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Climate Changes & Food Security

Introduction

Climate change threatens to reverse the progress made so far in the fight against hunger and malnutrition. Climate change augments and intensifies risks to food security for the most vulnerable countries and populations. The earliest and the more impacted are the most vulnerable countries and populations, including in arid, semi- arid, landlocked and small island (developing). Climate change will also have broader impacts through effects on trade flows, food markets and price stability and could introduce new risks for human health.



Fig. 1.

What is the climate?

Climate is the usual weather of a place and it can change one area to another one.

Climate changes

Climate change is a change in the usual weather found in a place. This could be a change in how much rain in a place usually gets in a year or it could be a change in a places usual temperature for a month or year.

Earth's climate is always changing. There have been times when Earth's climate has been warmer than it is now. There have been times when it has been cooler. These times can last thousands or millions of years. Earth's temperature has gone up about one degree Fahrenheit in the last 100 years. This may not seem like much but small changes in Earth's temperature can have big effects.

Some effects are already happening. Warming of Earth's climate has caused some ice melt and the warming also has caused oceans to rise. It can increase the water level of the ocean. It has changed the time consume to growth of certain plants . Factors affecting in the climate changes

- ✓ Mainly human activities and natural factors are affected in the climate changes.

Natural factors

1. Topography

Refers to the shape of the land. Latitudes and elevation ranges are one of the factor that lead to fluctuation in surface temperature. it can lead to local changes in climate.

2. Sea level

One of the influential factors affecting a region's climate is the distance from the sea and nearby water bodies. The surface temperatures in sea have an effect on land temperatures. Coastal areas are cooler and wetter than internal areas. This leads for cloud formation while the warm air from these interior and areas meets with cool air from the sea.

3. Ocean currents

These can transfer heat energy from land to sea or vice versa, hence influencing the temperature of the region.

4. Prevailing wind

Wind scatter specific air masses.

Apart from these natural factors, there is a huge influence of humans on a climate changes. Climate changes is remarkably induced by human activities. Human activities increase the greenhouse gasses in the atmosphere.

Human activities

- ✓ Burning fossil fuels
e.g. coal, gases and oils (carbon dioxide release the atmosphere)
- ✓ Deforestation – trees absorb the CO₂ during the photosynthesis, if they are cut down there will be higher amounts of CO₂ in the atmosphere.
- ✓ Agriculture – agricultural practices lead to the release of greenhouse gasses like methane
- ✓ Dumping waste in landfill

A natural function of the Earth's atmosphere is to keep in some of the heat that is lost from the Earth. This is known as the greenhouse effect.

Greenhouse effect

The atmosphere allows that the heat from the sun is to pass through to heat the Earth's surface.(short wave radiations). The Earth's surface then gives off heat(long wave radiations). This heat is trapped by greenhouse gasses. (carbon dioxide, methane, nitrous oxide)which radiate the heat back towards Earth. This process heats up the Earth.

Greenhouse effect is the important thing to maintain temperature fluctuations. It also help maintain warmer conditions in the night time. But the thing is now a days greenhouse gasses are over produced. Therefore, Earth’s climate increase very rapidly and it caused many of climate changes.

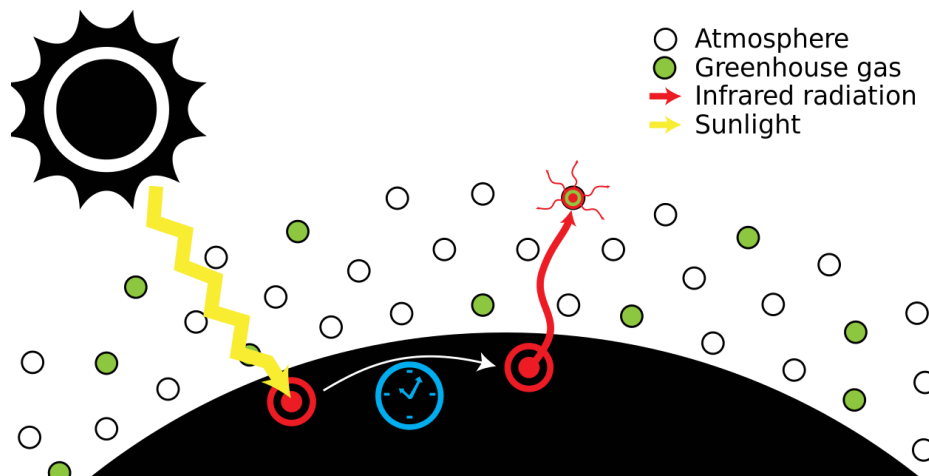


Fig. 2.Source: Wikimedia

Impacts of Climate Change

- ✓ **Hydrologic:** The hydrologic cycle now includes more frequent and intense droughts and floods in many agricultural regions. These events can damage and at times even destroy crops.
- ✓ **Heat:** Over the next 30-50 years, average temperatures will likely increase by at least 1.0 °C. Anticipated regionally-dependent changes include increased number of heat waves and warm nights, a decreasing the number of frost days, and a longer growing season in temperate zones.
- ✓ **CO2:** Over the next 30-50 years, CO2 concentrations will increase to about 450 parts per million by volume (ppmv). The CO2 response is expected to be higher on C3 species (wheat, rice, and soybeans), which account for more than 95% of world’s species than on C4 species (corn and sorghum). C3 weeds have responded well to elevated CO2 levels, symbolizing the potential for increased weed pressure and reduced crop yields.
- ✓ **Crop Biodiversity:** The distribution of wild crop relatives, an increasingly important genetic resource for the breeding of crops, will be severely affected.
- ✓ **Economic Consequences:** Price will rise for the most important agricultural crops–rice, wheat, maize, and soybeans. This, in turn, leads to higher feed and therefore meat prices. As a result, climate change will reduce the growth in meat consumption slightly and cause a more substantial fall in cereals consumption, leading to greater food insecurity

Climate Change Impacts on agriculture

Agricultural systems are currently undergoing rapid shifts owing to Socio economic development, technological change, population growth, economic opportunity, evolving demand for commodities, and the need for sustainability amid global environmental change.

Current and future agricultural systems are additionally burdened by human-caused climate change, the result of accumulating greenhouse gas and aerosol emissions, ecological destruction, and land use changes that have altered the chemical composition of Earth’s atmosphere and trapped energy in the Earth system

Food and health systems face increasing risk owing to progressive climate change now manifesting itself as more frequent, severe extreme weather events—heat waves, droughts, and floods (IPCC, 2013). Often without warning, weather-related shocks can have catastrophic and reverberating impacts on the increasingly exposed global food system—through production, processing, distribution, retail, disposal, and waste. Simultaneously, malnutrition and ill health are arising from lack of access to nutritious food, exacerbated in crises such as food price spikes or shortages. For some countries, particularly import-dependent low income countries, weather shocks and price spikes can lead to social unrest, famine, and migration.

Although previous actions have already guaranteed a human fingerprint on Earth’s climate system, the extent to which the climate will change in coming years will depend on future emissions, land use, and technological innovations. Furthermore, the extent to which climate changes will affect agricultural systems and dependent populations will be determined by our ability to anticipate risks, diagnose vulnerabilities, and develop mitigation and adaptation strategies that lessen agricultural sector damages.

Climate change impacts on agriculture must be understood in the context of the intertwined systems that affect food security and agricultural trade, including biological, socioeconomic, and political processes. Rapid gains in socioeconomic development around the world may give the mistaken impression that climate change is not detrimental, but in many of these regions climate change impacts act as an additional burden holding back the pace of development. In addition to the biological impact of changing climate conditions on farms, future agricultural production will be affected by economic and policy incentives across a wide variety of stakeholders and actors both locally and interacting through global markets

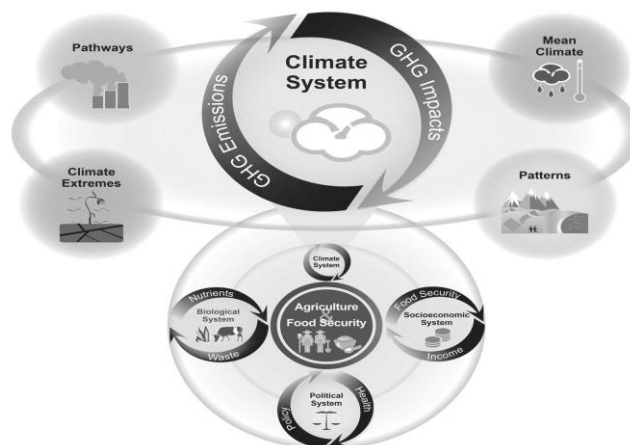
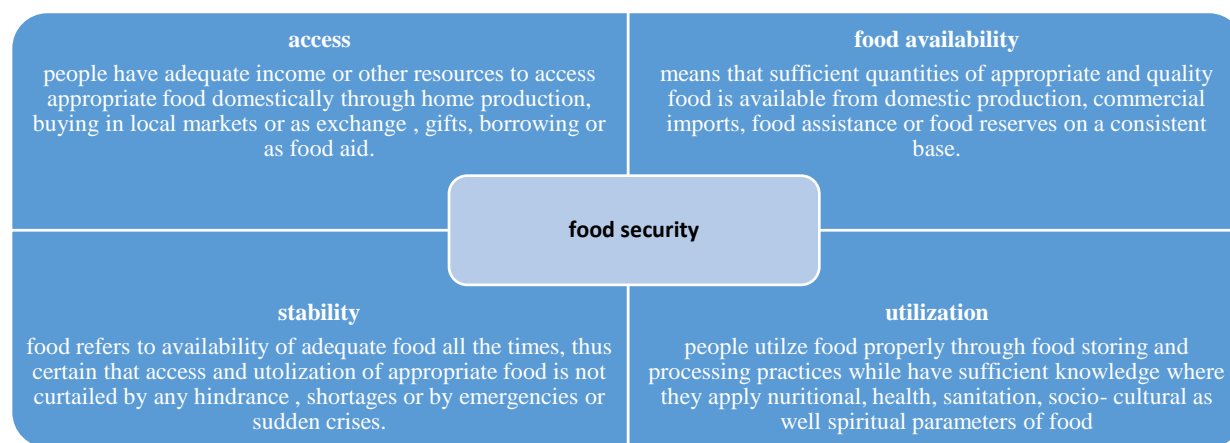


Fig. 3.Source: Figure adapted from Rosenzweig and Hillel (2018).

Climate changes will also affect elements of the agriculture and food system beyond the farm, including economic risks to elements of the value chain such as storage facilities, processing plants, and transportation, as well as political risks should government policies shift toward or Agriculture & away from environmental sustainability (Figure 3).

Food security

The food and agriculture organization (FAO) defines food security as a “situation that exists when all people , at all times have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. this definition comprises four key dimensions of food supplies: availability, stability , access and utilization.



How will climate change affect food security?

Food security is about adequate access to food, which can be acquired through trade as well as production – production self-sufficiency is not a prerequisite for food security, at either the household or the national level. Most food secure individuals buy the food they eat instead of growing it, and even wealthy countries import some basic consumption commodities. But if the households and countries that stand to lose food production due to climate change are also those that depend most on agriculture and have fewest alternative sources of income, then falling harvests will certainly undermine household and national food security.

Many poor countries already experience sizeable cereal gaps every year and significant proportions of their populations are undernourished. Understanding the full range of climate change impacts on food security therefore requires understanding the implications for prices, incomes and trade, as well as on production.

The future of food and farming: 2050s

By 2050, climatic impacts on food security will be unmistakable. There are likely to be 9 billion people on the planet, most people will live in cities and demand for food will increase significantly.



Widespread impacts on food and farming are highly likely

Average decline in yields for eight major crops across Africa and South Asia



Marine fisheries will also be affected

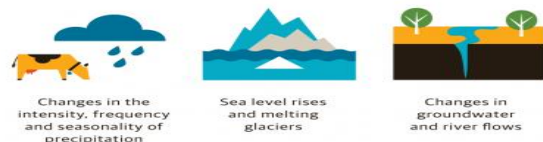


Heat and water may pass critical thresholds

Temperature increases of more than 4°C will endanger the ability of farms and ecosystems to adapt



Water cycles will be very different and less predictable



We will need major innovations in how we eat and farm

To cope with climatic changes, we may need to consider:



SOURCES: Porter, J. R., Xie, L., Challinor, A., Cochrane, K., Howden, M., Iqbal, M. M., Lobell, D., Travasso, M. I. 2014. Food Security and Food Production Systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. <http://www.ipcc-wg2.gov/> With data from Cheung et al 2010, Cochrane et al 2009, Knox et al 2012



In future Agriculture.....

Agriculture is the first practice of the man. Most important activity from the human industry Human evolution may be human civilization. In agriculture field faces many challengers. Currently agriculture facing lot of challengers and it will face some civiar challengers is future as well assuming that in 2050 how to world going to be like above figure

Climate going to be change. It's like warmer, dryer, less preditionable. There can be heavy rains and droughts . according to above figure we also expecting temperature increasing around 4 degrees of Celcius.

In 2050 Asia and Africa crop production and yield is going to be decline 8% . but population is increasing and demand is increasing rapidly. It will caused for hungers and malnutrition. Because of the water cycle changes, photosynthetic pathway will reduce . we can't avoid next few years going to be very challenging in agriculture sector and countries like us.

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