

THE CHANGE IN UNDERSTANDING CLIMATE CHANGE – A STUDY ON HOW AND WHY PUBLIC PERSPECTIVE OVER CLIMATE CHANGE IS SUBJECT OF A CONTINUOUS TRANSFORMATION

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Abstract

This article aims to present the multiple perspectives that compete in defining public perception over global warming and the impact that several endogenous and/or exogenous factors have on it. Due to the overwhelming amount of existing information, often conflicting and vague, we have confined ourselves to try to identify common patterns - elements and differences in the discourse on global warming of different actors that have a great impact on public opinion. We consulted materials provided by scientists, activists, politicians and public media and we have also aligned ourselves to previous research and studies on the controversy aroused by the subject of global warming in order to better grasp the complex relation between existing arguments and counterarguments and how they affect public opinion. In the conclusion section, we bring to attention some of the most relevant factors of confusion and misinterpretation that we have identified as leading to a continuous dynamic of the public perception over global warming, thus contributing to a general state of confusion and insecurity.

Key words: *climate change, climate skeptics, climate variability, global warming, sustainability.*

INTRODUCTION

When trying to get an accurate picture about what climate change really means, one can not help but notice that scholars nowadays have really different opinions on the topic and that despite the continuous feedbacks and arguments they have been giving each other by the time being, many aspects of the climate change debate remain still controversial, generating three main attitudes around the topic (Giddes, 2009). To start with, the climate change skeptics either claim that we are still at the stage of insufficient knowledge and because of this the global warming produced by human activity can not be demonstrated, or they accept that climate change is happening and that it is humanly induced, but argue that the threat it poses has been exaggerated. In either case, the skeptics find themselves at the opposite corner to the mainstream view of global warming due mainly to the negative action of the human factor and especially to the increase of GHG emissions, supported and promoted above all by the publications of the Intergovernmental Panel on Climate Change (IPCC, 2007).

In addition to these two sides, there is also a third party, represented by the radicals, who think climate change will bring even greater threats and sooner than is conventionally expected.

Taking into account the long exposure of the concept to the analytical tendencies of different parties, period in which all sciences, social sciences and humanities and political, economical and even religious behaviours kept changing and impacting public opinion in countless ways, climate change has ended up being perceived by some scholars as a “mutating idea” (Hulme, 2009). As climate change is being examined from different angles, such as those mentioned before, which apart from affecting general perception over climate change, have also been affected by the mere idea and concept of it, carrying quite different meanings for each of them.

Although conflicting conversations about climate change could be seen as a mark of the diversity of our values, beliefs and expectations, this is only possible when we get really engaged with the subject and when we have the necessary information to have an opinion that

really reflects our beliefs or our inner system of ethical, ideological and political values. However, this is rarely the case, mostly because of the intrinsic nature of the conflict and the way in which it is presented to the general public.

When examining whether readers' assessments of the certainty of scientific findings regarding climate change depend on how news are presented, research shows that adding controversy and/or context to a news story about global warming influenced readers' perceptions of its certainty. The context treatment produced the highest level of certainty about global warming, while controversy treatments resulted in the lowest levels of certainty (Corbett, 2016). Key findings from other studies on how science stories from radio, television and the press are perceived, including those on topics such as climate change, also suggest that there is a clear link between media coverage and the way people understand science, that the presence of more researchers in the media does not seem to build open comprehension of science issues and that a clear and consistent story behind an issue helps create public engagement (Hargreaves, 2008).

In this article we intend to emphasize, in the first part, the main differences of perspective between the different sides. These are mainly based on the uncertainties that still exist regarding the manifestation of the phenomenon. The second part will be dedicated to the impact these differences have on public opinion and even on our daily lives.

MATERIALS AND METHODS

In order to achieve a better understanding of the yet unclarified controversy regarding climate changes and global warming, we first identified the most relevant official documents on global warming and the dynamics of its perception both inside and outside the European space. Subsequently, documents in which counter-arguments about global warming are provided have been identified and ranked from the point of view of the sources' credibility. The contribution of the media was taken into account for both sides. As a last resort, studies previously carried out by

specialists in various fields, which presented in parallel the pros and cons of the two sides, were analyzed. This research brought to a number of observations, which will be presented in detail in the next chapter.

RESULTS AND DISCUSSIONS

Skepticism on global warming: Although nowadays most climatologists claim that we are witnessing a global phenomenon of climate change accelerated by the multitude of human activities based on fossil fuel consumption (Raileanu, 2015), there are a considerable number of skeptics, the voices whose main points of view are based on uncertainties existing regarding how this phenomenon actually occurs. They claim to have various arguments for being skeptical, of which the most commonly used are the following:

- The weather forecast faces challenges even in the short term –the fact that the weather can not be predicted for sure for the coming weeks makes the forecasting capacity for longer periods of time (like centuries) even less reliable

- The atmosphere does not suffer abnormal temperature changes in relation to the geological time scale: there have been other global warming periods in the history of the planet, they are normal and are part of the cyclical climate change. In addition, measurements proving a warming of the atmosphere are recorded at the surface of the earth and are insufficient to establish a verdict, as similar rising of temperatures are not recorded in the upper atmosphere.

- Global warming and cooling processes are not due to human activities, but to natural causes, which could explain the rapidity of the global warming process over certain segments of time, such as the last half of the last century. The climate cycles are influenced by the solar activity, which happens independently of human activity. Moreover, even if at present humanity finds itself in a period of climate warming, some researchers claim that we should rather worry about the dropping temperatures that are about to come.

- The recorded climate changes will not cause any disasters, so we do not have to implement any type of measures, but on the

contrary, as the current climate trends show an increased potential for increasing the crop yield.

- The presence of carbon dioxide is not fully understood - at present, the percentage of carbon dioxide in the atmosphere is at the lowest level in the last 500 million years and the percentage in the atmosphere accounts for only 0.001% of the total quantity in the oceans, rocks, soil and different forms of life. In addition, Plimer states that human activity only contributes very little to the presence of the gas in the atmosphere (Plimer, 2009).

The oceans and earth hold about 50 times more carbon dioxide than there are in the atmosphere, and the circulation between these carbon dioxide reservoirs is still poorly understood. Due to the carbon dioxide property of having a "greenhouse" effect, allowing more solar energy to enter the atmosphere than it leaves, the hypothesis of global warming has come to find its logical sense. However, the definition according to which climate change brings an extreme greenhouse heating of the atmosphere with catastrophic environmental consequences has ended up seen as exaggerated by many scientists (Robinson et al., 1997).

Arthur Robinson and Zachary Robinson are chemists at the Oregon Institute of Science and Medicine in the United States. They show that there is a relationship according to which the shorter the solar cycle, the more active it gets and the higher are the temperatures, which explains the heating and the high temperature fluctuations that took place starting with the Little Ice Age. According to the chart, the highest temperatures since then were recorded around 1940 when the temperatures began to drop. Most of the increase in carbon dioxide in the atmosphere has occurred over the last 50 years, and growth has continued over the last 20 years. However, there has been no significant increase in atmospheric temperature during these 50 years, and in the 20 years with the highest levels of carbon dioxide, temperatures have actually dropped, according to their interpretation.

In critical papers on the position of climate skeptics, these arguments are sometimes fought and then the arguments of these critics are once again tackled by skeptics in a chain that does not seem to seek to get to an end.

In his exhaustive work entitled *Global Warming - Myth or Reality?: The Erring Ways of Climatology*, Marcel Leroux goes through all these elements of interest to the skeptics that we mentioned above. He pursues the history of the global warming concept since his appearance and analyzes past climates and recent climate developments, sea and ocean levels, atmospheric behavior, and the events we are currently exposed to, the causes of climate change, greenhouse effect, and numerical patterns, concluding that we can not consider human behavior responsible in any way for climate change (Leroux, 2005).

Marcel Leroux is an empiric climatologist and emeritus professor of climatology at the Jean Moulin Lyon 3 University, director of the Institute for Climatology, Risk and Environment Research and Cavalier in the Ordre des Palmes Académiques. His work also criticized the tabloid climatology that dominates the attention of the media and of the governmental decision makers as well. Leroux was outraged by the amount of money invested by the U.S. into global warming research, a level of funding providing the climate modelers with generous research grants dependent upon producing dramatic statements and arguments exclusively in favor of global warming.

While the United Nation's Intergovernmental Panel on Climate Change (IPCC) warns of a dangerous human effect on climate, the Nongovernmental International Panel for Climate Change concludes the human effect is likely to be small relative to natural variability. Also in contrast to the IPCC, NIPCC is sponsored by three non-profit organisations (Center for the Study of Carbon Dioxide & Global Change, The Science and Environmental Policy Project and The Heartland Institute).

Those who are sceptical about climate change see the IPCC as the enemy of free and proper scientific thinking (Giddes, 2009), being responsible for the politization of climatology.

Criticisms on the hypothesis of human impact on global warming: The hypothesis of climate warming due to anthropogenic factors is most frequently challenged by skeptics, who claim that the causes of this climate change are natural (solar activity variation or astronomical

causes). Regarding the global warming that occurred since the end of the small glacial era, there are no uncertainties, but the fact that global temperatures have seen countless variations over time, even before the carbon dioxide levels in the atmosphere began to rise significantly (Easterbrook, 2001) has easily become a reason for controversy.

The new hypothesis according to which global warming has natural causes is supported by the Nongovernmental Panel on Climate Change (NIPCC) Report, published in 2008 and coordinated by Professor Fred Singer, with the collaboration of 24 scientists of the highest degree. This report insists on the fact that short-period climate changes have taken place well ahead the existence of people and polluting technologies. The report also makes a severe critique of the Intergovernmental Panel on Climate Change and their methods, which have led to the conclusion that Earth may warm up during this century by 2-6 ° C due to human activity (IPCC, 2007). In the United States, over 31,000 scientists, of whom about 9,000 doctors from various disciplines, signed a petition against the thesis that, due to greenhouse gas emissions, mankind has become exposed to catastrophic warming.

The main arguments put forward by those who contest the main contribution of the human factor to global warming are the following (Argelean et al., 2008):

- The numerical models used for prediction are considered less reliable instruments;

- Sea level rise is not clearly linked to increased emissions of greenhouse gases; melting ice may not be the result of global warming (but of the interference with warmer waters brought by currents from the Atlantic Ocean);

- The actual role of the greenhouse gas in the reported increase of ocean temperatures is unknown;

- Incomplete understanding of the balance of carbon dioxide in the atmosphere;

- Weather stations for the measurement of concentrations of pollutants in the troposphere are not placed uniformly (they are often placed in urban centers and not taking into account the urban heat islands effects);

- The phenomenon can be observed on other planets as well (e.g. on planet Mars, it takes place even four times faster than on Earth);

- There is a number of internal factors that affect climate and which have not been taken into account for the theoretical modeling; The main natural factors currently known and influencing climate change are: insolation, Milanković parameters or Milanković cycles (terrestrial orbit eccentricity, terrestrial obliquity and terrestrial precession movement) and terrestrial albedo. For the skeptics, the most important causes of climate change remain the astronomical phenomena and the variation of solar activity.

Extending skepticism: Whereas in the early years of the movement against pollution the number of skeptics was rather small compared to the promoters, the numbers started to change with the loss of control over the quality of information which led to global warming being perceived as a hoax, a mean for mass manipulation and manipulation of data, one of the greatest scientific scandals of all time (Global warming-a manipulation, 2015). Consequently, supporters started changing sides chaotically.

This was made possible by a number of elements, but their impact was boosted with the contribution of the media. We present an extract from the activity of the publications that stand out for having a high-value impact factor:

- questioning the official temperature records and suggesting that there was a change in the official data, systematically "adjusted" to show that the Earth was warming up more than it really did –with respect to this matter, the daily newspaper The Telegraphis citing blogger Paul Homewood, who claimed that by checking the temperature charts recorded by weather stations in Paraguay or the Arctic region, from Canada to Siberia, they would have been modified so that the cooling trend would have been changed with a significant heating one.

- highlighting the fragmentary character of the phenomenon - in this regard, The Vancouver Sun quotes geologist and professor Ian Plimer, one of Australia's most famous academic voices, and one of the main critics of the theory that human society is causing global

warming and the idea that people could stop the rise in temperature by changing lifestyle (Global warming has become the new religion, 2009). In his book, *Heaven and Earth - Global Warming: The Missing Science*, Plimer draws attention to the fact that geologists use a much wider time frame, that reaches hundreds of millions of years, unlike ecologists, who justify their theories on climate change on data from a temporally reduced fragment (Plimer, 2009).

- claiming that in reality the climate behavior does not follow the initial forecasts of rising temperatures. Moreover, simultaneously the UK Met Office Meteorological Institute revised its 2012 forecast for the following decade: this initially predicted a succession of years with record-breaking temperatures, but after the revision it instead advocated a pause in the heating process at least until 2017 (Rose, D., 2013). This new developing context also affected the attitude of an increasing number of researchers.

- developing the hypothesis that information is deliberately exaggerated – there was a massive scandal generated around over 1000 electronic messages and 3000 documents stolen by a group of hackers from the computers of a UK research center and belonging to famous American and British climatologists (Documente secrete, n.d.). These mails supposed to contain discussions between the scientist over the past 10 years concerning how to tackle the arguments of the skeptics and possible ways of manipulating public opinion to be convinced that these climate changes are more serious than they really are (Încălzire globală o farsă, n.d.). In addition, according to these new discovered sources, soon supported by different scientist (Leroux, 2005; Idso et al., 2015) the Earth would actually face an opposite, global cooling phenomenon, with average temperatures not actually emerging since 1960 (Încălzirea globală adevăr sau conspirație, 2016). According to The Washington Times, the main contributors to the altered presentation of this data would be the director of the Department of Climate Research at East Anglia University, and a scientist of climatic conditions from Pennsylvania State University,

- promoting the idea that only one party can be right and skeptics are discriminated

against - The Weather Channel meteorologist and co-founder John Coleman claims that there is no consensus in science and, moreover, that "Science does not mean voting. Science works with deeds. If you judge only on the facts, you find that there is no climate change". Furthermore, in October 2016, he wrote a letter to the Los Angeles University of California, claiming that the US government is biased about the financial support of scientists, his statement being made public later on the "Reliable Sources" program at CNN (Padure, R., 2014).

- the loss of credibility on research quality - climatologist Patrick Michaels, senior fellow in environmental studies and director at the Cato Institute in Washington D.C. and former president of the American Association of State Climatologists asserts that only one-third of those who produce the IPCC reports are scientists, the rest being government bureaucrats (Giddens, 2009). Michaels was also a professor of environmental sciences at the University of Virginia and associated with other universities such as University of Wisconsin, and University of Chicago.

Creating myths: "the myth" of global warming is rooted in the observation that we are witnessing an increase in the amount of carbon dioxide in the atmosphere. Starting from this information, however, as a result of its assimilation by various economic and political actors and adding the way in which the media has alternatively positioned itself on one side or another of the conflict (Thirty Global Warming Myths, 2016), the public opinion has become affected by certain beliefs which, in the absence of complete arguments, remain only myths.

Looking from a single perspective, and without engaging in a diligent research process, the public opinion remains to be anchored in personal preferences regarding the subject. A number of factors of influence, such as political ambitions or scientific interests make it even more difficult for the audience to position themselves in this conflict generated around global warming, as it is overly challenging to find out what is really real and what is supposition or misinterpretation.

In this context, climate change is not a technical issue anymore, but a challenge to

reinterpret relationships (Hulme, 2009). Maybe the only “consensus” that there is among climate scientist is that human activities can have a certain impact on local climate (Idso et al., 2015), however they do not agree whether it is likely or not to become a dangerous change outside the range of variability. This disagreement is due to various reasons that generate fundamental uncertainties among people at a global scale. These reasons could be classified as follows:

- Management errors: climate is an interdisciplinary subject which requires insights from many fields, however only few of the scholars have mastery of more of these disciplines, some practitioners lack even basic qualification; research funding by the state depends on the result of research, which makes both the state and the research less reliable

- Research errors: poor observational evidence and bad measurements, data misinterpretation and improper setting of the parameters of models might have led to an exaggeration of the role of CO₂ as a prime suspect in affecting world climate;

- Dissemination errors: The media alters the information and paints a picture of doom to attract attention; censorship of the opposition; environmental news is socially constructed and it reflects the multiple competing claims that need to be sorted out in the course of putting together a story (Hannigan, 2014).

- External factors: mass-media seeking for impact oversized the role of political and economic reasons, while social media as a dissemination channel is being linked to the poor quality of research, methods and methodology, scientists can be biased - careerism, grant-seeking, political views and confirmation bias (Idso et al., 2015)

We believe that this classification will be able to facilitate a better understanding of the factors that create confusion among people regarding scientific aspects. Also, this synthesis can be used for understanding the character of the information we have at the first hand, understanding the conflict scale in science, and building prerequisites for developing self-defense mechanisms and better accessibility to correct information.

CONCLUSIONS

Although at first impression it may seem that the subject of climate change has nothing left to offer from a scientific point of view, the truth is that we are still far from fully understanding the phenomenon and the appropriate solutions to minimize its effects.

Climate change is such a complicated phenomenon that it still leaves space for interpretation and weak spots in argumentation both for promoters as well as for skeptics.

Both groups are mixed groups containing people active in climate research, others working in the field of atmospheric science, consultants, writers, or spokespersons of various institutions, which makes it more difficult to control the quality of the transmitted information or the numerical representativeness of each side.

The conflict generated around the causes of global warming is continuously growing in proportions, since accepting or rejecting any of the existing hypotheses would lead to certain economic agents having to bear huge costs.

The role of this paper is to raise awareness over the existing scientific conflict, its scale and impact over everyday life. We think that this type of research should be continued in the fields of climatology as well as in other fields that concern public opinion, to better identify truth from delusion and to smoothen everyday conflicts that make us waste energy instead of finding real solutions for real problems. No matter which of the two scenarios is closer to the truth, at the end of the day, we should be able to find better ways of adapting ourselves to an ever changing world and keep seeking to achieve a sustainable lifestyle, based on care and wise administration of resources.

The paradox that we have to face in the end is that the most important thing in order to be able to adapt and take action against climate change is to prevent it from being transformed into a cliché before being fully understood, while in the same time understand and accept that at least at the time being, it can not be fully understood.

REFERENCES

- Ardelean, F., Colda, I., 2008. Cauzele schimbărilor climatice – un subiect controversat, Conferința a XV-a Eficiență, Confort, Conservarea Energiei și Protecția Mediului, Facultatea de Instalații, București. Retrieved January 13, 2017, from http://instal.utcb.ro/conferinta_2010/conferinta_2008/articole/instalatii/conf_nov_2008_Ardelean_Colda_1.pdf [accessed 13.01.2017]
- Corbett, J. B., Durfee, J. L., 2016. Testing Public (Un)Certainty of Science. Media Representations of Global Warming in Science Communication Vol 26, Issue 2, pp. 129 – 151
- Documente secrete arata ca incalzirea globala este o manipulare. (n.d.). Retrieved January 13, 2017, from <http://www.ziare.com/international/stiri-externe/documente-secrete-arata-ca-incalzirea-globala-este-o-manipulare-957878>
- Easterbrook, D., 2011. Evidence-Based Climate Change, Data Opposing CO2 emissions as the Primary Source of Global Warming, Elsevier, Oxford
- Giddens, A., 2009. The politics of Climate Change, National responses to the challenge of global warming, Polity Press, Cambridge
- Hannigan, J., (2014). Environmental Sociology, Third Edition (first published in 1995), Taylor and Francis Group, Routledge, New York
- Hargreaves, I., Lewis, J., Spears, T., 2008. Towards a better map : science, the public and the media, Economic and Social Research Council. Retrieved April, 01, 2017 from <http://www.scidev.net/global/communication/key-document/towards-a-better-map-science-the-public-and-the-me.html>
- Hulme, M., 2009. Why we disagree about climate change. Understanding controversy, inaction and opportunity, Cambridge University Press, Cambridge
- Idso, C. D., Carter, R. M., Singer, S. F., 2015. Why Scientists Disagree About Global Warming, The NIPCC Report on Scientific Consensus, Published for the Nongovernmental International Panel on Climate Change (NIPCC) by The Heartland Institute, Illinois.
- Incalzirea globala a devenit noua religie a elitelor urbane din tarile dezvoltate - om de stiinta australian. (2009, July 30). Retrieved January 13, 2017, from <http://www.hotnews.ro/stiri-mediu-6010038-incalzirea-globala-devenit-noua-religie-elitelor-urbane-din-tarile-dezvoltate-stiinta-australian.htm>
- Încălzirea globală, adevăr sau conspirație? Un grup de hackeri au descoperit date științifice trucate care ascund „răcirea globală”. (2016, August 02). Retrieved January 13, 2017, from <http://www.b1.ro/stiri/eveniment/incalzirea-globala-adevar-sau-conspiratie-un-grup-de-hackeri-au-descoperit-date-stiintifice-trucate-care-ascund-racirea-globala-157613.html>
- Incalzirea globala - o manipulare si unul dintre cele mai mari scandaluri stiintifice din istorie? (2015, February 09). Retrieved January 13, 2017, from <http://science.hotnews.ro/stiri-international-19333473-incalzirea-globala-manipulare-unul-dintre-cele-mai-mari-scandaluri-din-toate-timpurile.htm>
- Incalzirea globala, o farsa? Documente secrete dezvaluie conspiratia. (n.d.). Retrieved April 01, 2017 from <http://stirileprotv.ro/exclusiv/exclusiv-online/incalzirea-globala-o-farsa.html>
- IPCC, 2007: Climate Change Synthesis Report. Summary for Policymakers. Retrieved February, 10, 2017 from www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf
- Leroux, M., 2005. Global Warming - Myth or Reality?: The Erring Ways of Climatology, Springer Publishing House, New York.
- Pădure, R. (2014, November 03). ÎNCĂLZIREA GLOBALĂ este o MASCARADĂ politică! Retrieved January 10, 2017, from <http://www.evz.ro/un-om-de-stiinta-denunta-incalzirea-globala-este-o-mascarada-politica.html>
- Plimer, I., 2009. Heaven and Earth: Global Warming, The Missing Science, Connor Court Publishing Pty Ltd, Victoria
- Raileanu, M., 2015. Campanii de mediu vs. sceptici/grupuri lobby. România pe harta schimbărilor climatice. Impactul transformărilor socio-economice și tehnologice la nivel național, european și mondial no. 1/2015, vol. 1, available at SSRN: <https://ssrn.com/abstract=2619182>.
- Robinson, A. B., Robinson, Z. W., 1997. Science Has Spoken: Global Warming Is a Myth, Dow Jones & Co., Inc., The Wall Street Journal, accessed: http://stephenschneider.stanford.edu/Publications/PDF_Papers/RobinsonAndRobinson.pdf.
- Rose, D. for The Mail on Sunday. (2013, May 01). The Great Green Con no. 1: The hard proof that finally shows global warming forecasts that are costing you billions were WRONG all along. Retrieved January 13, 2017, from <http://www.dailymail.co.uk/news/article-2294560/The-great-green-1-The-hard-proof-finally-shows-global-warming-forecasts-costing-billions-WRONG-along.html>
- Thirty Global Warming Myths vs Facts. (2016, December 24). Retrieved January 10, 2017, from <http://www.conserve-energy-future.com/30-global-warming-myths-facts.php>

