UNIDAD EDUCATIVA JAVIER

BACHILLERATO GENERAL UNIFICADO

Causes and consequences of the ice melt at poles from 1980 to 2015

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3er. BGU Section A

2016 – 2017

ACKNOWLEDGMENT

First of all, I would like to thank God for giving me the capability to doing this graduation work. I want to thank my parents for selecting this beautiful school to educate me, for their encouragement and support to be the person I am now. I would like to thank my school and my teachers for all the values a person needs to be a great human being, and for their help to overcoming myself.

Abstract

Global Warming is nothing more than the term used to denote the phenomenon that occurs when global mean temperature increases, the Earth's atmosphere and the oceans.It is caused by different factors, but the main one; Is the Greenhouse Effect, a phenomenon that refers to the absorption of atmospheric gases, part of the energy that the soil emits, as a result of having been warmed by solar radiation. With the rise in the temperature of the air, the storms are going to be more intense because the warmer temperatures evaporate more water, and for that reason, it would rain more. Scientists say that national precipitation during the year has risen between 5 and 10% since the beginning of the 1900s. One effect of this rain is flooding. The consequences of this phenomenon may be economic; Where insurance, transport, agriculture and trade are affected. In health Global Warming causes; Spread of disease, dengue, malaria, heart disease, due to high temperatures. The child population will be affected due to lack of water, etc. In society, affects; In the development of the same, people start migrations, from one country to another, and social security undergoes many changes.That is why it is advisable to take preventive measures such as: save electricity; Make more use of solar energy; To properly use water consumption; Recycle paper, glass and plastic containers, use public transport, make proper use of the automobile, use fluorescent light bulbs, create awareness in the population, to take care of our planet, so that it has a better and longer life.
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Introduction

The present graduation work focuses on the causes and consequences of the ice melt at poles from 1980 to 2015, and its purpose is to analyze the effects in the future if we do nothing about global warming, which is increasing the Earth temperature, due to the use of fossil fuels and other industrial processes, leading to an accumulation of greenhouse gas emissions in the atmosphere. Also, this work will show what is currently happening around the world. This problem affects the human life, and are gradually taking part of our lives, threatening life on the planet in a radical way and without turning back.

This research work is important because it discusses the combustion of gases of 4x4s cars, and the mid-term effect in temperature. Through a complex feedback loop, fuels combusted today affect heating within 30 to 50 years. Today we have temperatures related to fuel emissions of about 1960, when fuel consumption was much lower. Today's fuel emissions will be experienced in the atmosphere around the year 2040 (Villafranca, et al., 2006). Approximately 250 millions of years back the species where extinct in about 90% due to volcano eruptions in Siberia, that raised temperature in 6 degrees and that caused that the natural reserves of gas in poles went out, when the heat melt the ice, so the gas came out producing a lot of carbon dioxide that produced anoxia, killing 90% of species by lack of oxygen.

The presence of different changes in climate and weather conditions have presented several variations, causing environmental disasters that directly attack the life of human beings and their living conditions. Some of the disasters are the mudslide in Vargas state in 1999, the tsunami in Asia in 2005, Katrina, Rita and Wilma hurricanes that hit the southern American states, extremely hot summers in this country and south of Europe, and floods in lot of places like Central America, some British islands, Bangladesh, Indonesia, Mozambique and many others. All these are consequences of excessive global warming. Also, in Galapagos islands, the species are fighting to survive because of the cold water, that decreases the amount of fish in the ocean, so the species that depend on them to survive like Waved albatrosses, Galápagos penguins, Galápagos sea lions, are decreasing its population.

Chapter I

Weather impact

Atmospheric humidity increases faster than temperature; in the United States and Europe, increased atmospheric humidity was 10 to 20 percent from 1980 to 2000 . Trenberth (2000) says "That's why you see the impact of global warming especially intense storms and floods as we have seen in Europe, "a scientist working with the National Center for atmospheric research (NCAR), told the Financial Times of London.

The summer of 2002 presented a number of extreme weather events, especially regarding precipitation. Excessive rain swept through Europe and Asia, flooding towns and villages and killing at least 2,000 people, while drought and high temperatures singed eastern cities and western United States. Climate change skeptics argued that time is always variable, but other observers noted that the ends appeared to be more frequent than before. A year later, following the episodic flooding during the summer of 2002, Europe experienced some of the highest (and most sustained over time) temperatures in recorded history, causing (by various estimates) between 19,000 and 35,000 deaths. They soured up to 80% of crops in eastern Germany, scene of one of the worst floods of 2002.

In warmer weather, the chances of encountering too much or too little, are greater .Scientifics working for the government, have measured an increase in storms cloudburst in the United States during the past 50 years .Winter rainfall in Sierra Nevada have been occurring increasingly as rain, increasing flood risks rather than snow, which is what provides water to farmers and wells alike as it melts in spring. The report by the World Water Council compiled statistics showing that between 1971 and 1995, floods affected more than 1.5 billion people worldwide, or 100 million people a year. Approximately 318.OOO have died and more than 18 million have been made homeless. The economic cost of these disasters has

been estimated at about $ 300 billion in the Nineties while in the sixties was 35 billion. Global Warming will rise 88 centimeters sea level in 2100 so it is expected that due to global warming by 2100 sea level will have risen 88 centimeters, something serious, because 100 million people currently live in areas that are below that altitude. According to the National Data Centre Snow and Ice the melting of Arctic began in early 2005. The area covered by sea ice in the Arctic has decreased for the fourth consecutive year. Reducing this month is the highest in more than a century, global warming caused by humans is partly to blame thaw could accelerate in the coming years. "September 2005 will be remembered as a new record minimum of ice in the Arctic."

Analysis of satellite-derived sea-ice age data and a new proxy record of ice thickness for 1982–2007 shows that in addition to less multiyear ice overall in the Arctic, the mean age and thickness of ice within the remaining multiyear ice pack have decreased due to loss of the oldest ice types, and the remaining older and thicker ice is now confined to a much smaller portion of the Arctic Ocean than in earlier years. Given this, the ice cover is likely to be increasingly susceptible to large, rapid reductions in ice extent and fractional coverage. Such extreme variability is particularly evident during the current summer when more ice was lost than during any previous summer on record, with ice extent and ice area reaching new lows that are well below the previous minima. The replacement of older, thicker ice by younger, thinner ice over much of the Arctic Ocean, combined with cumulative effects of warming, unusual atmospheric circulation patterns, and resulting intensification of the ice-albedo feedback, contributed to this large and abrupt loss of ice. Taken together, these changes suggest that the Arctic Ocean is approaching a point where a return to pre-1990s ice conditions becomes increasingly difficult and where large, abrupt changes in summer ice cover as in 2007 may become the norm(J. A. Maslanik,et al.,2007) . Whitney et al. (2007) documented persistent oxygen declines in the eastern subarctic Pacific between the 1950s and

2000s. Since the ice is thinner overall today than in the 1980s, and the melt is happening earlier and earlier, open water areas develop earlier than before, and become more extensive throughout the summer. These open water areas absorb solar radiation, heat up, and foster more melting of the ice (Perovich et al., 2007). Stroeve et al. (2007) confirmed that sea-ice extent has declined dramatically in the Arctic. Holland et al. (2008) said that the Arctic is expected to be sea-ice free during summer starting in the mid- to late twenty-first century. Maybe climate change might benefit some species and populations due to the growing availability of food and nutrients or reduced competition or predation. This species may experience higher survival, growth, and reproduction, and may be the survival species in a changing world. In multiple cases a shift of environmental conditions outside the normal range would be stressful, creating the losers of environmental change. This shifts would affect the behavior, diet, reproduction and environment where species live changing for complete the world ecosystems .So let's see what is nowadays is changing .NSIDC & JAXA (2015) according to an study showed that ice melting of the ice caps in Arctic and Antarctic is increasing . The ice glaciers of Arctic had decreased by about 10 % in the past 30 years. The ice lost in Antarctica and Greenland together contributes approximately 12 % of the rise in sea levels. The thickness of the ice caps also is decreasing showing the disappear of old ice caps. The potential energy of the ice cover will be converted into kinetic energy which is what happens when the molecules of ice moves faster when the heat os the water moves into the ice creating then the ice melt .Coastlines and islands areas of the world are vulnerable to the climate change and will be affected by the ice caps melting. The sea levels could rise about 50-100 cm by 2100. These levels might not be that significant for you but this rise would cause many effects. It could fast the erosion and would increase the evacuation of the coastlines areas due to more than a hundred millions of people live in areas under this insignificant numbers. With these ocean level increasing underground water will be affected

cause of the filtration of salt water into this source of human being. Connected to this the normal evaporation of water will increase creating floods, hurricanes, storms in coastlines affecting also species in this areas. Coral reefs are also affected, the temperature in the oceans can kill them, also the cyclones that could increase in number and size .Cyclones increase the water stream plucking the coral out of his habitat killing them.

Chapter II

North Pole

The flora and fauna in the North Pole would be affected .The polar bear probably the most known animal in the North Pole will disappear if the ice melts continues. Polar bear weights around 350–700 kg and needs approximately thirty kilos per day .A ringed seal weighs up to 70 kg.Polar bears hunt season starts when the ocean freezes and they can walk looking for seals and wait for hours near a breath hole to hunt a seal. Polar bears are carnivores so they eat just meat especially fat to maintain the body temperature because temperature can go up to −89.2 °C and also they need the fat to get energy and survive the melt season where the oceans melt again and they can't hunt seals .Polar bears don't hibernate like their cousins the grizzly bears so they really need to hunt as many seals they can in order to survive . Polar bear's main food are seals but they also eat other Artic animals like muskox ,reindeer, birds, eggs, rodents, crabs, other crustaceans and other polar bears. Despite they are principally carnivores they can also eat plants such as berries, roots, and kelp but none of this are significant part of its diet, maybe when they can't hunt seals they eat whatever they can catch, we can say they are part time omnivores .when polar bears hunt land animals including willows they use vegetative cover and wind direction to bring them as close to their prey as possible before attacking. Polar bears have been observed hunting the small Svalbard reindeer, which weigh only 40 to 60 kg as adults, as well as the barren-ground caribou, which is about twice as heavy as that. Adult muskox, which can weigh 450 kg are more nutritive and essential to survive during the lean period .Scientists found that during their time on land polar bears survive eating birds, marine algae, and other land animals .What they found was that bears that had this diet during the lean period lost more weight than the ones that just eat

food rich in fat .The ones that eat fat food eat whales and seals carcasses bringing them the fat they need to survive. So due to ice is not freezing well polar bears have it harder to hunt seals and whales, they are starving .This lack of food brings polar bears into human territory searching for food . It's a problem also to people because during last year's there have being reports about polar bears looking into towns for food and that is a real problem. Polar bears behavior is different from grizzly bears because they are not territorial .They rather scape before fighting .But the lack of human contact makes them impredictible and dangerous .Many of the attacks from grizzly to human where because they were surprised but with polar bears is different ,they stalk on the person until is too late. Same how is happening with artic foxes that depends on what polar bears doesn't eat.

The walrus is a marine mammal that lives in North Pole in the Arctic Ocean and subarctic seas of the Northern Hemisphere. Walruses prefer shallow shelf regions and forage primarily on the sea floor, often from sea ice platforms. They can remain submerged for as long as half an hour. The walrus has a diverse and opportunistic diet, feeding on more than 60 species of marine organisms, including tunicates, crabs, tube worms, shrimp, soft corals , sea cucumbers, various mollusks, and even parts of other pinnipeds. They prefer eating clams .They use their sensitive whiskers to find their food and cleaning the bottom of the marine floor with jets of water and use their powerful lips to suck out the meat of the organism .They also have been documented hunting and catching seals and seabirds particularly the Brünnich's guillemot .The walrus has two natural predators the polar bear and the assassin whale .But human used to hunt them for they tucks, their fat and meat.Assasin whales hunt them in water and they successfully eat them with minimum injuries. But both polar bear and the assassin whale trend to hunt walrus calves .For polar bears a walrus even a calve means a lot of food necessary for its survival .Polar bears hunt them when they rest at the beach .The walrus have successfully defended against both polar bear and the assassin whale .In the case

of the whale the walrus use his tucks to counterattack and with the polar bear they follow the bear into the water where it is at disadvantage.

Humpback whales are also in danger .humpback whale eats principally krill and small fish this makes that if ice melt continues his natural feed place will no longer be functional.Becasue every year humpback whales migrate from tropical habitats where they breed and give birth on winter to the Artic seas where they eat krill. Krill is sensible to temperature change where studies show an average of 20% decreased in krill population. Cold waters around the world bring nutrients like zooplankton that feed fish and krill in this case. So what happens if krill doesn't exist anymore, the feed chain will break causing marine species extinction .Another fact is that humpback whales are adapted to freeze waters having fat to maintain their temperature, if cold water disappear they could suffocate until dead. In the ataractic circle also exist another important animal .The ringed seal lives in the Artic and it is as important as the polar bear and the humpback whale .This Artic seal also known as the jar seal .the ringed seal eat a variety of small marine animals consisting on 72 species of fish and invertebrates. They have a solitary behavior .between fish they prefer eating, shrimp, mysids, herring and arctic cod. This seal is the prey of many of the artic animals such as polar bears, assassin whales, the Greenland shark and artic foxes .being the main of the artic feed chain means the warning of his conservation .as the seal eat fishes and the fishes eat krill or zooplankton means that if the artic continues melting zooplankton will disappear ,krill will disappear and so the fishes that feed seals ,walrus ,humpback whales ,artic birds and the predators like the vulnerable polar bear, the assassin whale and the artic fox will disappear .

Chapter III

South Pole

The Weddell seal is a species of pinniped mammal of the phycid family. They live in large herds and inhabit the circumpolar region of the southern hemisphere, Antarctica. It is estimated that there were approximately 800 000 individuals in the prehistoric era. They are regularly seen on the many ice-free islands of the Antarctic Peninsula. It is not a migratory species, and its local movements are the result of changes in ice conditions. These seals are well suited to cold weather, with their large layers of fat coating their organs. Adults have a dark gray cover, dotted with black or slightly gray areas. The species exhibits sexual dimorphism in favor of females, which are larger. The Weddell seal diet consists of squid, Antarctic blenids and cod. The Weddell seal diet consists of squids, Antarctic blenids and cod, which weighs up to 54 kg. Predators of Weddell seals include killer whales and leopard seals. These animals are also hunted by man as food for dogs. Due to the high number of parasitic infections, the remains of these animals are used for the study of parasites and infections by worms. Weddell seals regularly eliminate their parasites by regurgitation.

The leopard seal is a species of pinniped mammal of the family of the Fócidos. It is usually recognized for being an aggressive, solitary animal and the main predator of the emperor penguin. Antarctic summer runs from November to January. At this time, the female of the leopard seal leaves the water and settles on the ice to give birth; She then eats more than usual in order to prepare for the postpartum fast. Unlike other seals that stop in colonies, the leopard does it alone.The newborn baby weighs about 25 kg and is 1.5 m long. Fed with her mother's nutritious milk, she gains weight quickly. At two weeks or so, his first skin changes and he goes to the sea. When she is able to swim alone she stops being fed by her

mother and starts to fend for herself. Then the female can be re-fertilized by a male, but the fertilized egg is not implanted in the uterus nor develops until after about three months.

The emperor penguin, endemic to Antarctica, is the largest and most important of all penguins; Male and female are similar in plumage and size, can exceed one hundred and twenty centimeters in height and weigh between twenty and forty five kilograms. Their diet is composed mainly of fish, but can also include crustaceans such as krill and cephalopods like squid. While hunting can remain submerged for up to eighteen minutes, diving to a depth of more than five hundred meters. He has developed several adaptations to facilitate this task, such as a hemoglobin with a structure that allows him to work effectively with a low level of oxygen, solid bones to reduce barotraumatism and the ability to slow down his metabolism and pause the functions of non-essential organs. Among the predators of the emperor penguin are various birds and marine mammals. The Antarctic giant petrel is its main avian predator, responsible for up to 34% of chicks killed in some colonies. Classified as a species of minor concern in the IUCN Red List since 2004, in 2012 this organization changed its situation to Species almost threatened by a moderately rapid demographic decline in the next three generations of these birds due to global warming, but notes that there are numerous uncertainties about these changes and their effects on the species. In 2007 the Emperor pigüino was included Along with nine other species of penguin, under the protection of the US Endangered Species Act due to the decline in food availability motivated mainly by the effects of climate change and industrial fishing of fish and crustacean populations, As well as diseases and the destruction of their habitat. The Antarctic fur seal is a species of pinniped mammal of the family of the otáridos, one of the seven of the genus Arctocephalus. It lives in Antarctic waters, and was first seen on the Kerguelen Islands. This species has a short snout compared to other members of the family. Adult males have dark brown skin while females and young males tend to be gray. There is a variety of pale yellowish color that occurs

infrequently. Adult males can measure up to 2 m and weigh between 110 and 230 kg. Females, on the other hand, measure up to 1.4 m and weigh between 22 and 51 kg. They feed mainly on krill and to a lesser extent on fish. The blue whale, also known as the blue whale, is a species of mica whale of the family Balaenopteridae. Its average size is between 24 and 27 m in length and weigh between 100 and 120 t, 2 although there are records of specimens of almost 30 m in length and 173 t of weight, 3 that make it the largest animal on Earth, Not only nowadays but also the biggest one that has the news in the history. Like other bearded whales, its diet consists mainly in small crustaceans known as krill.

Blue whales were abundant in almost all oceans until the beginning of the 20th century. For more than forty years they were hunted until almost extinct, which encouraged their protection by the international community in 1966. Before the commercial whaling began, the largest population was Antarctica, with about 239 000 copies. Currently there are only much lower concentrations of about 2000 individuals in the Northeastern, Antarctic and Indian oceans. They feed almost exclusively on krill, although they also eat small amounts of copepods. The specific species to which the zooplankton belongs feed from one ocean to another. An adult can ingest up to 40 million krill in one day. Warming Globally causes glaciers and permafrost to melt rapidly, which leads to a large increase in the amount of fresh water in the oceans and there is a risk of reaching a critical point in that increase that may lead to a disturbance in the thermohaline circulation. Like most cetaceans, blue whales are migratory and spend the summer in high, cooler latitudes, where they feed on krill abundant waters; In winter they move to lower, warmer latitudes where they mate and give birth. Given that their migratory patterns are based on ocean temperature, a change in this circulation that displaces hot and cold water around the world would probably have effects on their migration. Changing ocean temperatures would also affect their food supply, as warming would cause a

decrease in salinity levels that would cause a significant change in krill abundance and situation. So it is with the rest of the species in the Antarctic or in the Arctic that the ice depend to survive, to mate and to feed.

Conclusions

At the end of this monographic work, it is concluded that:

- The principal cause of the ice melt at Poles in the last decades is the global warming.
- Because human being has no conscience of how to keep healthy the planet, continuous contaminating the nature causing different issues to the whole ecosystems.
- As result of melting so much water, the sea level would rise about 5 meters, leaving large areas of land heavily populated in the world, such as London and Bristol, under water. It should be noted that the increase of a single meter in the sea, would endanger more than 17 million people. This, in turn, would have serious economic and social consequences.
- Species like the polar bear are decreasing its population and very soon if we don't do anything about it will disappear forever.
- Climate will change because the water will be more and it will evaporate creating more storms, floods and, hurricanes.
- The large masses of molten water could alter the balance of the sea currents, stopping them completely, which means stronger hurricanes, much more severe snowfall and more extensive and strong droughts.
- Mangroves, coral reefs, beach systems and others would disappear by the rise of sea level. Increased coastal erosion and salinization of the waters in the lower coastal rivers and aquifers. Demolitions of the housing constructions by the high swell.
- Extension of the tropical region to higher latitudes, the pine forests will extend to what today forms part of the tundra and taiga. Loss of moisture from the soils that are now forests increasing arid regions. Water scarcity similar to the Argentine pampas and plains of North America.

- The melting of the poles is a current problem, which can lead to a crisis that would be difficult to leave. Therefore, if one wishes to avoid the death and suffering of many people and species, one would have to create social awareness from now on, and in this way eradicate one of the greatest threats of planet earth.

Recommendations

- Generally, fossil fuels are burned for energy, doing so releases too much carbon dioxide into the atmosphere. But what you should do is save energy by participating in these global blackout campaigns.
- You can also save energy with the new biofuel technologies with which you can generate energy without burning so many fuels.
- Another solution is to use fluorescent bulbs, these last 15 times longer than incandescent, which are used by most people.
- Join recycling campaigns or at least contribute a bit with community recycling.

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