

Celebration of Earth Day 2011

The theme of Earth Day and the social perception of what is really happening to our planet*

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Resum. La percepció social de la informació és cada vegada més diversa i es basa en fonts gairebé sempre allunyades de les coneudes tradicionalment. Els nous mitjans de comunicació socials i de masses obren també la porta a una nova «rumorologia» universal que, en el cas de notícies lligades a la ciència o al coneixement objectiu, dóna pas a la desinformació i a les teories conspiradores. L'escalfament planetari o el canvi climàtic són un exemple clar de com les fonts científiques es tergiversen i de com, amb un rerefons científic, s'acaba negant el que la font originària afirmava. En el món de les xarxes socials, la comunicació d'idees i coneixements i les notícies objectives es confonen irreversiblement. En el conjunt de la societat, la ciència i les notícies lligades al coneixement científic arriben sovint sense cap filtre o revisió d'experts, sense cap mena de coneixement vague sobre la font real que els ha emès. La percepció social i global sobre el canvi climàtic i el futur del Planeta es modela mitjançant les xarxes socials, i per això, el lema del Dia de la Terra d'enguany és encara més significatiu: «Mil milions d'actes en verd» o la socialització universal d'una necessitat planetària.

Paraules clau: Grup Intergovernamental d'Experts sobre el Canvi Climàtic · canvi climàtic · escalfament global · percepció social i global · xarxes socials

In 1798, Thomas Malthus wrote in *An Essay on the Principle of Population* that,

“The power of population is so superior to the power of the earth to produce subsistence for man that premature death must in some shape or other visit the human race. The vices of mankind are active and able ministers of depopulation. They are the precursors in the great army of destruction,

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Summary. The social perception of information is increasingly diverse and based on sources that in many cases are far removed from the traditional ones. New social mass media have opened the door to a universal ‘rumorology,’ which in the case of news related to science or objective knowledge often results in the transmission of misinformation and conspiracy theories. Global warming and climate change are a clear example of how scientific sources can be distorted and how, despite a scientific basis, the original source declared can be obscured. In the world of social networks, the communication of ideas and knowledge and of objective news are hopelessly confused. In society as a whole, science and news involving scientific knowledge are often reported unfiltered or without prior peer review, with only vague background knowledge. The social and global perception of climate change and the future of the planet have been shaped by social networks. Consequently, the theme of Earth Day 2011 is even more significant: ‘A Billion Acts of Green,’ or the universal socialization of a global necessity.

Keywords: Intergovernmental Panel for Climate Change (IPCC) · climate change · global warming · social and global perception · social networks

and often finish the dreadful work themselves [...] Should success still be incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow levels the population with the food of the world.”

He believed that population growth was generally restricted by the available resources. At the time he wrote his essay, and for the following 200 years, most societies were at or beyond their agricultural limits. And yet what we have seen is that population levels have determined agricultural methods rather than the other way around. Likewise, often when we talk about climate change there is an almost global catastrophic view. We are at the beginning of the 21st century and world population is expected to reach 10 billion by 2050. If in the past we referred to a lack of food, today we talk about the lack of energy or the great climatic or meteorological phe-

nomena that might regulate the world's human population in some way.

On every occasion a new intern comes to work with us, I challenge him or her with three quotes. The first is "Our Father in heaven...", and approximately half of them stare blankly at me, while the rest manage to complete the sentence with "hallowed be your name." The second is "*La Internationale*" (in reference to the French anthem, *L'Internationale*, one of the most recognizable songs of the socialist movement since the late 19th century), leaving more than 90 % of the interns perplexed, "A store? A bar?" It means nothing to them. The third and last is "*Cara al Sol*" (or "Facing the Sun," the national anthem of Franco's Falangist Party in Spain). In this case, approximately 80 % will reply with something that resembles the rest of the phrase ("con la camisa nueva", or "in my new shirt"), so you could say they do have some slight perception of what it refers to. The reason for this not-so-arbitrary short quiz is to confirm that the three events that have caused the greatest number of deaths—throughout the history of humanity, namely, religion; over the last 100 years, namely, the wars against communism; and in the past 60 years, in Spain, namely *Franquismo* or Francisco Franco's dictatorship—have been virtually erased from the worldview of the current generation of young people. But over the last 20 years it is not only their perception of reality but also that of our own generation that has drastically changed.

Are we tired of climate change?

Whenever I give a lecture about climate change and I ask this question, most people, 70–80% of the attendants—and we are talking about people who actually came to hear a lecture on the topic, in other words, people with some awareness of the issue—will answer yes. What is the reason for this?

I am best known as the weatherman for TV3, the primary television channel of the Catalan public broadcaster *Televisió de Catalunya*, but I have also been president of the Climate Broadcasters Network - Europe, of the European Commission. The main objective of this network is to communicate to citizens the science of climate change; its impacts, and the need for adaptation and mitigation in order to facilitate broad under-

standing of the various issues. It also aims to obtain a common vision between the different member countries of the European Union, in the hope that society's opinion-makers will have a better understanding of the complexity of climate change issues but also motivate European citizens to take both individual and collective actions aimed at its mitigation. As former chairman of the International Association of Broadcast Meteorology, which has consultative status with the World Meteorological Association (WMO), I have been able to forge contacts at the highest levels within the field of meteorology and to participate actively in expert teams and task forces reporting to the WMO. Consequently, I am quite active with regard to topics pertaining to climate change and the Intergovernmental Panel for Climate Change (IPCC).

So are we indeed tired of hearing about climate change? The answer is yes. But let us examine this question in greater depth. Between 2007 and 2008, the polling company Gallup conducted the first comprehensive survey of global opinions about climate change, posing two questions to respondents in 128 countries: 1) How much do you know about global warming or climate change? and 2) How serious of a threat is global warming to you and your family? My personal perception, as someone who works in communication, is that we are very selfish. I do not believe that historical approximations about how climate change will affect our grandchildren, or great grandchildren, for example, are effective, mostly because in today's society it is very difficult for us to consider things beyond our personal reality or at the most that of our direct family members. In any case, Gallup found that the majority of the world's adult population is aware of climate change issues (Table 1), and that those who are aware are more likely to say that climate change poses a serious threat to themselves and to their families (Table 2).

Overall, 61 % of people in the world are aware of global warming and climate change, claiming to know a great deal about it or at least something about it. More than 8 in 10 adults in Europe and North and South America are familiar with these two issues, whereas the percentage is lower, about 50 %, in Asia, Middle East / North Africa, and sub-Saharan Africa. If we look at individual countries, in many of them, both developed and developing, approximately 80 % of the population will

Table 1. How much do you know about global warming or climate change? Source: Gallup Poll

	Have not heard of it	Know something about it	Know a great deal about it	Don't know/Refused	Aware
World	24 %	50 %	11 %	15 %	61 %
Americas	14 %	64 %	17 %	4 %	82 %
Asia	24 %	45 %	8 %	23 %	53 %
Europe	8 %	70 %	18 %	4 %	88 %
Middle East / North Africa	41 %	42 %	10 %	7 %	52 %
Sub-Saharan Africa	48 %	37 %	7 %	9 %	44 %

Based on Gallup surveys in 128 countries between 2007 and 2008. Data weighted to 2008 World Bank adult population estimates. For more information, <http://www.gallup.com/poll/124652/awareness-climate-change-threat-vary-region.aspx>.

Table 2. How serious of a threat is global warming to you and your family? Source: Gallup Poll

	Very/Somewhat serious	Not very/Not at all serious	Don't know/Refused	Not aware
World	41 %	18 %	2 %	39 %
Americas	67 %	15 %	1 %	17 %
Asia	32 %	20 %	2 %	46 %
Europe	59 %	25 %	4 %	12 %
Middle East / North Africa	42 %	9 %	1 %	48 %
Sub-Saharan Africa	36 %	7 %	1 %	56 %

Based on Gallup surveys in 128 countries between 2007 and 2008. Data weighted to 2008 World Bank adult population estimates. For more information, <http://www.gallup.com/poll/124652/awareness-climate-change-threat-vary-region.aspx>.

claim to know either something or a great deal about climate change (Table 3).

The countries whose populations claim to know less, with an average of 20 %, in most cases, coincide with the 'Least Developed Countries,' according to the United Nations, and are also the countries with the lowest literacy rates, in accordance with a lower general knowledge and less transfer of learning in their populations. Furthermore, with regard to the question of how serious of a threat global warming is to themselves and their family, the results also show that global warming and climate change are perceived as a relatively low threat in the most vulnerable regions. This can be attributed to the previously mentioned lower awareness in Asia, Middle East / North Africa, and sub-Saharan Africa, and therefore a lower likelihood of concluding that global warming will have serious consequences. Again, adults in Europe, North and South America are the most likely to perceive global warming as a very or at least a somewhat serious threat. But if we look again at individual countries things are far from uniform within continents or regions. A good example of this can be found in Latin America, where in Brazil 76 % of the population views global warming as a serious personal threat, as opposed to Haiti, where only 35 % has the same view. If we take Haiti's survey results for 2010, it is almost half of that, at 18 %. Clearly, in a country devastated by earthquakes and hurricanes, there are bigger, immediate concerns than whether there is global warming or not, nor is it certain that this information has reached most of the population. But there are also large differences among developed countries. In Europe, for example, global warming is considered as a serious personal threat by 82 % of the population in Greece but only by 39 % of the population in the Czech Republic.

Most importantly, the result varies among the top five greenhouse-gas-emitting countries: China, India, Japan, Russia and United States. This underscores the challenges leaders face in reaching a global climate agreement. In China, which is the world's top emitter of CO₂ into the atmosphere, with the amounts expected to increase even further, 62 % of the population is aware of climate change but only 21 % consider it a serious personal threat. During the World Climate Conference-3 (WCC3), held in Geneva, I had the chance to talk with representatives from around the world to ask them about their

planned negotiation position for the 15th Conference of the Parties (COP15) in Copenhagen, a few months later. One of the top-level negotiators from China put it this way: China has 1.6 billion people and in the last 20 years more than 300 million have emerged from poverty. The current challenge is to increase that number to 500 million and this is the top priority of the government. There is no other country in the world that has undertaken a more difficult and decisive effort for population control as that of the one-child policy. For any European, or any other citizen of the world, for the government to impose such a policy on private life would be inadmissible, and yet in China it was introduced as an attempt to alleviate the country's social, economic, and environmental problems. So, according to the Chinese negotiator, no other country is in a position to tell the Chinese what to do, for they will do what they believe is necessary to take people out of poverty, just as they defended their right to impose their own approach to control the country's population growth.

If we compare survey results for how serious of a threat global warming was considered to be between 2007–2008 and 2010, in the regions where awareness was the highest it has dropped significantly: by 10 % in Western Europe, 7 % in Eastern Europe, and 10 % in the United States. Conversely, awareness has increased in other regions, such as Latin America and sub-Saharan Africa, but mostly where it was low to begin with (Table 4).

Worldwide, there has been a 1 % increase in awareness, but we should not fool ourselves. In all of the regions that are central opinion- and decision-makers as well as the key participating countries in global climate debates—in other words, developed Asia, Europe, and the United States—the sense of a threat by global warming is much less today than it was just recently. As one study concluded, declining concern about climate change may reflect the lack of progress towards achieving a global climate policy compounded by the increasing skepticism about global warming after the so-called Climategate in 2009, when climate skeptics argued that emails from the Climate Research Unit at the University of East Anglia showed that global warming was a scientific conspiracy in which climate data were manipulated and there had been attempts to suppress critics. The reduced concern about climate

Table 3. Global awareness of climate change and perceived personal threat by individual countries. Source: Gallup Poll

Country	Know something/great deal about climate change	Global warming serious personal threat	Country	Know something/great deal about climate change	Global warming serious personal threat
Afghanistan	25 %	18 %	El Salvador	55 %	51 %
Algeria	56 %	46 %	Estonia	88 %	32 %
Angola	43 %	38 %	Ethiopia	80 %	73 %
Argentina	76 %	71 %	Finland	97 %	39 %
Armenia	78 %	65 %	France	93 %	75 %
Australia	97 %	75 %	Georgia	62 %	47 %
Austria	95 %	54 %	Germany	96 %	60 %
Azerbaijan	58 %	43 %	Ghana	26 %	19 %
Bangladesh	33 %	32 %	Greece	87 %	82 %
Belarus	80 %	30 %	Guatemala	57 %	51 %
Belgium	89 %	68 %	Guinea	55 %	43 %
Belize	53 %	45 %	Guyana	67 %	56 %
Benin	21 %	15 %	Haiti	46 %	35 %
Bolivia	55 %	51 %	Honduras	62 %	57 %
Botswana	38 %	30 %	Hong Kong	92 %	54 %
Brazil	79 %	76 %	Hungary	93 %	75 %
Burkina Faso	36 %	34 %	Iceland	95 %	33 %
Burundi	22 %	20 %	India	35 %	29 %
Cambodia	58 %	51 %	Indonesia	39 %	33 %
Cameroon	49 %	32 %	Iran	55 %	43 %
Canada	95 %	74 %	Iraq	55 %	28 %
Central African Republic	56 %	37 %	Ireland	94 %	60 %
Chad	45 %	38 %	Israel	86 %	62 %
Chile	73 %	69 %	Italy	84 %	76 %
China	62 %	21 %	Japan	99 %	80 %
Colombia	68 %	65 %	Jordan	62 %	51 %
Costa Rica	75 %	72 %	Kazakhstan	60 %	35 %
Czech Republic	87 %	39 %	Kenya	56 %	49 %
Democratic Republic of Congo (Kinshasa)	53 %	41 %	Kyrgyzstan	52 %	39 %
Denmark	90 %	40 %	Laos	80 %	49 %
Djibouti	43 %	35 %	Latvia	91 %	37 %
Dominican Republic	50 %	46 %	Lebanon	64 %	54 %
Ecuador	70 %	69 %	Liberia	15 %	13 %
Egypt	25 %	21 %	Lithuania	91 %	47 %
			Luxembourg	95 %	75 %

Country	Know something/great deal about climate change	Global warming serious personal threat
Madagascar	49 %	46 %
Malaysia	71 %	50 %
Mali	53 %	48 %
Malta	75 %	64 %
Mauritania	44 %	35 %
Mexico	67 %	63 %
Moldova	82 %	73 %
Mongolia	75 %	30 %
Morocco	30 %	29 %
Mozambique	54 %	48 %
Namibia	46 %	35 %
Nepal	37 %	32 %
Netherlands	96 %	57 %
Nicaragua	53 %	49 %
Niger	24 %	21 %
Nigeria	28 %	18 %
Norway	97 %	43 %
Pakistan	34 %	24 %
Palestinian Territories	67 %	55 %
Panama	65 %	61 %
Paraguay	58 %	54 %
Peru	61 %	58 %
Philippines	47 %	42 %
Poland	84 %	54 %
Portugal	90 %	85 %
Qatar	64 %	43 %
Republic of Congo (Brazzaville)	41 %	31 %
Romania	81 %	66 %
Russia	85 %	39 %
Rwanda	30 %	22 %
Saudi Arabia	48 %	40 %
Senegal	36 %	33 %
Sierra Leone	36 %	24 %
Singapore	84 %	59 %

Country	Know something/great deal about climate change	Global warming serious personal threat
South Africa	31 %	21 %
South Korea	93 %	80 %
Spain	85 %	69 %
Sri Lanka	73 %	65 %
Sudan	47 %	42 %
Sweden	96 %	56 %
Syria	56 %	41 %
Taiwan	91 %	70 %
Tajikistan	43 %	19 %
Tanzania	52 %	48 %
Thailand	88 %	61 %
Togo	29 %	23 %
Trinidad and Tobago	72 %	71 %
Tunisia	60 %	46 %
Turkey	74 %	66 %
Uganda	35 %	30 %
Ukraine	79 %	52 %
United Kingdom	97 %	69 %
United States	97 %	63 %
Uruguay	73 %	68 %
Uzbekistan	53 %	38 %
Venezuela	63 %	62 %
Vietnam	73 %	53 %
Zambia	26 %	18 %
Zimbabwe	52 %	36 %

Based on Gallup surveys in 128 countries between 2007 and 2008. For more information, <http://www.gallup.com/poll/124595/Top-Emitting-Countries-Differ-Climate-Change-Threat.aspx#2>.

Table 4. How serious of a threat is global warming to you and your family? Percentage saying 'Very/Somewhat serious' threat. Source: Gallup Poll

	2007– 2008	2010	Change (Percentage points)
World	41 %	42 %	+ 1
Canada	74 %	71 %	- 3
Commonwealth of Independent States	42 %	44 %	+ 2
Developed Asia	79 %	74 %	- 5
Developing Asia	31 %	31 %	-
Eastern/Southern Europe	67 %	60 %	- 7
Latin America	67 %	73 %	+ 6
Middle East and North Africa	42 %	37 %	- 5
Sub-Saharan Africa	29 %	34 %	+ 5
United States	63 %	53 %	- 10
Western Europe	66 %	56 %	- 10

Based on Gallup surveys in 111 countries in 2010. Figures projected to the entire adult population. For more information, <http://www.gallup.com/poll/147203/Fewer-Americans-Europeans-View-Global-Warming-Threat.aspx>.

change may also reflect the difficult economic times, as environmental issues have become less important.

According to a Rasmussen report on opinions about global warming as expressed by likely voters in the United States, in a poll conducted in 2010, 41 % thought that global warming is caused primarily by human activity while 47 % said it was due to planetary trends [http://www.rasmussenreports.com/public_content/politics/current_events/environment_energy/energy_update]. This is a marked difference from results of the 2008 survey, when voters were more inclined to think that the primary cause was human activity (47 %) rather than planetary trends (34 %).

What is our perception? What is our knowledge?

Figure 1 shows the covers of the IPCC Assessment Reports on Climate Change. The first report appeared in 1990, with supplementary reports published in 1992; the second report appeared

in 1995, the third in 2001, and the fourth in 2007 (Fig. 1). The fifth Assessment Report will be released in 2013 and 2014.

Why does it take so long for these reports to be released? Basically, because they are compiled with great care. Figure 2 shows the workflow of the preparation, review, acceptance, adoption, approval, and publication of the IPCC reports. In summary, a first draft of reports is prepared based on available scientific, technical, and socioeconomic information. The IPCC assessment is extensively supported with references from the peer reviewed and internationally available literature. In preparing an IPCC report, the lead authors must clearly identify disparate views for which there is significant scientific or technical support. Contributing authors may be invited to submit further material. Review is essential to the IPCC process as it ensures an objective and complete assessment of the current information. A multi-stage review process is carried out, initially by experts and then by governments and experts. Subsequently, the report is submitted to both expert reviewers and governments, who may then comment on its accuracy and completeness, in terms of scientific/technical/socioeconomic content and overall balance. The circulation process among peer and government experts is very wide. Hundreds of scientists examine the drafts, checking the soundness of the scientific information included in the report. The review editors of the report (normally two per chapter) make sure that all comments are well considered. On completion of a report, review comments are then retained for a minimum of 5 years thereafter in an open archive. In light of this complex review process, the most fundamental knowledge on climate change is, by the time of its publication, 'scientifically obsolete' because the reports contain data with a lag or difference of 3 or 4 years compared to the most up-to-date knowledge.

A search for 'Global warming' on Google Scholar, yields hundreds of thousands of articles. But if we look year by year, we find there are about 45,000 since 2012, 39,400 for 2011, 46,000 for 2010, 41,400 since 2009, etc. Thus, there are around 40,000 articles every year. That means that an average of 110 new articles about the science of global warming are available to the public every day. This may look as a good number, but let us compare it with the number of opinions a regular world citizen is exposed to on a daily basis.

Social and global perception of climate change in the social networks

Today, the debate on global warming is alive in the social networks. On Twitter, there is approximately one tweet about glo-

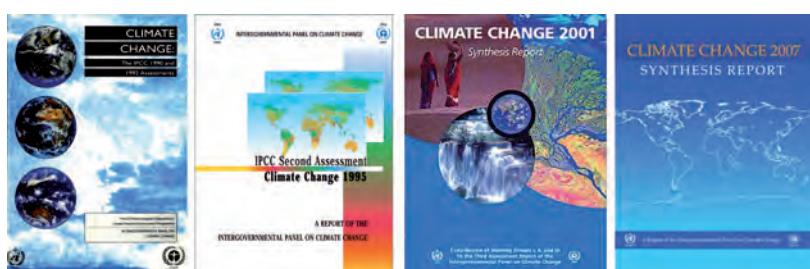


Fig. 1. The four IPCC Assessment Reports on Climate Change published to date.

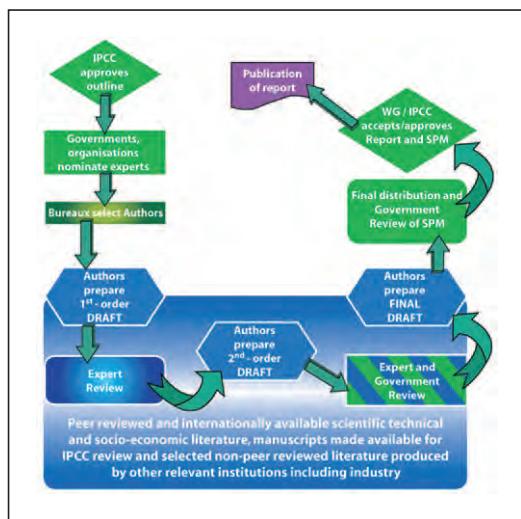


Fig. 2. Workflow of the preparation, review, acceptance, adoption, approval, and publication of the IPCC reports. Source: IPCC.

bal warming every minute. That means that around the world, at least every minute there is someone expressing an opinion, positive or negative, about climate change, which results in a very marked and very sustained debate. Through social networks, many hundreds of thousands of people share their views and opinions in highly systematic forms of communication.

Today, information is widely accessible to almost anyone and it comes from an increasingly diverse number of sources. Thus, we often form our opinions based on summaries of the results provided by search engines to a specific enquiry. But the social perception of information has become increasingly stratified and sources that we rely upon for information may well be remote from traditional ones. The new social mass media has also opened the door to a universal ‘rumorology,’ which for news related either to science or to objective knowledge often results in the transmission of misinformation and conspiracy theories.

What is the opinion of weather forecasters?

This is an example of social perception related to the growing opinion that global warming is primarily caused by planetary trends. For many people, the weatherman/woman is the only scientist they know. In most cases, weather forecasters are scientists, with training in physics, geography, etc. In others, they are TV or radio presenters that are communicating information from meteorologists. Nonetheless, in the United States, the meteorologist is generally considered to be the ‘station scientist’ and thus the authoritative voice to discuss science-related topics.

According to a wide study of weathermen/women in the United States, carried out by George Mason University, only 33 % believe that global warming is due to natural causes [http://www.climatechangecommunication.org/images/files/TV_Meteorologists_Survey_Findings_%28March_2010%29.pdf]. Two out of three weather broadcasters in American television believe that global warming is caused by planetary trends.

Thus, if they express this opinion, in some way or another, repeatedly on TV over their 3-minute segment every day it is possible for society to come to the same conclusion. And by society I mean not only the general public, but also politicians, decision-makers, and even scientists of different specialties. Furthermore, one out of four weather broadcasters—strong generators of opinion—considers global warming as a scam, an assertion that is far beyond simply saying they do not believe in it.

In a speech pronounced on 2003, US Senator James Inhofe said that the theory that man-made emissions have caused global warming was “the greatest hoax ever perpetrated on the American people.” Two years later, in a Senate floor speech he reiterated his ideas once again, saying that “much of the debate over global warming is predicated on fear, rather than science. I called the threat of catastrophic global warming the ‘greatest hoax ever perpetrated on the American people,’ a statement that, to put it mildly, was not viewed kindly by environmental extremists and their elitist organizations. I also pointed out, in a lengthy committee report, that those same environmental extremists exploit the issue for fundraising purposes, raking in millions of dollars, even using federal taxpayer dollars to finance their campaigns.” He goes on to cite the work of several scientists and refers mostly to the melting of the ice-caps and future projections to support his views. But if we examine the fourth chapter of the IPCC Fourth Assessment Report, “Observations: Changes in Snow, Ice and Frozen Ground” [<http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter4.pdf>], we see that 22 of the authors (coordinating, lead and contributing) and review editors, more than half, are from the United States. With regard to projections of future changes in climate, there are 31 scientists from the United States—again, more than half—contributing to the report. Therefore, these so-called ‘environmental extremists,’ as referred to by Senator Inhofe—a high-ranking member of the American political system and thus potentially highly influential as an opinion- and decision-maker—are mostly scientists carrying out research in the United States.

Where does society get its information from?

Generally, we consume information from the easiest and most accessible source. And nowadays this is mostly through Google searches, Twitter feeds, and other social networks. Access to information is so fast that social perception advances at an alarming speed. Global warming and climate change are a clear example of how scientific sources can be distorted and of how, despite a scientific basis, the original source can be obscured. In the world of social networks, the communication of ideas and knowledge and objective news are hopelessly confused. There are millions of opinions, stories, points of view, sources of information, all of which, for the majority of people, are of the same weight. In society as a whole, science and news related to scientific knowledge often come without the benefit of a filter or peer review, such that knowledge about the real source of the information is vague at best.

We cannot change society, but we can try to steer it in a direction that we honestly believe is appropriate. As scientists, we must conduct sound research but it is just as important that we pay closer attention to the communication of climate science, so that our findings provide information of the highest quality possible while expressed in such a way that it can be

readily understood by most of society. The social and global perception of both climate change and the future of the planet is modeled through social networks. Recognition of this new reality was reflected in the theme of Earth Day 2011: 'A Billion Acts of Green,' or the universal socialization of a global necessity.