



## **Economic and Socio-Demographic Effects of Global Climate Change**

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### **ABSTRACT**

The article discusses the main challenges and threats of global climate change and their impact on economic and socio-demographic processes in the countries most exposed to climate change. In world politics the topic of global climate change is not new, and every year more countries participate in international programs to reduce the impact of climate change on social, economic, demographic and even geopolitical processes. The problem of climate change is not local in nature and affects the entire group of countries and even continents. According to the intergovernmental group of experts of the UNPO, in the period 1880 to 2012, global average temperatures have risen by 0.85°C (The official website of UNPO, 2015). At the same time, every year more and more countries feel the consequences of climate change. According to the world organization for migration, in 2014, more than 19.3 million people were forced to change their place of permanent residence in connection with climatic factors (Gemenne et al., 2015). The loss of the world economy is measured in billions of US dollars.

**Keywords:** Economic Processes, Economic Consequences of Climate Change, Social Instability, Demographic Threat

**JEL Classifications:** J10, J19, Q54

### **1. INTRODUCTION**

In the 21<sup>st</sup> century climate change has become one of the main and real problems of humanity that threatens the political, economic and social stability of entire countries and continents.

Today, in most cases under global climate change refers to global warming, reflected in the increase of average ambient temperatures in almost all seasons.

Initially, climate change was an object of study to greater extent natural sciences. However, with increasing negative effects of climate change, this subject has been actively studied in other research areas. Russian scientific thought in this regard is the kind of exception. With significant experience of leading Russian scientists-climatologists, geophysicists, geographers, research in the field of socio-economic impacts are almost there.

As a subject of study in this paper is the effects of climate change, elaborate on the reasons that led to climate change, we won't. Note that even in the natural environment, there is no consensus

on the determining factors of climate change. As in the twentieth century, one of the scientists takes the view that the current climate change is a natural process formed by millions of years of cyclical fluctuations, recurring intervals of time and unrelated to human activities. The second part of the scientific community's view about only the anthropogenic nature of climate change, caused primarily by emissions of carbon dioxide (carbon dioxide), which has led to so-called greenhouse effect (Ballantyne et al., 2012). It is the arguments of the supporters of anthropogenic factor in climate change led to the adoption and subsequent ratification of the Kyoto Protocol by most of the developed world. He was admitted in December 1997 to complement the UN convention on climate change. Its essence is to limit emissions of greenhouse gases by developed countries and countries with economies in transition (The official website of UNPO, 2016). Today it has been ratified by almost all countries of the world except the United States. It should also be noted on the exit of Canada from the Protocol in 2012.

The effects of global climate change are diverse and specific. Anthropogenic impact of human activities on natural conditions is the determining factor in shaping such elements as flooding

(due to increase of level of World Ocean), tropical storms and hurricanes, desertification areas, droughts, fires. The peculiarity of the manifestations of natural disasters is odnomomentnoe manifestations completely opposite of natural disasters on a relatively small area. An example is the province of Vietnam, located in the Delta of the Mekong River, where at the same time part of the territory suffers from drought, the other to coastal floods due to sea level rise.

Types and forms of climate effects largely depend on the geographical location of the territory, and scale effects from population density areas, and located on its territory of industrial and infrastructure facilities and structures.

Today there is not one continent, which would have revealed the consequences of climate change. However, the intensity of natural disasters due to climate change is not the same, and as mentioned above, is largely determined by geographical location. The most affected continent is Asia, which accounts for 38% of all natural hazards. This continent is the leader on the total damage from these phenomena. On the second and third areas are the Americas and Africa, with rates of 26% and 14% respectively (Osipov, 2016).

Also important is the analysis of the dynamics of natural phenomena, mostly caused by climate change. According to the Brussels Research Centre on epidemiological disasters (The Center for Research on the Epidemiology of Disasters), which tracks all of the major catastrophes of natural and technogenic character, since the 50s of XX century, the growth rate of natural negative phenomena sharply began to rise. Of the many phenomena for analysis from common databases, selected the following: Floods, storms and typhoons, droughts. In our opinion, based on the analysis of scientific reports of scientists and experts, climatologists and geophysicists, it is the intensity of these phenomena is largely influenced by global climate change (Houghton et al., 2001). And here again it should be noted that in most cases under global climate change in the first place, refers to global warming. In the XX century the average temperature on the surface increased the range of  $0.6 \pm 0.2^{\circ}\text{C}$ . And the data of the report of the intergovernmental panel on climate change indicate a temperature increase of  $0.85^{\circ}$  (The official website of UNPO, 2015) the climate models show different scenarios of climatic processes. However, absolutely all of them are united in one: The increase in emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, tropospheric ozone and water vapour) will lead to average temperature increase in the medium term. With all the arguments of the skeptics of global climate change (warming), that human activity leads to increased concentrations of the greenhouse gases. So the concentration of carbon dioxide in the atmosphere has increased by 31% and nitrous oxide by 17% and methane 151% (Houghton et al., 2001). And it happened in just 260 years, which accounts for dawn of most technologies, the development of new sources of energy (primarily mineral), the development of the chemical industry. The burning of fuel despite the reduction in forest area due to deforestation is the main factor of growth.

It is the increased temperature primarily affects the chosen climatic natural disasters. The increase in average temperature increases on the one hand the risk of drought, with another-

increases the intensity of storms, including tropical cyclones with higher wind speeds, and also leads to the emergence of more intense mid-latitude storms. The direct effect of the increase in average temperature of melting glaciers, which, together with the expansion of water due to the heat leads to the increase in water level in the oceans. During the 20<sup>th</sup> century the average global sea level depending on the territory increased from 10 to 20 centimeters. According to forecasts of world Bank experts, by 2040 the growth of rise in global sea level could reach 30 cm (Lukyanets et al., 2015) Floods caused by rising sea levels, also significantly reduce the soil fertility due to exposure to salty sea water, which creates risks and threats to food security of individual countries.

As noted above, statistics show a noticeable increase in natural disasters over the past decade. All three of the chosen natural phenomena show a positive trend.

The Table 1 demonstrates the scale and trends of adverse climate events. Peak values of all these phenomena fit into a small time series. The greatest number of floods was recorded in 2006 - 226 cases, storms in 1990 - 137 cases of drought in 1983, 32 of the case.

At the same time, climatic natural disasters are not distributed evenly throughout the planet. As noted, the greatest number of cases occurs in Asia. So, in 2015 in Asia were recorded 169 cases in America - 90, in Africa, 68. If in Asia the major natural phenomena are floods and curtains with tropical typhoons, in Africa a major threat and problem of drought and, as a consequence, the desertification of the territory.

The study of trends and dynamics of climate change is not the ultimate goal of the study. Climate change and, as a result, a natural negative effects with each passing year more and more impact on the territory where they occur. Every year more and more recorded deaths, reduced the standard of living in the territories affected by climate change, the population of whole villages forced to leave the territory of their permanent residence, fleeing from death (Gemenne et al., 2015). From year to year increasing expenditure on the prevention and elimination of consequences due to climate change.

## 2. ECONOMIC CHALLENGES AND THREATS OF CLIMATE CHANGE

The impact of climate change on the world economy is a difficult and controversial process. The complexity of the process lies in the very nature of the causes of climatic changes on the planet, and in what period for the study was selected, what industries were studied.

**Table 1: Dynamics of natural disasters are most exposed to anthropogenic factor (fixed events in the year)**

Disaster	1950	1990	2000	2010	2015
Floods	10	46	157	184	152
Storms	11	137	102	94	115
Drought	0	12	27	17	26

The heterogeneity of climate change on the planet's surface leads to uncertainty in the estimation of the economic impact. However, the analysis of statistical data, scouting reports of the intergovernmental commissions on issues of the impact of climate change has led to the conclusion that the world economy is suffering and will suffer losses with increasing average temperature.

According to the UN report already by 2030 the total losses of the world economy could reach \$2 trillion dollars, and a decline in world production due to the increase in temperature is estimated at 1.6% annually (UNDP, 2016). An important condition is that the global community through joint efforts we will be able to limit the rise in average temperature within 2°C that rate is 2 degrees celsius was enshrined in the Paris agreement in 2016, signed by 195 countries as a limit to growth in average temperature.

The negative economic consequences for the world economy are not in doubt. At the same time, for individual countries and regions is not so clear. In assessing the economic consequences of global climate change, the determining factors are time and geographical location. If in the long-term, all, without exception, countries and continents will suffer significant economic losses, in the short and medium term-individual countries will be able to obtain a positive economic effect. First of all we are talking about countries located at higher latitudes (Canada, USA, Russia).

The negative economic impacts of climate change are expressed in economic costs, which can be divided into direct and indirect. Direct costs to estimate much easier, but their share is below. So, this includes property damage from destruction of residential buildings, commercial and infrastructure facilities from extreme natural events (floods, tropical storms and typhoons), the frequency and strength of which the growth of the average temperature of air and water in the oceans will rise. Direct costs include costs of liquidation of consequences of these natural phenomena, including the relocation of the population from areas at highest risk.

Much more difficult to estimate indirect costs, which pose the greatest danger. The latent nature of these costs does not manifest simultaneously, and often accumulates and can manifest itself on a large scale, like "soap bubble." Indirect costs include possible economic losses to the world economy related to climate change. These include the slowdown in gross domestic product (GDP) growth or GDP decline, reducing the cost of transnational corporations, the primary business of which is in areas prone to natural anomalies, inflation, the collapse of the insurance market (due to an increase in insurance payouts), loss of productivity, threats to energy security and.

Modern models show that for the world economy relatively safe from the economic point of view, is the increase in the average temperature to 1°C. With the increase in average temperature to 2°C annual losses of the world economy will make 1% - low variant of the forecast, and 2% at high (Wade and Jennings, 2016).

Analysis of the state of the world economy in the context of the impact of climate change is necessary but at the same time,

insufficient for understanding the overall picture. As noted, the intensity of climate change is not the same and depends primarily on the territory and hence, the magnitude of the effects is different. In regional terms the problem of climate change is catastrophic for the whole group of countries located in lower latitudes. First of all we are talking about countries in South, Southeast Asia and Africa South of the Sahara. They are the first to feel all the negative phenomena, including the economic recession, decline in living standards of the population, death population. By coincidence, developing countries increasingly felt by all the costs of climate change. According to the economist, stern, 80% of all economic costs from climate change will have on developing countries, while developed countries of Northern and Western Europe, North America and the Northern part of Russia will receive short-term positive economic impact (Stern, 2006). This statement is confirmed by the UN report, according to which by 2030 the greatest losses in South-East Asia and Africa, namely 43 countries. It is expected that the greatest decline in GDP will occur in Ghana by 6.5%, Nigeria - 6.4%, Thailand 6%, the Philippines, Malaysia and Viet Nam - 5% India - 3.2%, China 0.8% (Kulikov, 2016). If in Africa the main cause of declared drought and desertification of the territory, the Asia - floods, typhoons in the coastal regions and drought in the Central.

Feature of developing countries is a significant share of the agricultural sector in the GDP structure. At the same time, it is this sector of the economy most vulnerable to the impacts of climate change. In Asia and Africa, where the bulk of the population lives in rural areas and is engaged in the cultivation of the land, this sector of the economy is vital. In both the short- and long-term it is on agriculture have major losses of GDP in these countries, which directly affects the standard of living of the population and its employment.

Developing countries will also feel the effects of climate change in developed countries. Basic foods programme the economic and social development, with assistance from the UN to the poorest countries, largely financed by the money of the economically more developed countries of Europe and North America. It is obvious that the increase in private economic costs, the amount of financial assistance will be reduced, which may further aggravate the socio-economic situation of the developing countries most vulnerable to climate change.

### **3. SOCIO-DEMOGRAPHIC IMPACTS OF CLIMATE CHANGE**

The major threat is the development trend of natural disasters-reducing protection of people. In the first place in addition to the economic costs such as the decline in the production of goods and services, reduction of investment attractiveness of the national financial markets, downturn of a level of business activity, are threatening the life and health of the person. The demographic consequences of global climate change, as a rule, have disguised and often occur at the time of the disaster, if we are talking about a man's death. Mortality is a key demographic indicator of the effects of climate change and partly an indicator of the effectiveness

of the measures taken at the state level. At the same time, with increased attention to a growing problem by the international community, increased mortality from extreme climatic conditions continues growth. At the same time, to accurately quantify the number of deaths due to climate change, it is impossible. This is due, primarily, with the state policy of the countries with the methodology of demographic events with the level of development of state statistics. So, according to the Director of the Institute of Geoeconomy of RAS academician V. I. Osipov in the period from 1965 to 2000, the number of deaths from natural disasters amounted to 3.8 million, with the annual growth rate was on average 4.3% (Osipov, 2001). Of course, these data do not reflect fully the real situation, as this includes all the death, the cause of which was nature. However, not all natural phenomena are exposed to anthropogenic factors, such as earthquakes.

The lack of common classifications of causes of death, a unified methodology for the accounting of demographic events are the main reasons for the lack of reliable information on the actual number of deaths or injured as a result of climate change. A number of countries, including Russia, do not have any database on impacts of climate change on socio-demographic processes.

The main sources of statistical data on the impact of climate change on demographic processes are the reports of the UN and the scientific work to the academic community. So, according to the world health organization (WHO) at the United Nations, every year as a result of temperature increase caused by global climate change in the world die each year 250,000 people (WHO, 2016). These include those who directly died as a result of a natural disaster and those who died of malnutrition, malaria and heat stress, due to the increase in the average temperature of the planet. Most of the victims lived in the densely populated countries of South-East Asia and Central Africa. In addition to these regions, but to a much lesser extent, suffering and other continents. So in Europe in summer 2003 heatwave caused the death of over 70,000 people (Robine et al., 2008).

In addition to mortality, global climate change has a direct impact on people's health. Higher temperature increases the concentration of ozone, pollen and other air pollutants. Hot and in the conditions of South-East Asia, and moist air is a breeding ground of infections, leading to a series of epidemics. The lack of clean drinking water is a major factor in the illness and death of children in Africa, along with famine caused by drought. Despite further progress in the treatment of epidemic diseases, the development of new vaccines, the WHO predicts a further increase in mortality of the population from the harmful effects of global warming is about 230,000-250,000. The share of infectious diseases such as malaria and diarrhea will be at least 50% of the total number of deaths. At least another 30% will die from hunger.

Along with increasing mortality and morbidity of the population, global climate change is fraught with another socio-demographic risk-mass environmental migration caused by climate reasons. Existing data allow speaking about the growth in migration flows from year to year. International organization for migration (IOM) estimates the flux of forced environmental migrants in the range

from 25 million to 1 billion people in dependence and trends of climate change (IOM, 2016).

The problem of global warming, which is primarily faced by countries in South-East Asia and Central Africa, is not a purely local character. The decrease in densely populated areas of the country or even groups of countries, taking into account the trends of population reproduction can cause a migration flow of forced migrants a large scale. At the highest upgrade level of the World Ocean own the remaining territory may not be enough to accept the entire flow of immigrants and, as a consequence, it will start to go beyond the countries of the regions. With high probability we can predict that a significant proportion of migration flows can be sent in more developed countries. Along with the migration crisis that erupted in Europe in 2015-2016, the migration flux of forced environmental migrants will provoke even more significant demographic and socio-economic problems in their countries of reception. Dramatically increase the flow of illegal migration, which can exacerbate the problems of the host society.

One of the major problems faced by the world community is no concerted and coordinated actions on prevention and liquidation of consequences from climate change. Almost all the countries most acutely affected by climate change belong to the group of developing countries whose budgets do not allow in full measure to adopt and implement effective programs. In turn, the groups of developed countries are not always economically or politically advantageous to support financially or technologically certain countries for political or economic reasons.

At the national level, individual countries have their own programs on liquidation of consequences of climate change. So, the Vietnamese authorities in 2008 approved the state target program on response to climate change. Protection Ministry of natural resources and environment was tasked to create the scenario of climate change and sea level rise in Vietnam (Ryazantsev et al., 2013). One of the results was implemented at the present time the program of resettlement away from coastal areas subject to frequent flooding. By the beginning of 2015, the authorities had relocated 93.6 thousand households from the coastal areas of Vietnam and provinces in the Mekong Delta. This program is not permanent and is implemented in cases of inability to restore the former living conditions of the household.

## 4. CONCLUSION

Global climate change in the twenty-first century is a daunting challenge, turning from a hypothetical possibility in a horrible modern reality to which humanity has grappled. The main form of global climate change is warming, i.e., the increase in the average temperature. Over the past 25 years the average annual growth rate temperature was 0.18°C/decade over the last 130 years the temperature has increased by 0.85°C, which corresponds to an increase of 0.065°C/10 years (Takle, 2016). The main cause of rising temperatures on the planet is called greenhouse gases as the result of human activities. With assistance from the UN annually held conference with the participation of most countries of the world. Significant success in working together coordination

can be considered the signing of the Paris agreement under the UN framework convention on climate change, one of which is to contain the average temperature within 2°C by 2020, with a gradual restriction of growth to 1.5°C. Despite the importance of this agreement, its main drawback is the voluntary nature of the participation of countries in limiting greenhouse gas emissions.

The control of emissions of greenhouse gases, especially carbon dioxide, is the major condition for reducing the negative effects of global climate change. At the same time, the calculations of climate scientists show that if in modern conditions, to reduce emissions to zero, then the temperature rise will continue for several decades (Sudarkodi and Sathyabama, 2011).

With all the evidence of the manifestations of global climate change, its negative effects, there is enough skepticism on the part of politicians and scientists. In particular in Russia still in law does not have passed legislation at the state level, the topic almost never discussed. At the expert level on the contrary to prove that global warming will bring economic benefits. As evidence is the possibility of increasing the acreage by 30%, the development of irrigation technologies, increasing yields, which will bring additional income to the agricultural sector in 3-5 billion. USA. Additional economic effect will be achieved by reducing the cost of heating, repair of roads that will bring at least \$10 billion. USA (Kulikov, 2016). In our view, these economic benefits are in something controversial, something unreal. So in the Southern and Central regions of Russia that do not experience extreme cold, the quality of the roads is the same and sometimes worse than in the rich Northern regions. The increase in acreage is debatable, because the soil located in zones of permafrost, in general, is not suitable for agriculture and can give short-term effect on the similarity of virgin lands in Kazakhstan. At the same time, Russia is already facing the effects of increasing temperature. Abnormal temperature in February 2016 has led to the deaths of more than 15,000 deer. The main reason is hunger. Warming led to the formation of an ice crust on the snow, which the reindeer could not reach the lichen. In May 2016, a heat wave caused the death of 1.2 deer (On Yamal quarantined, 2016). The autopsy showed that deaths of deer were caused not only by heat shock but also by the disease-anthrax. According to biologists, anthrax spores appeared due to the melting of permafrost. Massive rains in the Caucasus and Far East of the country led to many billions of dollars of losses to the economy.

Despite the fact that Russia is not included in the list of countries most acutely affected by global climate change, its consequences already manifested. Incorrect expert opinion, saying a short-term positive economic effect of increasing temperature can be interpreted as not wanting a deep understanding of the impending problems, lack of understanding of impending threats.

Attempts of the international community to limit anthropogenic impacts on the environment are faced with national economic interests of countries such as USA, China, Russia, Canada, which are the main "producers" of greenhouse gases. Cyclic financial crisis, which alternately are a world power, overshadow the problem of global climate change, care about nature and our

own population. Despite the significance of the agreements in the framework of the United Nations to limit greenhouse gas emissions, they are declarative, because they are not binding. Until then, until there is a supranational body coordinating the activities of all participants, regulations which would be binding, the problem of climate change effectively will not be solved. The establishment of such a body does not meet the interests of the economically developed Nations, and therefore, in a short time will not appear.

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