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# Perceived Effect of Climate Change on Agricultural Extension Services Delivery in Anambra State, Nigeria

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## Abstract
*This study assessed the apparent effects of climate change on the discharge of agricultural extension services in Anambra State. Population of the study comprised all contact farmers and extension agents in Anambra State. Simple random sampling technique was used to select two hundred and ten (210) respondents.* A structured questionnaire was used to gather the data, and descriptive statistics were used for analysis.. *The results showed that the major perceived effects of climate change on extension services were disruption of fieldwork (39.4%), reduced adoption of innovation (18.3%), and a shift to participatory approaches (11.0%). The findings also showed that increased flooding (17,2%), rainfall intensity (16.7%) and surface temperatures (10.0%) were the major evidence of climate change on extension services and contact farmers. It was concluded that climate change hinders extension services by disrupting traditional farming, reducing the efficiency and effectiveness of innovation and making it harder for extension agents to deliver timely and relevant information. It was recommended that extension agents educate farmers on climate change adaptation strategies and weather forecasting to improve agricultural productivity, increase income levels, and minimise losses, thereby boosting their interest in effective extension service delivery.*

**Keywords**: Climate change, extension services, farmers' resilience

## Introduction

The term climate change describes a long-term change in temperatures and weather patterns that has been mostly caused by human activity since the 1800s, such as burning fossil fuels like coal, oil, and gas (Maibach, 2024). Climate change poses significant challenges for fisheries in the coastal Nigeria, fisheries extension workers who provide fishers with guidance and training must themselves be resilient in order to continue providing services (Comfort, 2026). Extension programs play an important role in supporting farmers to acquire new technology, skills, innovation, and manufacturing advice (Eyitayo et al. 2024). Agricultural extension services involve applying systematic research and understanding to agricultural practices and delivering information and skills guidance to farmers (Alakpa & Ehigie, 2024).

Seasonally, Anambra State, especially local government areas within the river basins, faces flooding to the extent that human lives and other property are damaged whenever it rains heavily. Obiekwe et al. (2026) stated that flood have a considerable impact on agricultural sustainability and food safety, often leading to long-term consequences. Crop failures brought about by changes have reduced agricultural productivity and increased food shortages and protracted famines.. It is against this backdrop that this study seeks to classify the perceived

effects of climate change on extension service delivery; and determine evidence of climate change on extension guidance and contact farmers**.**

## Methodology

Anambra State, where the study was conducted, lies between latitude 5º $32^1$ and 6º$43^1$N and longitude 6º$43^1$ and 7º$22^1$E. The study population comprised 210 respondents.
Data for the research were collected from primary sources using a well-structured questionnaire. The controlled interview schedule was validated by 5 lecturers in the Department of Agricultural Economics and Extension of Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus. 10 enumerators were properly trained for the work. Respondents rated the apparent effect of climate change on agricultural extension services conveyance on a 4-point Likert scale of highly important (4), very important (3), somewhat important (2), and not important (1). A mean score below 2.5 indicates not important, while scores of 2.5 or above indicate important. Ratings of evidence of climate change on extension service delivery and the contact farmers were done using a 4-pointLikert-type scale of extremely beneficial (4), highly beneficial (3), somewhat beneficial (2), and not beneficial (1). A mean score of less than 2.5was regarded as not beneficial, while a mean score equivalent to or greater than 2.5 was regarded as extremely beneficial.

## Results and Discussion

### Impacts of Climate Change on Extension Services Delivery

Table 1 shows the distribution of participants by apparent effect of climate change. The table reveals the impacts of climate change on extension service conveyance at a glance. Climate change makes the following impacts according to the research; disruption of field work (39.4%), reduced adoption of innovation (18.3%), Shift to participation approaches (11.0%), hotter temperatures (10.0%), food shortage (7.7%), poverty and displacement (6.1%), more severe storms (3.9%), increased drought (2.2%) and loss of species of some animals (1.1%). Table 2 shows the mean scores that disruption of fieldwork ($\bar{x}$=3.54), reduced adoption of innovation ($\bar{x}$=3.48), shift to participation approaches ($\bar{x}$=3.46), hotter temperatures ($\bar{x}$=2.88), and Food shortage ($\bar{x}$=2.75), with mean points above 2.5, were highly important effects. In contrast, Poverty and displacement ($\bar{x}$=1.33), more severe storms ($\bar{x}$=1.21), Increased drought ($\bar{x}$=1.17), and Loss of species of some animals ($\bar{x}$=1.15), with mean points less than 2.5, were the effects that were not important. Concerning the above, Obiekwe et al. (2026) stated that most victims faced mobility difficulties (71.9%), challenges in accessing markets (54.7%) and damage of stored produce (70.4%) among other hardship. Nowrouzi-Kia et al. (2026) stated that climate change is worsening the work. The findings is in contrast with the finding of Jamaal and Omer (2026) which reported that 90.2% decline in rainfall was a perceived effect of atmosphere change and 87.0% of households alleged rising temperature as an effect.

Climate change also affects the delivery of extension services in several ways, as revealed by extension agents' responses. Impacts of climate change. Climate change was evident in several ways, as shown in Table 2. Both the extension workers and contact farmers had similar responses. Climate change was apparent in Adoption of resilient crop varieties (12.8%), Difficulty in persuading farmers to spend more in Agriculture (2.8%), Dissemination of climate smart agriculture (16.1%), Early warning and information services (13.9%), Difficulty in well-timed and pertinent guidance of farmers (7.8%), Facilitating technical knowledge Transfer (11.7%), Collapse in execution of farm administration or new farm innovations (10.0%), Diversification of livelihood (11.11%), Strengthening local institutions (8.3%), Reduced agricultural labour due to rural-urban movement from affected zones (5.6%).

In an investigation on the adaptation of public agricultural extension in Kenya, Makamane et al. (2025) explained that district extension managers and frontline extension workers are well aware of the problem of climate change. They recognize climate as changes in atmosphere patterns over extended period of time and as disruptions to annual weather patterns or shifts in their trends. They established that the area investigated was affected by atmospheric change in numerous ways: more regular and long-standing droughts, adjustment of rainy seasons not following prior patterns, more inconsistency of little rains as compared to the lengthy rains, high heat levels; increased dryness; amplified rainfall failures; irregular rains hence not able to counsel farmers, drying up of water sources, abridged rainfall amounts, late onset of rains, decreased plant leaves have dried up and some species have vanished (Makamane et al., 2025). The workers alleged the natural environment to be altering as well. They established that forests and bushes had been diminished as farmers cleared more bushes for cultivation. Forests have also been cleared for housing, agriculture, charcoal making, and building supplies (timber), and the rate of diminution does not match the rate at which they are substituted. The workers account that natural water supplies have declined, with river altitudes falling and many rivers becoming seasonal. They also pointed out that non-natural water sources are increasing, especially embankment dams, water pans, and surface wells. These changes have affected agricultural output through crop loss, thereby reducing yields, escalating food shortages, and prolonging food crisis. The study aligns with the belief that human development can proceed without threatening the natural environment or depleting natural resources (Zhang & Wu, 2022), as extension personnel are also affected by atmospheric change. Also, Global warming is defined as the average increase in temperature observed as an effect of atmospheric change (Najmaldin, 2024).

**Table**1: Distribution of the Respondents according to the apparent effect of climate change

| **Perceived Effect of Climate Change** | **Percentage** |
|---|---|
| Disruption of field work | 39.4 |
| Reduced adoption of innovation | 18.3 |
| Shift to participation approaches | 11.0 |
| Hotter temperatures | 10.0 |
| Food shortage | 7.7 |
| Poverty and displacement | 6.1 |
| More severe storms | 3.9 |
| Increased drought | 2.2 |
| Loss of species of some animals | 1.1 |
| **Extension Services Impacts** | |
| Adoption of resilient crop varieties | 12.8 |
| Difficulty in convincing farmers to invest more in Agriculture | 2.8 |
| Dissemination of climate-smart agriculture | 16.1 |
| Early warning and information services | 13.9 |
| Difficulty in timely and relevant training of farmers | 7.8 |
| Facilitating technical knowledge Transfer | 11.7 |
| Failure in the implementation of farm management or new farm technologies | 10.0 |
| Diversification of livelihood | 11.11 |
| Strengthening local institutions | 8.3 |
| Decrease in agricultural labour due to rural-urban migration from affected zones | 5.6 |

**Table 2: Distribution of the Respondents according to the perceived effect of climate change**

| Perceived Effect of Climate Change | Mean ($\bar{x}$) | SD |
|---|---|---|
| Disruption of field work | 3.54* | 0.684 |
| Reduced adoption of innovation | 3.48* | 0.698 |
| Shift to participation approaches | 3.46* | 0.672 |
| Hotter temperatures | 2.88* | 1.109 |
| Food shortage | 2.75* | 0.989 |
| Poverty and displacement | 1.33 | 0.613 |
| More severe storms | 1.21 | 0.533 |
| Increased drought | 1.17 | 0.400 |
| Loss of species of some animals | 1.15 | 0.396 |

**Source: Field Survey**

Table 3 presents evidence of atmospheric change affecting extension provision delivery and farmers. Climate change was apparent in several ways, as shown. Both the extension managers and the farmers have similar responses. Climate change was obvious in increased flooding (10.0% and 6.7%), rainfall intensity (17.2% and 26.7%), and surface temperatures (16.7% and 16.7%), with the latter increasing by 7.2% and 3.3%, respectively, according to both extension workers and farmers who were got in touch with. Other signs of atmospheric change included a 4.4% rise in rainfall intensity, a 10% decrease in low rainfall intensity, over 6.7% unpredictable weather patterns, and 6.7%. There was an increase in the evaporation rate from the soil, a rise in river water levels, observed flooding, observed lack of rain, and heavy rainfall. This is in line with the study on the adaptation of open agricultural extension in Kenya. Makamane et al. (2025) stated that district extension managers and the frontline extension workers are conscious of the atmospheric change problems.

**Table 3: Evidence of atmospheric change on extension service delivery and the farmers**

| Distribution of the respondents based on evidence of climate change | Farmers Per (%) | Ext. agents Per (%) |
|---|---|---|
| Increased flooding | 17.2 | 26.7 |
| Rainfall intensity | 16.7 | 16.7 |
| Surface temperatures | 10 | 10.0 |
| Increase surface temperature | 7.2 | 3.3 |
| Increased rainfall intensity | 4.4 | 10.0 |
| Low rainfall intensity | 6.7 | 6.7 |
| Irregular rainfall | 7.2 | 6.7 |
| Increase the rate of evaporation from the Earth | 8.9 | 3.3 |
| Rise in the water level of rivers | 7.2 | 6.7 |
| Observed flooding | 3.9 | 3.3 |
| Observed drought | 7.8 | 3.3 |
| Heavy Precipitation event | 2.8 | 3.3 |

**Source: Field survey, 2026**

Table 4 shows the mean distribution of evidence on atmospheric change and its effects on extension service delivery and farmers. Both the extension workers and the farmers have same responses. The evidence of atmospheric change that was extremely beneficial based on the mean was on Increased flooding ($\bar{x}$=3.05) and ($\bar{x}$=3.01), Rainfall intensity ($\bar{x}$=3.00) and ($\bar{x}$=3.00), Surface temperature ($\bar{x}$=2.98) and ($\bar{x}$=2.99), Increased rainfall intensity ($\bar{x}$=2.96) and ($\bar{x}$=2.82), Low rainfall intensity ($\bar{x}$=2.94) and ($\bar{x}$=2.77), Unpredictable weather pattern ($\bar{x}$=2.58)

and ($\bar{x}$=2.54), respectively while the evidence of climate change that was not beneficial based on the mean was on Increase rate of evaporation from the earth ($\bar{x}$=1.44) and ($\bar{x}$=2.48), Rise in water level of rivers ($\bar{x}$=1.35) and ($\bar{x}$=2.40),observed flooding ($\bar{x}$=1.26) and ($\bar{x}$=2.30),observed drought ($\bar{x}$=1.25) and ($\bar{x}$=1.27) and heavy precipitation event ($\bar{x}$=1.24) and ($\bar{x}$=1.26) respectively.

**Table 4: Evidence on atmospheric change and its effects on extension service delivery and farmers respondents**

| **Respondents** | **Farmers** | | **Extension Agents** | |
|---|---|---|---|---|
| **Response** | **Mean ($\bar{x}$)** | **SD** | **Mean ($\bar{x}$)** | **SD** |
| Increased flooding | 3.05* | 0.977 | 3.01* | 0.940 |
| Rainfall intensity | 3.00* | 0.996 | 3.00* | 0.996 |
| Surface temperature | 2.98* | 0.879 | 2.99* | 0.923 |
| Increased rainfall intensity | 2.96* | 0.911 | 2.82* | 0.789 |
| Low rainfall intensity | 2.94* | 0.863 | 2.77* | 0.71 |
| Unpredictable weather pattern | 2.58* | 0.894 | 2.54* | 0.800 |
| Increase the rate of evaporation from the Earth | 1.44 | 0.696 | 2.48 | 0.882 |
| Rise in the water level of rivers | 1.35 | 0.827 | 2.40 | 0.853 |
| Observed flooding | 1.26 | 0.692 | 2.30 | 0.818 |
| Observed drought | 1.25 | 0.625 | 1.27 | 0.699 |
| Heavy Precipitation event | 1.24 | 0.600 | 1.26 | 0.692 |

***= $\bar{x}$ ≥ 2.50 = Extremely Beneficial, SD= Standard deviation**
**Source: Field survey, 2026**

## Conclusion and Recommendations

Climate change hinders extension services by disrupting traditional farming, reducing the efficiency and effectiveness of innovation and making it harder for extension agents to deliver timely and relevant information. Climate change is a multifaceted problem involving diverse interactions among the surroundings, natural assets (land, crops, animals, and water), and people. These connections are likely to change the environmental and agricultural landscape and, therefore, control agricultural output.

The extension workers should enlighten the farmers on atmospheric change adaptation strategies and weather forecast study for improved agricultural productivity, increase income level and minimise losses to boost their interest in effective extension services delivery. The respondents need to be guided/trained with expert skills to enable persons, neighbourhoods and the nation-states to deal with climate change risks and put adaptation into practice, as it is essential in order to reinforce climate change awareness in Nigeria to reach decision-makers, grassroots organizations, learners and scholars, who are on the forefront of delivering adaptation programs. Awareness and knowledge sharing must be made available to a wide range of persons, mainly those most vulnerable, as it would include an establishment, unique unit and avenue for organising and supporting the ordinary generation, administration, exchange and distribution of climate-related information and capacity-building programs.. Aboriginal persons should also be integrated within atmospheric change-oriented establishments to enable farmers have a sense of belonging, information, and awareness, as the level of public consciousness on issues related to atmospheric change in Nigeria is measured to be low. There is the necessity for reporters to look for avenues to make climate change information more appealing, perhaps by telling stories that reflect more on human perspective, as a high level of consciousness among farmers of climate change can be attributed to widespread awareness creation made through the print and electronic media and

through other public and religious groups. There is pressing need to enlighten farmers in local areas of Nigeria about climate change and build their technical ability to engage in alleviation and adaptation. Currently, many of them have minute or an insufficient acquaintance of climate change and its likely responses. Agricultural extension personnel should develop climate-smart farming education. Farmers also require having access to adaptive knowledge and innovations through extension and information networks as they need to be taught to be aware of the implications of some of their farming activities that can worsen environmental problems, for instance, mono-cropping, bush burning, indiscriminate use of man-made agrochemicals and tree felling.

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