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CHALLENGES OF AFFORESTATION PROGRAMME IN KADUNA STATE, NIGERIA

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ABSTRACT

The study was carried out to examine the challenges of afforestation programme in Kaduna State, Nigeria. Stratified random sampling was used for the study. The State was stratified into three political zone, using 30% sampling intensity; seven Local Governments were randomly selected. Four hundred open and close ended questionnaires were distributed and administered randomly to respondent within the selected communities. The data was subjected to descriptive and binary Logistics Regression analysis. The result of the study revealed that 66.3% of the respondents were Male. Similarly, 29.4% of the respondents were within the age bracket of 31-40 years. Educational status shows that 36.4% have non-formal education. There was no significant difference between stakeholders in planning, monitoring, implementation and benefits sharing with afforestation programmes at 0.05 level of significant. The result obtain revealed that inadequate fund (wms=4.18), inadequate land (wms=3.61), poor government policies (wms=3.53), Ignorance of the people (wms=3.47), destruction of forest by headers (wms=3.19) and long gestation period (wms=3.18) were respectively considered very serious challenge (VSC).While fire outbreak (wms=2.96) was considered moderate challenge (MC). Also, inadequate labour (wms=2.28), poor marketing (wms=2.40), bad climatic condition (wms=2.40), effect of pest and diseases (wms=2.65) as well as inadequate seedlings (wms=2.78) were respectively considered not very serious challenge (NVSC) to Afforestation successes in Kaduna State. The study recommends that Government and other private organizations should be committed to assisting the people with funds in other to encourage afforestation practices. Furthermore, Flexible Government policies such as establishment of grazing reserve to cater for livestock, enactment of Laws that favour's land availability for Afforestation should be establish. Lastly, the need for Government to enlighten the people on the importance of Afforestation practices through extension Agent and mass media to boost Afforestation is very necessary

Keywords: Challenges, Afforestation Programme, Kaduna,

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INTRODUCTION

According to the Kyoto Protocol, afforestation is the process of directly causing the conversion of land that has not been wooded for at least 50 years into forested land (Mohan *et al.,* 2021). Reforestation, on the other hand, generally refers to the act of replanting trees in places that have lost their forests, primarily as a result of deforestation. Target 15.2 of the UN Sustainable Development Goals (SDGs) #15 (Life on land), which reads, "By 2020, promote the implementation of sustainable management of all types of forests, stop deforestation, restore degraded forests, and substantially increase afforestation and reforestation globally," makes reference to afforestation/reforestation (A/R) (FAO, 2018, Mohan *et al.,* 2021). SDG #2 (Zero Hunger),

SDG #6(Clean Water and Sanitation), and others all have ties with SDG #15 both directly and indirectly (Baumgarter, 2019, Mohan *et al.,* 2021).Through state policy and financial assistance, a lot of nations have worked hard to encourage afforestation as an alternative land use for economic development (Ryan and O'Donoghue, 2016;; Minang *et al*., 2018; Dupraz et al., 2019; Mhaka *et al.,* 2022).Today one of the most serious environmental problem faced by Nigeria like other nations in the world is deforestation (Maijama'a*et al.,* 2020,Mephors *et al.,* 2021).

Nigeria has been dealing with an extraordinarily rapid deforestation process for many years (Anifowose and Ashiru, 2019). Nigeria has one of the highest rates of deforestation in the world, having continuously lost about 410,100 hectare per year between 2005 and 2010 at a rate of 3.12% per annum (FAO, 2010, Maijama'a*et al.,* 2020,Mephors *et al.,* 2021). Today most countries of the world are concerned about the phenomenon of deforestation (Medugu *et al.,* 2010). Policies, strategies, projects and programmes have been formulated and implemented at both national and international level to curtail the challenges of deforestation and it impact on the Environment. As a result of the ecological decline especially deforestation and desertification in the northern region of Nigeria, rain-fed agriculture became unreliable and unpredictable in the region (Odjugo, 2010). Scientists have been intensely discussing the phenomenon and its potential impact on the region's agricultural production, animal husbandry and food security (Odjugo, 2001). In the same way, the role of afforestation in land use has become more important in order to restore degraded land, support agriculture, strengthen food security, safeguard water reserves, and enhance the well-being of local populace. In response to rapid deforestation and desert encroachment, the federal and state governments of Nigeria, in collaboration with the World Bank, embarked on some afforestation programmes to check desertification and further reduce environmental deterioration, while attempting to reclaim some of its dislocated communities. An initial "Forestry I" was designed to last from 1979 to 1986.

However, this first attempt was unsuccessful and consequently was aborted in 1984. Seedlings survivals rate was very low. Anderson (1987) documents that less than 5 percent of over 50 million seedlings distributed free of charge during the five-year period survived. Despite the regrettable termination of the "Forestry I" programme, there were useful lessons learned for future investments. For instance, it was learned that some farmers acquired the free potted seedlings in order to use the enriched potting soil as fertilizer for their millet, and not necessarily to plant the trees (Anderson, 1987). These practice-alerted programme planners to farmers' concern for better food crop yields into feed their family. Insufficient protection of saplings from grazing livestock, inappropriate choice of trees species, conflicting scheduling times, poor transportation and insufficient distribution methods, etc. were some of the limiting factor that constrained this precursory tree – planting initiative. It was also learned that farmers had tree preferences and took pains to protect and nurture their fruit and shade trees such as cashew, mango, parkia, guava and neem. Afforestation programme in Kaduna State has been in existence for decades with programme such as yearly tree planting campaign, United Nation Development programme, global energy facility and shelter belt green world project. Every year the state government flag off tree planting campaign in all the 23 local government of the state, with the aim of managing desertification and deforestation. This is done inform of plantation establishment as well as planting enrichment by random planting of trees in the forest reserve to argument trees harvested for timber, charcoal and for other purpose.

Seedlings are distributed to various communities as well as primary, secondary and tertiary institutions all within the state in other to replenish the lost forest. Keep Kaduna green programme was initiated by the State government in 2016 with the aim of planting 1 million seedlings yearly. The programme was split into three forms that is the state wide tree planting project, shelter Belt and enrichment planting campaign in northern part of the State. There is widespread land degradation mainly attributed to deforestation. Increasing agricultural intensity and livestock over-

grazing, combined with increasing demands for fuel-wood have led to high rate of deforestation. Drought is another factor contributing to the depletion of naturally wooded areas and other natural vegetation zones, thus leading to soil degradation and intensification of erosion processes, particularly in the northern part of Nigeria in the savannah belt, as indicated by experts in their reports on the status of the vegetation cover in the country (Third National Communication, 2020).This study focuses mainly on the challenges of afforestation Programme in Kaduna State with a view to provide some suggestions to innovative tree planting programme

MATERIALS AND METHODS

Study Area

Kaduna State is located at latitude 10.5264°N and longitude 7.4388°E, in the Northern hemisphere. The total land mass of the state is estimated at 46,020 sqkm, making it the 4th largest state in the Country after Niger, Borno and Taraba State respectively. According to 2006 census, Kaduna State has a population of 6.7 million which makes Kaduna State the 3rd most populous State in Nigeria (NPC, 2006). The State occupies the entire mid-central portion of the Northern part of Nigeria, and has 23 Local Government. The state shares common borders with Zamfara, Niger, Katsina, Kano, Bauchi, Nassarawa, Plateau States as well as Abuja, the Federal Capital Territory. The predominant religion among the people is Islam and Christianity. Others forms of religions practices in the state are traditional religion. The State enjoys a typical tropical continental climate with two distinct seasons, i.e. the dry and rainy seasons. These seasons reflect the interplay of North-East trade wind and South-West trade wind which sweep across the entire country from November to April and May to October respectively.

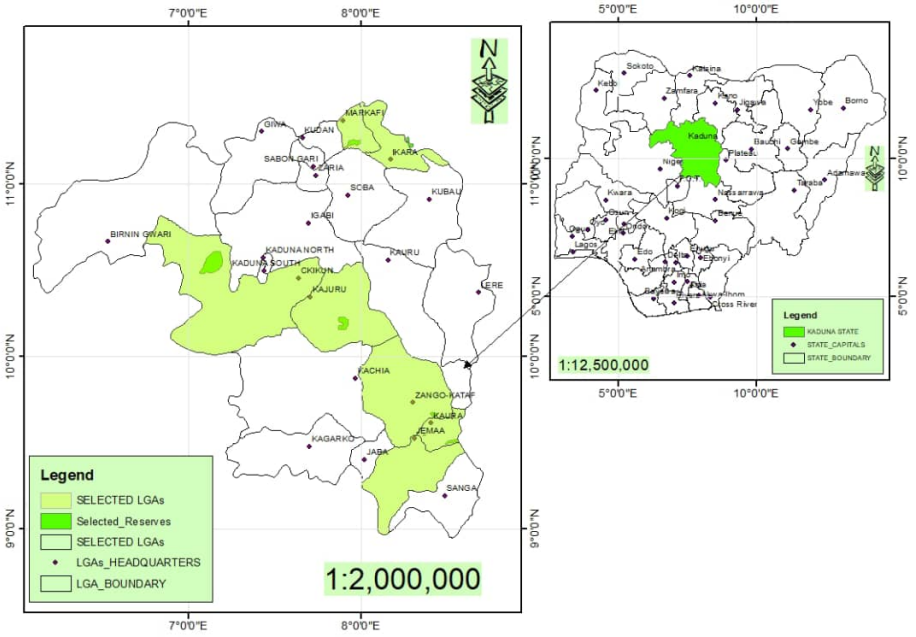

Figure 1: Map of the study area

Population of the Study

The study also employed the use of questionnaire in which stratified random sampling techniques was used.The state was stratified into three political Zones namely: Northern, central and southern zone each comprising (8, 7 and 8) LGAs respectively. Using 30% Sampling Intensity (SI), Seven Local Governments were randomly selected with at least two from each zone. The selected Local Governments were Jema'a, Kaura, Zangon Kataf, Chikun, Kajuru, Makarfi and Ikara.

Table 1: Population of Local Government in the study area

S/N	Name of LGA	Population
1.	Chikun	372272
2.	Ikara	194723
3.	Jema'a	278202
4.	Kajuru	109810
5.	Kaura	174626
6	Zangonkataf	318991
7	Makarfi	146574
Total		**1595198**

Source: Census, 2006

Knowing the population of the study area to be (1595198), sample size for the study was determined using Taro Yamane formula as follows:

$$n = \frac{N}{1 + N(e)^2}$$

..... [2]

Where:
n = sample size
N = population of the study
1= constant
e = % level of significance or margin of tolerable error
Therefore, the sample size for the study is 400 respondents.
The sample size for each local government was determined as follows:

$$nh = \frac{n\text{x Nh}}{N}$$

..... [3]

Where nh = Local Government Sample size
n = Population Sample size
Nh = Local Government Population
N = Total Population of the studied Local Government

Table 2: Sample Size of the study

S/N	Name of LGA	Population	Sample Size
1.	Chikun	372272	93
2.	Ikara	194723	48
3.	Jama'a	278202	70
4.	Kajuru	109810	28
5.	Kaura	174626	44
6.	Zangonkataf	221276	80
7.	Makarfi	146574	37
Total		**1595198**	**400**

Data source and collection
This research makes use of both primary and secondary data. Primary data for this study where collected from the field with the use of questionnaire and oral interview. Oral interview was organized for major stakeholders such as community Leaders and staffs of Kaduna State ministry of agriculture and Forestry all in the study area. The researcher engages two research assistant in each of the community who help in the distribution and collection of questionnaire after completion to avoid misplacement. Secondary data where obtain from document at Kaduna state ministry of agriculture and Forestry.

DATA ANALYSIS
The study make use of Descriptive statistical techniques such as frequency counts, means, percentages, standard deviation, Likert scale and tables were used to present result.
Challenges of afforestation programme were analyse using Binary Logistic Regression Analysis statistical tool. The Binary Logistic Regression Analysis is expressed as:

$$\text{Logit (y)} = a + b_1 + x_1 + + b_2 + x_2 + b_3 + x_3 + b_4 + x_4 + b_5 + x_5 + b_6 + x_6 + b_7 + x_7 + b_8 + x_8 + b_9 + x_9 + b_{10} + x_{10} + b_{11} + x_{11} + b_{12} + x_{12} + e$$

……..Eqn. 1

Where :
y = Dépendent variable (binary variable) ; y = 1 if influence afforestation programmes in the study area, y = 0 if otherwise.
a = Constant of the equation
$b_1 - b_{12}$ = coefficient of the independent variables
$x_1 - x_{12}$ = Independent variables
x_1 = inadequate Fund for afforestation practices in the study area
x_2 = inadequate land for afforestation practices in the study area

x_3 =poor government policy in the study area

x_4 =inadequate seedlings in the study area

x_5 =inadequate labour in the study area

x_6 =poor climatic condition in the study area

x_7 =ignorance of the people in the study area

x_8 = effect of pest and diseases in the study area

x_9 = long gestation period of trees in the study area

x_{10} = poor marketing of forest product in the study area

x_{11} =fire outbreak in the study area

x_{12} = destruction of forest by animals in the study area

Likert Weighted Mean Score (WMS) was used to determine the challenges of Afforestation Programme in Kaduna State (Table 6). Going by the internal scale of 0.05 the Upper Limit (UL) cut-off is MS + 0.05 (3.0+0.05=3.05). The Lower Limit (LL) cut-off is MS-0.05 (3.0-0.05=2.95). Based on the two extreme limits, any variable with WMS below 2.95 (MS $<$ 2.95) was considered not serious challenge (NSC). While any variable with MS between 2.95 and 3.05 was considered Moderate (MC) and those with MWS greater than 3.05 (MS $>$ 3.05) were considered very serious challenge (VSC) to Afforestation success.

RESULTS

Socio-economic characteristic of the respondents

The results on the socio-economic characteristics of the respondents as presented in (Table 3) indicate that 66.3 % of the respondents were Male while 33.7 % were Female. Also most 29.4 % of the respondents were within the age bracket of 31-40 years. Majority 51.9 % of the respondents were farmers while the least were Timber dealers with 2.0 %. Educational status shows that 36.4% have non-formal education while 15% representing the lowest have only primary education. Family size "between" 5-10 was the highest at 47.4 % while the lowest family size is 8.7 %.

Table 3: Socio-economic Characteristics of Respondents

Characteristics	Category	F (n=400)	%100
Sex	Male	265	66.3
	Female	135	33.7
Age (Yrs)	<21	16	4.0
	21-30	85	21.4
	31-40	118	29.4
	41-50	101	25.2
	>50	80	20.0
Mean Age (Yrs)			
Major Occupation	Farmers	207	51.9
	Civil savant	84	20.9
	Trading	101	25.2
	Timber dealers	8	2.0
Educational Status	Non-formal	146	36.4
	Primary	60	15.0
	Secondary	82	20.7
	Tertiary	112	27.9
Family Size	<5	98	24.4
	5-10	190	47.4
	11-15	77	19.5
	>15	35	8.7
Mean Family Size			

Participatory index of stakeholders in afforestation programme

Results on the participatory index (Table 4), shows that there is no significant difference between stakeholders in planning, monitoring, implementation and benefits sharing with afforestation programmes at 0.05 level of significant.

Table 4: Participatory Index of Stakeholders in Afforestation Programme

Afforestation Stage	Participatory index
Planning	0.48
Monitoring	0.47
Implementation	0.49
Benefit Sharing	0.53

Level of some Stakeholders participation in afforestation programmes

The stakeholders participation in Afforestation as presented in (Table 5) shows that most (30.9 %) of the respondents never participated in afforestation programmes at the planning stage, while 8.0 % of the respondents always participated in the planning stage. At the Monitoring stage, 28.2 % of the respondents representing the highest proportion never participated in the monitoring stage of Afforestation programmes while 7.2 % of the respondents representing the lowest proportion always participated in the monitoring stage. At the implementation stage, 30.7 % of the respondents representing the highest proportion never participated in the implementation stage of Afforestation programmes while 10.7 % of the respondents representing the lowest proportion always participate in the implementation stage of Afforestation programmes. At the Benefit sharing stage, 25.7 % of the respondents representing the highest proportion occasionally participate in the benefit sharing stage of Afforestation programmes while 10.5 % of the respondents representing the lowest proportion always participate in the benefit sharing stage of Afforestation programmes. The stakeholders are as follows: Traditional rulers, Local Government Chairmen, Youth Leaders, Religious leaders and staff of Kaduna State Ministry of agriculture.

Table 5: Challenges on stakeholders Participation in Afforestation Programme

Participation	Category	Frequency	percentage
Planning Stage	Always	32	8.0
	Often	54	13.5
	Occasionally	79	19.7
	Rarely	112	27.9
	Never	123	30.9
Monitoring	Always	29	7.2
	Often	45	11.2
	Occasionally	87	21.7
	Rarely	111	27.7
	Never	128	28.2
Implementation Stage	Always	42	10.7
	Often	61	15.2
	Occasionally	61	15.2
	Rarely	113	28.2
	Never	123	30.7
Benefit Sharing Stage	Always	42	10.5
	Often	68	17.2
	Occasionally	103	25.7
	Rarely	90	22.4
	Never	97	24.2
	Total	400	100

Challenges of afforestation programme in the study area

The result as presented in (table 6) on the challenges of afforestation programme as presented in (table 6) shows that 12 challenges of afforestation programmewere listed by the respondents, however, inadequate fund (MWS=4.18), inadequate land (MWS=3.61), poor government policies (MWS=3.53), Ignorance of the people (MWS=3.47), destruction of forest by headers (MWS=3.19) and long gestation period(MWS=3.18) were respectively considered very serious challenge (VSC).

Table 6: Challenges of afforestation programme in the study area

Variable	VSC	SC	MS	NSC	NVSC	N	WS	WMS	Decision
Inadequate funds for afforestation Practices	217(1085)	96 (384)	47 (141)	25 (50)	15 (15)	400	1675	4.18	VSC
Inadequate land for afforestation practices	104(520)	147(588)	68(204)	54(108)	27 (27)	400	1447	3.61	VSC
Fire outbreak	78(375)	74 (296)	66 (198)	119(238	63 (63)	400	1170	2.96	MC
Poor Government policy	97(485)	127(508)	93 (279)	59(118)	24 (24)	400	1414	3.53	VSC
Inadequate Labour	24(120)	56 (224)	52 (156)	147(298	121(121)	400	919	2.28	NVSC
bad climatic condition	29(145)	65 (260)	72 (216)	105(210	129(129)	400	960	2.40	NVSC
Ignorance of the people	88(440)	131(524)	93 (279)	58(116)	30(30)	400	1389	3.47	VSC
Effect of pest and diseases	32(160)	69 (384)	79 (237)	167(334	53 (53)	400	1168	2.65	NVSC
Long gestation period	68(340)	126(504)	80(240)	63(126)	63(63)	400	1273	3.18	VSC
Poor marketing	28(140)	45 (180)	75 (225)	165(330	87 (87)	400	962	2.40	NVSC
Inadequate seedlings	47(235)	65 (260)	119(357)	94(188)	75 (75)	400	1115	2.78	NVSC
Destruction of Forest by Headers	76(380)	117(468)	70 (210)	82(164)	55 (55)	400	1277	3.19	VSC

Key: *VSC= Very Serious Challenge, SC= Serious Challenge, MC= Moderate Challenge, NSC= Not Serious Challenge and NVSC= Not Very Serious Challenge, N= Number of sample size, WMS=Weighted Mean Score and WS=Weighted score The values outside brackets are frequencies of respondents while figures inside brackets are Likert Weighted Scores*

DISCUSSION

Afforestation practices are generally common economic activities in most parts of the country but the challenges involve is enormous. In Kaduna Sate, 12 challenges were listed by respondents.The socio-economic characteristic of respondents showed that gender has significant role in afforestation programme in Kaduna State this is due to gender imbalance as more male were involved in afforestation practice than female possibly because it is labour intensive. The finding corroborates with that the findings of Usman, (2011) That tree planting activities in Kaduna State is predominantly done by male and the major reason is religious and cultural believe of the people that farming and landownership is only inherited by the male.Also, a greater proportion of people involved in afforestation were within the active age group of 31-40, Age is very key factors in afforestation practices because of its tedious nature which requires young and able bodies who can withstand the rigour of hard work. The finding is in line with the findings of Saliu and Alao (2010) that the highest proportion of people in afforestation practice were within the age bracket of 31-40.The major occupation of the people in Kaduna state as revealed by the study were farmers, this could possibly be due to high level of poverty as majority of the respondents leave in rural areas who do not have access to white collar jobs.Education is an essential factor for effecting desirable changes in attitude, skills and knowledge of individuals (Odebode, (1997) cited in Usman 2011).

From the study, most people participating in afforestation in Kaduna State acquired non-formal Education, this therefore means that afforestation practice has greater potentials of reducing social vices, poverty and unemployment. Saliu and Alao (2010) also found out that greater proportion of the respondents had non-formal Education, this contradicts the findings of Usman., (2011) that most people participating in tree planting in Kaduna state had Quranic Education, this is due to religious differences emanating from the region where the study was carried out. A greater proportion of people participating in afforestation were within the range of 5 -10 (47.4 %) household.

It is always encouraging to have large household size as it is very necessary in satisfying the labour requirement on the farm. On the other hand large household size will increase household consumption as well as increase forest degradation. The level of participation as indicated by the participatory index shows that there is no significant difference between stakeholders' in planning, monitoring, implementation and benefit sharing with afforestation programme. Stakeholders' participation in afforestation programme shows that majority (30.9 %) of the respondents never participate in afforestation planning process while the least (8.0 %) always participate. At the monitoring stage, (28.2 %) of the respondent never participate in the monitoring process while the least (7.2 %) always participate. At the implementation stage, (30.7 %) of the respondent never participate in the implementation process while the least (10.7 %) of the respondent always participate. At the benefit sharing stage, (25.7 %) of the respondent occasionally participate in the benefit sharing stage while the least (10.5 %) always participate.

The study also revealed that inadequate funds, inadequate land, long gestation period, ignorance of the people, destruction of forest by Livestock as well as poor Government policy were respectively considered as very serious challenge to afforestation successes. The findings is in line with the findings of Jaiyeoba (1996), who observed that lack of funds (loans) or subsidy that could help poor farmers who wish to practice Afforestation in most rural areas is inadequate as such Most of the farmers operate at subsistence level because they lack the capital to cultivate on a large scale and their local authority has done little or nothing to improve Afforestation practices. The findings also reveals that ignorance of the people affect their participation in afforestation practices, this corroborates with the findings of Kalu *et al. (*2014) that there are low awareness programme of deforestation and its associated impacts on afforestation which spell danger in ecosystem and adverse environmental implication.

Furthermore, inadequate land for afforestation also appears to be a major factor militating against afforestation successes. This could probably be due to increase in population, urbanization and land tenure system, all this could be managed through birth control, encouraging urban forestry and enacting laws that will favour afforestation against land tenure system For example, the planting of trees, the incentive for investing in soil fertility improvement for future use of the land is low, unless the benefits are accrued to the tree planter. At a site in southeast Nigeria, communal control of land rotation, as well as seasonal redistribution of land which is commonly held were identified as factors that affect the practice of Afforestation. This could be the reason for unavailability of land for afforestation in the study area. Destruction of forest by livestock is also a very serious challenge as discovered by the study, this corroborate with the findings of Usman, (2011) that livestock causes serious damage to trees and seedlings especially at the early stage of planting. The study also discovered that poor government policy is a very serious challenge to afforestation practices, this findings is in line with the views express by Kalu and Izekor (2006) that the urgent need for proper forest policy implementation is a strong safeguard for providing best option for forest decline and encouraging afforestation. This is apparent that the major avenue that Government influences forest operation are through sustainable forest management and the practice of forestry in line with spelt out lay down forest policy.

CONCLUSION AND RECOMMENDATIONS

Afforestation is not without challenges in the study area. Inadequate funds, inadequate land, long gestation period, Ignorance of the people, destruction of forest by livestock as well as poor government policies where considered as the most prevalent challenges face by communities when carrying out Afforestation activities though willing to start practicing Afforestation when their need is made.

In view of the importance of afforestation programme and the consequences of deforestation in the study area, this study recommends that Government and non Governmental organization should be committed to assisting the people with funds so as to help practice afforestation.

Government policies should be made flexible enough to encourage the people to participate in afforestation such policy could be enactment of Laws that will increase land availability for People to practice Afforestation, establishment of grazing reserve to cater for Livestock in other to prevent destruction of forest by livestock. There is need for government, NGO's and other private organisation to enlighten the people on the need to practice Afforestation through extension agent and mass media in other to boost Afforestation practice. Let there be effective planning, monitoring and implementation of Afforestation project as planted trees are allow to undergo survival of the fittest due to lack of proper care, this could be achieve by convincing community, political and religious leaders to initiate tree planting project that could serve as demonstration to the people.

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