

WHY CLIMATE CHANGE SPELLS DANGEROUS FOR HUMANITY

Porquê a mudança climática é perigosa para a humanidade

João Almeida Santos, Maria Cristina Sanches Amorim

Pontifical Catholic University of São Paulo, Brazil

E-mail: professoralmeida2011@gmail.com, cris.amorim@pucsp.br

ABSTRACT

Today no one may be hesitant to talk about climate change because we are feeling its effects on health. In this article, you will find basic information about the subject, what it is, what causes it, and what we can do about it. But you don't need to be an expert on climate to talk about the risks climate change poses to human health, or the health benefits of taking action against these changes. When the subject is a climate change, we often hear specialist no knowledge in fact about subject. People often talk about climate change with too much emotion and without paying attention to the facts that are driving those climate changes. At one moment they talk about people and animals dying for lack of water or food, at another moment, they point to the negative effects on people's health. This article points out some causes of the effects of these changes on people. One of the causes is the lack of water and the reduction of food supply. Another cause is heat wave with temperature reaching a record of 49 degrees Celsius in several cities, with an effect on people's regular work, breathing difficulties and water shortage. This article is based on exploratory research to get to know the topic in more depth and establish an opening for future research. The technique for obtaining information is a bibliographical one that points out the facts that generate the impacts of climate change on the lives of people and animals, aiming to stimulate understanding and discussion about the problem. The first results of this research indicate that the problems generated by climate change in the health of people and animals are the reduction in food production, for example: the production of wheat in India; death of people in Pakistan, Spain, India due to temperatures of 49 degrees Celsius and, finally, the lack of water in Somalia and other regions.

Keywords: climate change, heatwave, food, health of people.

ACEITO EM: 20/04/2023

PUBLICADO: 31/05/2023



PORQUÊ A MUDANÇA CLIMÁTICA É PERIGOSA PARA A HUMANIDADE

Why climate change spells dangerous for humanity

João Almeida Santos, Maria Cristina Sanches Amorim

Pontifical Catholic University of São Paulo, Brazil

E-mail: professoralmeida2011@gmail.com, cris.amorim@pucsp.br

RESUMO

Hoje ninguém pode hesitar em falar sobre mudanças climáticas porque estamos sentindo seus efeitos na saúde. Neste artigo, você encontrará informações básicas sobre o assunto, o que é, o que o causa e o que podemos fazer a respeito. Mas você não precisa ser um especialista em clima para falar sobre os riscos que as mudanças climáticas representam para a saúde humana ou os benefícios para a saúde de tomar medidas contra essas mudanças. Quando o assunto é mudança climática, muitas vezes ouvimos especialistas sem conhecimento de fato sobre o assunto. As pessoas costumam falar sobre mudanças climáticas com muita emoção e sem prestar atenção aos fatos que estão impulsionando essas mudanças climáticas. Em um momento eles falam sobre pessoas e animais morrendo por falta de água ou comida, em outro momento eles apontam os efeitos negativos na saúde das pessoas. Este artigo aponta algumas causas dos efeitos dessas mudanças nas pessoas. Uma das causas é a falta de água e a redução da oferta de alimentos. Outra causa é a onda de calor com temperaturas que atingem o recorde de 49 graus Celsius em várias cidades, afetando o trabalho regular das pessoas, dificuldades respiratórias e escassez de água. Este artigo é baseado em pesquisa exploratória para conhecer mais a fundo o tema e estabelecer uma abertura para pesquisas futuras. A técnica de obtenção de informações é a bibliográfica que aponta os fatos que geram os impactos das mudanças climáticas na vida das pessoas e dos animais, visando estimular o entendimento e a discussão sobre o problema. Os primeiros resultados desta pesquisa indicam que os problemas gerados pelas mudanças climáticas na saúde das pessoas e dos animais são a redução da produção de alimentos, por exemplo: a produção de trigo na Índia; morte de pessoas no Paquistão, Espanha, Índia devido a temperaturas de 49 graus Celsius e, finalmente, a falta de água na Somália e outras regiões.

Palavras-chave: mudança climática, onda de calor, alimentação, saúde das pessoas.

INTRODUCTION

Currently, any fact associated with climate change awakens everyone's interest and dominates daily debates among people. For some, human beings are capable of adapting to these changes and mitigating the climatic effects of both drought and excessive rainfall. For others, human beings could disappear from the face of the Earth as a direct consequence of the negative impacts of this alteration in the climate. At this moment, while the results of this research are being written in article format, somewhere on planet Earth there is flooding due to excessive rain, intense drought devastating agriculture, intense heat causing death due to respiratory problems, melting polar ice caps, among others. This is clearly a change in the environment. (Rudolph; Buckley; North, 2018) (World Meteorological Organization, 2021).

The inventions made by man over time have been useful to create a better environment for their survival. Since the discovery of fire and the emergence of life in society, people live in cities, work in factories, produce their food and other industrialization processes. To generate more comfort to man, inventions do not stop there, several other resources were created such as: press, radio, television and, currently, the internet, etc.

Many of these technological resources that bring more comfort to life, especially in cities, need a source of energy for their operation and, thus, to perform the task for which the equipment was created.

In order for your cell phone, tablet or notebook to work, you must have electricity.

This energy source can come from turbines installed in dams on a given river, that is, the hydroelectric plant. In this case, the damage to the environment is considered minimal, although there may be floods to form lakes and the consequent removal of people and animals from the place where the hydroelectric generation plant is being installed.

The generation of electric energy can be done by generators powered by oil, called thermoelectric plants. In this case, the generator is driven by an engine that consumes diesel oil, gasoline or kerosene that are derived from petroleum. This oil increases the pollution released by the engine exhaust, during its burning. In this case, the product generated, which is electricity, has a greater benefit than the cost of air pollution with the gases generated by the burning of this fuel.

One of the most important inventions for man was the car. This vehicle helped in the transport of goods, in the displacement of man to different locations, growth of cities, increase in population, among other reflections of the rise in total of goods and services for the convenience of people. This vehicle burns fossil fuel, gasoline or diesel oil, which harm the environment with increased air pollution and increasing the temperature of the planet.

To live in big cities it is necessary to have countless electronic devices powered by electricity, a vehicle powered by fossil fuel; damaging the health of people with worsening respiratory diseases, climate change with heat waves, high temperatures, excessive rain or lack of water in many regions of the world, reducing the supply of food with a direct impact on hunger (Fitzgerald, 2022)

Although the causes of climate change are numerous and many of them are known to many experts and non-experts, this research points out some impacts of changes in temperature on the lives of people and animals. One of the thematic focuses is the lack of water and the reduction in the supply of food, which directly harm people's health, both due to the lack of water for food and hygiene, as well as for planting and cooking food (IPCC, 2021). Another cause is heat wave with temperature reaching a record of 49 degrees Celsius in several cities around the world, with an effect on people's regular work, breathing difficulties and water shortage.

1 THEORETICAL BACKGROUND

1.1 Global warming: some known causes

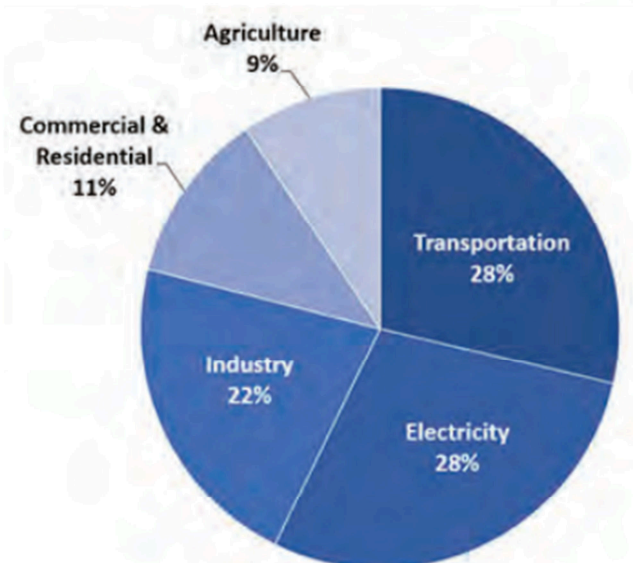
Global warming is a fact. Humans and animals feel its effect directly or indirectly. People feel the effect of global warming on their health with respiratory and circulatory problems, lack of water or total scarcity in various regions of the planet, large volume of rain that causes floods, leaves people homeless and sick because of dirty water (Rudolph; Buckley; North, 2018).

We will present one of the largest economy in the world and the weight it represents for the greenhouse effect. In the U.S. and elsewhere on the planet, there are several sources, but major sources include transportation, agriculture, and energy production.

In agriculture, the lack of water causes a drop in food production or the total loss of a crop. As a result, the increase in food prices has an immediate effect on inflation and several other problems in the economy. This lack of water poses a problem for personal hygiene, such as bathing, cleaning the environment and washing clothes, cooking food and watering plants. In urban areas, this water shortage causes an increase in the price of providing treated water and becomes another driver of rising inflation.

The causes of these problems is global warming that profoundly alters the climate on the planet. The causes of these problems is global warming that profoundly alters the climate on the planet. Currently talking about this problem is part of the discussions in the classroom, in the company, in the family, in the government and other environments.

Figure 1: Percentage of U.S. Gases de efeito estufa by Economic Sector, 2016



Rudolph, L., Harrison, C., Buckley, L. & North, S. (2018)

There are several causes of global warming and the effects on the causes of droughts on people's lives are known. One of the causes of global warming is the release of carbon dioxide and other gases during the development process of activities in various sectors (figure 1). The quantities of greenhouse gases come from a variety of sources, but major sources include transportation, agriculture, and energy production.

In summary, the contribution of the agriculture sector is 9% in its tasks of moving the land for planting, that is, the agricultural machines that are used to prepare the land for the next harvest emit carbon dioxide with the burning of fossil fuel. by their engines. The irrigation process is also carried out by tractors that burn the fuel, as well as the pumps used to fill the water reservoirs for this plantation irrigation process.

The contribution of the commercial and residential sector is 11% in carrying out domestic tasks such as cooking food using gas derived from petroleum or natural gas. This process of burning these gases for cooking generates carbon dioxide that fuels the greenhouse effect. In turn, the use of other appliances for domestic convenience, such as frying pans, grills and grills in snack bars, are sources that generate the greenhouse effect due to the heat generated during the cooking process.

The industrial sector participates with 22% in various tasks for the production of goods and services for society. Considering a metallurgy activity in which metals are produced in the form of sheets or rails for the construction or railway system, for example, the operation of the furnaces to produce the metal generates heat and greenhouse gases. The greenhouse gases coming from the electricity sector with 28%, can be noticed, mainly with the use of thermoelectric plants. The generation of electricity from the use of thermoelectric plants is

polluting because of the use of fossil fuel. In this sense, the generation of carbon dioxide causes global warming from this sector.

The great villain of the greenhouse effect problem is the transport sector with 28%. Specialists and non-specialists, when talking about the topic of global warming, point to the transport sector in the foreground, with the main character, the vehicle, as the source that generates this problem (Leggett, 2018)

The vehicle is an important resource for modern life. It helps people move to different activities and helps transport raw materials and goods. In this process it burns fossil fuel and generates carbon dioxide that causes global warming.

This is the visible part of global warming. These causes are studied by several researchers, there are statistics indicating the volume of gases generated by these activities.

1.2 Greenhouse effect and Climate Change

Although there was no reliable record of climate change before the 19th century, we can accept that climate change was already happening. There is only one difference between that time and today as to the causes of this climate change. In more remote times, the causes were more associated with natural issues of planet transformation such as volcanoes, earthquakes and tidal waves.

With the entry of machines and equipment, created mainly in the Industrial Revolution and improved since then; multiplied the human capacity to produce the goods of its need. During this production process the speed of pollution was amplified and tons of gases and other pollutants were released into the atmosphere (Climate Change 101, 2016). The clearest evidence for surface warming comes from widespread thermometer records that, in some places, extend back to the late 19th century. Today, temperatures are monitored at many thousands of locations, over both the land and ocean surface (Royal Society , 2020).

From the moment that research on the topic increases and people start to worry about what is happening with the Earth's climate, records on this topic become important.

Statistics on temperature, rainfall, number of floods, identification of dry and water-scarce regions and other climate-related problems are carried out more seriously.

Activities for the production of electricity, industrial products and transport, contribute to the formation of the greenhouse effect that is responsible for global warming. This process uses fossil fuels such as coal, oil and gas, generating carbon dioxide that forms an invisible layer around the Earth, preventing the heat caused by the sun's rays from escaping.

A simple analysis of global warming is on Earth warming because the sun's rays are not reflected back into space. First, Solar radiation passes through the clear atmosphere. So, The Earth's surface is heated by the sun's rays. Every day, the sun's rays heat the Earth's surface. The thermal sensation of heat is amplified because of the infrared radiation and reflected by the molecules of greenhouse gases, in such a way that the heat increases frequently (Royal Society , 2020). (Brekke et al. 2009).

To avoid this process of heating the Earth, part of these solar rays should be reflected back into space. As the greenhouse effect layer prevents this output, the temperature on Earth increases and generates an imbalance in the climate.

The climatic imbalance generated by this warming causes problems in human health, in food production due to lack of water, floods due to excess rain, in addition to other problems today known and felt by all people on the planet. Research records of Earth's surface air temperature show that since 1900, it has averaged an increase of 1 °C (1.8 °F), but the case worsened after the mid-1970s. A wide range of other observations (such as reduced Arctic sea ice extent and increased ocean heat content) and indications from the natural world (such as poleward shifts of temperature-sensitive species of fish, mammals, insects, etc.) together provide incontrovertible evidence of planetary-scale warming (Climate Change 101, 2016). (Royal Society , 2020).

Climate change is quickly felt because of the concrete effects caused by floods and loss of people's homes, furniture and other objects, loss of agricultural production, increase in ambient temperature.

Table 1 - Understanding the Climate Change

Concept	reflection
Weather	the temperature, humidity, precipitation, cloudiness, and wind that we experience in the atmosphere at a given time in a specific location. Weather forecasts are generally accurate over days to weeks. Climate is the average weather over a long time period (30–50 years) in a region.
Climate variability	refers to natural variation in climate that occurs over months to decades. El Niño, which changes temperature, rain, and wind patterns in many regions over about 2–7 years, is an example of natural climate variability. Climate change is a systematic change in the long-term state of the climate over multiple decades or longer.

Source: adapted from Rudolph, L., Harrison, C., Buckley, L. & North, S. (2018)

With the evolution of communication systems and society's interest in recording climate change and researching its effects; these data can be recorded and analyzed, facilitating the study and understanding of the facts. These data on climate effects involve: drought, rain, tornadoes, cyclones, forest fires, sandstorms and others. Several approaches are carried out by researchers on climate change, with the aim of verifying the relationship between the various variables to find some thesis that justifies the fact and find a solution to avoid or mitigate the effects on people's lives. (Rudolph; Buckley; North, 2018).

However, the burning of fossil fuels generates a large amount of carbon dioxide in the atmosphere, forming the greenhouse effect layer. Carbon dioxide is by far the most abundant of all atmospheric gases generated by people's production and consumption systems. Although the total amount of gas emitted in this way represents about 2% of what is generated by Nature, however, it interferes with the natural balance. Emission factors were calculated for all important processes that lead to the emission of carbon dioxide (Cullis; Hirschler, 1989).

Therefore, this article intends to contribute with specialists in the study of the climate, researchers and the population interested in understanding the causes of climate change, identifying the causes that lead to the lack of water and the reduction of the food supply, to the high temperatures caused by the heat wave in different parts of the world and the problems generated in people's health.

2 METHODOLOGY

Why climate change spells danger for humanity? To answer this central question of our article, several research sources were examined and adopted as a resource to help understand what causes climate change and its effects on people's lives. So, the research method is based on a bibliographic survey of sources from experts on the subject, descriptions and analyzes in scientific articles, private and governmental research bodies, books and academic works.

The initial impressions, chosen by the researchers of this article, about the causes and effects of climate change on people's lives, point to: causes: burning of fossil fuel and increased human interference on the planet and the effects: increase in temperature, lack of water, excess rain, fall in food production, respiratory diseases.

3 RESULTS

3.1 Burning of fossil fuel

Until that moment, this article points to the fact that the climate is undergoing transformations that are affecting everyone's lives. The greenhouse effect has changed the seasons, both with low and high temperatures, with excess or lack of rain, for example.

The first estimate of global CO₂ emissions was published in 1894, indicating strong concern with fossil fuel burning. In an attempt to identify the possible causes and consequences of the observed increasing atmospheric CO₂, concentration, the source of the CO₂, is a major concern. Through the past several decades, the combustion of fossil fuels has grown immensely and it is clearly an important source of CO₂ (Marland; Rotty, 1984) (Andrew, 2020).

We do not intend to elect a villain for this thematic discussion, but rather point out elements that provide the safest possible interpretation of what is happening with the climate of our planet.

Modern life needs a source of energy to move its industrial and domestic machines and equipment, so the burning of fossil fuel has been the great source of this energy.

For example, to generate electricity, Nigeria burns about 18.27 BCM (billion cubic meters) and loses approximately US\$ 2 billion annually, which is the part of the unused gas that must be burned because it cannot be emitted in the atmosphere in its natural form. Therefore, what goes into the atmosphere is the result of this burning, which is carbon dioxide.

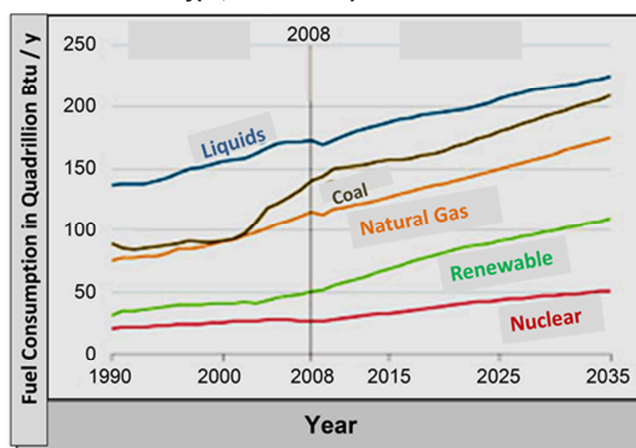
The data obtained show that the gas producing company burns about 8.33% of its total production, which exceeds the 6.6 million cubic meters (MCM) used daily. In that research it was shown that in the Nigerian oil and gas sector, a gas turbine unit with a gas consumption capacity of 0.93 MCM generates 150 MW of electricity daily. It is verified in the evaluation of the results that 50 turbines are enough to consume an average of 46.5 MCM of gas daily to generate 7500 MW of electric energy (Ojijiagwo; Oduoza; Emekwuru, 2016).

The burning of fossil fuel even happens in the production of more fossil fuel, as in the case of gas burning that occurs in the process of processing and producing crude oil. Around 5% of the global gas supply is wasted due to flaring and/or venting as a result of lack of processing facilities, causing the release of around 300 million tonnes of CO₂ per year into the environment (Ojijiagwo; Oduoza; Emekwuru, 2016). (Hirschler, 1981).

Other important GHG (greenhouse gas) such as methane, nitrous oxide, black carbon, and various fluorinated gases are emitted in smaller quantities than CO₂, but they trap more heat in the atmosphere than CO₂ traps.

The ability to trap heat is measured as Global Warming Potential (GWP). As the most common and abundant greenhouse gas, CO₂ has a GWP of 1; all other GHG warming potentials are compared to it. Fluorinated gases, for example, have GWPs thousands of times greater than CO₂, meaning that pound-for-pound, these gases have a much stronger impact on climate change than CO₂ (Climate Change 101, 2016). (Boden; Andres; Marland, 2017).

Figura 2: Historical and projected world energy consumption by fuel type, in units of quadrillion Btu



Source: Gabr, E. (2022)

As technology development takes place, more energy consumes with high rates of greenhouse gases. For the next fifty years this energy source will still be used a lot because the production infrastructure is very dependent on it. There are many types of clean energy, such as solar energy, biofuel and wind energy, but this exchange is still very expensive today (Gabr, 2002).

The projection of consumption by type of fuel for 2035, in units of quadrillion Btu - British thermal unit (unit of measure corresponding to the energy required to raise the temperature of one pound of water by one degree Fahrenheit) shows that fossil fuels still lead the ranking. The surprise factor is with the information of green energy or clean energy that appears in fourth place, followed by nuclear energy, which is still fearful in its

use for energy generation due to fear of accidents and misuse for the production of nuclear weapons (Gabr, 2002) (Marland; Rotty, 1984).

3.2 Water shortage and excess rain

Emissions are the main reasons for severe climate change and its consequences of Global Warming, Desertification, Fires, people homeless because of floods, health problems due to high temperatures and air pollution (Gabr, 2002).

In the early 1890s, Swedish geochemist Arvid Högbom was possibly the first to consider the global geochemical carbon cycle, and he presented some of his thoughts from him to the Swedish Chemical Society, later published in the Swedish Chemistry Journal. He briefly considered whether combustion of fossil fuels might perturb the carbon cycle, estimating that emissions at that time were 0.5 Gt C (see Supplement for details) and determining that this was insufficient to have any effect on atmospheric concentrations because it would merely compensate for CO₂ consumed in the continuous formation of carbonates (Andrew, 2020).

The world is going through transformations both due to natural issues that still do not have a scientific explanation, as well as changes imposed by human actions such as cutting down forests, moving earth to facilitate the construction of houses, roads and changes in the course of rivers and streams. The effects on the climate make the natural cycle of rain and the volume of water on the planet, make periods of rain and rainfall more intense, causing floods and displacing people. Another effect is the scarcity of water, with a longer drought, crop failure, reduced electricity supply and other harmful results for the population. Scientists call it the hydrologic cycle, which changes the frequency of rainfall and amplifies droughts. (Royal Society, 2020).

Freshwater is one of the most vital natural resources of the planet. The quantities that humans need for drinking and sanitation are relatively small, and the fact that these basic needs are not satisfied for many people today is primarily a matter of access to, and quality of, available water resources (Schewe et al., 2019).

There is strengthened evidence since AR5 (IPCC's Fifth Assessment Report) that the global water cycle will continue to intensify as global temperatures rise (high confidence), with precipitation and surface water flows projected to become more variable over most land regions within seasons (high confidence) and from year to year (medium confidence) (IPCC, 2021).

3.2.1 Water shortage

We tried to show some regions that are facing problems with water scarcity and the reflexes in their lives.

Worst drought since 1980 leaves 13 million at risk of famine in Horn of Africa, also known as Northeast Africa or the Somali Peninsula, which includes Somalia, Ethiopia, Eritrea and Djibouti. It has an area of approximately 2 million km² and a population of about 116 million people, with Ethiopia with 94.3 million people, Somalia with 14.7 million people; Eritrea with a population of 5 million and Djibouti with a population of 956 thousand (Worst Drought since 1980, 2022) (Sherwood; Huber, 2010).

In a statement, the United Nations' World Food Program (WFP) warns that three consecutive years of failed rainy seasons have decimated crops and caused abnormally high numbers of livestock deaths (Worst Drought since 1980, 2022). The lack of water and pasture is forcing families to abandon their homes and increasing conflicts between communities, adds the UN agency. Forecasts point to below-average rainfall, which threatens to worsen already difficult conditions in the coming months. (Fergus; Healy, 2017).

The impacts are accompanied by increases in food prices, inflation and low demand for agricultural labor, which further worsens the ability of families to buy food, with a consequent increase in malnutrition rates.

Faced with climate change and the impacts on the environment in several cities around the world, temperature records are broken, with effects on the amount of rain, floods and other damage to the population. In June 2022, India and Pakistan were at that record high temperature, and India had not suffered such a heat wave impact since a hundred years earlier, when records about this fact began. New Delhi (India) and Jacobabad (Pakistan) reached 49 degrees Celsius, that is, they broke a record high temperature (Fitzgerald, 2022)

The effect of elevated temperatures is not just on history over a recording period. People suffer its effects, even if they are used to high temperatures in the region where they live. In this case, the region of Balochistan

suffered for weeks in June 2022 with temperatures above the historical average. One of the effects felt by the residents was at work, because when they moved to carry out their activities, the thermal sensation of heat and the discomfort with difficulty breathing increased. Therefore, staying in a closed place like your home or work was difficult due to the heat caused by the high temperature (IPCC, 2013).

It is important to note that heat waves cause a shortage of water, a vital product for the body to lower its internal temperature and maintain hydration in general. Other reflections are perceived as the decrease in rainfall and this causes a reduction in the supply of electricity due to the decrease in the volume of water in the reservoirs. Meanwhile in urban areas, people turn on their air conditioners to keep the home or work environment cooler, overloading the system. Residents of Balochistan in Pakistan felt the effects of water shortages firsthand as their air conditioners and refrigerators were turned off for up to nine hours a day in June 2022 (Worst Drought since 1980, 2022).

3.2.2 Excess rain

The fact is that climate change has caused temperatures to reach high peaks and earlier throughout each year. The climate changes due to human actions that alter the ecosystem to generate more and more products and the effects are noticed with excess rain, hot weather, lack of water and other negative effects (Worst Drought since 1980, 2022).

In 2022 around 1.5 billion people faced the challenge of surviving to face the problems generated by the monsoons that bring with it periods of excessive rain and drought, more intense. Due to the high temperatures that occur in India and Pakistan during the month of June 2022, approximately 90 people die from the effects of hot Weather (Fitzgerald, 2022).

As these climate changes are anticipated each year, people are unable to adapt either to excess or lack of rain, intense heat or cold, water shortages, lack of electricity, drop in food supply, among other effects. Added to this are the structural problems of each country, such as disorderly urban growth that does not allow rainwater to flow out, with impermeable land and no conditions to capture water to be used by people.

So, populous regions suffer more from the effects of climate such as India and Pakistan, where the concentration of houses and people face the problem of flooding, common in the monsoon season.

Climate change shows the fragility of several regions in recent years. The news records floods and droughts very naturally. Estimates show that 750 million people had problems with disasters caused by heavy rain or heat. Harder reflexes are identified in Asia, so much so that studies by WMO-No. 1273 corroborate the facts when they indicate that in 2020 there was an average temperature increase of 1.39 °C in Asia, and between 1981 and 2010 the variation fluctuated between 1.29 °C and 1.55 °C. (World Meteorological Organization, 2021).

Food insecurity is a problem for the people of Afghanistan. This problem was aggravated between 2020 and 2022 with the extension of the drought due to the high temperatures generated by climate change. (IPCC, 2021) (Fitzgerald, 2022).

The force of nature in the form of tornadoes, cyclones, storms and windstorms devastates cities and leaves a trail of destruction in its wake. Approximately five million people in India and Bangladesh saw their lives transformed by Cyclone Amphan in 2020 as a result of this climate change. The case is even more serious because Bangladesh has sixty percent of the country with less than five meters above sea level. Both this country and Sri Lanka were caught by surprise with flooding due to heavy rains (Royal Society, 2020). (Fitzgerald, 2022) (Dana, 2022).

Flooding in December 2021 devastated Bahia, in northeastern Brazil. The emergency situation reached at least 72 municipalities, at least two dams collapsed and several cities in the interior of the state were left without electricity. It is estimated that since November 2021, heavy rains have killed at least 18 people. More than 280 people were injured and two are reported missing. There are more than 19,500 homeless.

The Maritime Alps region was hit by the passage of Storm Alex, which is traveling through southeastern France and northern Italy. The Italian regions of Piedmont and Liguria are calling for a state of emergency to be declared. On the French side, near Nice, it rained in 12 hours the equivalent of a year's average rainfall. As a

result of the floods, around 10,500 French homes were left without electricity. Without re-established lines of communication, many families found it difficult to contact relatives (Storm "alex", 2020)

This happened in October 2020. The same event had been repeated in November 2019, when flooding hit the Var region in southeastern France after a weekend of torrential rains. The floods triggered landslides and claimed the lives of at least four people and two missing. The bad weather also affected northern Italy, causing cuts in several roads and important damage to various infrastructures, including the partial collapse of a bridge on the A6 motorway, which connects the cities of Turin and Savona (Dana, 2022).

3.2.3 Climate change and people's healths

These emissions are the main reasons for severe climate change and its consequences of Global Warming, Desertification, Forest Fires, Floods, Droughts, Disruption of Natural Balance, Deterioration of Human Health and Bad Impact on Economy (Gabr, 2002).

Climate change affects the health of every community. At the same time that the discoveries of new medicines make it possible for man to live longer and better, climatic factors end up reducing this possibility because of the diseases generated by the increase in temperature and increase in air pollution, due to the burning of fossil fuels that generate the greenhouse effect. Climate change increases food insecurity, reduces our access to clean water, displaces people from their homes, and causes widespread social and economic disruption (Rudolph; Buckley; North, 2018).

Climate change acts as a threat multiplier, exacerbating poverty, environmental degradation, and political instability. Rising temperatures and more frequent heatwaves makes the urban area look like an heat island. At least 37 states of U.S. saw record high in the summer 2020. More 7.415 deaths were attributed to excessive natural heat from 1999 to 2010. Dehydration, heat stroke, aggravated cardiovascular illnesses, aggravated respiratory illnesses, are some of these diseases caused by this climate change (Rudolph; Buckley; North, 2018).

Table 2 - Health Impacts of Extreme Heat

Reason	Effect
Extreme heat	Extreme heat results in excess death and illness through heat stroke, heat exhaustion, and exacerbation of chronic illness. In addition, heat exposure triggers multiple physiological mechanisms that cause damage to the brain, heart, intestines, kidneys, liver, lungs, and pancreas.
Ozone levels	Increased ozone levels from extreme heat exacerbate asthma, respiratory disease, and cardiovascular disease.
Heat stress	Heat stress and associated dehydration can exacerbate renal disease and may be linked to new epidemics of chronic kidney disease.
Mental health	Exposure to extreme heat impacts mental health through increased incidence of disease, death, violence, aggression, suicide and higher rates of admission for those with a psychiatric condition. Persons with mental illness may have triple the risk of death during a heat wave. In the U.S., there is an association between periods of extreme heat and increased rates of violent crimes in cities.
Medications are sensitive to heat	Some medications are sensitive to heat and may lose effectiveness or cause harmful side effects when exposed to heat. Other medications alter individual tolerance to extreme heat, increasing the risk of heat illness.
Crop and livestock loss	Heat waves contribute to crop and livestock loss, resulting in rising food prices and increased food insecurity.

Source: adapted from Rudolph, L., Harrison, C., Buckley, L. & North, S. (2018)

The risk of heat-related mortality may be about 3% higher in rural areas when compared to urban areas, potentially linked with less access to health care services, greater proportions of elderly people, many outdoor occupations, fewer media to share heat information, and less access to air conditioning and transportation (Rudolph; Buckley; North, 2018).

CONCLUSION

This article discussed some aspects that contribute to climate change. Changes have occurred since the planet emerged due to the behavior of volcanoes and earthquakes, causing acid rain, increasing air and water pollution. Urban life with the increase in the concentration of people, construction of buildings and soil impermeability, are other aspects that cause climate change.

We point out that climate change has strong human participation. To live in an urban area, it was necessary to build buildings that concentrate a large number of people in a small space, increasing the use of air conditioners both for heating in winter periods and for cooling in summer.

Electronic devices, useful for this convenience in the city, consume electricity. Population growth and the increase in the popularity of these devices make the consumption of electricity increasing. Therefore, it is necessary to generate more energy to power these devices. When this energy is generated by hydroelectric dams, the changes in the course of the rivers for their installation, have an effect on the environment with the removal of people from a region and the flooding of areas for the construction of the dam to generate electricity.

The problem is greater when the generation of electrical energy is done by thermoelectric plants that use fossil fuel. So, in the process of generation by this method, there is an increase in global warming because of the gases generated by the engines when burning this fuel.

Another point made by this research is the increase in global warming with the discoveries of machines and equipment after the Industrial Revolution. These discoveries increased the volume of production and the displacements of people. This was possible with the use of vehicles that consume large amounts of fossil fuel and its burning pollutes the air, water and the environment in general.

This burning of fuel from the engines of these vehicles increases global warming and brings problems with climate change with a decrease in temperature in one part of the planet and an increase in heat in another part.

The rise in temperature has an effect on people's health and their daily activities. At least 37 states of U.S. saw record high in the summer 2020. More 7.415 deaths were attributed to excessive natural heat from 1999 to 2010. Dehydration, heat stroke, aggravated cardiovascular illnesses, aggravated respiratory illnesses, are some of these diseases caused by this climate change (Rudolph; Buckley; North, 2018).

Today, it has been established that the great villain of the greenhouse effect problem is the transport sector with 28%. The vehicle is an important resource for modern life. It helps people move to different activities and helps transport raw materials and goods. In this process it burns fossil fuel and generates carbon dioxide that causes global warming.

Other effects pointed out are: the excess of rain and the lack of water. Flooding in December 2021 devastated Bahia, in northeastern Brazil. As reported in this article, the effects of climate change affect all countries, however, those that are more fragile, the population suffers more. This is the case of Bangladesh, Sri Lanka and South Asia, which have geographical vulnerabilities that are aggravated by the rains caused by Cyclone Amphan. This cyclone contributed to the displacement of around five million people in 2020, including India, leaving a trail of destruction of houses, more seriously than what happened in 2017 when four and a half million people were affected.

Effect of high temperature, the impacts are accompanied by increases in food prices, inflation and low demand for agricultural labor, which further worsens the ability of families to buy food, with a consequent increase in malnutrition rates. These effects were seen in India, Pakistan, Somalia, for example.

Climate change acts as a threat multiplier, exacerbating poverty, environmental degradation, and political instability. Rising temperatures and more frequent heatwaves makes the urban area look like an heat island.

There are alternatives to reduce these effects on climate change, but they are expensive from an economic point of view and need to break a chain of production and consumption habits that are based on the burning of fossil fuel.

Clean energy such as solar or wind, still need expensive equipment because the production chain still produces on a low scale and the use of some of them still requires land spaces that are expensive for an urban area. For example, building a wind farm to generate electricity from the use of wind requires land space and a wind frequency that allows generating energy as often as a hydroelectric plant.

Producing electric vehicles requires batteries, which in turn, to be produced, need raw material taken from nature such as lithium or niobium. In both extraction processes, environmental degradation occurs. Therefore, producing the battery to use clean energy implies making the planet more dirty.

Finally, alternatives for climate change and the reduction of the effects of global warming exist, but there should be a break between the profits of a production chain already consolidated in fossil fuels and the new production processes with products that are less harmful to the environment.

REFERENCES

- Andrew, R.M. A comparison of estimates of global carbon dioxide emissions from fossil carbon sources. Copernicus Publications. <https://www.doi.org/10.5194/essd-2020-34>, 2020.
- Boden, T. A.; Andres, R. J.; Marland, G. Global, Regional, and National Fossil-Fuel CO₂ Emissions (1751 - 2014) (V. 2017). United States: N. p., 2017. https://www.doi.org/10.3334/CDIAC/00001_V2017
- Brekke, LD; et al.. Climate Change and Water Resources Management—A Federal Perspective: US Geological Survey Circular 1331, 65 p., Also available online at <https://pubs.usgs.gov/circ/1331/>, 2009.
- Climate change 101: climate science basics. Public Health Institute/Center for Climate Change and Health. 2016.
- Cullis, C.F.; Hirschler, M.M. Man's emissions of carbon monoxide and hydrocarbons into the atmosphere, Atmospheric Environment (1967), Volume 23, Issue 6, 1989, 1195-1203, ISSN 0004-6981, [https://doi.org/10.1016/0004-6981\(89\)90146-7](https://doi.org/10.1016/0004-6981(89)90146-7)
- Dana, J. As global food crisis deepens, solutions grow in Mideast. june 1, 2022. <https://asiatimes.com/2022/06/as-global-food-crisis-deepens-solutions-grow-in-mideast/>
- Fergus Green, F.; Healy, Noel. How inequality fuels climate change: The climate case for a Green New Deal. One Earth 5, June 17, 2022 @ 2022 The Author(s). Published by Elsevier Inc. 635 This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>). <https://www.doi.org/10.1016/j.oneear.2022.05.005>.
- Fitzgerald, C. Why climate change spells danger for south asia. june 1, 2022. <https://asiatimes.com/2022/06/why-climate-change-spells-danger-for-south-asia/>
- Fitzgerald, Chris. Why climate change spells danger for South Asia. Asia Times Newspaper. June, 01,2022. <https://asiatimes.com/2022/06/why-climate-change-spells-danger-for-south-asia/>
- Gabr, E. Application Model of Energy Management and Emissions Control to Limit Environmental Risks of Fossil Fuel. Open Journal of Applied Sciences, 12, 672-687. doi: 10.4236/ojapps.2022.125046. 2022.
- Hirschler, M.M.. Man's emission of carbon dioxide into the atmosphere, Atmospheric Environment (1967), Volume 15, Issue 5, 1981, Pages 719-727, ISSN 0004-6981, [https://doi.org/10.1016/0004-6981\(81\)90276-6](https://doi.org/10.1016/0004-6981(81)90276-6). 1981.
- IPCC, 2021: summary for policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change . In Press. SBN 978-92-9169-158-6. 2021.
- Ipc, A. Climate change 2013: the physical science basis. *Contribution of working group I to the fifth assessment report of the intergovernmental panel on climate change*, 1535. 2013.
- Leggett, J.A. Evolving Assessments of Human and Natural Contributions to Climate Change. Congressional Research Service. February 1, 2018.
- Marland, G.; Rotty, RM. Carbon Dioxide Emissions from Fossil Fuels: A Procedure for Estimating and Results for 1950-82. Tellus 36(B):232-61. 1984.
- Ojijiagwo, Emeka; Oduoza, Chike F.; Emekwuru, Nwabueze. Economics of gas to wire technology applied in gas flare management. Engineering Science and Technology, an International Journal, Volume 19, Issue 4, 2016, 2109-2118, ISSN 2215-0986, <https://doi.org/10.1016/j.jestch.2016.09.012>. 2016.
- Royal Society and the National Academy of Sciences, update 2020. Climate Change Evidence & Causes. https://royalsociety.org/-/media/Royal_Society_Content/policy/projects/climate-evidence-causes/climate-change-evidence-causes.pdf. 2020.

Rudolph, L., Harrison, C., Buckley, L. & NORTH, S. Climate Change, Health, and Equity: A Guide for Local Health Departments. Oakland, CA and Washington D.C., Public Health Institute and American Public Health Association, 2018.

Schewe et al. Multimodel assessment of water scarcity under climate change. www.pnas.org/cgi/doi/10.1073/pnas.1222460110, 2019.

Sherwood, Steven C.; Huber, M.. An adaptability limit to climate change due to heat stress. PNAS, May 25, 2010, vol. 107, no. 21. www.pnas.org/cgi/doi/10.1073/pnas.0913352107.

Storm "alex" leaves a trail of destruction. 10/07/2020. <https://pt.euronews.com/2020/10/04/tempestade-alex-deixa-rasto-de-destruicao>

World meteorological organization. Wmo-no. 1273. Switzerland. 2021. https://library.wmo.int/doc_num.php?explnum_id=10867

Worst drought since 1980 leaves 13 million at risk of famine in Horn of Africa. 8 Fevereiro 2022, (13:12). https://www.rtp.pt/noticias/mundo/pior-seca-desde-1980-deixa-13-milhoes-em-risco-de-fome-no-corno-de-africa_n1382925