

# What is the Global Climate Change? With the Perspective of the People Who Live

Z. Fuat TOPRAK

Civil Engineering Department, Dicle University, Diyarbakir, Turkey

toprakzf@dicle.edu.tr; topzakzey@itu.edu.tr

**Abstract**-Due to its serious impact upon the environment and on almost all aspects of life, climate change is internationally discussed among all vital sectors of life. In this study, global climate change is explained with the perspective of the people who have no prejudices, but live it. Therefore, it is possible to extract the answers of 5 questions that are frequently asked on global climate change that people are concerned with in their answers. For the goal, herein first, the previous research performed on “global climate change” has been abstracted and discussed briefly. Finally, in the light of the current literature, the study is concluded in 15 questions.

**Keywords**- Global Warming; Global Climate Change; Climate Change; Greenhouse Gases

## I. INTRODUCTION

Ozone layer depletion (OLD) and global climate change (GCC) are two very important subjects that have been internationally discussed since the 1980s. Although they seem to be similar and one triggers the other, they are actually different problems. On the other hand, the two problems were known as the same and they were discussed together for a long time in the past. Due to their serious impacts upon the environment and on almost all aspects of life, OLD and GCC are internationally discussed among the members of all vital sectors of life.

TABLE 1 THE TIME DEPENDENT VARIATION OF SCIENTIFIC ARTICLES MADE ON “OZONE LAYER”, “GCC”, AND “WATER”

YEARS	STUDIES MADE ON OZONE LAYER	STUDIES MADE ON GCC	STUDIES MADE ON WATER	YEARS	STUDIES MADE ON OZONE LAYER	STUDIES MADE ON GCC	STUDIES MADE ON WATER	YEARS	STUDIES MADE ON OZONE LAYER	STUDIES MADE ON GCC	STUDIES MADE ON WATER
1980	3	0	179	1991	32	351	933	2002	34	655	1380
1981	2	2	227	1992	39	373	993	2003	45	806	1466
1982	3	1	267	1993	26	356	1009	2004	30	837	1619
1983	3	2	259	1994	32	309	1072	2005	34	971	1617
1984	3	2	301	1995	43	391	994	2006	35	1023	1598
1985	3	2	239	1996	38	418	1182	2007	31	1469	1699
1986	3	8	229	1997	58	493	1273	2008	41	1863	1796
1987	9	6	225	1998	36	535	1463	2009	53	2267	1996
1988	14	13	212	1999	35	585	1257	2010	33	2289	2232
1989	26	73	226	2000	29	597	1447	2011	36	2542	2273
1990	24	193	325	2001	35	703	1446	2012	32	2568	1974
CORRELATION COEFFICIENT	0,829	0,666			0,089	0,930			0,030	0,974	CORRELATION COEFFICIENT
	0,810				0,058				0,167		
	0,865	0,953							0,036	0,903	
	0,848								0,081		
The number of SCI indexed publications made on ozone layer					900	22703	The number of SCI indexed publications made on GCC				
					All publications						
					23603						

As is well known, from the 1980s, OLD had been discussed among scientists, environmental groups, civil society organizations, politicians, stakeholders, and other sectors of life for at least two decades. In this period, numerous scientific articles have pointed out the hole or depletion in the ozone layer (Table 1). Furthermore, important news and political opinions or statements were both extreme and widespread in the same period. The ozone layer depletion has led to a significant increase in surface Ultraviolet levels. The increase in the surface Ultraviolet levels causes many health and environmental consequences (e.g. skin cancer, cataracts and immunity suppression, global warming, loss of agricultural products that in turn leads to loss of farmers and food, changes in the physiology of plants affecting plant growth and crop yield, threats to the survival of certain species such as amphibians and larvae, destruction of phytoplankton affecting aquatic food chains). So, the consequences of

the depletion in the ozone layer are clearly visible in the short term.

From the 1980s up to date, GCC has been widely discussed. Why is the planet warming up? As is well known, the short-wave radiation that comes from the sun is reflected by the earth surface as long waves. On the other hand, increase in greenhouse gases (i.e. water vapor, CO<sub>2</sub>, CO, SO<sub>2</sub>, NO<sub>x</sub>, CFC, etc.) in the atmosphere restrains reflection of such shortwave solar radiation from the earth surface to the atmosphere. Previously, the effects of the greenhouse gases were known only in terms of temperature, and therefore the problem was called global warming. Later, it was recognized that the emission of greenhouse gases has an effect not only on temperature but also on the other characteristics of both meteorology (in short term) and climate (in long term) (e.g. rainfall, temperature, pressure, wind speed and direction; number of floods, storms, and hurricanes; sea water level, snow thickness, snow-melting, glacier-melting, fresh water resources, the hydrological cycle etc.). Therefore, the problem has been re-defined. The emission of greenhouse gases led to changes in the atmospheric, meteorological and climatic conditions locally and globally in the short and long-term horizons, which are today called global climate change. This definition is more realistic than the previous one.

The use of fossil energy sources produces greenhouse gases, and consequently, IPCC reports claim that emission of such gases mostly depends on human activities at high percentages of 98% or 99% (IPCC, 2007; IPCC, 2013) [1-2]. Türkeş et al (2000) say that 1998 included abnormal and extreme meteorological and natural events. It was the warmest year of the last 140 years. Furthermore, 240 strong storms, 170 floods, 190 forest fires, numerous severe droughts and warm as well as cold weather waves occurred in the same year [3]. The GCC has serious impacts upon the atmosphere, earth, and ocean. Therefore, the issue becomes internationally disputable subject among climatologists, atmospheric researchers, oceanographers, hydro-meteorologists, agriculturalists, and in particular, among local administrators including politicians as well as the people at different walks of life as Toprak et al. (2013) says [4]. Such serious impacts of GCC have triggered scientists, governments, and social organizations to undertake further research to measure and predict the consequences of global climate change. The United Nations Framework Climate Change Convention (UNFCCC) and then Kyoto Protocol were signed in 1992 and 1997, respectively, to alleviate the current situation. In addition to the protocols, Intergovernmental Panels on Climate Change (IPCC) are organized and their reports are periodically published (Toprak et al., 2011; Toprak et al. 2012; Toprak, 2013; Toprak et al., 2013; Batan and Toprak., 2015) [4-8].

The main goal of this study is to discuss the past, the present, and the future of GCC in the light of recent literature. Therefore, the scientific debates and doubts on the problem are also presented. For the aim, a large review on the literature on both issues is presented, discussed, and criticized in the study. The paper will give the readers the answers to three specified questions: 1) "Currently, are humans faced with global climate change or not?" 2) "How much have we faced?" and 3) "Is the terrible reality exaggerated or not?"

## II. NUMERICAL COMPARISON OF THE STUDIES PUBLISHED ON THE SUBJECT

The time dependent variation of scientific articles cited by SCI is tabulated in Table 1 and graphically presented in Fig. 1. As clearly seen from both Table 1 and Fig. 1, from 1980 to 2012, the total number of published scientific articles made on the ozone layer and on the GCC are 900 and 22703, respectively. Studies made on the ozone layer are almost stationer after the year 1990. However the studies made on the GCC dramatically increase year by year. On the other hand, from the year 1980, for the first 11 years the numbers of the studies made on both topics are close to each other (Table 1 and Fig. 1). In Table 1, the correlation coefficients between the studies and the years are given for different periods. Accordingly, the correlation coefficient between the studies made on the ozone layer and years are high before 1991 and very low after this year. Contradictorily, this coefficient is low for the first 11 years and high for the next period for the studies made on GCC.

In light of the above consideration, Table 1 and Fig. 1 can be concluded without any interpretation as follows:

- 1) Although the problem in ozone layer was recognized by the scientists in 1980, in this year the GCC was not yet apparent.
- 2) For the first 11 years, the scientists had interest in both two topics with an increasing trend year by year. This increase is more significant for GCC.
- 3) After 1990, the scientists have left the ozone layer depletion and instead they have preferred to study GCC.
- 4) In the next decades, interest has increased significantly in GCC.
- 5) Another interesting result can be extracted from the table as well as from the figure is fact that the studies made on GCC are more frequent than those made on water after 2008.

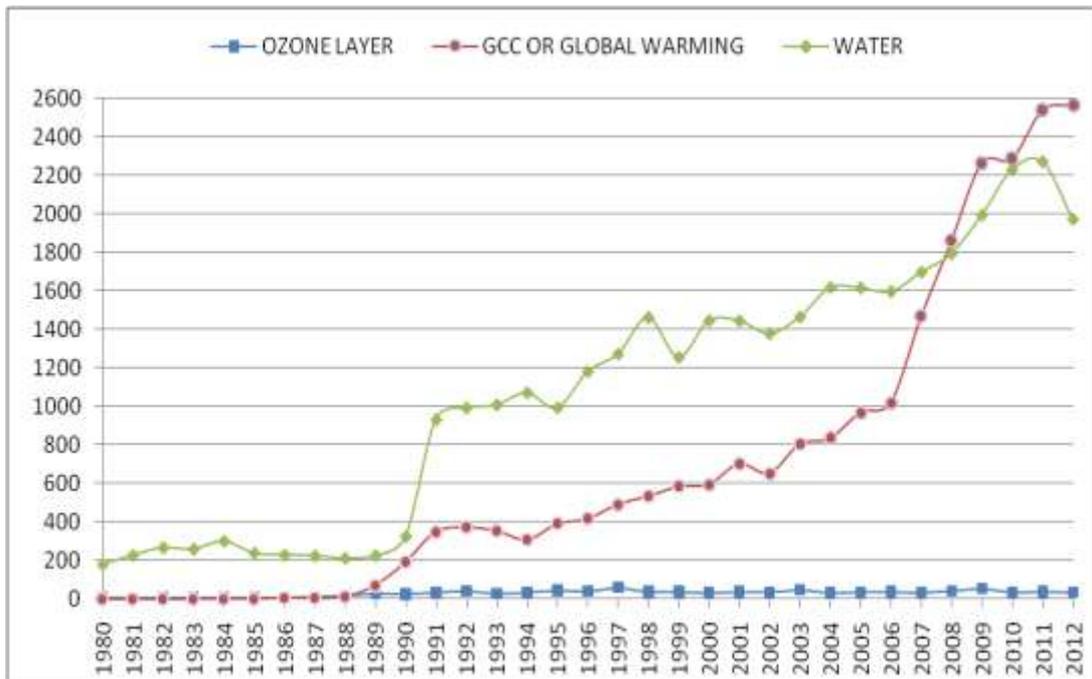


Fig. 1 The time dependent variation of scientific articles made on “ozone layer”, “GCC”, and “water”

III. REFLECTION OF THE PROBLEM TO THE PEOPLE WHO LIVE IT

In order to investigate the reflection of the problem to masses of ordinary people who live it, the same keywords together with “love” and “cancer” were searched in the Google engine (April 14, 2011 and June 10, 2013). The results are presented comparatively for two different dates in Table 2. The key words were searched in English. Table 2 can be concluded without any interpretation as follows:

- 1) The masses of ordinary people who live GCC still mainly mention the problem as “global warming”. “Global climate change” has not been adopted among people yet.
- 2) According to the data obtained in 2013, “global warming”, “global heating”, and “global climate change” have been mentioned 378 times more than “ozone layer depletion”.
- 3) According to the table, from April 2011 to June 2013, 33 million pages about the first three key words have been added to the web (16.5 million pages/year).
- 4) Globally, masses of ordinary people who live the problem are still more interested in or talk about “love”, “water”, and “cancer”, respectively.
- 5) The Kyoto Protocol has globally taken place in the people agenda.

TABLE 2 SEARCHING SEVERAL IMPORTANT KEY WORDS IN GOOGLE ENGINE

KEY WORDS	GOOGLE	
	DATES	
	April 14, 2011	June 10, 2013
"GLOBAL WARMING"	42.300.000	66.300.000
"GLOBAL HEATING"	69.900	132.000
"GLOBAL CLIMATE CHANGE"	2.940.000	7.240.000
"KYOTO PROTOCOL"		4.740.000
"OZONE LAYER DEPLETION"		195.000
"CANCER"		646.000.000
"WATER"		2.950.000.000
"LOVE"		4.100.000.000

## IV. CONCLUSIONS AND RECOMMENDATIONS IN 15 QUESTIONS

The study can be discussed in the following 15 questions:

- 1) Was there any hole or depletion in ozone layer?
- 2) If yes, who repaired it and when was it repaired?
- 3) If no, why is it not globally in people's agenda?
- 4) Does the OLD pose a danger for humans, other living beings, and the environment in the short, medium, and long term as much as GCC?
- 5) Are the effects of the depletion in the ozone layer clearly visible in the short term?
- 6) Does OLD have local or global effects?
- 7) Why have scientists given "global warming" up?
- 8) Can global warming be proven?
- 9) Is "global climate change" more meaningful, accurate, and inclusive as a term?
- 10) Is it possible to forget "global climate change" just as "ozone depletion"?
- 11) Is it possible to discuss another global problem later?
- 12) Why do people still talk more on love, water, and cancer after 30 years?
- 13) Could not the people be convinced yet?
- 14) Is it possible to see one or more global or regional self-seekers who exaggerate the problems so that they appear bigger, more effective, and more dangerous?
- 15) Is it possible to obviate such a concern? Can scientists do this?

## REFERENCES

- [1] The Intergovernmental Panel on Climate Change (IPCC), established by WMO and UNEP Fourth Assessment Report "Climate Change 2007", February 2007.
- [2] The Intergovernmental Panel on Climate Change (IPCC): The Physical Science Basis, established by WMO and UNEP Fifth Assessment Report, 2013.
- [3] M. Türkes, and G. Kılıç, "European Union Policies and Measures on Climate Change," (Avrupa Birliği'nin iklim değişikliği politikaları ve önlemleri), *Çevre, Bilim ve Teknoloji*, vol. 2, pp. 35-52, 2004.
- [4] Z.F. Toprak, N. Hamidi, Ş. Toprak, and Z. Şen, "Climatic identity assessment of the climate change," *Int. J. Global Warming*, vol. 5(1), pp. 30-45, 2013.
- [5] Z.F. Toprak, Ş. Toprak, and N. Hamidi, "Global Climate Changes and Meteorological Identity," in *Proc. The 4<sup>th</sup> International Symposium- Water Resources and Sustainable Development (CIRED'4)*, February 2011.
- [6] Z.F. Toprak, Ş. Toprak, and N. Hamidi, "Changement Climatique et Identite Climatique," *Le Journal de l'Eau et de l'Environnement, Revue Scientifique et Technique*, vol. 20, pp. 81-91, 2012.
- [7] Z.F. Toprak, "A Review on Global Climate Change," (Küresel İklim Değişikliğine Genel Bir Bakış), in *Proc. 3<sup>rd</sup> Turkey Climate Change Congress*, June 2013.
- [8] M. Batan and Z.F. "Toprak, Küresel iklim değişikliğinin olumlu etkileri ve bu etkilerin iklim değişikliğine uyum kapsamında değerlendirilmesi," *DÜ Mühendislik Fakültesi Dergisi*, vol. 6, pp. 93-102, 2015.