INOSR Scientific Research 12(2):40-46, 2025.
©INOSR PUBLICATIONS
International Network Organization for Scientific Research
https://doi.org/10.59298/INOSRSR/2025/1224046
ISSN: 2705-1706
INOSRSR12200000

The Impact of Climate Change on Global Water Resources

Kibibi Muthoni L.

Faculty of Science and Technology Kampala International University Uganda

ABSTRACT

Climate change is significantly altering the dynamics of global water resources, influencing both water quantity and quality across different geographical regions. This paper examines the multifaceted impacts of climate change on hydrological cycles, runoff patterns, groundwater levels, and precipitation extremes. It provides an in-depth review of the latest research using advanced climate and hydrologic models to assess current and future scenarios of water stress. Regional disparities in water availability and quality are analyzed, alongside the socio-economic implications for agriculture, industry, and human livelihoods. Furthermore, the study explores adaptation and mitigation strategies including water governance reforms, technological innovations such as desalination and irrigation efficiency, and the development of sustainable policy frameworks. The findings underscore the urgent need for integrated, multi-scalar solutions to preserve water security in the face of an increasingly unstable climate system.

Keywords: Climate change, global water resources, water quality, hydrological cycle, water stress, precipitation patterns, droughts.

INTRODUCTION

Climate change is having a profoundly significant impact on global water resources, and this encroaching reality is affecting not only river flows and groundwater levels but also soil moisture. These alterations in turn pose substantial threats to the availability of freshwater, which is critical for a variety of essential services. While there is a growing body of research focused on understanding the effects of climate change on water resources, many existing assessments often lack the necessary depth and comprehensive analysis, sometimes even utilizing outdated climate and modeling scenarios that do not accurately reflect current conditions. To address these significant gaps in knowledge, this new assessment delves into more complex and nuanced questions. It also incorporates recent advancements in climate modeling techniques, utilizes downscaled climate data, and considers hydrology in much greater detail. These global-scale studies are particularly noteworthy as they cover larger geographical areas, which enables them to better reflect broader climate trends and changes in land use. These comprehensive studies predict severe impacts of climate change on water availability in the coming years, illustrating significant changes in monthly runoff, temperature fluctuations, and precipitation patterns across various regions. Moreover, they assess the cascading effects on evaporation rates, soil moisture levels, and even the occurrence of flooding events. Overall, the findings of this assessment reveal significant and concerning changes in water availability as a direct consequence of climate change, though specifics such as the extent of these changes and their precise locations will ultimately depend on the chosen emissions scenarios and climate models used for the analysis [1, 2].

Understanding Climate Change

Climate change is considered a long-term change in the mean weather patterns. Climate change causes a net increase in global temperature of the Earth's surface, but it also includes increases in economic burdens, sea-level rise, which leads to flooding of low-lying coastal areas, desertification, and changes in the spatiotemporal pattern of precipitation. 'Climate change' refers specifically to a change in climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and in addition to natural climate variability. Climate change is thought to possibly alter forecasting capabilities, hydrologic systems (especially for surface runoff determination), and water resources assessment. Global climate models and regional climatic models were employed in conjunction with distributed hydrologic models to assess the impacts of proposed climate changes on both water quantity and water quality. This study provides a broad summary of the key concepts related to climate change, as well as changes in hydrologic and biogeophysical processes and in forecasting and modeling technologies [3, 4].

Water Resources Overview

Water covers 71% of the Earth's surface and is one of the defining features of the planet. It not only shapes the physical characteristics of the surface, but its many properties also allow life itself to flourish, making Earth unique in this regard compared to other planets. Climate change, linked to human activity since before the Industrial Revolution, now threatens the continued resilience of the Earth and associated ecosystems. Water resources, in particular, are threatened by systemic changes in the global water cycle as a consequence of climate change. Highlighting the importance of this discourse, the United Nations has assigned the theme of World Water Day 2018 as 'Nature for Water', with a focus on nature-based solutions for the sustainable management of water resources in the face of global change. Water is central to development, and many aspects of socio-economic activity have a robust dependence on care of this critical natural resource. However, demand for water is projected to continue to rise to support an increasing global population. This population demand will place increasing pressures on water availability, potentially threatening continued socio-economic development on global scales through reduced economic activity, impacts on supply chains, migration, and changes in the importance of key industries such as agriculture, forestry, and energy. Changes in the variability and extremes of water availability and use will amplify the challenges posed by these pressures on water resources, and while all regions of the world will be impacted by climate change induced water stress, it is regions with robust water policies which may see opportunities to capitalize on predicted changes [5, 6].

Effects of Climate Change on Water Availability

The results suggest a general broadening of the wet and dry regions. In a substantial part of the wet regions (the high latitudes and the monsoonal regions), water availability is projected to increase. In a considerable part of the continental interiors, droughts are projected to occur more severely and more often, and may cause water withdrawal in excess of the stream flow. The increase in rainfall and evapotranspiration is projected to significantly enlarge the flood area in central North America, north of South America, Australia, and Asia, including the north of India, while the south of India, southern Africa, and southern parts of South America may undergo severe drought. A less severe precipitation increase in excess of evapotranspiration is closer to the edge of the flood in Western Europe, northeastern Asia, and northern regions of Africa, which demonstrates a tendency for regional climate change to persist. It can be anticipated that unregulated flow alteration due to the development of irrigation systems may cause the observed climate to amplify intensities and the occurrence of droughts and floods. These projections, however, do not reflect another aspect of climate change in permafrost thawing. Projected changes in water availability include a substantial region in which an increase in rainfall exceeds an increase in evapotranspiration, resulting in an increase in water runoff. Additional water in excess of the local demand can help supply enough water for irrigated agriculture and mitigate problems of future water shortages. On the other hand, water resources modelling suggests a greater risk of environmental degradation in polar and monsoonal regions, which is projected to be apparent in decreased freshwater distribution, groundwater depletion, harm from flooding, and increased salinity due to the rising sea levels. For almost all areas, especially developing countries, damage in some facet caused by increasing water resources is projected [7, 8].

Impact on Water Quality

Climate change affects water quality in two main areas: impacts on water quality indicators and changes in TDS loading and pollutant discharges in conjunction with climate change driving factors. Changes in precipitation and temperature will affect water quality in the future under changing land use. This paper uses the simulations of hydrology and water quality based on the set of WGMS scenarios of precipitation and temperature changes in Typical Years of the 2030s and 2050s year couples to investigate the impact of climate change on water quality in the Yangtze River Basin. The major findings are as follows: (1) the water quality indicators will experience a significant change; (2) the climate change-driven water quality changes in most sub-basins have both positive and negative impacts; and (3) the joint effects of multiple factors will affect TDS loading and pollutant discharge changes. Climate change affects almost all chemical elements (including TDS, TN, TP, NH4+-N, NO3--N, and PO43--P) discharges, while only small changes in pollution loads are projected. Meanwhile, only part of the chemical elements with loading change will also experience a direction change in the Olympic River system. The effect of pockets on precipitation change and land use change will dominate in some sub-basins, independently from precipitation, temperature change, and land use changes. Based on strong coupling with land use, the impact of temperature change should be regarded as a promising hope for improving water quality control. It is found that climate change can significantly affect water quality in the Yangtze River Basin, although the regulatory control remains low. It is also found that the whole basin human activities change will dominate the increase of TDS loading and sediment discharge in the Yangtze River Basin [9, 10].

Regional Case Studies

Climate change is expected to alter the hydrological cycle, resulting in large-scale impacts on water availability. However, future climate change impact assessments are highly uncertain. For the first time, multiple global climate and hydrological models were used to systematically assess the hydrological response to climate change and project the future state of global water resources. This multi-model ensemble allows us to investigate how the hydrology models contribute to the uncertainty in projected hydrological changes compared to the climate models. Due to their systematic biases, outputs cannot be used directly in hydrological impact studies, so a statistical bias correction has been applied. Uncertainty in the projected changes of the climate is shown to dominate. However, the different hydrology models project large-scale, similar and robust changes in Annual River and soil moisture availability, propagating the influence of global warming into the hydrological cycle. It is found that the land and water management and infrastructural measures, like large dam building, mute the impacts of climate change on regional hydrology. There is increasing evidence that the global climate is changing and that this will have implications for the future of water resources. Changes in water availability and hydrological extremes will impact at regional and global scales on economic activity, supply chains, key industries, and migration. While all regions will be impacted by climate-induced water stress, regions with robust water policies and water management strategies may see opportunities. Here, we discuss the projected impacts of climate change on water resources and the challenges and opportunities this poses for economic activities, including readiness to adapt to changes in water availability. Water is the most critical natural resource available to humanity. However, water resources are currently threatened by systemic global changes as a consequence of climate change, population growth, and urbanisation. Water availability and water quality are increasingly under threat, leading to water-related disasters, including floods and droughts. This poses challenges, risks, and opportunities across regions and sectors [11, 12].

Socioeconomic Implications

Climate change is expected to affect water supply, demand, and the resulting water stress in many countries. Future river runoff is a function of climate change and water withdrawal policies. Changes in climate are anticipated to affect river runoff, representing the main source of water supply. Water demand reduction can be achieved by efficient irrigation systems, substantial increase in price, and rainwater harvesting policies. The choice of water withdrawal scenarios is crucial in analyzing the resulting changes in water stress. There is a need for a simple climate adaptation assessment framework for assessing both water supply and demand changes jointly. Such a framework can be readily applied to other changes in water supply and demand and their management policies. Socio-economic scenarios. Indicators of impact cover water resources, flooding, agriculture, natural environment, and built environment sectors. Impacts are assessed under four SRES socio-economic and emissions scenarios. There is considerable uncertainty in projected regional impacts across the climate model scenarios. An example narrative assessment is presented in the paper. 3 million extra people would be flooded in coastal floods each year. Crop productivity would fall in most regions, and residential energy demands would be reduced in most regions because reduced heating demands would offset higher cooling demands. Most global impacts on water stress and flooding would be in Asia, but proportional impacts in the Middle East and North Africa region would be larger. Two key conclusions can be drawn from these assessments. First, the distribution of impacts across space and between regions is as relevant as the global aggregate impact when assessing the global-scale impacts of climate change. However, there have still been few consistent studies of the impact of climate change across sectors and the global domain [13, 14].

Adaptation Strategies

Future scenarios of climate change and water availability, including drought and flooding, indicate both potential congestion in water demand and new rules about how to allocate water among current uses. By design in some states and by circumstance as a product of climate change and water mega-droughts in others, ocean-side states plumbing in from ocean desalination, are seeking to expand and preserve existing supplies. Other states have adopted basin-wide futures planning processes to engage in formal negotiations to agree on rules for future water allocations and transfers that would govern existing uses and create an explicit market for new uses. Common law doctrines more than a century old in many states that govern disputes between surface water users and limit the right to augment supplies or monetize water during shortages would be barred from consideration. In other areas, in the arid West in states such as New Mexico, repeated mega-droughts have generated more litigation, new laws, and a new, unanticipated problem regulating and adjudicating ground water depletions caused by the cessation of repeated transfers from newly deserts lands. Last, both states and localities are using new climate-ready water supply planning tools and originally state-derived "other state" supply share allocation regimes to refine their economic and environmental supply share targets, calculate the incremental investments needed to aggregate that share, and bid for rights to construct and own new "other state" supplies. All these states are responding to an existential threat to their economies, cityscapes, and natural environments, which the authors used to refer to as mega-droughts but have now renamed climate change. The authors argue that climate change adaptation is all about water. It is the most affected resource in ways fundamental to the viability of everything else: the economy, the ecology, human settlement, and the very habitability of the earth. However, in broad swathes of the country, institutions and processes capable of vitally affecting adaptation remain unaddressed [15, 16].

Mitigation Efforts

Some people are denying climate change altogether. Others, from politics to finance, or even climate scientists and climatologists, are debating the details of a more nuanced story regarding the timing and nature of effects and the relative merits of different mitigation strategies, in a bid to put together a coherent and robust position. At the broadest level, however, there seems to be a consensus on three general points: climate change is happening, is human-induced, and has a great potential for very serious negative consequences. As a result, widespread calls have been made for a large-scale, concerted effort, across the globe, to transition energy systems to more environmentally friendly, low-carbon forms. Mitigation efforts began in earnest in the mid-1990s with the establishment of an international forum for cooperation. Since then, there have been comprehensive reports on almost all of the aspects of climate science and science policy on which it touches. The most widely recognized outcome of the effort has been the Framework Convention on Climate Change and its daughter efforts. However, in addition to these high-profile efforts, there has also been a proliferation of analysis, modeling, and decision frameworks aimed at providing scientific input into the above climate negotiations and coordinating mitigation efforts. The mitigation scenario often used assumes no mitigation and indeed very rapid and continued growth of greenhouse gas emissions. It is "better" than most of the other scenarios at reproducing the 20th-century emissions data, with the exception of the early acceleration of CO_2 emissions, which occurred very soon after the Second World War. In terms of 21st-century scenarios, it gives a much stronger warming signal than any other, being regarded as a worst-case scenario. This is reiterated by assessment reports, which argue for the need for mitigation efforts to move towards a pathway consistent with a 2°C warming [17, 18].

Technological Innovations

Recent innovations in technical systems have some potential to improve the efficiency with which freshwater resources are used, and help in conserving existing freshwater resources. This has important implications for new and ongoing water-resource risk, often connected with climate change, that are increasing with rising temperatures. New investments in water-saving technologies, infrastructure, and maintenance can also have direct economic benefits for consumers and governments. However, these innovations are largely limited in their impacts and benefits to water situations where already significant freshwater stress has occurred, and there are also potential economic and environmental risks associated with widespread use of some of these technologies. As freshwater demand is increasing faster than other resources, large-scale technical systems to transport freshwater to supply municipalities or irrigated agricultural areas are becoming more important. Large-scale water-supply systems built in coastal areas and mountain ranges can improve the security of supply to some municipalities and agricultural areas. As droughts become more frequent and severe with climate change, major investments in ocean water desalination are also increasingly common in coastal areas, and could be effective in supplying indigenous, non-displacing sources of water in these areas. Climate change and population growth have increased near-coastal agricultural land expansion, and these broader agricultural systems, which span urban hubs, have undergone increasing internal and external human pressures. While these systems can theoretically supply large amounts of fresh water to consumers, they are likely only a practical solution to freshwater scarcity in areas not already under significant, persistent stress. The successful function of either freshwater-delivery system requires powerful and relatively inexpensive energy systems, and is very capital- and energy-demanding, which can create negative feedbacks and increased costs for water supply during climate change. They can also lead to other economic consequences as industrialized agriculture urbanizes vicinal landscapes in search of input and output markets [19, 20].

Public Awareness and Education

Hundreds of millions are facing freshwater access challenges due to climate change. Growing demand from agriculture, energy, and urbanization exacerbates the crisis, threatening food security, health, and economic development. A report examines the impacts of climate change on global water resources, implications for health, the economy, and ecosystems, and calls for a water-wise response. It provides fresh data for COP28 discussions. Climate change primarily affects freshwater abundance, quality, and reliability. Increased flooding and drought linked to intense rainfall and evaporation threaten water supply infrastructure, heightening pollution and deteriorating water quality. Declining groundwater recharge in arid regions harms food and water supply, worsening health outcomes. Vulnerable populations, particularly women and girls, will face increased barriers to safe drinking water and sanitation, intensifying agriculture-related water scarcity. Water Primacy acknowledges that climate change consequences will be felt primarily through the water cycle, affecting freshwater quantity and quality. It calls for prioritizing freshwater in climate change adaptation and mitigation strategies. Physical climate risks such as sea-level rise and extreme weather events compound existing vulnerabilities, like poverty and pollution. As climate impacts escalate, water scarcity and flood risks will disproportionately affect already stressed areas. Addressing water-related challenges requires a paradigm shift in awareness, action, investment, and governance. Inaction will worsen climate impacts on human systems. Failure to prioritize freshwater now could lead to a multi-scale water crisis, jeopardizing the achievement of Sustainable Development Goals (SDGs) [21-24].

Future Projections

The assessment of the vulnerability of river basins from climate change and changing water use is conducted to identify critical basins worldwide that may be vulnerable to changes in water availability. The full extent of freshwater resources worldwide is analyzed, taking into account uncertainty in future climate and greenhouse gas emissions scenarios and modeling approaches. Consequently, river basins are identified for which a high risk of vulnerability exists in some future scenario or where there may be significant scope to reduce it. It is shown that some of the world's major river basins are vulnerable to changes in water availability as a result of climate and societal change in the next 50 years. By the year 2050, many basins show substantial decreases in the average annual water availability and the proportion of rainfall that is stored as river runoff. Areas of increased conversion of previously unutilized resources into withdrawals are expected in high, middle, and low annual water availability basins alike. There is the potential for both increased risk of vulnerability in many river basins worldwide and the option of reducing vulnerability in some basins. Climate and societal changes will likely alter perceptions of the resource modestly in absolute terms and dramatically in terms of monsoon seasonality, timing, and intensity. Current populations in vulnerable basins are both large and growing. A significant proportion of the population and arable land is located in areas likely to experience increased risk of vulnerability. For all of these reasons, it is crucial, whether studying a river basin, aquifer, or sub-national region, but essential for all freshwaters that clients not only consider prediction skills but also the robustness of the results produced and the inherent uncertainties involved. By combining these two modeling approaches, users are empowered to explore potential future trajectories for freshwater availability under changing climate and land use and to assess the degree of certainty and confidence in those trajectories [25-28].

CONCLUSION

Climate change is reshaping the availability, distribution, and quality of global water resources, with far-reaching consequences for ecological systems, economic stability, and human well-being. From altered precipitation and evaporation patterns to increased instances of drought and flooding, the cascading effects of climate change demand urgent attention. This study highlights the broad spectrum of challenges, from physical impacts on freshwater systems to socio-economic disruptions and geopolitical concerns. Despite growing risks, there are pathways forward. Through adaptive water management, technological advancements, robust policy interventions, and international cooperation, communities can build resilience against water-related climate threats. Ultimately, addressing the climate-water nexus is not just an environmental imperative but a foundational element of global sustainability, equity, and peace.

REFERENCES

1. Malik MS, Shukla JP, Mishra S. Effect of groundwater level on soil moisture, soil temperature and surface temperature. Journal of the Indian Society of Remote Sensing. 2021 Sep;49:2143-61. researchgate.net
2. Soulsby C, Scheliga B, Neill A, Comte JC, Tetzlaff D. A longer-term perspective on soil moisture, groundwater and stream flow response to the 2018 drought in an experimental catchment in the Scottish Highlands. Hydrological Processes. 2021 Jun;35(6):e14206. wiley.com

3. Kumar V, Ranjan D, Verma K. Global climate change: the loop between cause and impact. InGlobal climate change 2021 Jan 1 (pp. 187-211). Elsevier.
4. Kabir M, Habiba UE, Khan W, Shah A, Rahim S, De los Rios-Escalante PR, Farooqi ZU, Ali L, Shafiq M. Climate change due to increasing concentration of carbon dioxide and its impacts on environment in 21st century; a mini review. Journal of King Saud University-Science. 2023 Jul 1;35(5):102693. sciencedirect.com
5. Ugwu Chinyere Nneoma, Ogenyi Fabian C., Val Hyginus Udoka Eze and Ugwu Okechukwu Paul-Chima. Hydrogen Fuel Cells: A Pathway to Clean Energy. Research Output Journal of Engineering and Scientific Research 2025 4(2): 37-43. https://doi.org/10.59298/ROJESR/2025/4.2.3743
6. Karimidastenaei Z, Avellán T, Sadegh M, Kløve B, Haghighi AT. Unconventional water resources: Global opportunities and challenges. Science of the Total Environment. 2022 Jun 25;827:154429. sciencedirect.com
7. Jain SK, Singh VP. Water resources systems planning and management. Elsevier; 2000.
8. te Wierik SA, Cammeraat EL, Gupta J, Artzy-Randrup YA. Reviewing the impact of land use and land-use change on moisture recycling and precipitation patterns. Water Resources Research. 2021 Jul;57(7):e2020WR029234. wiley.com
9. Rogers CD, Ting M, Li C, Kornhuber K, Coffel ED, Horton RM, Raymond C, Singh D. Recent increases in exposure to extreme humid-heat events disproportionately affect populated regions. Geophysical Research Letters. 2021 Oct 16;48(19):e2021GL094183. wiley.com
10. Wu J, Zeng S, Yang L, Ren Y, Xia J. Spatiotemporal characteristics of the water quality and its multiscale relationship with land use in the Yangtze River Basin. Remote Sensing. 2021 Aug 20;13(16):3309.
11. Yang X, Meng F, Fu P, Zhang Y, Liu Y. Spatiotemporal change and driving factors of the Eco-Environment quality in the Yangtze River Basin from 2001 to 2019. Ecological Indicators. 2021 Nov 1;131:108214.
12. Ugwu Chinyere Nneoma, Ogenyi Fabian, Val Hyginus Udoka Eze and Ugwu Okechukwu Paul-Chima. Biodegradable Plastics: Innovations and Market Potential. Research Output Journal of Engineering and Scientific Research 2025 4(2): 1-6. https://doi.org/10.59298/ROJESR/2025/4.2.1600
13. Wang X, Liu L. The impacts of climate change on the hydrological cycle and water resource management. Water. 2023 Jun 24;15(13):2342.
14. Yang D, Yang Y, Xia J. Hydrological cycle and water resources in a changing world: A review. Geography and Sustainability. 2021 Jun 1;2(2):115-22.
15. Liu X, Liu W, Tang Q, Liu B, Wada Y, Yang H. Global agricultural water scarcity assessment incorporating blue and green water availability under future climate change. Earth's Future. 2022 Apr;10(4):e2021EF002567.
16. Salehi M. Global water shortage and potable water safety; Today's concern and tomorrow's crisis. Environment International. 2022 Jan 1;158:106936.
17. Castro B, Sen R. Everyday adaptation: theorizing climate change adaptation in daily life. Global Environmental Change. 2022 Jul 1;75:102555.
18. Biswas JK, Sarkar SK. Aquatic life at risk under global warming and climate change regime. InLife Below Water 2022 Aug 4 (pp. 1-13). Cham: Springer International Publishing.
19. Gilder E, Pal DK. Climate change–Probable Socio-Economic Systems (SES) implications and impacts in the Anthropocene epoch. InInternational Conference Knowledge-Based Organization 2015 (Vol. 21, No. 2, pp. 308-317).
20. Ugwu Chinyere Nneoma, Ogenyi Fabian C., Val Hyginus Udoka Eze, Ugwu Okechukwu Paul-Chima. Renewable Energy Solutions: Harnessing Algal Biofuels. Research Output Journal of Engineering and Scientific Research 2025 4(2): 79-86. https://doi.org/10.59298/ROJESR/2025/4.2.7986
21. Valavanidis A. Extreme weather events exacerbated by the global impact of climate change. Available online: Chem-toxecotox. org/ScientificReviews (accessed on 28 May 2023). 2022.
22. Mishra RK. Fresh water availability and its global challenge. British Journal of Multidisciplinary and Advanced Studies. 2023 May 29;4(3):1-78. bjmas.org
23. Gleick PH, Cooley H. Freshwater scarcity. Annual Review of Environment and Resources. 2021 Oct 18;46(1):319-48. annualreviews.org
24. Geoffroy M, Bouchard C, Flores H, Robert D, Gjøsæter H, Hoover C, Hop H, Hussey NE, Nahrgang J, Steiner N, Bender M. The circumpolar impacts of climate change and anthropogenic

stressors on Arctic cod (Boreogadus saida) and its ecosystem. Elem Sci Anth. 2023 Aug 8;11(1):00097. ucpress.edu
25. Sauz-Sánchez JD, Rodiles-Hernández R, Andrade-Velázquez M, Mendoza-Carranza M. Modelling the potential distribution of two tropical freshwater fish species under climate change scenarios. Aquatic Conservation: Marine and Freshwater Ecosystems. 2021 Oct;31(10):2737-51. [HTML]
26. Ugwu Chinyere Nneoma, Ogenyi Fabian C., Val Hyginus Udoka Eze, and Ugwu Okechukwu Paul-Chima. Climate Resilience: Engineering Solutions for Coastal Communities. Research Output Journal of Engineering and Scientific Research 2025 4(2): 16-22. https://doi.org/10.59298/ROJESR/2025/4.2.1622
27. Zhao Y, Ma J, Li Y, Cheng K, Zhang M, Liu Z, Yang F. Carbon emission based predictions of anthropogenic impacts on groundwater storage at typical basins in 2050. Research. 2025 Jun 2;8:0680.
28. Zhang Y, Zheng H, Zhang X, Leung LR, Liu C, Zheng C, Guo Y, Chiew FH, Post D, Kong D, Beck HE. Future global streamflow declines are probably more severe than previously estimated. Nature Water. 2023 Mar;1(3):261-71. google.com

CITE AS: Kibibi Muthoni L. (2025). The Impact of Climate Change on Global Water Resources. INOSR Scientific Research 12(2):40-46. https://doi.org/10.59298/INOSRSR/2025/1224046