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CLIMATE CHANGING IN KAZAKHSTAN IS A HUMAN-CAUSED PHENOMENON

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Abstract

This paper describes the main reasons of climate changing. This is one of the urgent problems that must be solved at an early date, because deterioration of the current climatic situation in the world can lead to tragic consequences. The author determines the positive and negative sides of natural phenomena affecting the world differently.

Moreover, this paper reports the climate changes in Kazakhstan because of the personal interest of the author in forthcoming study of motherland. According to reports of the Ministry of Environment of the Republic of Kazakhstan the climate in our country becomes hotter every year. There are three main research questions that will be answered in this research paper: Is climate change human-caused phenomenon? What factors can prove that people are responsible? Was the climate in Kazakhstan changed during last 100 years?

Keywords: ecology, global problem, climate, climate change, humanity, phenomena

Introduction

Every day, every hour and every minute in the world of billions of events occurs. All these phenomena affect the world differently. These phenomena have as positive as negative sides. Unfortunately, at the moment we face with many global problems as nuclear weapons, overpopulation, poverty, and racism. These kinds of urgent problems must be solved at an early date, because deterioration of the current climatic situation in the world can lead to tragic consequences.

One of the most issues of climate changing is sea level. Annually, global sea level rises gradually. According to Oceans National Research Flagship of Australia and the Antarctic Climate and Ecosystems Cooperative Research Centre the level of sea increased about 21 cm with mean about 1.6 mm per year from 1880 to 2009 [1]. Obviously, that modern map of the world will change beyond recognition. Many countries such as the USA, Russia and some European countries, will suffer from sea level.

However, in this research we consider more specific question “Is climate change human-caused phenomena?”. Most of scientists claim that humanity is to blame in climate change. All our industrial progress has a bad impact on climate. Greenhouse gases are widespread example of negative influence on Earth climate. We must find a solution immediately, because consequences of our influence will not wait and one day humanity will regret about it.

The aim of this research project is to answer to the question: Is a climate change human-caused phenomenon? The purpose is considering the strongest reasons, which can prove the negative influence of human actions on climate of the Earth. Another purpose is considering the real climatic situation in Kazakhstan.

There are three main research questions that will be answered in this research paper:

- Is climate change human-caused phenomenon?

- What factors can prove that people are responsible?
- Was the climate in Kazakhstan changed during last 100 years?

Literature review

Since ancient times, humanity is suspect that their activities affect the local climate. For example, Theophrastus, a student of Aristotle, suggested that the drainage of wetlands affects the susceptibility of land to freezing. Also according to Theophrastus, deforestation is the cause of increasing of temperature in the surface of Earth. Later scientists noticed that deforestation and irrigation changed the area around the Mediterranean. Of course, this has affected the local weather [2].

In the late 19th century, official commissions in several European countries are considering reforestation should be encouraged. It may have been a manifestation of the government's first concern about the impact on climate. Unfortunately they came to the wrong conclusion. By the end of the century, the scientific opinion was based on the fact that a person has no effect on the climate [2].

But if we consider the current state of affairs, according James Lawrence Powell research only one scientist inside 9136 learned is against idea of climate change. Researcher considered 2000 studies published from November 2012 up to December 2013. Also recently Journal of Climate published their study and learned that we can be sure in 95% that climate change caused by mankind [3].

Firstly, we consider the most popular reason that climate change is caused by human activity. The striking example is greenhouse gases. But what is a greenhouse gas? According to threedictionary.com greenhouse gases means “Any of the atmospheric gases that contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), and water vapor. Although greenhouse gases occur naturally in the atmosphere, the elevated levels especially of carbon dioxide and methane that have been observed in recent decades are directly related, at least in part, to human activities such as the burning of fossil fuels and the deforestation of tropical forests.” All these gases are trapping heat in the lower atmosphere, gradually warming the Earth's surface. During last 50 years, climatologists from around the world claim the concentration of CO₂ in the air steady increases. All this has led to the following conclusion: until about mid-18th century the concentration of CO₂ was constant, however after the Industrial Revolution it began to grow rapidly. But a person not only increased concentrations of carbon dioxide, but also others, such as methane. Since 1980, its number has increased 2.5 times[4].

However, some scientists consider greenhouse gases from positive perspectives. For example, one of the advantages is increasing the concentration of photosynthesis in the nature will lead to situation when some areas will be suitable for crop cultivation. Also greenhouse effect will make the Earth's climate is more humid and in arid areas will increase the amount of precipitation[5]. But the result of human activity has led to what is now nature cannot recycle the excess of the greenhouse gases. According to National Research Council, about 45% carbon dioxide contains in the air. Since 1750, the content of nitrogen oxide increased by 15% due to the constant use of fertilizers.

If we consider climate change more narrowly, we chose one of the aims the climate of Kazakhstan. According to reports of the Ministry of Environment of the Republic of Kazakhstan the climate in our country becomes hotter every year. According to calculations of climatologists surface temperature has risen by 1.8 degrees per 100 years. Unfortunately, this indicator exceeds the permitted limit of 2 times [6]. Starting from 1941 to 2010 the temperature increased throughout Kazakhstan approximately every 10 years by 0.31 degrees. According to Vice-Minister of Environment Marlene Iskakova the most significant growth was seen in the East, some areas of the North and the Central part of Kazakhstan, namely 0.60 and 0.65 degrees in 10 years. The least significant growth was seen in mountain areas of the southern part of Kazakhstan [7]. The question

arises: how these changes will influence on our country? Firstly, it is reduction of the number of crops, increase in arid areas. Secondly, the South part of Kazakhstan can lose fertile fields of wheat.

Methods

Using different types of gathering data, we can support each method and exclude the possibility of incorrect or misleading information. The first way of collecting data is the Internet resources. This type of collecting information provided us with the background information about this issue. We found a lot of information about climate change and part of this information has not been validated by any references. However we work on sites of international organization. The example is National research council of the National Academies of USA or CSIRO's Wealth from Oceans National Research Flagship and the Antarctic Climate and Ecosystems Cooperative Research Centre.

The primary method in this research is survey. The main audience of this survey is students of 12 grades of Nazarbayev Intellectual School of physics and mathematics in Kokshetau city. The main reason of this choice is Global Perspectives lessons. Students of Nazarbayev Intellectual schools in Kokshetau study this subject and consider different global problems. They can identify reliability, reputation of source. Also they have Critical thinking lessons. This subject helps students to analyze and think better.

There were 40 students of Nazarbayev Intellectual schools in Kokshetau. Survey was designed for students aged 16-18. In survey participated 7 males and 8 females from Kazakh group and 14 males and 11 females from Russian group. All respondents live in Kokshetau.

We have used two kinds of methods in our researching. The first of these is the Internet resources in order to summarize all gathered information and identify the following key points:

- People are to blame for climate change (95% of respondents know about climate change).
- One of the factors that prove negative human impact on the Earth's climate is the greenhouse gases.
- Climatic conditions for 100 years in Kazakhstan changed in a negative direction.

Second method that we used in the research paper is a survey. Data from this survey is compared the results obtained in the study on the Internet.

According to our survey, we have known that

- 95% of respondents agree that climate change is a global problem
- 55% of respondents believe that mankind is to blame for climate change
- According to the students of 12th class, greenhouse gases have greatest impact on climate change
- 70% of respondents believe that the climate changes in Kazakhstan.

If to consider all questions from demographic side, we will see following situation. The first question was "Have you heard something about climate change?" Overall 38 respondents answered option *YES*. 24 students from Russian group including 13 males and 11 females answered *YES*. 14 students from Kazakh group including 7 males and 8 females also answered *YES*. Only 2 respondents chose option *NO*. First from Russian class and gender is male. Second student from Kazakh class and gender is female.

The second question was "Climate change is global issue. Do you agree with this statement?" (Figure 1).

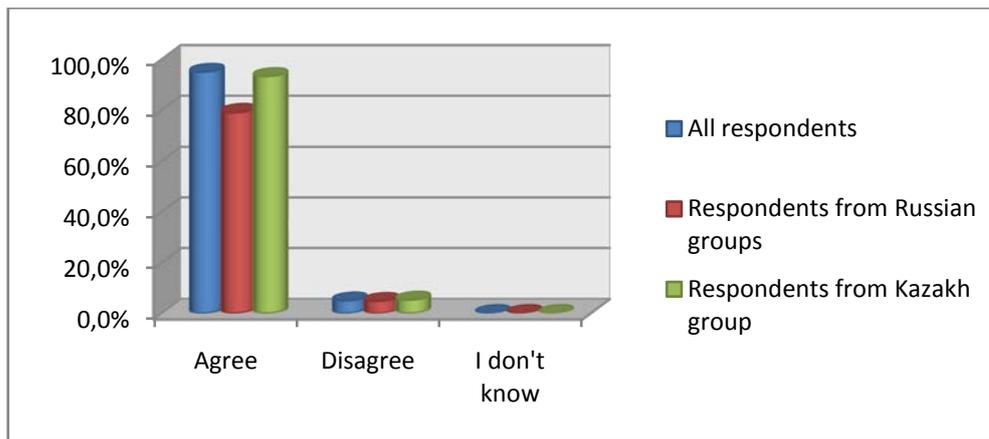


Figure 1 – The results of respondents' answers

According to the figure 1, most of the students chose option “Agree”, namely 38 students or 95% from all respondents selected this variant. Amongst students of 12th Russian groups 19 students from 24 respondents chosen option “Agree” and amongst students of 12th Kazakh groups 14 students from 15 respondents chosen this variant. Only 2 people chosen variant “Disagree”. One was from Russian group and one was from Kazakh group. In addition you can see that nobody selected option “I don’t know”.

The third question was “Is climate change human-caused phenomena, natural process”. According to the table 1, 55% or 22 students of 12th grade of Nazarbayev Intellectual schools believe that climate change human-caused phenomena. 12 or 57.14% males from 21 students and 10 females or 52.63% from 19 students think that humanity is to blame for climate change. If we consider the students who believe that climate change is a natural phenomenon we see following result. 15 students or 37.5% from all respondents support this point of view. If we consider in terms of gender, 9 males or 42.86% from 21 students 6 females or 31.58% from 19 students. Also according to Table 1, only 3 females from 19 cannot identify climate change and they choose option 3 “I don’t know”.

Table 1- The results of respondents' answers to the third question

Human-caused phenomena	Natural process	I don't know
21 (55%)	15 (37.5%)	3 (7.5%)
11 males (57.14%)	9 males (42.86%)	0 males
10 females (52.63%)	6 females (31.58%)	3 females (15.79%)

The fourth question was “What factors influence on climate change?” At the result, 31 students from 40 respondents agree that greenhouse gases influence on climate change. 19 respondents from all students believe that land-use and land-cover changes effect on climate change. 18 students from 40 students of 12th grade of Nazarbayev Intellectual schools think that water vapor strongly caused climate change. If we consider all options in terms of gender, we can see interesting results. The first option, which was offered in the survey, was greenhouse gases. 16 males or 76.19% from 21 respondents and 15 females or 78.95% from 19 respondents support the point of view that proves that greenhouse gases is main cause of climate change. The second option was land-use and land-cover changes. 11 males or 52.38% from 21 respondents and 8 females or 42.11% from 19 respondents believe that land-use and land-cover changes affect on climate change stronger other factors. The third option was water vapor. This point of view supported 11 males or 52.38% from all students and 7 females or 36.84% from all students. Also in our survey question was fourth option. This option was for students who believe in natural property of climate change.

Overall 15 respondents or 37.5% or 6 males or 28.57% from all students and 9 males or 47.37% chose this option (Table 2).

Table 2 - The results of respondents' answers to the fourth question

Greenhouse gases	Land-use and land-cover changes	Water vapor	Natural process
31 (77.5%)	19 (47.5%)	18 (7.5%)	15 (37.5%)
16 males (76.19%)	11 males (52.38%)	11 males (52.38%)	6 males (28.57%)
15 females (78.95%)	8 females (42.11%)	7 females (36.84%)	9 females (47.37%)

The fifth question was “The climate of Kazakhstan changes. Do you agree with this statement?” According to Table 3, 28 students or 70% from all respondents agree that the climate of Kazakhstan changed. If we consider this question in terms of gender, we can see following results. 14 males or 66.67% from all students and 14 females or 73.68% from all students support this point of view. Only 4 respondents believe that climate does not change in Kazakhstan during 100 years. 3 males or 14.29% and 1 female 5.26% chose this option. 8 students of 12th grade of Nazarbayev Intellectual schools don not know anything about climatic situation in Kazakhstan. 4 males or 19.05% and 4 females or 21.05% do not have sufficient knowledge about the climate of Kazakhstan.

Table 3 - The results of respondents' answers to the fifth question

Agree	Disagree	I don't know
28 (70%)	4 (10%)	8 (20%)
14 males (66.67%)	3 males (14.29%)	4 males (19.05%)
14 females (73.68%)	1 female (5.26%)	4 females (21.05%)

The sixth question was “What factors influence on climate of Kazakhstan?” (Figure 2)

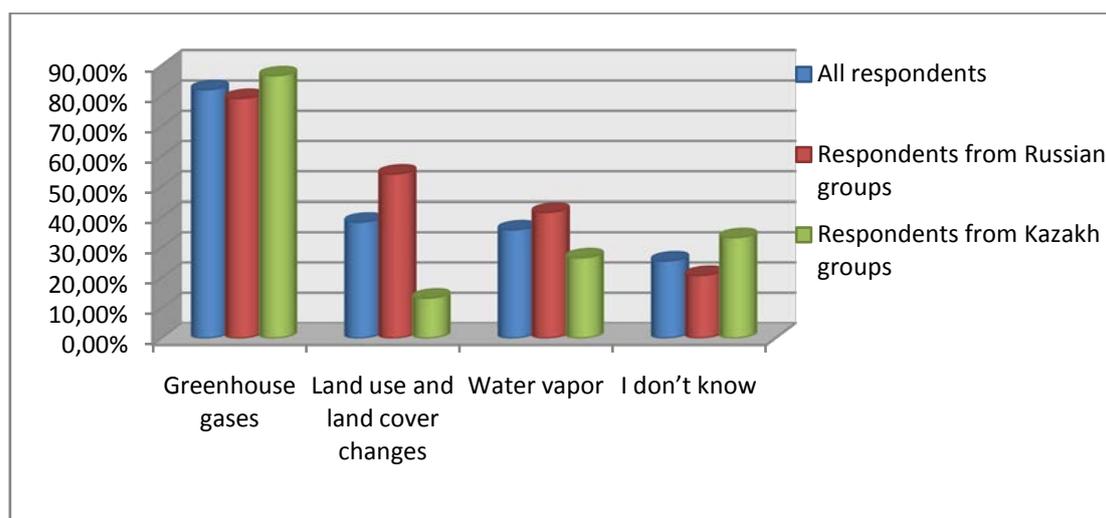


Figure 2 – The results of respondents' answers

According to the figure 2, most of the students chose option “Greenhouse gases”, namely 32 students or 82.05% from all respondents selected this variant. Amongst students of 12th Russian groups 19 students from 24 respondents chosen option “Greenhouse gases” and amongst students of 12th Kazakh groups 13 students from 15 respondents chose this variant. Moreover 15 students or

38.46% from all respondents selected variant "Land use and land cover changes". Amongst students of 12th Russian groups 13 students from 24 respondents chose option "Greenhouse gases" and amongst students of 12th Kazakh groups only 2 students from 15 respondents chose this variant. Thus, 14 students or 35.9% from all respondents selected variant "Water vapor". Amongst students of 12th Russian groups 10 students from 24 respondents chose option "Greenhouse gases" and amongst students of 12th Kazakh groups only 4 students from 15 respondents chose this variant. Furthermore, 10 students or 25.64% from all respondents selected last variant "I don't know". Amongst students of 12th Russian groups only 5 students from 24 respondents chose option "Greenhouse gases" and amongst students of 12th Kazakh groups only 5 students from 15 respondents chose this variant.

Conclusion

It worths to note, that our research reached its goal and we could answer questions.

- Is climate change human-caused phenomenon?

Since the Industrial Revolution, the concentration of greenhouse gases, such as methane, carbon dioxide, nitrous oxide, has increased. Greenhouse gases directly effect on climate of our Earth.

According to our survey, some respondents believe that climate change is natural process. In addition only 3 students don't know anything about climate change.

Having compared the results from different methods, the opinion of students of 12th grades of Nazarbayev Intellectual schools and information on the Internet completely coincides.

- What factors can prove that people are responsible?

According to National Research Council of the National Academies of USA the concentration of carbon dioxide in atmosphere from Industrial Revolution increased rapidly 2.5 times. And we can clearly understand that the amount of carbon dioxide in atmosphere effect on global climatic situation.

- Was the climate in Kazakhstan changed during last 100 years?

According to reports of the Ministry of Environment of the Republic of Kazakhstan the climate of Kazakhstan changed during 100 years. Between 1941 and 2010 the temperature in atmosphere increased approximately by 0.31 degrees every 10 years.

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ТЕРМОДИНАМИЧЕСКАЯ ВЕРОЯТНОСТЬ ПОЛУЧЕНИЯ УГЛЕВОДОРОДОВ ИЗ ПАРНИКОВЫХ ГАЗОВ

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В 1992 году в целях координации международных усилий для решения проблемы климата на основе отчета Межгосударственной группы экспертов по изменению климата (МГЭИК) была принята Рамочная конвенция Организации Объединенных Наций об изменении климата (далее по тексту - сокращенно, РКИК или Конвенция). Конвенция вступила в силу 21 марта 1994 года. Сейчас ее ратифицировало 198 государств мира. Главной целью РКИК является стабилизация концентрации парниковых газов в атмосфере на таком уровне, который не допускал бы опасного антропогенного воздействия на климатическую систему [1].

Для повышения эффективности активных мер по выполнению обязательств по Конвенции и усилению обязательств развитых стран в 1997 году был принят Киотский Протокол, определивший рыночные механизмы достижения сокращения выбросов парниковых газов и закрепляющий обязательства развитых стран по сокращению эмиссий парниковых газов. В 2009 году в соответствии с международными обязательствами наша страна ратифицировала Киотский протокол к Рамочной конвенции по изменению климата. Казахстан предпринял шаги по вступлению в Приложение Б Киотского протокола и подписал Копенгагенское соглашение, взяв на себя добровольные обязательства по сокращению выбросов парниковых газов на 15% к 2020 году и на 25% к 2050 году относительно базового 1990 года. В связи с этим потребовалось ввести более жесткие меры государственного регулирования выбросов парниковых газов. Республика Казахстан устанавливает национальные целевые показатели снижения выбросов парниковых газов на 15 % к 2020 году и 25 % к 2050 году по сравнению с базовым 1992 годом (далее – Национальные целевые показатели). Целевые показатели должны достигаться равномерно и последовательно, начиная с 1 января 2013 г. В соответствии с данными Национальной инвентаризации парниковых газов за 2010 год общие выбросы парниковых газов составили 256685420 тонн CO₂ эквивалента с учетом поглощений. В период с 2008 по 2010 годы проведена инвентаризация выбросов парниковых газов на уровне отдельных природопользователей. Наиболее полные данные по предприятиям, осуществляющим выбросы ПГ и предоставившим паспорта инвентаризации, собраны за 2010 год. Совокупный объем выбросов двуокиси углерода 177 природопользователей за 2010 год составил 145606072,13 тонн двуокиси углерода. Доля указанных выбросов в общенациональных выбросах 2010 года составляет 77 % выбросов двуокиси углерода или 56,7 % выбросов парниковых газов в эквиваленте (с учетом поглощений) [2].

В настоящей работе посредством термодинамического анализа рассмотрена вероятность образования предельных углеводородов на основе CO₂.