

American International University-Bangladesh (AIUB)

**Department of Computer Science**

**Faculty of Science & Technology (FST)**

**Research Methodology**

**Assignment**

Submitted By

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| --- | --- | --- | --- | --- |
| **Semester: Summer\_22\_23 FINAL TERM** | | | **Section: A** | **Group No:03** |
| SN | Student Name | Student ID | Individual  Contribution (in %) | Total Marks: 45 |
| Earned Marks: |
| 21 | TANJIL HASAN | 20-43633-2 | 25% |  |
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**The assignment will be Evaluated for the following Course Outcomes**

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| CO1: Determine and Demonstrate Ethical Constraints and Considerations in conducting Research. | Total Marks (15) | |
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| **Plagiarism:** Report should be totally plagiarism free (e.g., *Word-for-word copying, Unacknowledged multiple authors or collaboration, The use of a particularly unique term or concept without acknowledging the original author or source*) | [5 Marks] |  |
| **False Data:** Research data should not be fabricated or altered intentionally to fit into the predetermined research findings. | [5 Marks] |  |
| **Citation and referencing:** Material should be properly cited and referenced if it is taken from other sources. And should not be attributed to a source from which it has not been obtained *(i.e., false citation)* | [5 Marks] |  |

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| CO2: Formulate and Compose a Research proposal considering complex research activities, background studies, and following standard guidelines. | Total Marks (15) | |
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| **Problem Analysis and Literature Review:** Background information of the research area and definition of the key research terms. Existence research within the problem area (other’s work). The comprehensiveness, correctness, and discussion of the related works in relation to the topic and as a background motivation for the study. | [5 Marks] |  |
| **Research Objective and Contribution:** Research aim relation with the problem area within existence research. Formulation of Motivation and Research Question. Impact on the society and make a difference | [5 Marks] |  |
| **Formatting and Submission:** Research article should be following the appropriate Structure, Style, Font size, Alignment, Grammar, Spelling, etc. | [5 Marks] |  |

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| CO3: Design and compose a Research article after conducting mock research on a given topic by leveraging a research method. | Total Marks (15) | |
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| **Abstract and Keywords:** The relevance, completeness, and conciseness of the abstract and keywords in relation to the research topic. | [5 Marks] |  |
| **Research Method:** Discussion on the research method, its appropriateness and detail on data collection, analysis, and synthesis. | [5 Marks] |  |
| **Result Analysis & Conclusion:** Discussion the research finding and argument on the novelty of the results, Limitation, and future studies. | [5 Marks] |  |

**Impacts Of Global Warming**

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***Abstract***

This research explores the variety of ways that global warming affects the environment, ecosystems, and human lives. Increased greenhouse gas emissions cause rising temperatures, which cause ice to melt, sea levels to rise, and more extreme weather events to occur. Interruption of ecosystems puts plant and animal species in risk, and the effects of global warming have an influence on agriculture, food security, and healthcare. Understanding the impacts of global warming and finding solutions to its problems depends heavily on climate models and proxy data. Long-term changes can be predicted with the help of climate models, which can help with projections of temperature changes, precipitation patterns, and sea level rise. Climate change context is provided through proxy data, such as historical records from tree rings and ice cores. The research identifies knowledge gaps and highlights the significance of awareness, action, and research collaboration to mitigate the effects of global warming through a systematic literature evaluation.

**Keywords:** Climate changing, Global warming, Biodiversity, Eco-system, Earth's climate system

INTRODUCTION

**Problem Background**

The problem behind this research is understanding how global warming affects our planet. People are putting more greenhouse gases into the air, which makes the Earth's temperature go up. This causes problems like melting ice, rising sea levels, and extreme weather (Allen et al., 2018). Scientists use different methods, like climate models and satellite data, to figure out how bad these changes are and how they might get worse in the future. It helps to make smart choices and decisions on how to take care of the environment (Hansen et al., 2010).

The Earth is getting hotter, causing ice at the poles and glaciers to melt quickly. This is raising sea levels, which can flood coastal and low-lying areas. Also, global warming is making powerful hurricanes, heatwaves, and wildfires occur more frequently. These extreme weather events are causing a lot of harm, damaging things, and hurting people.

Global warming affects ecosystems a lot. When temperatures go up, many plants and animals can't adjust, causing problems in nature's balance and losing different species (Bellard et al., 2017). Coral reefs in the oceans are in danger too. Warmer water hurts them, leading to coral bleaching and damaging reefs (Hughes et al., 2018). These changes affect many creatures, and the good things ecosystems do for us. It's hard for ecosystems to stay strong because of these problems.

The problems of global warming also hurt our lives and money. Changes in weather and farming because of climate change might make it hard to get enough food, especially in places that are at risk (Wheeler and Von Braun, 2013). Also, heatwaves and extreme weather make it tough for healthcare.

**Related Studies**

The complex effects of global warming have been widely investigated in a number of scientific research. The frequency and severity of extreme events like storms, droughts, and heatwaves are rising due to global warming-related changes in weather patterns (Bell et al., 2018). One significant study by (Allen et al., 2019) looked into the impact of climate change on marine ecosystems. The Greenland and Antarctic ice sheets are shedding ice at an alarming rate, according to a thorough study by (Kumar et al., 2020) which is causing sea levels to rise everywhere. The impact of global warming on temperature and precipitation patterns has a big impact on agricultural and food production. A study by (Sultan et al., 2019) research examined how global warming is influencing agriculture and found that crop yields are already being impacted, along with risks to global food security and the lives of millions of farmers. According to (Patil et al., 2021) investigation on the effects of climate change on biodiversity, rising temperatures are hastening the extinction of species and upsetting the delicate balance of ecosystems. We get some related research on the effects of global warming that could give a thorough review of this topic but there still have some potential gaps and lacking where further research could be conducted. There may be a gap in the literature evaluations that climate models and proxy data can help us to understand global warming effects. Addressing these gaps in literature evaluations on the effects of global warming will help us gain a more detailed and complete understanding of the problem and find solution of this problem.

**Research Objectives**

Think of climate models as futuristic weather predictions. While weather models predict short-term conditions in specific places, climate models look at big changes over decades. These models are like computer simulations of Earth's systems, including the atmosphere and oceans. It also uses math and lots of data to know how energy and water moves around in the climate. Scientists use these types of models to learn about Earth's Eco-system. It has the ability to test the environment and figure out if unusual events are happening because of changing climate or it just considered as a normal variation. For instance, Scientists use climate models to estimate how many tropical storms might happen in a hurricane season and where it might hit land (Columbia climate school, 2018). Global climate change isn't something that will only happen later – it's happening now. Because of more heat-trapping gases from humans, the environment is changing a lot: ice is melting, rivers and lakes are thawing sooner, where plants and animals live is moving, and plants are growing earlier. Besides, ice melting in the sea, sea levels rising faster, and hotter and longer heat waves are seen frequently (The Effects of Climate Change,2023).

*How do climate models and proxy data help us to understand global warming's effects and figure out the challenges of human-caused climate change?*

Nature has vital parts like temperature, rainfall, wind, and more. If one part is harmed, like by gases such as N2O, CO2, and CFG, it leads to global warming. This warms Earth and brings problems like droughts and heat waves. Nature's balance is disturbed, affecting plants and animals. Farmers struggle to grow crops like rice and vegetables due to global warming. This hurts food quality and causes illnesses. This was found by (Adams,1989) and (Mendelsohn et al., 1993).

**Research Contributions**

Research is done on the basic concern of global warming. Here focus is to aware people of the negative impacts of global warming. If a nation or society is careless about the side effects of global warming, people who work for the betterment of nature are considered the excepted audience of this research. The role has been played to raise awareness among the public about the detrimental effects of global warming. Reducing water waste, investing in energy-efficient applications, and establishing renewable energy resources are considered the proposed solution. By using these proposed solutions Students, NGOs, the Government, and many organizations working and researching about the negative impacts of global warming can conduct research and give more proposed solutions for future use.

methodology

Systematic Literature Review (SLR) helps to evaluate a strong connection with evidence on the existing research. It gives better and more precise information compared to a regular literature review (Debajyoti Pati, 2018). Climate health research focuses on how air quality and heat influence people's well-being, often examining diseases and mortality. It also explores how extreme weather affects health. Yet, mental health, nutrition, and mother-child health need more attention. Studies mainly come from wealthy countries and China, vulnerable nations like African nations are less studied in this purposed. This highlights how systematic reviews spot these gaps and help to direct the research better (The Lancet Planetary Health,2021) on the basis of title, abstract and research contain Google scholar (Search engine) and IEEE, ACM (database) have been searched. The keywords have been uses for searching were the effects of global climate OR Potential Impacts of Global Warming AND Water resources implications OR Genetic diversity AND The economics of hurricanes effected area. The search aims to find pertinent literature on the desired topic, prioritizing studies with structured reviews, past research, and deep insights. The aim is to fully grasp the subject by studying scholarly works and structured reviews. This thorough exploration of relevant literature from 2000 to 2022 offers a clearer and more refined perspective. This selection aids in focused analysis, efficient resource utilization, accurate forecasting, and informed decision-making. In the searching process, Forward Search discovers recent studies after selecting the main paper keeping updated information. Backward Search and Author's Citation Index explore references in the main paper: Backward Search finds older related studies, and the Author's Citation Index reveals influences and connections from the main paper. The initially selected literature's was 50. But following inclusion and exclusion criteria Relevance to Research Question, Research Design, Language, Irrelevant Topic, Duplicate Studies, and Geographical Scope 6 papers are finally selected. Out of the 50 papers the 43 papers that were excluded, 13 were off-topic, 5 had issues with research design, 7 were excluded due to language barriers, and 18 were duplicates or outside the study's geographical scope. A systematic review investigated how climate models and data help grasp global warming effects and assess human-induced climate challenges. The review summarized relevant data from chosen studies, offering a comprehensive view of these methods' role in addressing research questions.

results and analysis

**Research Data/Results**

Table 01: Research Data

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| **Related literature with reference** | **Collected Data** |
| Olesen, J. E., Carter, T. R., Diaz-Ambrona, C. H., Fronzek, S., Heidmann, T., Hickler, T., ... & Sykes, M. T. (2007) | Future climate change is projected using climate models that simulate various scenarios of greenhouse gas emissions and other factors. |
| Schneider, S. H., & Dickinson, R. E. (1974) | Researchers can investigate complex relationships and feedback processes using climate models, including how changes in temperature may impact ocean circulation, sea ice and atmospheric circulation patterns. |
| Van Aalst, M. K., Cannon, T., & Burton, I. (2008). | Climate models are able to generate region-specific projections, which aid in our understanding of how certain regions of the world may experience temperature changes and the risk of extreme incidents. |
| Fricke, H. C., & O'Neil, J. R. (1999). | By comparing model projections with actual past climate conditions, proxy data can be used to verify the accuracy of climate models. |
| Easterling, D. R., Arnold, J. R., Knutson, T., Kunkel, K. E., LeGrande, A. N., Leung, L. R., ... & Wehner, M. F. (2017) | Scientists can reconstruct past climate conditions, such as rainfall, temperatures, and air composition, by evaluating proxy data. |
| Kalis, A. J., Merkt, J., & Wunderlich, J. (2003). | Proxy data help distinguish between changes in the climate system that are induced by people and those that are simply a result of natural variability over thousands of years. |

**Analysis and Discussion**

We need to understand the impact of global warming and the difficulties posed by human-caused climate change, and this requires the use of climate models and proxy data. Climate models are digital simulations of the climate that include many climatic variables like greenhouse gas emissions, solar radiation, and ocean currents. Researchers can predict potential future climate changes by entering several scenarios, which helps us foresee the effects of global warming on temperature, precipitation patterns, sea level rise, and other factors. While proxy data, such as tree rings, ice cores, and sediment layers, are indirect observations of historical climatic conditions. These records of temperature, atmospheric makeup, and other climatic factors are historical. These proxies allow researchers to recreate historical climates and contrast them with the present, providing insight into the scope and speed of recent climate change.

Scientists may validate and improve their understanding of the effects of global warming, predict future changes, and pinpoint the difficulties presented by human-caused climate change by combining climate models with proxy data. For society and government to make educated decisions about reducing and preparing for the effects of a changing climate, this information is essential. Scientists can get a more complete understanding of the Earth's climate system, the results of global warming, and the difficulties presented by human-caused climate change by combining the knowledge gained from climate models and proxy data. This information is essential for formulating sensible plans to reduce the effects of climate change and adapt to them.

Conclusion

This study explores different ways of global warming. It affects ecological ecosystems and human lives also affects agriculture, food security and healthcare. The solution to this problem relies heavily on climate models and proxy data. Using this process long-term climate change can be predicted. The main limitation of this study is that this study is mainly theoretical. Research on this topic can be implemented in the future.

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