

1 **Communicating the most accurate and reliable science on**
2 **climate change to society: A survey of editors from the**
3 **Intergovernmental Panel on Climate Change**

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8

9 **Abstract.** This study focuses on the perspectives of scientists involved in the IPCC AR5 and AR6 synthesis
10 reports, examining their views on the communication of climate change knowledge and its dissemination to the
11 public. The objectives include understanding scientists' opinions on the state of climate change knowledge, the
12 effectiveness of current communication strategies, and recommendations for improving public engagement. A
13 survey was conducted among 72 IPCC scientists, assessing their perceptions on various aspects of climate
14 communication, including the use of media, educational integration, and challenges like misinformation. Results
15 show that scientists generally rate the scientific community as well-informed, policymakers as moderately
16 informed, and the public as only acceptably informed about climate change. Many respondents suggested
17 improvements in the clarity and accessibility of IPCC reports, emphasizing the role of media, social networks,
18 and education in better informing the public. The study concludes that trust in information sources is vital for
19 effective climate communication and that a more tailored, empathetic, and solutions-based approach is
20 necessary to bridge the gap between scientific knowledge and public understanding.

21 Keywords: communication, climate, IPCC, survey, public

22

23 **1 Introduction**

24

25 The challenge posed by climate change to society is immense. The overwhelming evidence that human reliance
26 on fossil fuels has led to atmospheric warming, which in turn is altering weather patterns and the global climate,
27 highlights the need for widespread social awareness on a global scale. Few times in human history has there
28 been such an urgent need for a shared global consensus among all inhabitants of the planet (Somerville &
29 Hassol, 2011). Addressing and adapting to climate change requires not only agreement on a transition to new
30 energy paradigms but also discussions on the future of economic growth, or even potential degrowth (Hansen et
31 al., 2008; Howes et al., 2013). This consensus must be grounded in scientific knowledge, its credibility, and the
32 broad agreement within the scientific community (Buttel et al., 1990; Change, 2011; Fuhrer et al., n.d.).

33

34 The losses and damage already being caused by climate change, as well as those anticipated in the future,
35 highlight the fact that there will inevitably be both winners and losers in this global crisis. This reality extends

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36 the discussion beyond the realm of science, touching on ethics, politics, ecology, sociology, and even religion
37 (Francisco, 2015). Addressing these multifaceted impacts requires an interdisciplinary approach that recognizes
38 the complex and far-reaching consequences of climate change on all aspects of society (Molina & Abadal,
39 2024).

40

41 In this highly complex context, science is expected to play a critical role in guiding decision-making and
42 shaping a unified global strategy for humanity's adaptation to these changes (Cutter et al., 2012). The
43 Intergovernmental Panel on Climate Change (IPCC) has emerged as the leading authority on expert knowledge
44 related to climate change. However, it is not without controversy (De Pryck, 2018). The influence of its
45 scientific reports on national and global policies often blurs the line between politics and epistemology, creating
46 tensions around the intersection of science and policy (Beck, 2012; Hermansen et al., 2021).

47

48 From its first report in 1990 to its sixth in 2023, the IPCC's level of certainty in its findings has steadily
49 increased. As a result, the urgency for action among decision-makers and society at large has intensified, giving
50 rise to terms like "climate emergency" and global agreements such as the Paris Agreement. The latter aims to
51 limit emissions and keep global temperature rise well below 2°C compared to pre-industrial levels (Höhne et al.,
52 2021; Molina & Abadal, 2021; Ripple et al., 2022).

53

54 The scientific foundation of the IPCC reports is derived from research published in peer-reviewed scientific
55 journals, which undergoes rigorous scrutiny by independent experts. Only knowledge that passes this
56 demanding review process is included in these reports. However, determining which findings are ultimately
57 incorporated into the reports that inform policymakers is itself a subject of analysis, attention, and, at times,
58 controversy (Beck & Mahony, 2018a).

59

60 Ultimately, the knowledge and strategies for mitigation and adaptation outlined in the IPCC reports are handed
61 over to policymakers, whose decisions impact society at large. The global strategy to combat and adapt to
62 climate change targets individuals across all social, cultural, and religious backgrounds, as well as those from
63 diverse economic and educational levels. The public's perception of the urgency, as well as the mitigation and
64 adaptation strategies outlined in the IPCC reports, extends beyond policymakers (Gemedu et al., 2023). These
65 reports form a key part of the information that reaches global society, which must ultimately support the
66 decisions made by political leaders. The popularization of the IPCC's findings—making complex scientific and
67 technical information accessible to the general public—requires an effective communication strategy. This
68 strategy should ensure that people of all knowledge levels can understand and engage with the content (Doran et
69 al., 2023; Rödder & Pavenstädt, 2023).

70

71 **2 Objectives**

72

73 Our study group consists of scientists who were part of the writing teams for the IPCC5 and IPCC6 synthesis
74 reports. We are interested in their perspectives on the communication aspects of current climate change
75 knowledge, as well as their views on how effectively this information is being conveyed to the public.

76 The specific objectives are as follows:

- 77 1. To understand the perspectives of IPCC scientists on the current state of climate change and their role
78 in efforts to reduce and mitigate its impacts.
- 79 2. To gather opinions from IPCC scientists on how best to communicate the scientific content of IPCC
80 reports to the public.
- 81 3. To collect proposals from IPCC scientists on how to improve the dissemination of this scientific
82 information to society at large.

83 The scientific knowledge about climate change that reaches society must be both up-to-date and supported by
84 the broadest possible consensus within the scientific community. Additionally, this knowledge should be
85 presented in a way that is not only rational and easy to understand but also resonates with people on emotional
86 and spiritual levels across different cultures (Bolisani & Bratianu, 2018).

87 **3 Methodology**

88

89 The IPCC reports are published approximately every seven years, which can make it challenging to stay in
90 contact with the scientists who contributed to them. For this reason, we have focused our study on the two most
91 recent reports: IPCC AR6 and IPCC AR5. Our sample includes members of the Scientific Steering Committee
92 for the IPCC AR6 synthesis report (IPCC, n.d.), as well as the Chairs and Vice-Chairs of the IPCC AR5
93 synthesis report.

94

95 The fifth IPCC report was published in 2014, nine years before we launched our survey. As a result, some of the
96 scientists involved were no longer reachable at their original contact addresses. To address this, we searched
97 research publication databases for up-to-date contact information for both the IPCC AR5 and AR6 synthesis
98 report writing teams. After accounting for deceased individuals, we obtained a final sample of 28 contacts from
99 the IPCC AR6 and 44 from the IPCC AR5, resulting in a total of 72 contacts across the two reports.

100 The survey was structured into four sections: general information about the scientists, their perception of the
101 current level of knowledge on climate change, their views on the IPCC reports, and opinions on the
102 communication of these reports to society. We used closed-ended questions with a Likert scale, along with
103 open-ended options for questions related to communication.

104 The survey questions were reviewed by a scientist who contributed to both the IPCC AR6 and AR5 reports.

105 To rate the responses on the Likert scale, we assigned numerical values to each option, with 1 representing the
106 lowest value and 5 representing the highest. We then averaged the responses for each question or survey section.

107 The resulting average reflects the respondents' positions based on the following scale: 1 = very low, 2 = low, 3 =
108 neither high nor low, 4 = high, 5 = very high.
109 To enhance the clarity of the results, we multiplied the average by two, converting the values to a scale of 1 to
110 10. The results were then classified using standard educational labels: "Very poor / F" from 0 to 2,9
111 "Insufficient / E" from 3 to 4,9
112 "Sufficient / D" from 5 to 5,9
113 "Good / C" from 6 to 6,9
114 "Notable / B" from 7 to 8,9
115 "Excellent / A" from 9 to 10
116

117 The survey was distributed via email using a Google Forms format, with English as the language of
118 communication. It was initially sent out in February 2023, coinciding with the approval phase of the IPCC's
119 Sixth Assessment Report, which took place at the 58th panel session in Interlaken, Switzerland, in March of the
120 same year. A reminder was sent in April, after the approval process had been completed.
121

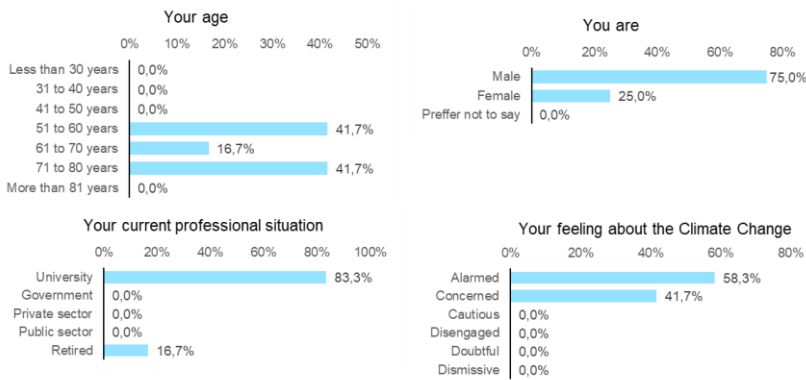
122 **4 Results and discussion**

123

124 The scientists who responded to the survey (figure 1) were aged 51 and older, with a significant portion (58.4%)
125 over 61. Although only one respondent explicitly identified as retired, the CVs of those who provided their
126 details indicate that some hold emeritus professor positions at their respective universities. The majority of
127 respondents were men (75%) and from academic institutions (83.3%). The representation of women, at 25% of
128 responses, aligns with the published gender demographics of IPCC report authors (Liverman et al., 2022). The
129 age distribution of our respondents is also consistent with findings from other studies on IPCC authors (Gay-
130 Antaki, 2021).

131 Out of all respondents, six chose to identify themselves to receive the survey results. Four were from Europe
132 (the UK, France, the Netherlands, and Switzerland), while two were from Africa, both hailing from Ethiopia but
133 affiliated with different IPCC cycles.

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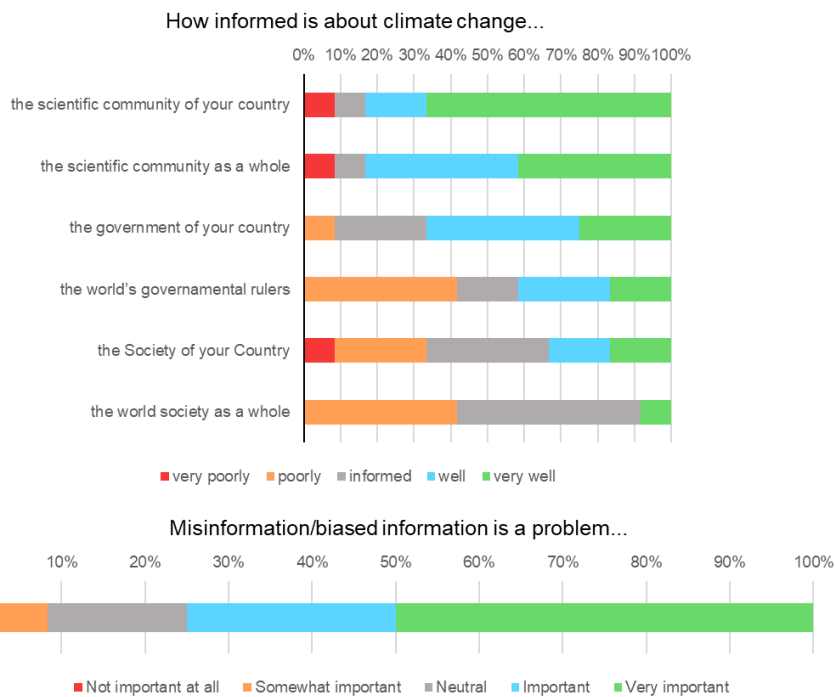
135 *Figure 1. Age, Gender, Profession & Feelings about Climate Change*

136

137 The majority of participants feel alarmed (58,3%) or worried (41,7%) about climate change. Those with a
 138 deeper understanding of the current climate situation tend to view its potential future with greater concern and
 139 alarm. [This aligns with the evolution of the "Global Warming's Six Americas" framework, which illustrates a](#)
 140 [growing concern about climate change and a shift in public attitudes over time \(Leiserowitz et al., 2021\).](#)

141 Responses indicate that participants (figure 2) view the scientific community as highly informed about climate
 142 change (rated 8,7) while they consider policymakers only moderately informed (rated between 6,3 (world) and
 143 7,7 (local)). In contrast, the general public is seen as being only "acceptably" informed (rated between 6,2
 144 (local) and 5,5 (world)). Participants also identified misinformation and biased, self-interested information as
 145 notable issues (rated 8,3) [The literature on climate change communication highlights several key points:](#)
 146 [explaining its causes enhances science acceptance, emphasizing scientific consensus counters misinformation,](#)
 147 [culturally aligned messaging is more effective, and inoculating against misinformation works best, though](#)
 148 [debunking can also be successful.](#)

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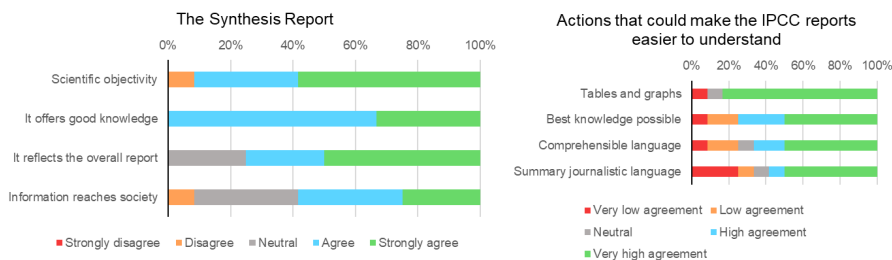
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154 *Figure 2. Information Status, and Biased information*

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156 Regarding the IPCC reports (figure 3), the majority of participants believe they demonstrate notable scientific
 157 objectivity (rated 8,8) and reflect the best available knowledge on climate change (rated 7,8). While respondents
 158 feel that the reports have a notable impact on society as a whole (rated 7,5), opinions vary more widely in this
 159 area.

160 The use of graphs and tables to enhance comprehension is highly appreciated (rated 9), as these visual aids make
 161 the reports more understandable (Harold et al., 2020). Many respondents see the primary role of the IPCC
 162 reports as providing the best possible information to decision-makers, rather than directly to the general public.
 163 They believe that the public often accesses these reports through other interpretive channels, as expressed in
 164 open-ended responses.



171

172 *Figure 3. About Summary Reports & Understanding of Reports*

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174 [Many respondents suggested the possibility of creating a more concise version of the IPCC summary report](#)
 175 [specifically for the general public. Our survey findings align with the discussions and recommendations from](#)
 176 [the IPCC's February 2016 Expert Meeting on Communications and their ongoing implementation. The goal is](#)
 177 [to deepen understanding of the IPCC's communication efforts within the broader context of climate](#)
 178 [communication and policy. This may also inspire further ideas on how to strengthen the IPCC's communication](#)
 179 [strategies \(Lynn, 2018\).](#)

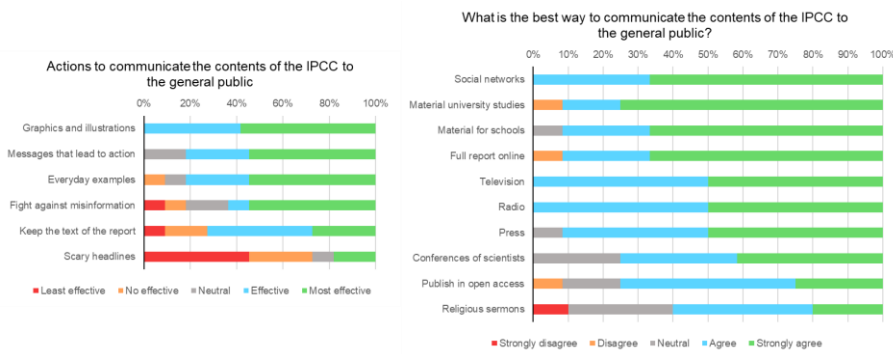
180 [When discussing how to communicate the contents of IPCC reports to the public, the majority \(rated 9.2\)](#)
 181 [believe it is appropriate for these reports to be integrated into university curricula and school education \(rated](#)
 182 [9.2\). The strong agreement among our survey respondents aligns with literature indicating that university](#)
 183 [students believe climate change is real and primarily human-induced, with the majority expressing concern.](#)
 184 [However, the studies also reveal misconceptions about the fundamental causes and consequences of climate](#)
 185 [change \(Wachholz et al., 2014\).](#)

186 [Respondents also emphasized the importance of making the reports fully accessible to everyone via the internet](#)
 187 [\(rated 9\). Social networks \(rated 9.3\), along with media outlets like television \(rated 9\) and radio \(rated 9\), were](#)
 188 [seen as the most suitable platforms for informing the public. The written press was rated slightly lower \(rated](#)
 189 [8.8\), but still viewed as an important channel. Overall, respondents rated highly the effectiveness of these](#)
 190 [channels for informing the population. The use of new media aligns with studies suggesting that non-elite](#)
 191 [actors, such as individual bloggers and concerned citizens, are effective climate change advocates. While](#)
 192 [mainstream media remains the most frequently discussed, new media and science information sources are strong](#)
 193 [competitors for audience attention \(Newman, 2017\).](#)

194 [It is worth noting that some respondents expressed dissenting opinions on the use of journalistic language,](#)
 195 [political debates, and religious or spiritual sermons in the communication of these reports. The simplification of](#)
 196 [scientific information often risks undermining its credibility, largely due to a failure to recognize the tensions](#)
 197 [between scientific and public interpretations. Maintaining scientific credibility requires balancing it with](#)
 198 [meaningful social and political dialogue about the values we hold and the actions we take to protect them.](#)

Eliminado: Many respondents suggested the possibility of creating a more concise version of the IPCC summary report specifically for the general public. Our survey findings align with the discussions and recommendations from the IPCC's February 2016 Expert Meeting on Communications and their ongoing implementation. The goal is to deepen understanding of the IPCC's communication efforts within the broader context of climate communication and policy. This may also inspire further ideas on how to strengthen the IPCC's communication strategies (Lynn, 2018).¶
 When discussing how to communicate the contents of IPCC reports to the public, the majority (rated 9.2) believe it is appropriate for these reports to be integrated into university curricula and school education (rated 9.2). The strong agreement among our survey respondents aligns with literature indicating that university students believe climate change is real and primarily human-induced, with the majority expressing concern. However, the studies also reveal misconceptions about the fundamental causes and consequences of climate change (Wachholz et al., 2014). ¶
 Respondents also emphasized the importance of making the reports fully accessible to everyone via the internet (rated 9). Social networks (rated 9.3), along with media outlets like television (rated 9) and radio (rated 9), were seen as the most suitable platforms for informing the public. The written press was rated slightly lower (rated 8.8), but still viewed as an important channel. Overall, respondents rated highly the effectiveness of these channels for informing the population. The use of new media aligns with studies suggesting that non-elite actors, such as individual bloggers and concerned citizens, are effective climate change advocates. While mainstream media remains the most frequently discussed, new media and science information sources are strong competitors for audience attention (Newman, 2017).¶

233 Strengthening the link between the theory and practice of climate science communication is essential (Hollin &
 234 Pearce, 2015; Pidcock et al., 2021).



235

236 *Figure 4. Public Communication and Channels*

237

238 Misinformation is widely seen as a significant problem (rated 7,8). This issue was raised three times throughout
 239 the survey (Sanford et al., 2021), and in both instances where respondents were asked whether misinformation
 240 was a concern, the responses were remarkably consistent. There was even stronger agreement on the need to
 241 actively combat misinformation (Lewandowsky, 2021).

242 According to respondents, the biggest challenge in communicating climate change is not the difficulty of
 243 understanding its scientific aspects (rated 6.5), nor simply the need to convey clear and relevant information to
 244 users (Adler & Hirsch Hadorn, 2014). Instead, the primary challenge lies in the complexity of decision-making
 245 within social and economic contexts (rated 8.3). As highlighted in the literature, this complexity reflects an
 246 evolving relationship between climate science and policy, which is undergoing a significant transformation
 247 (Beck & Mahony, 2018b).

248 Additionally, the vast majority of participants provided comments and suggestions in the open-ended questions.
 249 Among the most commonly suggested solutions were:

- 250 • Short, simple, and easy-to-understand messages, that may help in making IPCC a power
 251 communicating tool (Stocker & Plattner, 2016).
- 252 • Demonstrating empathy towards individuals and communities by linking climate change to everyday
 253 life and focusing on the future of new generations, while staying true to the content of the reports
 254 (McBeth et al., 2022).

255 One notable response from Ethiopia highlighted the need to improve the training of those responsible for
 256 informing the public about climate change.

Eliminado: According to respondents, the biggest challenge in communicating climate change is not the difficulty of understanding its scientific aspects (rated 6,5), nor simply the need to convey clear and relevant information to users (Adler & Hirsch Hadorn, 2014). Instead, the primary challenge lies in the complexity of decision-making within social and economic contexts (rated 8,3). As highlighted in the literature, this complexity reflects an evolving relationship between climate science and policy, which is undergoing a significant transformation (Beck & Mahony, 2018b).¶

267

268 Conclusions

269

270 Participation in our survey was relatively low, with only 16.6% of the sample responding. The lack of
271 engagement from key IPCC scientists, who are responsible for preparing the institution's most widely read
272 reports, aligns with findings from previous studies highlighting the difficulty that the average reader has in
273 comprehending these reports (Dormer, 2020; Jos Delbeke et al., 2019).

274 One lead author of IPCC AR6 WGII declined to participate in the survey because it did not allow the option to
275 leave questions blank or to skip options, they felt were insufficiently detailed. Another scientist, a vice-chair of
276 the IPCC AR6, completed the survey but expressed, both in the open-response section and via email, their
277 disagreement with several concepts and requested that some of his responses be disregarded.

Eliminado: ¶

278 The disparity in participant behavior in our survey is evident: while some respondents scored highly on
279 questions involving concepts such as journalistic language, religion, or politics, others either refused to
280 participate or expressed dissatisfaction with the inclusion of these topics. This highlights the need for a revised
281 communication strategy that addresses these concerns and enhances the impact of the IPCC report content
282 (Anseel et al., 2010; Bhandari, 2022; Solecki et al., 2024).

283 Trust in the source of information is crucial for that information to influence decision-making. This relationship
284 between trust and decision-making has been extensively studied in medicine, particularly in managing the
285 delivery of "bad news" and the need for patients to make significant decisions. Informed decision-making is
286 now a well-established practice in medical fields (Chandra et al., 2018; Musmade et al., 2013).

287 Information about climate change often represents "bad news" for much of society, requiring careful
288 communication and informed decision-making. Trust in the source of climate information is just as essential as
289 it is in medicine. Similar to medical contexts, recipients of climate information often lack the full capacity to
290 understand highly technical or scientific content, especially during times of emotional stress. Therefore, this
291 information needs to be adapted to the audience's level of understanding. The scientists' responses in our survey,
292 which emphasize the need for empathy and a solutions-based approach, reflect this mindset. While the diagnosis
293 and proposed solutions must come from science, their implementation requires clear communication to society,
294 which must ultimately make the final decision—ideally, with widespread social consensus (Goldberg et al.,
295 2020).

296 The open-ended responses to our survey also highlight the critical role of trust in the information source
297 (Goodwin & Dahlstrom, 2014). National Meteorological Services serve as key guarantors of the accuracy and
298 reliability of past climate data, which underpins their credibility when comparing past and present data to
299 confirm that climate change is occurring. They also play a vital role in explaining the new climate realities to
300 society, allowing people to comprehend and contextualize the future climatology they will face (Molina &
301 Abadal, 2024).

303 Communication is a broad concept that encompasses the sender, the receiver, and the message. However, it also
304 involves the action (or inaction) of communicating, beyond the mere intentions of those sending and receiving
305 information (Charles Bazerman, 2019; Luhmann, 1992). In the case of climate change, where the active
306 participation of the public is crucial, a proliferation of diverse and engaging narratives around the topic is
307 necessary to inspire action and understanding.

308 These narratives must be tailored to the diverse cultures, beliefs, and values of different human communities
309 worldwide, offering a moral framework that is acceptable to all (Hulme, 2009). Climate change communication
310 involves many stakeholders with varying levels of expertise and perspectives, yet all rely on the scientific
311 foundation of climate knowledge. How this knowledge reaches and resonates with society is crucial, and the
312 process of popularizing it should involve the scientists who created it. Developing a methodology within the
313 IPCC itself to produce texts written in clear, accessible language—akin to journalistic style (Smith & Higgins,
314 2020)—could help reduce the contradictory and confusing headlines that often reach the public. Some IPCC
315 scientists who responded to our survey suggested that this could be an innovation for future cycles, proposing
316 ideas such as creating a summary text for the general public, approved by scientists rather than governments, to
317 eliminate concerns about politicization and preserve trust in both the message and its source.

318 The role of the media and social networks in interpreting and delivering IPCC information to the public is vital,
319 as reflected in the opinions of our respondents. Media coverage and social media discussions shape public
320 opinion on climate change (Pearce et al., 2019; Sarathchandra & Haltinner, 2023). The media's portrayal of the
321 Conferences of the Parties (COP), where decision-makers, government representatives, and non-governmental
322 organizations gather, also influences societal perceptions of climate action and the acceptance of measures to
323 mitigate climate change, whether current or forthcoming (Sisco et al., 2021).

324 In recent years, significant research has explored the role of emotions, empathy, and affect (Brosch, 2021) in
325 climate change communication, aiming to inspire societal action. However, the gap between climate scientists
326 and the delivery of their findings to the global public remains unresolved. More efforts are needed to create
327 content that can be directly communicated to society without the often inaccurate interpretations introduced by
328 intermediaries who currently serve as the public's source of climate information.

329

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331

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531

532 **-Ethics Approval**
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538 All authors consent to participate.

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