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COMPARATIVE ASSESSMENT OF CLIMATE CHANGE IMPACTS ON AGRICULTURE IN KENYA AND ROMANIA

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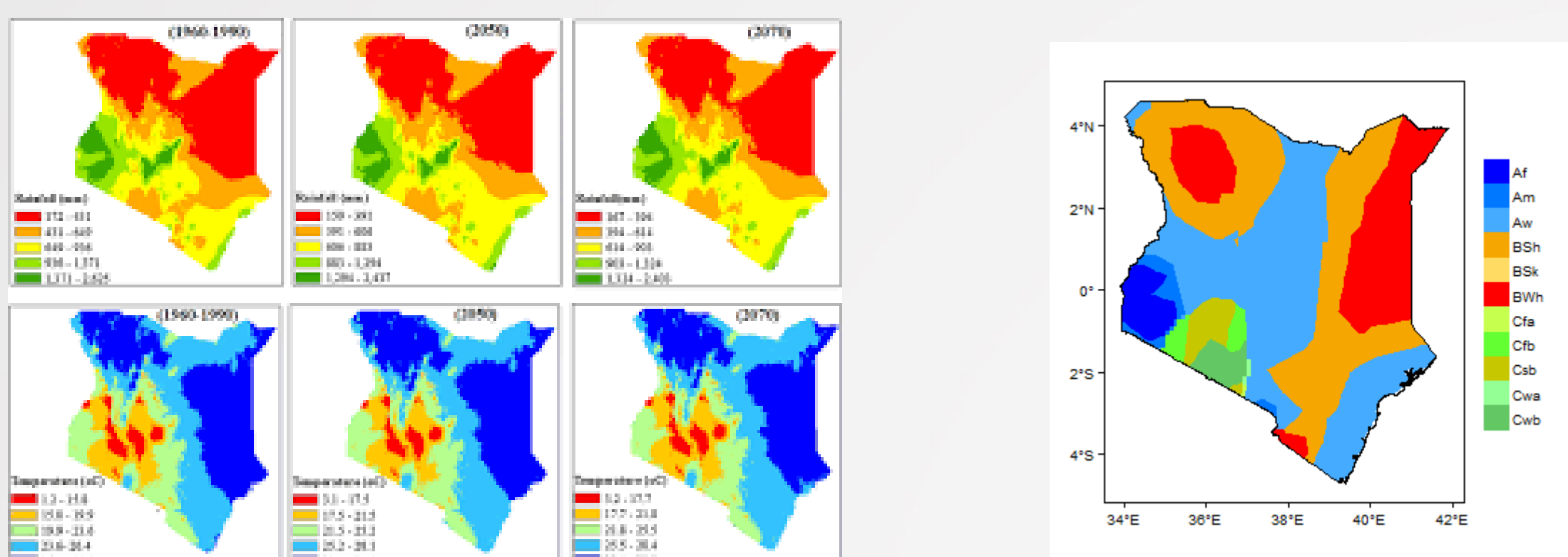
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Abstract:

Abstract: Climate change poses a significant threat to agricultural productivity and food security across the globe, particularly in regions that rely heavily on farming for livelihoods. This study provides a comparative assessment of the impacts of climate change on agriculture in Kenya and Romania—two countries with contrasting climatic, ecological, and socio-economic conditions. The analysis draws upon secondary data from meteorological records, agricultural production statistics, and existing scientific literature to identify major trends, vulnerabilities, and adaptive responses. In Kenya, agriculture is predominantly rainfed and highly sensitive to temperature fluctuations, erratic rainfall, and prolonged droughts, which have led to reduced crop yields and increased food insecurity. Conversely, Romania, located in a temperate zone, faces challenges such as rising temperatures, altered precipitation patterns, and an increased frequency of floods and droughts that disrupt crop cycles and threaten soil fertility. Despite these differences, both countries exhibit common vulnerabilities, including limited access to climate information, insufficient infrastructure, and financial constraints that hinder adaptation efforts. However, each country also presents unique opportunities for resilience building. Kenya's adoption of climate-smart agriculture and indigenous knowledge practices, and Romania's implementation of precision farming and EU-supported adaptation policies, demonstrate promising pathways toward sustainability. The study concludes that sharing knowledge and technological innovations between developing and transitional economies can strengthen adaptive capacities and ensure long-term agricultural resilience in the face of a changing climate.

Keywords: climate change, agriculture, challenges, comparation, climate adaptation



- Results and discussions

The analysis revealed that both Kenya and Romania are increasingly affected by climate change, though the nature and intensity of impacts vary due to their distinct climatic zones, agricultural structures, and economic capacities. Despite these differences, both countries face common challenges such as reduced crop yields, changing rainfall patterns, and growing pressure on natural resources. In Kenya, agriculture is largely rainfed, making it highly sensitive to rainfall variability and prolonged droughts. Over the past two decades, average temperatures have risen by approximately 1.0–1.5°C, leading to increased evapotranspiration and water stress. Recurrent droughts, particularly in arid and semi-arid regions, have caused significant declines in maize, bean, and sorghum yields. Floods during heavy rainy seasons further damage crops and degrade soil fertility. In contrast, Romania has experienced rising temperatures and irregular precipitation, with more frequent droughts in southern and eastern regions. These changes have disrupted traditional crop cycles, especially for wheat, maize, and sunflower, and have led to increased irrigation demand and soil erosion. Despite higher mechanization levels, Romania's agricultural productivity remains vulnerable to climatic extremes. Both countries have initiated adaptation strategies to mitigate these impacts. Kenya promotes climate-smart agriculture (CSA), including drought-tolerant crop varieties, agroforestry, and improved water harvesting. Government and NGO programs have focused on enhancing farmer awareness and resilience through training and early warning systems. Romania, benefiting from European Union (EU) support, emphasizes precision agriculture, irrigation modernization, and sustainable soil management. Policy instruments such as the Common Agricultural Policy (CAP) provide financial incentives for climate adaptation and environmental protection. While Romania benefits from stronger institutional support and funding mechanisms, Kenya demonstrates high levels of local innovation and community-based adaptation. However, both nations face constraints such as limited access to finance, fragmented data systems, and low awareness among small-scale farmers. The comparison highlights that technological innovation, policy integration, and knowledge exchange between developed and developing economies can enhance adaptive capacity and agricultural resilience.



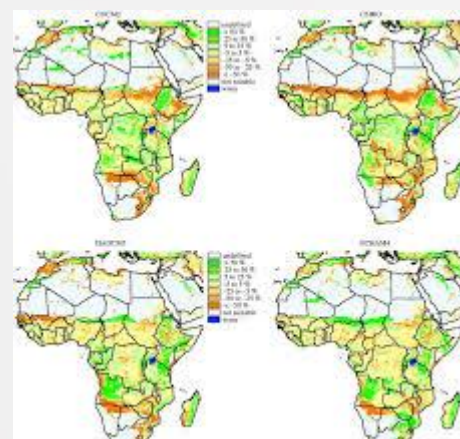
Conclusions

The findings of this study demonstrate that climate change significantly affects agricultural productivity in both Kenya and Romania, albeit in different ways. Kenya faces increasing temperatures, erratic rainfall, and frequent droughts that threaten rainfed farming systems and food security. Romania, while benefiting from a temperate climate and greater mechanization, experiences rising temperatures, altered precipitation patterns, and recurring droughts that disrupt crop cycles and degrade soil quality. Despite their differing contexts, both countries share common vulnerabilities such as limited adaptive capacity among small-scale farmers, inadequate access to climate information, and insufficient financial support for sustainable farming practices. The study concludes that addressing these challenges requires multi-level strategies that combine technology, policy, and community engagement. For Kenya, scaling up climate-smart agriculture, investing in irrigation infrastructure, and expanding access to digital climate information systems are essential to enhance resilience. For Romania, priorities include strengthening irrigation efficiency, promoting sustainable land management, and aligning agricultural policies with long-term climate adaptation goals. Collaboration between the two countries—through knowledge sharing, research exchange, and technology transfer—could foster innovation and mutual learning in climate adaptation. Policymakers should also encourage regional and international partnerships that support sustainable agriculture and environmental conservation. Ultimately, integrating scientific innovation with local experience will be crucial to building climate-resilient agricultural systems in both Kenya and Romania, ensuring food security and sustainable rural development in the face of an increasingly unpredictable climate.



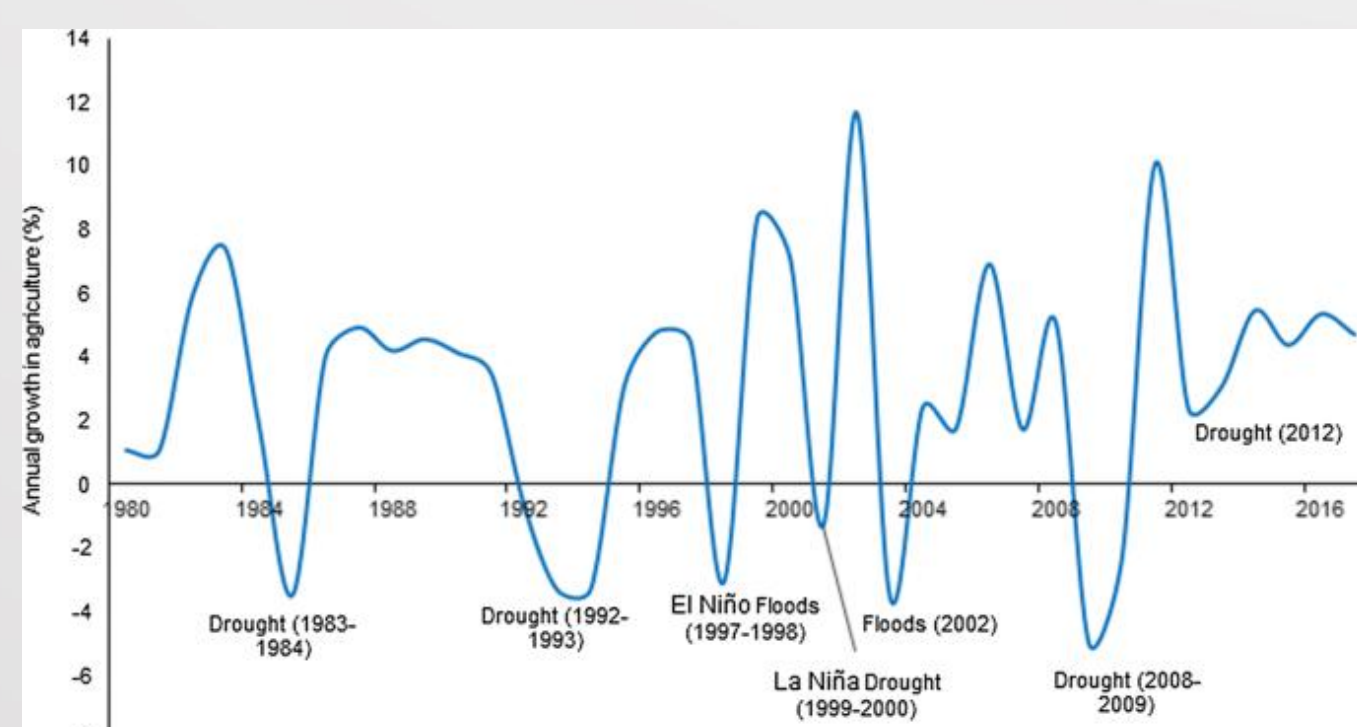
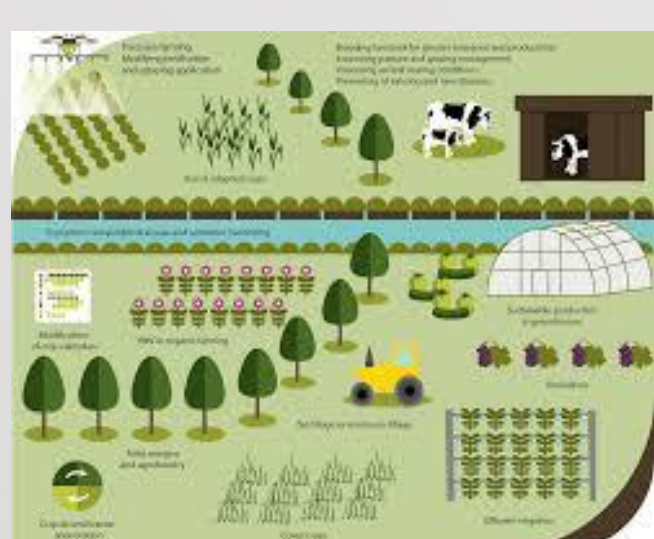
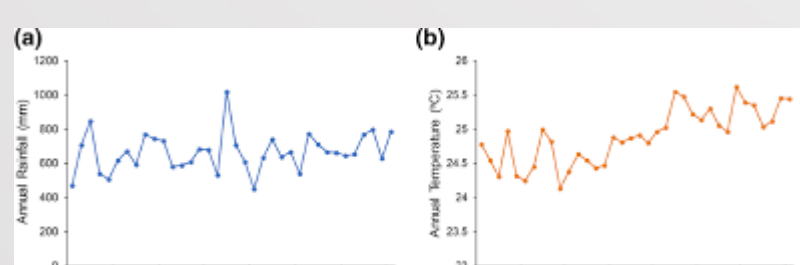
Introduction

Climate change is one of the most pressing global challenges of the 21st century, exerting profound effects on ecosystems, economies, and human livelihoods. Among all sectors, agriculture is particularly vulnerable due to its dependence on climatic variables such as temperature, rainfall, and soil moisture. The increasing frequency of extreme weather events—droughts, floods, and unpredictable rainfall patterns—threatens food production, rural livelihoods, and national economies worldwide. Understanding the differentiated impacts of climate change on agriculture across regions is crucial for developing adaptive strategies that promote sustainable food systems. This research focuses on Kenya and Romania, two countries situated in distinct climatic and socio-economic contexts but both heavily reliant on agriculture. Kenya's agricultural sector is predominantly rainfed, employing over 70% of the rural population and contributing significantly to GDP. The country faces recurrent droughts, erratic rainfall, and rising temperatures that have led to declining crop yields, soil degradation, and food insecurity. In contrast, Romania, located in Eastern Europe's temperate zone, has a more mechanized and diversified agricultural system. However, it also experiences the adverse effects of climate change, including increased drought frequency, irregular precipitation, and extreme weather events that disrupt farming operations and affect soil fertility. By comparing these two contrasting agricultural systems, this paper aims to highlight common vulnerabilities, region-specific impacts, and adaptation strategies. The comparative approach provides valuable insights into how developing and transitional economies can enhance resilience through technology transfer, climate-smart practices, and policy cooperation. Ultimately, understanding these dynamics contributes to building more sustainable, adaptive, and climate-resilient agricultural sectors in both Kenya and Romania.



Material and methods

This research employed a comparative qualitative research design aimed at assessing the impacts of climate change on agriculture in Kenya and Romania. The analysis was based primarily on secondary data sources, including scientific journal articles, government reports, meteorological data, and publications from international organizations such as the Food and Agriculture Organization (FAO), the Intergovernmental Panel on Climate Change (IPCC), and the World Bank. Data were collected through systematic searches in reputable databases such as Scopus, Web of Science, and Google Scholar, focusing on studies published between 2010 and 2025. The search terms included “climate change,” “agriculture,” “Kenya,” “Romania,” “climate impacts,” and “adaptation strategies.” Relevant national reports, including Kenya’s National Climate Change Action Plan and Romania’s Climate Change Strategy, were also reviewed to ensure a comprehensive understanding of both policy and field-level perspectives. The collected data were analyzed using comparative content analysis, focusing on identifying patterns, differences, and similarities in how climate change affects agricultural productivity, crop patterns, and resource availability in each country. Key variables examined included temperature and rainfall trends, frequency of extreme weather events, crop yield variations, and adopted adaptation measures. To ensure objectivity, all findings were cross-validated through triangulation of multiple data sources. The comparative framework provided an integrative understanding of how contrasting geographical, economic, and institutional contexts influence agricultural vulnerability and adaptation capacity in Kenya and Romania.



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