ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 **VOLUME 3, ISSUE 2, 2026**

RESEARCH ARTICLE

A REVIEW OF CLIMATE CHANGE AND SOME OF ITS CONTROVERSIES: CONNECTING THE DOTS

TOOCHUKWU ACHO AGIRIGA

Department of Geography and Planning, Abia State University, Uturu, Nigeria

ABSTRACT

The issue of climate change has orchestrated many controversies. They are multi-faceted. This paper reviewed climate change and some of its controversies. The trajectory aimed to connect the dots in the issue. The conceptual framework utilized the Regional Atmospheric Climate Model (RACMO). This study employed a combination of literature reviews and empirical research. Data were obtained from secondary sources. The first set of authors, analyzed the annual rainfall and mean annual temperature distributions in Bauchi town, for an extended period of 30 years (1978-2008). Subsequent authors examined the water supply by some communities in Isiala Ngwa North Local Government Area, Abia State, for the years 2001 and 2016. A photo of Sunspots was taken by the SOHO Telescope image of the Sun for the year 2001 (1), and 2009 (r**)**. The rainfall and temperature data were analyzed with tables while that of the water supply was with Differences (Litres), Percentage Rating and Mean. The results showed increases in annual temperature and annual rainfall by 0.2mm and 0.0299^0C respectively. Increases were equally evinced in the water supply in households. They ranged from an average of 84.21 litres in 2001 to 201.27 litres in 2016. The water demand also increased from 11,090,160 litres in 2001 to 17,480,790 litres in 2016. However, from the SOHO Telescope image of the Sun for the years: 2001 (1), and 2009 (r**)**, the Sun hit a 50-year low in solar wind pressure, a 55-year low in radio emission and a 100-year low in Sunspot activity, instead of the Sun becoming more active after a quiet spell. The study concluded that there was a high risk of flooding and ecosystem change arising from the variation in climatic condition and climate change phenomenon in Bauchi town. It equally concluded that the water supply had significant shortage to meet demand at the household level in Isiala Ngwa North. Along similar lines, the study posits that the recent Sunspot controversies are among the controversies of climate change. The study recommended connecting to local impacts, leveraging trusted messengers, communicating the scientific consensus and inoculating against misinformation to help the public connect the dots.

Keywords: Climate change, controversies, connecting, dots**.**

Corresponding Author

Toochukwu Acho Agiriga
Email Address: mezirimacho@gmail.com

Received: 2/4/2026; **Revised:** 17/6/2026; **Accepted:** 10/7/2026; **Published:** 17/7/2026

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

1.0. INTRODUCTION

The paper reviewed climate change and some of its controversies. It leveraged recommendations to connect the dots. Moreover, the paper comprised of five sections. The first section captured the introduction. The second section discussed the conceptual framework. The third section analyzed the research methodology and empirical studies on climate change. The fourth section dealt extensively with some of the climate change controversies. Subsequently the fifth section drew conclusions on the topic of discourse while outlining and elucidating the recommendations.

Climate change is a sustained alteration of the average weather condition by natural or anthropogenic sources or both, for an extended trend of thirty to thirty five years. Other scholars, have viewed climate change from various perspectives. The fulcrum of their lines of thoughts, laid on the variations in climatic condition.

Imoh (2009) defined climate change as changes in mean annual temperature and other aspects of climate over periods of time ranging from decades, hundreds of years to several million years. Climate change can also be explained as a long term alteration of weather, evident in temperature increase (Ike and Audu, 2010). IPCC (2007) further defines it as any change in climate over time as a result of natural variability or human action.

The question of climate change and its potential impacts on the systems concept of the environment cannot be overemphasized. Reports of Climate change of the Intergovernmental Panel on Climate Change (IPCC) plenary XXVII (2007b) showed that eleven of the last twelve years (1995 - 2006) rank among the twelve warmest years in instrumental record of global surface temperature since 1850. More so, the 100-year linear trend (1906 – 2005) of 0.74 (0.56 to 0.92) ^{0}C is larger than the corresponding trend (1901 - 2000) of 0.6 (0.4 to 0.8) ^{0}C (Ike and Audu, 2010).

The IPCC third assessment report of 2007 showed that the average sea level has risen since 1961 at an average rate of 1.8 (1.3 to 2.3) millimeters per year and since 1993 at 3.1 (2.4 to 3.8) millimeters per year with key contributions from polar ice sheets, thermal expansion, melting glaciers and ice caps.

More so, climate changes such as: shrinking of glaciers, shifts in Hydrologic Growing Season (H.G.S.), rainfall intensities and disease distributions are expected to have substantial and largely negative effects on food production, water supply and diseases proliferation in many parts of the world (Imoh, 2009).

Both scientific and media reports show that human-induced factors are responsible for the negative trends in the global climate. According to Andrew (2006), the so-called human induced factors such as: Green House Gas emission due to human activities, have grown since pre-industrial time with a record increase of 80 percent between 1970 and 2004.

However, considering most of the reports of the IPCC, and other monitoring groups, the term ‘very likely’ has been used to connote the possible cause and effect of climate change (Ike and Audu, 2010). The authors added that such connotations can be found in works, like: IPCC plenary XXVII 2007 fourth assessment reports and Decision 2/CP.15, which takes note of the Copenhagen Accord. The widespread perspective on the cause of global climate change is based on the fact that humans have been contributing significantly to the observed patterns of warming and the resultant atmospheric

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

forcing. But Imo, (2009) noted that, there is a debate whether the recent trends are part of the normal cycles. More so, reports from an international panel of climate experts, have concluded that, based `on the balance of scientific evidence, there is a discernable human influence on global climate since last century (Ike and Audu, 2010). However, the panel members could not unequivocally state that human-induced global warming is in fact occurring.

The fact remains that most of the results presented as consequential parameters in climatic forcing were cooked because such results may have been over-emphasized, over-presented or over-estimated as the case may be. In fact, natural activities and contradictions based on long-term astronomical, geological, geo-physical and geographic distributions, have suggested an anomaly in the supposedly or expected outputs.

2.0. CONCEPTUAL FRAMEWORK

The study hinges upon the Regional Atmospheric Climate Model (RACMO). It is a high-resolution regional climate model originally developed by the Royal Netherlands Meteorological Institute (KNMI). It is primarily used to simulate small-scale weather and climate dynamics, with a globally recognized specialization in Polar Regions, such as Antarctica and Greenland (Zenodo, 2020).

The polar versions (such as RACMO2.3p2 for Greenland and RACMO2.4p1 for Antarctica) contain specialized physics to simulate extreme, cold conditions over glacier surfaces, ice dynamics, snowfall, and melting.

The RACMO model has been used by Noel, van de Berg, van Wessem, van Meijgaard, van As, Lenaerts, Lhermitte, Kuipers Munneke, Smeets, van Ulft., van de Wal, van den Broeke, (2018) and van Dalum., van de Berg and van den Broeke (2022) etc. The former used it to downscale climate models and determine the surface mass balance of Greenland, exploring how historical and future precipitation changes impact the ice sheet while the latter used it to simulate Antarctic surface climate, integrating spectral snow albedo and radiative transfer schemes to understand melt-water production.

This conceptual framework was based on the RACMO model, informed by the Ewing and Donn hypothesis (which explained glacial-interglacial cycles) and the relationship between solar radiation and ice age formation. These concepts were examined in this study.

3.0. RESEARCH METHODOLOGY

Employing a combination of literature reviews and empirical analyses, this study examined climate change and related controversies using secondary data sources.

The annual rainfall (Table 1) and mean annual temperature (Table 2) distributions in Bauchi town for the epochs (1978 - 2008) were obtained from Odiana and Ibrahim, (2015). The water supply by some communities in Isiala Ngwa North Local Government Area, Abia State, for the study periods of the years: 2001 and 2016 (Table 3) were sourced from Chima and Alozie, (2006); Eze, Alozie, and Alozie, (2016) respectively. These were leveraged as empirical studies on climate change. Moreover, photos of sunspots captured by the SOHO Telescope were obtained from the BBC (2009) for the years 2001 and 2009. The purpose of this was to help resolve recent sunspot controversies.

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

The rainfall and temperature data were presented in tables, while the water production data were analyzed using differences (in litres), percentage ratings, and means.

The tables showed the upward and downward trends in annual rainfall and mean annual temperatures in Bauchi town. Meanwhile, the results accentuated variations in water supply differences (in litres), percentage ratings, and means across selected communities in Isiala Ngwa North Local Government Area, Abia State, between 2001 and 2016.

4.0. CONTENT ANALYSES AND DISCOURSES

4.1. Empirical Studies on Climate Change

This section explored some empirical studies on climate change. Correspondingly, it analyzed the annual rainfall and mean annual temperature distributions in Bauchi town. In furtherance, it evaluated the water supply by some communities in Isiala Ngwa North Local Government Area, Abia State, for the years 2001 and 2016.

Table 1: Annual Rainfall Distribution for Bauchi Town 1978 - 2008

Years	Annual Rainfall Distribution (mm)
1978	1151.00
1979	1000.30
1980	988.20
1981	1244.80
1982	900.00
1983	779.00
1984	893.70
1985	742.20
1986	946.20
1987	790.90
1988	920.70
1989	909.70
1990	879.60
1991	949.60
1992	1226.00
1993	1141.90
1994	1174.30
1995	961.40
1996	1180.80
1997	770.00
1998	1156.50
1999	1403.80
2000	937.00
2001	1307.2
2002	781.00
2003	744.00
2004	672.10
2005	1078.50
2006	1007.20
2007	1136.90
2008	1133.10

Source: Odiana and Ibrahim, (2015)

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

In a study of Bauchi town, in northeastern part of Nigeria, Odiana and Ibrahim (2015), using rainfall data (See Table 1) and temperature data (See Table 2), noted that over a period of 30 years, that rainfall in the town has been increasing by 0.2mm annually while temperature has been increasing by 0.0299^0C annually over the same period. The authors concluded that there was a high risk of flooding and ecosystem change arising from the variation in climatic condition and climate change phenomenon in the area.

Table 2: Mean Annual Temperature Distribution for Bauchi Town 1978 - 2008

Years	Mean Annual Temperature Distribution (^{0}C)
1978	25.59
1979	26.47
1980	26.30
1981	25.75
1982	25.73
1983	25.68
1984	26.88
1985	25.32
1986	26.69
1987	27.44
1988	26.64
1989	25.33
1990	29.05
1991	26.33
1992	26.56
1993	28.77
1994	27.46
1995	18.83
1996	26.63
1997	24.43
1998	27.77
1999	23.87
2000	28.69
2001	25.80
2002	26.70
2003	20.07
2004	26.71
2005	27.08
2006	31.64
2007	24.95
2008	26.84

Source: Odiana and Ibrahim, (2015)

Climate change leads to reduction in crop yield, increase in average temperature, snow melt in Polar Regions, change in rainfall amount and distribution, intensity of extreme climate events such as: floods, drought, and outbreak of climate sensitive disease (Amaefula and Asumuogha, 2011; and Alozie, Oti and Igolo, 2018).

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

The International Water Management Institute (2007) observed that water scarcity has been very critical, affecting agricultural activities very drastically in parts of Africa. Similarly, Eze, Alozie, and Alozie (2016); Chima and Alozie, (2006) noted that deficiencies exist between water demand and actual water supplied per household of four in Isiala Ngwa, Abia State. Although household water supply increased from an average of 84.21 litres in 2001 to 201.27 litres in 2016 (Table 3), Alozie, Oti and Igolo (2018) added that water demand also increased from 11,090,160 litres in 2001 to 17,480,790 in 2016 in Isiala Ngwa, Abia State.

Table 3: Water Supply by Some Communities in Isiala Ngwa North Local Government Area Abia State, for 2001 and 2016

Communities	Average Household Supply in 2001 (Litres) (a)	Average Household Supply in 2016 (Litres) (b)	Differences (Litres)	Percentage Rating
Amapu Ntigha	87.25	206.53	119.28	136.71
Eziama Ntigha	96.42	188.68	92.26	95.69
Mbawsi	91.29	240.36	149.07	163.29
Amaoji	77.60	202.30	124.7	163.29
Ihie	78.28	189.31	111.03	141.84
Abayi	79.28	193.41	114.13	143.77
Okpuala Ngwu	80.30	236.32	156.02	194.30
Ngwankwu	80.23	195.33	115.1	143.46
Osugu	87.25	189.23	101.98	116.88
Total	**757.9**	**1841.47**	**1,083.57**	**1,299.23**
Mean	**84.21**	**204.61**	**120.40**	**144.36**

Sources: (a) Chima and Alozie, (2006) (b) Eze, et al., (2016)

As could be observed from Table 3, household water supply improved for all the communities investigated. For instance, in Amapu Ntigha, it increased from 87.25 litres in 2001 to 206.53 litres in 2016, at the rate of 136.71 percent. Nevertheless, Eziama Ntigha recorded the lowest incremental value of 95.69 percent which is lower than the total mean percentage increase of 144.360 percent. Even with these impressive results, water demand increased from 11,090,160 in 2001 to 17,480,790 in 2016 (Alozie, et al., 2018).

With the depletion of surface water bodies and drying of government operated boreholes, the people now rely on alternative sources of water to meet their water needs, Eze, Alozie and Alozie (2015) observed that accumulated costs as burden on the consumers include the following: sickness associated with trekking long distances, headache, early morning sickness, dizziness/fatigue, cramp and stiff necks as well as malaria, typhoid, river blindness, filariasis, guinea worm and snake bites.

4.2. Some Controversies of Climate Change

In the climate change debate, some controversies abound. Notably among them are: recent sunspot activities, the Milankovitch orbital theory and the Ewing and Donn hypothesis. These are sequentially discussed as follows.

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

Recent Sunspot Controversies: The ultimate source of energy to the earth is the sun, hence, climatic forcing, varying tidal pull and ecosystem functionality are based on inputs from the sun. Astronomical instrumentation and observations, have showed that radiation from the sun changes in both quality and quantity. These changes are reflected by dark regions of lower surface temperature on the surface of the Sun and changes in the ultraviolet range of the solar spectrum respectively. The dark regions are called sunspots (Fig. 1)

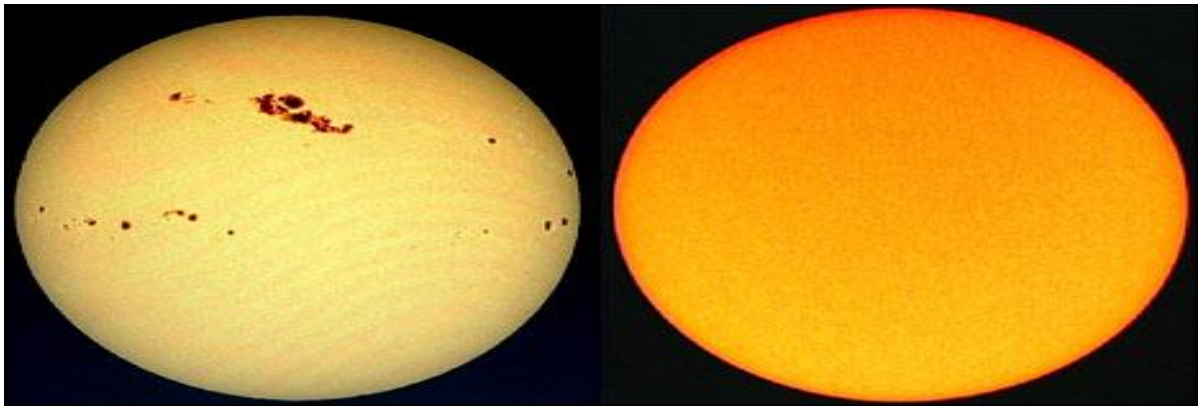

Fig. 1: A Photo of Sunspots by the SOHO Telescope for 2001 (1), and 2009 (r)
Source: BBC, (2009)

Cycles of the Sun have been established for a short term by many workers with 11-22 years cycles being noted in particular (Ike and Audu, 2010). The authors added that the observations of sunspot in historical times have also given a striking feature of a near absence of Sunspots between AD 1640 and 1710, a period sometimes called the Maunder Minimum.

At the peak of the Sun's activity, there is always a tumultuous boiling atmosphere that splits out flares and planet-sized chucks of super-hot gas which indicates the advance of a calmer period. Contrary to this, the SOHO Telescope image of the sun for 2009 showed that instead of the Sun to be heating up after a quiet spell, it hit a 50-year low in solar wind pressure, a 55-year low in radio emission and a 100-year low in Sunspot activity (Ike and Audu, 2010). The big scientific question is: are we going into another Minimum Maunder? If yes, then why are there still continuous warming when the Sun supplies over 95% of energy for the earth? Is it not possible that this cooling might or has been offsetting the impacts of climate change? The fact remains that no one can possibly detect how the centuries long waxing and warming of the Sun works.

Another important factor is the question of solar radiation as it relates to ice formation and ice ages. While climatologists and meteorologists accept 'glaciation-with-high-sun', astronomers and geologists prefer the formation of glaciers with cool-Sun. The former school of thought, is of the view that Ice ages are associated with increased solar radiation or with relative increase in precipitation, the latter are of the opinion, that Ice ages are associated with a relative decrease in temperature.

Some meteorologists, particularly Bell (1953) and Simpson (1959), are of the opinion that cooling will lead to a decline in moisture content of the atmosphere, precipitation and vigour of the atmospheric circulation patterns.

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

4.3. The Controversial Milankovitch Orbital Theory of Climate Change

The Milankovitch orbital theory of climate change is based on three cycles of the ellipse nature of the earth's orbit, precision of the equinoxes and obliquity of the elliptic orbit. To begin with, if the earth were a perfect sphere, then the influences of wind systems that produces winter and summer parts, will be equal in length. Consequently, greater centricity of seasonal length will result in greater difference of the seasons. Astronomically, a period of 96,000 years of eccentricity of the earth's orbit can 'stretch' by departing much further from a circle and then revert back to almost true circularity (Ike and Audu, 2010).

Additionally, changes in the precision of the equinoxes entails that the time of the year at which the earth is nearest to the sun will vary. Astronomical evidences have revealed that the periodicity is about 21,000 years (Ike and Audu, 2010). Furthermore, researches carried out on the Roll of ships, have shown variations $21^0\ 39^1$ to $24^0\ 36^1$ in tilting (Ike and Audu, 2010). The authors added that as a result, with a periodicity of about 40,000 years, changes occur in the 'obliquity of the elliptic' – the angle between the plane of the Earth's orbit and the place of its rotational equator. Consequently, the greater the tilt, the more pronounced is the difference between winter and summer.

The important factor of the Milankovitch orbital theory as it relates to climate change, is based on the fact that similarity in the periodicity to the durations of these changes is associated with glacial and interglacial periods of the past 1.6 million years (Ike and Audu, 2010).

4.4. The Ewing and Donn Hypothesis

Images from high resolution satellites of the Arctic, Antarctic and basin reveal that the Antarctic ice sheets cover a continent that is a third bigger than Europe or Canada and twice big as Australia (Ike and Audu, 2010). The authors added that it attains a thickness greater than 4000m. The Arctic basin shows a special characteristic of terrestrial relief that is ringed about by continents with restricted connections with other Oceans.

It is on these two great geographic contrasts of the Arctic and the Antarctica that Ewing and Donn, attempted to explain variations between glacial and interglacial phases of the Ice age. Their opinion was that before the peak of the Ice ages, a maximum amount of the Earth's water was locked in glaciers. A free interchange of water took place between Arctic and Antarctic Ocean across a shallow Sill between Norway and Greenland and as a result of evaporation of water from the Arctic Ocean, increased precipitation, heavier snow and subsequent growth of glaciers may have occurred.

The result of this is that the ice–free Arctic Ocean was not characterized by interglacial phases, but resulted in the initiation of glacial phases. The Arctic Ocean as a result of the shallow Faroe-Iceland ridge and Eustatic drop of sea level and the cut-off of the Gulf Stream, permitted continental ice sheets and became covered with ice. With ice cover over the Arctic Ocean, glaciers were no longer receiving enough moisture from rainfall after which polar ice sheets, melt slowly with the exception of Greenland, so that the circle can initiate. The resulting effect of this cycle according to Ewing and Donn (1956) is that:

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

1. The melting of the ice sheets would increase the interchange of water between Antarctic and Arctic Oceans, thus cooling the North Atlantic and warming the Arctic, so that it becomes free of ice for effective moisture distribution in the Polar region.

2. Glaciers are formed from two principal factors: increased precipitation over Arctic sub lands and changes in atmospheric circulation.

3. The lowering of the sea level would greatly decrease the interchange of water between the Atlantic and Arctic Oceans. These together with the cooling effects of the surrounding sub lands glaciers, would reduce surface temperature of the Arctic until continuous freezing occurs. The development of glacier would subsequently cease as a result of reversal of conditions favourable to its development. This will make the sea level to rise, causing continuous northward transport of surface water until the ice sheets are melted, thus completing the cycle again.

Could this be an explanation to temperature changes in the surface water temperature of the Arctic and the Atlantic Oceans? Although it is very difficult to discount the Ewing and Donn hypothesis in explaining glacial and interglacial exchanges, why then in spite of melting ice, the Atlantic Ocean still continue to increase in temperature? These questions cannot stop.

5.0. CONCLUSION AND RECOMMENDATIONS

There is more than meets the eye to the controversies of climate change. The study concludes that there was a high risk of flooding and ecosystem change arising from the variation in climatic condition and climate change phenomenon in Bauchi town. It equally concludes that water supply had significant shortage to meet demand at the household level in Isiala Ngwa North. Along similar lines, the study posits that recent Sunspot controversies are among the controversies of climate change.

Effectively connecting the dots between climate change and its controversies involves clear communication of the overwhelming evidence and the high certainty of the science as depicted in Tables 1, 2 and Fig 1, while also addressing the underlying social and political drivers of skepticism. Key strategies include:

Connecting to local impacts: “Bring climate home” by relating the issue to micro-climatic elements. For instance, Tables 1 and 2 depicted the annual rainfall and mean annual temperature distributions respectively for Bauchi town from 1978 – 2008. These empirical studies should be leveraged, to provide a nuanced approach that validates and reframes the issue of climate change. Thereby creating an alignment with diverse ideological perspectives in communities, especially in the aforementioned study area.

Leveraging trusted messengers: Fig 1 shows the Sunspots photo by the SOHO Telescope for the years 2001 and 2009. The source has credibility. Information is often more accepted when it comes from a credible source within one’s own social or political group. Utilizing climate-friendly actors and leaders within conservative or skeptical communities can help bridge the trust gap. To put things into perspective, geographers should adopt the Sunspots photo for the years 2001 and 2009 to buttress the reality of the variations in the quality and quantity of solar radiations while enlightening individuals

ALVAN JOURNAL OF SOCIAL SCIENCES (AJSS)
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
ALVAN IKOKU FEDERAL UNIVERSITY OF EDUCATION, OWERRI
https://www-ajsspub-org.b12sites,com https://www.ajsspub2.org
E- ISSN: 3043 – 5463 ISSN: 1595 – 5842 VOLUME 3, ISSUE 2, 2026

with divergently dichotomized ideologies on climate change, that are asymmetrical to its impacts shown in Tables 1 -3.

Communicating the scientific consensus: Clearly and consistently communicate the overwhelming scientific consensus that human-caused climate change is occurring. Contextually, Table 3 shows that household water supply increased from an average of 84.21 litres in 2001 to 201.27 litres in 2016 in Isiala Ngwa North. However, Alozie, et al. (2018) adds that water demand skyrocketed in this Local Government Area in Abia state, skyrocketed from 11,090,160 litres in 2001 to 17,480,790 litres in 2016. This surge occurred despite the increased water supply in the study area.

Increased water demand will strain supplies and energy-intensive ways of meeting that demand (pumping and treating), thereby adding to greenhouse gas emissions, and worsening climate change. Climate change propels unpredictability and volatility in water supplies, while increased demand forces reliance on energy-heavy solutions, thus creating more emissions and further disrupting water cycles. Therefore, it's paramount to leverage infrastructure and storage solutions such as: dams and reservoirs, rainwater harvesting, groundwater management, aqueducts and distribution networks in the study area. Presenting these facts using simple, short messages and clear graphics can be effective across party lines.

Inoculating against misinformation: Pre-emptively protect the public from misinformation by exposing them to common skeptical arguments in a controlled setting. The arguments claim that anthropogenic sources (like: burning fossil fuels, deforestation, etc.) are not contributory to climatic changes. Instead, they attributed climatic changes to naturogenic sources (like: Earth's orbital changes, volcanic activity, etc.) alone. Basically, factual rebuttals like pieces of empirical evidence on the anthropogenic sources of (Table 3) climatic changes should be provided as checks and balances.

Conflict of Interest

The author declares that no conflict of interest exist in this manuscript.

REFERENCES

Alozie, M.C., Oti, U.C., & Igolo, I. (2018). Poverty reduction and climate change in sub-Saharan Africa. In G.N. Chima, & A.U. Egbu., (Eds.), *The climatologist and the Nigerian environment: A sustainable perspective* (pp. 174-175). Flyann Ltd.

Amaefula, A. & Asumuogha, G.N. (2011). Food security in Nigeria, root and tuber crops production in a changing climate. In C.O. Amadi, K.C. Ekwe, G.O. Chukwu, A.O. Olojede, & L.N. Egesi, (Eds.), *Root and tuber crops research for food security and empowerment*. Snaap Press Ltd.

Andrew, G. (2006). *The human impacts on the natural environment: Past, present and future.* (Sixth Edition). Blackwell Publishing.

BBC, (2009). Science and environment /'quiet sun' baffling astronomers. Available at www.http://news.bbc.co.uk (Accessed on November 5th, 2025).

Bell, B. (1953). Solar variations as an explanation of climate change. In H. Shapely (Ed.), *Climatic change: Evidence, causes, and effects (pp.123 - 136).* Harvard University Press.

Chima, G.N. & Alozie, M.C. (2006). *Marching the average daily water demand of water (ADD) in Isiala Ngwa with institutional and corporate interventions as a pre-regulation for sustainable rural housing development in Nigeria: Concepts, issues and strategies*. Paulton Press

Ewing, M & Donn W.L., (1956). A theory of ice ages. *Science, 123*, 106166.

Eze, M.U., Alozie, M.C. & Alozie, G.C. (2015). Cost implications of relying on alternative sources of water in rural Abia state. *International Journal of Innovative Research in Social Science and Strategic Management Techniques, 2*(1), 221 – 229.

Eze, M.U., Alozie, M.C., & Alozie, G.C. (2016). Implications of average daily demand for water (ADD) on water supply in Isiala Ngwa, Abia state. *International Journal of Strategic Research in Education, Technology and Humanities, 3* (1), 136 -145.

Ike, F & Audu, H.O. (2010). Controversies of global climate change. In G.N. Chima, & A.I. Kalu, (Eds.), *Contemporary issues in environmental sciences* (pp. 471 - 477). ABSU Press.

Imoh, U (2009). Adaptations to climate change. Paper presented at the one day dialogue on climate change, organized for legislators and policy makers in Akwa-Ibom state in partnership with the United Nations Development Programme (UNDP). Amnity Hotels, Uyo.

International Water Management Institute, (2007). Water for food – water for life, comprehensive assessment of water management in agriculture. Available at https://www.researchgate.net (Accessed on November 9th, 2025).

IPCC (2007). *The scientific basis contribution of working group 1 to the fourth assessment report of the intergovernmental panel on climate change*. University Press.

IPCC (2007b). *An assessment of the intergovernmental panel on climate change. Summary for policy makers plenary XXVII*. University Press.

Noel, B, van de Berg, W.J, van Wessem, J.M., van Meijgaard, E, van As, D, Lenaerts, J.T.M, Lhermitte, S., Kuipers Munneke, P, Smeets, C.J.P.P, van Ulft, L.H,., van de Wal, R.S.W., & van den Broeke, M.R (2018). Modelling the climate and surface mass balance of polar ice sheets using RACMO2, part 1: Greenland (1958-2016). *Cryosphere, 12*, 811-831.

Odiana, S. & Ibrahim, A. (2015). An assessment of the evidence of climate change in Bauchi, Nigeria. *Journal of Applied Science and Environmental Management*, *19*(3), 375 – 381.

Simpson, G.C. (1959). World temperatures during the Pleistocene. *Quarterly Journal Royal Meteorological Society*, *85*, 332 -349.

Van Dalum, T. C, van de Berg, J. W & van den Broeke, M.R (2022). Sensitivity of Antarctic surface climate to a new spectral snow albedo and radiative transfer scheme in RACMO2.3p3. *European Geosciences Union, Vol.16* (3), 1.

Zenodo, (2020). Regional atmospheric climate model 2 (RACMO2), version 2.3p2 – Zenodo. Available at https://zenodo.org (Accessed on May 30th, 2026)