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Poverty and Land Degradation Nexus: The Case of Asunafo, Ghana

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Abstract: ***Clarification of poverty-land degradation nexus is essential for finding solutions to the twin problems. Indigenous farmer perspective is sought through analysis of eleven indicators which are suggestive of poverty and land degradation via the application of pairwise ranking based on LSD (5%). The study reveals that the average scores of three indicators: food/feeding of farmer family, quality of farmer clothing/appearance and the tendency of borrowing money to make ends meet were higher than the calculated LSD. Also, the farmers felt the pinch of poverty more painfully in June than any other month. In response, government and NGOs are providing building materials and free-for-all-farmers agrochemical spraying of cocoa farms among other strategies to curb the twin menace. The paper reveals that the notion of rich cocoa farmer no longer holds for majority of farmers in the cocoa growing areas of Ghana.***

Keywords: Poverty, land degradation

1. Introduction

The link between poverty and land degradation is said to be a symbiotic one in a form of a vicious cycle. It is considered as a downward spiral [1] in which causality runs both ways [2]. Hence, poverty reduction should be tackled alongside the control of land degradation [3; 4].

In Ghana as well as other developing countries, land degradation is a major problem due to the agrarian nature of their economy. Most Ghanaians (70%) depend on the land for their livelihoods [5:8]. The fundamental importance of land extends to dependence on food, fibre, fuel and general ecosystem provisions of fresh air (oxygen), water and climate regulation. The growing reliance on the land for timber, agricultural produce and minerals has extracted land productivity over the past several years [5]. Instead of wealth creation through these resources, poverty is rather widespread in the country. The three northern regions of Ghana portray the highest incidence of poverty and occurrence of land degradation [6; 7]. In the forest ecosystem the poor receive little attention. About 35.8% of the forest poor live in the Brong Ahafo Region [6]. Their plight appears to be overshadowed by the general perception that cocoa farmers are rich. Therefore, their cry of poverty seemingly does not reach state authorities.

2. Literature Review

Land considered as *terra firma* – solid portion of the earth, terrestrial ecosystem – self maintaining association of plants, animals and the biophysical environment, as land resources; - soil, water, vegetation, rocks, air, climate and relief, as property; – economic value, as space/territory and as landscape is critical to solving the problem of poverty [8; 9; 10]. Hence, degradation of land means a lot to the achievement of poverty reduction objectives. Land degradation may be defined as the long-term loss of ecosystem function and productivity caused by disturbances from which land cannot recover unaided [11:223]. Land degradation poses serious threats to global food security, water availability, adaptation and mitigation to climate change and the livelihoods of millions of people [12]. In relation to income, poverty refers to purchasing power parity of less than US$1.25 a day [13]; as indicator of food consumption, poverty is defined as the intake of less than 2,200 calories per day [14]; and in terms of assets, poverty indicates deprivation of basic needs, goods and services [15] such as cattle holdings, the quality of agricultural implements, housing materials, labour resources, access to land and the ability of the household to produce food [16].

Aguedelo et al. [17] found no linear relationship between household poverty and natural environmental degradation in fragile hillside farming. The poor smallholder and medium-size farmers exerted relatively lower pressure on the natural environment through firewood and wood collection, deforestation, burnt area, hunting and loss of topsoil. However, large-scale livestock producers generated the greatest pressure on the natural resources. Although the poor are more dependent on natural resources than the rich, better-off households, in quantitative terms, use more natural resources than the poor [18]. Dasgupta et al. [19] considered the nexus between poverty and land degradation to be mutually reinforcing in specific context such that in Cambodia deforestation and fragile lands were not significantly associated with poverty; in Lao PDR deforestation and fragile lands significantly correlated with poverty; and, in Vietnam the results were eclectic however, fragile soils significantly related to poverty of steeply sloped areas. Duraiappah [20] posited that the impact of the poverty-land degradation nexus is localized. Generally, lack of security of land tenure, power, wealth and greed may cause land degradation amidst institutional and market failure and further result in creation of poverty. Smallholder farmers are the primary losers since they lack ability to diversify. In this regard, land degradation occurs and converts its victims from other income groups to the poverty zone. Diao and Sarpong [6] predicted that land degradation would reduce farm income in Ghana by US$4.2 billion by 2015. Consequently, poverty levels in the country would increase by 5.4 percentage points. In Ghana, droughts and

bushfires in the 1970s and 1980s aggravated land degradation resulting in the exacerbation of poverty [21].

Bai et al. [11] revealed correlation coefficient of 0.20 (weak positive relationship) between poverty (infant mortality rate and malnutrition of children under five years) and land degradation. Gisladottir and Stocking [3] reproduced that eradication of poverty and hunger are related to declining natural resources. DeClerck et al. [22] pointed out the overlap of extreme poverty and natural environmental degradation in the tropical latitudes particularly Sub-Saharan Africa. Lamb [23] linked loss of biodiversity to livelihoods of the poor who depend on degraded forest; that biodiversity restoration and conservation could contribute to poverty reduction. Poverty reduces resilience of local farmers to mitigate land degradation, makes the farmers become charity case depending on foreign food aid, makes some farmers starve to death and/or simply migrate [24]. Poverty means little opportunity to accumulate further means to manage the land resources. In effect the farmer is confined to cultivating simply with no means of physical conservation [10:80]. Ironically, farming households are the most affected in terms of food insecurity and poverty in Africa especially the smallholder farming households though the rest of the population depends on their production [25:26].

In many developing countries notably Ghana, population increases create corresponding increases in the proportion of poor people. The poor depends on the natural environment for survival [21]. Harvesting of natural environmental resources goes on without adequate replenishment or enough time to allow renewable resources to rejuvenate [26]. This inevitably results in land degradation. Once started, degradation reinforces itself through progressive addition to poor human population who continues to exploit natural resources unsustainably [27]. The incidence of poverty is found to be high among smallholder and subsistence farmers [7]. Hence, poverty reduces capacity of such farmers to use land sustainably, in other words, unsustainable agricultural practices are carried out mainly by the poor. As such, unsustainable land use is categorized as socio-economic indicator of land degradation [7; 28].

The literature suggests that simultaneous efforts are required to remedy poverty and land degradation menace [3]. In Africa, the struggle involves implementation of Sustainable Land Management (SLM) and poverty reduction. Investment in SLM, for example, organic soil fertility management provides three-fold benefits: agricultural productivity increases, declining land degradation and poverty reduction [29]. To some authors, sustainable livelihoods approach to poverty reduction could stem the two problems. They argued that absence of income/money is not the whole story as the poor may possess assets that can contribute towards reducing poverty and associated land degradation [30]. Namikat [21] suggested that African countries' efforts to achieve increased economic growth with shared benefits would control land degradation-poverty problems. Barbier [31] argued that policy reforms hold the key to solving land degradation-poverty difficulties. Carter [32] advocated for cooperative approach to poverty reduction through self-help projects. These projects integrate tenets of social inclusion, democratic decision making, corporate ownership, responsibility, community participation and contribution.

The cocoa industry in Ghana has checked history. There were many cocoa growing trials in the Gold Coast during the nineteenth century, however, successful commercial production started in 1879 by Akuapim farmers of the present Eastern Region of Ghana [33; 34]. When power struggle over the industry resulted, the natives lost control to the British colonial government in 1890. Then on, cocoa farming rapidly spread over the colony and Ashanti (including the present Brong Ahafo and Western Regions) as a result of suitable forest soils, ideal tropical climate and enthusiastic local farmers. Thousands of farmers became prosperous and created tremendous income gaps between them and the urban professionals, subsistence farmers, and underemployed migrant labourers [34:53].

Unfortunately, the world market price of cocoa suffered decline between 1950 and 1960 and reached all-time low in the 1980s [33; 35]. Indeed, the cocoa industry nearly folded up in the period between 1965 and 1982 [35]. However, both production and producer prices of cocoa picked up in the middle of 1990s and the 2000s [35].

3. Materials and Methods

The basic research methodology included the case study method. It permitted the use of multiple procedures essentially the application of Q-square which relied on quantitative and qualitative methods in tandem [36]. Data sourcing techniques comprised of literature review, participatory appraisals, personal observation, key informant interviews and questionnaire survey. The study involved 21 communities, 774 farmers and a proportionate sample size of 264. Data analysis used pairwise ranking of poverty-land degradation indicators relying on LDS (5%). Descriptive statistics and proportional circles were used via the assistance of GenStat, SPSS and ArcGIS.

As shown in Figure 1, the study area: Asunafo North and Asunafo South Districts occupies an area of 2,187.5 km^2 and located within $6^o27'$ and $7^o00'$N and $2^o23'$and $2^o52'$W [37]. The relief of the forest dissected plateau falls within the elevation of 550 and 800 ft with isolated spot heights of 1250 ft, 1350 ft, 1750 ft and 2050 ft [38]. Acrisol is the dominant soil type with traces of Nitisol and Fluvisol [39]. The districts come under the wet-semi equitorial climate where there are two rainfall peaks in May-June and September-October. The hottest month is March (34.3^oC) and coldest is January ($17.2\ ^oC$). The moist-semi deciduous forest is generally humid with relative humidity of 77% in July and August and 47% in February [40].

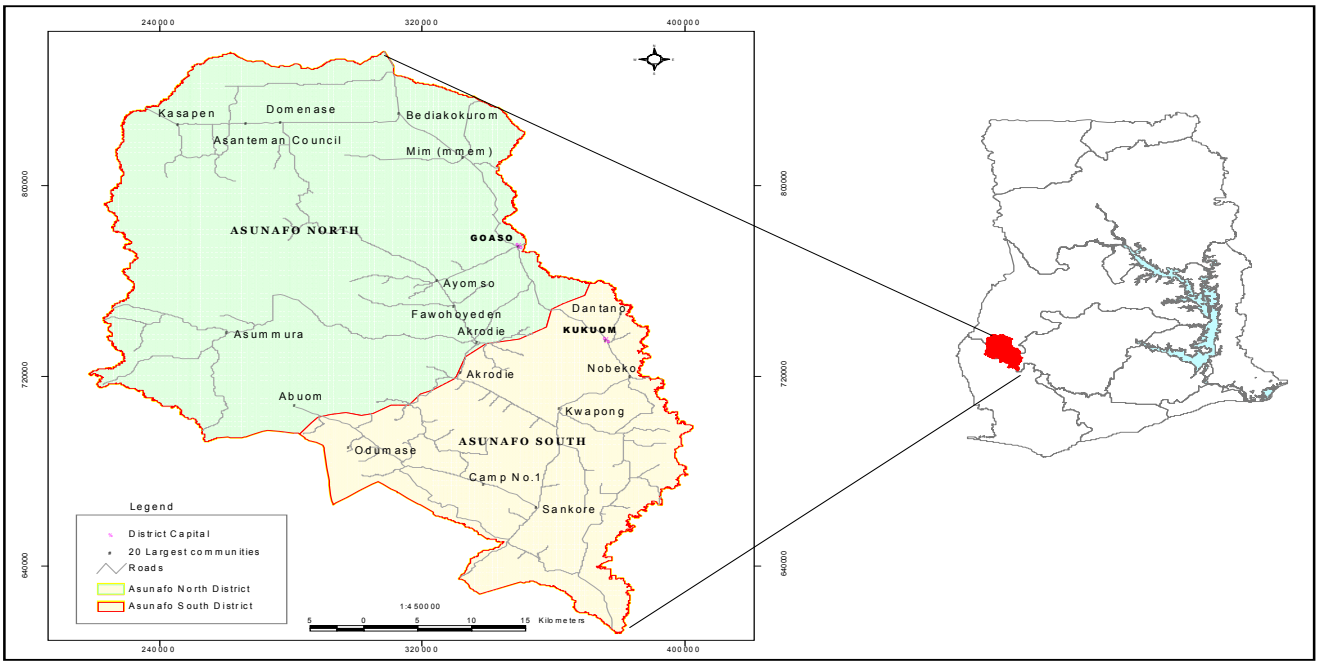

Figure 1: Map of Asunafo Area
Source: CERSGIS Department of Geography and Resource Development [39]

4. Results

The farmers grow several cash and food crops. They are described as cocoa farmers because about 95% of the 774 farmers (target population) grow cocoa. The number of farmers who cultivate other crops include plantain (80%), cocoyam (34%), cassava (60%), yam (6%), maize (22%), vegetables (11%), oil palm (34%), citrus (3%), other fruits (4%) and non-timber forest products (such as *Zingiber officinale*, *Voacanga africana* and *Aframomum melegueta, Griffonia simplicifolia*) (4%).

Table 1 indicates physical indicators farmers use to detect land degradation as involving conditions of the land and water action on the land.

Table 1: Physical state of land as indicator of land degradation

Physical Indicators of Land Degradation	*Number of Farmers who use the indicator*	*Percentage*
Hardened soil	13	38.2
Burrowed pits	1	2.9
Iron pan/plinthite	9	26.5
Presence of wet sand	2	5.9
Water erosion	4	11.8
Waterlogging	4	11.8
Flooding	1	2.9
Total	34	100

Table 2 Shows characteristics of crops suggestive of land degradation.

Table 2: Crop features indicative of land degradation

Crops as Indicators of Land Degradation	*Number of Farmers who use the indicator*	*Percentage*
Diminishing crop size	30	19
Rotting of farm produce	10	6
Stunted growth of crops	86	54
Green cocoa leaves turn yellow	25	16
Death of plantain crops (*Musa ABB*)	4	2.5
Failure of cocoyam (*Colocasia esculenta*) to sprout after slash and burn	3	2.5
Total	158	100

Table 3 presents the presence or absence of certain macro-fauna as farmer indicator of land degradation.

Table 3: Presence or absence of macro-fauna as farmer indicator of land degradation

Presence/absence of Macro-fauna as Indicators of Land Degradation	*Number of Farmers who use the indicator*	*Percentage*
Presence of termites	22	84
Presence of *Diplopoda*	1	4
Presence of *Camponotus*	1	4
Absence of earthworms	2	8
Total	26	100

Table 4 indicates conditions of vegetation identified by farmers as indicators of land degradation.

Table 4: Vegetation condition as farmer indicator of land degradation

State of the Vegetation as Indicator of Land Degradation	*Number of Farmers who use the indicator*	*Percentage*
Reduced tree cover	2	66.7
Loading camp of timber vehicles	1	33.3
Total	3	100

Table 5 shows that farmers consider the presence of weeds as indicators of land degradation.

Table 5: Presence of weeds as indicators of land degradation

Presence of Weeds as Indicator of Land Degradation	*Number of Farmers who use the indicator*	*Percentage*
Grass	29	82.9
Euphorbia heterophylla	6	17.1
Total	35	100

Figure 2 shows farmer indicators of poverty which are suggestive of land degradation. Previously, farmers were able to finance construction of their own houses. They accommodated their families and even strangers free of rent payment. Presently, farmers are not able to maintain the houses against damaging effect of soil erosion on the building foundations and patch up cracks in the mud walls due to poverty.

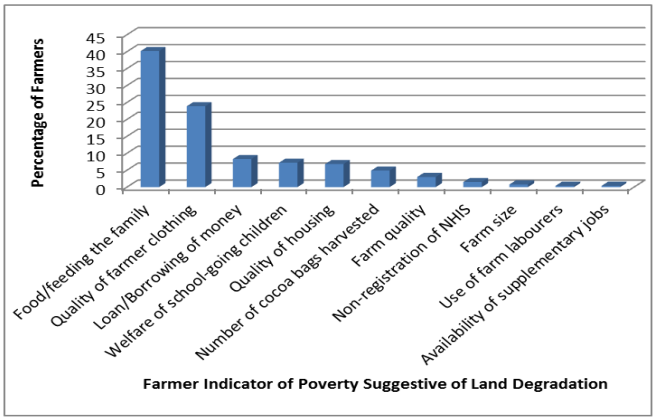

Figure 2: Indicators suggestive of both poverty and land degradation

Table 6 reveals calculated LSD of the mean scores of the 11 indicators that suggest occurrence of poverty and land degradation. The scores shaded yellow were greater than the calculated LSD of 0.941.

Table 6: Pairwise ranking of indicators suggestive of poverty and land degradation

		A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
		5.05	3.00	1.05	0.90	0.86	0.62	0.38	0.19	0.10	0.05	0.05
A	5.05											
B	3.00	2.05										
C	1.05	4.00	1.95									
D	0.90	4.15	2.10	0.15								
E	0.86	4.19	2.14	0.19	0.04							
F	0.62	4.43	2.38	0.43	0.28	0.24						
G	0.38	4.67	2.62	0.67	0.52	0.48	0.24					
H	0.19	4.86	2.81	0.86	0.71	0.67	0.43	0.19				
I	0.10	4.95	2.90	0.95	0.80	0.76	0.52	0.28	0.09			
J	0.05	5.00	2.95	1.00	0.85	0.81	0.57	0.33	0.14	0.05		
K	0.05	5.00	2.95	1.00	0.85	0.81	0.57	0.33	0.14	0.05	0.00	

A=Food for the farmer's family; B=Quality of farmer clothing/appearance; C= Loan/borrowing of money; D=Welfare of school going children; E=Quality of housing; F=Number of cocoa bags harvested; G=Farm quality; H=National Health Insurance Scheme registration; I=Farm size; J=Number of farm labourers and K=Availability of supplementary jobs

About 62% (164 respondents) of 264 sample size claimed to be poor while 38% (61 respondents) were not poor. Table 7 shows number of farmers who suffer poverty and land degradation.

Table 7: Cross tabulation of poverty and land degradation

		Land Degradation		*Total*
		Yes	*No*	
Poverty	Yes	153 (58%)	12 (4.5%)	165 (62.5%)
	No	84 (31.8%)	15 (5.7%)	99 (37.5%)
Total		237 (89.8%)	27 (10.2%)	264 (100%)

Table 8 presents the mean scores of causative factors of poverty and ANOVA grand mean of 1.09 and calculated LSD of 0.844. About ten outcomes shaded yellow were greater than the calculated LSD.

Table 8: Pairwise ranking of factors responsible for poverty

		A	B	C	D	E	F	G
		4.43	1.38	0.52	0.19	0.29	0.14	0.67
A	4.43							
B	1.38	3.05						
C	0.52	3.91	0.86					
D	0.19	4.24	1.19	0.33				
E	0.29	4.14	1.09	0.23	-0.1			
F	0.14	4.29	1.24	0.38	0.05	0.15		
G	0.67	3.76	0.71	-0.15	-0.48	-0.38	-0.53	

A=Low Crop Yield; B= Land Degradation; C= Only Cocoa Earnings; D= Loans with 100% Interest Rate; E= Land Scarcity; F= Small Farm Holding; G= Inability to Work

Figure 3 indicates farmer perception on the types of poverty. The size of pie chart varies according to the proportion of income poverty. The study reveals that in about 67% of the 21 communities farmers were more worried about income poverty. Lack of basic needs dominated responses of 29% of the communities while landlessness was the major poverty concern in 4% of the case study communities.

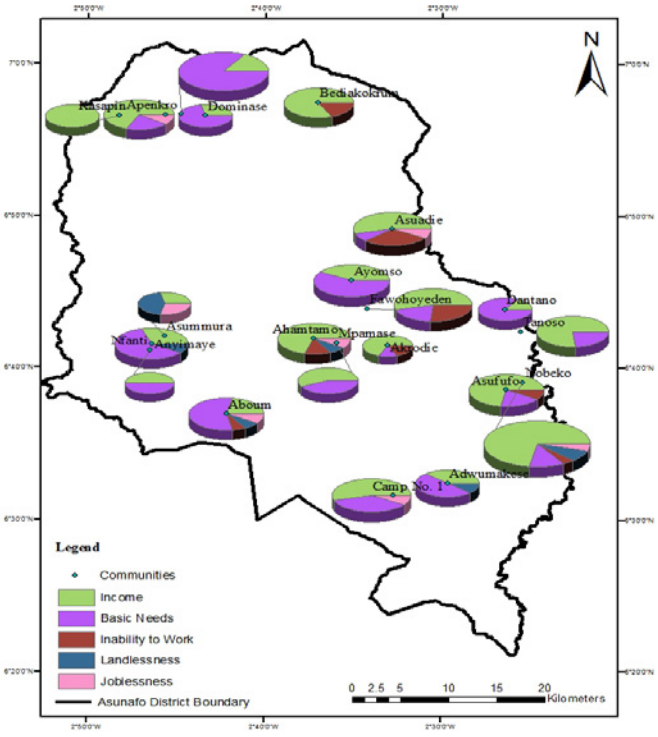

Figure 3: Five types of poverty perceived by farmers

Table 9 compares the mean score of the five types of poverty in order to show their ranks. The ANOVA produced mean

score average at F probability of (0.001) with a grand mean of 2.5 and LSD of 1.658.

Table 9: Pairwise ranking of five types of poverty

		A	B	C	D	E
		6.48	4.38	0.81	0.43	0.38
A	6.48					
B	4.38	2.1				
C	0.81	5.67	3.57			
D	0.43	6.05	3.95	0.38		
E	0.38	6.1	4.0	0.43	0.05	

A= Scarcity of Income; B= Lack of Basic Needs; C= Inability to Work; D= Landlessness; E= Joblessness

Figure 4 reveals farmers' perception with regard to suffering brought about by poverty in the twelve months of the year.

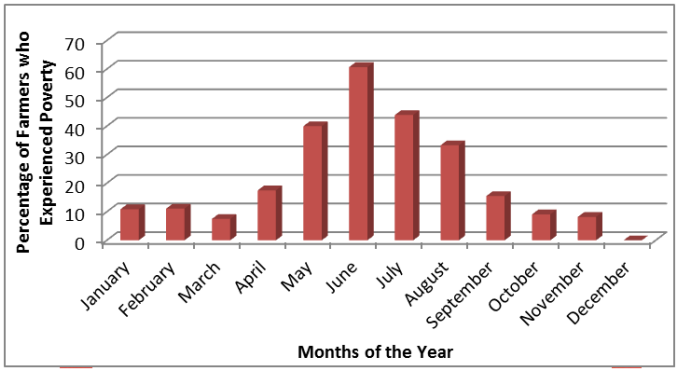

Figure 4: Farmer rating of the twelve months in relation to suffering the pinch of poverty

5. Discussion

The research set out to verify the incidence of land degradation in the forest ecosystem and investigate farmer management of the degradation. The aspect of the main research of which this paper examined is the identification of linkages between poverty and land degradation. The result suggests that the two are related. The farmer-respondents were mainly cocoa farmers many of whom suffered from both poverty and land degradation (58%). Only a handful of farmers were not poor and did not also experience land degradation (5.7%). The poverty and land degradation suffering farmers cited low crop yield and degradation of land as the main causal factors of poverty. They explained their situation is a consequence of scarcity of farm income as well as lack of some basic human needs. The poor farmers found it extremely difficult to cater for their families in the four months of May, June, July and August. They intimated that the best indicators to cite poverty and land degradation stricken farmers were quality and quantity of food available for feeding the farming family, the quality of clothing of family members and the tendency of asking for loan or borrowing money to make good the situation.

The leaning of the farmers on cocoa farming could be clarified severally. The forest vegetation, climate and associated edaphic features were supportive of cocoa farming. The once dense forest was opened up with accessible roads by Mim Timber Company and WA Gliksten Limited in the 1940s [41; 42]. This eased the transportation of dry cocoa beans and carting of other farm produce. Another reason was the high income returns generated from cocoa farming. Again the land was owned by families; hence, industrious members of the family took to cocoa farming due to easy entry requirement such as acquisition of simple farm implement and family labour. The farmers experienced low crop yield because besides old cocoa trees, the land has been farmed for well over 90 years (1921-2011) [43; 44]. Hence, the soils were exhausted, much of the soil nutrients had been mined and replenishment was little or nil. Where chemical fertilizers were not applied, yield was low indeed. By implication, income returns to little farm produce was low. The income was further reduced by expenditure on inputs such as chemical fertilizers and agrochemicals. Therefore, after taking care of children's school fees in September and October, Christmas and New Year festivities in December and January as well as Easter celebration in March or April, the remaining income became inadequate to cater for family expenditure for the rest of the months. In June crops such as maize (*Zea mays*), cassava (*Manioc*) and cocoyam (*Colocasia esculenta*) on fresh farms were not mature for harvesting. Hence, the farming families faced food shortages and lack of income to supplement food. As such June is called 'hold your hands' (kuta wo nsa) so that you do not steal. This name sounds enough warning that June is a really difficult month for farmers.

The rich cocoa farmers who do not suffer from land degradation probably due to continuous application of chemical fertilizers and agrochemicals also keep their farms free of weeds competition. They raise small ruminants (sheep, goats, rabbits, guinea pigs, cane eaters) and local poultry (fowls, turkey, ducks). A few rich farmers maintain fish ponds and cattle with the help of hired labour. In effect, the rich farmers manage relatively larger cocoa farms. The poor often maintain smaller cocoa farms and rely solely on income from cocoa and sale of labour on daily basis as 'by day labourers'. As such, they spend much of their time working in other farmers' farms to earn extra income. Their small farms are often engulfed with weeds. The remaining time left is used to set traps to hunt for game and wildlife. When successful, the game is sold to the rich farmers and the money spent on salted, smoked or iced fish and other family needs. While the poor expect and need so much harvest from the farm, little or no investment is done to replenish the land.

Again, the rich cocoa farmers carry out their duties with respect to child naming, puberty rites, marriage and funeral ceremonies. Income levels of the rich farmers determine the opulence level while participation is a mark of social networking and solidarity. Entertainment through singing and dancing, clapping of hands and drumming plus communal eating and drinking are the usual accompaniments. The poor farmers simply evaded ceremonial responsibilities. However, funeral dues are compulsory for the members of the bereaved family and optional to sympathizers. The study reveals that 17% (28 respondents) find the funeral dues very largely difficult to pay, 15% (25 respondents) largely difficult, 36% (59 respondents) moderately difficult and 32% (52 respondents) slightly difficult.

Levying of residents above age 18 is the usual way communities in Ghana raise revenue to meet their share of

development project funding. For instance, Self-Help Electrification Project (SHEP) was the rural electrification policy that was to electrified communities within 20 km of the national electricity grid to the extent possible. Poor cocoa farmers would leave their homes for the farm at dawn and return at dusk in order to evade payment of their levy. The case study revealed various levels of difficulty to pay levies as 19% (31 respondents) very largely difficult, 19% (31 respondents) largely difficult, 40% (66 respondents) moderately difficult and 22% (36 respondents) slightly difficult.

Other studies which showed similar findings included [45] who found that smallholder farmers and small-scale cattle herders in northern Ghana were poor and carried out their activities on degraded land. Diao and Sarpong [6] using simulation of Economy-wide Multimarket Model found that at 1999 poverty level of 35.8% for the Brong Ahafo Region, without soil degradation will reduce to 13.4% in 2015 but with soil degradation will reduce to 20.2% in the presence of government programmes at achieving MDG one: halving poverty by 2015.

6. Conclusion

Clearly, this study shows that large number of poor farmers till degraded lands. Poverty is synonymous with land degradation. Although, the rich and poor farmers use land in Asunafo to do cocoa farming, the rich reap good harvest supported by proper farm maintenance with chemical fertilizers and agrochemical application. The rich cocoa farmers break the vicious cycle of poverty-land degradation nexus through farm maintenance and diversification. The poor lack resources to do same and reap poor harvest. The downward spiral of poverty and land degradation is more applicable to the case of poor farmers. Additionally, majority of the cocoa farmers are poor and suffer land degradation. The notion of rich cocoa farmers is exemplified by only a handful of farmers and such farmers do not experience land degradation.

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