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Research Article

An evaluation of the effects of natural disasters on agricultural practices by farmers in Kogi State, Nigeria.

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Keywords

Evaluation,
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Abstract

The Nigeria environment is very much known to be vulnerable to series of natural hazards which affect farmers and other non-farmers alike. It is on this basis that the study examined the effects of natural disasters on agricultural practices by farmers in Kogi State. Four (4) research questions were formulated based on the following specific objectives which include; (i) determine the major forms of natural disaster common in the study area; (ii) determine the causative agents of natural disaster; (iii) examine the major effects of natural disasters on agricultural practices by farmers and (iv) determine the measures to be taken to ameliorate the incidence of natural disasters on agricultural practices by farmers in Kogi State and one (1) null hypothesis guided the study. The population for the study involved all the male and female farmers from the twenty – one (21) Local government areas that make up Kogi State. It is a descriptive study involving four hundred and twenty (420) which was made up of 315 males and 105 female farmers were randomly sampled and used for the study. A 41-item questionnaire designed by the researcher and validated by four experts in agriculture and geography was used for data collection. Personal observation and visitation to affected sites were also used in gathering data for the study. The data collected were carefully analysed using frequency distribution, mean, standard deviation and t-test statistics. The study revealed that flooding, wildfire hazard, overgrazing, disease outbreak and windstorms are major forms of natural disaster in Kogi State. The identified natural disasters were discovered to emanate from geological, destruction of natural barriers and climatic factors. The study also showed that no significant difference existed between the responses of male and female farmers. Community wide awareness and education programs on natural disasters through effective campaign strategies; priority need to be given to support research that has bearing with disasters; shifting the period of dam evacuation and the need for historical studies as a way of helping to inform the development of appropriate methodologies for the assessment of future disaster among others were proffered as useful recommendations for curbing natural disaster in the study area.

Introduction

Before the Nigerian civil war of 1967, agriculture was known to have contributed immensely to 50 percent of the nation's gross domestic product (GDP), served as the major source of food security, accounted for over 70 percent of the foreign exchange earnings, supplied raw – materials to agro – allied industries and accommodated profitably over 70 percent of the labour force (employment). Because of these, agriculture has been known to have immeasurable role to the total existence of man (Oluwasanmi, 1996 & Adejoh, 2013).

As a step towards the improvement of the measurable roles of agriculture, Nigerian government has at several occasions introduced and implemented a number of fiscal policies and programmes. Some of these notable programmes and policies include, Operation Feed the Nation (OFN), Green Revolution (GR), River Basin Development Authorities (RBDAS), Directorate of Food, Roads and Rural Infrastructure (DFRRI) and Bank to Land (BL). Each of these, were charged with specific responsibilities of which the major one among others was to improve the food security situation of the nation. Upon

all these efforts by the government, food insecurity still prevails thus threatening the life and health of millions of Nigerians (Mkpado; Onuoha & Uduma, 2011).

The prevailing state of food insecurity may be as a result of the complex nature of agriculture. According to Bryant and Johnston (1992), agriculture is a complex system within which changes are driven by the joint effects of economic, environmental, political and social forces. Agriculture is known to be sensitive to climatic conditions and also vulnerable to weather and climate risks (Atanu, 2012). World Bank (1997) estimated that about three quarter of the extreme poor currently live in rural areas and depend on agriculture and related activities for their livelihood. The implication is that, low agricultural productivity combined with extreme poverty results thus making the population living in Nigeria the most vulnerable to natural disasters. These natural disasters constrains development as there are disruption of economic activity and diversion of government funds towards its control.

Natural disasters are natural events that threatens lives, properties and other assets. Apart from occurring naturally, they are likely to have effects on people or the environment. Many of these natural disasters are interrelated and intertemporally correlated and can cause tsunamis and drought which can lead directly to famine or population displacement (Wikipedia, 2003). They can be predicted and tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area. Most of these natural disasters have caused major loss of human lives and livelihood, the destruction of economic and social infrastructure, as well as environmental damages. Hoppe (2007) in support ascertained that millions of dollars are lost to the control of natural disasters resulting from different factors. Losses from natural disasters have increased dramatically.

Some of the common natural disasters are floods, drought, wildfire, disease, earthquake, tornado, windstorms etc. Most of these natural disasters are products of geological, environmental degradation, destruction of natural barriers, climatic, atmospheric and unforeseen factors. These major factors contribute immensely to the vulnerability of agriculture, forestry and rangelands.

The economic impacts of natural disasters are greater and more pronounced in poorer nations in which Nigeria is inclusive (UNISDR, 2003). Ironically, an attempt to address the impact of these natural disasters on agricultural sector has not received due attention it deserves by policy makers. The existence of this, over time will have a devastating effect on agricultural practices by Nigerian farmers in general and Kogi State in particular. The question now is, which of these factors aggravate natural disasters most and to what extent has this affected agricultural practices in Kogi State?

Purpose of the Study

The main purpose of the study is to examine the effects of natural disasters on agricultural practices in Kogi State, Nigeria. Specifically, the study sought to:

1. determine the major forms of natural disaster in Kogi State.
2. determine the causative agents of natural disasters in Kogi State.
3. examine the major effects of natural disasters on agricultural practice by farmers in Kogi State.
4. determine the measures to be taken to ameliorate the incidence of natural disasters on agricultural practice by farmers in Kogi State.

Research Questions

Based on the purpose of the study, the following research questions were formulated:-

1. Which of the following are the major forms of natural disasters common in Kogi State?
2. What are the causative agents of the common natural disasters in Kogi State?
3. What effects has natural disasters on agricultural practice by farmers and the general environment in Kogi State?
4. What are the measures to be taken to combat natural disasters in Kogi State?

Hypothesis

One null hypothesis was formulated and tested at 0.05 level of significance as follows:

There is no significant difference between the responses of male and female subjects on the effects of natural disaster on agricultural practices by farmers in Kogi State.

Methods

The study employed a descriptive survey research design. The study covered all the twenty – one (21) local government areas in Kogi State. The study population comprises of the male and female subjects in Kogi State. Twenty (20) subjects of fifteen (15) males and five (5) females were randomly picked or selected from each of the 21 local government areas. This gives a total of 420 subjects as the sample size for the study.

Using four point Likert Scale of Strongly Agree (SA); Agree (A); Disagree (DA) and Strongly Disagree (SD) representing 4, 3, 2 and 1 point respectively, a 41 – item questionnaire was designed and used for the study by the researcher. The designed questionnaire for the study was divided into two (2) sections (A – B). Section A was used to collect personal data

about the respondents while section B which was divided into four different components of B₁, B₂, B₃ and B₄ was made up of six; six; seventeen and twelve items, was used to address the four (4) research questions that guided the study.

The drafted questionnaire items was subjected to validation by four experts of which two are agricultural specialists and two are specialist in measurement and evaluation. The four validators, were drawn from Kogi State University, Anyigba and University of Nigeria, Nsukka. Forty (40) copies of the questionnaire were trial tested using test re-test method on forty (40) subjects in Benue State to determine the reliability of the instrument. Using Cronbach alpha, a reliability index of 0.83 was obtained.

Four hundred and twenty (420) copies of the questionnaire were administered by the researcher with the help of ten (10) other trained research assistants. All the administered questionnaire were correctly filled and returned. In addition to the questionnaire, personal observation and visitation to some sites in the state previously prone to natural disasters were also done by the researcher.

The data generated in the cause of the study, was analysed using frequency counts, mean and standard deviation while the only null hypothesis that guided the study was analysed using t-test statistics.

Decision Rule

Any item of the questionnaire that recorded mean score of 2.50 and above are regarded as been significant while those below 2.50 are insignificant for consideration.

Results

From the study, the following results emerged:

Research Question 1

Which of the following are the major forms of natural disasters common in Kogi State?

Table 1 shows that items 1, 3, 4, 5 and 6 recorded mean scores (x) above 2.50 signifying that these forms of natural disaster are common in Kogi State. The recorded standard deviation is between 0.142 – 0.503. Item 2 with means score (x) of 1.00 is below the cut-off point of 2.50 indicating that it is not a common natural disaster in Kogi Sate. Item 1 and 6 which is flooding and drought recorded the highest mean scores (x) of 3.52 and 3.51 showing that flooding and drought are the most commonest forms of natural disasters in Kogi State.

Research Question 2

What are the causative agents of the common natural disasters in Kogi State?

Table 2 shows that items 2,4 and 6 recorded mean scores (x) of 2.67, 3.67 and 3.62 which are above the decision rule of 2.50 indicating that they are causative agents of natural disasters in Kogi State while items 1,3 and 5 recorded mean scores (x) of 1.25, 2.17 and 2.31 which are below the decision rule of 2.50 showing that they not significant causative agents of natural disaster in Kogi State. The table also shows that the most causative agent of natural disaster is destruction of natural barriers like opening of dams which recorded the highest mean score (x) of 3.77 followed closely by that of climatic factors with mean score (x) of 3.62. The standard deviation recorded ranges between 0.208 to 0.613

Research Question 3

What effects has natural disaster on agricultural practice by farmers and the environment in Kogi State?

Table 3 shows that items 1-17 recorded mean scores (x) above the cut-off point of 2.50 indicating that all the items are regarded as effects of natural disasters on agricultural practice by farmers and the environment in Kogi State. Items 16 recorded the highest means score (x) of 3.94 showing that natural disaster makes the land unsuitable or infertile for agricultural production while items 7 and 11 recorded low mean scores (x) of 3.35 and 3.37 respectively indicating that natural disaster does a lot of harm but less in the areas of increasing famine and collapse of economic trees. The standard deviation recorded is between 0.197 to 0.232 showing that the factors were very significant.

Research Question 4

What are the measures to be taken to combat natural disaster in Kogi State?

Table 4 shows that items 1 – 12 recorded high mean scores (x) above the cut off point of 2.50 indicating that all the items are useful measures of combating natural disasters in Kogi State based on the responses of the subjects. The mean scores (x) recorded was between 3.60 and 3.81. The standard deviation recorded were between 0.300 and 0.313 showing that all the measures were very desirable in curbing the effect of natural disasters.

Hypothesis

There is no significant difference between the responses of male and female subjects on the effects of natural disaster on agricultural practices by farmers in Kogi State.

The results of the hypothesis is as presented below:

The table above shows that the mean of male is 3.61 and their standard deviation (SD) is 0.83 while the female has mean value to be 3.46 and standard deviation of 0.79. The

Table 1: Table showing different forms of natural disasters

| S/NO | Description of items | SA 4 | A 3 | DA 2 | SD 1 | dFx | \bar{X} | SD |
|------|----------------------|---------|--------|---------|---------|------|-----------|-------|
| 1 | Flooding | 251 | 129 | 26 | 4 | 1477 | 3.52 | 0.503 |
| 2 | Cyclones | 0 | 0 | 4 | 416 | 420 | 1.00 | 0.142 |
| 3 | Overgrazing | 184 | 124 | 101 | 15 | 1309 | 3.12 | 0.445 |
| 4 | Wild fire hazard | 180 | 121 | 116 | 4 | 1355 | 3.23 | 0.461 |
| 5 | Wind storms | 192 | 113 | 95 | 20 | 1317 | 3.14 | 0.449 |
| 6 | Drought | 250 | 130 | 25 | 5 | 1475 | 3.51 | 0.501 |
| 7 | Disease outbreak | 194 | 125 | 81 | 10 | 1323 | 3.15 | 0.450 |

SA: Strongly Agree, A: Agree, DA: Disagree, SD: Strongly Disagree.

Table 2: Causative agents of natural disaster in Kogi State**N=420**

| S/NO | Description of items | SA 4 | A 3 | DA 2 | SD 1 | EFx | \bar{X} | SD |
|------|--|---------|--------|---------|---------|------|-----------|-------|
| 1 | Mode of settlement pattern | 16 | 4 | 51 | 349 | 527 | 1.25 | 0.208 |
| 2 | Geological factors (e.g. Nature of soil particles, topography etc) | 101 | 96 | 211 | 9 | 1123 | 2.67 | 0.444 |
| 3 | Environmental degradation (e.g bush burning, overgrazing etc) | 91 | 101 | 118 | 10 | 913 | 2.17 | 0.362 |
| 4 | Destruction of natural barriers (e.g. opening of dams etc) | 301 | 103 | 13 | 3 | 1542 | 3.67 | 0.613 |
| 5 | Farm practices | 71 | 68 | 201 | 80 | 970 | 2.31 | 0.385 |
| 6 | Climatic factors (e.g. heavy rainfall, wind storms etc) | 311 | 83 | 17 | 9 | 1519 | 3.62 | 0.603 |

Table 3: Effects of natural disaster on agricultural practice by farmers and the environment in Kogi State.**N=420**

| S/NO | Description of items | SA 4 | A 3 | DA 2 | SD 1 | dFx | \bar{X} | SD |
|------|---|---------|--------|---------|---------|------|-----------|-------|
| 1 | Water logging of farmlands | 313 | 101 | 5 | 1 | 1566 | 3.73 | 0.219 |
| 2 | Destruction of properties | 309 | 107 | 2 | 2 | 1563 | 3.72 | 0.218 |
| 3 | Renders people homeless | 321 | 98 | 1 | - | 1580 | 3.76 | 0.221 |
| 4 | Exposes aquatic animals e.g. fishes | 292 | 121 | 3 | 4 | 1541 | 3.67 | 0.216 |
| 5 | Seization of farmlands | 321 | 86 | 10 | 3 | 1565 | 3.73 | 0.219 |
| 6 | Increases government capital expenditure (overhead cost increases) | 301 | 119 | - | - | 1561 | 3.72 | 0.218 |
| 7 | Increase famine | 226 | 127 | 53 | 14 | 1405 | 3.35 | 0.197 |
| 8 | Increases cost of production | 310 | 109 | 1 | - | 1569 | 3.74 | 0.220 |
| 9 | Reduction of farmers' income | 381 | 21 | 16 | 2 | 1621 | 3.86 | 0.227 |
| 10 | Increases nutrient loss and thus leads to low crop yield | 319 | 83 | 17 | 1 | 1560 | 3.71 | 0.218 |
| 11 | Collapse of economic trees | 201 | 181 | 30 | 8 | 1415 | 3.37 | 0.198 |
| 12 | Collapse of farm structures | 293 | 120 | 4 | 3 | 1543 | 3.67 | 0.216 |
| 13 | Roads are eroded away thus hindering transportation of goods and services | 313 | 104 | 2 | 1 | 1569 | 3.74 | 0.220 |
| 14 | Total collapse of agricultural investment | 299 | 101 | 15 | 5 | 1534 | 3.65 | 0.216 |
| 15 | Loss of potential production due to disturbed flow of goods and services | 311 | 107 | 2 | - | 1569 | 3.74 | 0.220 |
| 16 | Make land unsuitable or infertile for agricultural production. | 317 | 103 | - | - | 1577 | 3.94 | 0.232 |
| 17 | Stress induced sickness reduce the life span of the farmers | 303 | 99 | 17 | 1 | 1544 | 3.68 | 0.217 |

Table 4: Measures towards curbing natural disaster in Kogi State.

N=420

| S/NO | Variables | SA 4 | A 3 | DA 2 | SD 1 | dFx | \bar{X} | SD |
|------|---|---------|--------|---------|---------|------|-----------|------|
| 1 | Educating people about flooding risks via the environmental management agency | 303 | 111 | 4 | 2 | 1555 | 3.70 | .308 |
| 2 | Examining settlement rules/regulations | 317 | 98 | 4 | 1 | 1571 | 3.74 | .313 |
| 3 | Intervention of weather forecasters | 289 | 113 | 16 | 2 | 1529 | 3.64 | .310 |
| 4 | Creating of multiple water reservoirs to accommodate excess water release. | 324 | 83 | 9 | 4 | 1567 | 3.73 | .310 |
| 5 | Intensifying the supervisory roles of urban and regional planning agency | 313 | 102 | 4 | 1 | 1567 | 3.73 | .310 |
| 6 | Creating of channels as outlets for water release | 302 | 109 | 9 | 2 | 1549 | 3.69 | .307 |
| 7 | Shifting the period of evaluation of dams from the rainy season period to dry season. | 341 | 79 | - | - | 1601 | 3.81 | .312 |
| 8 | Effective campaign strategies through media | 289 | 103 | 18 | 10 | 1511 | 3.60 | .300 |
| 9 | Purchasing flood insurance | 301 | 113 | 0 | 2 | 1553 | 3.70 | .307 |
| 10 | Avoid living at a low lying area | 296 | 121 | 2 | 1 | 1552 | 3.70 | .307 |
| 11 | Construction of barriers (leaves, beams, flood walls) to stop flood water | 310 | 89 | 16 | 5 | 1544 | 3.68 | .306 |
| 12 | Seal walls in basement with water proofing compounds to avoid seepage. | 299 | 87 | 31 | 3 | 1522 | 3.62 | .302 |

Table 5: T-test on the mean rating of male and female subjects on the effects of natural disaster on agricultural practices by farmers in Kogi State.

No for Males = 315; Females = 105

| Variables | N | Mean value (\bar{x}) | Standard deviation (SD) | t-cal | t-tab | df | p | Remarks |
|-----------------|-----|--------------------------|-------------------------|-------|-------|-----|------|----------------|
| Male subjects | 315 | 3.61 | 0.83 | 0.562 | 1.960 | 418 | 0.05 | No significant |
| Female subjects | 105 | 3.46 | 0.79 | | | | | |

calculated table value (t-cal) is 0.562 as against table value (t-tab) of 1.960 at a degree of freedom (df) of 418. As the t-cal of 0.562 is less than t-tab of 1.960, it therefore means that no significant difference exist thus making the null hypothesis formulated to be upheld.

Summary of major findings

The following major findings emerged from the study:-

1. The major forms of natural disaster in Kogi State are flooding; wildfire hazard; overgrazing; disease outbreak; drought and windstorms.
2. Natural disaster in Kogi State are caused by agents arising from geological factors, destruction of natural barriers (opening of dams) and climatic factors such as heavy rainfall and windstorms.
3. Natural disaster majorly affect agricultural practices by farmers and the environment by
 - reducing farmers’ income
 - making land unsuitable for agricultural production
 - rendering people including farmers homeless.

- increasing cost of production
- causing erosion on roads and hinder transportation of goods and services.
- leading to loss of potential production
- leading to seizure of farmlands
- causing water logging of farmlands.
- causing of destruction of properties.
- increasing government capital expenditure (over head cost).
- leading to collapse of farm structures and agricultural investment
- causing sudden stress and reduction in the life span of farmers and
- promoting leaching of vital soil nutrients which will subsequently lead to decrease in crop yield.
- Natural disasters can be controlled via
- Effective campaign by the environmental management agency
- Examining settlement rules and regulations

- Creating multiple water reservoirs
 - Intensifying the supervisory roles of urban and regional planning agency.
 - Creating of channels as outlets for water release
 - Shifting period of dam evacuation to the dry season period.
 - Purchasing of flood insurance
 - Construction of barriers
 - Using of water proofing compounds to seal walls as to avoid seepage.
 - Using media as campaign strategies against natural disaster.
1. Male subjects opinion about natural disaster in Kogi State does not differ significantly from that of their female counterparts.
 2. From personal observations and visitations, it has been seen that the most pronounced natural disaster is that from flooding which was very common along the river Niger and Benue in Lokoja, Idah and Ibaji areas of Kogi State. Apart from this, occurrence was also noticed in Kogi West of Kogi State which can be attributed to the clay nature of their soil.

Discussion of findings

Natural disasters occurred in Kogi State and they are in the form of flooding, wildfire, overgrazing, disease outbreak, wind storms and drought. The ones that are majorly pronounced and disrupt agricultural practice by farmers are flooding, drought and overgrazing. In support of this, Hoppe (2007) observed that the commonest natural disaster or hazards are drought, floods, wind storms, wild fires and they have caused major loss of human lives and livelihood, the destruction of economic and social infrastructure, as well as environmental damages. Furthermore, Atanu (2011) outrightly stated that farmers farming activities for the past four years have been disrupted by serious flooding, overgrazing by farm animals and occasional existence of drought which has led to a draw back in farmers' turnover in terms of output and seizure of farmlands in some serious cases.

Natural disaster in Kogi State arises from combined factors of geological, destruction of natural barriers, climatic factors and Environmental degradation. In agreement with this, Udale (2012), observed and stated clearly that, man's activities as it relates to geological, destruction of natural barriers and general environmental interference has greatly aggravated the incidence of natural disaster in the state. He further added that, if the situation is not brought under control, agricultural activities will be jeopardized thus increasing the intensity of famine among most households in the state. In another dimension Davidson (2011) stated that due to incessant activities of man, a lot of destruction

has been done to the environment leading to disequilibrium of the ecosystem and degradation of the environment which in excess cases results into soil nutrient loss and interference in agricultural practice by farmers. Udale (2013) in his study observed and stated that the existence of natural disasters will results into destruction and seizure of agricultural lands; destruction of farmers and non – farmers properties, increase the cost of transportation and production activities including collapse of farm structures which affect agricultural investment in developing countries where the source of control is far fetched.

In support As Das (2003) explained further that within hours of occurrence of natural disasters produce direct damage to agriculture in terms of total or partial destruction of farm buildings, installations, machinery, equipment, means of transport, storage as well as damage to crop land, irrigation works, dams, and destruction of crops ready for harvesting.

Following the serious damages done to the farmers and the environment, a lot of control major measures has been identified in the cause of this study as follows; campaign by the environmental management agency should be intensified, settlement pattern should follow rules and regulations, purchasing of flood insurance, creating of channels as outlets for water release and shifting of dam evacuation to the dry season period. Supporting this, Daniel (2002) stated that natural disasters can be effectively minimized through such measures as improved use of climate and weather information and forecasts, early warning systems, land and natural resource management, agricultural practices, the ecosystem conservation in order to reverse the current trends and minimize degradation of land and water resources.

There is no significant difference between the opinions of the male and female respondents on the general impact of natural disasters in Kogi State. The reason been that the pinch of these impact is equally felt without any sex discrimination.

Finally, impact and the general effects of natural disasters based on personal observations and visitations to sites of occurrence has majorly restricted to riverine areas compared to places that are not close to the river. This is the more reason why the 2012 flood disaster in Kogi State was more pronounced in Lokoja and Idah areas of Kogi State. Other places including Kogi West experienced this from tributaries of river Niger and Benue together with the nature of their soils.

Conclusion

Natural disaster exist in Kogi State been the study area. The major natural disasters in existence are in the forms of flooding, drought, wildfire, windstorms and overgrazing but

more pronouncedly are flooding and drought. Cyclones as natural disasters are known to majorly arise from destruction of natural barrier like opening of dams, climatic factors like heavy rainfall and geological factors due to soil nature and characteristics. The effects of natural disasters are enormous and numerous and some of the major ones are; making land unsuitable for agricultural production, reduction of farmers' income, loss of potential production, increase cost of farm operations, destruction of properties, renders farmers homeless, destroys farm structures, increase government capital expenditure and induce stress sickness among farmers thus reducing their life span.

From the studies, it was concluded that there is no significant difference between the views of the male and female subjects on the agents, causes, effects and possible approaches to be adopted towards the control of natural disaster in Kogi State. Some areas like the Kogi West Senatorial district of the state experienced minimal flooding due to the nature of their soil which is clay inclined.

Recommendations

Based on the findings and discussions, the following recommendations can be proffered as this will help reduce the incidence of natural disaster to a greater extent.

1. The period of dam evacuation should be shifted from the rainy season period when rainfall is heavy to the dry season period.
2. There must be greater investment in disaster reduction rather than high profile response efforts.
3. Improved data on past disasters would help inform investment and policy decisions and thus help become more appropriate levels and forms of disaster prevention; mitigation and preparedness.
4. There is need for historical studies as this would help inform the development of appropriate methodologies for the assessment of future disaster.
5. It is very important to develop mechanisms for more efficient assessment and documentation of natural disaster impacts in agriculture.
6. Priority need to be given to support research with practical applications since research is very useful to understand the physical and biological factors that contribute to disasters.
7. There is need for community – wide awareness and education programs on natural disasters through effective campaign strategies.
8. Programs for improving prediction methods and dissemination of warnings should be expanded and intensified.
9. The supervisory roles of urban and regional planning agency should be intensified.
10. Finally, settlement rules and regulations should be strictly observed.

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