

The of climatic
change has raised
questions



The Impact of Climate Change on Agriculture Climate change has become a significant challenge for many countries globally. Food security posed by the adverse effects of climatic change has raised questions regarding the world's capacity to supply food to an increasing population, while at the same time sustaining an already stressed environment (Rosenzweig 14). Frequent extreme weather conditions such as violent storms, droughts, and floods have negatively impacted food and livestock productions, thus disrupting food supply chains and the availability of certain foods in various regions (Nordås 27). It is in the context of this background that this paper highlights the impact of climate change on agriculture and recommends steps that can be implemented to mitigate some of these effects.

Just like in any country, the agricultural sector plays a significant role in the economic growth of Canada. More precisely, it contributes to about 6.6% of the country's gross domestic product (GDP). The sector is reported to have generated an estimated amount of \$108.1 billion in 2014 (Berrang-Ford 26).

Furthermore, it is the largest employer in the country and employs around 2.4 million people. On the other hand, the sector relies heavily on climate change which plays a vital role in influencing crop productivity, animal production, and water availability, just to mention (Rosenzweig 15).

It is therefore not surprising that factors such as unpredictable weather changes pose a significant threat, especially, to the country's economy, future food supply, and stability. This is especially the case because frequent and unpredictable extreme weather conditions such as drought, violent storms, and floods, are more likely to interfere with the supply chain and

production of certain crop yields and livestock, thus impacting the economy and agricultural sector negatively (Rosenzweig 19). Impacts of Climate Change The agricultural sector in Canada has undergone numerous changes over the last few decades. For instance, the number of people practicing agriculture in the region has significantly declined compared to the previous years. This development is linked to various factors such as climate change, shifts in consumer preferences, government policies, and advances in technology (Nelson 21). The economy in general and the food production sector in particular has suffered dramatically due to these radical changes.

This is as evidenced by many studies which have shown that the drought in 2001-2002 saw agricultural exports and output decline by almost one-quarter, thus reducing the country's GDP by \$5.8 billion and employment rate by 1% (Rosenzweig 22). There is need to design and implement effective measures that would help counter the harmful effects of climate change more so as witnessed in the agricultural sector. Food Insecurity One major challenge posed by climate change in Canada is food insecurity. Worse still, variability in rainfall, prolonged droughts, and frequent extreme weather conditions, are anticipated to become more frequent in the coming decades, thus disrupting food supply chains and the production of particular crop yields in some regions. Studies have shown that temperatures are more likely to rise across the country with an annual average of up to 4.6 degrees centigrade throughout the century (Nelson 21).

In addition, an increase in atmospheric temperature is likely to result in more severe droughts, violent storms, and a decline in the snow cover, thus affecting the growth and development of crop yields such as wheat,

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barley, and canola (Delgado 18). Food insecurity will be more magnified because farming activities will not go on as successfully. Impact on dairy Farming Predicted climate changes will have a negative impact on dairy farmers and consumers of dairy products. Extreme weather conditions such as heat waves, decreased rainfall, and drought will affect the quality of pasture and affect the output of grazing animals.

In the same matter, studies suggest that a decrease in rainfall by more than 10% will impact immensely on the growth of crops and pasture in some areas, thus affecting animal production (Rosenzweig 27). Moreover, the elevated levels of CO₂ in the country is more likely to result in a reduction in the foliar nitrogen concentration in plants, and impact the production capacity and nutritional value of pasture used in grazing animals. Contextual poor fields may affect the quality of milk, cheese, meat, and other dairy products (Nelson 21).

Besides, it may also affect the health and well-being of animals, thus leading to more financial losses for farmers and consumers of dairy products.

Implications on Food Prices The impact of climate change on the agricultural sector could increase food prices. For instance, research has shown that the California drought that began in 2012 has had a major impact on the costs of vegetables and fruits in Canada (Smit 86). In the context of this illustration, most of the plants and fruits consumed in Canada come from California, which had been adversely affected by the drought in question, thus leading to increased food prices (Nordås 29).

The effect on food prices is clear considering that the costs of vegetables increased by 40%, while that of fresh fruits by 43%. Additionally, the Cyclone Larry that took place in 2009 destroyed almost 90% of the North Queensland banana crop, thus resulting in an increase in prices by 500% after a decline in supply for nearly nine months (Rosenzweig 29). Therefore, the rapid increase of food prices is expected to continue if no mitigating measures are taken to counter the adverse effects of climate change.

Mitigation Strategies

The purpose of undertaking mitigation strategies in the agricultural sector is to minimize future and current effects of climate changes effectively. The approaches taken now could help inform future decisions of farmers, policymakers, and other stakeholders, thus minimizing the adverse effects of climate change (Berrang-Ford 27). Some of the strategies that could be implemented include the use of crop development models, irrigation systems, and crop species with a greater resistance to climate change, among other approaches (Smit 89). In this regard, the use of irrigation scheme methods could help farmers preserve water and counter the effects of extreme weather conditions such as drought and wildfires. Additionally, adopting advanced crop species with a greater resistance to climatic changes would protect farmers against financial losses often caused by extreme weather events (Delgado 26).

Besides, it would ensure future food security and supply in the country. Lastly, the use of crop development models could help researchers study the effects of global warming and climate change on agriculture, thus making it possible to consider efficient adaptation strategies. Climate change is expected to affect the quality and seasonality of many foods in Canada. For

instance, increased temperatures could result in frequent droughts and more resistant pests and thus impact the country's wine growing region, which is likely to affect the quality of wine in the long run (Nordås 27). Therefore, many wine farmers and consumers are concerned about the anticipated climatic changes, and feel that the government should take more drastic measures to counter these effects before they occur (Delgado 25)

Additionally, the yields of many important crop species such as wheat, corn, and barley are anticipated to decrease significantly due to global warming, which is expected to escalate by more than 30% across the country (Smit 89).

Moreover, these changes could influence the increased use of more heat-tolerant breeds in beef production and affect the quality of meat and reproductive rates. It is not disputable that more farmers, consumers, and suppliers of these products are likely to suffer nutritional and financial losses. The implementation of climate change policies such as the carbon tax and the direct-action plan is another step currently being utilized by developed countries towards sustainability.

Here, the main objective of the policies is to minimize the emission of greenhouse gases, which is regarded as the greatest contributors to climate change in the world. From studies, it has emerged that greenhouse gases enhance global warming, thus leading to extreme weather events such as wildfires and droughts, among other effects (Smit 90). In addition, the carbon tax policy ensures that the largest emitters of greenhouse gases are charged for every tone of carbon they emit. On the other hand, the direct-action plan provides incentives to emitters for emission reduction initiatives,

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thus minimizing the level of greenhouse gases in the atmosphere (Berrang-Ford 32).

Indeed, farmers are more likely to benefit from the reduction of carbon in the atmosphere since it will counter the effects of climate change on agriculture. In conclusion, climate change has become a significant threat to food production and security in many developed countries globally. In other words, frequent extreme weather conditions such as drought, floods, and violent storms, have negatively impacted the production and quality of livestock and food in various regions. According to research, these trends are more likely to continue if no effective mitigating strategies are taken. In this context, the Canadian government has implemented various policies such as the carbon tax policy and the direct-action plan, to minimize greenhouse gas emission which is among the leading causes of global warming.

Other adaptation measures that could be implemented include the use of crop development models, irrigation schemes, and crop species that are resistant to climate change. These mitigating strategies will protect farmers against huge financial losses commonly caused by extreme weather events and ensure food security within the country. It is, therefore, the responsibility of the government and policymakers to ensure that these initiatives are enforced and efficiently implemented.