

How Have Deforestation Affected Economic and Social Welfare: The Case of Port Harcourt City

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Abstract

This work internalized the influence of deforestation on economic and social welfare in Port Harcourt City. The study espoused the survey approach through special surveillance, conversations and opinion poll and the data collected was analyzed to obtain the variances, correlations and regression models. The results of the research showed that deforestation significantly and negatively affected output and social welfare in Port Harcourt City and also negatively and significantly affected income of the farming communities. It therefore recommended that governments should take urgent steps to discourage unsustainable deforestation and at same time encourage reforestation to improve output, income and enhance social welfare.

Keywords: Deforestation; Reforestation; Biological species; Biodiversity; Biodegradation.



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1. Background to the Study

There is seemingly a widespread belief among analysts (especially environmentalists) who hold the view that the present rate of destruction of forests is exceeding the ideal ratio required to support human well-being in both present and future generations. Deforestation, as stated in Agbarakwe (2014), removes the vegetation and increases the speed of water run-off, reduces percolation and water retention capability of the area and therefore reduces evaporation and rainfall.

“Intergenerational considerations are also important in this case, as future generations' preferences may not be taken into account in making current decisions on land use” (Andersen and Reis, 1997). The reasons for deforestation varies from agricultural, land degradation with pesticides and fertilizers, housing, urbanization, road construction, collection of firewood, strip mining, harvesting of timber, overgrazing, etc. These are intentional causes. There are also unintentional causes like wild fire, oil pollution, wind, natural landslides etc (Ukpong, 1994). It is essential to identify and properly appreciate the exceptional socio-economic generosity of forests to societal well-being and developmental progress. However, the array of variations in such generosity ought to be a foremost basis of worry as it relates to ecological sustainability, ecosystem services, or economic benefits (Agrawal *et al.*, 2013).

The highly endowed rich evergreen forest of Nigeria especially within the southern region where so many rivers are located, the forests are mostly wet lands that help to drain rain waters to the Atlantic Ocean. In addition to the function of draining waters, these forests, usually called rain forests, are habitat to millions of biological species – plants and animals, on which the society depend for food, beverages, herbs, building materials and recreational activities such as swimming, boat/raft riding etc.. In the upland areas of Rivers State (Ikwerre land), these rain forests were in abundance accommodating a wide variety of biological species and therefore provided a variety of economic opportunities, hence, employment for the people and sustaining a comparatively improved level of social welfare.

Port Harcourt City is sitting in the middle of these forests close to the creeks of the Atlantic Ocean in the present day Port Harcourt Local Government Areas. Since the location of the city there, economic activities have so astronomically expanded that the city now extended to consist the present day Port Harcourt and Obio/Akpor Local Government Areas (LGAs) and has even spread to Ikwerre, Etche, Oyiabo, Eleme and Okirika Local Government Areas (LGAs). This work concentrated on Port Harcourt and Obio/Akpor LGAs (henceforth Port Harcourt City) where the forests are most damaged. Other LGAs still have most of their forest standing even though degraded. Also for ease of gathering data on the variables of the study the work focuses on Port Harcourt City.

In Port Harcourt City, remnants of the forests can still be found at Alakahia, Choba, Rumuekini, Ozuoba, Rumuolumeni, Nkpolu-Rumuigbo, Mgbuoba, Eneka, Rukpoku, Rumuodara and Elemenwo. The people of these areas are traditionally farmers and fishermen that produced different kinds of farm products and fishes for both subsistence and commercial purposes. The fishes were harvested from the rainforests and fresh water rivers.

However, as population expands there is the need to increase economic activities to ensure that par capita income and consumption do not decline. There is also the need to increase the housing units to accommodate the expanding population. Furthermore there is need to construct more roads to decongest the existing ones and ease production and distribution activities. Also, there is the need to grow the economy to be able to compete favourably

at the international market and achieve economic development. All these needs exacerbates high demand for forested land and its products like timber, herbs, fishes and wild life and contributed to the rapid deforestation and therefore the inability of the forest to regenerate itself as usual in Port Harcourt City. Humanity and other biological species (Biodiversity) are today threatened. As economic activities expand, the environment which sustains humanity is gradually being destroyed in the area. Reports from ministry of land & housing showed that most of the forested areas in Port Harcourt City have been destroyed and in its place we have houses, roads etc; we find a similar trend; at Nkpolu 90% of the forest has been destroyed and about 80% already covered by houses and roads. The same is the case in Eneka, Rumuodara, Mgbuesilaru etc. What is left is being quickly deforested for other economic activities. These forest destructions are being carried out for the immediate pecuniary benefits. More so, deforestation in Nigeria according to [Sambo \(2006\)](#) as cited in [Anowor et al. \(2014\)](#) continues to be a burdensome subject as the estimates suggested that about 350,000 hectares per annum of the current space of forestry and timberland are taken out, while replanting is no more than one-tenth of the rate of deforestation; hence the need to examine the effects of this trend on the economy.

This study stands to pave way for further studies in this area since there is no study of this kind readily available about Port Harcourt City. Informed by these facts, this study set its objectives to be: examining the effect of deforestation on the output of the area; ascertaining the effect of the deforestation on income of the people; and evaluating the effect of deforestation on social welfare.

2. Review of Literature

The paper reviews the contribution of scholars in this area of study as regards the role of the forest in environmental sustainability, the theories in the area of economics and theories of reforestation.

According to [World Bank Group \(2013\)](#) approximately 350 million inhabitants living in or near forests rely on these forests as means of sustenance. Out of this number, roughly one-sixth (60 million) of the inhabitants (particularly the native groups) entirely depend on these forests. In some areas in Tanzania, plantations and timber sources specifically honey, woods for making fire, building materials, and fruits make up around 40 % of the sum of consumptions within the aggregate households. [Food and Agricultural Organization \(FAO\) \(2015\)](#) of the United Nation says that nearly 1.6 billion persons (this is above twenty percent of the earth's inhabitants) depend on forest's wealth for their living and a significant number of them (about three quarter = 1,200,000,000) take advantage of the trees on farms to generate food and income. Furthermore, a lot of nations within the emerging economies derive up to ninety percent of their required energy from the woods.

[Soaga and Kolade \(2013\)](#), in their work proposed that forestry policies in the Sub-Saharan Africa should focus on programmes that can propel gateways to the wealth of the forest and consequently raise the absolute welfare of the underprivileged by means of the natural plenteousness of commodities from the forest; and that the rural-poor can only be inspired to consume forest-products by means of suitable agro-forestry procedures.

The classical economists postulated that without government intervention, the economy will naturally grow through free individuals carrying out their various selfish economic interests ([Akpakpan, 1991](#)). They also argued that an imbalance in the economy will automatically be returned back to its balanced state by the invisible hand. The obvious assumption of relying on this so-called classical view has led to the destruction of man's environment and made the attainment of development a mirage.

The Forest Transition theory explains the U-shaped development from increasing forest covering to declining forest covering, and to an enlarged forest covering taken place in reasonable number of emerging economies. This points to Reducing Emissions from Deforestation and Forest Degradation (REDD). The theory is typical of a geography based one described land use trends as contrary to the era of forest space loss to an era of net forest space increase. In other words it describes a transition from a period of rich forest cover to that of deforestation and finally to a period of afforestation that develops the land to rich forest covers again - the change from rich to contraction of forests and to expansion of national forest area. The forest transition theory appears to suit the classical economic viewpoint – leave the economy alone at the long run it will heal itself of whatever short comings there may be.

A particular proposition that is considerably visible in the literatures related to environmental Economics in the empirical modeling of the nexus between environmental-degradation and economic growth is Environmental Kuznets Curve (EKC). The inverted U-shaped relationship as shown in [Fig. 1](#) (see Appendix II) derived its connotation from the 1955 work of "[Simon Kuznets](#)" that hypothesized an identical model is depicting the functional relationship between income inequality and economic development. The EKC proposition puts forward the inverted U-shaped nexus between environmental degradation and per capita income. Specifically, the degradation of the environment is expectedly going to cause a rise in income to a particular starting point further than which the quality of the environment will be improved by higher per capita income ([Usenobong, 2011](#)).

A typical EKC is presented in [Fig. 1](#), (see Appendix II)

The rationality of the EKC is instinctively attractive such that there is rapid growth of pollution in the beginning phase of industrial development because of extreme importance attached to growth in output. Hence, income becomes more paramount than what happens to the environment. This speedy growth inexorably leads to more use of natural resources and consequently more pollutions that cause more harm to the environment and its inhabitants. Nevertheless, the willingness to pay for a cleaner environment rises as income increases in the later phase of the industrial development because at this stage, the desires for a cleaner environment rise by larger proportion than the desires for income. Regulatory organizations hence become more effectual for the improvement of the ecosystem and the levels of pollutions begin to decline [Kijima et al. \(2010\)](#). This suggests that there is possibility of

compatibility between environmental safety and economic growth in the long-run and economies could eventually “grow themselves” out of their environmental problems.

The land use theory of deforestation says that the more beneficial of profitable a forest land is the more its likelihood of being deforested. Objectives that produce more economic gains or other advantages to the owners of land have always been allocated more land than less productive uses. Similar principles work for lands used forestry. For instance if there is sufficient growth in the concentration of land for recreational use or tourism, there are tendencies that forested lands would be reallocated from the productions of timber and woods to recreational purposes. Facts that support this theory are found all through history and in all parts of the world. This accounts for why several forest land are reallocated to agriculture and other economic activities than mere environmental considerations.

In Nigeria the forests, as observed by Fuwape (2003), have been one dominant sources of living for most citizens. The forest is also a valuable ecological resource with various benefits. The benefits are among others: enhancement of the pattern of weather, provision of cleaner air, safeguarding of biodiversity, protection of watershed, of the soil, and of food crops, and provision of recreational facilities Fuwape (2003).

3. Materials and Method

The survey design was used for the study to bring together the needed data from the communities within Port Harcourt City. Data gathered include data on the effects of deforestation on output, income and welfare. The data were sourced directly from the natives who are at least 40 years and above. This category of natives was purposefully selected because they are the ones that have experiences of what benefits they enjoyed from the forest before its destruction.

It will concentrate on those communities where deforestation is still taking place, but still have remnants of forests. Such communities are Rumuekini, Ozuoba, Rumuolumeni, Nkpolu, Rumuigbo, Mgbuoba, Eneka, Rukpoku, Rumuodara and Eledenwo. The population of study was drawn from these communities.

This study used the Taro Yamane formula to find out the sample size. The Taro Yamane formula is given as:

$$n = N / [1 + N(e)^2]$$

Where

n = Sample size

N = Sample population

e = level of precision or confidence level

According to the national population commission of Nigeria based on the 2006 national census, the population of our choice location is 878,890.

Therefore,

$$N = 878,890$$

$$e = 0.05 \text{ or } 5\%$$

Hence using the Taro Yamane formula, we have:

$$n = \frac{878,890}{1 + 878,890(0.05)^2} \text{ i.e. } n = 399.85. \text{ Therefore } n \approx 400$$

Four hundred (400) questionnaires were distributed, and out of which 339 were filled correctly and returned amounting to 85 % response rate, while 15 percent were either not returned or not properly filled.

Psychometric scales were used by the respondents to present their views:

SA = Strongly Agree

D = Disagree

SD = Strongly Disagree

Their responses were ranked thus in table 1 (see Appendix I):

This scale consist of ten (10) items and uses the Liker's four (4) points scoring. This has good reliability. Its coefficient of internal consistency Cronbach is 0.84. Test-retest reliability is 0.81 ($p < 0.001$). Split-half reliability is 0.79 ($p < 0.001$). The SPSS 22.0 software package was used for the statistical analyses (Analysis of Variance; Correlation; and Regression).

4. Demographic Characteristics of the Respondents

Table 2 (see Appendix I) indicates that 122(36.00%) of the respondents are between the ages of 40 – 49; 131 (38.64%) are between the ages 50 – 59; 51 (15.04%) are between the ages of 60 – 69 and 35 (10.32%) respondents were within age of 70 and above. The results showed that most of the respondents within the age brackets of 40 – 49 and 50 – 59 (122 + 131 = 253) i.e. 74.64% are within the labour force population; this reveals that the respondents are relatively of the productive age, and should be agile and energetic. They also are assumed to have more opportunities to benefit of suffer from the environment.

Table 3 (see Appendix I) indicates that the male respondents were 51.91% while female respondents were 48.09%. There are not much gender differences.

Table 4 (see Appendix I) shows that 24.78% (84) of the respondents had only primary education, and that 51.92% (176) of the respondents stopped after high school while 23.30% (79) of the respondents were able to acquire tertiary education. This result showed that all the respondents had basic (universal primary) education that enables each to respond properly to the questionnaire.

Table 5 (see Appendix I) shows that 26.25% (89) of the respondents are civil servants, 20.06% (68) work with corporations and 53.69% (182) of the respondents are self-employed.

Table 6 (see Appendix I) shows that 5.61% of the respondents are single, 69.32% are married, 4.13% are divorced, 7.08% separated and 13.86% are widowed. Thus most of the respondents (69.32%) are married and possibly with children.

Table 7 (see Appendix I) indicates that 6.70% of the respondents do not have households, 53.33% of the respondents have between 1-5 households while 40% of the respondents have household size between 11-15. Hence the respondents have moderate household sizes. The result showed that the mean household size of respondents was 5; it reveals that the respondents have lesser dependents.

4.1. Hypothesis Testing I

H₀: Deforestation has positive effect on output.

5. Discussion

From tables 8, 9, and 10 (see Appendix I): Pearson's correlation (-0.861) indicates that there is a significantly inverse relationship between deforestation and increase in output. This implies that there is a significant relationship existing between the responses of the sample group. The coefficient of determination (Adjusted R square) showed that the explanatory variables (i.e. deforestation has led to erosion of farmland; deforestation has led to low yield of forest products; certain forest products are no longer available as a result of deforestation; and output has reduced significantly when compared to forest era of 1980s and 1990s) have 73% influence on output. On the analyses of variance, with the calculated value of F-ratio (4.454) greater than the theoretical value at $F_{0.05}$ (1.22), we therefore reject the null hypothesis (H_0) and accept that the entire model is statistically significant. Hence the model can be adopted for economic policy making.

For further exploration, regression analysis was employed so as to study the predictability of the effect of deforestation on output. From the table 11 (see Appendix I)

With the rule of thumb from the table 11 (see Appendix I), all the t-values (4.979, 3.848, 4.885, and 2.388) are greater than two (2). Therefore they are all statistically significant, which implies rejecting the null hypothesis (H_0) and accepting the alternative i.e. Deforestation has negative effect on output.

5.2. Hypothesis testing II

H₀: Deforestation has positive effect on income.

5.3. Discussion

From tables 12, 13, and 14 (see Appendix I): Pearson's correlation (-0.769) shows that there is a significantly inverse correlation between deforestation and income. This implies that there is a significant relationship between the responses of the sample group. The coefficient of determination (Adjusted R square) showed that the explanatory variables (i.e. deforestation has led to declined income of members of the farming community; and that income was higher among farmers before the current state of deforestation) have 58.8% influence on income. On the analyses of variance, with the calculated value of F-ratio (6.387) greater than the theoretical value at $F_{0.05}$ (1.22), we therefore reject the null hypothesis (H_0) and accept that the entire model is statistically significant. Hence the model can be adopted for economic policy making.

For further exploration, regression analysis was employed so as to study the predictability of the effect of deforestation on output.

From the table 15 (see Appendix I):

With the rule of thumb from the table 15 (see Appendix I), all the t-values (6.723 and 4.534) are greater than two (2). Therefore they are all statistically significant, which implies rejecting the null hypothesis (H_0) and accepting the alternative i.e. Deforestation has negative effect on income of members of the farming community.

5.4. Hypothesis Testing III

H₀: Deforestation has positive effect on social welfare.

5.5. Discussion

From tables 16, 17, and 18 (see Appendix I): Pearson's correlation (-0.912) indicates that there is a significantly inverse relationship between deforestation and increase in output. This means that there is a significant correlation between the responses of the sample group. The coefficient of determination (Adjusted R square) showed that the explanatory variables (i.e. some forest products that enhance standard of living are no longer available due to deforestation; products as wood, herbs, beef of wild animals, fishes, Palm wine, forest fruits, edible maggots, crabs etc are no longer available; Deforestation has increased the cost of living; and Standard of living has reduced significantly when compared to forest era of 1980s and 1990s) have 82.7% influence on social welfare. On the analyses of variance, with the calculated value of F-ratio (5.638) greater than the theoretical value at $F_{0.05}$ (1.22), we therefore reject the null hypothesis (H_0) and accept that the entire model is statistically significant. Hence the model can be adopted for economic policy making.

For further exploration, regression analysis was employed so as to study the predictability of the effect of deforestation on output. From the table 19, (see Appendix I).

With the rule of thumb from the table 19 (see Appendix I), all the t-values (3.734, 4.383, 4.643, and 6.514) are greater than two (2). Therefore they are all statistically significant, which implies rejecting the null hypothesis (H_0) and accepting the alternative i.e. Deforestation has negative effect on output.

6. Discussion of Major Findings

The results obtained showed that deforestation in Port Harcourt City has impacted negatively on output. In all the villages where this research was carried out, more people agreed that deforestation has led to their domestic output to reduce significantly. This is explained by the fact that a lot of these outputs are forest products. Thus the decline of the forest therefore led to a fall in its output. It also affirmed that deforestation has caused a reduction in both farmers' and traders' income. That is to say, revenue generating funds from these forest products have reduced as many respondents agreed. Naturally, a shrink in output of the people often tends to lead to a decline in income.

The results also showed that the people of these communities have experienced a decline in their welfare. Social welfare, according to Agiobenebo (2003) is a function of all the commodities available to the society that give them satisfaction. When the quantity, quality and variety of the commodities increase, then the societal welfare has improved. When forest products like the palm wine and rubber, herbs, fishes, animals, fruits etc that were sources of income and food depleted the implication will of course not far from loss of welfare. Some of the forest products, as observed from field survey, like edible maggots are obviously suffering extinction. This has caused a reduction in the standard of living of families. Also certain life sustaining herbs that are no longer available caused those in need of them to remain with their health challenges or even die.

The study, in summary, found as follows:

1. that deforestation has a significant negative effect on output in Port Harcourt City
2. That deforestation has negatively affected the income of the members of the farming communities within Port Harcourt City.
3. That deforestation has also significantly and negatively affected the welfare of the people of Port Harcourt City.

7. Conclusions and Recommendations

Based on the above findings we conclude that deforestation has had a negative and significant effect on economic and social welfare of Port Harcourt City. This is in line with findings of Agbarakwe (2012) in his Introduction to Environmental Economics where he found that deforestation for agricultural and other economic endeavours was affecting the Runde economy in Emohua Local Government Area of Rivers State negatively.

This study therefore recommend thus:

The intentional and unintentional causes of deforestation as mentioned earlier can be checked through insistent afforestation policies to replenish what has been depleted. The rate of afforestation should be in excess of what has been lost to ensure that subsequent depletion do not outweigh the existing vegetation. If afforestation is used effectively for the needs of the community it could result in the increase in yield for consumption and improved biodiversity. There should be an enforcement of environmental laws which pertain to forest protection to some extent.

It is also noteworthy to remind us that deforestation is not necessarily a negative occurrence because there is the need to ensure that per capita income, housing and consumption do not decline as population expands. Cities could face the threat of overcrowding which will likely cause increase unemployment and scarce living accommodations; hence deforestation was just a part of the developmental process of Port Harcourt City.

In the case of the certain forest products (like wood, herbs, beef of wild animals, fishes, Palm wine, forest fruits, edible maggots, crabs etc) that are no longer available, declined income of members of the farming community as a result of deforestation: provision should be made to accommodate the existing lifestyle by relocating the initial inhabitants to environments similar to theirs' prior to developmental process. This will ensure and enhance the accessibility of certain forest products that had been stripped off in their previous locations.

There should be environmental campaigns aimed at educating dwellers on the negative impacts of deforestation and efficient forest management techniques. Also, community leaders should also ensure that households cultivate the habit of planting trees.

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Appendix-I. Tables

Table-1. Psychometric scales of the responses of the respondents

SA	A	D	SD
4	3	2	1

Source: Researchers’ field report, 2017

Demographic Characteristics of the Respondents

Table-2. Age distribution of the respondents

Age (in years)	Frequency	Percentage (%)
40 – 49	122	36.00
50 – 59	131	38.64
60 – 69	51	15.04
70 and above	35	10.32
Total	339	100

Source: Researchers’ field report, 2017

Table-3. Gender distribution of respondents

Sex	Frequency	Percentage (%)
Male	176	51.91
Female	163	48.09
Total	339	100

Source: Researchers’ field report, 2017

Table-4. Educational qualification of respondents

Type	Frequency	Percentage %
Primary education	84	24.78
Secondary (High school)	176	51.92
Tertiary education	79	23.30
Total	339	100

Source: Researchers’ field report, 2017

Table-5. Current occupation of respondents

Type	Frequency	Percentage %
Civil Service	89	26.25
Corporation	68	20.06
Self employed	182	53.69
Total	339	100

Source: Researchers’ field report, 2017

Table-6. Marital status of the respondents

Sale	Frequency	Percentage (%)
Single	19	5.61
Married	235	69.32
Divorced	14	4.13
Separated	24	7.08
Widowed	47	13.86
Total	339	100

Source: Researchers' field report, 2017

Table-7. Household size of respondents

Household Size	Frequency	Percentage %
0	29	8.55
1-5	276	81.42
6-10	34	10.03
11-20	0	0
Total	339	100

Source: Researchers' field report, 2017

Hypothesis Testing I

Ho: Deforestation has positive effect on output

Table-8. Model Summary

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
Dimension	1	-0.861 ^a	0.741	0.728	0.85416

Source: Authors' computation using SPSS: 22.0 software package

Table-9. Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.0216	1.4182	1.3333	.07947	33
Residual	-.41721	.78020	.00000	.46734	33
Std. Predicted Value	-3.935	1.068	.000	1.000	33
Std. Residual	-.890	1.660	.000	.994	33

Source: Authors' computation using SPSS: 22.0 software package

Table-10. ANOVA^b

Model		Sum of Squares	Df	Mean Square	F
1	Regression	.562	1	.562	4.454
	Residual	19.438	335	.221	
	Total	20.000	336		

Source: Authors' computation using SPSS: 22.0 software package

Table-11. Effect & Challenges

Effect	Challenges	Coef.	t_value
The Effect of Deforestation on Output	Deforestation has led to erosion of your farmland	0.414	4.979
	Deforestation has led to low yield of forest products	0.312	3.848
	Certain forest products are no longer available as a result of deforestation	0.289	4.885
	Output has reduced significantly when compared to forest era of 1980s and 1990s	0.174	2.388

Source: Authors' computation using SPSS: 22.0 software package

Hypothesis Testing II

Ho: Deforestation has positive effect on income

Table-12. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Dimension 1	-0.769 ^a	0.591	0.588	0.63425

Source: Authors' computation using SPSS: 22.0 software package

Table-13. Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.0327	1.6812	1.5432	.08652	339
Residual	-.51632	.86020	.00000	.57634	339
Std. Predicted Value	-2.935	1.087	.000	1.000	339
Std. Residual	-.773	1.870	.000	.895	339

Source: Authors' computation using SPSS: 22.0 software package

Table-14. ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.417	1	.659	6.387	0.118 ^a
	Residual	18.583	337	.342		
	Total	21.000	338			

Source: Authors' computation using SPSS: 22.0 software package

Table-15. Effect & Challenges

Effect	Challenges	Coef.	t_value
The Effect of Deforestation on Output	Deforestation has led to declined income of members of the farming community	0.705	6.723
	Income was higher among farmers before the current state of deforestation	0.631	4.534

Source: Authors' computation using SPSS: 22.0 software package

Hypothesis Testing III

Ho: Deforestation has positive effect on social welfare.

Table-16. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
dimension 1	1			

Source: Authors' computation using SPSS: 22.0 software package

Table-17. Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.0418	1.6832	1.2435	.07785	339
Residual	-.3712	.86040	.00000	.48243	339
Std. Predicted Value	-4.356	1.076	.000	1.000	339
Std. Residual	-.873	1.7320	.000	.898	339

Source: Authors' computation using SPSS: 22.0 software package

Table-18. ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.654	1	.875	5.638	0.116 ^a
	Residual	19.346	335	.264		
	Total	20.000	336			

Source: Authors' computation using SPSS: 22.0 software package

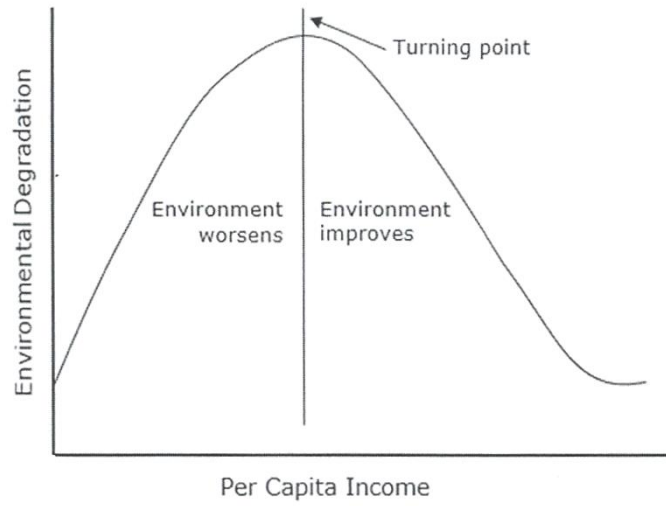
Table-19. Effect & Challenges

Effect	Challenges	Coef.	t_value
The Effect of Deforestation on Output	Some forest products that enhance standard of living are no longer available due to deforestation	0.521	3.734
	Products as wood, herbs, beef of wild animals, fishes, Palm wine, forest fruits, edible maggots, crabs etc are no longer available	0.523	4.383
	Deforestation has increased the cost of living	0.591	4.643
	Standard of living has reduced significantly when compared to forest era of 1980s and 1990s	0.643	6.514

Source: Authors' computation using SPSS: 22.0 software package

APPENDIX II: Figures

Fig-1. A typical Environmental Kuznets Curve (EKC)



Source: Govinddelhi, 2015