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Effect of Deforestation on Energy Resources: A Climate Change Crisis Analysis using Pearson Product Moment Correlation.

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Abstract

This study is aimed at carrying out a study on the effects of deforestation caused as a result of global warming and climate change crisis Delta state precisely. The objectives of the study are to: determine various sources of deforestation and the impacts on the environment. Also, mitigation measures and government regulations are put in place to reduce the impact of deforestation in the environment. The problems investigated are loss of trees, allows for flooding, soil erosion, deforestation, hyper temperatures, climate change, increase in global warming and the environmental effects on man. The methodology involves the use of questionnaires and 200 questionnaires were administered to respondents that lives in the environment. Test of reliability of the experiment was done from the data gotten from questionnaires distributed to staffs (X) and residents (y). The data from the questionnaires were analyzed using Pearson product moment correlation method between the dependent (y) and independent (X) variables. The result of the study From the Pearson product moment correlation value (r = 0.92), confirming that there exist a strong correction between the response of the employees and residents. The findings of the research showed that most of the respondents have little knowledge of the consequences of deforestation. It was also found out that the main economic activities of the indigenes were farming, logging, which resulted in destroying large areas of land because they do not take any measures to conserve the forest in search of their basic daily needs. The study recommends that enforcement enacted against logging, education/awareness creation on effects of deforestation, re-introduction of tree planting programs, nurseries should be established in each of the communities to enable them raise seedlings for planting. There should be government regulations to curb the felling of trees by enforcing a serious rules and laws to govern it and the government should enforce a law to ensure monitoring the forests and defaulter penalized. Finally, the government should educate the people, because many are entirely unaware of the global warming problem.

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1. Introduction

Deforestation is the practice of permanently removing or uprooting trees from the ground to give rise to something else other than forests [1]. The reasons for deforestation are mainly to ensure that there is sufficient land for cultivation, infrastructure purposes, residential purpose, and manufacturing or industrial purposes. Deforestation is not only caused by human intervention but it can also be caused by other natural causes [2]. For example, when natural fires occur, large swathes of land covered by forests are crucial for conservation and human survival. Without forest people will lack the natural herbs they can use as medicine, without forests, the habitat for animals of all species will become destroyed. Forest cover also ensures that the air that the people breathe is filtered and the earth surface is not affected by the harmful rays from the sun. Despite the increasing importance of forest cover, many people contend that forests occupy lands that would otherwise be used for human settlement, development and civilization. Forests cover occupies land that would otherwise be converted into paring areas to be used for crop and livestock farming.

The rise in urbanization steadily over the past few years has seen a decline in the forest cover in the world. Large towns and cities now stand in place of areas that were once booming forests. The food and agricultural organization estimates that by 2050 at least 68% of the world's population will be living in urban centers [3]. The current urban centers cannot sustain all these people leading to the expansion of towns and cities. The expansion of towns cannot happen without the decimation of the natural environment around them such as forests and other critical natural resources like Rivers.

For many decades our societies have pursued the objectives of economic growth and material progress on the other hand, adverse effects have also been generated, the consequences of which one today has to pay for dearly. Environmental problems, affected quality of living in some aspect and the rise of inequalities are some of the numerous reasons why economic growth does not any longer positively impact on life satisfaction[4].There is overwhelming evidence and Conesus that deforestation is one of the major causes for climate change. In fact, the impacts of climate change are occurring faster than what was first predicted. An estimated 75 to 80% of glide emissions stern from industrial sources, specifically, the burning of fossil fuels [5]. The remaining 20 to 25% can be sourced to deforestation emissions predominantly in the tropics. But the burning of fossil fuels and deforestation, most be urgently and effectively addressed in order to save the world's biodiversity and people from catastrophic climate change. At this time, a new opportunity exists to address the issue of deforestation within the climate change regime due to the rapid increase in deforestation in the area as a result of increase in population and use of firewood for domestic purposes.

Forests plays vital role in the economic development of the country.it provides resources for basic livelihood needs. This is especially true for the poor and rural populations. more than 200 million inhabitants of the forest and the livelihoods of poor immigrants is directly depended on the food, fiber, fodder, fuel and other resources taken from the forest or produced on recently cleared forest soils[6].medical researchers in the tropical rainforests continues making new discoveries each year from plants. these plants may contain the cure for cancer or some clues that could lead to a scientific discovery[7].Deforestation is one of the main environmental problems in third world

countries[8]and rapid depletion of forest resources is causing social and economic problems in the world. Every year, large areas of rainforest were cut down in the whole world.

2 Methodology

2.1 Area of Study

The area of study in this research work is in Ughelli and its environs in Ughelli North Local Government of Delta State covering 25 (twenty-five) local government areas situated in the southern part of the Nigeria.

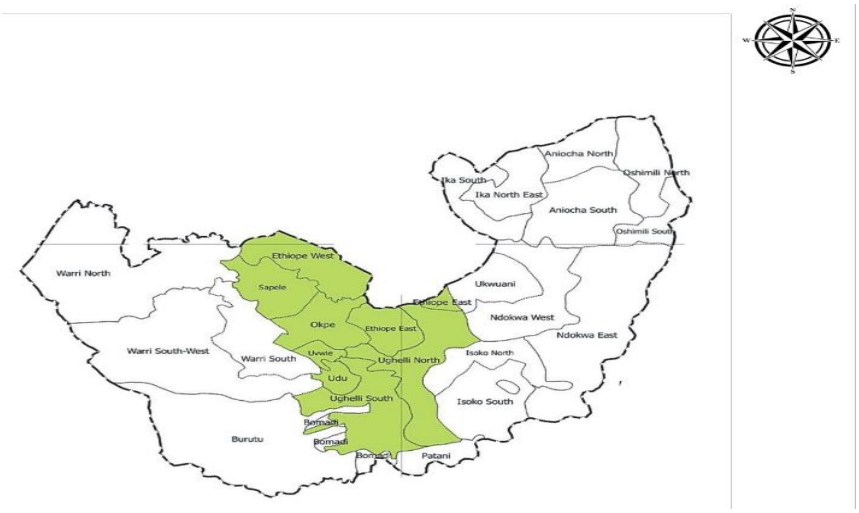

Figure 1: Showing the map of Delta State (source: Fusel and Klen, 2006)

2.2 Sampling and Sampling Techniques

The sampling which comprise of one hundred respondent that are government workers and one hundred respondents of people living the area of the study were derived from the above populations. In orders to get this population different work place and people close to those area chosen at random and given questionnaires to respond to the research question raised. The samples was also considered an adequate source [9] which highlighted that if the population of the study is in thousands, 5 % or less is adequate.

2.3 Data collection

2.3.1. The Use of Questionnaires

The research was a quasi-experimental descriptive survey, aimed at eliciting opinions of government people and people that are involved in the area of study in Ughelli and its environs within Delta state. The design was used to obtained relevant information on the research work.

2.3.2 Population of the Study

The population comprised of 200 (two hundred) people in the study area. 100 (one hundred) people are government workers while the other 100 (one hundred) people are peoples that lives in the environment/area within Ughelli and its environs were used for the study.

2.3.3 Instrument of the Study

Two sets of questionnaires formed the basis of the study. One of the questionnaires, which

collected data from the government workers, had thirty (30) items focused on collecting data on the 10 (Ten) research questions. The other questionnaires which collected data from people that lives in the area of study, had thirty (30) items focus on collecting Ten (10) research questions as well. Items in the questionnaires have a structure response pattern of

i. Strongly agree (SA)
ii. Agree (A)
iii. Undecided (U)
iv. Disagree (D)
v. Strongly Disagree (SD)

2.3.4 Validity of Instrument

This questionnaire was adopted from the study of (10) and the instrument was validated by two Lecturers of environmental statistics in the department of statistics, Chukwuemeka Odumegwu Ojukwu University, Uli.

2.3.5 Reliability of the Instrument

The reliability coefficient of the instrument was determined using Pearson product moment correlation coefficient (r). The reliability co-efficient of correlation was obtained. Two set of questionnaires formed the instrument of study.

2.3.6 Method of Data Analysis

In analysis the data, the researchers made use of mean scores to answer the research question that guided the study. In doing this a cut-off mean score of 3 and above was regarded as constituting a problem while a mean score of less than 3 was regarded as not being a problem was given the following value by the researchers.

i.	Strongly Agree	(SA)	5 values
ii.	Agree	(A)	4 values
iii.	Undecided	(U)	3 values
iv.	Disagree	(D)	2 values
v.	Strongly Disagree	(SD)	1 value

With the formula $\bar{x} = \frac{Efx}{N}$ the mean was calculated

Where $\bar{x}$ = mean

E = frequency of observation

X = individual occurrence

N = Sample number

Decision Rule: The mean score determined the cut-off point, which is 3.0 any responsible mean that is equal to or greater than 3.0 was accepted as agreed while responds less than 3.0 was regarded as disagreed.

3.Results and Discussion

3.1 Correlation Coefficients-Computation

In this research the Pearson product moment correlation coefficient (Pearson r) was used. The Pearson r coefficient was necessary to ascertain if the research questions reflect if there is a problem or not for further analysis. Pearson (r) is employed when the distribution is bivariate, continuous and normal (or approximately so) however, the scores of the individuals concerned in each variable are ranked in order magnitude.

Thus, the resulting ranks are used for the computations.

A total of ten (10) question were carefully and scientifically developed from the problems deserved from several literatures reviewed in the case of this research. This question formed the basis of the questionnaires that was distributed in Ughelli in Delta state the Southern part of Nigeria. The questionnaires were divided into two categories, as follows.

i. Questionnaires for deforestation crisis, staffs mark X
ii. Questionnaires for deforestation crisis, resident marked Y

The questionnaires administered were well distributed and filled by workers and residents. The questionnaires were collected and the mean of each of the thirty (30) question were carefully calculated and tabulated in the table for the Pearson product moment correlation coefficient (Pearson r) to be calculated and computed using the formula's below

X = X-Y = deviation from the mean of X and Y scores

Y = Y-X

Thus, $\frac{\sum x}{n}$ n = number of variables

Y = $\frac{\sum x}{n}$

After the tables have seen formulated the Pearson r co-efficient is calculated using,

$$r = \frac{\sum x}{\sqrt{(\sum x^2)\,(\sum y^2)}} \quad \text{---------- 3.1}$$

Supposing the mean X and Y involved fractions or decimals then X and Y will involve fractions. To remove the rigors involved on multiplying decimals by decimals and premature approximations, the raw score or machine formula approach is adopted.

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)\;(n\sum y^2 - (\sum y)^2)}} \quad \text{---------- 3.2}$$

(2)

3.2 Test of Reliability of the Experiment

The reliability coefficient of the experiment determined using Pearson product moment correlation (r)

Table 3.1: where X represent staffs and Y represent resident

S/N	Description of Question	X	Y	XY	X^2	Y^2
1.	Deforestation led to environmental consequences such as global warming.	4	4	16	16	16
2.	Deforestation led to environmental consequences such as biodiversity loss and livelihood	4	4	16	16	16
3.	Deforestation led to environmental consequences such as soil degradation	4	4	16	16	16
4.	Deforestation led to environmental consequences such as soil degradation	4	4	16	16	16
5	Deforestation led to environmental consequences such as natural forest fire.	4	4	16	16	16
6	Livelihood activities causing deforestation such as agriculture	4	3	12	16	9
7	Livelihood activities causing deforestation such as wood fuel production	4	3	12	16	9
8	Livelihood activities causing deforestation such as chainsaw operation	4	4	16	16	16
9	Population growth/urbanization led to deforestation	4	4	16	16	16
10	Over-grazing led to deforestation	4	4	16	16	16
11	Lumbering can lead to deforestation	4	4	16	16	16
12	Deforestation led to environmental aspects such as increased gullies.	4	4	16	16	16
13	Deforestation led to environmental aspects such as decreased in plants and wild animals	4	4	16	16	16
14	Deforestation led to environmental aspects such as increased in the atmospheric temperature	4	4	16	16	16
15	Deforestation led to increased household expenditures (to buy forest products)	4	4	16	16	16
16	Deforestation led to increased nursery of people (due to decreased availability of forest products).	3	3	9	9	9
17	Deforestation led to decreased productivity in farm produce	4	4	16	16	16
18	Deforestation led to decreased social cohesion. (Increased conflict among the people).	3	3	9	9	9
19	Deforestation led to reduced household income	4	4	16	16	16
20	Deforestation led to rise in sea level	3	3	9	9	9
21	Deforestation led to ecosystem collapse and death	3	3	9	9	9
22	Deforestation led to climate imbalance and climate change	3	3	9	9	9
23	Deforestation led to increase in greenhouse gas emissions	3	3	9	9	9
24	Deforestation led to floods	4	4	16	16	16
25	Deforestation leads to wildlife extinction	4	4	16	16	16
26	Deforestation leads to food insecurity in the future	3	3	9	9	9
27	Deforestation leads to the decline in life quality of people	4	4	16	16	16
28	Deforestation leads to increase of carbon-dioxide in the atmosphere and burning fossil fuel make our ocean more acidic	3	3	9	9	9
29	Deforestation leads to habit loss	2	2	4	4	4
30	Deforestation leads to soil erosion desertification	2	2	4	4	4
Total		108	106	392	400	386

DATA

$$\sum x = 108 \sum y = 107 \sum xy = 396 \sum x^2 = 400 \sum y^2 = 393 \, n = 30$$

Thus, mean = X = $\frac{\sum x}{n} = \frac{108}{30} = 3.6$

Y = $\frac{\sum y}{n} = \frac{106}{30} = 3.5$

In the above case the mean X and Y involved fractions then X and Y will involve fractions. To remove the rigor in multiplying decimals and premature approximation, the raw score or machine formula approach is adopted.

Raw Score or Machine Formula

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)\ (n\sum y^2 - (\sum y)^2)}}$$

$$r = \frac{30\ X\ 392 - (108\ X\ 106)}{\sqrt{(30\ X\ 400 - 108^2)\ (30\ X\ 386 - \ 106^2}}$$

$$r = \frac{11760 - 11448}{\sqrt{(12{,}000\ -\ 11664)\ (11580\ -\ 11236}}$$

$$r = \frac{312}{\sqrt{(336\ X\ 344)}}$$

$$\frac{312}{r = \sqrt{115584}}$$

$$r\ = \frac{312}{339.976}\ = 0.9177 \sim 0.9$$

$$r\ = 0.92$$

From the Pearson product moment correlation value (r = 0.92), confirming that there exist a strong correction between the response of the employees and residents.

4.0 Conclusion and Recommendation

4.1 Conclusion

From the result of this study, the researcher conclude that the deforestation level measure shows that the deforestation existing in Delta State is beyond the permissible exposure of government regulations. People are also over exposed to deforestation crisis in their various occupation at works place, above the permissible exposure of government regulations. the data from the

questionnaire analyzed using Pearson moment correlation (r) was 0.9177 showing a strong correlation between the respondents. Deforestation in the study area was caused by poverty, unemployment, illegal logging, subsistence agriculture and fuel wood exploitation which has created negative impact that is contributing greatly to the recent changes occurring in climate change. From the research work, the researcher was able to know some climate change resulting from deforestation with negative impacts such as increase in ambient temperature, drought, flooding, erosion, biodiversity loss, and increase in global warming, increase in greenhouse gas emissions, famine, ecosystem collapse and death. It has been established that forest serves as carbon sinks. Therefore, improper deforestation practice will only add to the amount of CO_2 already in the atmosphere.

4.2 Recommendation

There should be government regulations to curb the falling of trees by enforcing a series of rules and laws to govern it. Banning and clear cutting of forest will curb the total depletion of the forest cover. It is practical solution and it is very feasible. Reforestation and afforestation should be enforced and land skinned of its tree cover for urban settlements should urge to plant tree in the vicinity and replace the cut trees. Reduce consumption of paper, try to reduce consumption, reduce waste of paper and also opt for recycled paper products make life simple and wherever possible, go paperless. The government should educate the people because many are entirely unaware of the global warming, we are facing by sharing the deforestation facts, its causes, and the effect. This can make an impact. It resources such as funds, facilities and man-power are the constraints, every effort should be made that they are available and adequate for the authorities to undertake their tasks.

Programs and activities undertaken by any stake holder in enhancing socio-economic well-being and reforestation should be encouraged. Facilities and resources should also be made available to support this noble deeds. The impediment is also a strategy of the authorities where physical boundaries are placed around the forest to prevent the people form encroachment on the forest and patrolling. The promotion of alternative energy efficient and renewable sources should be encouraged to reduce the dependence on the use of fire wood.

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APPENDIX

A questionnaire on the effect of deforestation on energy resources – a climate change crises using Pearson product moment correlation

Instruction: Please tick (√) where applicable in the space provided below.

Strongly Agree (SA), Disagree (D) Undecided (U), Agree (A), Strongly Disagree (SD) gender male ( ), Female ( )
Marital Status: Married ( ), single ( )

Employment Status: Employed: ( ), Unemployed ( )

S/N	Questions	SD	D	U	A	SA
1	Deforestation lend to environmental consequences such as global warming.					
2	Deforestation lend to environmental consequences such as biodiversity loss and livelihood.					
3	Deforestation led to environmental consequences such as soil degradation.					
4	Deforestation led to natural factors such as drought					
5	Deforestation led to natural factors such as natural forest fires.					
6	Livelihood activities causing deforestation such as wood fuel production					
7	Livelihood activities causing deforestation such as agriculture.					
8	Livelihood activities causing deforestation such as chainsaw operation.					
9	Population growth/urbanization can lead to deforestation.					
10	Over-grazing can lead to deforestation					
11	Lumbering can lead to deforestation					
12	Deforestation led to environmental aspect such as increase gullies.					
13	Deforestation led to environmental aspect such as decreased in plants and wild animals					
14	Deforestation led to environmental aspect such as increased in atmospheric temperature.					
15	Deforestation led to increased household expenditures (to buy forest product)					
16	Deforestation leads to increased misery of people (due to decreased availability of forest products)					
17	Deforestation leads to decreased productivity in farm produce					
18	Deforestation leads to reduced household income					
19	Deforestation leads to decreased social cohesion (increased conflict among the people).					
20	Deforestation leads to rise in sea level					
21	Deforestation leads to ecosystem collapse and death					
22	Deforestation leads to climate change imbalance and climate change					
23	Deforestation leads to increase in greenhouse gas emission					
24	Deforestation led to flood					
25	Deforestation leads to wildlife extinction					
26	Deforestation leads to food insecurity in the future					
27	Deforestation leads to the declined in the quality of people					

28	Deforestation led to increase of carbon dioxide in the atmosphere and burning fossil					
29	Deforestation leads to habitant loss					
30	Deforestation leads to soil erosion desertification					