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Climate Change in Algeria: Assessing Risks and Implementing Sustainable Solutions

Maroua Dahbi, P. Florin Prunar
University of Life Sciences “King Mihai I” from Timișoara

Abstract: *Algeria and Romania, despite their geographical differences, face significant challenges due to climate change. Both countries are experiencing rising temperatures, with Algeria facing a more pronounced increase. In Algeria, the temperature rose by 0.5 °C between 1931-1990 and is projected to increase by 2 °C by 2050. This will lead to less frequent but more intense rainfall events, resulting in increased droughts. The impacts of these changes include water scarcity, declining agricultural yields, desertification, planning challenges, and increased energy consumption. In Romania, the projected temperature increases of 1.5 to 2 °C by 2050 will lead to more frequent droughts, especially in the south. These changes will result in declining agricultural yields, particularly for maize, increased flooding, and water management challenges. Both countries need to integrate adaptation strategies into their development policies to mitigate the negative impacts of climate change. While Algeria's contribution to global warming is minimal, its vulnerability is high. Romania, despite a less extreme climate, faces its own set of challenges.*

• Introduction

The issue of climate change is also a significant challenge for Romania, which, like Algeria, is affected by the broader impacts of climate change in the Mediterranean basin. Romania ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 and has been committed to stabilizing greenhouse gas emissions to mitigate climate change.

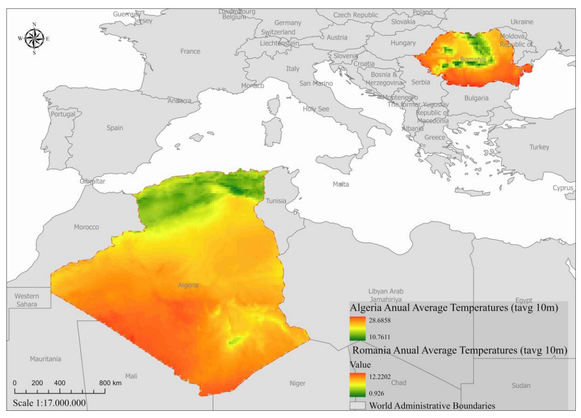
In line with its commitments under the Kyoto Protocol and subsequent agreements, Romania has developed strategies to address climate change, focusing on both mitigation and adaptation. The national strategy includes reducing greenhouse gas emissions, enhancing energy efficiency, promoting renewable energy sources, and protecting vulnerable ecosystems.

Romania's approach is structured around several key sectors: energy, transport, agriculture, water management, and biodiversity conservation. The country has made progress in integrating climate considerations into national policies and sectoral plans, particularly in renewable energy, where it has invested in wind and solar power.

In terms of adaptation, Romania faces challenges such as increased flooding, droughts, and impacts on agriculture and water resources. The government has established various programs and initiatives aimed at enhancing resilience, particularly in rural areas and among vulnerable populations.

Romania has also engaged in international cooperation and knowledge sharing to strengthen its response to climate change, recognizing that collective action is crucial. Efforts include participation in the European Union's climate policies, which aim for significant reductions in emissions and increased sustainability across member states.

Both Algeria and Romania share common goals in addressing climate change while balancing development needs and environmental sustainability. By learning from each other's experiences, they can enhance their strategies for mitigation and adaptation, fostering a more resilient future in the face of climate challenges.



• Material and method

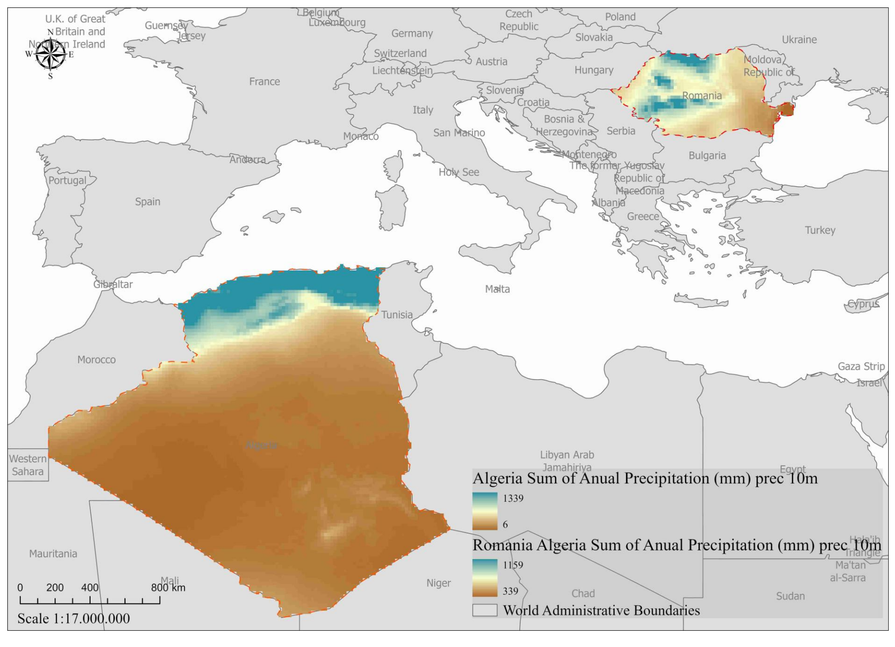
We employed comparative methods and mixed-methods analysis to comprehensively examine climate change impacts, vulnerabilities, and mitigation strategies in Algeria and Romania. The combination of quantitative and qualitative approaches allowed for a detailed exploration of the environmental, socio-economic, and policy dimensions in both countries.

Comprehensive Insights:The mixed-methods approach allowed us to gain a fuller understanding of the complex interplay between climate change, environmental degradation, and socio-economic development. Quantitative data provided statistical evidence on temperature rise, rainfall variation, and greenhouse gas (GHG) emissions, while qualitative data from national policy documents and interviews with experts enriched the contextual understanding of these phenomena.For instance, quantitative climate models and historical data helped measure temperature and precipitation trends, while qualitative data from climate reports and policy reviews provided insights into government responses and strategic plans.

Validation of Results:The combination of both quantitative and qualitative findings improved the validity of our research. By comparing quantitative projections (e.g., temperature rise, water resource decline) with qualitative assessments of vulnerability and policy preparedness (e.g., national climate plans, renewable energy strategies), we were able to cross-validate conclusions.The convergence of findings from both data types (e.g., water scarcity predictions and policy measures for water management) strengthened the reliability of our conclusions regarding the countries' adaptive capacities.

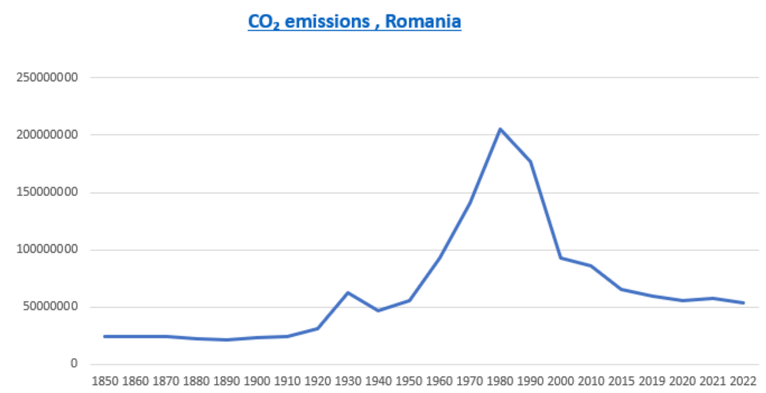
Practical Application:Mixed-methods analysis proved essential for deriving practical, context-specific recommendations. Quantitative analysis of Algeria's renewable energy potential (e.g., solar energy contribution) was supported by qualitative insights from the country’s National Renewable Energy Plan (2011). Similarly, Romania's commitment to the EU's climate targets was examined both through emission reduction trends and an evaluation of national policies.These insights were used to propose adaptation strategies that address key issues like desertification in Algeria and water management challenges in Romania, providing actionable solutions that could guide policy adjustments and improve sustainability efforts

. Comparative Methods:Comparative Analysis: We applied a comparative framework to identify the different vulnerabilities, adaptive capacities, and policy approaches between Algeria and Romania. By contrasting the geographic, climatic, and economic conditions of these two countries, we were able to highlight unique challenges (e.g., desertification in Algeria vs. agricultural impacts in Romania) and explore how each country tailors its climate strategies accordingly.Quantitative Data: Climate projections and statistical trends were analyzed using climate models and historical data sets to quantify the extent of temperature rise, rainfall changes, and greenhouse gas emissions in both countries. These quantitative metrics were essential for comparing the degree of climate vulnerability.Qualitative Data: National climate policies, adaptation strategies, and mitigation plans were reviewed through qualitative content analysis. By analyzing policy documents (e.g., Algeria’s National Climate Plan, Romania’s EU-driven emissions reduction commitments), we explored how each country is preparing for future climate impacts and which strategies are most effective.In summary, the integration of both quantitative and qualitative data through mixed-methods analysis, alongside comparative techniques, provided a robust framework for understanding and addressing the challenges posed by climate change in Algeria and Romania. This approach enabled us to generate comprehensive insights that inform sustainable development policies and practical mitigation strategies.



• Results and discussions

Results and Discussion1. Impact on Water Resources and AgricultureAlgeria: Climate change has intensified water scarcity, reducing agricultural yields, particularly in semi-arid regions. Drought-resistant crops and water-efficient farming practices, such as drip irrigation, are improving resilience.Romania: Southern Romania faces increasing droughts, affecting crops like maize. Precision agriculture and adaptive irrigation techniques are helping mitigate these challenges.2. Renewable Energy PotentialAlgeria: Solar energy projects show great potential, with the 40% solar electricity target by 2030. However, challenges in financing and infrastructure remain.Romania: The country is making progress with wind and solar energy, supported by EU climate policies. Increased investment is needed to meet long-term carbon neutrality goals.3. Policy and Adaptation StrategiesAlgeria: The National Climate Plan emphasizes renewable energy and water management, but stronger measures are needed for desertification control.Romania: EU climate policies provide strong support, though more focus is needed on regional adaptation, especially in rural areas.4. RecommendationsAlgeria: Focus on expanding solar infrastructure and water management, and improve technical training for renewable energy implementation.Romania: Continue aligning with EU goals, enhance agricultural resilience, and expand renewable energy projects.In summary, both Algeria and Romania must strengthen their climate adaptation and mitigation strategies, with Algeria focusing on renewable energy and water management, while Romania should expand renewable energy capacity and agricultural resilience efforts.



• Conclusions:

In conclusion, Algeria and Romania face distinct but significant climate challenges that require tailored adaptation and mitigation strategies. Algeria's vulnerability to water scarcity, desertification, and rising energy demands necessitates a focus on expanding renewable energy, particularly solar power, and improving water resource management. The implementation of the National Climate Plan and renewable energy initiatives will be crucial in addressing the socio-economic impacts of climate change.

Romania, while benefiting from a more temperate climate, faces increasing droughts and shifting rainfall patterns that threaten agriculture. The country’s integration into EU climate policies has provided a framework for emissions reduction and renewable energy development. However, further efforts are needed to ensure regional adaptation, especially in vulnerable rural areas.

Both countries must prioritize investment in sustainable practices and capacity building to meet their climate goals. By continuing to refine their strategies, Algeria and Romania can reduce their climate vulnerability and foster sustainable development for the future.