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CLIMATE CHANGE AND AGRICULTURAL ECONOMICS: LITERATURE SURVEY AND INTERNATIONAL EVENTS WITH CHRONOLOGY REVISITED!

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ABSTRACT

Agriculture contributes to and is a cause of climate change, but it is also a component of the solution. To reduce greenhouse gas emissions and aid in the storage of carbon, agricultural practices must be modified. Ecosystems that are controlled by agriculture are also vital socio-economic issue for human being. It is crucial to consider human response to appreciate and quantify the effects of climate change on agriculture and food supply in this regard. All in all, agricultural systems are dynamic, and producers and consumers must constantly adapt to changes in crop and livestock yields, food prices, input costs, resource availability, and technological innovation. Within this perspective, research and events on the physical and financial impacts of climate change on agriculture around the world has been included in this literature survey with chronological order.

Keywords: Agricultural Effects, Climate Change, Literature Survey

ABSTRAK

Pertanian berkontribusi dan merupakan penyebab perubahan iklim, tetapi juga merupakan komponen dari solusi. Untuk mengurangi emisi gas rumah kaca dan membantu dalam penyimpanan karbon, praktik pertanian harus dimodifikasi. Ekosistem yang dikendalikan oleh pertanian juga merupakan masalah sosial ekonomi yang vital bagi umat manusia. Sangat penting untuk mempertimbangkan respons manusia untuk menghargai dan mengukur dampak perubahan iklim terhadap pertanian dan pasokan makanan dalam hal ini. Secara keseluruhan, sistem pertanian bersifat dinamis, dan produsen dan konsumen harus terus-menerus beradaptasi dengan perubahan hasil panen dan ternak, harga pangan, biaya input, ketersediaan sumber daya, dan inovasi teknologi. Dalam perspektif ini, penelitian tentang dampak fisik dan finansial dari perubahan iklim pada pertanian di seluruh dunia telah dimasukkan dalam studi survei ini dengan urutan kronologis rekonsiliasi internasional.

Kata Kunci: Pengaruh Pertanian; perubahan iklim; survey study

INTRODUCTION

The effects of global climate change are a serious issue for the worldwide community. Extreme weather and climatic events like heat waves, droughts, and floods have become more frequent around the world because of climate change, and these effects have a growing impact on how people live and how society and the economy are developing. Since the 1992

United Nations Conference on Environment and Development, climate change has dominated international political discussions and global environmental concerns.

To assess the economic effects of climate change, it is essential to comprehend how a changing environment affects regional comparative advantage. Global agriculture productivity may be significantly impacted by climate change. This could include not only the typical crop yields a farmer can anticipate in the future but also the degree of risk and the yearly volatility of agricultural production. How capable are current agricultural systems to adapt and maintain productivity for a growing population when faced with these demands and amid increasingly unpredictable environments? Do today's "efficient" agricultural systems have the buffering power to handle unpredictability and shocks in the future? This paper aims to contribute to the literature by reviewing the most recent literature and events on this subject in chronological order.

Crop and livestock productivity, hydrologic balances, input sources, and other aspects of agricultural systems are all predicted to be impacted by climate change. The nature of these biophysical impacts and how people will react to them, however, are complicated and unclear. For instance, changes in meteorological variables like temperature and precipitation as well as the frequency and severity of extreme events like droughts, floods, and windstorms have a direct impact on agricultural and livestock production. Additionally, carbon dioxide is essential for the growth of plants; hence, increased concentrations could increase agroecosystem productivity. The availability and timing of irrigation water supplies, the severity of soil erosion, and the types, frequencies, and intensities of numerous crop and livestock pests are all potential outcomes of climate change.

Agriculture systems are also regulated ecosystems. To comprehend and estimate the consequences of climate change on production and food supply, it is essential to consider human response. Additionally, agricultural systems are dynamic; producers and consumers constantly react to shifts in crop and livestock yields, food prices, input prices, resource availability, and technology advancement. To effectively evaluate the effects of climate change, it is challenging but vital to account for

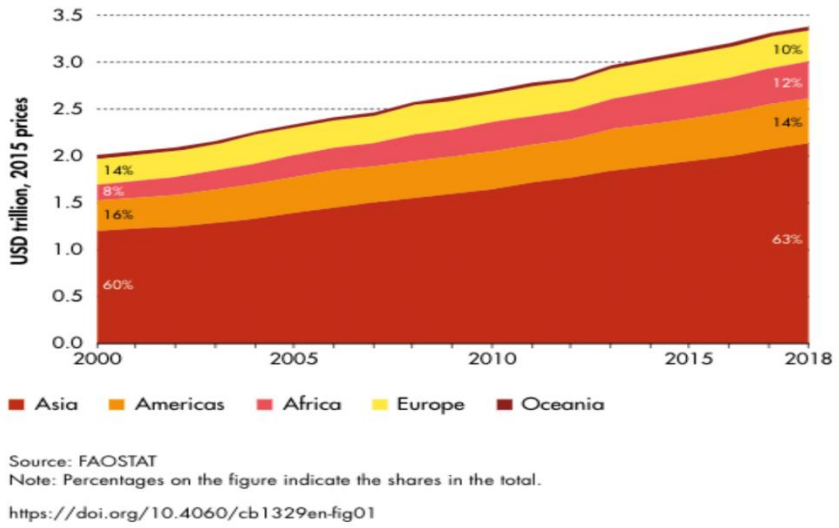
these adaptations and changes. Failure to consider human adaptations, whether they take the form of long-term technological advancements or short-term modifications in production and consumption patterns, will result in an overestimation of the potential harm from climate change and an underestimation of its potential benefits.

RESEARCH METHOD

This paper was written with the intention to skim and summarize recent papers on the field of economics of climate change within the perspective of agricultural effects and their adhering to policy advice. By doing so, contemporary articles and publications about agricultural impacts was revisited.

Trade Off of Carbon as a Social Cost and Benefit

This broader perspective on how the climate affects agriculture has significant policy ramifications. Firstly, the social cost of carbon is significantly influenced by agricultural practices. The overall social cost of carbon may be greatly increased by upward modification of these estimates. A higher social cost of carbon implies the need for greater climate mitigation. In addition, increasing mitigation efforts will directly affect the size of cultivated land, since most of the current low-cost greenhouse gas reductions are land-based. More mitigation will result in higher food prices, increasing worries about poverty and food security (Hertel & de Lima, 2020).



Picture 1. Graph of Value Added of Agriculture, Forestry and Fishing by Region (2000-2018, 2015 prices). Source: (*World Food and Agriculture - Statistical Yearbook 2020*, 2020)

Agricultural GDP in the world has been increased from 2 trillion dollars from 2000 to 3.5 trillion dollars in 2018. Asian continent dominantly holds with 63% of all value added of this amount.

With this regard, according to Chandio et al. (2020) while rainfall has a favorable impact on agricultural productivity, climate variables like temperature and CO_2 emissions had a negative impact. Moreover, non-climatic elements such as energy use, financial progress, and labor force had a long-term favorable impact on agricultural production. The anticipated long-run results further showed that temperature had a negative impact on cereal output and yield, while CO_2 emissions and rainfall had a beneficial impact.

Agricultural emissions are anticipated to increase in tandem with food demand, which is being fueled by population and wealth growth and the ensuing shift in diets toward a greater consumption of animal-derived goods. By reducing emission intensity—the amount of Greenhouse gas produced per unit of output—agriculture can help mitigate climate change by decoupling production growth from emissions growth. Actions that lessen food loss and waste and promote adjustments in eating habits can then be used to supplement this (Wiebe et al., 2019).

Every aspect of society is concerned about carbon dioxide emissions (CO_2) and climate change. Countries are working to lessen the negative consequences of industrialization on the environment. On the one hand, the world economy has experienced rapid urbanization and industrialization over the past few decades; on the other hand, there have been calls for efficient food production to fulfill the rising global food demand in the face of persistent droughts and unfavorable weather patterns. Industrialization and agriculture both have opposing demands for reducing carbon emissions (Sibanda & Ndlela, 2020).

The current trend in climate change is quite concerning for many socioeconomic and climate-sensitive businesses, including agriculture and food production. Around 1.2 to 1.5 billion hectares of land are used for crop cultivation worldwide. However, given the occurrence of climate change and global warming, it is projected that attaining the world's food security goals would be a substantial continuous concern (Ahmed et al., 2021).

Drought continues to be a problem in African countries, primarily because of unfavorable weather patterns and climatic changes that have a negative effect on rural households and agricultural output. The article of Ngcamu & Chari (2020) attempted to evaluate the impact of drought on food insecurity in African nations while considering the limitations. In addition, that paper aimed to analyze the resilience and climate change adaptation tactics used by African nations to lessen the negative effects of food insecurity on rural lifestyles. That article reviewed recent research on how drought affects food insecurity in rural Africa, which focused on four fascinating themes: (1) strategies for adapting to climate change, (2) the impact of drought on food insecurity in Africa, (3) the susceptibility to food insecurity due to drought, and (4) local resilience tactics. The literature review for this topic revealed some gaps in the data that had been released between 2000 and 2020.

According to Vila-Traver (2021) concerns about deteriorating global weather patterns and their effects on agriculture have grown in recent decades, with increased droughts and water scarcity among the key issues. Food security is anticipated to become more and more challenging throughout the 21st century because of deteriorating climate conditions, a growing global population, and related factors. As water is crucial for agricultural productivity, especially in dry regions, appropriate management of water resources is crucial to securing the world food supply. However, at the same time, pressure is growing on the availability of an increasingly scarce resource.

Awakening to Global Climate Change & Gatherings

When predicting climate change for the twenty-first century, researchers can better comprehend a variety of climate systems by revisiting historical and contemporary climates. Additionally, they can help in determining the current climatic conditions in areas with a high risk of crop failures. According to extensive data on the Earth's surface temperature from the glacial epoch to the present, the last four decades have all been successively warmer than any of the decades before them. Among the effects of climate change on human societies are temperature rise, sea level rise, and modifications in precipitation patterns that have an impact on agriculture (Uprety et al., 2019).

Table 1. International Climate Change Events at 1990s

Year	Event	Explanation
1988	The creation of the Intergovernmental Panel on Climate Change (IPCC)	The UN Environment Program (UNEP) and World Meteorological Organization (WMO) form the Intergovernmental Panel on Climate Change (IPCC). IPCC assessments continue to serve as the scientific foundation for international talks and offer special insights for reducing the risk of extreme occurrences and disasters, for instance.
1990	IPCC's first report relased	According to the report, "emissions from human activities are substantially increasing the atmospheric concentrations of greenhouse gases," prompting calls for an international agreement from the IPCC and the second World Climate Conference.
1990	The Intergovernmental Negotiating Committee (INC) for a Framework Convention on Climate Change is established by the UN General Assembly.	More than 150 governments participated in 5 sessions of the INC, where they examined "shared but differentiated" obligations of rich and developing nations, funding mechanisms, binding pledges, objectives, and timelines for emissions reductions.
1992	The United Nations Framework Convention on Climate Change's text is approved.	"Stabilize greenhouse gas concentrations in the atmosphere at a level that would preclude dangerous anthropogenic interaction with the climate system," according to the UNFCCC.
1992	At the Rio Earth Summit, the United Nations Framework Convention on Climate Change becomes formally open for signing, uniting nations to reduce greenhouse gas emissions and prepare for climate change.	The UN Convention on Biological Diversity and the Convention to Combat Desertification are the UNFCCC's two sister treaties, both of which were ratified in Rio.
1994	Entry into force of the United Nations Framework Convention on Climate Change, which was established in Rio two years earlier.	Parties are nations that have ratified the pact. The UNFCCC has 196 Parties, which is almost universal. Parties convene yearly at the Conference of the Parties (COP) to discuss multilateral climate change measures.
1995	First Conference of the Parties (COP 1) in Berlin is presided over by Germany's former environment minister, Angela Merkel.	The parties concurred that the convention's promises were "inadequate" for achieving its goals. The Kyoto Protocol is made possible by the Berlin Mandate, which sets a procedure for negotiating increased commitments for industrialized nations.
1997	With the passage of the Kyoto Protocol, the third Conference of the Parties marks a significant historical turning point.	The first agreement in the world to reduce greenhouse gas emissions

Source: (Sequeira & Reis, 2019)

According to Sequeira & Reis (2019) neoliberal institutionalism is pertinent to the discussion if we approach climate change from the perspective of international negotiations, understandings reached between sovereign states, and the implementation of international agreements. This is because it concentrates on the function played by institutions within interstate cooperation. Institutions grow apart from the four states that founded them, giving them a lasting character. This appears to be a crucial aspect in the context of climate change because

international climate negotiations also take place outside the strict confines of interstate relations. As it was seen that international agreements and negotiations serve as one of the main pillars of international relations, regardless of whether state "interests" and "threats," international cooperation and international institutions, or norms, values, and ideas are considered (Sequeira & Reis, 2019).

Table 2. International Climate Change Events in 2000s before 2009 Global Crisis

Year	Event	Explanation
2001	At the second session of the sixth Conference of the Parties meeting in Bonn, a significant development is made.	Governments attaining a wide political consensus on the Kyoto Protocol's operational rules in 1997
2001	The Marrakesh Accords, which are the product of the seventh Conference of the Parties, pave the way for the ratification of the Kyoto Protocol.	Along with a compliance regime and accounting procedures, this would codify agreement on operating standards for International Emissions Trading, the Clean Development Mechanism, and Joint Implementation.
2005	Launch of EU Emissions Trading	Launched as a key tenet of EU climate policy is the European Union Emissions Trading Scheme, the first and largest emissions trading scheme in the world. Nearly half of the CO_2 emissions in the EU are caused by installations that are subject to the scheme's regulations.
2005	Kyoto Protocol becomes effective. It came in to force.	As the Kyoto Protocol enters into force after the Russian Federation filed its ratification instrument.
2005	Montreal's COP11, the eleventh Conference of the Parties has been held.	The conference is held in conjunction with the first Conference of the Parties acting as the Meeting of the Parties for the first time (CMP 1)
2006	Clean Development Mechanism is created.	Opening of the Clean Development Tool, a crucial mechanism under the Kyoto Protocol
2007	In Nairobi, Kenya, the twelfth Conference of the Parties was held.	The Nairobi Work Programme NWP operations are ongoing, and the Subsidiary Body for Scientific and Technological Advice SBSTA is obliged to implement a program to address impacts, vulnerability, and adaptation to climate change.
2007	The Bali Road Map, which also includes the Bali Action Plan, is adopted by the Thirteenth Conference of the Parties, setting the route for a new round of climate change negotiations.	The strategy is divided into five primary categories: financing, technology, shared vision, and mitigation and adaptation.
2008	Joint Implementation mechanism is come into force.	The "Joint Implementation" mechanism of the Kyoto Protocol begins. This enables a country that has committed to reducing or limiting emissions under the protocol to obtain emission reduction units (ERUs) from an emission reduction or emission removal project in another nation that has made comparable commitments.

Source: (Sequeira & Reis, 2019)

Since the global financial crisis of 2009, there have been several significant

international climate change conferences and negotiations. Among the significant occasions are:

The Copenhagen COP15 The United Nations Framework Convention on Climate Change's Parties met for the 15th time during this summit in 2009, which took place (UNFCCC). It was supposed to result in a new global climate change agreement, but it eventually failed to do so.

The Durban COP17: The UNFCCC Parties met for the 17th time at this conference in 2011, which took place. It resulted in several significant accords, such as the Durban Platform for Enhanced Action, which created a schedule for talks to begin on a new, legally enforceable climate change deal by 2015.

Table 3. International Climate Change Events after 2009 Global Crisis

Year	Event	Explanation
2009	The Copenhagen Accord was created at the fifteenth Conference of the Parties, which takes place in Copenhagen, Denmark.	Developed nations promise fast-start financing of up to USD 30 billion for the years 2010-2012.
2010	The Cancun Agreements, a comprehensive package put together by governments to help developing countries deal with climate change, are the product of the 16th Conference of the Parties.	The Cancun Adaptation Framework, the Technology Mechanism, and the Green Climate Fund are created.
2011	Governments agree to a new global climate change accord by 2015 for the years beyond 2020 at the seventeenth Conference of the Parties in Durban, South Africa. As a result, the Ad Hoc Working Group on the Durban Platform for Enhanced Action, or ADP, is established.	Momentum for Change, a special UNFCCC effort, highlights creative and revolutionary climate action happening across the world.
2012	Governments agree to quickly work on a global climate change deal by 2015 and to discover methods to scale up efforts by 2020 beyond existing pledges to limit emissions at the 18th Conference of the Parties in Doha.	Additionally, they adopt the Doha Amendment, ushering in the Kyoto Protocol's second commitment period.
2013	The UNFCCC secretariat's new location	The former German Parliament building is now the UNFCCC secretariat's new home on the Bonn UN Campus. The structure has undergone significant renovations and is now a model for environmental efficiency thanks to the use of solar electricity and smart lighting.
2013	IPCC publishes the Fifth Assessment Report's second section.	The Working Group 1 contribution to the Fifth Assessment Report (AR5) on the science of climate change is published by the UN Intergovernmental Panel on Climate Change (IPCC).
2013	The Warsaw Outcomes are a set of guidelines for lowering emissions from deforestation and forest degradation as well as a system to deal with loss and damage brought on by long-term climate change consequences.	The parties reached an agreement on a "international framework for loss and damage," which acknowledges that negative effects will unavoidably occur if mitigation does not happen rapidly enough and if nations cannot adapt to the consequent climate change. Developing nations want this mechanism to serve as a conduit through which they can request compensation

		from nations with significant emissions of greenhouse gases for this harm. The following landmark meeting will be COP 21 in Paris in 2015, where parties want to reach an extensive, binding global agreement.
2014	IPCC publishes the Fifth Assessment Report's second section.	The Working Group 2 contribution to the Fifth Assessment Report (AR5) of the UN Intergovernmental Panel on Climate Change (IPCC), which examines impacts, adaptation, and vulnerability
2014	Climate Summit hosted by the UN Secretary-General	UN Secretary-General Ban Ki-moon to host a climate summit in New York, inviting Heads of State and Government, business, finance, civil society, and local leaders to mobilize action and ambition on climate change in advance of COP 21 in Paris in 2015
2014	In Lima, at the 20th Conference of the Parties has been held	In 2015, world governments will have the chance to make one more push toward a new and significant global accord and investigate the possibilities that biodiversity and climate market incentives can offer for combating climate change and promoting sustainable development.

Source: (Sequeira & Reis, 2019)

There are also two basic approaches from an economics perspective: (1) evaluating the impacts of climate change on economic results, and (2) researching the incentives that can stop or lessen climate change. First, studies have been done to assess the effects of climate change on an empirical and theoretical level (and pollution). According to research on resources and economic growth, the use of finite or nonrenewable resources can thwart long-term economic growth if pollution lowers utility and depletes nonrenewable resources utilized in production. This is because those resources will eventually cap economic growth. However, technical advancement may offer a way out of a deadlock. In addition to this, the commercial incentives that might hinder or facilitate climate change mitigation are the second. They point out four areas of the literature where sophisticated models have already provided insightful data: coalition building and climate negotiations, macroeconomic effects of climate-related events, energy markets, and the spread of climate-friendly technologies. It is generally suggested in the field that interactions and disequilibrium dynamics offer typical economic models a complementary and fresh perspective on each of these problems. This study also underlines the danger of underestimating systemic risks associated to climate change and the potential economic gains of mitigation and adaptation programs (Sequeira & Reis, 2019).

The Paris Agreement and Afterwards

A low-carbon, resilient, and sustainable future will be achieved through the

actions and investment of 195 nations in the fight against climate change. For the first time, the Paris Agreement unites all nations behind a shared cause based on their past, present, and upcoming obligations.

The 21st meeting of the Parties to the UNFCCC took place at the COP21 in Paris in 2015. It resulted in the Paris Pact, a binding international climate change agreement that intends to keep warming well below 2 degrees Celsius over pre-industrial levels and to push for warming to be kept to 1.5 degrees Celsius.

The 23rd COP in Bonn: The UNFCCC Parties met for the 23rd time during this conference in 2017, which took place. It put a strong emphasis on carrying out the Paris Agreement and advancing important problems like the creation of "climate finance" and the contribution of non-state entities to the reduction of greenhouse gas emissions.

The 24th meeting of the Parties to the Convention was convened during the COP24 in Katowice in 2018. It came up with the "Katowice Climate Package," which provided the tactical instructions for carrying out the Paris Agreement.

The worldwide response to climate change and efforts to find solutions to this urgent environmental problem have been greatly shaped by these international discussions and activities.

COP 26 – United Kingdom's Glasgow Gathering

The UK hosted the 26th UN Conference of the Parties on Climate Change (COP26) in Glasgow from October 31 through November 13, 2021. Parties came together at the COP26 meeting to advance the objectives of the Paris Agreement and the UN Framework Convention on Climate Change. The prologue reiterates the importance of a sustained recovery from Covid-19 and support for vulnerable parties in efforts to combat climate change on a global scale.

Table 4. The Paris Agreement and Afterwards

Year	Event	Explanation
2015	COP 21: Adoption of the historic Paris Agreement	195 countries' initiatives and investments in the battle against climate change will result in a low-carbon, dependable, and sustainable future. The Paris Agreement, which is based on nations' past, present, and future duties, brings all countries together for the first time in support of a common cause.

2016	The Marrakech Partnership for Global Climate Action was established at COP 22.	Advancing the creation of the Paris Agreement's rulebook was a key outcome of the Marrakech climate conference. The meeting successfully introduced the Marrakech Partnership for Climate Action to the world and showed that the Paris Agreement is being implemented.
2017	The Climate Change Secretariat's home venue, the World Conference Center in Bonn, Germany, host the 2017 UN Climate Change Conference from November 6–17.	Additionally, Bonn become the first COP to be presided over by a tiny island developing state; in this case, it will be the Fijian Presidency.

Source: (Sequeira & Reis, 2019)

It emphasizes the significance of the World Leaders Summit, when 120 Heads of State and Government made several key commitments to take national action and work together to combat climate change. The summit set the tone for a successful COP26. It also reaffirmed the importance of multilateralism, human rights, the rights of indigenous peoples, local communities, migrants, children, people with disabilities, and those in vulnerable situations, as well as gender equality, women's empowerment, and intergenerational equity. It also reiterated the continuation of key principles from the Paris Agreement and previous COPs (*UN Climate Change Conference (COP26) at the SEC – Glasgow 2021*, n.d.).

Climate Neutral Now Action and COP27

In any case, The Climate Neutral Now Initiative aims to urges businesses and other interested parties to take immediate action to realize the Paris Agreement's goal of a climate-neutral world by 2050. It serves as a tool to encourage and recognize further voluntary climate action. Even while involvement in the effort can assist stakeholders in moving forward on their route to achieving those certifications through appropriate standards and processes, claims of carbon neutrality, net zero, or similar are outside the purview of Climate Neutral Now (*Climate Neutral Now | UNFCCC*, n.d.).

Besides, in Sharm El-Sheikh, Egypt, the Conference of the Parties (COP 27) to the UNFCCC will hold its 27th meeting. The original schedule for COP 27 was for it to occur from November 8–20, 2021. The date of COP 26 was moved from November 2020 to November 2021 because of the COVID-19 epidemic. COP 27 therefore occurred on November 7–18, 2022 (Hub, n.d.).

Koronivia Joint Work on Agriculture

The Koronivia Joint Work on Agriculture, a component of the COP process that focuses on agriculture, has received little media attention thus far. It is crucial that COP27 places a greater emphasis on the role of agriculture. An important decision made under the United Nations Framework Convention on Climate Change (UNFCCC) recognizes the special potential of agriculture in combating climate change in the Koronivia Joint Work on Agriculture (KJWA). The Koronivia ruling covers six interconnected subjects, including soils, nutrient use, water, livestock, techniques for evaluating adaptation, and the socio-economic and food security implications of climate change throughout the agricultural sectors. The choice is in line with FAO's main mission to end hunger, food insecurity, and malnutrition; lessen rural poverty; and increase the productivity and sustainability of agriculture, forestry, and fisheries.

Almost one-fourth of all human greenhouse gas emissions are caused by agriculture, forestry, and other land use. The economic toll of climatic disasters is also absorbed by agriculture, which rises to 83 percent for drought in underdeveloped nations. We can no longer think about agriculture and food security without addressing climate change, as it is predicted that by 2030, 122 million more people, primarily farmers, will fall into extreme poverty. Agriculture may contribute to the answer to the challenge of climate change, the KJWA acknowledges. No other industry has the same potential to cut greenhouse gas emissions. Taking both immediate and long-term adaptation actions can assist the most vulnerable people become more resilient while maintaining food security.

Under the UNFCCC, the KJWA is the sole program that focuses on food security and agriculture. The KJWA may promote change in agricultural and food systems and address the synergies and trade-offs between adaptation, mitigation, and agricultural productivity by mainstreaming agriculture into UNFCCC procedures. It can offer practical answers to the current environmental and climate concerns we face, such as the COVID-19 epidemic. The Paris Agreement's Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), and Enhanced Transparency Framework (ETF) are all complemented by the KJWA, which advances the Sustainable

Development Goals as a whole (SDGs). The KJWA, which recognizes the special potential of agriculture in combating climate change, was the only workstream within the UNFCCC (United Nations Framework Convention on Climate Change) directly dedicated to food growers and producers from every corner of the world during COP27 in Egypt. The "Joint Work on Implementation of Climate Action on Agriculture and Food Security" was agreed upon by the KJWA.

On the one hand, the COP27 agreement also states that "protecting food security and fighting hunger" is a basic concern and that communities may better defend themselves from climate effects by protecting and conserving water systems. In contrast, neither food nor water were mentioned in the Glasgow Climate Pact from the previous year. Agricultural concerns were on the scene in this regard at COP27. On the other hand, there is no mention of the estimate by the Intergovernmental Panel on Climate Change that between 21% and 37% of world emissions are attributable to food systems. Land-use change and 'carbon farming' have chances to contribute to [climate] mitigation, but they are overlooked.

RESULTS AND DISCUSSION

Extreme weather events, rising energy prices, and an increase in international conflict, such as the war in Ukraine, have all created previously unheard-of challenges to food security around the world in 2022.

A key area of focus become agriculture's adaptation to climate change and food shortages. Achieving the global objective of limiting warming to below 1.5 degrees requires reforming the agriculture and food sectors, which account for one-third of all greenhouse gas emissions. Without increasing food system resilience to expected climate impacts and involving those on the front lines of food production, it is impossible to feed a growing global population and support a just rural transformation. However, regenerative agriculture systems have a huge potential to store carbon, thus promoting them must be a major component of climate strategy.

All in all, enhancing tenure security and social capital as well as addressing specific issues like access to credit, markets, and information will be a component of the portfolio of policies required to make agriculture more sustainable and increase resistance to

climate change. The context will determine how much weight is given to the various components. Some interventions will also demand cooperation and organization from all parties.

Policies and institutions must enable and support the coordinated planning and implementation of activities, whether they be in a sector, such as the entire food chain, or a particular location, such as a watershed or forest. The promotion of social networks, multistakeholder dialogues for better governance of land and water tenure systems, and cross-sectoral coordination to assist landscape restoration are important areas.

It is crucial that COP27 placed a greater emphasis on the role of agriculture. An important decision made under the United Nations Framework Convention on Climate Change (UNFCCC) recognizes the special potential of agriculture in combating climate change in the Koronivia Joint Work on Agriculture (KJWA). The Koronivia ruling covers six interconnected subjects, including soils, nutrient use, water, livestock, techniques for evaluating adaptation, and the socio-economic and food security implications of climate change throughout the agricultural sectors.

In addition to all, the Russian Federation is a significant player in the global markets for agricultural products (such as wheat, barley, and edible oils, with shares in global exports ranging between 5% and 20% in 2020) as well as metals and minerals (such as aluminum, palladium, platinum, fertilizers, and pig iron), in addition to being a significant supplier of fossil fuels to foreign markets. In addition, Ukraine is a significant exporter of agricultural goods and pig iron, accounting for 20% of global export volumes in 2020. It is a significant exporter of wheat, rapeseed, barley, vegetable oil, and maize in addition to being the largest producer of sunflower seeds in the world. Energy and fertilizer prices are rising, exports from the Russian Federation and Ukraine are declining, and this is placing pressure on the markets for agricultural products globally and jeopardizing food security.

The Russian Federation's war against Ukraine also hampers diplomatic ties and global gatherings, like COP27. It is seen that the war discussed during the COP's opening plenary. When the EU, the Umbrella Group, and the Environmental Integrity

Group denounced the war and expressed support for Ukraine, this was already the case during the opening session of the Subsidiary Bodies meeting in Bonn in June 2022. Delegates from various Parties left the plenary when the Russian Federation spoke to defend its invasion of Ukraine. However, there was no impact on the technical negotiations at the Subsidiary Bodies meeting in June 2022, and participants concentrated on the issues in their inputs rather than discussing the conflict.

CONCLUSION

Since mid-2020, agricultural commodity prices have been rising, and the trend has been worse since the war started. The rebound in demand following the COVID-19 epidemic, unfavorable weather, and increased input costs, particularly for energy and fertilizers, were some of the factors that contributed to the increase. Agricultural supply systems are under increasing strain because of the war. As a result of the war's effects on supply and demand for agricultural products as well as the rise in commodity prices, climate and environmental conservation goals for agricultural practices may be compromised.

There will be winners and losers everywhere, with some regions profiting from increased agricultural production brought on by climate change while other regions see declines. Additionally, climate change may have varying effects on various economic groups' welfare (e.g. consumers vs producers).

The purpose of this essay is to skim and synthesize recent articles and gatherings on the economics of climate change from the standpoint of agricultural effects and their adherence to policy recommendations. In doing so, recent writings and publications about the effects of agriculture are reviewed.

In addition to this, both qualitative and quantitative assessments of the effects of climate change on various economic outcomes are a crucial component of public policy, guiding choices on investments in both programs to reduce emissions and those that aid in the adaptation of economies to a changing climate. The fact that many current impact estimates do not consider longer-term adjustments that economic agents might make in response to a changing climate is a common cause for concern. These studies frequently rely on short-run weather fluctuation to calculate how

outcomes respond to variations in temperature and precipitation.

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