**International Journal of Academic and Applied Research (IJAAR)**
**ISSN: 2643-9603**
**Vol. 9 Issue 8 August - 2025, Pages: 29-36**

# Implication Of Population Growth Rate On Environmental Degradation In Osun State And Its Theoretical Applicability

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***Abstract:*** *This study assessed the high population growth rate in Osun State and inquired into its application to Malthusian Population theory and Demographic Transition theory. It also investigated the implications of the population growth rate on the environment. These were with the view to providing a baseline data and necessary information for environmental control and management in the study area and other areas of similar characteristics. Primary and secondary data were used in the study. Primary data included the administration of structured questionnaire and field observation, To extend after 1991 and 2006 census data, exponential growth model was adopted to project population of Osun State. Purposive sampling technique was adopted to select long stayed resident's between 40 years and above. 100 respondents were selected across each of the 12 most populated local government areas according to 2006 population census data i.e 12 x 100 making 1200 respondents. Secondary data include relevant population theories, population data and related literature and documents in the achieves. Data were analyzed using descriptive ad inferential statistics. Results of the projected population and growth rate in Osun State confirmed high growth rate of 0.0306 with 2,158,669, 3,416, 959, 4,875,532 and 5,929,825 people in 1991, 2006, 2016 and 2021 respectively on a constant landmass of 8.602km*$^{2}$*. The analysis of the relationship between Malthusian theory, population growth and environmental degradation in Osun State revealed factors such as technological advancement, investments in human capital and access to healthcare as factors that weakens the application of the theory in Osun state. Also, Osun State population growth rate is found related to the third stage of demographic Transition Theory: the stage of late expanding as socio - economic and development progresses, leading to change in family size preferences and increase access to education and contraceptive. In addition more than 80% of the respondents among the residents claimed farming, tillage practices, deforestation and pollution as indicators of environmental degradation as a result of high population in Osun State. This study concluded that when population increases, it will definitely have resultant effects on the environmental degradation.*

**Keywords**: population growth, Population theory, Constant landmass and Environmental Degradation

## Introduction

One of the global issues impacting the world today is the threat of overpopulation. The growing population of 7 billion is expected to reach at least nine billion by 2031 according to the UN medium project. Every year, the world population grows by 1.2 percent. Although this number may not sound alarming, the global population is doubling in less than 50 years. Every second of the day, nine lives are brought into the world. Every 10 seconds, 44 people are born, which accounts for 140 million people being brought to the world and with an estimate of about 230,000 people being added per day. Therefore, it is no doubt that the planet is becoming over populated. In Singapore more than 7000 people live per square kilometer. Following the World Trade Centre attacks in New York City on September 11, 2011, the reports found out 2,819 deaths were recorded, but the world population was not severely affected as already in 20 minutes, the numbers lost to the attack were recovered (Mayaud, Tran, & Nuttall, 2019; Ganivet, 2020; Copeland, 2020).

The reason for land degradation is the humanity's footprint. With the growing population, degradation increases. Expansion of urban areas, race for food and water resources and lack of housing and employment opportunities arise as consequences of overpopulation (Jegasothy, 1999). Burning of fossil fuels and unsustainable use of other natural resources provided developed countries with cheap ride to growth but left undeveloped nations with an excessive demand for the resources which are taken (Stephanie, 2022; Wang, & Azam, 2024). The major problem of environmental degradation in the urban centres is evident in air and water pollution. In urbanized cities, air and water pollution is mainly emitted through industrial activities, especially from the production of electricity generated from fossil fuels. Transportation, households, hospitals, laboratories and pesticide used for crops are also responsible for the release of these pollutants into the environment (Babayemi, Ogundiran, & Osibanjo, 2016). Consequently, this dumping of dangerous waste on open sites produces polluted air and water and probably makes people living around the site suffer from diseases simultaneously increasing the incidence of allergies and other symptoms.

Nigeria is a large country with a total land area of about 923,766 sq. km and a population which by 1952/53 was estimated to be 36 million, by 1963 it was put at 56 million. During 1991 population census Nigeria was estimated to have a population of

88.85 million and 146 million in 2006 (Chijioke, 2011; Bello, 2015). World Bank estimated that Nigeria's population was 206.1 million. According to National Bureau of statistics of 2020, the population figure of Nigeria is estimated to be 208 million people; In 2021 Nigerian's population was estimated to amount to 213 million individuals. In essence, between 1965 and 2021, the number of people living in Nigeria regularly increased at a rate above two percent. In 2020, the population grew by 2.58 percent compared to the previous year (Olowe, 2021; Aiyedogbon, et al. 2022). Today, Nigeria is the most populous nation in the continent of Africa, ranking almost tenth and even rising to the eleventh position in the world. With this, it is obvious that the Nigerian population is characterized by high population size, high fertility rate (3.3%) (NPC 2006) and a moderately low mortality rate due to improved medical facilities and better control of nature. More than 65-70 percent of Nigerian populace resides in the rural areas while Nigerian urban areas are highly populated. Nigeria is experiencing rapid urbanization process and about 60-70 percent of the urban inhabitant are the poor and the slum dwellers, as well as satellite settler (Idowu, 2013; Aliyu, & Amadu, 2017). Nigerian population is unhealthy vulnerable to diseases, health and other associated environmental hazards. These are the resultant effects of environmental degradation in which the natural environment deteriorates from its original state as a result of alarming population increase (Pona, Xiaoli, Ayantobo, & Tetteh, 2021).

In a situation where the land is fixed as the total land mass is constant at 723,766 square kilometers and there is alarming population increase, automatically there will be pressure on the natural environment leading to environmental degradation. There is multiple and Synergistic links between rapid population growth, poor agricultural performance and land degradation. The relationships are difficult to analyse, as multiple factors affect rate of population growth, environmental degradation, pace and direction of agricultural development (Tan, et al. 2022). Agricultural intensification occurs as population density on agricultural land increases. Sub-Saharan Africa is characterized by agricultural expansion rather than intensification. Expansive agriculture involved conversion of large areas of forest, wetlands, river valley bottoms, and grassland savanna to crop land. Agricultural expansion coupled with population growth resulted in accelerated degradation of natural resources and hence, agricultural stagnation. Also, rapid population growth led to an erosion and breakdown in customary laws and rules governing sustainable use and management of land and other common property resources. 90% of households in sub-Saharan Africa use wood fuel as the staple source of energy hence the demand for wood fuel would increase with population growth (Ricker-Gilbert, Jumbe, & Chamberlin, 2014). Maja, and Ayano (2021) have established the relationship between population growth, climate change, natural resource degradation and biodiversity. This is evident in collapsing fisheries, loss of animal and plant species due to shrinking forest; likewise global warming, using oceans, increased flooding, coastal erosion, salinization of aquifers and cropland. Pattern of precipitation is also likely to change with global warming and reduced agricultural productivity since there is a link between population increase, development and consumption patterns.

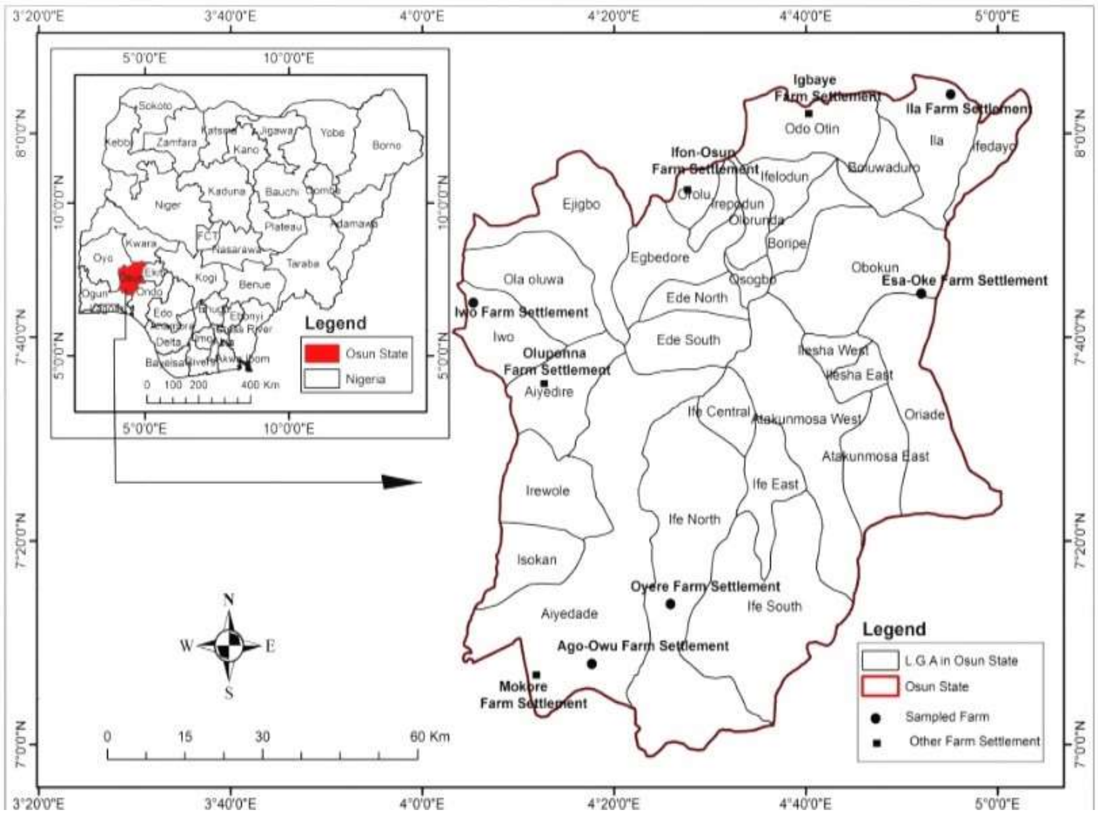
Few issues are of great importance to planners and environmentalist, one of the issue is the continuous increase in the global population. The world population is projected to increase by 2 billion between 2020 and 2050, rising from 7.7 billion in 2019 to 9.7 billion in 2050, before reaching its peak of 10.9 billion slightly after 2100 (Dorling, 2021). According to Malthus (1798), the population in increasing geometrically while the food availability is increasing arithmetically. The rapid population increase that has a negative impact on the environment and natural resources is one of the main reasons for environmental degradation in any nation. Sustainable development is made difficult by both population growth and environmental degradation. The process of socioeconomic development may be aided or impeded by the presence or absence of advantageous natural resources. The three primary demographic factors of births (natality), deaths (mortality), and migration and immigration (population moving into a country produces higher population) produce changes in population size, composition, and distribution, and these changes raise a number of significant cause-and-effect issues. The difficulties with the environment in Osun State have been greatly influenced by population growth and environmental degradation. Land degradation, forest loss, habitat devastation, and biodiversity loss are a few of them (Oladimeji, 2017; Unat, 2020). Similarly there is also significant pressure on the environment. Increased demand for energy as a result of changing consumption patterns, and this eventual results in water pollution, water scarcity, climate change, and air pollution.

It is obvious from the foregoing that land sustainability has been subjected to the population growth rate and it is evidently clear that there is correlation between land management and population studies in any geographical area. Therefore, land degradation is the resultant effect of population explosion.

Methodology

Osun state as political entity came into being on the 27th of August, 1991 when it was carved out of the old Oyo state. Osun state is made up of 30 Local Government Areas. It lies between latitudes $6^o$ N and $8^oOO^1$N of the equator and between longitudes $4^O05^1$and $5^002^1$E east of the Greenwich meridian (Figure 1). The state covers a land area approximately 8, 602$km^2$. It is bounded in the north by Kwara State, in the south by Ogun State, in the west by Oyo State, in the east and north west by Ondo and Ekiti State respectively.

According to the 2006 population census, Osun State has a population of 2.6 million, made up to 1.279 million males and 1.323 million females. Being part of the cocoa belt, Osun State has been a major destination for migrant farmers from other parts of Nigeria. Some of the migrants work as hired labourers in cocoa farms while others settle down as migrant farmers and traders. A large number of these self-employed migrant farmers are found in Ifetedo, Garage Olode and Owena areas. Hausa traders, who are involved in the Kolanut and Tobacco trade are also found in Ife, Olode, Omifunfun, Mefoworade and Ilesa area.




Primary data were obtained through administration of structured questionnaire and field observation while population records of the study area since the creation of Osun State August 27th 1991 to 2021 obtained from the federal office of statistics, Osogbo branch and available literature, on population theories as available in the and archives form the secondary data for this study. The structured questionnaire has four thematic sections, section A of the questionnaire seeks data on the socio - demographic characteristics of the respondent section B and C contain questions on degradation while section D explained data on possible ways of striking balance in man - environment interaction Likert Rating Scale was used in section C and D in which the respondents were asked for their level of agreement or disagreement on environmental degradation related statements. 100 respondent were selected across the 12 most populated local government areas according to 2006 population census data i.e 12 x 100 making 1200 respondents. Both descriptive and inferential statistics were used to analyze data, based on the objectives of the study. For the population growth rate, population data were collected from state area from 1991 to 2021. data collected through questionnaire were analyzed using statistical package for social sciences (SPSS Version,16). the mean values of socio - economic data were calculated and preserved using descriptive statitcis, this involves identifying calls with largere ratio and percent using tables, charts and diagrams

Result and discussion

Population growth in Osun State

Exponential Growth Model was used to project for the years between 1991 and 2021 with the provisions of the 1991 and 2006 population censuses of Osun state. Exponential Growth Model is a model that depicts population growth that occurs at the same rate over time. The growth rates for the study area was positive (table 1) this indicated the population growth with increase in years

Table 1: projected population and growth rate of the study area

| Growth rate | 1991 | 2006 | 2016 | 2021 |
|---|---|---|---|---|
| 0.0306 | 2,158,669 | 3,416,959 | 4,875,532 | 5,929,825 |

Malthusian population theory and its application in the study area

Thomas Robert Malthus (1766–1834) formulated a landmark theory in the history of population studies. He argued that population could increase by multiples, doubling every twenty–five years. He contended that the population would eventually grow so large that food production would be insufficient. According to him, the food supply increases in an arithmetic progression (1, 2, 3, 4 and so on) while the population expands by a geometric progression (1, 2, 4, 8 and so on), in brief, Malthus theory states that population is necessarily limited by the means of sustenance and population invariably increases where means of sustenance increases, unless prevented by some very powerful; and obvious checks. He spoke of famines, diseases or wars, pestilence and vicious customs about women. He explicitly demanded artificial means of birth control and suggested as an alternative that birth rate be reduced through late marriage, moral restrains and abstinence.

In the context of this study, the means of sustaining the alarming growing population is land and environment in general which is fixed in supply leading to too much pressure on it thereby resulted into deterioration and all forms of degradation. Amothus saw the tension between population and resource as a major cause of the misery of much of the humanity. Although, malthus' views have been widely challenged on many grounds but the obvious pressure on the environment as a resultant effect of high population growth is now a burning issue in environmental studies.

**APPLICATION OF THE THEORY TO THE STUDY**

The relationship between Malthusian theory and population growth rate in Osun State, Nigeria, could be analyzed in the context of how population dynamics interact with resource availability and economic development. Malthusian theory posits that population tends to grow exponentially while resources grow arithmetically, leading to a point where population exceeds available resources, resulting in checks such as famine, disease or war. In Osun State, Nigeria, the application of Malthusian theory might suggest that if population growth outpaces the rate of economic development and resource availability, it could lead to strains on the available infrastructure, healthcare, education and other essential services. This could potentially lead to socio-economic challenges such as poverty, unemployment, food insecurity and environmental degradation.

However, it is important to note that the relationship between Malthusian theory, population growth and environmental degradation in Osun State, Nigeria, may be influenced by various factors such as government policies, technological advancements, investments in human capital and access to healthcare. Effective policies aimed at sustainable development such as family planning, education and economic diversification can mitigate acts of rapid population growth, that will help to achieve a balance between population growth and resource availability.

**2.3.2 Demographic Transitional Theory**

Warren S. Thompson propounded demographic transition theory in 1929 and later buttressed by frank W. Notestein in 1945. This theory attempts to specify general law by which human populations changes in size and structure during industrialization. It is a useful tool in describing the demographic history of a country. The theory postulates a particular pattern of demographic change from a high fertility and high mortality to a low fertility and low mortality when a society progresses from a largely rural agrarian and illiterate society to a dominant urban, industrial, literate and modern society.

The three stages of population growth according to this theory are: -

High and fluctuating birth and death rates with little population growth,

High birth rates and declining death rates with rapid population growth

Low birth and death rate with slow population growth.

This theory holds that pre-industrial societies were characterized by stable populations which had both a high death rate and birth rate. It postulates a little and slows population growth. The theory states that the high mortality rates characteristics of undeveloped areas will decline before fertility rates which are also high.

In the context of this study any country, in the second stage of demographic transition theory whereby there is high birth rate and declining death rate will definitely have high pressure on environment being the only means to sustain the high population, environmental degradation will definitely become the resultant effect of this inequality.

The theory about population size, growth and change likewise population versus means of sustaining it and implication on the environment have remained an important debate since time immemorial. Ancient philosophers like Confucius in China, Kautilya in India, Ibu Khaldin in Arab, Plato in Greece and several general modern thinkers like Adam Smith, David Richard and others have directly or indirectly said a lot of something significant on population issues.

For instance, to the Jews the injunction to Adam and Eve by the Almighty is "to be fruitful and multiply; and replenish the earth". This has been a guiding principle for their attitude towards marriage and procreation. The Chinese philosopher, Conficius, argued that a numerical balance can be maintained between population and environment. He propounded the concept of Optimum Population level. Edmond Halley (1656-1742) was the first to use death statistics in different age groups to determine a person's likelihood of death as he or she passes through each age group (Population today, 1986).

**APPLICATION OF THE THEORY TO THE STUDY**

The demographic transition theory describes the process of population change over time, typically as societies' transition from high birth and death rates to low birth and death rates. This transition is often associated with economic and social development. In the context of Osun State, Nigeria, the relationship between demographic transition theory and population growth can be understood as follows:

Stage 1: stage of high stationary: This stage is characterized by high birth and death rates, resulting in slow population growth. Historically, Osun State may have been in this stage with limited access to healthcare and high infant mortality rate.

**International Journal of Academic and Applied Research (IJAAR)**
**ISSN: 2643-9603**
**Vol. 9 Issue 8 August - 2025, Pages: 29-36**

Stage 2: stage of early expanding: The birth rate remains high while death rates decline due to improvements in healthcare, sanitation and nutrition. This leads to rapid population growth, Osun State might have experienced this stage during the periods of economic development and improved healthcare infrastructure.
Stage 3: stage of late expanding: Here, the birth rate begins to decline due to factors such as increased urbanization, education and access to family planning. Death rates continue to decline or stabilize. Population growth slows down but remains positive. Osun State could be transitioning into this stage as socio-economic development progresses, leading to changes in family size preferences and increased access to education and contraceptives.
Stage 4: stage of low stationary: Here, both birth and death rates are low resulting into very slow population growth or stabilization. This stage is associated with advanced economic development, urbanization and widespread access to education and healthcare. Osun State may eventually reach this stage as it continues to develop economically and socially.
Understanding where Osun State falls within the demographic transition model can inform policies and interventions aim at mapping population growth, promote socio-economic development and ensuring sustainable use of resources. Efforts to improve healthcare, education, women's empowerment; and access to family planning services can help accelerate the transition to lower birth rate and stabilize population growth in the state.

SOCIO – DEMOGRAPHIC AND DEMOGRAPHIC

Table 1 presents the distribution of socio – economic and demographic characteristics of the respondents revealed that 32.67% of the respondents are in age group below 44 years. About 27.33% of the residents are in age group 45 – 54 years. In addition, 14.67 of the respondents belong to age group 55 – 64 while the remaining 25.33% are in age group 65 years and above. Considering years spent in the town, about 34% of the residents have spent less than or equal to 10 years, about 22.00% of them have spent 11 – 20 years (11.3%) of the residents have spent 21 – 30 years 10% have spent more than 40 years in the area. With respects to their occupation about one quarter (24.0%) of them reported to be civil servants, 62.01 are workers in the primary activities sectors such as farmer, miners, hunter, quarrying etc. 4.7% of them are professional, 2.7% of them are traders, 6.7% are artisan. Regarding their marital status a large number of them are married. About 95.3% are married and the remaining 8.7% are either single or divorced. Moreover, their religion revealed that 50.5% of the respondents are Christian, 67% are Muslim and the remaining 2.6% are traditional worshippers. With respect to their educational status, a large number of the respondents attended at least primary school, critical examination of their educational status showed that 4.7% of them are not educated, 8.0% of them attended primary, school, 30.3% of them attended, secondary school, 30% of them attended secondary school, 30% of them attended OND/NCE and the remaining university

**Table 1 Socio – Economic and Demographic Characteristics of the Respondents**

| Age group (yrs) | Options | Frequency | Percentage (%) |
|---|---|---|---|
| | <44 | 392 | 32.67 |
| | 45 – 54 | 328 | 27.33 |
| | 55 – 64 | 216 | 14.67 |
| | 65 and above | 304 | 25.33 |
| Years spent in the community | 11 – 20 | 328 | 34.00 |
| | 21 – 30 | 264 | 22.00 |
| | 31 – 40 | 136 | 11.33 |
| | 41 – 50 | 120 | 10.00 |
| | 50 and above | 272 | 22.67 |
| Gender | Male | 680 | 56.67 |
| | Female | 520 | 43.33 |
| Marital status | Single | 88 | 7.33 |
| | Married | 1040 | 86.67 |
| | Divorced | 72 | 6.00 |
| Level of education | Primary and below | 152 | 12.67 |
| | Secondary | 568 | 47.33 |
| | OND/NCE | 360 | 30.00 |

| | | | |
|---|---|---|---|
| | Tertiary, HND, B.Sc. and above | 120 | 10.00 |
| Religion | Christianity | 608 | 50.60 |
| | Islamic | 560 | 46.66 |
| | Traditional | 32 | 2.66 |
| Occupation | Civil servant | 288 | 24.00 |
| | Farming/lumbering/ hunting/ quarrying | 744 | 62.00 |
| | Professional | 56 | 4.67 |
| | Trading | 32 | 2.67 |
| | Artisan | 80 | 6.67 |
| Total | | 1200 | 100 |

**Source: Author's Field work 2023**

POPULATION RELATED INDICATORS OF ENVIRONMENTAL DEGRADATION

Most of the residents alluded that there are different ways of environmental degradation as identified in the research instrument. A large proportion (88.37%) of the respondents expressed that farming and tillage practices caused environmental degradation against 11.66%, 87.5% of the respondents testified deforestation and they are related activities against 12.5% who responded in the contrary. 68.3% noticed the use of chemical and other pollutants while 31.7% remarked contrary to this assertion. Other 55.8% of the respondents noticed waste the dumping as a form of environmental degradation and 44.2% objected this opinion. Moreover 58.8% claimed that mining activities constitutes environmental degradation in this area against 41.2%. an overwhelming 71.2% of the respondents perceived erosion as a major form of environmental degradation in the study area. This is evidenced with the undulating landscape of the entire Osun State. Moreover 68.3%, 60.8% and 68.8% noticed noise pollution drought and overgrazing respectively as another form of environmental degradation in the study area.

As expressed by respondents during focus group discussion, population growth and its pressure account for all from of environmental degradation in the area.

**TABLE 2 Residents Perception on Environmental Degradation**

| Variable | Indicators | Frequency | Percentage |
|---|---|---|---|
| Farming and tillage practices | YES | 1060 | 86.37 |
| | NO | 140 | 11.66 |
| Deforestation land related activities | YES | 1050 | 87.5 |
| | NO | 150 | 12.5 |
| People used chemical and other pollutant | YES | 820 | 68.3 |
| | NO | 380 | 31.7 |
| Waste dump of different types | YES | 670 | 55.8 |
| | NO | 530 | 44.2 |
| Land degradation by mining activities | YES | 705 | 58.2 |
| | NO | 495 | 41.2 |
| Perception on soil erosion | YES | 855 | 71.2 |
| | NO | 345 | 28.8 |
| Noise pollution | YES | 820 | 68.3 |
| | NO | 380 | 31.7 |
| Drought in general | YES | 730 | 60.8 |
| | NO | 470 | 39.2 |
| Over grazing | YES | 825 | 68.8 |
| | NO | 375 | 31.2 |

**Source: Field work, 2023**

## CONCLUSION

The study clearly showed that there is increase in population growth in the study area which correlated the obvious environmental degradation in the areas. It was also cleared from this study that Malthusian population theory and Demographic Transition theory are both found somehow related to population growth in Osun state to a limited extend as modernization civilization and agricultural mechanization of the 21st century has proved some of the proposition of the theory wrong. It is the need to establish environmental management information centers, formation of environmental organization and provision of economics and social assistance to purchase environmental management / materials among others are recommended a mitigating option of the increasing environmental degradation in the area.

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