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CLIMATE CHANGE AND ITS IMPACT ON SUSTAINABLE DEVELOPMENT IN ARAB COUNTRIES

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ABSTRACT: *Human activities represented in industrial and technological revolution led to the increase of emissions of warming gases and their concentrations in the atmosphere. This increase caused the phenomenon of greenhouse gases and the rise of earth temperature over its natural rates as a result of the increase of absorption rate of infra-red rays, which led to the climate change of the earth. These gases are carbon dioxide, methane and nitrous oxide (PFc_s ,HFc_s, and SF6. Many studies dealt with natural and reviving environment and its relation with climate change. These studies have increased much in the last 5 years and they led to more confidence in the relation between warning phenomenon and its impact on the national economies. They confirmed that there is a high degree of certainty for the present regional changes in temperatures. The impact of these changes was quite clear on many physical reviving systems because of warming phenomenon. This research dealt with studying the different impact of climate on sustainable development in the Arab world. It set up a policy for adaptation to or mitigation of climate changes to achieve sustainability in development, through which we can preserve the environment and achieve development. The research is based on the realistic and Descriptive analysis to identify the nature of the relation between climate change and sustainable development in the Arab world. Besides, the research used the adjusted net saving rates which reflect the variability of sustainable development used by the World Bank to show environment deterioration and depletion in addition to the use of sustainability of development in the Arab world. we could find out that some countries achieved recent positive values and others achieved recent negative values. This shows that climate changes have negative impact on sustainable development operation in the Arab countries.*

KEYWORDS: Environment, Sustainable Development, Climate Change, Arab Countries.

JEL codes: Q56,N55,N57

INTRODUCTION

All world countries; the developing and the advanced ones, witness climate changes in atmospheric conditions. Therefore, they tend to hold conferences and forums to mitigate these severe climate changes. These conferences include Kyoto Protocol for climate changes which were held in New York in the U.N from 20-25 September 2015. It called for **TRANSFORM OUR WORLD** For the interest of people and the plant. At last, the climate change conference was held in Paris on 1st December, 2015 .It sought to reach obligatory legal convention for countries to face climate changes and offer subsidies to developing countries which are most badly affected by the problem of climate change and to give the required finance for mitigation, adaptation and technology transferring initiatives.

If the world did not take serious steps to control and stop climate change problems, scientists expect that the negative effects of climate change will cause negative damages for the

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infrastructures, great deterioration of soil and the escape of farmers from their farmlands to go to cities, which will create social, political and economic pressures that may lead to instability in world countries.

If we have a look at the Arab countries, we'll find that the Arab region's contribution to the emissions of greenhouse gases does not exceed 5% of the world emissions. However, world climate change will have its negative impacts on the Arab region as it will affect agriculture and, in turn, foods and water supplies which are originally scarce in the Arab world because evaporation will increase and the need for energy supplies for cooling equipment will also increase.

The rise of water levels in seas will negatively affect the coasted countries overlooking the Mediterranean Sea. The Red Sea the Arabian golf and the Atlantic Ocean. These countries are greatly exposed to salting of soil and underground water. This problem will increase with the rise of population numbers, poor planning, the misuse of resources and the decrease of the ability to adaptation to these problems in the Arab countries.

There is no wonder that the exploding environmental problems threaten both the advanced and the developing world equally. The developing countries have to achieve development. Without appropriate environment and available resources in high quality, development can't be achieved. Air and water pollution and depletion of resources reached an unreasonable degree in developing countries, which threaten to spread fatal diseases such as cancer and other diseases. It is quite enough to know that more than billion people of the developing world do not use clean fresh water in their foods and drinks and more than 2 billion do not benefit from sanitary drain system. The U.N General Assembly adopted the world declaration of Human Rights in 1948, which represents the first international ethical unanimity on what individuals ought to expect from the civil society of civil and personal freedoms and human rights that range between the speech freedom to the freedom of limiting torment, to fighting poverty and corruption, and also the right to enjoy good health and environment that is fit and clean to live in with its food, water, air, soil and houses. All these freedoms and rights will help to create and consolidate meeting points between the environmental and human rights movements. That is because there is an organic relation between man's right to get clean environment and sustainable development and his right to get education, nutrition, and food (the output of development process).

The U.N.O. issued several declarations that focused on the relation between high quality of environment and man's enjoyment of his basic rights, starting with Stockholm declaration in 1972, then Rio de Janeiro declaration and the declaration of Rabat, Abu Dhabi and Tehran, and the Islamic declaration for sustainable development in Jeddah in 2002 and the holding of the security council in 2007 for the first time its history to study the environmental danger which, if it continued, will lead to a comprehensive devastation of life on earth, and at last climate change conference that was held in Paris in September in 2015.

If we have a look at the Arab countries, we'll find that they face a lot of challenges on top of which are climate changes, natural disaster such as floods, earthquakes, forest fires, burying dangerous litter, deterioration of the soil and farm lands, the increase of abject poverty and hunger in some of the Arab countries, continuation of the population increase rates, urbanization, the increase in the emigration from rural to urban areas, the spread of unfit dwelling and the random structural expansion. All these environmental challenges have their different effects on sustainable development in the Arab world. Hence, the great importance of

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this research is to take the responsibility to try to answer the basic question, that is: what are the different effects of climate changes on development in the Arab world. Besides, it designs and plans a policy for adaptation or mitigation to achieve sustainable development through which environment can be preserved and development can be achieved.

This research is divided into the following three points in addition to the introduction and the previous literature. The first point deals with environment and sustainable development. The second point deals with the effects of climate changes on sustainable development in the Arab world. The third and last point sets the appropriate policy the Arab countries should follow to face climate changes that affect development process in the Arab world.

PREVIOUS LITERATURE

There are a number of former studies that dealt with changes in climate, other environmental changes and development operation in world countries. Jevons (1885) is one of the most important scientists who dealt with the environmental issues and their importance in development operation. In his study he concentrated on the great depletion of natural resources as he affirmed that industrial progress has led to the excessive use of coal. He drew our attention that the reserve of coal in Britain is limited Hotelling's (1931) study dealt with the different environmental issues that emerged in the 20th century. His study showed the negative impact of the environmental deterioration on development operation in European countries. In addition, Pigou (1932) presented the first economic analysis for pollution phenomenon through what he presented in his study about the welfare economics. Moreover, there is a group of other modern studies that dealt with the relation between climate changes and changes in environment and development. What follows are some of these studies:

N.	Study	Results
1	Patrick, L. and Raed, S. 1990	They confirm that the effective international cooperation in protecting the environment from pollution and that consumption needs a number of basic points: The first point: focusing on the idea that there are external effects on environment, which should be put into consideration in front of the different countries. The second point: trade policy makers in every country should identify the environmental target they are after. The third point: Identifying who pay for preventing pollution and monitoring of resources management programmes to make development sustainable.
2	David, R. (1991)	He made it clear that the trade policy is the economic tool to increase the economic growth (gains of competence from making use of proportional advantage) and to achieve redistribution of income (among the local producers and consumers). We can, through using this tool, achieve the environmental targets (preventing pollution, preserving the natural resources).
3	Kumar and Patrick (1997-1998)	This study tested the impact of the rise in temperatures on the agricultural production, income, process and the product in India. It found out that the rise of 2% in temperature leads to the decrease in farming production and losses in revenues by about 25% in addition to direct economic effects such as the increase of unemployment, the food security is not

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		attained, and the increase in scarcity of resources in the social variation resulting from climate changes.
4	Tol et al.(2000)	This study referred to the rise in economic changes (variability) in the developing countries as a result of climate change. In the lower standards of climate changes, losses will be different across the different regions of the world. For example, the poorer countries are likely to be the net losers while the richer ones will likely gain profits from the mild temperatures (mild heating).
5	(Denton et al. 2002) :(kiker 2000)	This study assured that south Africa state was affected by the climate changes. The impact was quits manifest on human on human health, especially malaria diseases and schistose malasis, in addition to negative effects on resources available in the country.

The environment and sustainable development:

Environmental problems increase steadily day after another. That is because of the increasing rise in the population number and the great expansion of industrial activity, whether in the advanced or the developing countries. These problems cause heavy damages that happened to man's health because of pollution and changes in the environmental system and the ozone layer hole.

This means that the developmental model authorized now on the global does not lead to sustainable development.

This is quite clear in the disorder in the developmental balances, yet no sufficient efforts are exerted. There is no strong will to get out of that critical situation. In spite of the economic progress countries have achieved, its negative consequences on the two levels; the social and environmental ones, are still clear-cut and obvious, even if it is different. But the countries that did not get proper economic progress are still suffering from severe problems, especially the increasing demographic problems, health risks and the environmental disasters whose consequences will be terrible (www.Isessco.org).

We should refer to the fact that the developmental model whether in the north countries or the south ones, is followed by many damages that do not only affect these countries negatively, but also exceed them to include the marine field and land atmospheres. The advanced countries where the industrialization sector has first priority, emit harmful gases that cause damages to the whole earth. These gases cause deterioration of atmospheric condition in the urban areas **because of industrialization** process and the spread of individual means of transport and the excessive use of land. All consequences that resulted from urbanization and marginalizing rural areas led to enormous amounts of polluting substances that leave great effect on the environmental system. Whereas in the developing countries, the environmental problems are related to poverty, negligence and variation which led to poor industrialization, weakness of infrastructure and the excessive use of natural resources. All these factors led to the disapprance and deterioration of lands. These developing countries have also disorders in production and consuming systems and the urban advancing to farmlands in addition to the absence of control institutions, which, in turn, led to environmental deterioration in these countries. (www.Isesco.org)

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The gap gets wider between the advanced and the developing countries. Some of them call for the freedom of exchanging goods and services and fight for globalization. Others call for showing the cultural characteristics of each country and preserving the environment and human tradition in its wider meaning.

We should point out that economic open-door policy, the economic freedom and globalization cause heavy environmental damages due to many reasons:

1- Multinational corporations seek to achieve the maximum profits. Therefore, they not only look for cheap manpower, but they also work hard to look for the places where they do not apply the environmental criteria firmly.

2- South countries are no longer able to direct these multinational corporations towards the sectors that need investment more than others , that is, they can't direct them to fields less harmful.

3- Laws of the World Trade Organization (WTO) are contrasted with health policy and U.N.O conventions related to environment. For example, it is not eligible to prevent a product to enter into national markets even if it were harmful. It is quite enough that control parts in the exporting countries prove that the product is valid to be available for shopping (such as the genetically modified substances U.S.A. produce). On the other hand, the convention related to biotic diversity states that genetic processes applied to natural resources should be codified with the objective of improving and getting benefit from them in an equitable way as it happens in the field of medicine and cosmetics. Yet laws of the WTO do not accept the local traditional medicine in looking for pharmaceutical prescriptions and substances.

If we look at the world today, we notice that it reached an extent of wealth and affluence that it had never attained before as the (GDP) gross domestic product doubled 7 times during the past twenty years. The average per-capita income from the gross domestic product (GDP) doubled 3 times. Consumption of goods and services has also doubled during the same period, but the differences have widened among nations and within parts of the same country in addition to class differences that have greatly and unbearably increased among individuals of the society. It is worthy to mention there that rural areas that represent two thirds of the world population get only one quarter of the available services. Moreover, these differences are intensifying to the degree that poor people represent 90% of the world population. (www.Iseco.org)

That is to say that the present developmental model found in the invasion of multinational corporations and the developing countries' renunciation of their economic wealth and their slipping away from the social responsibilities they should take and the intensification of economic differences, all of them, lead to a case of growth with which it will be impossible to create sufficient opportunities for employment and won't allow a good distribution of incomes, nor allow the poor and the needy classes to share a real democratic regime.

World countries have started to adopt the high quality instead of quantity. Therefore, new criteria to evaluate growth have appeared. So growth is now estimated and valued by how far the country looks after its citizens and provides the appropriate living conditions. Development is now looked at as a comprehensive and integrated system that gathers the economic, social and environmental sides together and makes the human being its main priority.

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Sustainable development depends on a set of principles that can be elaborated as follows:

1- Sustainable development depends on a social target that is represented in just distribution of wealth and enjoying of lawful rights.

2- Sustainable development cares for environment balance and avoiding environmental damages that may not be controlled by man.

3- Sustainable development is interested in local central tradition.

4- Sustainable development is a balanced model for growth on land as it fairly and equitably responds to the economic needs of the different parts inside the country.

In conclusion, sustainable development needs some sort of genius and creation in a way that it does not stop at only criticizing those productive methods that may leave many environmental damages but it should look for positive production methods that achieve both monetary profit and preserving environmental system such as reusing litter after recycling it and the search for alternative sources of energy.

Climate change and its impact on sustainable development in the Arab world

Different increasing aggressions on the environment have different consequences represented in the deterioration of environment and it turns to be non-usable. The environment is originally usable. Its usability is strong and good enough so as not to allow deterioration at any aggression. Yet, it can deteriorate in case aggressions are more intense. Then the usability of this environment decreases. Deterioration of environment means that it cannot provide man with what he needs, that is, what he can't do without in his life or even in his welfare matters. This deterioration has its negative impact on sustainable development operation in the countries where environment is intensely attacked.

Climate change is considered to be the greatest environmental threat in the human history, or even it is the main challenge for humanity in the 20st century. It results into:

Rise of temperature

Rise in temperatures spreads in the whole world but it is most clear in the northern polar zones. It is expected that the rise in earth temperatures will continue. This rise will cause drought waves that will affect the area by threatening water resources and productive land. The repetition of drought waves actually increased in Algeria, Morocco, Tunisia and Syria. Drought waves have also lately happened in Jordon and Syria which are considered to be the worst to be recorded for many decades.

Sea level rise

Sea levels rose all over the world in a way that copes with that warmth. The overall rise in sea levels in the whole world reached 17 centimeters in the 20th century. If the sea level rose to only one meter it will probably cause loss of 12% - 15% of farmlands in the Nile Delta zone. It can reduce the area of lands in Qatar by 2.6%. In addition to the agricultural sector, the industrial and tourist sectors, the urban areas and (GDP) gross domestic product in a number of Arab countries, all of these sectors are threatened and negatively affected by the sea level rise. The following figure (1) illustrates that.

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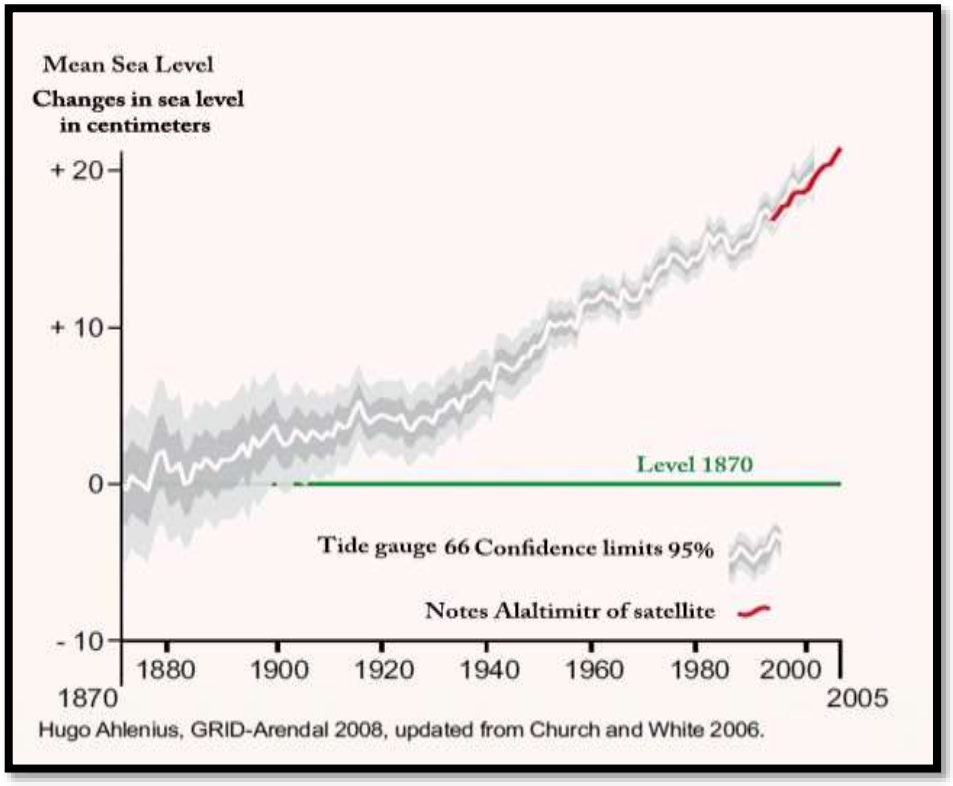
figure (1) Sea level rise



Rise in temperature in the 20th century greatly contributed to sea level rise. One of the dangerous effects of climate change – through the melting of snow as result of the rise in temperature- is the world sea level rise rate by 1.8 millimeter for each year during the period (1961-2003). It is also clear that the rate of sea level rise during (1993-2003) was obvious and greater, in which the rate was 1-3 millimeter for each year, that is to say, that sea level rise at the end of the 20th century was about 0.17 meter (Ipp,2007).

Previous studies found that the green house gases emissions continued greatly as a result of the rise in temperature, which, in turn, led to the sea level rise by about 1.3 metresin the 20th century. It may rise to reach 5 metres in sea level. (IPCC,2001), yet there is some sort of uncertainty relating to the sea level rise on the long run (IPCC, 2007 b)

The nature of effect on the sea level rise is different from one place to another. That is because of many different factors that depend on the local condition, such as the nature of lands , geology of the land that reflect different changes which are considered to be more variable than the other factors. Economic and social factors that include human response to climate change is also important (Neumann el. 2000)

The Nile Delta, the low coastal areas and the small islands are exposed to greater pressure of climate changes and sea level rise as a result of the various and basic human activities.

Egypt is considered to be one of the countries that are exposed to the effects of sea level rise. The level rise by one metre may affect 6 million people in Egypt, as about 12-15% of the farmlands in the Nile Delta are exposed to loss. Areas exposed to great risks in Egypt include

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Alexandria, Beheira, Port Said, Damietta and Suez governorate. If no protective procedures are taken to protect the places exposed to danger, the agricultural sector will be negatively subject to these changes (loss of 90% of the overall area of the governorate of Suez, then follows the industrial sector (loss of 65%) and the tourist sector (loss of about 55%) as a result of sea level rise by about 0.5 metre.

The sea level rise affects the Arab countries in recent studies of the (WB) World Bank. (Dasgupta et al., 2006), his study tested the impact of sea level rise by 1, 2, 3, 4, 5 metres on the country area, population, gross domestic product, the farmland area, the urban area and the coastal areas. The findings of his study refer to the area of land in Qatar to be affected by these changes. It may decrease by 2.6-13 % as a result of sea level rise by 5 metres respectively.

Dasgupta et al., found that if the sea level rose to about, one metre, 10% of Egypt's population will be directly affected. The biggest impact will be in the Nile Delta in which the loss will reach about 20% with the sea level rise by 5 metres. In U.A.E and Tunisia, the sea level rise by 1 metre will affect about 5% of the population.

The impact on fresh water resources:

Most of the Arab countries lie in the dry and semi-dry areas that are characterized by the increase of evaporation and scarcity of water. Water resources in the Arab countries vary, whether they are underground or surface resources. Egypt has annual water resources more than the other Arab countries. It has about 75, 65, 58 billion cubic metre for each year respectively. More than 50% of the surface water resources come from external resources. They represent high pressures on their water situation. Countries like Algeria, Lebanon, Mauritania, Morocco, Somalia, Syria, Tunisia and Yemen belong to the second category of gross water resources between 5- 30 billion cubic metres each year.

The gross underground water resources in the Arab region are 35 billion cubic metre. 50% of the water in the Arabian Peninsula is underground water resources. The annual average of rainfall varies among the countries of the Arab region. In Lebanon, Syria, the ratio of annual rainfall is about 300 to 600 millimeters for each year. If we move from the eastern coastal parts of the Mediterranean Sea to Morocco, Tunisia, we'll find that the ratio of annual rainfall reaches about 130 cubic millimeters for each year in North Africa countries, whereas the annual ratio of rainfall for the remaining Arab countries is about 290 cubic millimeters for each year.

Kuwait is considered to be the poorest of the Arab countries in the Arab region in its water resources; it has an annual ratio of rainfall of 121 cubic millimeters for each year. The gross annual water recourses are about 0.02 billion cubic metres. The dependency ratio is 100%.

Egypt is the second Arab country of having the least ratio of annual rainfall. Water resources in Egypt, Mauritania, Syria and Sudan are more variable because the dependency ratios are high in the area 97%, 96%, 80%, 77% respectively, in addition to the limited gross fresh water resources.

The per-capita ratio of annual water resources is considered to be one of the important measures for national water resources. All Arab countries are categorized to be more variable in this respect except for Iraq. We find that the per-capita ratio of water is about 2900 cubic metres annually. Syria faces water pressure (lack) where the per-capita ratio of water is 1000-1500 cubic metre annually.

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Water resources in the Arab zone face a threat by the economic and social pressures, in addition to the negative effects of climate change on the fresh water systems which are clear in the modern studies. These effects result from the rise in temperature, evaporation, sea level rise and the variability of rainfall (IPCC, 2007). A number of dry and semi-dry zones in the Arab World will have a decrease in water resources as a result of climate changes.

The sea level rise will cause the increase of salting of the underground water as a result of the decrease in the fresh water availability to the environmental and human systems in the coastal areas (Bobba et al., 2007) in addition to the store of the fact that underground water resources will decrease in some of the water pressure (shortage) areas.

FAO study confirms that the negative effects of climate change with the steady increase in population will include Algeria, Egypt, Morocco, Syria and Tunisia. These countries are expected to face water shortage (lack of water) with the advent of 2050 but Iraq is expected to be better in its water condition (FAO 2002 b). All Arab countries depend in great extent on surface and underground water. About 60-90% of water is used in farming. In all Arab countries, demand of water increase at a steady rate.

Shortage in water resources increases due to many factors: water crossing, rainfall basin conditions, basic structure, politics, disputes and conflicts that come at the head of the priorities, strategies of crossing to water in the Arab zone. The quality of water resources in the Arab world now has been affected by population, urbanization, flood, the excessive use of water resources. Climate change increases salting of underground water and fresh lakes as a result of rise in temperature (Haas, 2004). What is more dangerous is that the rise of concentrated pollutants in rivers increases pollution of the underground water. This results from the increase of leakage of agricultural chemicals in the underground water as a result of the surface running from the basins of water (IUCW, 2003). Those water basins now face drought because of the decrease of rainfall, which will cause soil erosion and desertification. In climate change conditions, desertification and deterioration will increase excessively.

Haas (2002) proposed that the different effects of climate change on hydraulic systems of the Mediterranean Sea such as the severe winter, the dry summer, hot waves, the great variability of extreme weather conditions, which start to rise; these effects may increase the evaporation processes that decreases water amounts and cause great water problems for countries in the Arab countries which suffer from water shortage.

Melting of snow

Satellite data that have been recorded since 1978 showed the shrinking of the snow area of the North Pole Sea by 2.7% every decade, and the increase of that rate of shrinking in summer. Snow peaks shrank and the ratio of snow covering in the two hemispheres of the globe shrank, too. Melting of snow leads to the increase of the solar radiation absorbed by the earth surface as snow zones reflect 80%-85% of the solar radiation falling on them, so melting of snow will speed up the rise of temperature of the earth's atmosphere.

Therefore, the thermal spreading out of oceans and seas waters and melting of snow and rivers as a result of the rise in temperatures will cause rise in these waters level to overflow vast parts of the coastal areas. This will result in serious reflections on the basic structure life utilities in addition to salting of the underground fresh water and the decrease of high quality of farmland and all economic sectors in these areas are harmed. These areas usually have high over-population which will increase its fragility and its liability to be damaged. Most scientists

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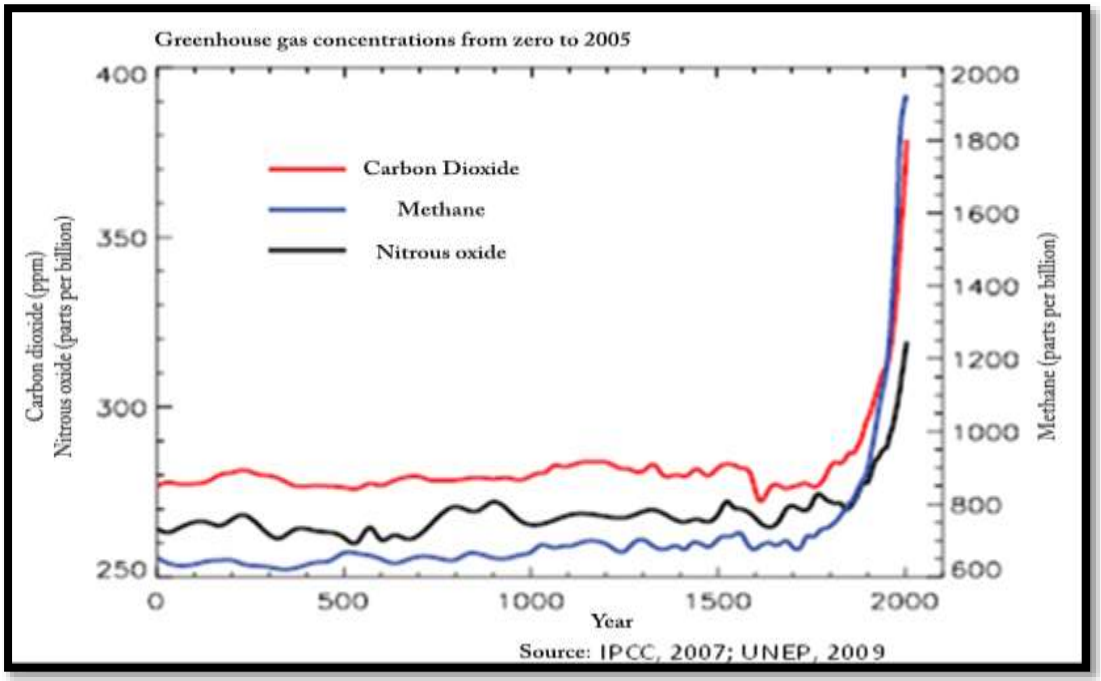
expect that sea level rise rate will increase by 50 centimeters in 2100. This rise is quite enough to overflow and flood important parts of the low coastal areas in different parts of the world.

Since 19th century several theories showed that some gases in the earth's atmosphere such as carbon dioxide, methane and nitrogen oxide, as figures (2) illustrates, keep back temperature, which contributes to warming of the earth.

Figure (2)

Concentrations of (GHG) greenhouse gases (carbon dioxide, methane and nitrous gas).



At the beginning of the 20thcentury, the Swedish scientist Svant Arinius introduced an idea that states that the GHG emissions in the temperature leads to the rise of the climate change on the earth planet. So, although the idea of the human impact on the earth's temperature appeared nearly a hundred years ago, scientists couldn't confirm that phenomenon until a relatively short period ago.

Since the industrial revolution, scientists confirm that human activates have contributed and still contribute to promoting the global warming through discharging great amount of (GHG) greenhouse gases emissions in the atmosphere such as carbon dioxide resulting from burning of fossil fuel like coal and oil to generate energy man needs for his development.

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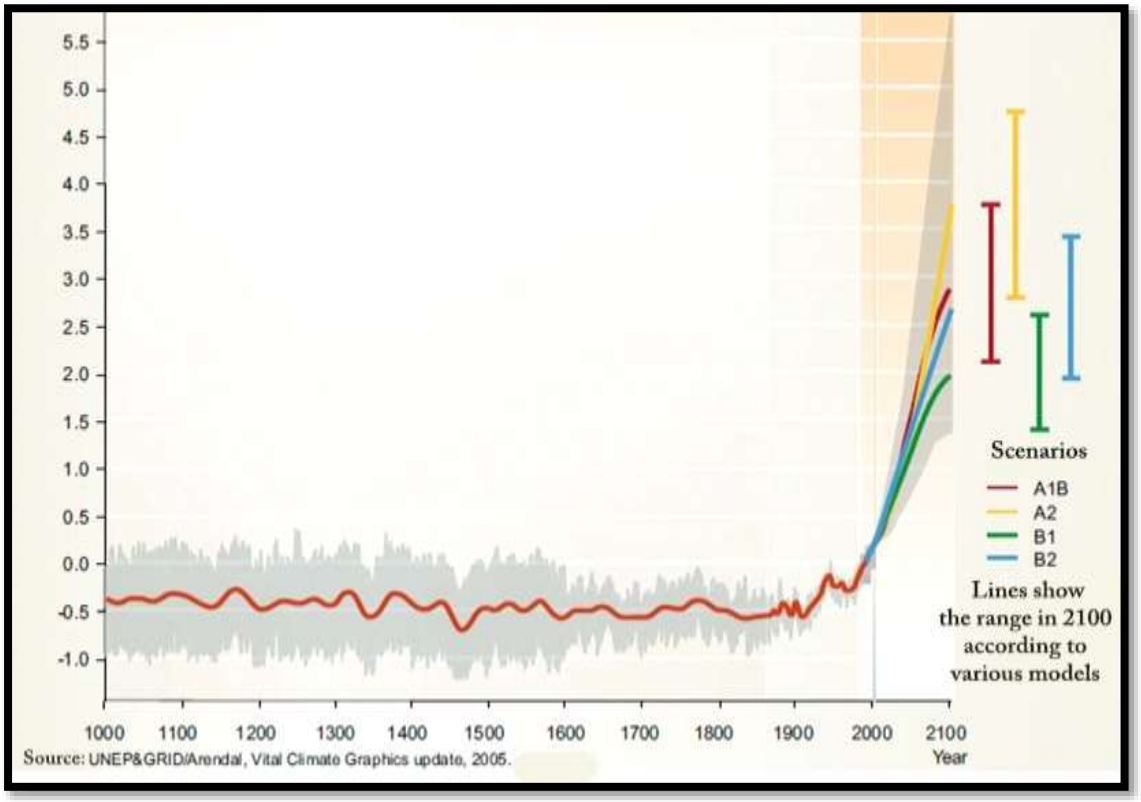
Figure (3)

The future scenarios for (GHG) greenhouse gases emission.



The governmental authority concerned with climate change as the above figure (3) illustrates, put a series of possible future scenarios for greenhouse gases emissions referred to by the name" a special report about scenarios of emission".These scenarios depend on a wide range of valuation and models of economic and social powers that produce warming gases. The figure illustrates:

A.1 describes the future world where the very quick economic growth prevails and the gross population number reaches its top in the middle of the century, then it shrinks. It also describes the quick introduction of the new technology which is most competent and efficient. The three groups of A1 are characterized by their concentration on technology.

A1 B (balance among all sources) promotes diversifying sources of energy, assuming that similar improvement rates are applied to all energy supplies and technologies of final use.

A2 describes a very inconsistent world. The main subject is the dependence on oneself and keeping the local identity, the economic development, all of which are in their first rank directed regionally. The economic development of the individual and the technological change is slower and more dismantled than other seen events.

B1 describes the world close to the same population of the world as in A1, but with a quick change in economic structures with decreases in the density of substances and introducing clean substances and competent resources. Concentration is directed to finding international solutions to achieve the economic, social and environmental sustainability.

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B2 describes the world in which concentration is made on local solutions for the economic, social and environmental sustainability. This world is characterized by a technology change less speedy but more diverse than it was in the scene events in A1 and B1. Its scenarios are also directed to protect the environment and equity, together with focusing on the local and international levels.

It can be said that the earth receives its entire thermal energy from the sun. The earth surface and the atmosphere absorb part of this energy. The remaining part is reflected in space outside the atmosphere. This absorbed energy heats the earth surface which, in turn, emits heat in form of infrared rays. Some gases that constitute the atmosphere such as carbon dioxide, methane, nitrogen oxide, water vapour and others keep back a large part of heat that the earth produces. Due to this warming, the earth heat rate reaches 15^0c which enables life evolution on the surface of this planet. This process looks likes the way green house (used in agriculture) is heated. Some gases are found naturally in the atmosphere such as carbon dioxide, methane, nitrogen oxide, water vapour and others.

Yet human activates such as using energy resources (fuels such as oil, coal) and pulling out of trees contributed to the increase of concentration of these gases in the atmosphere, which contributed and still contributes to strengthening the warming phenomenon and, in turn, the rise in temperature of the earth surface. All the above phenomena (warming and rise in temperature) cause deterioration of basic structure and life utilities, salting of fresh water resources, and also cause damages to economic sectors, deterioration of biological diversification and the increase in diseases that infect man and living creatures and finally they lead to the deterioration of sustainable development as it is illustrated in table (1)

Table (1): The regional effects and most affected sectors by climate change in the Arab countries.

Effects	Sectors most affected	Ability for adaptation
Temperature: -Rise in temperature in the area compared to the world ratio of temperature in all seasons. -Intense drought in some areas to become hotter than other areas. -The increase of cold days in some countries. Rain fall: -Decrease in rain fall ratio in some countries which are near or overlook the Mediterranean Sea. - Decrease of annual rain fall ratio in some countries in winter. - Increase of annual rainfall ratio in some countries.	Water: -Increase of water scarcity in a great number of countries. -Increase of people who face shortage of water by 2020. Agriculture and food security: -Decrease of agricultural production because of loss of farmlands and decrease in agricultural seasons. -Negative impact on food security and the increase in numbers of people who face hunger risks. -Yields (revenues)from rain crops will decrease. They may stop by 2020 in some countries. Net revenues from crops will decrease by about 90% by 20100.	Some countries have low abilities for adaptation to climate changes. They are on the way to achieve development operation which faces challenges. These challenges are: -Decrease of per-capita ratio from the GDP. -Weakness of institutions. -Education standards are low. -Shrinking of health care standards. -Shrinking of woman's participation and discrimination between man and woman is obvious.

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- Increase in rainfall rate in dry areas through evaporation processes. Extreme incidents: -Increase of desertification, drought and flood rates. -Great increase of rainfall rates.	-Depletion of fish field as a result of the rise in water temperature. Health: -Emergence of new diseases and spread of infection of endemic diseases such as malaria, meningitis, cholera and others. Environmental land system: -Devastating forests and forest fires. -Destruction of grassy lands. -Extinction of a number of animals. Coastal zones: -destroying coastal zones and their infrastructure such as the Nile Delta and other coastal zones. -Destruction of environmental systems of fish and coral reefs. -The increase of adaptation cost because of sea level rise by about 5% - 10% of the gross domestic product.	-Determination between man and woman. -Scarcity of capital in addition to the fall off of infrastructure and technology standards. -Destruction of environmental systems. -Complicated diseases. -Conflicts. -There are some countries that have economic ability for mitigation of or adaptation to climate changes.

Impact on adjusted net savings

Sustainable development is carried out through measuring adjusted net savings rates to reflect the environmental deterioration and depletion in addition to illustrating sustainability of development.

The table (2) illustrates the adjusted net saving as a proportion from the gross national product in the Arab countries during the period (1990-2014). From table (2) World Bank counted the sustainable development indicator through adjusted net savings rates which are counted by this formula:

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Table (2) adjusted net savings as a percentage of GNP (%)

	1990	1995	1996	1997	1998	1999	2000	2006	2008	2010	2012	2014
Arab Republic of Egypt	5.65	6.31	12.76	12.76	15.95	15:25	11:30	-9.18	-	6.7	2.3	-
Syrian Arab Republic	-24.63	-24.66	-20.78	-20.78	-11.46	-18.95	-27.91	-25.30	-	-	-	-
Algeria	7.37	-	-	-	-	-	-	-	-	26.7	25.7	24.8
Bahrain	-17.86	-2.45	-3.92	-3.29	-10.56	-12.98	-15.03	-13.39	-	4.6	2.1	-
Jordan	18:50	21.88	19.80	19.80	16:18	18:12	15.75	7.83	-	10.7	5.1	11.4
Kuwait	-21.61	-10.14	-6.31	-6.31	-9.29	-10.91	-8.43	-9.50	-	20.9	25.8	24.7
Morocco	20:56	14:53	14.87	14.87	15.96	17:06	17:57	29.40	-	17.9	11.9	13.7
Oman	-45.29	-	-	-	-	-	-	-	-	-	-	-
Mauritania	-6.53	5.17	-9.54	-9.54	-8.03	0.50	3.67	10.7	-	-	-13.9	-20.4
Saudi Arabia	-36.70	-26.40	-19.71	-19.71	-20.45	-17.93	-27.28	-24.25	-	22.8	25.9	21.5
Tunisia	16.98	14.67	17:36	17.36	18:37	19:03	15.65	12.7	-	6.1	-5.	-2.7
Sudan	-	-	-	-12.81	-14.21	-8.74	-6.19	-7.24	-	12.8	6.1	7.4
Yemen	-	-4.76	-0.6	-0.6	11.8	-2.01	-18.32	-17.25	-8.6	-	-	-
Lebanon	12:24	-14.22	-11.16	-11.16	-	-	-9.87	-10.45	-	-10.7	-7.	5.9

- Has been modified net savings rate is calculated by the World Bank in 2015.

- The other Arab countries is not available in his data.

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Adjusted net savings = gross national saving – fixed capital consumption – mineral depletion –forest depletion – carbon dioxide damages + expenditure on education.

We should notice that the adjusted net saving indicator is one of the best indicators in measuring sustainable development. Disappearance of sustainability lies in the turn of net saving rate from a positive rate into a negative one. This happens as a result of the great deterioration in natural assets in these countries where this turn happens. The studies that confirmed that are Hamilton and Clements (1993-1999), Dasgupta and Maler (2000) and Pearce and Atkinsan (1993)

The above table (2) points out that most of Arab countries, including Arab Syrian Republic, Bahrain kingdom, Kuwait, Oman Sultanate, Mauritania and kingdom of Saudi Arabia, Yemen and Lebanon make a negative net saving rate. This points out that during the period (1990-2008) there was no sustainability in development in these countries because of resources depletion, whether of energy or minerals and damages resulting from carbon dioxide in these countries. This is the most important factor that causes deterioration of environment and the development operation unsustainable.

But the Arab countries that achieve appositive net saving rate are the Arab Republic of Egypt-except for 2006 that had a negative value, Jordon, Tunisia and Morocco. This points out that these countries care for environmental resources by appropriate means to prevent the environmental deterioration that negatively affects sustainable development in these countries. At the head of these countries Jordon comes first, then Morocco follows, then ARE comes during the period (1990-2008). But later, adjusted net saving rates improved in some countries that cared for environment, during the period (2008-2014) including KSA, Kuwait, Bahrain kingdom and The Sudan.

From the above, we can say that the negative saving rate indicates that social welfare level during some time in the future will be less than the present social welfare level. So we can say that economy is on the course of unsustainable development. But the positive net saving rate indicates that the present value of social welfare is increasing along the path of development. This indicates implicitly that the path of development is sustainable.

We can also say that climate change represents a dangerous threat to sustainable development objectives (targets) world countries including Arab ones call for. This climate change affects human security (water security, food security, health security, energy security and living security) and cause instability and imbalance in addition to the impact on society, and it increases its poverty, and inequality. It also leads to individual emigration to other regions inside the country or abroad, which, in turn, affects available resources and services, and causes conflicts.

Adaptation/ mitigation policy to face climate change and to achieve sustainable development:

We can't avoid all consequences of climate change through adopting one policy. Adaptation policy is necessary on the short and long run to face the consequences resulting from warming. Mitigation policy is also important. Both policies of adaptation and mitigation, complete (complement) each other. Both together can reduce climate change risks.

First: mitigation:

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Mitigation policy is a basic procedure that can contribute to international efforts to limit and reduce emissions. At the same time, it achieve a group of economic and social drives that promote the sustainable development course by increasing the efficiency of using recourses and energy and by reducing pollution through building abilities and updating production systems and expanding plant covering development programmers. Table (3) indicates the different procedures of mitigation policy in the basic sectors.

Table (3) Mitigation policy in most affected sectors in the Arab countries

Most affected sectors	Basic mitigation technologies and practices	Effective policies, procedures and tools
Energy supplies	- Improving efficiency of supplying and distribution. - Turning from coal to gas using unclear energy and wind power. - Using solar power and wave power. - Building electricity generation utilities.	- Decreasing subsidies on fossil fuel. - Stimulating the use of renewable energy technologies and sticking to renewed energy criteria.
Agriculture and food security	- Improved management for yields and grazing to increase carbon in soil. - Improved techniques for cattle fertilizers to reduce methane emissions. - Improved techniques to apply to nitrogen fertilizers to reduce nitrous emissions.	- Financial incentives and regulations to achieve improved management of land. - Keeping carbon content in soil. - Effective use of fertilizers and irrigation.
Industry	- Controlling emissions of gases other than carbon dioxide. - Recycling substances and providing the alternative. - Using clean technologies in industry.	- Assimilation of clean and appropriate technology. - Presenting standard information. - Providing subsidies and tax exemption for producers who use clean technology.
Transport	- Vehicles depend on more efficient fuel. - Vehicles depend on cleaner diesel fuel. - Using means of transport that do not contain engines (such as bicycles and walking).	- Investing in attractive public transport services (utilities) and other means of transport that do not depend on engines. - Imposing pricing (quotations) on roads.

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Most affected sectors	Basic mitigation technologies and practices	Effective policies, procedures and tools
		- Imposing taxes on buying and registering vehicles and vehicles fuel.
Forest's	- Forestation(treereplanting) and reforestation. - Managing forests. - Reducing deforestation. - Managing wood products. - Improving trees species to absorb carbon in soil and planning use of lands.	- Financial incentives to raise the area of forests. - Reducing the removal of forests, maintaining and managing forests. - Putting regulations for using lands and activating them.

Second : Adaptation:

It contains a group of policies , practices and projects that aim at making modification that improve and the raise efficiency of social structure and economic activities to raise flexibility of the systems and make them more apt to face the probable consequences of climate change and to benefit from available opportunities. Adaptation operation to climate change includes avoiding risks by limiting the liability for impact , raising the ability to adaptation and putting adaptation strategies by depending on risk gathering valuation .

Adaptation procedures have become a necessity and priority to deal with climate change issues during the first half of the 20thcentury. These procedures depended on a set of objective factors relating to the inevitability of climate change because of …..

- Former emissions.
- The limited impact of mitigation
- Conditions of natural , economic and social environment .
- The efficient effect of adaptation procedures for saving souls and limiting risks related to climate variability and change.

Adaptation on the local scale is closely related to other standards of decision making . The local supporting parties should benefit from taking decision concerning adaptation and participate in forming it on other standards to ensure the success of responses to adaptation . Utilized lessons and experiences concerned with adaptation should be focused on the direct local level in high standard of decision making to ensure the continuation of the appropriate local strategies and to provide a basis for transferring information to other local sectors and societies (OECD 2009)

There are priorities on the national and sector standards that should put into consideration

1- Improving covering climate observing data and control of their high quality

2- Demanding making valuations on the national standard for climate change consequences and adaptation choices.

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- Second : Adaptation

3- Shifting the collaboration of work related to adaptation to powerful central authorities such as the Presidential Office, the Prime Minister's Office or other authorities that are concerned with adaptation .

4- Implying climate change risk factors into the long term views and strategies for limiting poverty and promoting sustainable development in the Arab countries.

5- Making valuations for available sector information about

The consequences of climate change:

6- Raising awareness among planners on the sector and donating parts scale concerning consequences resulting from climate change in some areas .

7- Raising the internal abilities in sectors ministries and within the donating parts to reach a better valuation for consequences that result from climate change.

8- Revising regulations and organizations that depend completely on historical information about climate .

9- Gathering better information about the cost and advantages of adaptation so that decision makers can put this information into consideration when they make decisions.

10- Assigning items inside the budget for adaptation responses that are identified inside the frame of plans, or establishing a special fund for adaptation figure

Adaptation procedures in basic sectors that are most affected in the Arab countries.

most affected Sectors	Interactive adaptation (responses)	Planned adaptation
Water resources	-Protecting underground resources . -Good management and maintenance of water supplying systems . -Protecting fishing areas. - Improving water supply	Better use of water - Protecting water fishing areas . - Reforming water policy including pricing and irrigation policy - Improving control and monitoring methods of floods and drought.
Agriculture and food security	-Monitoring erosion farm lands. - Building dams for irrigation works. -Providing good yields - Protecting soil fertilizer. - changes in times of planting and harvest -Educational programmes to protect soil and water in addition to good planning for them.	- Developing crops resistant to drought and salting. - Research and development - Diversification and keeping food sources and producing good yields. - Political procedures – taxing incentives / support to encourage agricultural production

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Human Health	- Reforming health administration of individuals of society - Improving living conditions and housing . - Improving response in times of emergency.	- Improving health administration to face diseases and its control . - Improving environmental high quality . - Changing housing designing
Land environmental systems	-Improving methods of management including cutting down trees , replanting them and forestation .	- protecting important areas and keeping biological diversification -Developing creatures resistant to Climate change. - Improving valuation of environmental systems. -Developing and keeping seed reserves
	- Propagating re-planting to improve goods and food services . - Improving and developing forest burning. - Improving carbon store in forests	
Coastal Areas and environmental systems for fish	– Protecting basic environments - General awareness of the importance of protecting the environmental systems of fish - Building and promoting marine shores - Protecting coral reefs and other creatures	-Administration of coastal areas. - Good planning for areas overlooking the sea. - Putting laws to protect the coastal areas . - Monitoring of environmental Systems.

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