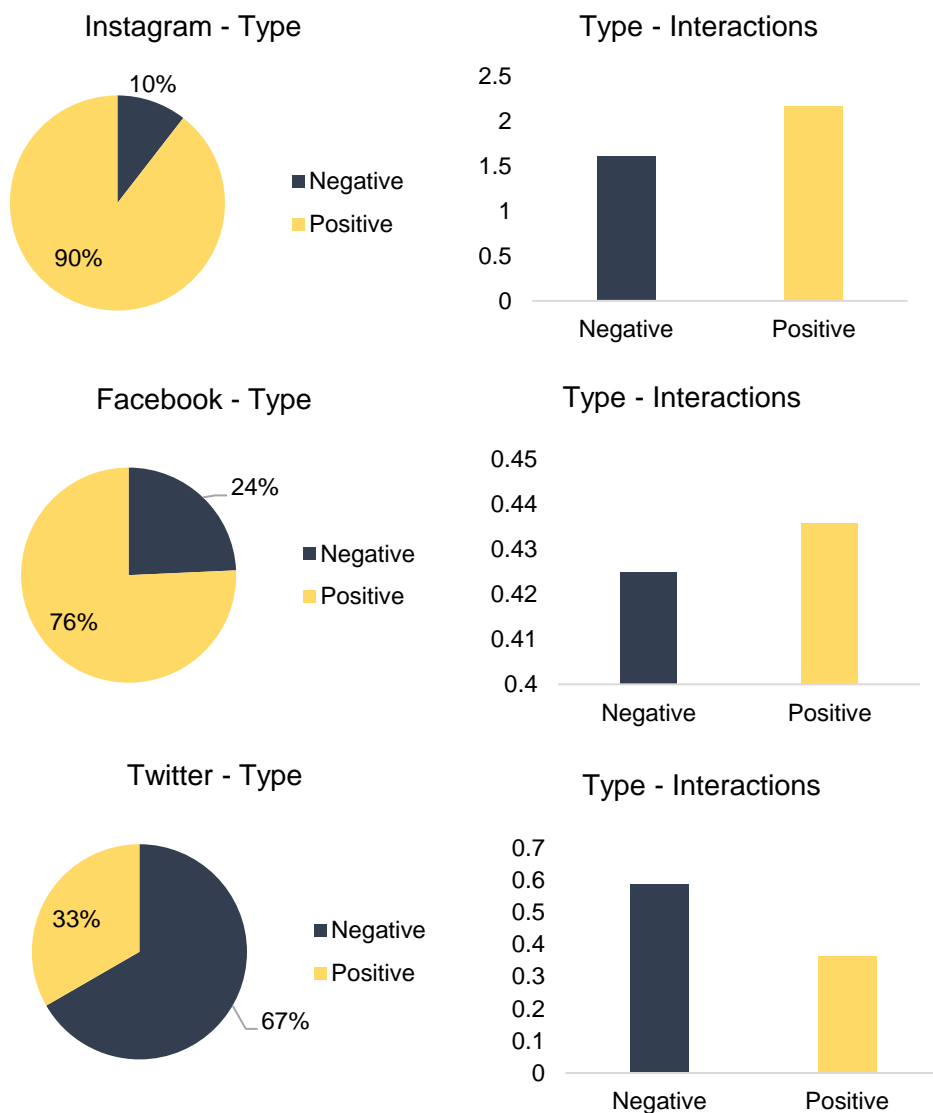
Figure 21. Frequency of posts with negative or positive themes for all social networks (left) and interactions with type of post for the respective social network (right).

4.4. Best communication options

The majority of people answering the survey chooses scientific publications (n= 327) as a way to obtain news about the environment. However, social platforms are a second favourite, with News websites (n=287) and Social media (n= 277), followed by Television (n= 130) and Printed newspapers (n=26) (question 3.1; Figure 22).

3.1. What is the preferred way to obtain news about the environment?
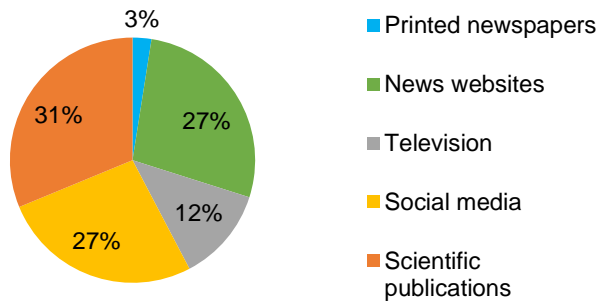
Figure 22. Data from survey to know the preferred means of communication when it comes to the environment.

Within social media platforms, Instagram is the preferred way to obtain news about the environment (n= 351), followed by Facebook (n= 198), YouTube (n= 187) and Twitter (n= 177). TikTok is the least preferred way to obtain news about the environment (n= 14) and 120 people choose other social networks (question 3.2; Figure 23).

3.2. If using social media, which is the preferred platform to obtain news about the environment?
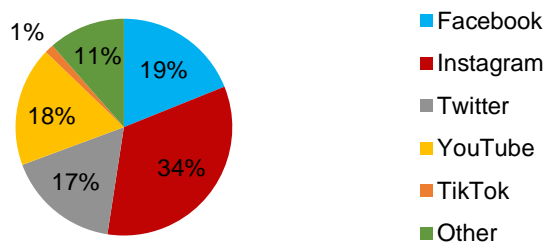
Figure 23. Data from survey to know the preferred social media networks when it comes know information about the environment.

When receiving news about environmental issues, the favourite media-support type is Video (n= 358), followed by Text (n= 317), Infographics (n= 242), and Photography (n= 130) (question 3.3.; Figure 24).

3.3. When receiving news about environmental issues, what is the favourite media-support type?
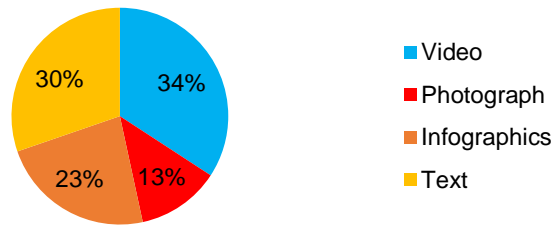
Figure 24. Data from survey to know the preferred media support type when it comes know information about the environment.

4.5. Ambassadors

When politician/corporation leaders (question 4.1) or public figures (question 4.2) talk about environmental issues, most of the public that answered the survey reacted with Happiness (n= 438 and n= 543, respectively) or Indifference (n= 195 and n= 322; respectively) (Figure 25). The following most common emotion shown was Surprise (n= 191 and n= 122, respectively). And people feel more anger when politicians or corporations talk about environmental issues (n= 170) than when entertainment or sports celebrities do so (n= 34).

4.1. What does the public feel when politicians or corporation leaders talk about environment issues?
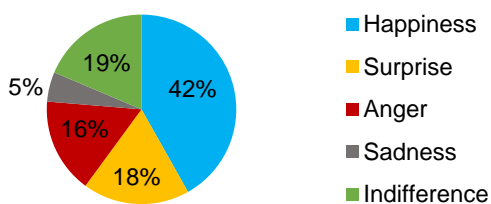
4.2. What does the public feel when entertainment or sports celebrities talk about environment issues?
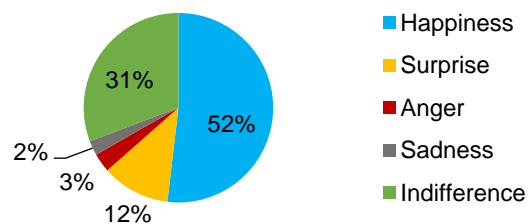
Figure 25. How the general population feels when public figures talk about environmental issues.

From the various names that were mentioned on the survey (question 4.3; Figure 26) as being genuinely concerned about the environment, Leonardo DiCaprio (n= 325) and Greta Thunberg (n= 116) represent half of the pie chart. They are followed by Bill Gates

(n= 27), David Attenborough (n= 24), António Guterres (n= 22), Emma Watson (n= 22), Angelina Jolie (n= 21), Bono (n= 17), Gisele Bündchen (n= 17), Al Gore (n= 14), and Catarina Gouveia (n= 12). Other various names were chosen by 267 people.

4.3. Name one celebrity that you can relate as being concerned about environmental issues
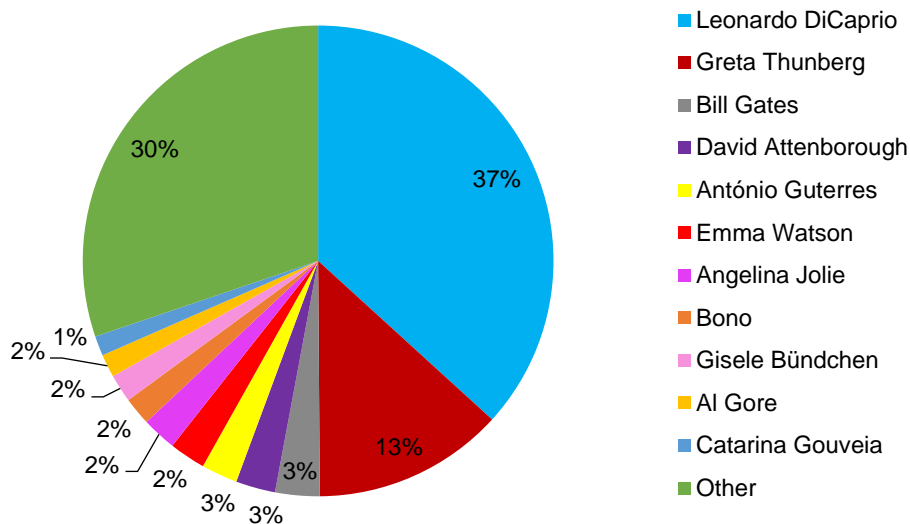
Figure 26. Which celebrities the public sees as being genuinely concerned about environmental issues. For this question we only had 884 valid answers and 173 celebrities were named.

From a total of 126 public figures analysed, 88 of them (69%) posted about environmental themes somewhere in between January 2020 and December 2021. However, only seven of them (5%) posted about global change more than 10% of the time, and only two of them (1.6%) posted about global changes more than 50% of the time. Some public figures who posted about global change 0.1% of the time, such as Rita Guerra and Kelly Bailey, for example, showed 100% originality, provided external links for all posts and solutions as well (Questions 4.4 to 4.7; Table 3).

Table 3. Frequency of posts about global changes, originality in the posts, external links and solutions provided by the public figures.

Public figures	% Global change	% Description	% External links	% Solutions
Catarina F. P. Barreiros	52.7	100.0	58.4	89.7
Isabel Silva	52.6	100.0	91.4	86.2
Ana Varela	29.7	100.0	84.5	93.1
Pedro Fernandes	29.1	98.2	61.4	78.9
Sylvie Dias	19.0	100.0	50.0	75.0
João Cajuda	17.5	94.4	66.7	83.3
Leonor Poeiras	13.0	84.0	84.0	56.0
Madalena Brandão	7.2	100.0	71.0	77.4
Carolina Loureiro	5.6	100.0	82.4	88.2
Joana Seixas	5.1	100.0	73.7	89.5
A melhor amiga da Barbie (Ana Gomes)	5.0	100.0	43.8	93.8
João Manzarra	3.8	100.0	52.4	100.0
Margarida Corceiro	3.4	100.0	100.0	100.0
Catarina Furtado	3.1	100.0	92.7	95.1
Alice Trewinnard	3.0	100.0	85.7	92.9
Toy	2.8	60.0	80.0	40.0
Sofia Barbosa	2.5	100.0	100.0	100.0
Afonso Lopes	2.4	100.0	100.0	50.0
Nuno Markl	2.3	100.0	33.3	12.5
Vanessa Martins	2.1	100.0	100.0	100.0
Jorge Gabriel	1.8	100.0	6.3	0.0
Bruno Nogueira	1.8	57.1	57.1	14.3
Rita Pereira	1.8	100.0	100.0	100.0
Ricardo Pereira	1.7	100.0	75.0	75.0
Rui Unas	1.6	100.0	28.6	28.6
Bumba na Fofinha (Mariana Cabral)	1.5	100.0	0.0	50.0
Fátima Lopes	1.5	100.0	78.6	73.8
Jessica Athayde	1.3	100.0	100.0	92.3
Nilton	1.2	100.0	66.7	0.0
Mariana Machado	1.2	100.0	27.3	100.0
Cláudia Vieira	1.2	100.0	53.8	76.9
Inês Rochinha	1.1	100.0	50.0	100.0
Mia Rose	1.1	100.0	100.0	100.0
Diogo Branco	1.0	100.0	100.0	33.3
Bernardo Almeida	1.0	100.0	100.0	100.0
Helena Coelho	0.9	100.0	50.0	100.0
Quimbé	0.9	100.0	100.0	100.0
Ana Marta Ferreira	0.9	100.0	100.0	100.0
Inês Castel-Branco	0.9	100.0	100.0	40.0
Luís Represas	0.8	100.0	100.0	75.0
Tânia Ribas de Oliveira	0.8	100.0	75.0	50.0
Dânia Neto	0.8	100.0	85.7	85.7
Por Falar Noutra Coisa (Guilherme Duarte)	0.7	100.0	0.0	0.0
Joana Barrios	0.6	100.0	50.0	75.0
Marta Faial	0.6	100.0	100.0	100.0

A Pipoca Mais Doce (Ana Garcia Martins)	0.6	100.0	91.7	75.0
Fernando Mendes	0.5	100.0	77.8	100.0
Agir	0.5	100.0	42.9	14.3
Maria Vaidosa (Mafalda Sampaio)	0.5	100.0	75.0	100.0
Carolina Patrocínio	0.5	100.0	66.7	100.0
Sofia Ribeiro	0.5	100.0	75.0	100.0
Daniela Ruah	0.5	100.0	66.7	100.0
Vasco Palmeirim	0.4	100.0	100.0	100.0
Júlia Pinheiro	0.4	87.5	50.0	100.0
Filomena Cautela	0.4	66.7	100.0	100.0
Inês Mocho	0.4	100.0	100.0	100.0
Lourenço Ortigão	0.4	100.0	100.0	100.0
Sónia Araújo	0.4	100.0	25.0	100.0
Mafalda Creative	0.4	100.0	0.0	0.0
Sara Sampaio	0.3	100.0	100.0	100.0
Angie Costa (Ângela Costa)	0.3	100.0	50.0	100.0
Môce Dum Cabréste (Dário Guerreiro)	0.3	100.0	0.0	0.0
Bárbara Inês	0.3	100.0	100.0	100.0
Jorge Corrula	0.3	100.0	100.0	100.0
Manuel Marques	0.3	100.0	66.7	0.0
Manuel Moreira	0.3	66.7	66.7	100.0
Gisela João	0.3	75.0	25.0	25.0
Windoh (Diogo Silva)	0.3	0.0	100.0	0.0
Diogo Infante	0.3	100.0	0.0	0.0
António Raminhos	0.3	100.0	83.3	83.3
Miss Fit (Mariana Rocha)	0.3	100.0	50.0	50.0
Bárbara Corby	0.2	100.0	100.0	100.0
Sílvia Alberto	0.2	100.0	100.0	0.0
Raquel Strada	0.2	100.0	100.0	0.0
Isaac Alfaiate	0.2	100.0	100.0	0.0
Joana Duarte	0.2	100.0	100.0	100.0
RicFazeres (Ricardo Fazeres)	0.2	100.0	0.0	0.0
Mariza	0.2	100.0	0.0	0.0
Cristina Ferreira	0.2	100.0	100.0	100.0
Pedro Teixeira	0.1	100.0	50.0	100.0
Sofiabbeauty (Sofia Barbosa)	0.1	100.0	100.0	0.0
Sea3P0 (Catarina Lowndes)	0.1	100.0	100.0	100.0
Bárbara Bandeira	0.1	100.0	100.0	100.0
Rita Guerra	0.1	100.0	100.0	100.0
Sara Matos	0.1	100.0	100.0	0.0
Kelly Bailey	0.1	100.0	100.0	100.0
Owhana (Ana Catarina Ribeiro)	0.0	100.0	100.0	100.0
Alexandre Santos	0.0	0.0	100.0	0.0

In all social platforms except Twitter, Consumption is the category mostly posted by public figures. On Twitter, Biodiversity is the category mostly posted, followed by Climate Change. (question 4.8; Figure 27)
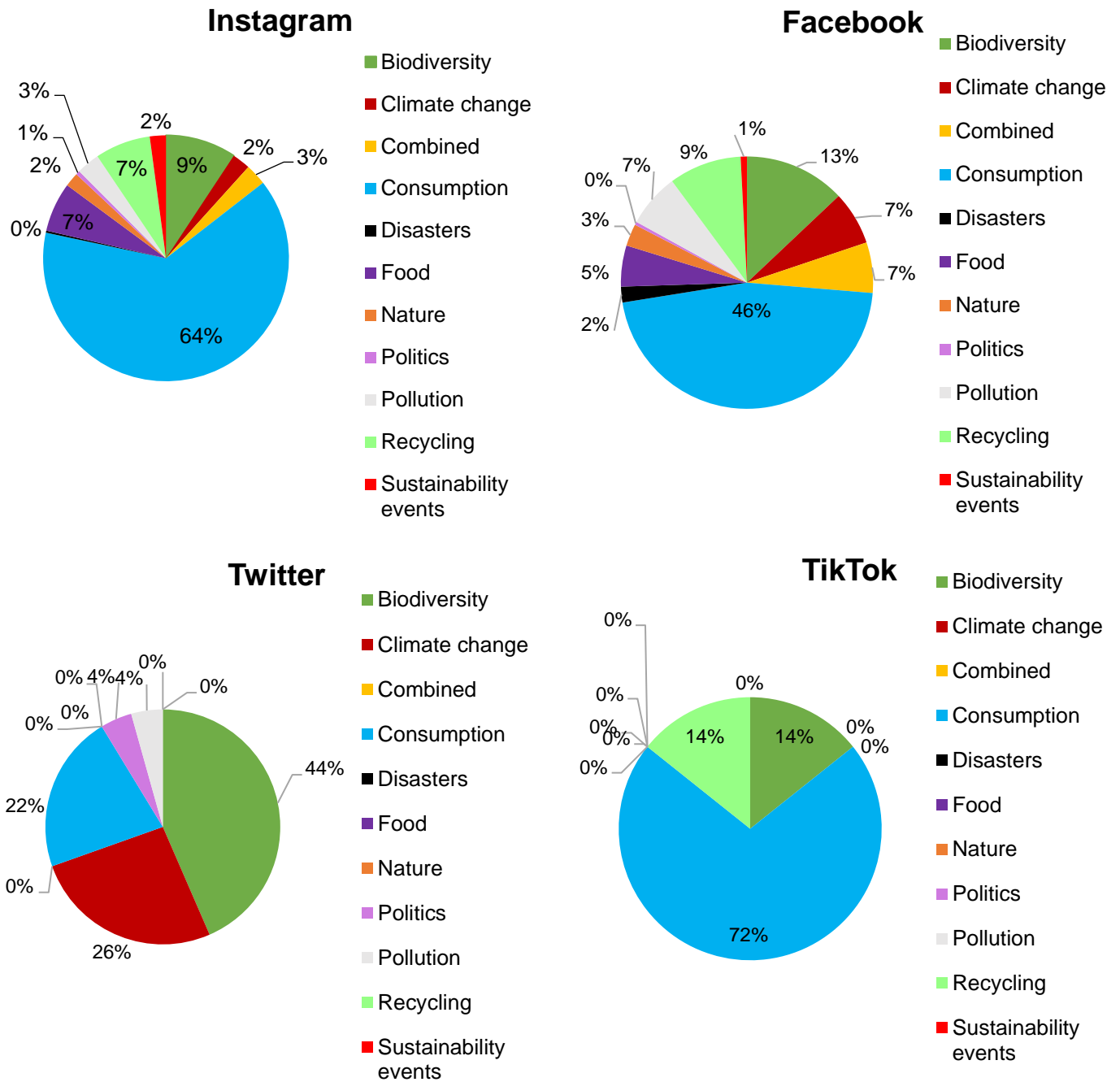
Figure 27. Frequency of posts per category in each social platform.

5. Discussion

In this work, I tried to find what the general public was more interested in when it comes to global change, what their knowledge was, what were the best ways to capture their attention in social platforms and what known Portuguese public figures were best to disseminate about these issues. I found that while the public is very interested in these matters, there is a knowledge gap, that themes such as climate change and human related ones are of most concern, that social media can provide a lot of ambiguous information, that the category "Consumption" was mostly posted by public figures - although not the most chosen by the public, that people prefer online content with positive and negative aspects, that people have a preference for non-human related content than human-related content, that scientific publications and Instagram are the preferred ways to obtain news about the environment-andespecially in the form of video. In the paragraphs below, the public perception and interest of the public, the preferred contents and feelings, the best communication options and the possible ambassadors will be discussed.

5.1 Public perception and interest

While the respondents declared to be very interested (56%) about global environmental issues, many considered that they do not have much knowledge about the topic (41%). This knowledge gap may happen for several reasons. There is a lack of clear communication about these issues or there is not enough contact with NGOs. The lack of clear communication can be observed in question 1.6 ("Does the public think that presently there is sufficient information about global threats to nature in the news?"), where the public stated that there is insufficient information in the news about these themes. Subsequently, question 1.10 ("Does the public have any frequent contact with non-governmental organizations working on environmental issues?") revealed that the public have little contact with NGOs. Moreover, certain topics about global environmental change, such as climate change, are a very controversial point in the news. This has much to do with political ideas that contribute to people being unaware of its real causes and consequences (Whitmarsh, 2011). Another misconception alongside climate change is biodiversity loss, where there is a lack of awareness regarding species' conservation status due to their omnipresence in our media (Courchamp et al., 2018). In conclusion, there is a clear interest in learning more about these issues but our main sources of knowledge, such as the media and work from NGOs, are not reaching the public. More

actions need to be made by these two sources so they can reach wider audiences and clear remaining doubts the public might have.

From the list of 17 Sustainable Development Goals of the United Nations, the "Climate action" was the one that the surveyed public selected as the most important (14.5%), followed by "No poverty" (11.9%) and "Zero hunger" (11.1%). A possible explanation for this is the amount of media focused around climate change, usually so much that more than a third of people globally (37%) said that they are "*tired of the fuss that is being made about the environment*" (Trumbo & Shanahan, 2000). However, the selection of the categories "No poverty" and "Zero hunger" show that people are worried about themes that have to do with humanitarian concerns. This pattern was previously found by Hayward et al. (2007), when people from the UK declared more importance about health, economy, and crime issues, rather than on climate change; the former factors being more personal and present in their lives. Contrastingly, "Life on Land" and "Life below water" have a low percentage of importance, being less relevant to the everyday lives of individuals. This may be caused by the media coverage on these other "less present" issues currently standing three times lower than stories on Climate Change (Legagneux et al., 2018). In summary, climate change and humanitarian issues are at the top of concerns people have, while biodiversity matters are deemed as not so important. This can have to do with different media coverage of these different issues.

From the list of IUCN Global Habitat Threats to nature, "Climate action" was the one that the surveyed public selected has the most importance (21.2%), likely due to its popularity on the media. This was followed by "Pollution" because of its high relation to Climate change, but also because of its antiqueness. That is, because pollution has been a prominently discussed topic for many years, even outside of the scientific community (Figure 14). Once again, themes related to Biodiversity, such as "Invasive species", "Fishing and harvesting aquatic resources", "Hunting and collecting terrestrial fauna and flora", as well "Logging and wood harvesting" have low percentages, especially "Transportation and service corridors development". The latter has to do with road mortality and fragmentation of habitats, which is very important subject with a significant lack of information available. As mentioned above, stories related to biodiversity, disease, pollution, and deforestation are currently standing three times lower than stories on Climate Change (Legagneux et al., 2018). This may be related to people thinking that Climate Change is the main driver for consequences of Biodiversity loss. However, it has been found that this is not true; habitat loss, land-use change, and deforestation have more impacts than just climate change (Caro et al., 2022). As it has been studied, if research is done in "*well-developed, richer countries with cooler climates, there will be a*

natural tendency to focus on anthropogenic climate change (Pasgaard et al, 2015)" (Caro et al., 2022). Moreover, the way the descriptions were provided might have also led to certain misconceptions such as people thinking positively about categories such as fishing and hunting because it could be seen as a source of income whereas climate change and pollution are seen in a negative way.

More than 90% of the people on this study stated that the consequences of global threats may affect their daily lives now or in the future. This does not correspond to previous literature on the subject where it has been stated that people cannot think so far ahead in the future and that these issues seem distant rather than present in their daily lives (Lorenzoni et al., 2007). However, it must be mentioned that this study had some limitations and it may only represent a small group of people, such as ones with a tertiary education that are more informed about how these global changes may affect their lives.

More than 80% of the respondents replied that current climate disasters such as floods, storms, hurricanes, and fires are generally caused by Climate Change and are not just sporadic climate events. However, when asked if the media generally relates these disasters to Climate Change, 50% of the people answered "Yes" and "No", which once again shows us the ambiguity that the media has when it comes to Climate Change. It can be talked about excessively (Legagneux et al., 2018), but there also can be a lot of mixed information about it (Whitmarsh, 2011). For instance, when asked if people think that the media presents available solutions to mitigate the problem, more than 90% of the respondents answered "No" to the question. As such, fear-based approaches can represent a barrier to proper public engagement. One of the biggest critics on how environmental issues are communicated is the absence of solutions (Remillard, 2011), which then can lead to people feeling hopeless and without knowledge on how to help. This may be why there is no frequent contact with NGOs; when there is, most people answered that they received information online rather than by attending locally organised activities. This displays the benefits of social media, as it can reach a wider audience in a way that is fast, efficient, and less costly. However, as it can be shown above in this paragraph, it can also be a place for ambivalence with no actual clear information.

5.2 Preferred contents and feelings

When asked about what type of social media content is more attractive and is more likely to keep participants following a particular page, 50% answered a combination of human actions and initiatives, natural features, as well as threat activities and impacts. The latter was the least chosen. Based on previous literature, this further conveys that fear is likely

not a good strategy to keep people engaged because it makes them hopeless and desensitised to these issues. This can then lead them to believe their behavioural changes will not make a significant difference in the long run (O'Neill & Nicholson-Cole, 2009). Another of the least chosen content options was a page that contained only natural features, which shows that people most likely do not want to only see the beauty of things either.

The analysed interactions according to each social media network provided distinct results. On Instagram, the "Nature" category had the most interactions, followed by "Consumption" and "Disasters". On Facebook, there were most interactions with "Nature" and "Pollution". On Twitter, "Politics" had the most interactions, being a platform well-known for discussions of these matters (Small, 2011; Blair ,2013; McGregor & Mourão, 2016). On TikTok, "Biodiversity" was the category with most interactions. Therefore, themes related to "Nature", "Biodiversity" and "Pollution" also had a lot of interaction. "Consumption" had the most interaction on Instagram because solutions are usually published under this category by public figures that can be easily adopted by the general public.

Posts from public figures on Instagram, Facebook, and TikTok tended to present solutions to global change issues, while posts on Twitter frequently presented no solutions. In general, the interactions had a higher tendency towards posts with solutions than those that did not on Instagram. However, for every other social network, posts with no solutions had more interactions than posts with solutions. This was not expected as more positive content, such as posts with solutions, are expected to generate more engagement (i.e., more likes and comments) than posts without solutions (O'Neill et al., 2013). On Instagram, Facebook, and TikTok, posts from public figures tended to be more about human-related themes in comparison to other themes (e.g. nature or biodiversity), with Twitter showing half of its content being human-related. The interactions, although not significant, show that posts with non-human related themes have more interactions than posts with human-related themes for all social networks except Instagram. This, once again, contradicts works from O'Neill et al., 2009 and Braasch, 2013 that showed that human-related impacts generate a bigger response from the public. However, these studies were solely focused on climate change and not on other issues. This might explain the distinct patterns that were found. On Instagram and Facebook, posts from public figures were more positive related than negative, with Twitter displaying more negative themes. The interactions, although not significant, show that more positive posts tend to have more interactions rather than negative ones, except on Twitter. All posts from TikTok were positive. This was expected; more positive content, such as good

news, are expected to generate more engagement. Meanwhile, posts with negative content, such as disasters or containing hopeless views without solutions, are expected to have less interaction because they are more likely to be avoided by people (O'Neill et al., 2013).

It is observed by me that different social networks serve different purposes, and although none of the interactions were significant, we can see the trends. For example, posts with non-human related themes had more interactions than posts with human related themes for 3 social networks, which provides evidence that people are also open and sensitive to posts that are not just human related. There is also evidence that positive posts have more interactions than negative ones.

5.3 Best communication options

When looking at the possible ways to obtain news about the environment, scientific publications were preferred. However, we must consider that the survey here conducted was mostly answered by scholars. In future research, we would need more people with different levels of education to see the preference of a more general population. Thus, aside from scientific publications, social media and news websites were preferred versus traditional media such as Television and Printed Newspaper. When using social media, the preferred platform to obtain news about the environment is clearly Instagram (34%), as it allows for an easier visualization of videos, images, and text. Also, this is the platform that many activists and NGOs use to promote their work. While Facebook and Twitter also allow for a visualization of video, images, and text, they are not as popular as Instagram, at least for the younger crowds (the majority of the people who answered the survey), NGOs, and activists. Additionally, YouTube is another platform to obtain news, as people can choose whatever topic they like and the length of the video they want to see. In the survey, people preferred video (34%) over text (30%), infographics (23%), and photographs (13%) (Figure 22). Research has previously shown that videos have more of an influence than text over people (Vandelanotte and Mummery, 2011; Walthouwer et al., 2015). As has been stated by Moura et al., 2016: "*According to Lee (2012), then, participants watching videos tended to manifest higher levels of attention, interactivity, and engagement, if compared with participants reading traditional text messages. From a psychological point of view, it is reasonable to assume the superiority of the video over the text format in disseminating scientific findings to the lay public, for several reasons. First, the use of the video format can actually engage and grab people's attention, more than text-based information (Alley, Jennings, Persaud, Plotnikoff,*

Horsley, & Vandelanotte, 2014; Koehler, Yadav, Phillips, & Cavazos-Kottke, 2005; Kristine, Rokka, & Hietanen, 2009)." Therefore, the use of video content on social media (especially on Instagram) should be considered by scientists when promoting their work.

5.4 Ambassadors

When the public was asked about how they felt when politicians, corporation leaders, as well as entertainment and sports celebrities talk about environmental issues, the emotion mostly shown was happiness, followed by surprise. However, surprise was conveyed more when politicians and corporation leaders talk about the environment, compared to when entertainment and sports celebrities do. The familiarity of celebrities usually leads to more interaction with the public on their social networks. The public also felt more anger when politicians and corporation leaders talk about environmental issues. This may be linked to the credibility of the people; this involvement is much more effective for catching the public's eye if the celebrity is personally connected to the issue, as people see them as more credible (Wheeler, 2009). Otherwise they will just be perceived as deceptive (de los Salmones & Dominguez, 2016).

When asked to name one celebrity that they can recall as being concerned about environmental issues, most people answered celebrities known globally, such as Leonardo DiCaprio and Greta Thunberg. These two personalities are very known due to the media, showing the importance of a large presence on social media. Portuguese names that were mentioned were António Guterres and Catarina Gouveia.

In this study, 126 Portuguese public figures were also analysed to view the extent they posted about global change, whether they displayed originality in the posts, and if they provided links to external information and solutions. These allowed to understand who would work best as a global change ambassador. Out of them, 88 (69%) posted about environmental themes somewhere in between January 2020 and December 2021. However, only 7 (5%) posted about global change more than 10% of the time and only 2 (1,6%) posted about global changes more than 50% of the time. Names such as Catarina F. P. Barreiros (Environmental activist), Isabel Silva (TV presenter), Ana Varela (actress), and Pedro Fernandes (Radio host) are known in the Portuguese community. These individuals enact much advocacy for environmental issues and could be very well global change ambassadors for scientific projects. However, some names, such as Rita Guerra and Kelly Bailey for example, posted about global change 0.1% of the time and showed 100% originality, 100% external links and 100% solutions. This means that, while they do not post much about global change, they put in the time to write a

description of their own, while also providing external links (additional information) for all posts and solutions as well (Table 3). This means they could potentially be good ambassadors. However, the biggest factor here is the number of global change posts and therefore they would most likely not be a good choice to represent scientific projects.

When considering their social media posts to see which categories were more prominent for all networks, "Consumption" was the category most posted, except for Twitter. These social networks are very effective when it comes to marketing products, and most of the time, public figures would publicize ecological products or services. On Twitter, "Biodiversity" was the most published category. Overall, Instagram was the social media that presented all categories established. This means that, for public figures, the "Consumption" category was very prominent due to the easiness of its matter or most likely, due to profiting reasons.

5.5 Limitations to this study

The socio-demographic profile was analysed by taking into consideration the nationality, age, sex, level of education, and annual income of each person who responded to the survey. In the current study, most of the answers were from people within Portugal, those born between 1990s and 2000s, females, individuals with a tertiary education, as well from low-income households. Thus, this could have constrained some of the answers from the survey and not conveyed what the general population really thought of the issues asked. Therefore, the survey was representative of Portuguese females, under 35 years of age with high education and from low-income households.

In the survey, people preferred Natural contents over Cultural or Urban ones. However, we must also consider the fact that this survey was answered mostly by scholars. Although it gives these results, the survey should reach more people outside of the academic 'bubble' in future research. Also the survey could have been benefited by having the participants working in social sciences or someone who works in the interface of natural and social sciences to help us develop the questions.

In terms of social media, some of the social networks did not allow for a full count of posts for both years of 2020 and 2021. It was also not possible to account for the number of followers each public figure had or gained each year. In future studies, this could be simplified by simple programming or easier access to marketing studies.

The categories and post analysis characteristics (Table 1) were also determined before this study. However, the post analysis is very subjective, so categories should be

thoroughly planned and strict in future studies. In this case, I was the only person analysing the posts, therefore the margin of error was always the same for each public figure.

In regards to the global change ambassadors, some names, such as Joana Barrios and Marta Faial, were not mentioned. This is not because they are not interested in environmental themes, but due to the total amount of posting they do. That is, when taking into account the total amount of posts, that number is much bigger than the posts on environmental themes, On the contrary, some public figures, such as Quimbé and Sylvie Dias, are simply not active to a sufficient extent on their social media. Therefore, they were not eligible to be global change ambassadors. However, many do have connections to the media in other ways, such as with soap operas, and could strive for change in those kinds of settings. In this study, we can identify those by seeing which actors have a higher percentage of global change posts, such as Ana Varela, or by those who present other qualities such as originality in the description, display of external links or presentation of solutions such as Margarida Corceiro. Not only so, some public figures have shown their interest in these matters by doing interviews or attending events that are linked to these issues. However, that was not a category analysed in this study, which means some public figures have indeed shown their interest and could strive for changes in their field, even if they didn't get a good score on this study.

6. Conclusions

In conclusion, we can see that while the survey was aimed at a more general public, it is more correct to say that it only reached the academic public. People seemed fairly interested in matters of global change issues, however, they have a medium perceived knowledge on it.

In terms of topics related to global change that were mostly chosen, it was clearly climate change, probably due to its popularity. It was also noticed that negatives posts were the least interacted with, as expected, however people did not want to see just the beauty of things either and rather chose contents that provided a middle term. Non-human related content was also more chosen than human related content.

When getting news about global change issues, people chose scientific articles but seen as this is probably more representative of the academic community and not the general public, we see that the most chosen aside from this were news websites and Instagram. Both of these platforms provide a wide array of visual content, such as text, video, photographs, infographics, etc.

Personally, I believe that this study should have had the help of social scientists so we could have reached a more general public and perhaps reframe some of our questions but also that scientists and scientific communication professionals should take more advantage of social media, especially Instagram for the dissemination of their work due to the amount of diverse content it can provide. They should also rely more on videos than just text.

7. References

Alley, S., Jennings, C., Persaud, N., Plotnikoff, R.C., Horsley, M., & Vandelanotte, C. (2014). Do personally tailored videos in a web-based physical activity intervention lead to higher attention and recall? An eye-tracking study. *Frontiers in Public Health, 2*, 1–7.

Anderson, A. (2013). "Together we can save the arctic": celebrity advocacy and the Rio Earth Summit 2012. *Celebrity Studies*, *4,* 339-352.

Beall, J.M., Pharr, L.D., von Furstenberg, R., Barber, A., Casola, W.R., Vaughn, A., Peterson, M.N., Larson, L.R. (2022). The influence of YouTube videos on human tolerance of sharks**.** *Journal of Animal Conservation.* In press.

Blair, A. (2013). Democratising the Learning Process: The Use of Twitter in the Teaching of Politics and International Relations. *Politics*, *33*(2), 135–145.

Braasch, G. (2013). Climate change: Is seeing believing? *Bulletin of the Atomic Scientists, 69*, 33-41.

Brockington, D. (2014). *Celebrity Advocacy and International Development*. Routledge.

Brossard, D. (2012). A (Brave) New World? Challenges and Opportunities for Communication about Biotechnology in New Information Environments. In: Biotechnologie-Kommunikation. Springer, Berlin, pp. 427-445.

Brown, W. J., Basil, M. D., & Bocarnea, M. C. (2003). The Influence of Famous Athletes on Health Beliefs and Practices: Mark McGwire, Child Abuse Prevention, and Androstenedione. *Journal of Health Communication. 8,* 41-57.

Brunsting, S., & Postmes, T. (2002). Social Movement Participation in the Digital Age: Predicting Offline and Online Collective Action. Small Group Research, 33(5), 525–554.

Capstick, S. B., Pidgeon, N. F. (2014). What is climate change scepticism? Examination of the concept using a mixed methods study of the UK public. *Global Environmental Change. 24*, 389-401.

Carvalho, A., & Burgess, J. (2005). Cultural circuits of climate change in U.K. broadsheet newspapers, 1985-2003. *Risk Analysis*, *25*, 1457-1469.

Caro, T., Rowe, Z., Berger, J., Wholey, P., & Dobson, A. (2022). An inconvenient misconception: Climate change is not the principal driver of biodiversity loss. *Conservation Letters* e12868.

CCSP (2008). Analyses of the effects of global change on human health and welfare and human systems. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Gamble, J.L. (ed.), K.L. Ebi, F.G. Sussman, T.J. Wilbanks, (Authors). U.S. Environmental Protection Agency, Washington, DC, USA.

Cherlet, M., Hutchinson, C., Reynolds, J., Hill, J., Sommer, S., Maltitz, G., & European Union, P. O. (2018). World Atlas of Desertification-Rethinking land degradation and sustainable land management. *Itu-R P.832-2*.

Cody, E. M., Reagan, A. J., Mitchell, L., Dodds, P. S., & Danforth, C. M. (2015). Climate change sentiment on Twitter: An unsolicited public opinion poll. *PLOS ONE* 10(8): e0136092.

Corbett, J. B., & Clark, B. (2017). How the arts and humanities help people see, feel, and engage with climate change climate change communication. In *Oxford research encyclopedia*. Oxford, England: Oxford University Press.

Courchamp F, Jaric I, Albert C, Meinard Y, Ripple WJ, Chapron G. (2018). The paradoxical extinction of the most charismatic animals. *PLOS Biology* 16: e2003997.

de los Salmones, M. del M. G., & Dominguez, R. (2016). Celebrity Endorsement and Involvement With the Social Cause in Nonprofit Organizations. *Journal of Nonprofit and Public Sector Marketing*, *28*, 309-326.

Doyle, J., Farrell, N., & Goodman, M. K. (2017). Celebrities and Climate Change. *Oxford Research Encyclopedia of Climate Science*.

EIA. (2019). International Energy Outlook 2019 with projections to 2050. U.S. Energy Information Administration. Washington, DC, USA.

EU Science Hub. (2019). By 2050, business as usual will wipe out pristine tropical moist forests the size of more than half the EU. EU Science Hub - The European Commission's science and knowledge service. https://bit.ly/375EhAF.

Fletcher, R., et al. (2016). The public and news about the environment. In: *Painter (Ed.), Something Old, Something New: Digital Media and the Coverage of Climate Change.* Reuters Institute for the Study of Journalism, Oxford, pp. 24–36.

Hayward, B., Turtle, J., Carpenter, H., & Hanson, T. (2007). Attitudes and behaviour in relation to the Environment Report. (2007) Department for Environment, Food and Rural Affairs, London. http://www.defra.gov.uk/.

IPBES. (2019). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Díaz S, et al. (eds.). IPBES secretariat. Bonn, Germany.

IPCC (2013). Climate Change 2013: The Physical Science Basis. *Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

IPCC (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. *Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.]

Ipsos (2020). Global trends 2020: Understanding complexity. https://www.ipsos.com/sites/default/files/ct/publication/documents/2020-02/ipsos-global-trends-2020-understanding-complexity.pdf

Koehler, M.J., Yadav, A., Phillips, M., & Cavazos-Kottke, S. (2005). What is video good for? Examining how media and story genre interact. *Journal of Educational Multimedia and Hypermedia, 14*, 249–272.

Kristine, D.V., Rokka, J., & Hietanen, J. (2009). Videography in consumer research: Visions for a method on the rise. *Finanza Marketing e Produzione, 27*, 81–100.

Lee, J.A. (2012). Effect of Web-based interactive tailored health videos on users' attention, interactivity, overall evaluation, preference and engagement. *Proceedings of the American Society for Information Science and Technology, 11*, 1–3.

Legagneux, P., Casajus, N., Cazelles, K., Chevallier, C., Chevrinais, M., Guéry, L., Jacquet, C., Jaffré, M., Naud, M. J., Noisette, F., Ropars, P., Vissault, S., Archambault, P., Bêty, J., Berteaux, D., & Gravel, D. (2018). Our house is burning: Discrepancy in climate change vs. biodiversity coverage in the media as compared to scientific literature. *Frontiers in Ecology and Evolution*, 19th January 2018.

Leviston, Z., Price, J., & Bishop, B. (2014). Imagining climate change: The role of implicit associations and affective psychological distancing in climate change responses. *European Journal of Social Psychology, 44,* 441-454.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change, 17*, 445-459.

Marktest. (2020). Figuras Públicas e Digital Influencers 2020. https://www.marktest.com/wap/private/images/Logos/Folheto_FigurasPublicasPresençaDigital2020.pdf

McGregor, S. C., & Mourão, R. R. (2016). Talking Politics on Twitter: Gender, Elections, and Social Networks. *Social Media + Society*.

Metag, J., Schäfer, M. S., Füchslin, T., Barsuhn, T., & Kleinen-von Königslöw, K. (2016). Perceptions of climate change imagery: Evoked salience and self-efficacy in Germany, Switzerland, and Austria. *Science Communication*, *38(2)*, 197–227.

Moura, M., Almeida, P., & Geerts, D. (2016). A video is worth a million words? Comparing a documentary with a scientific paper to communicate design research. *Procedia Computer Science, 100,* 747–754.

Muda, M., Musa, R., & Putit, L. (2012). Breaking through the Clutter in Media Environment: How Do Celebrities Help? *Procedia - Social and Behavioral Sciences*, *42*, 374-382.

NRC (2011). Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia. National Research Council. The National Academies Press, Washington, DC, USA.

Nurmis, J. (2016). Visual climate change art 2005–2015: discourse and practice. *Wiley Interdisciplinary Reviews: Climate Change*, *7(4)*, 501–516.

Olmedo, A., Milner-Gulland, E. J., Challender, D. W. S., Cugnière, L., Dao, H. T. T., Nguyen, L. B., Nuno, A., Potier, E., Ribadeneira, M., Thomas-Walters, L., Wan, A. K. Y., Wang, Y., & Veríssimo, D. (2020). A scoping review of celebrity endorsement in environmental campaigns and evidence for its effectiveness. *Conservation Science and Practice, 2,* e261.

O'Neill, S. J., & Nicholson-Cole, S. (2009). "Fear won't do it" Promoting Positive Engagement with Climate Change Through Visual and iconic representations. *Science Communication*, *30(3)*. 355-379.

O'Neill, S. J., Boykoff, M., Niemeyer, S., & Day, S. A. (2013). On the use of imagery for climate change engagement. *Global Environmental Change, 23(2),* 413-421.

Papworth, S. K., Nghiem, T. P. L., Chimalakonda, D., Posa, M. R. C., Wijedasa, L. S., Bickford, D., & Carrasco, L. R. (2015). Quantifying the role of online news in linking conservation research to Facebook and Twitter. *Conservation Biology, 29*, 825-833.

Park, S. (2018). We love or hate when celebrities speak up about climate change: Receptivity to celebrity involvement in environmental campaigns. *Journal of Contemporary Eastern Asia*, *18,* 175-188.

Pasgaard, M., Dalsgaard, B., Maruyama, P. K., Sandel, B., & Strange, N. (2015). Geographical imbalances and divides in the scientific production of climate change knowledge. *Global Environmental Change, 35*, 279-288

Pecl, G.T., Araújo, M.B., Bell, J.D., Blanchard, J., Bonebrake, T.C., Chen, I., Clark, T.D., Colwell, R.K., Danielsen, F., Evengård, B., Falconi, L., Ferrier, S., Frusher, S., Garcia, R.A., Griffis, R.B., Hobday, A.J., Janion-Scheepers, C., Jarzyna, M.A., Jennings, S., Lenoir, J., Linnetved, H.I., Martin, V.Y., McCormack, P.C., McDonald, J., Mitchell, N.J., Mustonen, T., Pandolfi, J.M., Pettorelli, N., Popova, E., Robinson, S.A., Scheffers, B.R., Shaw, J.D., Sorte, C.J.B., Strugnell, J.M., Sunday, J.M., Tuanmu, M.N., Vergés, A., Villanueva, C., Wernberg, T., Wapstra, E., Williams, S.E. (2017). Biodiversity redistribution under climate change: impacts on ecosystems and human well-being. *Science* 355: eaai9214.

Postmes, T., & Brunsting, S. (2002). Collective action in the age of the internet: Mass communication and online mobilization. *Social Science Computer Review*, *20*, 290–301.

Remillard, C. (2011). Picturing environmental risk: The Canadian oil sands and the national geographic. *International Communication Gazette, 73,* 127-143.

Tamara A. Small. (2011). What the Hashtag?, *Information, Communication & Society, 14(6)*, 872-895.

Taylor, M., Kent, M. L. & White, W. J. (2001). How activist organizations are using the Internet to build relationships. *Public Relations Review*, *27*, 263-284.

Trumbo, C. W., & Shanahan, J. (2000). Social research on climate change: where we have been, where we are, and where we might go. *Public Understanding of Science, 9*, 199-204.

UN Act Now. (2020). The UN Campaign for Individual Action – 758037 Climate actions taken around the world. UN Act Now. https://www.un.org/en/actnow/

USGCRP (2009). Global Climate Change Impacts in the United States. Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA.

USGCRP (2014). Climate Change Impacts in the United States: The Third National Climate Assessment. Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds. U.S. Global Change Research Program.

USGCRP (2016). Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N.Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J.Trtanj, and L.Ziska, Eds. U.S. Global Change Research Program, Washington, DC. 312 pp.

Vandelanotte, C., & Mummery, W.K. (2011). Qualitative and quantitative research into the development and feasibility of a video-tailored physical activity intervention. *International Journal of Behavioral Nutrition and Physical Activity, 8.*

Walthouwer, M.J.L., Oenema, A., Lechner, L., & De Vries, H. (2015). Comparing a video and text version of a web-based computer-tailored intervention for obesity prevention: A randomized controlled trial. *Journal of Medical Internet Research, 17*, 1–17.

Wheeler, R. T. (2009). Nonprofit advertising: Impact of celebrity connection, involvement and gender on source credibility and intention to volunteer time or donate money. *Journal of Nonprofit and Public Sector Marketing*, *21,* 80-107.

Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: Dimensions, determinants and change over time. *Global Environmental Change*, *21*, 690-700.

8. Supplementary material

Survey (available in English, Portuguese and French)

QUESTIONS	ANSWER OPTIONS
Environmental profile	
Rate your level of interest about global environmental changes (select only 1 option)	0 – not interested up to 5 – very interested
Rate your level of perceived knowledge about global environmental changes (select only 1 option)	0 – no knowledge up to 5 – high knowledge
From the list, select the United Nations-Sustainable Development Goals that concern you the most (select exactly 3 options)	No poverty Zero hunger Good health and well-being Quality education Gender equality Clean water and sanitation Affordable and clean energy Decent work and economic growth Industry, innovation, and infrastructure Reduced inequalities Sustainable cities and communities Responsible consumption and production Climate action Life below water Life on land Peace, justice, and strong institutions Partnerships for goals
From the list, select the global threats to nature that concerns you the most (select exactly 3 options)	Urban development Transportation and service corridors development Energy production and mining Agriculture and livestock farming Logging and wood harvesting Hunting and collecting terrestrial fauna and flora Fishing & harvesting aquatic resources Human intrusions and disturbance Fire occurrence Dams and water mismanagement/misuse Invasive species, genes, and diseases Pollution Climate change
Do you think that the consequences of global threats to nature (e.g. biodiversity loss, climate disasters, food shortage) may affect your daily life now or in the future?	Yes, No
Do you think that presently there is sufficient information about global threats to nature in the news?	Yes, No
Do you think that current climate disasters (e.g. floods, storms, hurricanes, fires) are generally caused by Climate Change?	Yes, No
When seeing news about climate disasters, do you think that the media generally relates them with Climate Change?	Yes, No
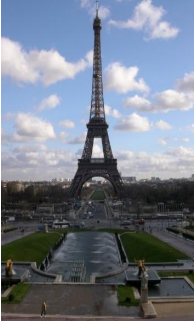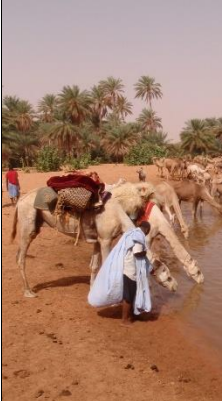
When seeing news about climate disasters, do you think that the media presents the available solutions to mitigate the problem?	Yes, No
What do you feel when entertainment or sports celebrities talk about environment issues?	Smiles/avatars representing options: Love Surprise Anger Sadness Indifference
What do you feel when politicians or corporation leaders talk about environment issues?	Smiles/avatars representing options: Love Surprise Anger Sadness Indifference
Name one celebrity that you can relate as being concerned about environmental issues	(open)
Do you have any frequent contact with non-governmental organizations working on environmental issues?	Yes, No
If yes, do you usually receive information online (e.g. Facebook, Instagram) or do you attend locally-organised activities?	Online, Attend local activities, Both
Do you think that the COVID-19 pandemic is somehow related with increasing human exploitation of wild animals/landscapes?	Yes, No
Best communication options	
What is your preferred way to obtain news about the environment? (select only 1 option)	Printed newspapers, News websites, Television, Social media, Scientific publications
If using social media, which is your preferred platform to obtain news about the environment? (select only 1 option)	Facebook, Instagram, Twitter, YouTube, TikTok, Other
When receiving news about environmental issues, what is your favourite media-support type? (select only 1 option)	Video, Photograph, Infographics, Text
When the support-type is video, what is the optimal length that you prefer? (select only 1 option)	<30 seconds; 30 to-60 seconds; 1 to 5 minutes; 5 to 10 minutes; >10 minutes
Do you frequently listen to podcasts?	Yes, No
If you were to listen to a podcast series, what would be the optimal episode length that you prefer? (select only 1 option)	<10 minutes; 10 to 20 minutes; 20 to 30 minutes; >30 minutes
If you were to watch a television documentary series about environmental issues, what is the optimal episode length that you prefer? (select only 1 option)	Short and concise episodes of up to 20 minutes each Episodes of 30 to 40 minutes each Extended episodes of nearly 60 minutes each
Imagine a television documentary series about environmental issues that is based in an overland expedition of several months to remote regions. Which of these formats of the series would likely best catch your attention and curiosity? (select only 1 option) Note: pictures are merely illustrative; what matters the most is your preferred format type	1-Small, exposed, intimate, but technically limited expedition 2-Large, protected, formal, but technically sound expedition
Preferred contents and feelings	

From the following types of contents, select the 3 that best catch your attention and curiosity. We want to understand which type of content inspires you the most Note: pictures are merely illustrative; what matters the most is your preferred type of content	1-urban vs natural 2-urban vs cultural 3-cultural vs natural 4-urban categories 5-cultural categories 6-natural categories
From the following types of contents, select the one that you would prefer to see in a social media platform. We want to understand which type of content is more attractive to you and that will likely keep you following a particular page Note: pictures are merely illustrative; what matters the most is your preferred type of content	1-Actions and initiatives 2-Natural features 3-Initiatives and natural features 4-Threat activities and impacts 5-Combination
Demographic and socioeconomic profile	
What year were your born?	(dropdown)
What is your gender?	M, F, prefer not to say
What is your highest education level?	Primary Secondary Tertiary (post-secondary education)
What is your country of residence?	(dropdown)
What is the overall annual income of your household (after taxation)?	< 20.000€ 20.000€ - 49.999€ 50.000€ - 99.999€ 100.000€ - 199.999€ >200.000€

LEGENDS

Small, exposed, intimate, and technically limited expedition	Large, protected, formal, and technically sound expedition
Expedition based in a small team (e.g. 1 to 2 persons) that travels alone (single vehicle), more exposed to social and environmental uncertainties, with an intimate and personal approach to the environmental issues, but technically limited in the ability to collect less stunning video, photo and audio recordings because of small team size	Expedition based in a large team (e.g. up to 10 persons) that travels in group (3 to 4 vehicles), less exposed to social and environmental uncertainties, with a more formal approach (typical television documentary) to the environmental issues, but technically able to collect more stunning video, photo and audio recordings because of large team size
Small team	Large team
Travel alone	Travel in group
Exposed	Protected
Intimate and personal approach	Formal approach
Technically limited	Technically unlimited

LEGENDS

1-urban vs natural					
Urban landscape	Natural lands	Urban discovery	Forest discovery	Urban river	Wild river
2-urban vs cultural					
Urban art	Rock art	Modern construction	Historical construction	Urban life	Rural life
3-cultural vs natural					
Rural life	Wildlife	Religious building	Natural landscape	Architectonical heritage	Geological heritage

4-urban categories					
Large city	Tourism resort	Small city	Industrial area	Cultural village	Huts
5-cultural categories					
Rock art	Rural life	Traditional building	Historical building	Religious building	Urban garden
6-natural categories					
Mammals	Forest	Reptiles	Flowers	Trees	Desert

LEGENDS

Actions and initiatives	Natural features	Initiatives and natural features	Threat activities and impacts	Combination
Page shares information **only** about actions and initiatives to tackle global threats (*positive human actions*)	Page shares information **only** about pristine natural landscapes and wildlife (*positive natural features*)	Page shares information about actions and initiatives to tackle global threats and pristine natural landscapes and wildlife (*mixture of first and second type of contents*)	Page shares information **only** about human activities responsible for global threats and their impacts in natural landscapes (*negative human activities*)	Page shares combined information about actions and initiatives to tackle global threats, pristine natural landscapes and wildlife, and about human activities responsible for global threats and their impacts in natural landscapes (*mixture of all contents*)
Rescue of threatened fauna	Mountain	Fauna	Fire	Rescue of threatened fauna
Conferences	Fauna	Conferences	Untreated garbage	Overhunting
Cooperation and research	Geological features	Cooperation and research	Conflict	Flora

Wildlife documenting	Wetlands	Mountain	Pollution	Conferences
Information signs	Flora	Information signs	Overhunting	Runover in roads
Responsible tourism	Deserts	Flora	Runover in roads	Wetlands

Portuguese:

PERGUNTAS	OPÇÕES DE RESPOSTA
Perfil Ambiental	
Avalie o seu nível de interesse sobre as alterações ambientais globais (seleccione apenas 1 opção)	0 – Não interessado até 5 – Muito interessado
Avalie o seu nível de conhecimento sobre as alterações ambientais globais (selecione apenas 1 opção)	0 – Nenhum conhecimento até 5 – Muito conhecimento
Da lista, seleccione os Objetivos de Desenvolvimento Sustentável das Nações Unidas que o/a preocupam mais (selecione exatamente 3 opções)	Erradicar a pobreza Erradicar a fome Saúde de qualidade Educação de qualidade Igualdade de género Água potável e saneamento Energias renováveis e acessíveis Trabalho digno e crescimento económico Indústria, inovação e infraestruturas Reduzir as desigualdades Cidades e comunidades sustentáveis Produção e consumo sustentáveis Acção climática Proteger a vida marinha Proteger a vida terrestre Paz, justiça e instituições eficazes Parcerias para implementação dos objectivos
Da lista, seleccione as ameaças globais à natureza que o/a preocupam mais (selecione exatamente 3 opções)	Desenvolvimento urbano Desenvolvimento de corredores de transporte e serviços Produção de energia e exploração mineira Agricultura e pecuária Extração e colheita de madeira Caça e recolha de fauna e flora terrestre Pesca e recolha de recursos aquáticos Intrusões e perturbação humana Ocorrência de fogo Má gestão/ Uso inadequado de barragens e água Espécies, genes e doenças invasoras Poluição Alterações Climáticas
Acha que as consequências das ameaças globais à natureza (por exemplo, perda de biodiversidade, desastres climáticos, escassez de alimento) podem afectar a sua vida diária agora ou no futuro?	Sim, Não
Acha que actualmente existe informação suficiente sobre ameaças globais à natureza nas notícias?	Sim, Não
Acha que os desastres climáticos actuais (por exemplo, cheias, tempestades, furacões,	Sim, Não
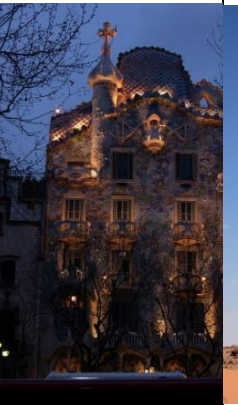
fogos) são geralmente causados pelas Alterações Climáticas?	
Quando vê notícias sobre desastres climáticos, acha que os média geralmente os relacionam com as Alterações Climáticas?	Sim, Não
Quando vê notícias sobre desastres climáticos, acha que os média geralmente apresentam as soluções disponíveis para mitigar esse problema?	Sim, Não
O que sente quando celebridades ligadas ao entretenimento ou desporto falam sobre questões ambientais?	Smiles/avatars representando opções: Alegria Surpresa Raiva Tristeza Indiferença
O que sente quando políticos ou líderes corporativos falam sobre questões ambientais?	Smiles/avatars representando opções: Alegria Surpresa Raiva Tristeza Indiferença
Escreva o nome de uma celebridade que acredite estar preocupada com temas ambientais	(aberto)
Tem algum contacto frequente com organizações não governamentais que trabalhem em temas ambientais?	Sim, Não
Se sim, normalmente recebe informação online (e.g. Facebook, Instagram) ou participa em actividades locais?	Online, Participação em atividades locais, Ambos
Acha que a pandemia COVID-19 está de alguma forma relacionada com um aumento da exploração humana de animais selvagens/ paisagens?	Sim, Não
Melhores opções de comunicação	
Qual é o seu modo preferido de obter notícias sobre o ambiente? (seleccione apenas 1 opção)	Jornais em papel, Websites de notícias, Televisão, Redes sociais, Publicações científicas
Ao usar redes sociais, qual é a sua plataforma preferida para obter notícias sobre o ambiente? (seleccione apenas 1 opção)	Facebook, Instagram, Twitter, YouTube, TikTok, Outro
Ao receber notícias sobre questões ambientais, qual o tipo de suporte dos media preferido? (seleccione apenas 1 opção)	Vídeo, Fotografia, Infografia, Texto
Quando o tipo de suporte é vídeo, qual é a duração ideal preferida? (seleccione apenas 1 opção)	<30 segundos; 30 até 60 segundos; 1 até 5 minutos; 5 até 10 minutos; >10 minutos
Ouve podcasts frequentemente?	Sim, Não
Se fosse ouvir um podcast, qual seria a duração ideal de um episódio? (seleccione apenas 1 opção)	<10 minutos; 10 até 20 minutos; 20 até 30 minutos; >30 minutos
Se fosse ver uma série documental de televisão sobre questões ambientais, qual seria	Episódios curtos e concisos de até 20 minutos cada Episódios de 30 a 40 minutos cada

a duração ideal de um episódio? (seleccione apenas 1 opção)	Episódios alargados de quase 60 minutos cada
Imagine uma série documental de televisão sobre questões ambientais baseada numa expedição terrestre de vários meses a regiões remotas. Qual destes formatos da série provavelmente chamaria melhor a sua atenção e curiosidade? (seleccione apenas 1 opção) Nota: as imagens são meramente ilustrativas; o que mais importa é o tipo de formato preferido	1-Expedição pequena, exposta, íntima, mas tecnicamente limitada 2-Expedição grande, protegida, formal, mas tecnicamente sólida
Conteúdos preferidos e sentimentos	
Entre os seguintes tipos de conteúdos, seleccione os 3 que melhor despertam a sua atenção e curiosidade. Queremos perceber que tipo de conteúdo o/a inspira mais. Nota: as imagens são meramente ilustrativas; o que mais importa é o tipo de conteúdo preferido	1-urbano vs natural 2-urbano vs cultural 3-cultural vs natural 4-categorias urbanas 5-categorias culturais 6-categorias naturais
Entre os seguintes tipos de conteúdos, seleccione o que preferiria ver numa plataforma social. Queremos perceber que tipo de conteúdo é mais atrativo e mais provável de fazer com que continue a seguir uma página em particular. Nota: as imagens são meramente ilustrativas; o que mais importa é o tipo de conteúdo preferido	1-Acções e iniciativas 2-Características naturais 3-Características naturais e iniciativas 4-Ameaças e impactos 5-Combinação
Perfil demográfico e socioeconómico	
Qual é o seu ano de nascimento?	(dropdown)
Qual é o seu género?	M, F, Prefiro não dizer
Qual é o seu nível de educação mais alto?	Primário Secundário Terciário (educação pós-secundário)
Qual é o seu país de residência?	(dropdown)
Qual é o seu rendimento familiar anual (depois da tributação)?	< 20.000€ 20.000€ - 49.999€ 50.000€ - 99.999€ 100.000€ - 199.999€ >200.000€

LEGENDAS
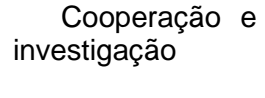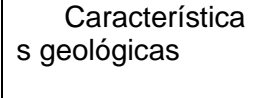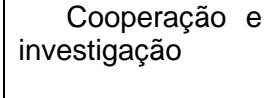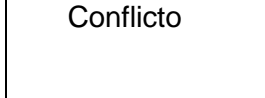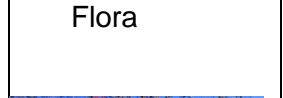
Expedição pequena, exposta, íntima e tecnicamente limitada	Expedição grande, protegida, formal e tecnicamente sólida
Expedição baseada numa pequena equipa (ex. 1 a 2 pessoas) que viaja sozinha (veículo único), mais exposta a incertezas sociais e ambientais, com uma abordagem íntima e pessoal às questões ambientais, mas tecnicamente limitada na capacidade de recolher vídeos, fotos e gravações de áudio espectaculares devido ao pequeno tamanho da equipa	Expedição baseada numa grande equipa (ex. até 10 pessoas) que viaja em grupo (3 a 4 veículos), menos exposta a incertezas sociais e ambientais, com uma abordagem mais formal às questões ambientais (típico documentário de televisão), mas tecnicamente apta a recolher gravações de vídeo, foto e áudio mais espectaculares devido ao grande tamanho da equipa
Pequena equipa	Grande equipa
Viagem a solo	Viagem em grupo
Exposta	Protegida
Abordagem íntima e pessoal	Abordagem formal
Tecnicamente limitada	Tecnicamente ilimitada

LEGENDAS

1-urbano vs natural					
Paisagem urbana	Paisagem natural	Descoberta urbana	Descoberta da floresta	Rio urbano	Rio selvagem

2-urban vs cultural					
Arte urbana	Arte rupestre	Construcção moderna	Construcção histórica	Vida urbana	Vida rural

3-cultural vs natural					
Vida rural	Vida selvagem	Edifício religioso	Paisagem natural	Património arquitectónico	Património geológico

4-categorias urbanas					
Grande cidade	Zona turística	Pequena cidade	Zona industrial	Aldeia cultural	Cabanas
5-categorias culturais					
Arte rupestre	Vida rural	Edifício tradicional	Edifício histórico	Edifício religioso	Jardim urbano
6-categorias naturais					
Mamíferos	Floresta	Répteis	Flores	Árvores	Deserto

LEGENDAS

Acções e iniciativas	Características naturais	Iniciativas e características naturais	Ameaças e impactos	Combinação
Página partilha informação **apenas** sobre acções e iniciativas para combater ameaças globais (*acções humanas positivas*)	Página partilha informação **apenas** sobre paisagens naturais pristinas e vida selvagem (*características naturais positivas*)	Página partilha informação sobre acções e iniciativas para combater ameaças globais e paisagens naturais pristinas e vida selvagem (*mistura do primeiro e segundo tipo de conteúdo*)	Página partilha informação **apenas** sobre actividades humanas responsáveis por ameaças globais e os seus impactos nas paisagens naturais (*actividades humanas negativas*)	Página partilha uma informação combinada sobre as acções e iniciativas para combater ameaças globais, paisagens naturais pristinas e vida selvagem, e sobre actividades humanas responsáveis por ameaças globais e os seus impactos nas paisagens naturais (*mistura de todos os conteúdos*)
Resgate de fauna ameaçada	Montanha	Fauna	Fogo	Resgate de fauna ameaçada
Conferências	Fauna	Conferências	Resíduos não tratados	Caça excessiva
Cooperação e investigação	Características geológicas	Cooperação e investigação	Conflicto	Flora

Documentação da vida selvagem	Zonas húmidas	Montanha	Poluição	Conferências
Painéis informativos	Flora	Painéis informativos	Caça excessiva	Atropelamento em estradas
Turismo responsável	Desertos	Flora	Atropelamento em estradas	Zonas húmidas

French:

QUESTIONS	OPTIONS DE RÉPONSE
Profil environnemental	
Évaluez votre niveau d'intérêt pour les changements environnementaux globaux (sélectionnez seulement 1 option)	0 – pas intéressé - 5 – très intéressé
Évaluez votre niveau de connaissance perçue sur les changements environnementaux globaux (sélectionnez seulement 1 option)	0 – pas de connaissance - 5 – haute connaissance
Dans la liste, sélectionnez les Objectifs de Développement Durable des Nations Unies qui vous préoccupent le plus (sélectionnez exactement 3 options)	Pas de pauvreté Faim zéro Bonne santé et bien-être Éducation de qualité Égalité des sexes Eau propre et assainissement Énergie propre et abordable Travail décent et croissance économique Industrie, innovation et infrastructure Réduction des inégalités Villes et communautés durables Consommation et production responsables Action pour le climat La vie sous l'eau La vie sur terre Paix, justice et institutions fortes Partenariats pour les objectifs
Dans la liste, sélectionnez les menaces globales à la nature qui vous préoccupent le plus (sélectionnez exactement 3 options)	Développement urbain Aménagement de corridors de transport et de services Production et exploitation minière d'énergie Agriculture et élevage Exploitation forestière et récolte du bois Chasse et collecte de la faune et de la flore terrestres Pêche et récolte des ressources aquatiques Intrusions et perturbations humaines Incendies Barrages et mauvaise gestion/mauvaise utilisation de l'eau Espèces, gènes et maladies envahissants Pollution Changement climatique
Pensez-vous que les conséquences des menaces globales sur la nature (par exemple, la perte de biodiversité, les catastrophes climatiques, la pénurie alimentaire) peuvent affecter votre vie quotidienne maintenant ou à l'avenir?	Oui, Non
Pensez-vous qu'il y a actuellement suffisamment d'informations sur les menaces globales à la nature dans les médias?	Oui, Non
Pensez-vous que les catastrophes climatiques actuelles (par exemple, inondations, tempêtes,	Oui, Non

ouragans, incendies) sont généralement causées par le changement climatique?	
Lorsque vous voyez les nouvelles sur les catastrophes climatiques, pensez-vous que les médias les relient généralement au changement climatique?	Oui, Non
Lorsque vous voyez les nouvelles sur les catastrophes climatiques, pensez-vous que les médias présentent les solutions disponibles pour atténuer le problème?	Oui, Non
Que ressentez-vous lorsque des célébrités du divertissement ou du sport parlent de questions environnementales?	Sourires/avatars représentant des options Amour Surprendre Colère Tristesse Indifférence
Que ressentez-vous lorsque des politiciens ou des dirigeants d'entreprise parlent de questions environnementales?	Sourires/avatars représentant des options Amour Surprendre Colère Tristesse Indifférence
Nommez une célébrité que vous pouvez comprendre comme étant préoccupée par les questions environnementales	(ouvert)
Avez-vous des contacts fréquents avec des organisations non gouvernementales travaillant sur des questions environnementales?	Oui, Non
Si oui, recevez-vous généralement des informations en ligne (par exemple, Facebook, Instagram) ou assistez-vous à des activités organisées localement?	En ligne, Assister à des activités locales, Les deux
Pensez-vous que la pandémie de COVID-19 est en quelque sorte liée à l'exploitation humaine croissante des animaux sauvages / paysages?	Oui, Non
Meilleures options de communication	
Quelle est votre façon préférée d'obtenir des nouvelles sur l'environnement? (sélectionnez seulement 1 option)	Journaux imprimés, Sites Web d'information, Télévision, Médias sociaux, Publications scientifiques
Si vous utilisez les médias sociaux, quelle est votre plate-forme préférée pour obtenir des nouvelles sur l'environnement? (sélectionnez seulement 1 option)	Facebook, Instagram, Twitter, YouTube, TikTok, Autre
Lorsque vous recevez des nouvelles sur des questions environnementales, quel est votre type de soutien médiatique préféré? (sélectionnez seulement 1 option)	Vidéo, Photographie, Infographie, Texte
Lorsque le type de support est vidéo, quelle est la longueur optimale que vous préférez ? (sélectionnez seulement 1 option)	<30 secondes; 30 à 60 secondes; 1 à 5 minutes; 5 à 10 minutes; > 10 minutes
Écoutez-vous fréquemment des podcasts?	Oui, Non
Si vous deviez écouter une série de podcasts, quelle serait la durée optimale de chaque épisode	<10 minutes; 10 à 20 minutes; 20 à 30 minutes; >30 minutes

que vous préférez ? (sélectionnez seulement 1 option)	
Si vous deviez regarder une série documentaire télévisée sur les questions environnementales, quelle est la durée optimale de chaque épisode que vous préférez ? (sélectionnez seulement 1 option)	Épisodes courts et concis d'une durée maximale de 20 minutes chacun Épisodes de 30 à 40 minutes chacun Épisodes prolongés de près de 60 minutes chacun
Imaginez une série documentaire télévisée sur les questions environnementales basée sur une expédition terrestre de plusieurs mois dans des régions reculées. Lequel de ces formats de la série attirerait le mieux votre attention et votre curiosité ? (sélectionnez seulement 1 option) Remarque: les images sont simplement illustratives; ce qui compte le plus, c'est votre type de format préféré	1- Expédition petite, vulnérable, intime, mais techniquement limitée 2- Expédition grande, protégée, formelle, mais techniquement solide
Sujets et sentiments préférés	
Parmi les types de contenu suivants, sélectionnez les 3 qui attirent le mieux votre attention et votre curiosité. Nous voulons comprendre quel type de contenu vous inspirent le plus Remarque: les images ne sont qu'indicatives; ce qui compte le plus, c'est votre décision sur le type de contenu préféré	1-urbain vs naturel 2-urbain vs culturel 3-culturel vs naturel 4-catégories urbaines 5-catégories culturelles 6-catégories naturelles
Parmi les types de contenu suivants, sélectionnez celui que vous préférez voir sur une plate-forme de médias sociaux. Nous voulons comprendre quel type de contenu est le plus attrayant et qui vous permettra probablement de suivre une page particulière Remarque: les images ne sont qu'indicatives; ce qui compte le plus, c'est votre décision sur le type de contenu préféré	1-Actions et initiatives 2-Caractéristiques naturelles 3-Initiatives et caractéristiques naturelles 4-Activités et impacts des menaces 5-Combinaison
Profil démographique et socio-économique	
En quelle année êtes-vous né?	(dropdown)
Quel est votre sexe?	M, F, Préférez ne pas dire
Quel est votre plus haut niveau d'éducation?	Primaire Secondaire Enseignement supérieur (enseignement postsecondaire)
Quel est votre pays de résidence?	(dropdown)
Quel est le revenu annuel global de votre ménage (après impôt)?	< 20.000€ 20.000€ - 49.999€ 50.000€ - 99.999€ 100.000€ - 199.999€ >200.000€

LÉGENDES

Expédition petite, vulnérable, intime, et techniquement limitée	Expédition grande, protégée, formelle, et techniquement solide
Expédition basée sur une petite équipe (par exemple 1 à 2 personnes) qui voyage seule (véhicule unique), plus exposée aux aléas sociaux et environnementaux, avec une approche intime et personnelle des enjeux environnementaux, mais techniquement limitée dans la capacité de récolter des enregistrements vidéos, photos et audio admirables en raison de la petite taille de l'équipe	Expédition basée sur une équipe nombreuse (par exemple jusqu'à 10 personnes) qui se déplace en groupe (3 à 4 véhicules), moins exposée aux incertitudes sociales et environnementales, avec une approche plus formelle des questions environnementales (documentaire télévisé typique), mais techniquement capable de collecter des enregistrements vidéos, photos et audio plus admirables en raison de la grande taille de l'équipe
Petite équipe	Grande équipe
Voyager seul	Voyager en groupe
Plus exposée	Moins exposée
Approche intime et personnelle	Approche formelle
Techniquement plus limité	Techniquement moins limité

1-urbain vs naturel					
Paysage urbain	Paysage naturelle	Découverte urbaine	Découverte de la forêt	Rivière urbaine	Rivière sauvage
2- urbain vs culturel					
Art urbain	Art rupestre	Construction moderne	Construction historique	Vie urbaine	Vie rurale
3- culturel vs naturel					
Vie rurale	Vie sauvage	Édifice religieux	Paysage naturel	Patrimoine architectonique	Patrimoine géologique
4- catégories urbaines					

Grande ville	Zone touristique	Petite ville	Zone industrielle	Village culturel	Cabanes
5- catégories culturelles					
Art rupestre	Vie rurale	Bâtiment traditionnel	Bâtiment historique	Édifice religieux	Jardin urbain
6- catégories naturelles					
Mammifères	Forêt	Reptiles	Fleurs	Arbres	Désert

LÉGENDES

Actions et initiatives	Caractéristiques naturelles	Initiatives et caractéristiques naturelles	Activités et impacts des menaces	Combinaison
La page partage **uniquement** des informations sur les actions et les initiatives visant à lutter contre les menaces globales (*actions humaines positives*)	La page partage **uniquement** des informations sur les paysages naturels vierges et la vie sauvage (*caractéristiques naturelles positives*)	La page partage des informations sur les actions et les initiatives visant à lutter contre les menaces globales et les paysages naturels et la vie sauvage (*mélange du premier et du deuxième type de contenu*)	La page partage **uniquement** des informations sur les activités humaines responsables de menaces globales et leurs impacts sur les paysages naturels (*activités humaines négatives*)	Page partage une information combinée sur les actions et les initiatives pour lutter contre les menaces globales, les paysages naturel et la vie sauvage, et sur les activités humaines qui ont des impacts sur la nature (*mélange de contenu précédent*)
Sauvetage de la faune menacée	Montagne	Faune	Feu	Sauvetage de la faune menacée
Conférences	Faune	Conférences	Déchets non traités	Chasse excessive
Coopération et recherche	Caractéristiques géologiques	Coopération et recherche	Conflit	Flora
Documentation de la vie sauvage	Zones humides	Montagne	Pollution	Conférence

Panneaux d'information	Flora	Panneaux d'information	Chasse excessive	Vie sauvage écrase
Tourisme responsable	Déserts	Flora	Vie sauvage écrase	Zones humides