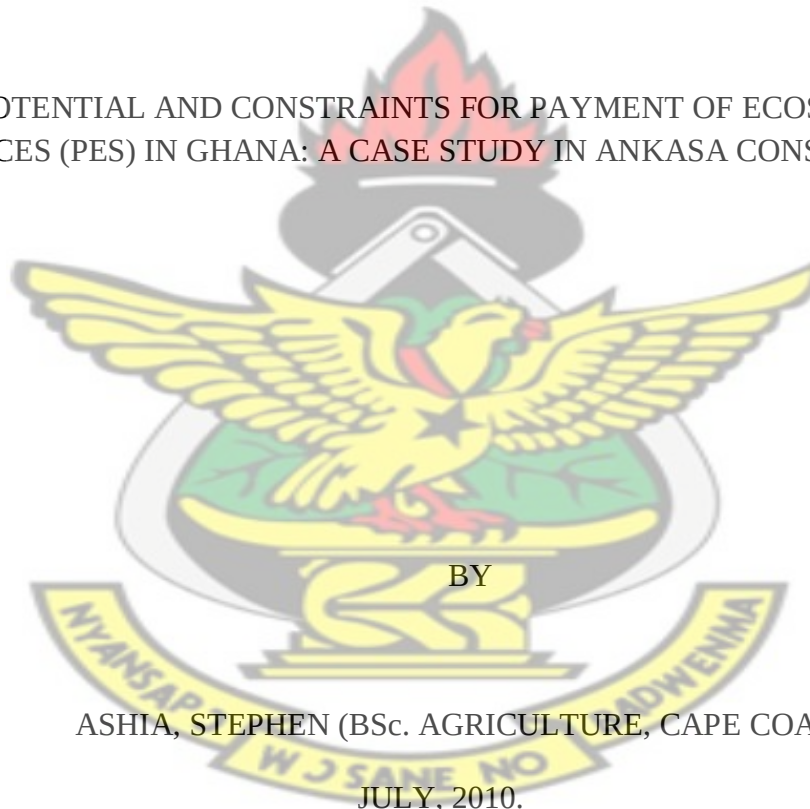


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COLLEGE OF AGRICULTURE AND NATURAL RESOURCES
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THE POTENTIAL AND CONSTRAINTS FOR PAYMENT OF ECOSYSTEM
SERVICES (PES) IN GHANA: A CASE STUDY IN ANKASA CONSERVATION
AREA.



ASHIA, STEPHEN (BSc. AGRICULTURE, CAPE COAST)

JULY, 2010.

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AREA.

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, KWAME
NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF
MASTER OF SCIENCE DEGREE IN AGROFORESTRY

BY

ASHIA, STEPHEN (BSc. AGRICULTURE, CAPE COAST)

JULY, 2010.

DECLARATION

I hereby declare that this submission is my own work towards my Master of Science Degree in Agroforestry and that, to the best of my knowledge, it contains no material published by another person or material which has been accepted in any other University for any degree except where due acknowledgement has been made in the text.

KNUST

Stephen Ashia

(Candidate)

.....
Signature

Dr. Kwame Twum – Ampofo

(Supervisor/Head of Department)

.....
Signature

DEDICATION

With love and affection, this thesis is dedicated to my parents, Mr. Samuel Owusu Ashia and Mrs. Veronica Tannaa for their financial and spiritual support and encouragement throughout my education.

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My greatest thanks go to the Almighty God for His divine strength, wisdom and care for me to go through this programme successfully.

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ABSTRACT

Markets for ecosystem services are being promoted by global institutions, transnational NGOs and some governments in industrialised and developing countries. However, the role of Payment for Ecosystem Services (PES) in the wider development context is less well explored despite its potential to increase overall conservation and/or restoration of an ecosystem and societal benefits. The study was conducted with the main objective of assessing the potentials and constraints for the implementation of Payment for Ecosystem Services (PES) in Ankasa Conservation Area and Ghana as a whole. The study conducted a general assessment of the institutional framework and key stakeholders and a local case study in order to analyse and evaluate the main components (potential environmental services, providers, buyers, and the local institutional framework) of a PES scheme. The study site was the fringe area of the Ankasa Conservation Area (ACA) in the Western Region of Ghana. Eleven communities were randomly selected with a total of 157 respondents. The study employs semi-structured questionnaires, focus group discussions and direct field observation to obtain primary data. Based on the nature of data gathered, a combination of data analyses techniques were used. The analysis took the form of descriptive, explanatory or interpretive analysis and relied mostly on qualitative data supported by quantitative data where necessary. The study reveals that PES itself is already discussed by state and non-state stakeholders. The study also revealed that carbon sequestration and storage, biodiversity protection or restoration, watershed protection and landscape beauty are the Environmental Services that have potentials to be traded in Ghana. However, water related services are the most promising services for a PES in Ghana. For watershed protection as a traded environmental service, Government of Ghana, Ghana Water Company, Ghana Electricity Company/ Volta River Authority and Water Resources Commission were found to be the potential service buyers. Although, a lot of Environmental Service providers were mentioned, farmers were considered as the most appropriate service providers for the implementation of a PES scheme in the fringe areas of the ACA as they cause a tangible threat to Ecosystem Services through unsustainable land- and resource use practices. It was again found out that NGOs are most trusted by the majority of stakeholders. Therefore, the NGOs could serve as potential

intermediaries in PES schemes by facilitating negotiation processes, monitoring the agreements, managing payment flows and organizing providers of the ES. The kinds of compensation preferred and projected amount that farmers are willing to accept were identified. The use of Agroforestry as a land use system for the provision of ecosystem services as well as food and cash crops and construction materials was identified. Agroforestry technologies such as riparian buffers, shaded cocoa, coconut and rubber agroforests and the plantation of rattan in cocoa and coconut trees were proposed. Constraints that could impede the implementation of the PES in Ghana were identified, which include: current system of land tenure, benefit sharing and the perverse pricing of cash crops threaten the success of a PES that aims at financing conservation, afforestation and reforestation. Missing interest in conservation issues in Ghana, the extinction of wildlife, illegal extraction and trade of Non – Timber Forest Products (NTFPs) bear constraints for PES schemes that deal with biodiversity and landscape beauty. Due to limited land size and high land pressure, farmers see tree growing as a threat to their food security. It was recommended that for the set up of any future PES scheme in the off reserve area would not only result in environmental benefits to the ACA itself but rather help to minimize the land use pressure on the reserve. It is recommended that an off-reserve PES based on the supply of environmental services provided by agroforestry systems that achieve various environmental benefits but with the effect of lowering the vulnerability of the local people should be designed. Again, the establishment of Community Resource Management Area which has the potential to act on behalf of PES providers should be strengthened. The development of PES is vital for improving the management of Ghana's forest ecosystems to ensure their conservation and sustainable use.

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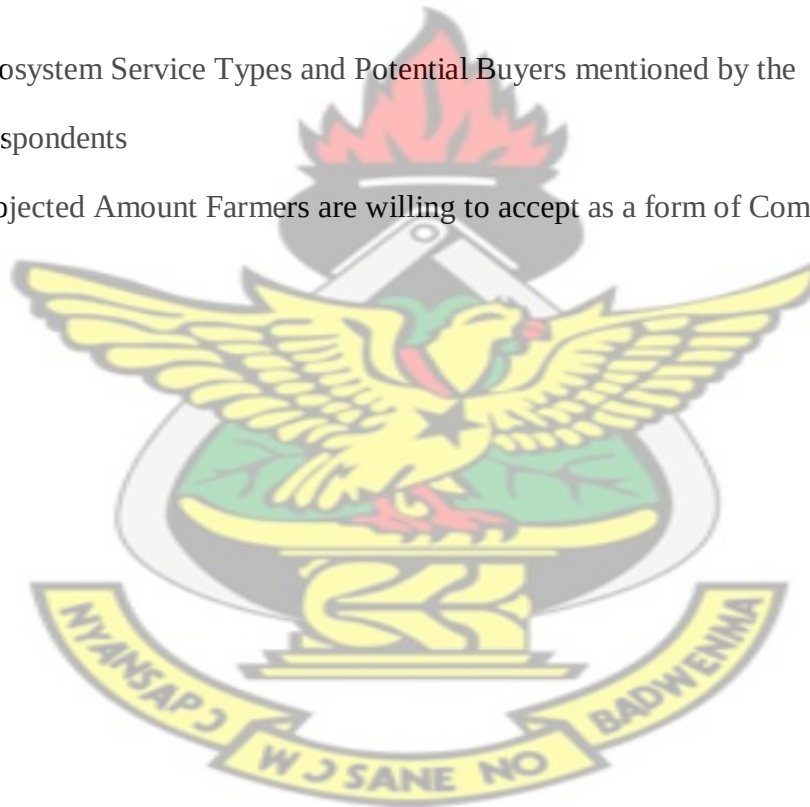
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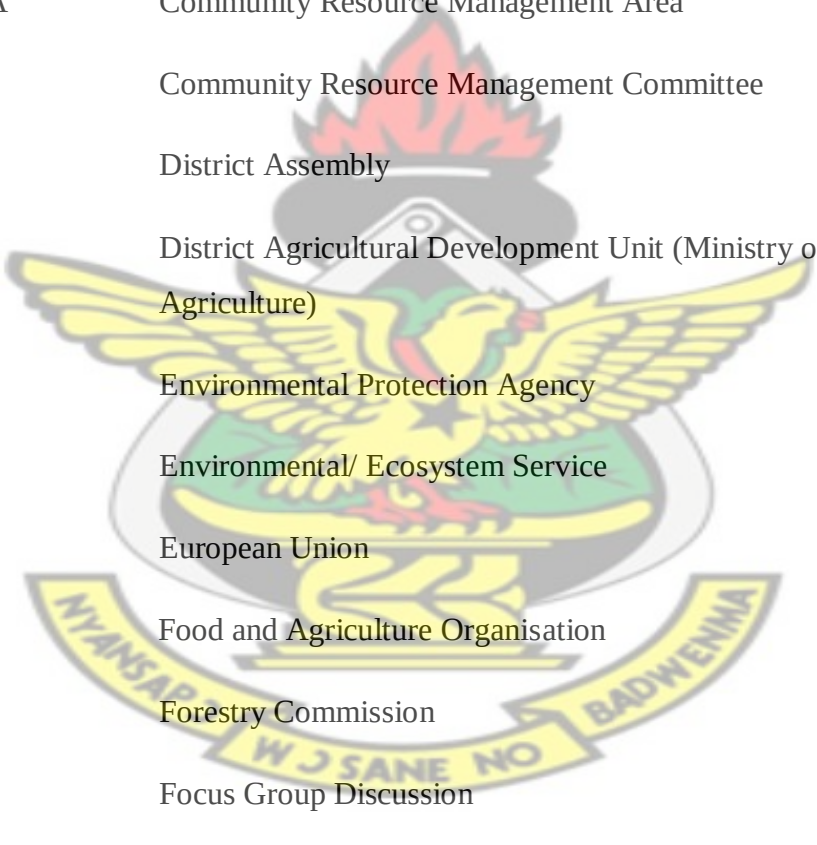


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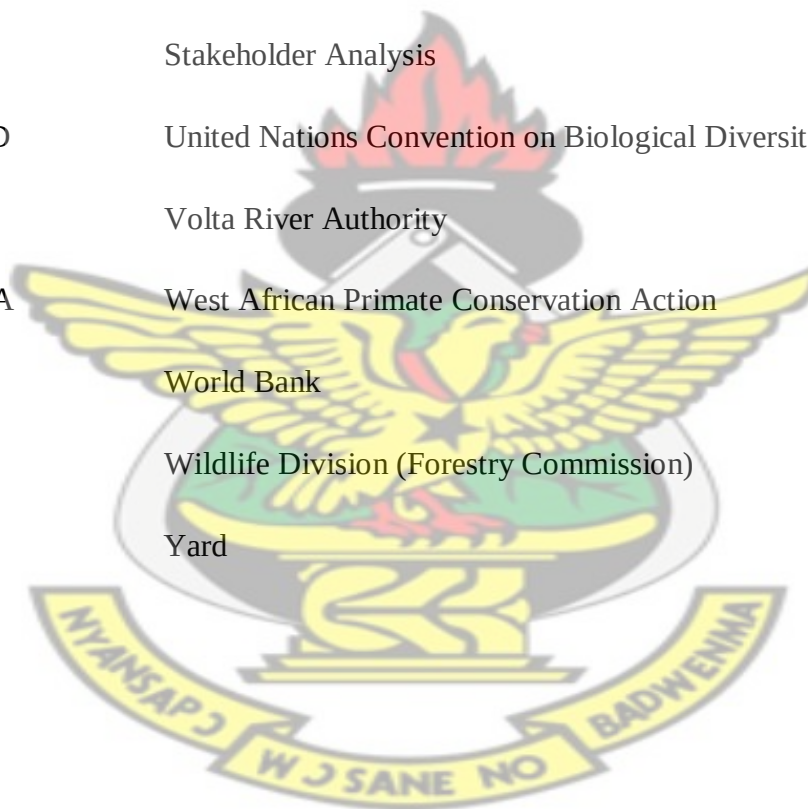
LIST OF ACRONYMS



ACA	Ankasa Conservation Area
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CIFOR	Centre for International Forestry Research
COCOBOD	Ghana Cocoa Board
CREMA	Community Resource Management Area
CRMC	Community Resource Management Committee
DA	District Assembly
DADU	District Agricultural Development Unit (Ministry of Food and Agriculture)
EPA	Environmental Protection Agency
ES	Environmental/ Ecosystem Service
EU	European Union
FAO	Food and Agriculture Organisation
FC	Forestry Commission
FDG	Focus Group Discussion
FORIG	Forestry Research Institute of Ghana
FR	Forest Reserve
FSD	Forest Services Division (Forestry Commission)
FWP	Forest and Wildlife Policy

GEF	Global Environmental Facility
GH¢	Ghana Cedi
GoG	Government of Ghana
GPS	Global Positioning System
GSBA	Global Significant Biodiversity Area
GTZ	German Technical Cooperation
GTZ/ BEAF	Advisory Service on Agricultural Research for Development of the German Technical Cooperation
GWC	Ghana Water Company
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
KNUST	Kwame Nkrumah University of Science and Technology
LAP	Land Administration Project
MA	Millennium Ecosystem Assessment
MDBS	Multi-Donor Budgetary Support
MLF	Ministry of Lands and Forestry
MoFA	Ministry of Food and Agriculture
MWRWH	Ministry of Water Resources, Works and Housing
NGO	Non Governmental Organization
NP	National Park
NREG	Natural Resources and Environmental Governance sector working group

NRM	Natural Resource Management
NTFP	Non-Timber Forest Product
ODA	Official Development Assistance
PA	Protected Area
PADP	Protected Areas Development Programme
PES	Payments for Environmental (Ecosystem) Services
REDD	Reduced Emission through avoided Deforestation and Degradation
SA	Stakeholder Analysis
UNCBD	United Nations Convention on Biological Diversity
VRA	Volta River Authority
WAPCA	West African Primate Conservation Action
WB	World Bank
WD	Wildlife Division (Forestry Commission)
Yr	Yard



CHAPTER ONE

INTRODUCTION

1.1 Background

Ecosystems sustain, strengthen and enrich various constituents of organisms and human well-being (Millennium Ecosystem Assessment, 2005a). Despite their importance to human well-being, many of these services provided are under threat throughout the world (FAO, 2007). Climate change, biodiversity loss, and destruction of natural ecosystems are among the major threats to the sustenance of ecosystem services, particularly in tropical developing countries with high poverty rates (W.H.O., 2004; IPCC, 2007c). For instance, since 1961, tropical countries have lost over 500 million hectares of forest cover and the consumption of forest products has risen by 50 percent worldwide. This situation is leading to the loss of environmental services that play an important role in the livelihoods, economic development and health of populations all around the world (Mayrand and Paquin, 2004).

Ecosystem services are either generally unknown, poorly understood or simply taken for granted by policymakers, private firms or local communities. This may also be due to lack of consumer information or awareness and the absence of appropriate economic incentives that would influence the behaviour of land users towards sustainable practices or conservation. Payment for Environmental/ Ecosystem Services (PES) schemes try to correct this market failure by internalizing benefits, thereby creating these missing incentives for the provision of environmental services (Mayrand and Paquin, 2004).

The concept of payments for environmental services (PES) has emerged in recent years as a potential tool for achieving ecosystem conservation and improving the livelihoods of environmental-service providers and consumers. However, considerable uncertainty remains as to what exactly environmental services are, what PES means, to what extent are they currently being implemented or promoted as well as what their prospects for success are (Capistrano, 2005).

The logic of the argument underlying PES is as follows: When 'free' environmental services are made scarce by human exploitation, they obtain an economic value. External service users might want to compensate local resource managers to ensure that the services they need are provided in the future. Consequently, if such compensation is made, the local service providers receive an income for their additional protection efforts. Since the mid-1990s, PES systems have begun to evolve in many parts of the tropics, in particular, in those of Latin America. The most developed markets and payment systems are located in North America and Europe, dominated by multi-billion-dollar public agri-environmental payments and public and private conservation easements. In developing countries, several billion dollars are spent on watershed payments. While Latin America has experimented extensively with diverse types of systems, developments in Asia and in Africa have lagged behind, although there are large pipeline of projects ready to be initiated by international development banks and funding agencies (Scherr *et al*, 2006).

1.2 Problem Statement and Justification of the Study

Ghana has suffered from the rapid deforestation and biodiversity loss and is the first country to have lost a major primate species (red colobus monkey has been extinct since 2003) after the Convention on Biological Diversity came into force. Some of the state managed forest reserves had lost as much as 90% of cover between 1990 and 2000 and it is estimated that 20,000 hectares per annum of the reserved area is lost to agriculture, or through bush fires and other human activities (Siaw, 2001; Forest Watch Ghana, 2006).

The Ankasa Conservation Area is one of the richest ecosystems in Ghana. However, the integrity of the area has been threatened, arising from the increasing human population, uncontrolled immigration and settlement. Over the last decade, there has been a rapid and apparently uncontrolled conversion to agriculture of forested land around the fringes of the Reserve. The loss of habitat, the degradation of streams, soils and natural resources have rendered the reserve as an island of biodiversity concentration in a sea of mono-culture plantations and secondary growth. Draw River Forest Reserve, which used to be very good forest has been severely damaged by logging companies. This in turn has led to increasing external pressures on the reserve resources, met by under-resourced and often ineffective policing action by the Ankasa management. The future integrity of Ankasa depends, therefore, on the stabilisation of the off-reserve land use and a rationalisation of the disharmony that exists between the land users and the Protected Area authorities (PADP, 2000a). As wild lands and natural habitats shrink, environmental services previously provided for free are becoming increasingly threatened. This emerging scarcity makes them potentially tradable, thus increasing the scope of Payment for Ecosystem Services (Wunder, 2005).

In view of the above problems, this research will help create financial incentives for local landowners and land users to adopt sustainable land and resource uses voluntarily that secure the conservation and or restoration of an ecosystem and will serve as reference materials for future project developers interested in implementing PES systems in Ghana and elsewhere. Therefore, there is the need to conserve the forest through payments for environmental services.

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1.3 Objectives

The main objective of the study is to assess the potentials and constraints for the implementation of Payment for Ecosystem Services in Ankasa Conservation Area and Ghana as a whole to adopt sustainable land and resource uses that secure the conservation and or restoration of an ecosystem.

The specific objectives were:

- i. To determine the environmental services (ES) that can be traded in Ankasa Conservation Area and the role of agroforestry systems.
- ii. To identify the providers and buyers of ES and the institutional arrangements of the PES.
- iii. To assess the national and global actors that have the capacity and show the willingness to support PES schemes in Ghana.
- iv. To assess the challenges that would impede the implementation of PES in Ghana.

1.4 Organisation of the Study

The study is organized into five (5) chapters. Chapter one contains the introduction. Chapter two reviews the relevant literature from the related studies while chapter three explains the methodologies used in the research. The fourth chapter analyses and discusses the results obtained. The last chapter draws conclusions on the study's findings and makes recommendations.

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CHAPTER TWO

LITERATURE REVIEW

2.1 The Concept of Payments for Environmental/Ecosystem Services (PES)

The concept of Payments for Environmental/Ecosystem Services (PES) has been described as a voluntary transaction where a well-defined environmental service (or land-use likely to secure that service) is being “bought” by a (minimum one) service buyer from a (minimum one) service provider if and only if the service provider secures service provision (conditionality) (Wunder, 2005). This definition is considerably broader than that used by some practitioners, who focus on direct voluntary payments by service users to service providers (Wunder, 2005; Pagiola and Platais, 2007). PES transactions are voluntary and negotiated frameworks, which distinguishes them from command-and-control instruments. It is important to emphasize that this concept considers payments as one of the potential tools for increasing the provision of environmental services (Robertson and Wunder, 2005). A genuine PES scheme needs to fulfill all five criteria indicated in its description. Those compensation schemes that satisfy several but not all of these criteria are referred to as “PES-like schemes” (Wunder, 2007).

Regarding the definition of the service, it must be clear what exactly is being bought. In several cases, it could be the service itself; which is stipulated in a contract regarding a certain land use that is likely to lead to that service. For instance, the downstream urban water users may want regular quantities of clean water, and may plan to pay upstream farmers to preserve their natural forests. With respect to the number of buyers and sellers, the widely used concept of ‘markets for environmental services’ would suggest

that multiple agents interact in a competitive manner to bargain for the right price as determined by supply and demand (Robertson and Wunder, 2005).

The core idea of PES is to create financial incentives for local landowners and land users to adopt sustainable land and resource uses voluntarily that secure the conservation and/or restoration of an ecosystem (Engel *et al.*, 2008). Frequently, service providers receive fewer benefits from conservation-friendly land uses, than they would receive from alternative land uses (Figure 2.1). The reduction or loss of the environmental services (ES), however, can impose costs on external beneficiaries of the service. Thus, Engel *et al.*, (2008) noted that compensation payments by service users are likely “to make conservation the more attractive option for land users”. Minimum payments by service users should at least cover the costs of conservation and the opportunity costs of forgone land uses, thus helping to make conservation the more attractive option for the land users and providers of ES. However, a balance is needed between the maximal payment that buyers are willing to provide and the minimal payments that will ensure the provision of services by land users.

The possibility to sell ES in PES schemes depends on the value that a potential buyer sees in it. The buyer of an ES needs to know what he is paying for and if a PES scheme really makes a difference, thus if “the PES scheme has a sufficiently large *additionality*” (Wunder, 2007). Wunder, (2007) refers to *additionality* as “the difference in service provision between the with-PES scenario and the without PES-baseline”. A key feature of PES is their conditionality; where payments are made only if the provision of the service is secured or the agreed-upon land-use caps are complied with on a *quid pro quo*

basis. In other words, they are based on monitoring of compliance with the contractual obligations (Robertson and Wunder, 2005).

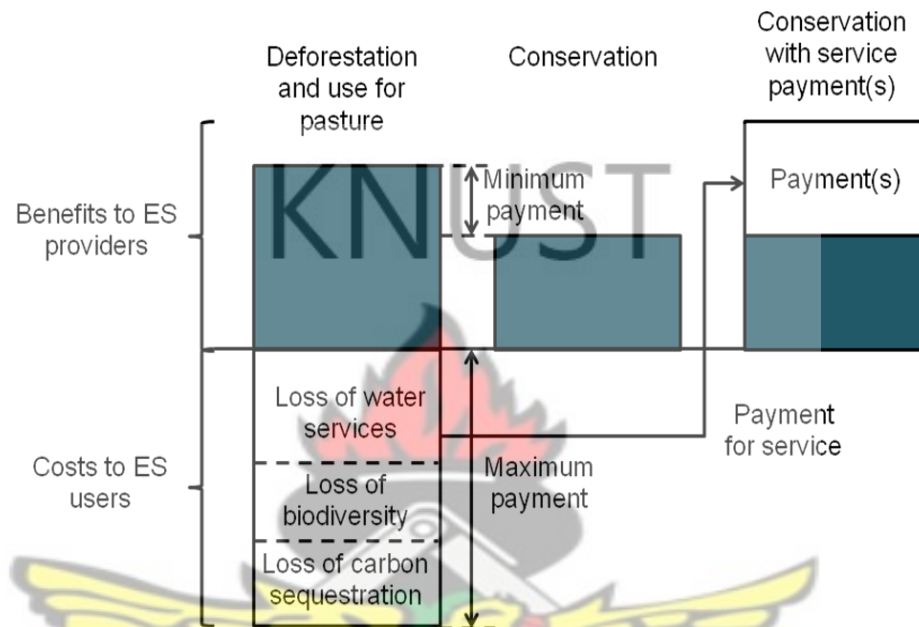


Figure 2.1: The logic of payments for environmental services (Source: Engel *et al.*, 2008).

Also, two other PES efficiency concepts are relevant to guarantee the sustainability of a PES intervention in time and/or geographical area. First, a PES scheme has to ensure that the ‘additionality’ achieved in the project area at the same time does not increase the pressure on neighbouring areas, commonly referred to as ‘leakage’. Second, the ‘permanence’ of the intervention should be secured after the termination of the PES scheme. For example, avoid the logging of the reforested area after the end of PES (Wunder, 2005).

Landell-Mills and Porras (2002) propose the following key steps to develop successful markets for environmental services: identify benefits provided by a specific service and by determination of activities that deliver this service; undertake a feasibility study; establish willingness to pay; formalize property rights; establish payment mechanisms and supporting institutions; and undertake pilot activities and feedback to market design. Indicators of success of PES schemes may include: the number of participants (both beneficiaries and land users); the land area that is included under the PES scheme; the extent to which a PES scheme is generating land use changes; the net additional revenues that a PES scheme brings to land users; the financial sustainability of the system in the long run; the extent to which the system is generating environmental services; and the cost-effectiveness of PES schemes compared to alternatives (Mayrand and Paquin, 2004) .

2.2 Ecosystems and their Services

An ecosystem is a dynamic complex of plant, animal and microorganism communities and the non-living environment interacting as a functional unit. Ecosystem or Environmental services (ES) are components of nature, directly enjoyed, consumed, or used to improve human well-being (Boyd and Anzaf, 2007). These benefits can be classified as provisioning, regulating, cultural and supporting services (Millennium Ecosystem Assessment, 2003; 2005a).

Provisioning services are the products people obtain from ecosystems, such as food, fuel, fiber, fresh water, and genetic resources. Regulating services are the benefits

people obtain from the regulation of ecosystem processes, including air quality maintenance, climate regulation, erosion control, regulation of human diseases and water purification. Cultural services are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences. Supporting services are those that are necessary for the production of all other ecosystem services, such as primary production, production of oxygen, nutrient cycling, and soil formation (Millennium Ecosystem Assessment, 2003; 2005a). Despite the ecosystems importance to human well-being, many of these services are under threat throughout the world (FAO, 2007).

2.3 Main Environmental/Ecosystem Services Paid for under PES Schemes

Current PES scheme transactions are dominated by four ES types: payments for carbon sequestration and storage, biodiversity protection or restoration, watershed protection, and landscape beauty (Wunder, 2005; Robertson and Wunder, 2005). However, payments for other forest environmental services are also taking place. For instance, the protections from tropical storms or pollination services provided by natural forests are examples of other candidates that can create or protect important economic values. Until now, however, willingness to pay has been concentrated in the four areas listed above (Robertson and Wunder, 2005).

2.3.1 Carbon Sequestration or Emission and Trading

Carbon sequestration involves the removal and storage of carbon from the atmosphere in carbon sinks such as oceans, vegetation, or soils through physical or biological processes (Jose, 2009; Nair *et al.*, 2009). A market for carbon sequestration or carbon emission

reductions worldwide is driven by Clean Development Mechanism (CDM) of the Kyoto Protocol. The Kyoto Protocol is an agreement under the United Nations Framework Convention on Climate Change (UNFCCC) that involves commitments on the part of a set of industrialized countries referred to as Annex I countries to legally binding limits or reductions to their greenhouse gas emissions from a base of the levels prevailing in 1990. The Kyoto Protocol became legally binding in 2005, with its first commitment period ending in 2012 (Robertson and Wunder, 2005; FAO, 2007; Pagiola, *et al.*, 2002). January 1, 2008 marked the formal start of the compliance period of the Kyoto Protocol and Phase II of the European Union Emission Trading Scheme (EU ETS) (World Bank, 2008).

According to FAO (2006), most efforts have so far been focused on emission reduction rather than on carbon sinks. Also, at present, the rules of the CDM restrict the type and amount of carbon emission reduction credits that can be obtained from carbon sequestration. Only afforestation and reforestation projects are allowed, and these can only make up one percent of the total base-year emissions (FAO, 2007). Payments to land users for reducing emissions from deforestation are one of the most important types of positive incentive measures being proposed (UNFCCC, 2007). This source of payments, if it materializes, will have the potential to augment the flow of payments for emission reductions from the agriculture sector (FAO, 2007). The prices that are being paid for credits for carbon emission reduction vary widely by source of demand and type of offset. The Ecosystem Marketplace reported prices of around US\$7 per tonne of carbon dioxide in 2007, up from a range of US\$3 – 6.5 per tonne in 2004 (Walker, 2007; World Bank, 2006).

In the global carbon offset market for 2003 and 2004, Latin America and Asia accounted for more than three-fourths of the emissions reduction projects, while Africa accounted for 3% (Lecocq and Capoor, 2005). In 2006, 508 megatonnes of carbon dioxide equivalents were sold by developing countries to Annex 1 countries, for a total value of US\$5.4 billion (World Bank, 2007). For the third consecutive year, China was the world leader in CDM supply with a 73% market share in terms of 2007 transacted volume. Brazil and India, at 6% market share each, transacted the highest volumes after China and Africa followed with 5%. Projects in Africa, such as Kenya, Uganda and Nigeria have contracted to supply about 50MtCO₂e to the market so far, with more than 20MtCO₂e transacted in 2007 alone. For Joint Implementation (JI) projects, Russia share of volumes supplied was 36% in 2007, followed by Ukraine with 33% and Bulgaria and Poland supplied 9% each (World Bank, 2008).

For the second consecutive year, European buyers dominated the CDM and JI market for compliance and at the close of 2007, UK alone shares of volumes purchased was 59%. Private companies have been the most active buyers, with 79% of volume transacted in 2007. Japan is back in the carbon compliance market with its 2007 market share of volumes purchased was nearly doubling from 6% to 11% with both public and private sector intensifying their activity (World Bank, 2008).

Currently, these regulated markets are unfavourable to small farmers for a number of reasons. First, the CDM excludes two of the major forms of carbon emission reductions that farmers can deliver relatively easily: Reduced Emissions from Deforestation in

Developing Countries (RED-DC) and soil carbon sequestration. Second, the process of certifying projects to be CDM-eligible is complex and costly. A third problem relates to the limits placed on the size of small-scale carbon projects. The CDM allows simplified procedures for establishing small projects; however, the maximum size of these projects is set at 8 kilotonnes of carbon dioxide that can be offset from sequestration per year, which is too small for the projects to be financially feasible at current market prices. Most country submissions to the UNFCCC in 2007 requested an increase in this cap to 32 kilotonnes in order to improve their feasibility (FAO, 2007).

2.3.2 Watershed Protection

Demand for watershed services appears to present a growing opportunity for farmers located in a critical watershed (Ecosystem Marketplace, 2005). PES for watershed management typically involves payments to upstream land users for improving or stabilising land use in the catchment, for example by paying land owners not to harvest trees, build roads, or convert forest land to other uses that could adversely affect water quantity or quality needed for irrigation, drinking water, or hydro-electric utilities. In some cases, financial transfers have been made from utility companies to land users or land owners (FAO, 2006).

Public watershed payment schemes, which currently represent by far the largest market for watershed services, are valued at US\$2 billion annually worldwide. Monetarily, these payments are concentrated mostly in China and the United States of America, but numerous smaller public watershed programmes are being established in Africa, Asia and Latin America. For example, in Costa Rica, Mexico and United State of America,

the size of the market (million US\$) in 1996 was 89.0, 23.1 and 11.3 respectively; the price of the service (US\$ per hectare) was 40 – 100, 33 and 2.37 respectively (FAO, 2007). Private voluntary watershed programmes consist mainly of small, localized markets totaling about US\$5 million annually, worldwide (Ecosystem Marketplace, 2005). However, payments for water services activities remain incipient in Latin America, albeit farther than in other parts of the developing world. One reason why PES is more successful in Latin America is that rural land tenure is more secure in the region. Another reason is that commercializing rights to land use and land management practices is culturally and politically acceptable in much of the region (Dillaha *et al.*, 2008).

Opportunities to use PES are more promising in Bolivia's lowlands, where there is less ideological resistance to economic instruments and where irrigated, commercial agriculture and urban water consumers are potential buyers (Dillaha *et al.*, 2008). Various municipalities in Tarija and Santa Cruz are also experimenting with PES-like watershed schemes (Robertson and Wunder, 2005). The most serious efforts have been in Alto Mayo- Moyobamba, San Martín department, and in the Jequelepeque and Piura watersheds, where development partners like German Technical Co-operation (GTZ) and NGOs have worked together in the Andean Watersheds Project. While negotiation processes have advanced noticeably, a primary obstacle has been to transform willingness to pay on the part of potential service buyers into actual payments (Dillaha *et al.*, 2008).

Two pioneer schemes that fit the five-point PES definition completely have been running for years. One is the Pimampiro municipal watershed scheme which draws on water funds to which customers contribute to finance watershed conservation (Dillaha *et al.*, 2008). Several cities in southern Brazil have shown interest in PES or PES-like schemes for watershed conservation. One of these is the Ecological Value Added Tax (VAT), which has been implemented first in Paraná and later in other states (May *et al.*, 2002). Mexico's Program for Hydrologic-Environmental Services (PSA-H) is the largest PES program in Latin America. The PSA-H focuses on the conservation of threatened natural forests for the sake of maintaining downstream flows and water quality. Funding for the PSA-H, \$30 million (U.S.) in 2004, is derived from charges paid by federal water users. Payments are disbursed to individual and collective landowners possessing natural forests that serve watershed functions (Dillaha *et al.*, 2008).

In Africa, 10 water projects are being implemented, of which two are making payments. Majority of African PES activity is taking place in South Africa. Relative to the rest of Sub-Saharan Africa, South Africa has a better business climate, higher income levels, greater scientific capacity, better understanding of the nation's hydrology, greater institutional capacity, a stronger national water law that makes provision for the use of economic instruments in water management, and higher rates of access to safe water (Dillaha *et al.*, 2008). In contrast with carbon sequestration and many biodiversity conservation services, watershed protection services are primarily of interest to local and regional users. On the positive side, it is relatively easy to identify the users or beneficiaries of watershed services; these include municipal water suppliers, hydroelectric facilities, industrial users and irrigation systems. On the negative side, the

local orientation of watershed service benefits is the limited scope for attracting payments from international beneficiaries (Landell-Mills and Porras, 2002). The development of local watershed PES programmes is difficult where the water users are poor and unable to afford payments to upstream stewards (Echavarria *et al.*, 2004). Also, as the size of the watershed increases and the number of providers and beneficiaries multiplies, more complex arrangements would be needed (FAO, 2006).

Nonetheless, development of a payment system for watershed services faces a number of problems which include the lack of clarity about the impact of different land uses on water. Numerous scientific doubts remain about forest-water linkages; in some societies, access to water is seen as a fundamental right. Development of markets for water requires defining property rights, which in many countries is not a trivial issue and in the case of large watersheds with many users, the transaction costs for PES can be very high. Intermediary organizations are usually needed to link producers and users (FAO, 2006).

2.3.3 Landscape Beauty

Forests provide landscape beauty in recreational areas and the presence of unique flora and fauna adds to the attraction, which people enjoy and value (Robertson and Wunder, 2005; FAO, 2006). The classical valuation of landscape beauty is the hedonic value captured in property markets. Both domestic and international tourists are also willing to pay for landscape beauty, and this has been the most important value in developing countries (Robertson and Wunder, 2005).

Tourists often reveal their willingness to pay for this beauty through both elevated travel costs of getting to an attractive site and, in some cases, additional entrance fees, higher-than-normal accommodation costs and other charges. Conversely, local people can be rewarded for the preservation or restoration of landscape beauty either directly through a share in entrance fees paid by tourists, through site-operation fees and fringe benefits paid by tourism companies, or through tourism-derived employment and petty trade (food, handicrafts, etc.) that is more highly remunerated than the locally available economic alternatives (Robertson and Wunder, 2005).

The rapid growth of eco-tourism in countries has enhanced the income potential in areas of undisturbed ecosystems. Eco-tourism is indeed the fastest growing segment of travel and tourism, and its expansion is particularly rapid in the Asia Pacific region (FAO, 2006). The strongest growth of tourism in receipts was noticeable in Africa, with a 10% increase in 2006, well over the global average of 4.5% (United Nations World Tourism Organization (UNWTO), 2007). Tourism has been seen as an important promoter of development and, as such, has been sponsored in the developing world by multilateral such as African Development Bank, European Union, UNDP and bilateral institutions such as USAID as well as by numerous domestic and international NGOs such as WWF (Billgren and Holmen, 2008). Payments have been collected from tourism operators in Peru's Madre de Dios region to finance the conservation of scenic vistas with a similar scheme existing in Bolivia's Madidi National Park (Robertson and Wunder, 2005). However, the specific mechanics of these initiatives differ from those of pure PES (Ferraro and Simpson, 2002).

2.3.4 Biodiversity Protection or Restoration

Biological diversity is the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, among species and of ecosystems (FAO, 2007). The types of payments for biodiversity protection are a purchase of high-value habitat, payment for access to species or habitat, payment for biodiversity-conserving management, tradable rights under cap and trade regulations, and support biodiversity-conserving businesses (Scherr *et al.*, 2006).

The increased attention to the intrinsic and utilitarian importance of biodiversity has prompted both private conservationists and governments to pay for its protection. Pharmaceutical companies have paid for the values of bio-prospecting the biodiversity contained in certain spatially defined areas, though the payments have been low and the number of systems very limited. Governments pay for the option value of biodiversity through the Global Environment Facility (GEF). The global wildlife enthusiast may be willing to pay for the existence value of biodiversity (Robertson and Wunder, 2005). In the United States of America, the conservation banking market is a biodiversity cap-and-trade system that allows for the sale and purchase of endangered species credits to offset negative impacts to endangered species and their habitat.

Internationally, particularly in developing countries, payment mechanisms being developed include certification of biodiversity-friendly agricultural products, hunting concessions, ecotourism development, markets for biodiversity offsets and niche markets for products with high agricultural biodiversity value (FAO, 2007). In Africa,

The Katoomba Group inventories list 18 biodiversity projects, of which two are making payments in cash or in kind. A couple of other nations have biodiversity payment initiatives such as Madagascar and Guinea (Dillaha *et al.*, 2008). Other examples of biodiversity programme in Africa include South Africa Biodiversity and Wine Initiative which certifies vineyards that implement practices consistent with biodiversity conservation (ten Kate *et al.*, 2004).

A lot of factors hinder the development of biodiversity markets in Africa. For example, the uncertainties in the future benefits of biodiversity. Also, market demand is mainly driven by philanthropy, consumer and voter preference and regulation. Furthermore, public finance for conservation is highly constrained and contested in Africa which makes it difficult to define “units of biodiversity” for the purpose of carrying out transactions (ten Kate *et al.*, 2004). Additionally, the market for biodiversity conservation is highly segmented, and a number of different payment systems exist, including the purchase of high-value habitat; payment for access to species or habitats; payment in support of management to conserve biodiversity; tradable rights and support for biodiversity conservation business. Each of these requires a specific policy and institutional framework (FAO, 2006; FAO, 2007).

2.4 Potential Providers and Buyers of Environmental Services

According to FAO (2003), Providers are economic agents whose productive activity generates, as a positive externality, the service for which the payment system has been created. Suppliers/Sellers are land or resource owners or managers who provide stewardship services to protect or restore ecosystem functions (Scherr *et al.*, 2006).

There are five main categories of environmental service suppliers who are being paid in national and local schemes. These include: Private landowners, having clear ownership of their land; Private entities registered as reserves and committed to conservation of specific ecosystems; Informal occupiers of public lands; Communal landholders; and Government or NGO managing protected areas (Porrás *et al.*, 2008).

To provide enhanced levels of environmental services, farmers can alter their production practices in a variety of ways, where lands remain in agriculture but production activities are modified to achieve environmental objectives. These include land-diversion programmes, where lands are diverted from crop and livestock production to other uses (FAO, 2007). Population density, agro-ecological conditions, level of market integration and primary technology employed in agriculture affect the demand and willingness to pay for environmental services at the local level. However, the actual amount of the environmental services that farmers will supply depends on how much they will be paid for and on the costs they would bear in supplying it (FAO, 2007).

Buyers on the other hand, are direct or indirect beneficiaries of the ecosystem service, including the private sector or the government (Scherr *et al.*, 2006). They can also be an individual or group who would be positively affected by more of the service and therefore willing to provide some financial incentive for its provision (FAO, 2007). However, the actual purchaser of an environmental service is often not the same as the beneficiary. In many cases, the purchaser is the public sector, acting on behalf of individual beneficiaries (FAO, 2007). Basically, there are five basic types of buyers for ecosystem services, who respond to different motivations. These are (a) philanthropic

buyers, who are motivated by non-use values; (b) public sector buyers, at different scales, who seek to secure ecosystem services that benefit the public at large; (c) private businesses, organizations or communities who engage in private deals to secure ecosystem use-values or other business benefits; (d) private buyers who are under regulatory obligation to offset ecological impacts; and (e) consumers of eco-certified products, who are motivated by both use and non-use values (Scherr *et al.*, 2006).

The most important buyers of landscape aesthetics and recreational services are likely to be private tour operators, working in a particular area of high scenic aesthetics. Private recreational hunters and fishers and private park visitors could also become buyers of landscape aesthetics and recreation services. Some of the documented cases of voluntary private markets include: irrigators paying for upstream water-flow management, fruit-growers paying to protect pollinator habitat and farming communities paying neighbouring communities to protect critical sources of drinking water (Landell-Mills and Porras, 2002).

Environmental services as well as their buyers according FAO, (2007) are listed as follows: **Carbon Sequestration:** - Potential buyers include Local, regional and national governments, World Bank- Bio Carbon Fund, National carbon funds, Conservation groups, Land trusts, Hedge funds and investment groups. **Biodiversity:** - International and National NGOs, Private businesses are the buyers. **Watershed protection/ quality:** - Municipalities Private water suppliers, Public water suppliers, Bottled water Companies, Farming organizations and hydroelectric energy providers are the buyers.

2.5 Sources of Financing PES

The development of an appropriate financing platform is a key to the establishment of a successful PES system which include (a) the cost of establishing the system such as scientific research, creation of institutions, stakeholder consultations, training; (b) payments to land users; and (c) ongoing management and monitoring costs of the system. Several sources of financing are available to PES systems, including: Donations and grants from national and international organizations; Government payments and subsidies (Earmarked Taxes); and Payments from beneficiaries (Charges and User Fees) (Mayrand and Paquin, 2004).

Most PES programmes are funded by the public sector (FAO/Forest Trends, 2007). There is currently little private sector involvement (Dillaha *et al.*, 2008). However, the private sector is increasingly becoming involved in purchasing environmental services. One such example is the French bottled water company Vittel which pays farmers to maintain specific land-use practices above the aquifers they use for bottling. In Costa Rica, La Esperanza Hydroelectric Company pays landowners in the watershed of its power-generating reservoir to maintain their forests intact in order to control erosion. Similarly, ecotourism operators sometimes pay local communities to ensure the conservation of attractive biodiversity in the surrounding areas (FAO, 2007).

A recent survey identified more than 100 types of private environmental service payment programmes with a relatively even distribution across the domains of carbon sequestration, water and biodiversity (FAO/Forest Trends, 2007). International public-sector funding is also an important source of finance for PES programmes in developing

countries particularly in Africa. One key player is the Global Environmental Facility (GEF), which has co-funded several PES projects in developing countries (Pagiola and Platais, 2007). The Bio Carbon Fund provides an example of an international source of payments for carbon emission offsets from land-use change that includes payments for activities allowable under the Kyoto Protocol, such as reforestation and afforestation, as well as soil carbon sequestration (FAO, 2007).

2.6 Mode or Form of Payments

According to FAO (2007), there are three main types of mechanism for environmental service payments. These are (a) direct payments; (b) offsets; and (c) agricultural product certification programmes (ecolabels). Each involves different sets of stakeholders among the buyers and sellers, as well as intermediaries involved in making the transaction. The direct payments are made directly from public programmes. Private payments may also fall into this category, including cases of hydropower companies paying for watershed services and payments made by NGOs for biodiversity conservation services. Currently, this mechanism accounts for the largest share of payments (FAO, 2002a). In Costa Rica, in the Rio Segundo watershed, for example, payments to landholders are financed in part with payments from a private bottling company and in part by the local town's public service utility ESPH (Empresa de Servicios Publicos de Heredia) (Pagiola, 2006).

On the payments in cash or in kind, Robertson and Wunder (2005) stated that, 'Payments' need not always be implemented in monetary terms; they could be in kind or a combination of different benefits to local land users. Where awareness of PES exists, upland communities participate for cash payments. Such payments typically flow to a

group, which has established rules, written or oral, on how to manage payments received for the benefit of the community as a whole (Dillaha *et al.*, 2008). It has been found that an alternative to cash payments, can include tenure-related compensations, such as enhanced land tenure security as explored in Indonesia and also provision of capacity-building in terms of skills development targeted towards livelihood improvement (Wertz-Kanounnikoff and Rankine, 2008). For instance, in Bolivia farmers have been provided with beehives and technical assistance in bee keeping as a form of payment for watershed services. This form of payment was perceived as creating a lasting benefit, while cash would more likely have been spent right away. One objection to such in-kind payments is that they allow less flexibility for meeting fluctuating labour and skill requirements. Moreover, they can also be seen as paternalistic, that is, it is an outsider who determines what is best for suppliers, rather than allowing them to choose how to invest or dispose of their cash payments (Wunder, 2005).

The timing and duration of payments are critical issues from both a buyer's and seller's point of view. In many cases, environmental services are only generated years after the supplier actually makes the required land-use changes and bears the costs. Obtaining investment credit is often difficult and expensive for developing country farmers. This strategy is used in the Silvopastoral Project in Colombia, Costa Rica and Nicaragua, where payments are explicitly short-term. These payments also alleviate the liquidity problems faced by many farmers and help them finance the required investments (Pagiola *et al.*, 2004).

Payments made in a single installment or periodically also need a critical consideration (FAO, 2007). It has been recommended that, payments must be made periodically, rather than once-and-for-all up front, so as to provide a clear incentive for the provider to continue to adhere to the contractual obligations, and a possibility for the buyer to exit the system in the case of the provider's non-compliance (Robertson and Wunder, 2005). Although an initial disbursement can be requested at contract signing, all subsequent annual payments require verification of compliance (Dillaha *et al.*, 2008).

2.7 What, how and who should Payments be made for?

In the vast majority of PES transactions to date, payments have been associated with land-use changes rather than with service provision directly, so long as the farmers manage their property in accordance with the terms of the contract, they are paid whether the service is provided or not (FAO, 2007c). In the New York City, payments were made for changes in land use and management and not directly for water quality improvements. In particular, World Trade Organization (WTO) rules restrict public payment programmes that directly affect production of marketed commodities (UNCTAD, 2007; FAO, 2004d).

Ideally, most schemes payments are based on the adoption of a particular land use (likely to secure the demanded environmental services), usually on a per-hectare bases (Engel *et al.* 2008). The most controversial issue is whether environmental service payments should be directed to those who currently provide services or to those whose land parcels have the greatest potential for increased service provision. One way of making that choice is to identify sites that present credible threats to the loss of

environmental services (Pagiola, 2006). An important strategy for targeting suppliers of environmental services, therefore, is the identification of areas where threats are projected to emerge, and where payments for environmental services are likely to be effective in changing land use and farming practices (FAO, 2007).

In general, how much should be paid depends on the options available to buyers and sellers of environmental services, along with other factors that determine their supply and demand (FAO, 2007). In some cases, pressure to maintain flat payments arise out of equity concerns and on social grounds, as in the case of Maasai community in Nairobi (FAO, 2007). However, many PES schemes apply fixed per-hectare payment levels differentiated by the type of land use, whereby the payment level is derived from an opportunity cost calculation (Wertz-Kanounnikoff and Rankine, 2008). In most programmes to date, prices for environmental services have been set close to the minimum amount that farmers would accept, although the reasons for this outcome differ by service (Pagiola and Platais, 2007). Direct negotiation between service users and providers is another approach for price-setting (Pagiola *et al.*, 2004).

2.8 Current Experience with Payments for Environmental Services

PES initiatives currently in operation have two main origins: agricultural policy in Organisation for Economic Co-operation and Development (OECD) countries, dating from the 1980s, and forest conservation initiatives in Latin America, which began in the 1990s (FAO, 2007a). For example, the Conservation Reserve Program (CRP) in the United States of America was introduced in 1985 with the aim of preventing soil erosion in cropland. Similarly, in the United Kingdom, through the Environmentally Sensitive

Areas Scheme created in 1987, farmers in eligible areas received direct payments as compensation for adopting less intensive farming practices that conserve landscape and wildlife values (FAO, 2007a). In the tropics, one of the most notable programmes, initiated in Costa Rica in 1996 was designed to enhance various forest environmental services through compensation payments to land and forest owners in exchange for multiyear contracts for reforestation, sustainable forest management and forest protection (FAO, 2002a; Pagiola, 2002). Mexico recently initiated a national PES programme for forest-based environmental services (FAO, 2007a).

Hundreds of PES schemes are now being implemented, in both developing and developed countries, primarily for forest based environmental services. A global review conducted by Landell-Mills and Porras (2002) examined 287 cases of market-based initiatives in the forest sector. The breakdown of these cases by service is as follows: Carbon sequestration – 75, Biodiversity conservation – 72, Watershed protection -61, Landscape beauty -51 and Bundled services – 29. Also, Ravnborg *et al.* (2007) cited a number of references dealing with about 107 country-specific PES schemes distributed across countries including Costa Rica, Mexico, Ecuador, Indonesia, Philippines, Brazil, Tanzania, India, Bolivia, Colombia, South Africa, Sri Lanka, Uganda, United States, Vietnam, Chile, El Salvador, Kenya, Argentina, Australia, China, Guatemala, Korea, Mali, Mauritania, Nepal, Panama, Russia, Canada, Ethiopia, Kazakhstan and Thailand.

One of the most prominent is China's Grain for Green programme, initiated in 1999 by the central government to address concerns about erosion, water retention and flooding. Farmers were paid to plant forests on sloping and degraded lands. The Scolel Té project

in Chiapas, Mexico, in which farmers and rural communities are paid by private individuals and firms for voluntary carbon emission offsets, generated by the adoption of agroforestry practices is one of the few examples of private payment mechanisms for the provision of environmental services in agriculture (FAO, 2007). Other schemes like Bird-friendly coffee in El Salvador are examples of a product being sold to environmentally conscious consumers paying a price premium over normal coffee prices (Pagiola *et al.*, 2002). In the case of Bolivia, watershed protection and landscape beauty/tourism proved to be the dominant environmental services being paid for so far. However, none of the systems satisfied all five basic criteria or principles of PES (Robertson and Wunder, 2005).

2.9 Negotiation, Contract Agreements and Monitoring of PES

To participate in the PES Program, the executing agency designates the areas that qualify for PES contracts and calls for applications from landowners (FAO, 2007x). The farmers collect the application forms from the officials and fill it with the help of extension agents. Once a farmer's application is accepted, the executing agency signs a contract with him or her, defining the objective (required land use), level and sequence of payments, obligations and contributions of the farmer, duration, and monitoring. The agency's extension service then often has the dual function of advising the farmer and monitoring compliance (Hartmann and Petersen, 2004). The simplest contracts between buyers and sellers rely on legal institutions to protect property rights and adjudicate disputes, when they arise, and on law enforcement to ensure the legal judgments are carried out (FAO, 2007). Each forest owner is awarded with a PES contract according to quantity and quality of forest committed to conservation (Dillaha *et al.*, 2008).

Typically, Contracts have a specific duration and may be renewable (Mayrand and Paquin, 2004). In China, under the Sloping Farming Lands Conversion Program, contracts to convert farming and barren lands are recognized for as long as 50 years, can be inherited, transferred, and can be extended on expiration (Dillaha *et al.*, 2008). Contracts may be shorter, such as in the Cidanau watershed in Indonesia, where the PT Krakatau Tirta Industri (KTI) company is paying upland communities to maintain forest cover on a 50 hectare pilot site for two years with the possibility of extension for another five years (Leimona and Prihatno, 2005). Thus, PES schemes tend to favour collective negotiations with land user associations or cooperatives when land users are numerous (Mayrand and Paquin, 2004). For communities to enter into PES-type contracts, it would be necessary that they become “formally recognized organizations” (Wertz-Kanounnikoff and Rankine, 2008). ‘Collective contracting’ was developed at Costa Rica, through which groups of small farmers can join the PES program collectively rather than individually and thus spreading transaction costs over a large group (Pagiola, 2008). In contrast, in India and Indonesia, individual households and communities participate in decision-making processes, select land management practices for payments, which is more characteristic of market-based PES programs (Landell-Mills and Porras, 2002).

Intermediaries such as local and international non-governmental organizations (NGOs), research institutes, community-based organizations, and government officials at various levels play a critical role in linking the providers and the buyers of the environmental services. In Asia, intermediaries provide a range of services including: increasing public

awareness, serving as a clearinghouse for information, training, capacity building, negotiating, monitoring and evaluation, resolving conflicts, absorbing transaction costs, and conducting scientific and socioeconomic feasibility assessments on the potential of PES in various watersheds (Dillaha *et al.*, 2008). Both public and private groups can serve as intermediaries or brokers to overcome collective action problems. For example, the Nature Conservancy has played a central role in brokering forest carbon projects in Belize, Bolivia and Brazil, and small farmers in the Macquarie River Valley in Australia have relied on their local organization (Macquarie River Fruit and Fibre) to negotiate with upper watershed ranchers (Wunder, *et al.*, 2005).

Development of rules and regulations and monitoring compliance can be very demanding, especially in situations where institutions are weak (FAO, 2006). Effective monitoring is essential to prove beneficiaries that their investments are generating land use changes. Good monitoring practices allow adjustments to payments and contributions to optimize the system (Mayrand and Paquin, 2004). The use of Remote sensing techniques, Landscape modeling, New metrics for biodiversity, Participatory assessment and monitoring as well as Reverse auctions render forest monitoring increasingly feasible and affordable (Scherr *et al.*, 2006). To serve as motivation for compliance with PES contracts and related environmental regulation; farmers are given access to credit. In the Mexican agricultural subsidy program (PROCAMPO), farmers entering PES contracts are given payment certificates against which they can borrow money from the bank (Wertz-Kanounnikoff and Rankine, 2008). Any PES contract would be broken and the scheme halted when the necessary condition of mutual self-interest of service buyers or/and providers no longer holds (Pagiola and Platais, 2007).

2.10 The Role of Agroforestry for the Provision of Environmental Services

Agroforestry has been noted as one of the land use systems providing ecosystem services or environmental benefits as well as economic commodities as part of a multifunctional working landscape (Jose, 2009). The integration of trees, agricultural crops, and/or animals into an agroforestry system has the potential to enhance soil fertility, reduce erosion, improve water quality, enhance biodiversity, increase aesthetics and sequester carbon (Jose, 2009; Nair *et al.*, 2009). Growing trees have the ability to absorb atmospheric carbon dioxide (CO₂) that contributes to global warming (Robertson and Wunder, 2005). However, the potential of agroforestry systems to sequester carbon varies depending upon the type of the system, species composition, and age of component species, geographic location, environmental factors, and management practices. However, the inherent variability in the estimates and lack of uniform methodologies have made comparisons difficult (Jose, 2009; Nair *et al.*, 2009).

In a recent review, Nair *et al.* (2009) showed that the carbon sequestration potential of the vegetation component (above and belowground) varied from 0.29 Mg ha⁻¹ yr⁻¹ in a fodder bank agroforestry system of West African Sahel to 15.21 Mg ha⁻¹ yr⁻¹ in mixed species stands of Puerto Rico. Soil carbon estimates ranged from 1.25 Mg ha⁻¹ in a Canadian alley cropping system to 173 Mg ha⁻¹ in an Atlantic Coast silvopastoral system in Costa Rica. These authors concluded that, in general, agroforests on arid, semiarid, and degraded sites had a lower carbon sequestration potential than those on fertile humid sites; and temperate agroforestry systems had relatively lower rates compared to tropical systems. Attempts have also been made to quantify the global carbon sequestration potential of agroforestry systems. For example, Jose, (2009) estimated a total of 585–

1,215 million ha of land in Africa, Asia and the Americas under agroforestry and a global potential to sequester 1.1–2.2 Pg of carbon (vegetation and soil) over 50 years.

Agroforestry systems where crops are grown under a diverse and dense canopy of trees protect biodiversity, provide other ecosystem services such as pest control, pollination, erosion control and water recharge, thereby preventing the degradation and loss of surrounding habitat. For example, in several agricultural and forest habitat types sampled in Chiapas- Mexico, Panama and Costa Rica, bird, bats, bees diversity were highest in forest, but it was closely followed by woodlots and shade coffee, cocoa agroforests, compared with cattle pastures, multigrain fields, arboreal pastures, and pine savannas (Bichier, 2006). Also, Shade coffee and multistrata cacao include timber, fruit, and native forest species contribute to biodiversity conservation by providing habitat for avian, mammalian, and other species, enhancing landscape connectivity, and reducing edge effects between forest and agricultural land (Jose, 2009; Bichier, 2006).

Agroforestry systems such as riparian buffers help clean runoff water by reducing the velocity of runoff, promoting infiltration, sediment deposition, and nutrient retention. Trees with deep rooting systems in agroforestry systems can also improve ground water quality by serving as a “safety net” whereby excess nutrients that have been leached below the rooting zone of agronomic crops are taken up by tree roots (Jose, 2009). Therefore, agroforestry offers proven strategies for carbon sequestration, soil enrichment, biodiversity conservation, and air and water quality improvement for not only the landowners or farmers, but for society at large. Hence, the use of agroforestry as a land use systems for ecosystems services provision should be encouraged.

2.11 Importance /Advantages of PES

Pagiola *et al.*, (2005) and Landell-Mills and Porras (2002) indicated several advantages of PES. They show through a global case-study analysis that PES systems can, under the right conditions, result in both more conservation and improved livelihoods for poor people. Rosa *et al.*, (2003) emphasize the potentially positive social outcomes that, economic benefits asides can be achieved through increased cooperation among participants in a PES system. According to FAO (2007), PES could enhance the provision of certain environmental services that may be degraded or undersupplied as a result of current agricultural practices, and also to offset pollution generated in other sectors. The poor are most likely to benefit from participation in PES programmes where land distribution is relatively equitable and where they are found on lands of poor quality for agricultural production but high quality for environmental service supply (FAO, 2007).

FAO (2002a) identified the following advantages and opportunities of PES schemes: PES schemes can serve as an instrument to educate the population about the value of the natural resources. Thus, PES schemes set a price for environmental services, which were previously priceless. Also, PES schemes can enhance efficiency in the allocation of natural, social and economic resources. Moreover, PES schemes can generate new sources of funding for the conservation, restoration and valuation of natural resources. Finally, PES schemes allow the transfer of resources to socio-economically vulnerable sectors providing environmental services.

2.12 Institutional, Stakeholders and Policy Framework for PES

The four main classes of PES systems, in terms of basic institutional structure are: Direct Public Payments in which the government makes payments directly to rural landowners and other providers of ecosystem services. Also, Cap-and-Trade Schemes in which a government or regulatory body first sets a limit (a “cap” or a “floor”) on the amount of ecosystem degradation or pollution permitted in a given area. Again, Direct Private Payments in which the non-profit organizations or for-profit companies take the place of the government as the buyer of the ecosystem service; and lastly, Eco-Certification Programs enable consumers to choose to pay a price premium for products produced to be ecologically friendly (Scherr *et al.*, 2006).

The institutional and policy framework for payments for PES will depend on the size, the number of providers and users of the service, and their social, economic and cultural situation (FAO, 2006). Supporting institutions assume key functions in PES schemes, including scientific research, capacity building, technical assistance, certification, fund management, marketing, and linkages with national and international actors (Mayrand and Paquin, 2004).

The setting up of governance structures may therefore require strong external leadership as well as confidence-building strategies to make sure that land users and beneficiaries will buy into the new system. In order to build trust, institutions supporting PES schemes must be as participatory and transparent as possible (Mayrand and Paquin, 2004). Organizations of smallholder farmers could play a similar role in local, national and international policy dialogues on PES (FAO, 2007c; van Noordwijk *et al.*, 2007).

Ideally, the role of governments consists in ensuring the establishment and functioning of an appropriate legal-institutional framework that enable the emergence of voluntary PES schemes (Wertz-Kanounnikoff and Rankine, 2008). The identification of key stakeholders that potentially could participate in PES schemes or have an influence on their implementation and functioning is important. These may include communities, NGO's, financial institutions, businesses and government (Billgren and Holmén, 2008).

2.13 Designing Effective Payments for Environmental Services

One of the ways to organize the policy guidance is to focus on the different stages of undertaking the PES, as is shown in a schematic illustration (Figure 2.2):

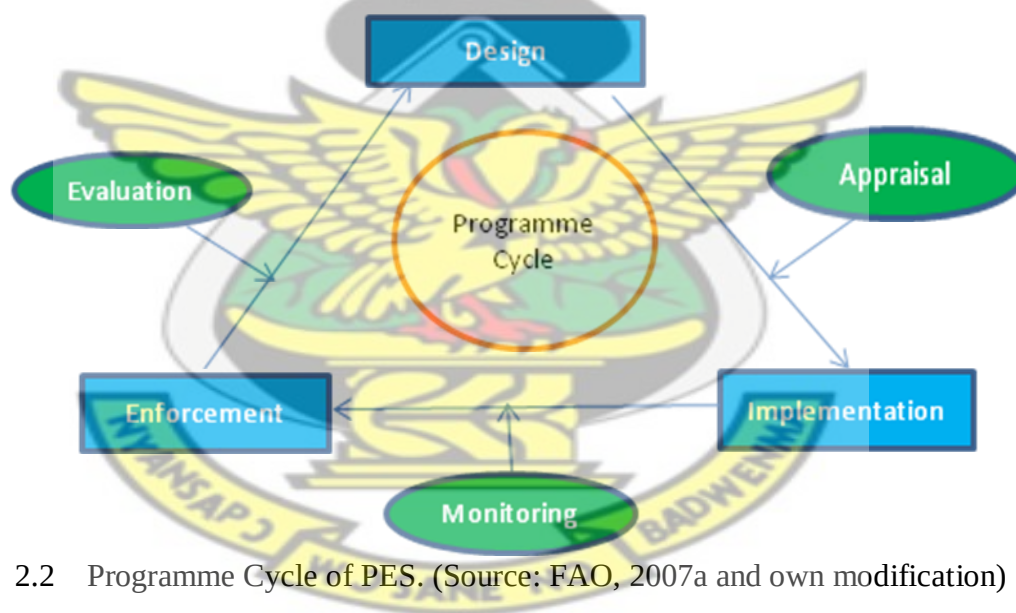


Fig: 2.2 Programme Cycle of PES. (Source: FAO, 2007a and own modification)

At the initial 'design' stage, the key parameters characterizing a scheme are determined. The implementation stage covers for example concluding a contract and undertaking compliance requirements. The enforcement of PES needs to be monitored and a proper punishment mechanism has to be triggered if PES is not enforced as originally planned (FAO, 2007a).

The effectiveness of PES programmes depends on their design and implementation. In addition to these factors, transaction costs associated with making an exchange between buyers and sellers need to be taken into account when designing cost-effective programmes. Hence, cost-effectiveness is a key criterion for programme design (FAO, 2007). Transaction costs includes the cost of attracting potential buyers or finding potential providers of environmental services. These costs are partly determined by the institutions and rules that govern environmental service exchanges, whether they are publicly funded programmes or private exchanges of offsets (FAO, 2007).

2.14 Challenges/Constraints to the implementation of PES schemes

The high transaction costs involved in the preliminary study and implementation phases may cause PES scheme to be very expensive as compared with other management options. Transaction costs can be reduced if the institutions involved in the implementation of the scheme know the local situation comprehensively (FAO, 2003). The administrative costs for users have to be low to ensure their involvement by receiving sufficient benefits from the system (Robertson and Wunder, 2005). Three main concepts that can help in reducing transaction costs when developing PES schemes are stated as follows: simplify the rules (Landell-Mills and Porras, 2002); facilitate buyer – seller linkages (FAO, 2007) and exploit economies of scale (Rosa *et al.*, 2003).

The lack of a clear definition of the service for which the payment system has been established is a common problem in many schemes. This causes serious deficiencies in the system, since it reduces the user's willingness to pay. Likewise, in some cases, not all relevant users or providers participate actively in the system, causing reluctance on

the part of the users who do pay consider it is unfair to pay for the service while others benefit for free. There are sometimes conflicts within providers, since those who are not participants feel excluded from the benefits granted for the services they are providing (FAO, 2003).

A study undertaken on what is required for PES schemes to work in Latin America, Asia and Africa, identified the lack of buyers as one of the biggest barriers. However, the difficulty of identifying potential buyers is particularly high in many parts of Africa. Some potential buyers were simply unaware of the PES concept, while others feel it was too risky a mechanism to trust (Ravnborg *et al.*, 2007). In countries like Bolivia, the issue of watershed protection via PES agreements has been met with criticism, when the local population protested against a water-service privatisation effort that would significantly raise the cost of drinking water to consumers (Robertson and Wunder, 2005). Imposing fees on low-income urban populations for drinking water is not likely to be politically or economically feasible. However, in situations where water users are already bearing heavy costs associated with the degradation of watershed services, be it in the form of payments for water treatment, desilting or new water-supply development, the demand and willingness to pay for watershed services may be quite substantial (FAO, 2007). The actual flow of funds to developing countries for environmental services is currently very small and primarily derived from public sector funding in a handful of countries. Furthermore, payments for environmental services are only small relative to the income that can be obtained from alternative uses of the resources (FAO, 2007). On the other hand, Some PES schemes are highly dependent on external financial

resources, threatening their long-term sustainability. Self-financing should be a key objective of PES schemes (FAO, 2003).

PES programmes and activities have been poorly disseminated among the local population and other barriers such as lack of information or credit, or insecure land tenure (FAO, 2003; FAO, 2007). A report summarizing PES inventories for East Africa and South Africa noted that most African countries lacked needed institutional capacity such as certification bodies, financial intermediaries, and national registries for ecosystem services, water management agencies and technical capacity to facilitate PES (Katoomba Group, 2006).

2.15 Factors Promoting/Affecting Potential Growth of PES Programmes

Identified factors that tend to promote successful PES programs included secure land tenure, larger land holdings, technical capacity to design and manage programs, higher standards of living, countries with high urban populations and a need for improved water resources, countries in which commercializing rights to land management is culturally and politically acceptable, countries with PES enabling legislation, and countries with good governance (Dillaha *et al.*, 2008).

According to the World Bank (2007), the carbon emission reductions and biodiversity conservation appear to have the greatest potential for bringing new streams of finance in developing countries. Interest among potential suppliers and buyers in developing countries is also high owing to the lower cost of service provision.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study was carried out within selected fringe communities of the Ankasa Conservation Area (ACA) in the Western Region of Ghana. The ACA was established in 1976, and comprises the Nini-Suhien National Park (NP) in the northern part and the Ankasa Resource Reserve in the southern part. The conservation area covers a total of 509 km² (Figure 3.1) and is managed by the Wildlife Division (WD) of the Forestry Commission.



Figure 3.1: Location of the Ankasa in the Western Region of Ghana closes to the border of Cote d'Ivoire. Dark areas at satellite image indicate remaining forest patches (including forest plantations). (Source: Google Earth, 2009).

Biodiversity surveys suggest that the Ankasa reserve is the most biodiverse among the remaining Rainforests of Ghana (PADP, 1999a). The ACA protects what is considered to be the most significant remnant of Upper Guinean Forest in Ghana. The Upper Guinean Forest stretches from Senegal to Togo (Figure 3.2) and harbours around 12,000 vascular plants of which 6,400 are endemic (Beentje *et al.*, 1994). Therefore, it is considered to be a biodiversity hotspot that needs special attention in terms of conservation (Myers *et al.*, 2000).

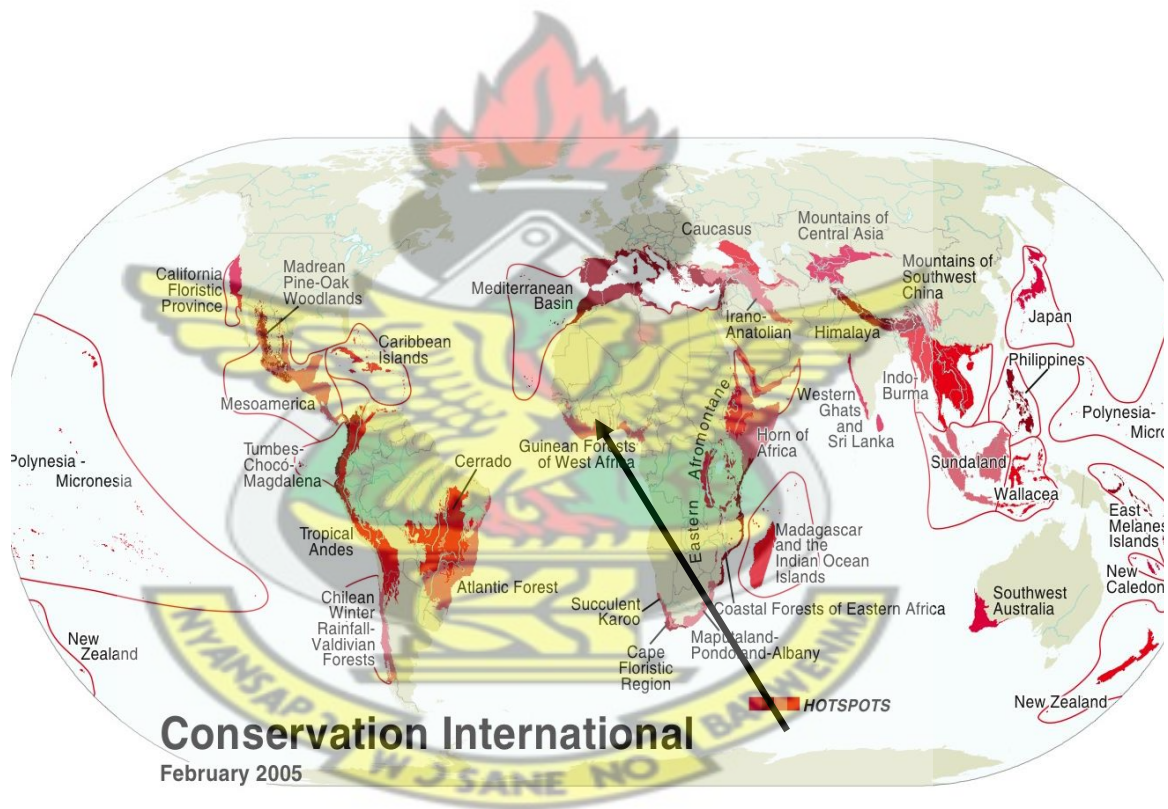


Figure 3.2: Global biodiversity hotspots (red). Arrow points at the Upper Guinean Forest area from Senegal to Togo (Source: Myers *et al.*, 2000; Conservation International, 2005).

The three storey Wet-Evergreen Rainforest receives up to 2500mm precipitation a year, illustrating its importance for watershed protection. The ACA harbours a comparably low number of larger commercial forest species. Thus, logging activities has been banned since it was designated as a conservation area (Hawthorne and Musah, 1993). Also, hunting is completely prohibited in the ACA.

The Park Managers are only in charge of the reserved area. However, environmental education and awareness campaigns towards the fringe communities conducted by the Park Managers reach the settlements in the 5-7 km surroundings of ACA. The off-reserve area around ACA is under several layers of administration, tenure and management systems and is managed by Traditional Authorities (PADP, 2000 a).

Formerly, ACA was situated within the three districts- Jomoro, Nzema East and Wassa-Amenfi, each with a District Assembly in charge of the political district administration. Currently, ACA is located within five districts, out of which two were created and demarcated in 2008 and as such maps covering these newly created districts are uncompleted or unavailable during the study period. Besides the political administration, the traditional authority exerts important functions in local socio-cultural structures. The traditional authority in the surroundings of the ACA consists of one paramount chief under whom a number of chiefs and village chiefs (Odikros) are installed. The traditional authorities around ACA are the major landowners.

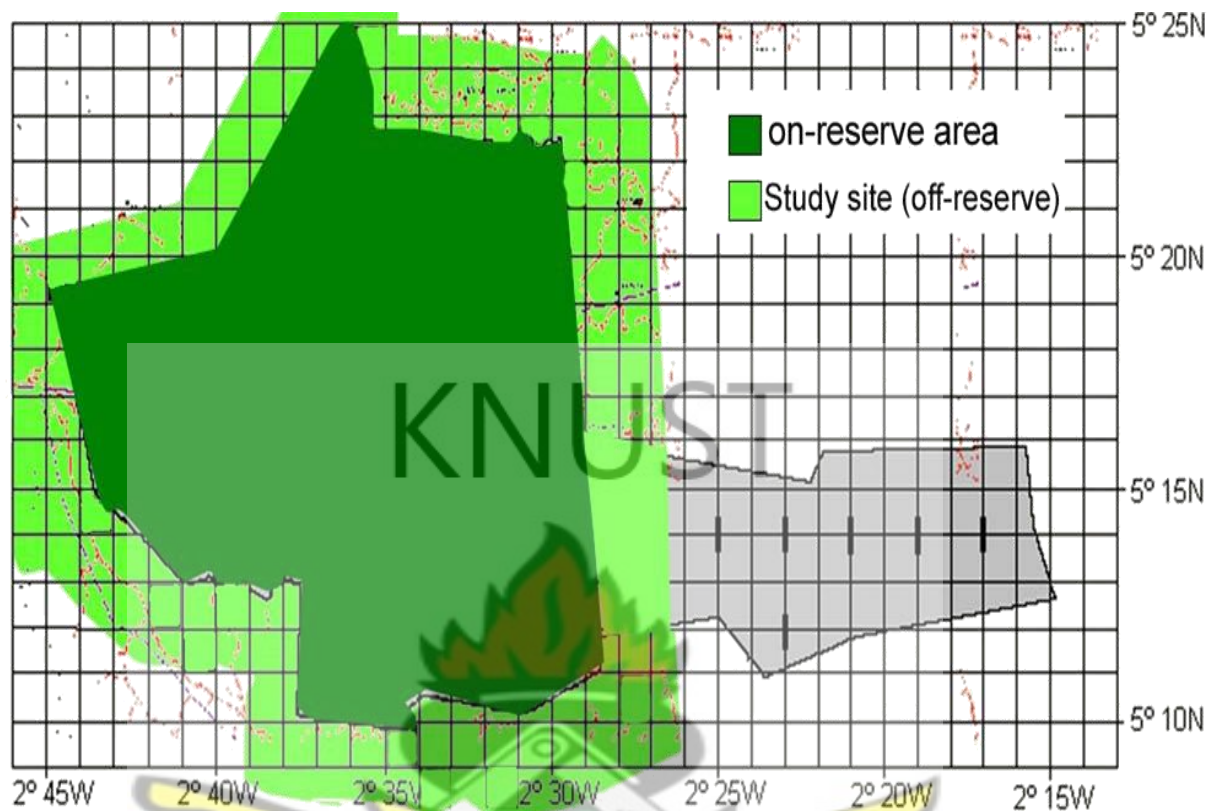


Figure 3.3: Location of the study site (both on and off-reserve area of Ankasa Conservation Area). (Source: Basic map including GIS-layer and grid (Danquah, 2007)

During the last decades, people from other regions have migrated to the Western Region in order to acquire land for farming. Therefore, the population around Ankasa can be subdivided into natives and settlers. The latter constitute over 70% of the total population. A demographic survey of the population living around ACA in 1998 indicated that about 25,000 people in 2,200 settlements live within 7 km surroundings of ACA with an annual growth rate of 5.5% (PADP, 1999 c). This high population growth has led to an increased land pressure that has devastated the adjacent rainforests. The predominant livelihood activity or land use around ACA is farming or agriculture with

over 90% of the population involved. The major agroforestry system identified is agrisilviculture with practices such as trees on cropland, cocoa agroforests and homegardens. The communities around ACA suffer from poor infrastructure with bad roads, limited access to schools, health services, markets and agricultural extension services. The illiteracy rate among the population is about 35% (PADP, 1998).

The study focused on ACA and the surrounding communities because ACA presents a very good Landscape for ecotourism and biodiversity conservation, which gives the area high potential for implementing PES related schemes. Secondly, forest environmental services are under great threat within and on the fringes of ACA, largely due to increased population and the expansion of agricultural lands.

3.2 Research Design

The research used the case study approach allowing the researcher to focus exclusively on the fringe communities of the conservation area and to gain more detailed information than other research approaches such as large-scale quantitative surveys. The study was participatory in approach employing interviews, administration of semi-structured questionnaires, focus group discussions and direct field observation to obtain primary data.

3.3 Data Collection Methods

3.3.1 Selection of Respondents

Reconnaissance visits were undertaken first to identify the location of settlements within the eleven selected communities (Figure 3.4) with the help of GPS device. The communities were then selected on the basis of their closeness, that is, less or greater than 5km to the boundary of ACA and their potential threats to the ACA. The research was conducted between August and October, 2008. Eleven fringe communities of Ankasa Conservation Area selected for the study were Ohia Madwen, Tikobo No. 2, Iyibuzule, Old Ankasa, Aquia Allah, Susuka, Domeabra Apatase, Apatase Damoa, Apatase Asoredanho, Beske and Sowodadiem.

The study adopted purposive sampling strategies in the selection of respondents. The use of purposive sampling therefore, enabled the researcher to identify and involve the core personnel who were not only very knowledgeable in the implementation of payments for ecosystem services, but also had the requisite skills and expertise in the specific areas of investigations.

In addition to purposive sampling, snowballing process was employed to identify key stakeholders, as commonly applied in stakeholder analyses (Grimble and Chan, 1995). A first step in this process involved the identification of a set of knowledgeable individuals. These individuals were then contacted by e-mail and phone numbers to arrange preliminary interviews to be conducted. When these individuals were interviewed, they were asked to identify other individuals and organisations with a stake in the development of payments for ecosystem services, climate change and carbon

forestry activities. These identified individuals and organizations were contacted and interviewed. The name, position and contact information of interview partners is included in Appendix E.

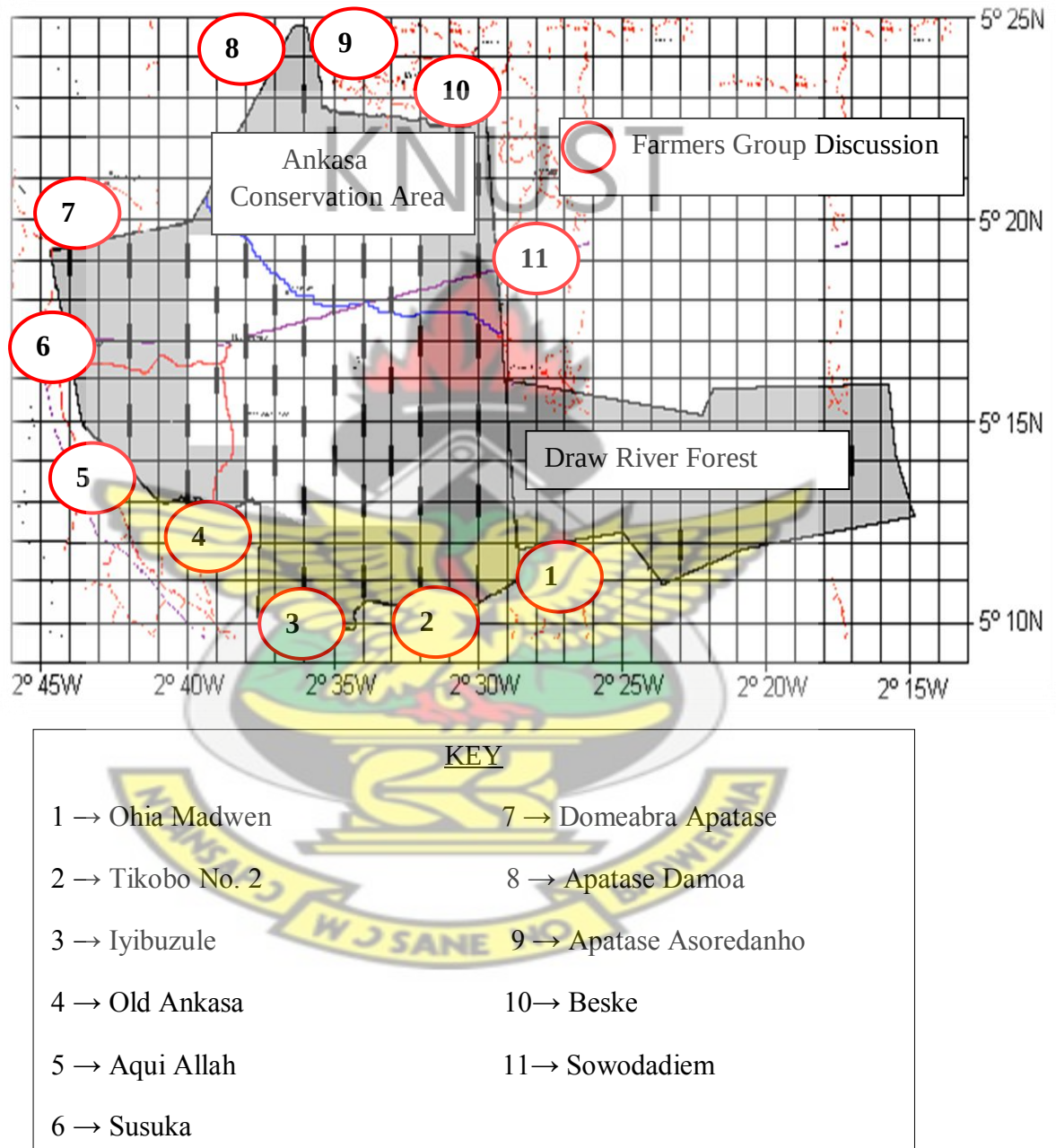


Figure 3.4: Location of focus group discussion and spatial distribution of sampling spots. Source: Basic map including GIS-layers and grid taken from Danquah, (2007) and own modification.

At the community level, land users, mostly farmers, located in the fringe communities of ACA were interviewed. In addition, the study incorporated the views of key personnel from around ACA such as the Park Management of ACA, Project Staff working in and around ACA, Local Opinion Leaders and Representatives from Traditional Authorities, Farmers' Associations and Representatives of the Community Resource Management Area (CREMA), District Administration and District Agricultural Extension Officers. Others interview partners were: Resource Persons from State Institutions, Donor Organisations, Environmental NGOs and Research Institutes working in the field of environmental conservation, Natural Resource Management (NRM), and climate change. External consultants dealing with sustainable funding for protected areas and NRM were also interviewed (Appendices D and E).

Secondary data were obtained from reviewed literature including textbooks, Ghana Forestry Commission publications, Ghana COCOBOD documents, Ankasa Conservation Area Management Plan document and materials from the internet. In addition to these, records at the District Administration and District Agricultural Extension Offices were consulted.

3.3.2 Focus Group Discussions (FGDs)

Focus group discussions ensured that qualitative data was obtained through discussions, opinions and knowledge sharing among participants.



Plate 3.1: Focus group discussion held at Tikobo No. 2

Eleven focus group discussions were conducted among land users in the fringe communities of ACA. The average number of participants for the focus group discussions was 14, with a minimum of 6 and maximum of 24. Altogether, 157 participants were involved, 118 male and 39 female. In a case, where the communities were located very close to each other, focus group discussions were held together (sampling spot 3 – Figure 3.4). The focus group discussions were held in local languages. The responses were recorded, transcribed and documented.

3.3.3 Semi-Structured Questionnaire Administration and Interviews

Information was further obtained through administering semi-structured questionnaire to key resource persons and relevant stakeholders, including government, NGOs, academics, multilateral agencies, project managers, project investors and local communities. A total of 59 respondents were interviewed. The interviews were conducted in Twi or English according to the respondent's preference.

3.4 Data Analysis

As noted in Appendix B, interviews covered a variety of themes under which sets of questions were included. Due to the fact that each interviewee had a different interview template, the process of interviewing also varied. In conducting interviews with government officials, NGOs, research organisations and multilateral agencies, the interview was contextualised by discussing the environmental services (ES) that can be traded in Ghana, land use pressure in and around the fringes of the Ankasa Conservation Area, potential providers and buyers of ES, national and global actors that have the capacity and show the willingness to support PES schemes in Ghana and the potential threats to the implementation of PES in Ghana.

All interviews were tape-recorded. In addition to tape recording, fieldwork notes were taken in order to keep a record of the more important discussion points in each interview. Other activities, including group discussions and meetings with park managers, were also documented in fieldwork notes. Interview data were transcribed into a Word processor and the contents of each interview was classified according to the

topics outlined in interview templates. This allowed for comparison among individuals and stakeholders for each analytical chapter. Anonymity was guaranteed to all interviewees. However, the name of the institution and the position of the interviewee within the institution, as well as the name of the community and the initials of local participants, were kept to remember the way in which the interview developed. The date and location of the research activity were also documented.

Based on the nature of data gathered, a combination of data analyses techniques were used. Content analysis facilitated synthesis of responses gathered through FGDs, interviews, questionnaires and personal observations. Simple statistical techniques such as percentages (achievement rate) and ratios enabled a summary of questionnaires on demographic characteristics of respondents. Also, tables and figures were employed in summarising the views of respondents on thematic areas of the study.

The results were presented in the form of tables, figures and charts to give good visual appreciation. Mainly, the analysis took the form of descriptive, explanatory or interpretive analysis and relied mostly on qualitative data supported by quantitative data where necessary. This is because qualitative research methods and qualitative analysis constitute the appropriate methodology for an institutional assessment. While description was used in presenting events, trends and patterns, explanatory analysis examined why certain events happened and their implications which took the form of discussion.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Socio-economic Characteristics

4.1.1 Literacy Level of Farmers

The introduction of PES is generally easier as the level of education of the farmer increases. The information on contract signing, land tenure agreements, payment schemes, etc could best be understood if the farmers are educated. The level of education of the farmers is shown in table 4.1 below.

Table 4.1: Literacy Levels of Farmers in the Sampled Communities of ACA

Educational level	Percentage of Respondents
Prim/ middle/JHS	29.2
SHS//SSS	10.1
Tertiary	0.4
No Schooling	60.3
Total	100

Source: Field Survey Data (2008)

From table 4.1, the level of education of respondents was moderately good. 39.7% of respondents had basic school, senior high and tertiary education. However, majority of the farmers, 60.3% were illiterate or had no formal education. The studies conducted by the PADP, (2000) within the conservation area revealed a discouraging level of illiteracy. It was estimated that while 35% of the population had no schooling whatsoever, only 26% of male and 7% of female household heads had completed elementary school. It should be noted that the educational levels in table 4.1 exclude key resource persons and relevant stakeholders.

4.1.2 Residential Status of the Farmers

The population around Ankasa can be subdivided into natives and settlers. The former constitute about 30% while the latter constitute 70% the total population. The non-native farmers had migrated from other regions to Ankasa in order to acquire land for farming. The table 4.2 shows the summary of the native and non –native farmers around Ankasa Conservation Area.

Table 4.2: Percentage distribution of Natives and Non-Natives Farmers in the Ankasa Conservation Area.

Residential Status	Percentage
Native Farmers	29.9
Non-native Farmers	70.1
Total	100

Source: Field Survey Data (2008)

4.1.3 Economic Activities

The main occupation of the participants involved in the focus group discussions was farming. The main cash crop is cocoa (39%), which was grown in all communities. Beside cocoa, 8%, 11% and 13% of the farmers cultivate oil palm, coconut and rubber respectively, all of which were subject to processing and marketing problems. Furthermore, plantain, cassava and pineapple were regarded as important, which are for both commercial and food crops. Yam, cocoyam, maize, vegetables, ginger and citrus are produced at a smaller scale for subsistence farming. The figure 4.1 below shows the occupations of farmers.

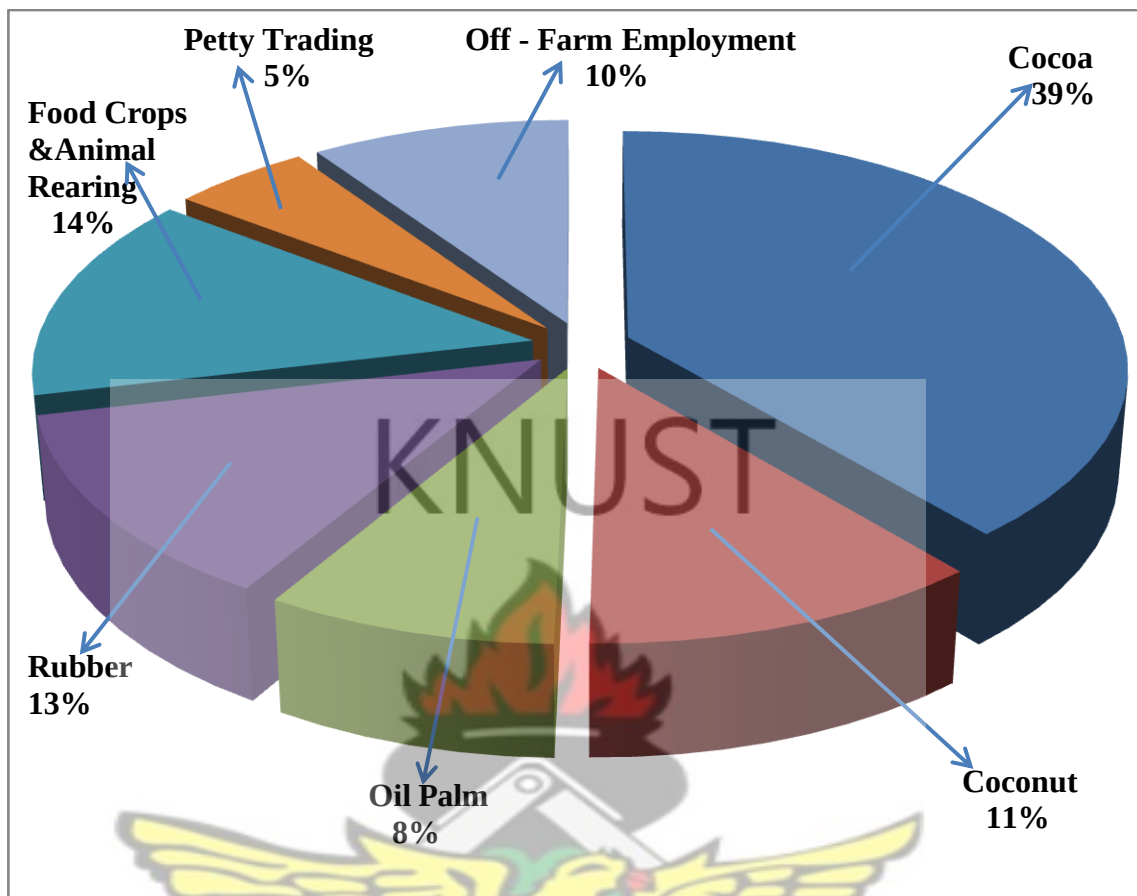


Figure 4.1: Occupations of Farmers in Ankasa Conservation Area.

According to the farmers, animal husbandry was not a viable option because of the prevalence of animal diseases. Animal rearing was practised as a means of wealth accumulation and as a casual occupation. A few goats, sheep and chickens were kept for this purpose but no large animal rearing was found. There were no cattle except those driven in for slaughter in the large towns. A small swine industry has started utilising the by-product of coconut processing. Whereas 10% of farmers are engaged in off-farm employment (palm wine tapping, chain saw operation, carpenters, drivers), 5% of farmers engaged in small-scale trading. This petty trading plays an important role to women who sell foodstuff on local markets.

4.1.4 Size of Landholdings

The land sizes of the farmers identified during Farmers Group Discussion are presented in the figure 4.2. With 157 respondents, about 53% of the farmers interviewed owned land which is more than 20 hectares; while the remaining 47% of the farmers owned small land holdings less than 20 hectares. This has effect on the success of PES. This is because the larger land holdings are one of the factors that tend to promote the successful PES programs (Dillaha *et al.*, 2008).

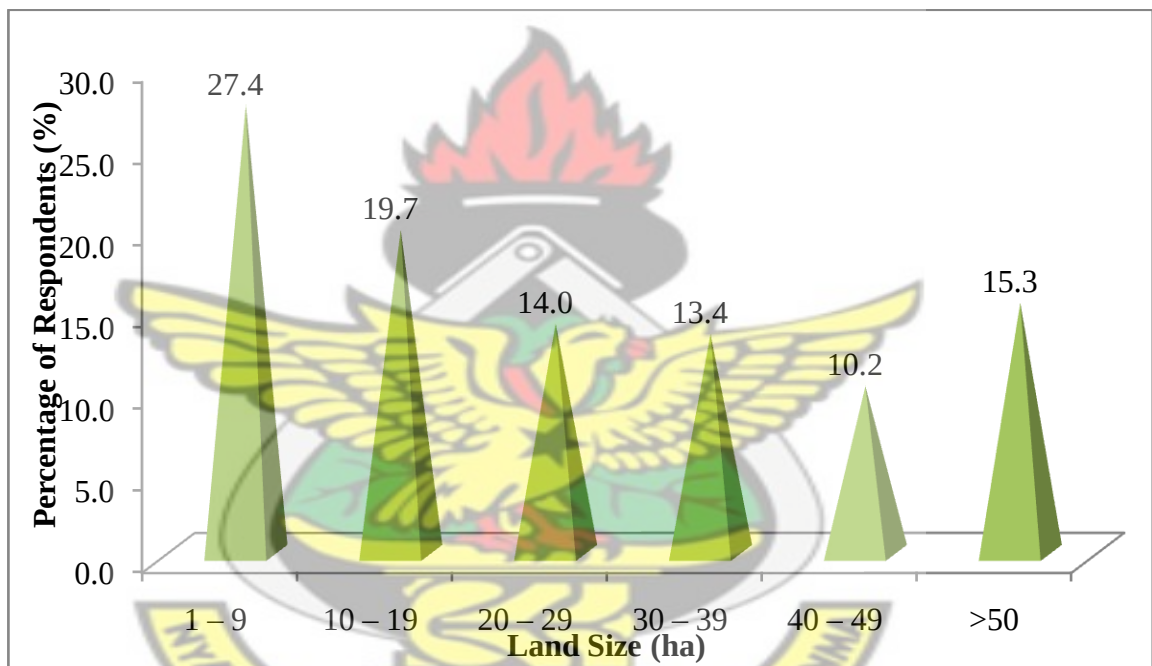


Figure 4.2: Land Sizes (hectare) of Farmers around Ankasa Conservation Area.

Besides that, various farmers possessed fields at different locations. Only two communities, which were dominated by settlers, had all fields located at one place.

4.1.5 Duration of Settlement of Farmers around Ankasa Conservation Area

The duration of the farmers in particular area has influence in adopting PES concept. The longer they stay there, the more threat they cause to the ES. According to the respondents, most of the farmers who have stayed around Ankasa had no land left uncultivated, resulting in deforestation. About 20% of the farmers had stayed there for more than 20 years and most of them constitute the native farmers. The native farmers either leased their lands to the settlers for cultivation or they have used almost their lands themselves for cultivation. The duration (years) farmers have settled around Ankasa Conservation Area during the FGD is shown in the figure 4.3.

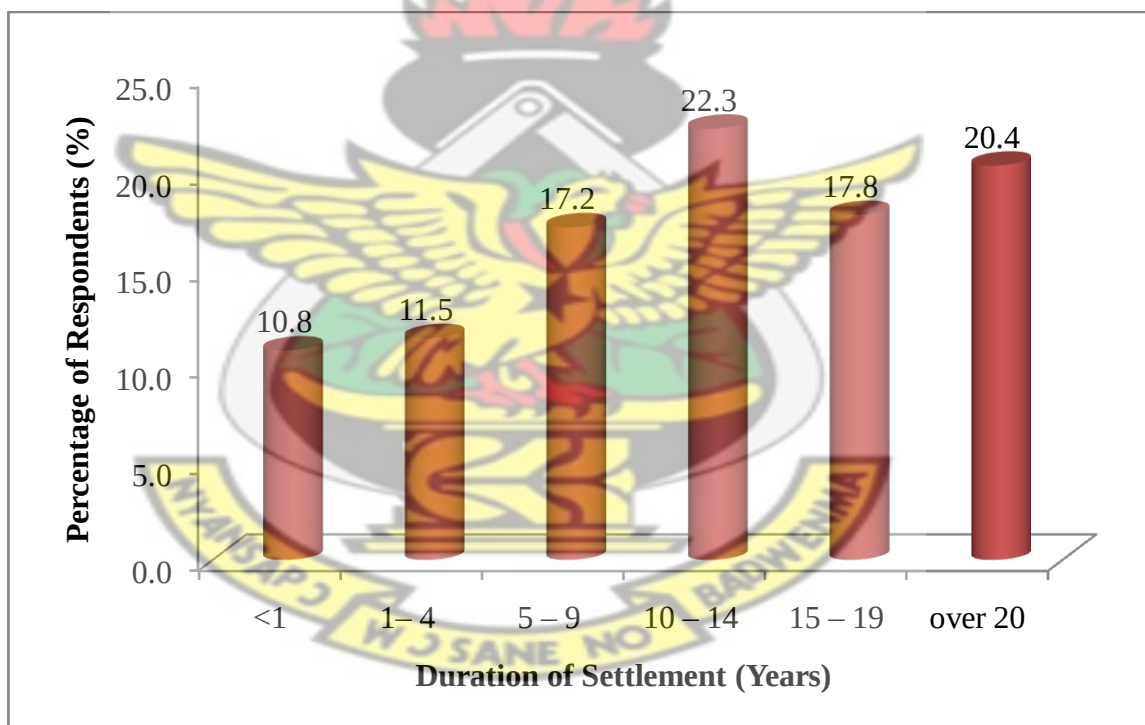


Figure 4.3: Duration of Settlement (years) of the Respondents in Ankasa Conservation Area.

On the other hand, 23% of the farmers who had not stayed there for longer time (about 4 years) had some forest land uncultivated. According to PADP (2000a), the settlements are dispersed around Ankasa as a result of influx of tenant farmers from many different ethnic areas, more land is utilised for cultivation leading to widespread clearance of forests.

4.2 The Role and Experience of Agroforestry for the Provision of Ecosystem Services Suggested by the Respondents in ACA

On agroforestry and sustainable land use practices during the focus group discussions, land users were asked how to change their land- and resource use practices towards more sustainable ones. Most of the farmers' favour more sustainable farming practices and suggested the following measures to secure Ecosystem Services: continuous cropping should be avoided and longer fallow periods should be allowed to improve soil fertility. Trees should remain on the fields to contribute to improved soil fertility through biomass production and to boost cocoa production: "In the past our fore fathers left a few trees on their farms when they planted cocoa, but today, everything is cut down and direct sun light cause harm to the cocoa trees. Some trees should therefore be left on the farm to prevent this trouble". Again, the farmers complained that their cocoa tress are dying early as a result of poor soils. This was explained by the MoFA representative that due to the infertile, highly acidic soils and blackpod and other diseases are causing the dying of the cocoa plants after about nine years. Multipurpose trees should be cultivated to deliver Non – timbers Forest Products (NTFPs) such as chewing sticks, canes which have become scarce in the region.

Regarding existing experience with agroforestry, farmers had attended workshops, where they had been given training on how to grow timber species on their farms (*Terminalia ivorensis*, Mahogany, *Cedrella odorata*, *Entandophragma angolense*).



Plate 4.1: A Typical Agroforestry System Practiced in the ACA.

Farmers stressed that they would only participate in agroforestry issues, if seedlings as well as the necessary knowledge were provided to them. Information generated from MoFA disclosed that, some NGOs have introduced four acres of bamboo and chewing stick agroforestry technology in co-operation with the Community Resource Management Area (CREMAs). The table 4.3 summaries the agroforestry Systems practiced and the reasons assigned by the respondents.

Table 4.3 Agroforestry and Land use Systems Practiced by the Respondents

Agroforestry Systems	Reasons Assigned by the Respondents
Bamboo/chewing sticks	- Income generation - Improve soil fertility - Protection of Rivers/Streams
Shaded cocoa agroforests	- Income generation through cocoa and timber - Provision of NTFPs - Improve soil fertility - Reduces the quantity of applied chemical fertilizer and pesticides - Biodiversity conservation by providing habitat for avian, mammalian, etc
Plantation of rattan in cocoa	- Provision of construction materials. - Income generation - Air and water quality improvement
Shaded coconut among cocoa trees	- Provision of Food - Erosion control - More income generation

Source: Field Survey Data (2008)

Therefore, Agroforestry offers proven strategies for carbon sequestration, soil enrichment, biodiversity conservation, and air and water quality improvement for not only the landowners or farmers, but for society at large. Hence, the use of Agroforestry as a land use systems for ecosystems services provision should be encouraged.

4.3 Key Ecosystem (Environmental) Services (ES) that could be traded

The main ES types that could be traded were identified by the respondents (farmers and other stakeholders) were carbon sequestration and storage (35%), biodiversity protection or restoration (30.3%), watershed protection (97.2%) and landscape beauty (37.5%). The stakeholders explained that these ES types have been discussed at various levels to assess its marketability potentials in Ghana.

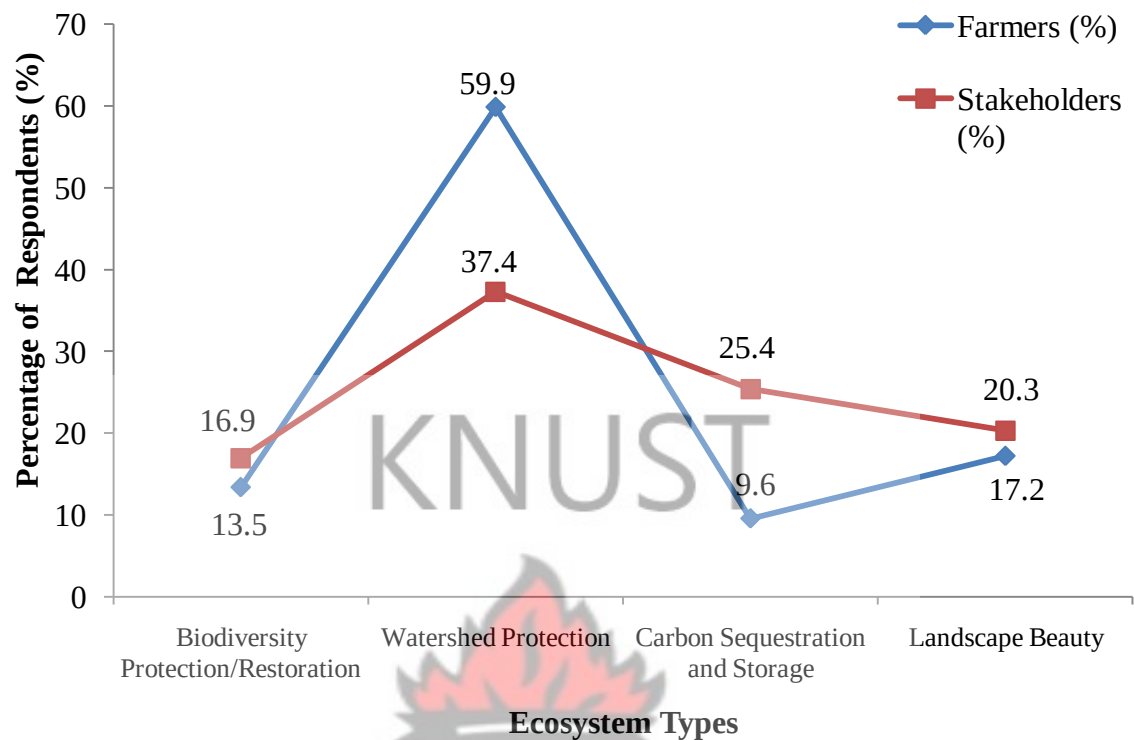


Figure 4.4: Market Potential for Ecosystem Service Types as Suggested by both the Farmers and the Stakeholders

4.3.1 Biodiversity Protection or Restoration

The farmers (13.5%) and 16.9% of the stakeholders considered the protection of endangered species as a very important issue. The respondents stressed the importance of provisioning services of forests, as livelihoods strongly depend on NTFPs for subsistence as well as for commercial use. Another reason was that Biodiversity protection ameliorates the local climate. Again, marketable potentials for biodiversity related PES scheme are seen in the provision of wildlife and NTFPs.

Those respondents who were not in support of the market potential for biodiversity related PES showed much concern about the ongoing extinction of species. Some

International Experts claimed that the protection and ecological status of ACA is poor. As a result of hunting activities, many species are close to extinction.



Plate 4.2: Trap found inside Ankasa Conservation Area during a transect walk

Again, respondents mentioned that biodiversity is the least marketable environmental service because the Ghanaian population shows little interest in conservation issues. Also, the respondents are of the view that it will be difficult to implement payments for Biodiversity Protection or Restoration in Ghana. This is because of the difficulty of defining the “units of biodiversity” for the purpose of carrying out transaction.

4.3.2 Watershed Protection

From Figure 4.4 above, 59.9% of the farmers and 37.4% of the stakeholders classified water related services as the most promising ES for PES in Ghana, taking into account that basic needs which are of top priority. The respondents emphasized the importance to maintain or ameliorate quality of drinking water especially in the transition zone. The reason being that water shortages are increasing in many areas and therefore there is the need to search for alternative ways to enhance supply and it is relatively easy to identify the users or beneficiaries of watershed services, such as municipal water suppliers, hydroelectric facilities, industrial users and irrigation systems than the biodiversity conservation services. According to FAO (2004d), the bulk of PES programs to date have focused on water services, reflecting both the urgency of addressing water issues in many developing countries and the relative ease with which the beneficiaries of water services can be identified.

Hydroelectric power provision is considered to be equally important. Hydroelectric power producers depended on sediment-free water flows and might be vulnerable to damage or disruption from flooding. The representatives from the park management confirmed that, 20% of the forest area has been protected to secure watershed services. Given the economic value of watersheds, it might be possible to collect user fees from people and companies that benefit from the drinking water to help pay for the management of the protected area. Compared to biodiversity, the local connection between provision and use of water is more understandable to the people.

The other interviewers argued that the development of local watershed PES programmes will be difficult where the water users are poor and unable to afford payments to upstream stewards.

4.3.3 Carbon Sequestration and Storage

Due to the international discussion on the Clean Development Mechanism as a mitigation tool to climate change, 25.4% of the stakeholders and 9.6% of the farmers referred to carbon sequestration as a potential for the set up of a PES scheme in Ghana. The 35% of the respondents agreed that markets for carbon sequestration are currently opening up under the Clean Development Mechanism (CDM) of the Kyoto Protocol, rewarding the planting of trees as a form of compensating for, or offsetting, greenhouse-gas emissions. Unlike watershed protection, biodiversity conservation and landscape beauty services, carbon is thus not characterised by spatial specificity, and that is, one can capture carbon anywhere on Earth, without qualitative differences in the type of service provided.

The critics on the other hand argued that if carbon credits are introduced in Ghana, it will result in further depletion of forest since existing/native forests was excluded from the final agreement for the first commitment period (2008–2012). Robertson and Wunder (2005) report that in many developing countries, especially forest-rich countries, a lot of forest is bound to disappear because it makes economic sense for the landowner to convert it than keeping the forest.

Though majority of the farmers did not have much information on carbon sequestration/credits, the 25.4% of stakeholders explained that Ghana has potential because most of our forests have been degraded and therefore afforestation and reforestation will be option available for us to receive payments for carbon credits.

4.3.4 Landscape Beauty

The respondents from farmers (17.2%) and stakeholders (20.3%) emphasized that nationwide tourism can generate some revenues for the local people and also served as recreation for tourists. Therefore, the respondents considered ecotourism as a big potential for the ACA. According to Robertson and Wunder (2005), the local people can be rewarded for the preservation or restoration of landscape beauty either directly through a share in entrance fees paid by tourists, through site-operation fees and fringe benefits paid by tourism companies, or through tourism-derived employment and petty trade (food, handicrafts, etc.).

The Managers of Ankasa Conservation Area and ecotourism proponents hoped that ecotourism will improve livelihoods through increased incomes and strengthen local organisation, while at the same time creating local pro-conservation actors who defend protected areas. For wildlife viewing ecotourism to work effectively in Ankasa, the tourism company has to make direct contracts with local communities to preserve natural beauty, thus not to practice hunting in the area.

Other stakeholders argued that the ecotourism potential of ACA is rather low due to the remote location in the southwest of Ghana, the insufficient infrastructure in and around ACA and the extinction of wildlife.

4.4 Potential Providers of Ecosystems Services

The concept of PES suggests that those who impose tangible threats on environmental goods and services should be paid for securing the future provision of these services. The providers' qualification to contribute to a PES scheme consists in their ability to reduce the identified threats by changing their current land- and resource use practices towards more sustainable ones. The potential providers of ecosystems services identified by both the farmers and stakeholders are shown in figure 4.5.

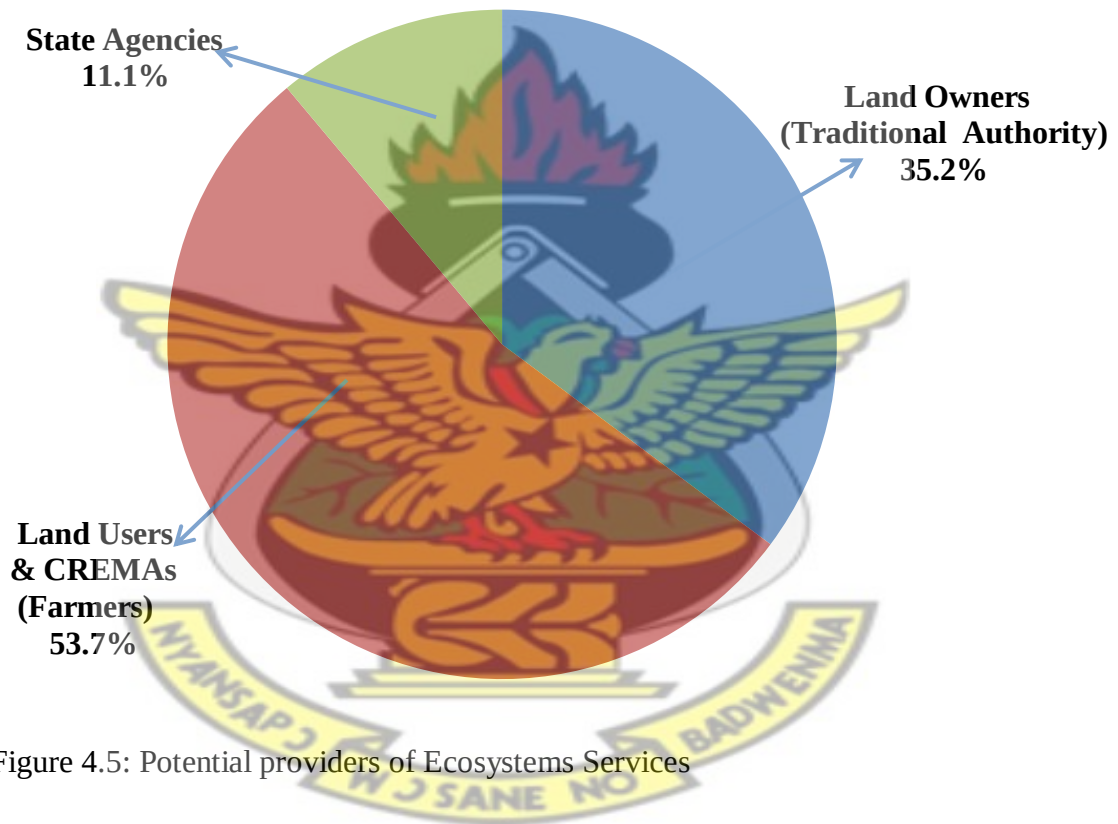


Figure 4.5: Potential providers of Ecosystems Services

4.4.1 Land Users (Farmers) and Community Resource Management Areas (CREMAs)

Since Community Resource Management Areas (CREMAs) introduce sustainable land use practices and set up rules on local land and resource use, 53.7% of the respondents referred to them as potential providers within a PES scheme. This is because; the CREMAs had set aside 40.5 hectares of land for afforestation and agroforestry. This information was given by the CREMAs representatives and was confirmed by the managers of ACA. The CREMAs representatives were quick to add that they would participate in afforestation and agroforestry if they would be paid for.

The respondents from the Ministry of Lands and Forestry (MLF) emphasized that providers are not necessarily the Community Resource Management Committees, but tenant farmers and land-owners. Various stakeholders ranging from international to local level considered the land users as the main providers of environmental services in a potential PES scheme. Hence, some kind of revenue needs to flow to the communities that provide ES. Conservation NGOs agreed that the fringe communities around conservation areas and traditional authorities should receive the payments. It has become very clear that biodiversity conservation can only work out together with the locals. Respondents from a farmers' association confirmed that farmers have the capacity to contribute to conservation if people receive technical support on how to protect the forest. Wunder (2007) reported that land users are the ones who are likely to secure or increase future service provision. While government agencies disqualify as providers because paying them for doing their task would not imply the additionality of a PES. Therefore, concentrating on farmers who significantly affect the provision of

environmental goods and services through their current unsustainable land- and resource use practices is important.

4.4.2 Land Owners (Traditional Authorities)

The 35.2% of the respondents stated that the traditional authorities have the power over current land- and resource use on stool lands; they are of great importance for service provision. On one hand, their income consists of the share they get from tenant farmers and the royalties they receive for commercial exploitation of natural resources. On the other hand, they set up rules on the land- and resource use, for example, farmers are not supposed to cultivate along river banks. The chiefs' potential to contribute to a PES varies according to their individual values and convictions. Some chiefs are already engaged in resource protection activities, such as planting of trees, but it will be difficult to convince farmers to do the same if they would not benefit from tree planting. The Traditional Authorities showed a great interest in sustainable land- and resource use and willingness to contribute to a PES scheme is high.

4.4.3 State Agencies of Government of Ghana

The respondents (11.1%) emphasized that the state agencies such Forestry Commission (FC) should serve as provider of environmental services as they have capacity to manage the forests and ensuring watershed protection. On the contrary, 88.9% of respondents argued that the park managers of ACA had weak law enforcement and also, it is highly questionable for paying state agencies for performing their tasks.

4.5 Assessment of Potential Buyers

PES seeks win-win solutions for both provider and buyer. A PES scheme has to be more attractive to both provider and buyer than the alternative land use system. Criteria for buyers are the willingness to pay which is linked to the benefit the buyer gets from the provision of the ES, the financial resources of the buyer to engage in a PES scheme and the institutional capacities.

Whether someone is willing to pay for an ES at first place is determined by the service itself. A water company will show a higher interest in paying for sufficient supply of clean water than paying for species protection in natural forests, whereas Conservation NGOs will have a greater interest in the latter. Potential buyers can be classified into those that are direct users of the ES and buyers acting on behalf of the people for example the government, NGOs or international agencies (Engel *et al.*, 2008). Concerning the potential buyers, the aim of the study is to assess opinions that could have an interest in paying for ES in Ghana. This assessment does not solely refer to the case study area. Other stakeholders were asked about which ES from the Upper Guinean Rainforest could be marketable in a PES scheme and who could have an interest in paying for them. Table 4.4 shows the potential buyers of ES types mentioned by the respondents.

Table 4.4: Ecosystem Service Types and Potential Buyers mentioned by the

Respondents

Ecosystem Service Types	Potential Buyers	Percentage (%)
Biodiversity protection or restoration	-International community	52
	-Companies (e.g. timber, mining, mobile phone)	30
	-Ghanaian Government	10
	-International NGOs	5
	-Global chocolate consumers	3
Watershed protection	-Ghanaian Government	45
	-Ghana Water Company	43
	-Ghana Electricity Company/ Volta River Authority	10
	-Water Resources Commission	2
Carbon sequestration and storage	-Companies/ Industrialized	
	-Countries / Funds on the carbon market	15
	-Private actors (WWF, GTZ)	25
Landscape beauty	-Tourism companies	10

4.5.1 Biodiversity Protection or Restoration

The potential buyer for biodiversity related ES is the international community (52%). Interview partners listed funding by international governments. For example, the Global Environmental Facility (GEF) grant under the Ecomarkets Project, World Bank loan and donor budgets (“debt for nature swaps”). The private sector (30%) consisting of National and International Companies was mentioned as further potential buyer such as Biodiversity and Wine Initiative (BWI) in South Africa. Mining and Timber Companies are mainly seen as those enterprises that use the natural resources in an unsustainable manner and cause environmental destruction. Mobile phone companies were named because they use forest land to install their transmission poles. In the view of most

stakeholders, such companies have a responsibility to pay for ES. At the same time, respondents claimed that the possibility to get those companies engaged in PES is very limited. As PES is a voluntary transaction, the potential of these mentioned actors to pay for biodiversity is estimated rather low and seems more appropriate to be tackled via the “polluter pays principle” for example, eco-taxes or fines. Thirty percent (30%) of the respondents clearly indicated the importance to involve the private sector in conservation issues. Already existing example is a partnership between a national conservation NGO and several companies by sponsorship for endangered animals. This will enable companies to improve their reputation and give themselves a “green face”. The government (10%) is seen by the respondents as another potential buyer, acting on behalf of the people to secure the future provision of biodiversity related ES. International NGOs (5%) were also named as potential buyers. NGO staff based in Ghana showed a real interest in PES. However, they made it clear that in any case a possible implementation would have to be decided at the respective headquarters. Three percent (3%) of the respondents mentioned global chocolate consumers as potential buyers for biodiversity. The reason was that global chocolate consumers are responsible for the shift from natural forests to cocoa plantations. Interestingly, this view was shared by some local cocoa farmers who asked why they are blamed for the destruction of natural resources instead of the “European chocolate consumer”.

4.5.2 Watershed Protection

Clean water derived from efficient watershed protection is another ES which might gain the interest of potential buyers. Forty – five percent (45%) of the respondents mentioned the Government of Ghana as potential buyer. More specifically, the Ghana Water

Company (GWC) that supplies urban industries and households with water was indicated by the respondents (43%) as the second highest potential buyers of the ecosystem services. First attempts have already been undertaken by the FC to make an agreement with GWC on payments for the sustainable management of forests to conserve watersheds. GWC is dependent on the water services provided by the forests. Other public agencies that were named as buyers for water services are electricity companies and the Water Resources Commission. Other respondents also explained that it is important not to lose sight of the tourism industry, although it relies on scenic beauty as a selling point, in addition, it needs clean and reliable water supplies for its bathrooms and swimming pools.

Unlike biodiversity, water is considered as national good mainly Ghanaian companies could pay for. The respondents argued that bottlers and water supply companies need reliable flows of clean water and hydroelectric power producers depend on sediment-free water flows. Georgieva *et al.*, (2003) reported that private sector companies were among the most important users of water-related environmental services. Water and electricity companies as buyers are examples for a typical user-financed PES. In the case of the Government of Ghana, the respondents mentioned it as a potential buyer for biodiversity and for water, although at the same time questioning a favourable setting of priorities and provision of sufficient funds. Engel *et al.*, (2008) reported that PES schemes could either be 'user-financed', in which the buyers are the actual beneficiaries of the ES, or be financed by a third party (typically a government agency, a non-governmental organisation (NGO) or an international agency acting as intermediaries on behalf of ES users.

4.5.3 Landscape Beauty

Landscape beauty that could create a willingness to pay by the tourism sector was only mentioned by 20% of the respondents. Explanations given by the interviewees were the very low probability to see animals in the dense forests of the ACA.

4.5.4 Carbon Sequestration and Storage

Although carbon is forestry related ES, only 15% of the respondents mentioned actors on the carbon market as a potential buyer for PES. The respondents gave few examples such as National Governments, World Bank – BioCarbon Fund and Conservation groups. According to FAO (2007), the potential buyers of Carbon Sequestration may include Local, Regional and National Governments, World Bank – Bio Carbon Fund, National carbon funds, Conservation groups, Land trusts, Hedge funds and investment groups. Other respondents (25%) mentioned private actors such as World Wildlife Fund (WWF) and the German Development Agency (GTZ) as they have increasingly entered into contracts with landowners to pay for the carbon sequestration.

4.6 Institutional Arrangements

To assess the potential of a PES scheme in the surroundings of the Ankasa Conservation Area, it is necessary to identify existing institutional arrangements which are already in place and could be adopted in the scheme. Therefore, the study assessed whether the following institutional arrangements bear potentials for PES schemes or whether they contradict to the logic of a PES scheme:

- (i) types of contracts and agreements viable in the local context;

- (ii) negotiation processes on agreements including the involved actors;
- (iii) transfer, management and sharing of payments; and

4.6.1 Local Agreements

One of the relevant aspects of a PES scheme is a reliable contract. For the assessment of the potential PES scheme around the ACA, it is necessary to analyse whether existing agreements and contracts serve as good blueprints and could also be applied in PES schemes. On local level, the institutional arrangements most crucial for PES are the tenure agreements between the farmers and the landowners. Figure 4.6 shows the methods of land acquisition.

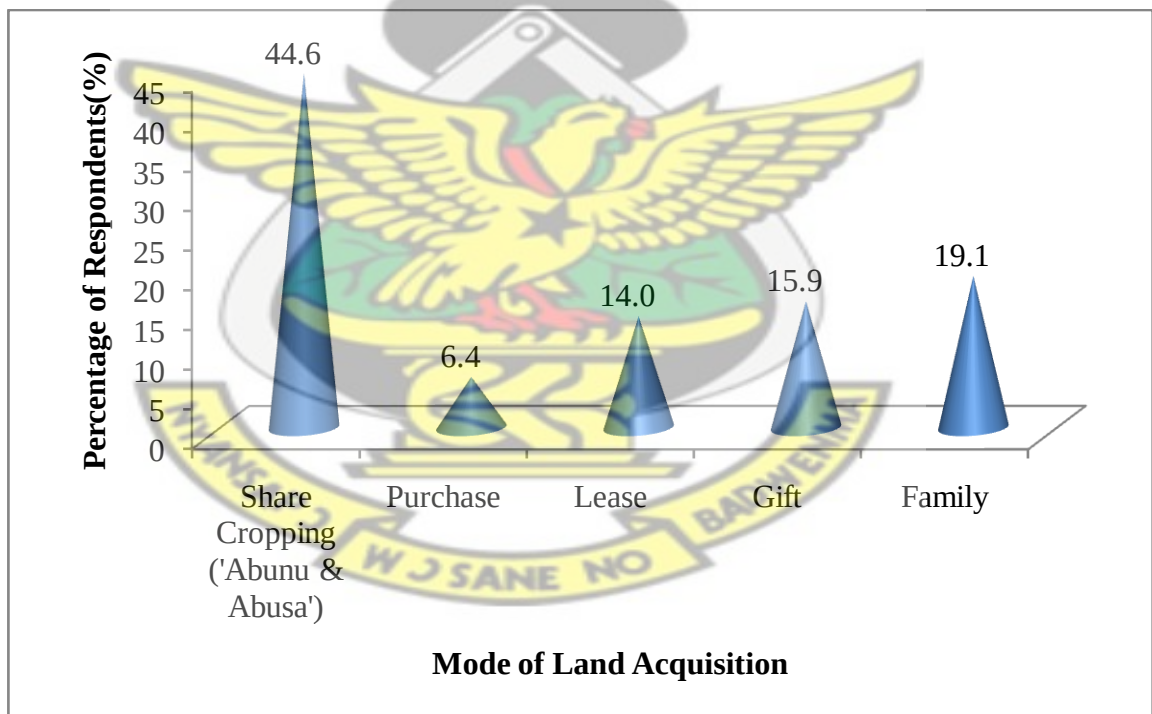


Figure 4.6: Mode/Methods of Land Acquisition by the Farmers in ACA

The Land Tenure System operating within the Conservation Area generally conforms to the Ghanaian tenurial system, particularly the Akan, under which the ‘allodial title’ is vested in the Paramount Chief with the indigenous individuals and families holding ‘customary freehold’ in the land. Immigrants must seek to lease land from either the Stool or the indigenous landowner.

The tenant farmers (44.6%) acquired land through:

- ‘Abunu’ – the farmer clears and plants perennial crops. At maturity half of the produce belongs to the landowner
- ‘Abusa’ – as for the above but at maturity one third of the produce belongs to the landowner.

According to the respondents, a cash payment is also required before the land is acquired for the ‘Abunu’ and ‘Abusa’ system. Also, 14.0% of the tenant farmers acquired land through lease. In this system according to the respondents, annual cash payments are paid to the landowners. Thirty-five percent of the respondents acquired land either through gift from their parents/friends or through family lands.

As discussed in the above, land use change in favour of conservation and afforestation measures on stool land have to be agreed with the chiefs as landowners. Otherwise tenant farmers run the risk of losing their farmland, since any land use change without authorization of the landowner constitutes a breach of the present agreement. Thus, any PES scheme that implies land use changes by tenant farmers like afforestation or reforestation and agroforestry might only be implemented by adopting those agreements. The interviewed chiefs stated that nowadays the agreements are presented in a written form. Since many farmers are becoming literate, they ask for formal agreements.

Additionally, the Land Administration Project (LAP) encourages Traditional Authorities to document and demarcate the land they have leased out. But still a lot of farmers only have an oral agreement. Respondents from the farmers' association commented that, they are not satisfied with the agreements. This is because the chief determines the amount the tenant farmers have to pay in the beginning, but later the chiefs demands more. Therefore, the trust between land users and chiefs as landowners is rated as very low by many respondents.

Existing and past projects that promote land use changes in favor of tree plantations, agroforestry or NTFPs elsewhere in Ghana show that the tenure agreements between chiefs and land users can be adapted for other purposes if the chief is convinced of the benefits. For example, Samartex Timber and Plywood Company (Samareboi) is working with farmers on the introduction of agroforestry systems on their plantations to avoid uncontrolled slash and burn practices destroying the trees. The chiefs as the landowners have been convinced to make agreements with the farmers on alternative land use systems that last for 50 years. The sharing of the revenues is oriented towards the traditional benefit sharing systems such as "Abunu or Abusa".

4.6.2 Negotiation Processes

Another important aspect for setting up a PES scheme is how negotiation processes are designed and how the different stakeholders are brought together for signing a contract. Around the ACA, agreements between chiefs and farmers are negotiated by themselves. To have contract security there are usually witnesses. The CREMA representatives indicated that usually the chief and the farmer present one witness each. Staff from WD and FSD said that the District Assemblies and the Forestry Commission are witnesses of

agreements on land and resource use. The chiefs named the head of the community as witness in the agreements undertake with the farmers.

In some communities, farmer debated how they should be involved in the negotiation process of new agreements. They agreed that in this situation, a trusted person should be appointed among the farmers. The interviewed project staff stressed the importance to let chiefs and farmers negotiate the agreements by themselves. A good practice is to inform both landowners and land users on the advantages of certain land use systems and make proposals on the appropriate benefit sharing in a workshop. But for agreements to be accepted by both sides, they have to make the decisions on the exact content of the agreement on their own. The strategy adopted by conservation NGO in community based resource management is to stimulate the process but then step back until the communities came up with their own benefit sharing scheme. An agroforestry project run by a Samartex Timber and Plywood Company has a similar approach. At the beginning they talk to the opinion leaders before having general meetings in the communities where the idea is presented and the people are sensitised. Then the farmers have to take the initiative to come to the Timber Company and ask to participate in the project. The contract is signed by each farmer and the paramount chief. Respondents from the company said that they act as a tenant who further releases the land to the farmers. Their goal is to formalize the agreements and give land title to the farmers that are registered at the Lands Commission.

4.6.3 Transfer, Management and Sharing of Payments

The farmers have clear ideas on the amount of payments and how these should be transferred to them. Payments for afforestation should cover the foregone benefits of the specific crop currently cultivated on the land. Farmers also proposed different forms of payments. Beside payments in cash (41%) which were favoured by most of the farmers, the others included, infrastructure like houses, vehicles and an award in the form of recognition (32%). They gave reason that this form of payment was perceived as creating a lasting benefit, while cash would more likely have been spent right away. Robertson and Wunder (2005) reported that ‘payments’ need not always be implemented in monetary terms; they could be in kind or a combination of different benefits to local land users. The kinds of compensations (both cash and in-kind) farmers prefer during FGD are presented in figure 4.7

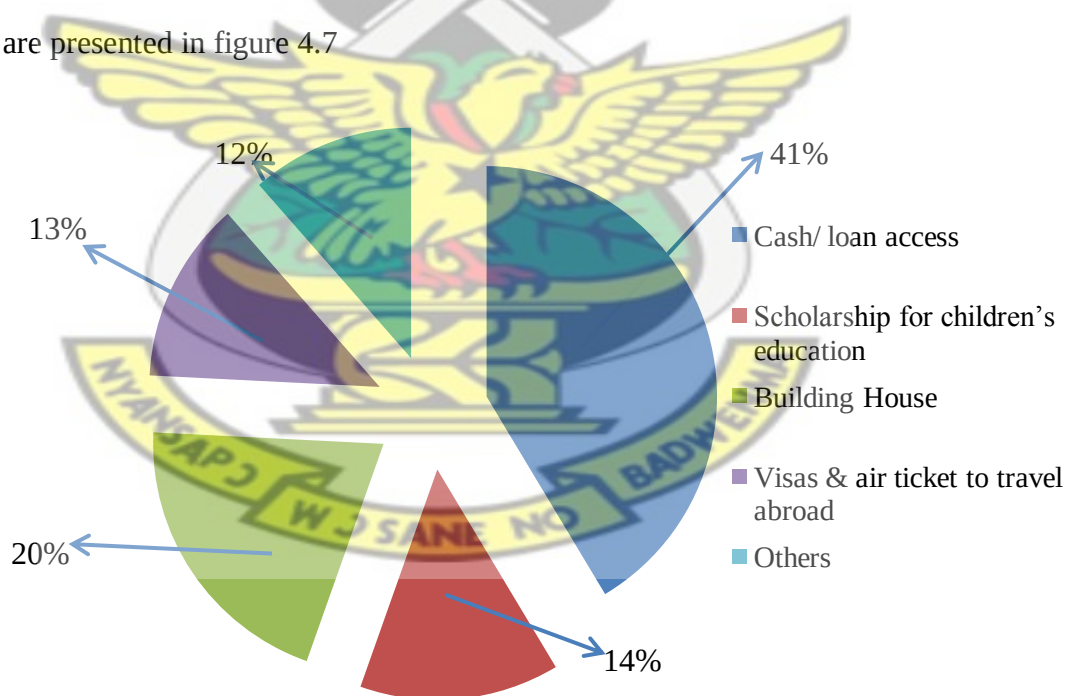


Figure 4.7: Kinds/forms of compensation farmers prefer in ACA.

Some farmers demanded the ownership of the tree as a form of payment. In the case of conservation of existing forest patches, (27%) of the farmers named payments like, scholarships for children's education or air tickets and visa for the entire family to travel abroad as a form of compensation.

For the frequency of the payments, the farmers proposed various short term intervals, ranging from monthly to yearly. Their reasons were that obtaining investment credit is often difficult and expensive for developing country farmers; to alleviate the liquidity problems faced by many farmers and also help them finance the required investments. With respect to the cash compensation, the length/periods in which the compensation should be paid to the farmers as indicated by the farmers during FGD are presented in figure 4.8

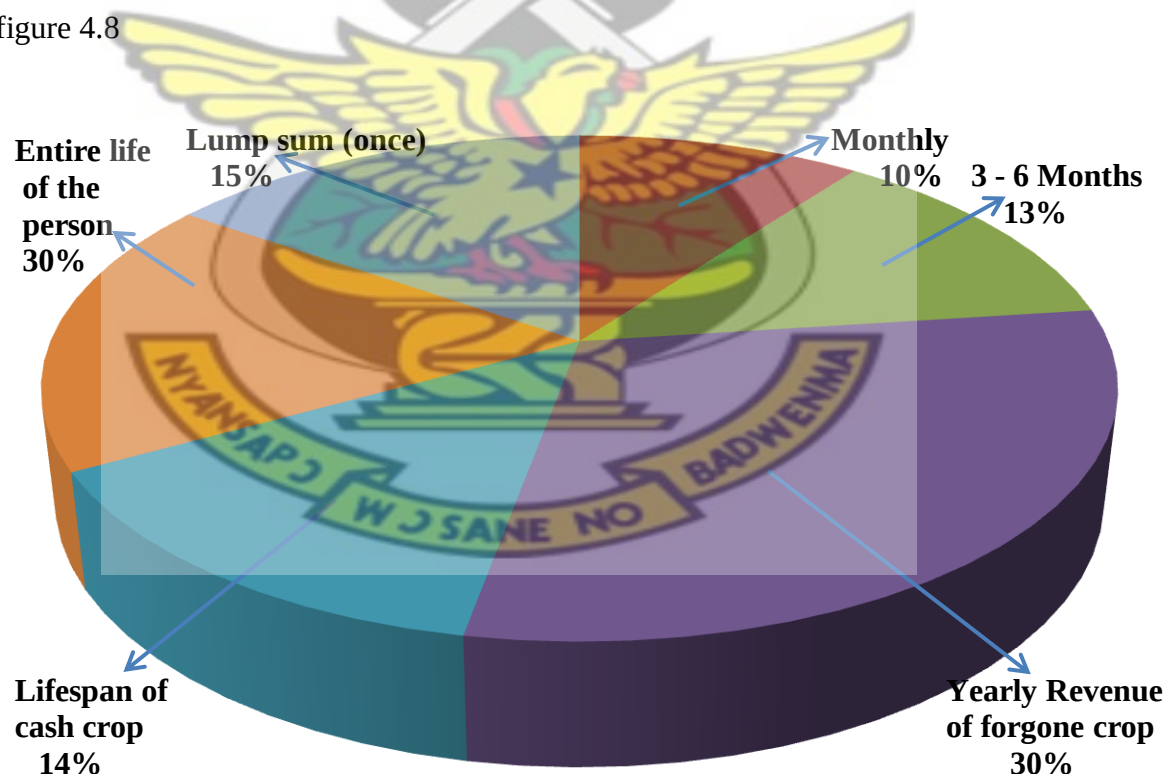


Figure 4.8: Length/period of cash compensation indicated by Farmers in ACA.

Fifteen percent (15%) of the farmers proposed lump sum payments and thereafter, they would leave the place. According to Robertson and Wunder (2005), payments must be made periodically, rather than once-and-for-all up front, so as to provide a clear incentive for the provider to continue to adhere to the contractual obligations, and a possibility for the buyer to exit the system in the case of the provider's non-compliance.

The farmers agreed that payments should start at least three years after plantation has been established and when intercropping with food crops is not possible anymore. The farmers further proposed that it would be reasonable that the farmers start with their own money "to avoid some people taking money and not do the work". Eighteen percent (18%) of the respondents prefer payments for the entire life of the person. The reason given by the respondents was that, the cash crops they have grown are their source of livelihood.

Stakeholders stressed the importance of a proper organisation of payment mechanisms. The stakeholders argued for the need of intermediaries as receiver of payments who should forward this to communities or single farmers. In contrast, 27.8% of the respondents favour direct payments to the farmers and users. 12% of the respondents mentioned Government Officials as intermediaries, but Park managers explained that the farmers have no trust in government workers, including their own staff. Therefore, only payments that are paid directly to them could be a motivation to engage in protection of forest and wildlife resources. But stakeholders see the danger of Traditional Authorities as the recipient of payments since in most cases; money is not transferred from the stool

to the communities. This was confirmed by many stakeholders. Suggested intermediaries for cash payment to farmers is shown in figure 4.9.

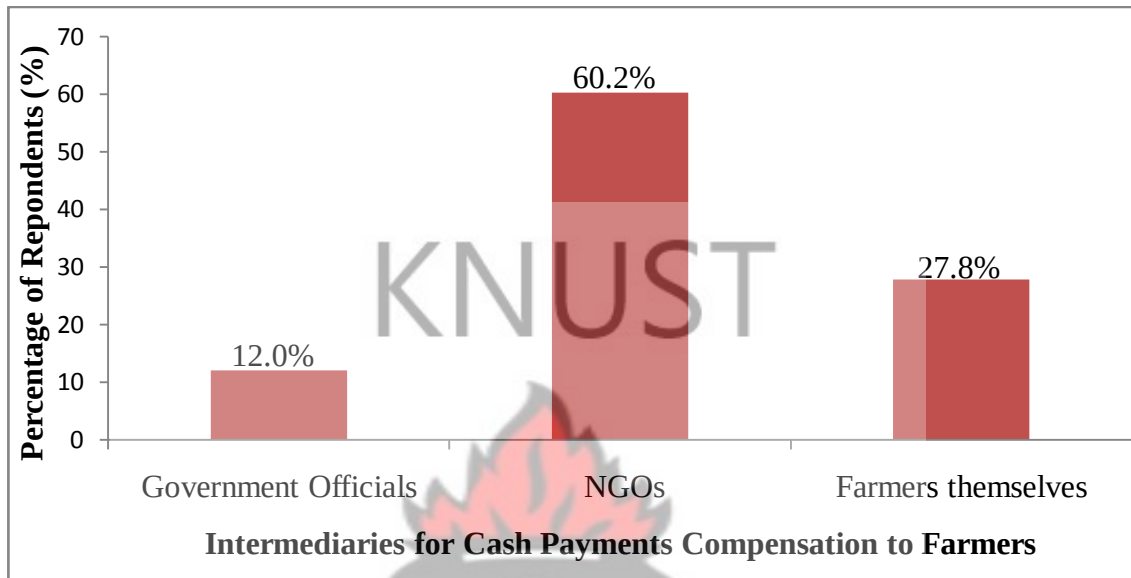


Figure 4.9: Intermediaries for Cash Compensation Payments to Farmers

Majority of the respondents (60.2%) emphasized that NGOs should served as intermediaries for cash payments to the land users as they are the trusted people. In one project, an NGO selected key persons to transfer the payments to the communities. The selected key persons made sure that the payments were not transferred to the Traditional Authorities.

The respondents from NGO named two ways in which money is delivered in other projects. The direct payment in cash is problematic because in this case migrant farmers often get no share. The other way is to give the payments in cash to the community development committee to finance priority needs which they have to set up in accordance with community members and the chiefs. In this case, marginalized groups

can benefit. For example, schools, health posts or community houses. Another example to manage common financial resources is to work with a community fund as Ghanaian Conservation NGO already does. The money is deposited on a bank account to be available in future. A community committee is in charge of the sharing of the money, controlled by an audit. The NGO itself acts only as the facilitator of the process and stays neutral in the process.

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4.7 Projected Amount Farmers are willing to accept as a form of Compensation

From figure 4.10, 30% of the farmers preferred cash compensation on Yearly Revenue of forgone crop. In this case, cocoa is chosen as majority of the farmers cultivate cocoa (figure 4.1).

According to MOFA representatives, the average yield of cocoa is 15 bags/year/acre. If producer price of cocoa/ bag in 2008/2009 was GH¢138.00 (Kpodo, 2008), then the amount the farmer will receive as compensation for a year will be $15\text{bags} \times \text{GH¢}138.00 = \text{GH¢}2070$. Table 4.5 summaries the projected cash amount of compensation farmers will accept.

Table 4.5: Projected Amount Farmers are willing to accept as a form of Cash Compensation for yearly forgone cocoa production.

Year	Expected Average Yield/ Acre/Year	Producer Price/bag (64kg)	Projected Amount of Compensation
2008/2009	15bags	GH¢138.00	GH¢2070.00
2009/2010	15bags	GH¢150.00	GH¢2250.00
2010/2011	15bags	GH¢200.00	GH¢3000.00

4.8 Problems/Challenges that could impede the Implementation of PES in ACA

There are many problems/challenges that could impede the implementation of PES in ACA, but the ones identified by the respondents during the study are discussed below.

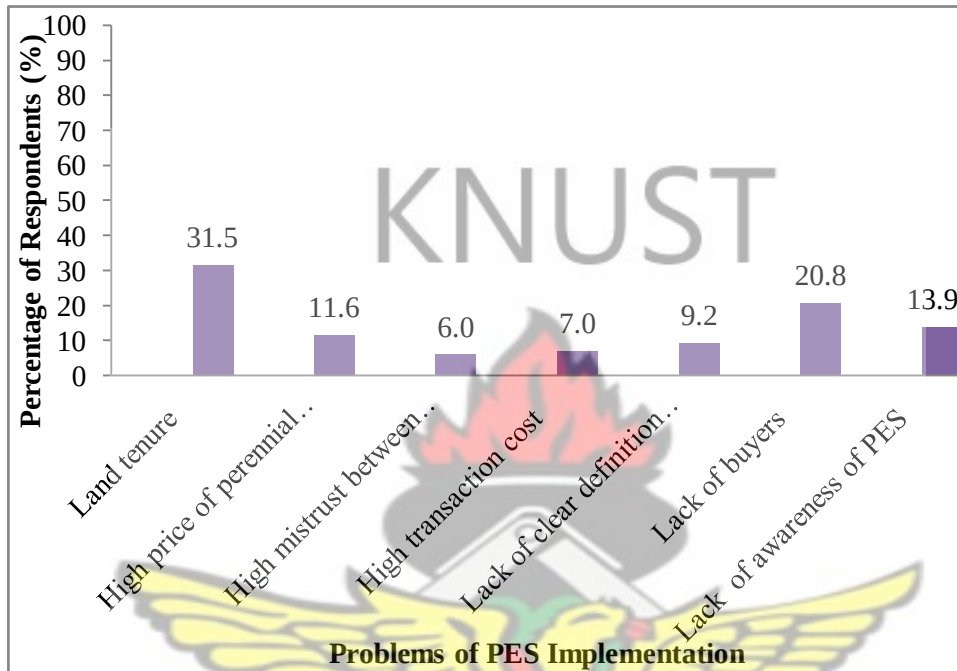


Figure 4.10 Problems/Challenges that could impede the Implementation of PES in ACA

The respondents from both farmers and stakeholders (31.5%) mentioned land tenure as the highest problem that could impede the implementation of PES scheme. They emphasised the missing of land security of tenant farmers as majority of farmers do not have any or only oral agreements with the chief and making it difficult to transfer the agreements to the successor. Again, due to limited land size and high land pressure around ACA, farmers see tree growing as a threat to their food security.

About 11.6% of the respondents pointed out that, because of large-scale agricultural production such as monocultures of cocoa and rubber and the perverse pricing of cash

crops had contributed to the ongoing degradation of forest cover and the loss of ecosystem services. Therefore, these factors threatened the success of a PES that aims at financing conservation, afforestation and reforestation. Again, 6.0% of the respondents emphasised that the level of mistrust between farmers and the Traditional Authorities when acting as landowners was high and this poses constraints on PES schemes since both sides had to agree upon a scheme that implies land use change on stool land.

The respondents (20.8%) indicated that it would be difficult to identify potential buyers who would be willing to pay for ecosystem services. Their reasons were that most potential buyers would be unaware of the PES concept, while others feel it would be too risky a mechanism for the buyers to trust. This was shown as some of the respondents (13.9%) especially farmers were not aware of the PES concept. Also, 9.2% of the respondents indicated the lack of a clear definition of the service for which the payment system has to be established, since it would reduce the user's willingness to pay. The respondents (7.0%) emphasized high transaction costs involved in the preliminary study and implementation phases may cause PES scheme to be very expensive and as such, many stakeholders would not involve in PES schemes.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusions

The study revealed that carbon sequestration and storage, biodiversity protection or restoration, watershed protection and landscape beauty are the Environmental Services that have potentials to be traded in Ghana. However, water related services are the most promising services for a PES in Ghana.

For watershed protection, Government of Ghana, Ghana Water Company, Ghana Electricity Company/ Volta River Authority and Water Resources Commission were potential service buyers. For biodiversity, the willingness to pay was mainly identified on global level by Multilateral Funds and International Conservation NGOs.

Although, a lot of Environmental Service providers were mentioned during the research, the farmers were considered to be the most appropriate providers of ES in the fringes of the ACA as they cause a tangible threat to ES through unsustainable land- and resource use practices.

A variety of institutional arrangements exist by which PES schemes could be developed. Since NGOs are most trusted, they could serve as potential intermediaries in PES schemes by facilitating negotiation processes, monitoring the agreements and managing payment flows. Farmers have clear demands on how high payments should be, the duration of payments, and how it should be transferred to them.

Agroforestry systems such as cocoa agroforests (multistrata cacao with timber, fruit, and native forest species), shaded coconut among cocoa trees have been proposed. Hence, the use of Agroforestry as a land use systems for the provision of ecosystems services as well as food and cash crops and construction materials and NTFPs should be encouraged.

The general constraints that could impede the implementation of the PES in Ankasa Conservation Area identified were:

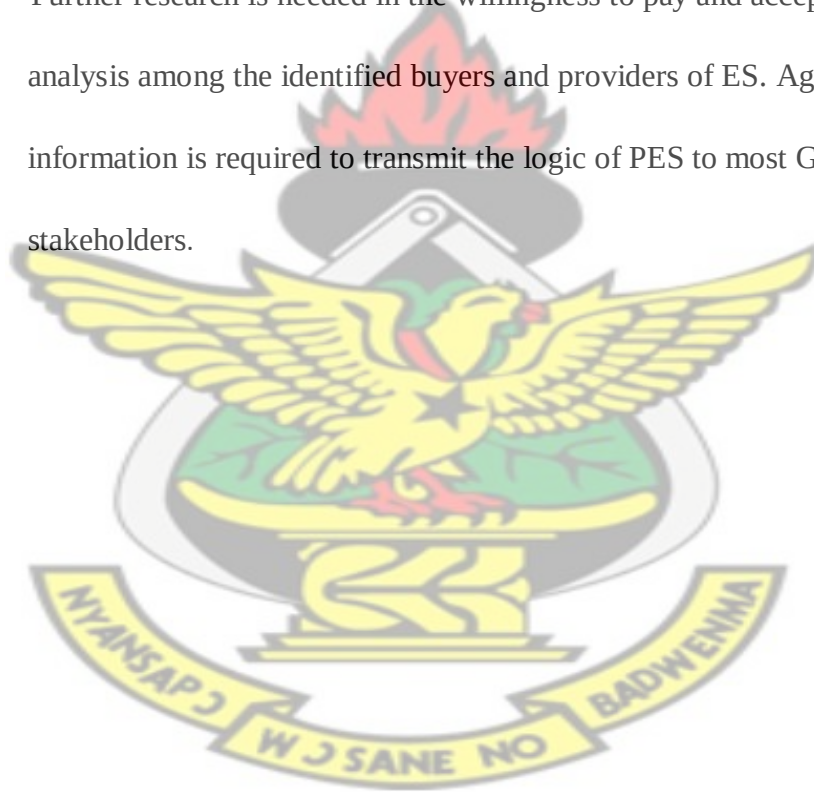
- ❖ Lack of an effective monitoring system and weak law enforcement and extinction of wildlife.
- ❖ Lack of awareness of PES schemes among the population and lack of buyers.
- ❖ Farmers see tree growing as a threat to their food security.
- ❖ Land tenure and benefit sharing and the perverse pricing of cash crop.
- ❖ Land use pressure in the fringe area of ACA is severe.

5.2 Recommendations for PES around Ankasa Conservation Area

The recommendations for PES in Ankasa Conservation Area are:

- (i) PES realized in the off reserve area would only result in environmental benefits to the ACA itself if it would help to minimize the land use pressure on the reserve. In the case of Ankasa, a possible PES design schemes is recommended:

- Design an off-reserve PES based on the supply of environmental services provided by agroforestry systems that achieve various environmental benefits but with the effect of lowering the vulnerability of the local people.
- (ii) The establishment of Community Resource Management Area which has the potential to act on behalf of PES providers should be strengthened.
- (iii) The existing bureaucratic barriers to register planted trees and to obtain land titles by the farmers should be removed by the responsible authorities.
- (iv) Further research is needed in the willingness to pay and accept compensation analysis among the identified buyers and providers of ES. Again, further information is required to transmit the logic of PES to most Ghanaian stakeholders.



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APPENDICES

QUESTIONNAIRE

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF RENEWABLE NATURAL RESOURCES
DEPARTMENT OF AGROFORESTRY**

**TOPIC: The Potential and Constraints for Payment of Ecosystem Services (PES)
in Ghana: A Case Study in Ankasa Conservation Area.**

APPENDIX A

INTERVIEW GUIDELINE FOR STAKEHOLDERS OUTSIDE ACA

Basic information

Date:

Facilitator:

Name:

Institution:

Position:

Duration of work for the institution:

Main Interest of the actor (all)

1. What are the main aims and objectives of your institution/ organisation?

Environmental services

1. What are the most important environmental services of the upper Guinean tropical forests like the Ankasa Conservation Area?
2. On which services do the livelihoods of the local population depend (on-site benefits)?
3. Who is benefiting outside the direct surrounding of the forest (off-site benefits)?
4. What are the main drivers for deforestation in Ghana?
5. Which of the following areas is the most promising to ensure the integrity of conservation areas in Ghana?
 - a) Eco Tourism
 - b) Sustainable agriculture around the conservation areas
 - c) Afforestation or reforestation around the conservation areas
 - d) Extension of conservation areas
 - e) Community Resource Management Areas
 - f) Other
6. What has to be done to ensure environmental service provision in future?
7. Do you have any activities that you would define as adaptation measures to climate change?

Buyer

1. Are the beneficiaries or users of environmental services aware that forest services are under pressure as a result of the overuse of forest resources? How do they react to ensure the provision?
2. Can you imagine someone who would be willing to pay for one or more of these environmental services?
3. Who could have interest and resources to do the up-front funding for PES schemes in Ghana?
4. Do you think the current budget-support approach of the donors entails funding possibilities for market-based mechanisms like PES?

Provider

1. Who could contribute to the provision of forest environmental services? How?
2. Which of the following actors would you accept as providers of ES and therefore receivers of payments?
 - a) Single farmers
 - b) Organised farmers
 - c) Community Resource Management Areas
 - d) Traditional Authorities as landowners
 - e) State Agencies
 - f) Companies

Institutional framework

State of discussion on PES in Ghana

1. As far as we know, the Ghanaian Government is developing a Sustainable Development Action Plan (SDAP) with attention to biodiversity and payment for environmental services (PES). Do you have further information on this? *Alternative question:* PES has been discussed in the Forestry Commission/ WD as an instrument to acquire additional financial resources for forest conservation. Have you heard about this?
2. Have you heard of anyone else who is planning to introduce PES in Ghana?

Assessment of the Institutional Framework by the interviewed actor

3. How would you assess the commitment of the Ghanaian government to conservation of forest and biodiversity? (Ranking from 1-5) Why?
4. How would you assess the commitment of the Ghanaian government to adaptation to climate change? (Ranking from 1-5) Why?

Institutional arrangements

Benefit sharing mechanisms in community projects

1. Which local benefit sharing mechanisms could be adapted in PES schemes?
2. What impacts do payments (in cash) have on social-economic and power structures in communities?
3. Who would be losers and winners?
4. (How) Should traditional authorities be integrated in mechanisms like PES schemes?

Role of the interviewed institution in potential PES schemes

5. Would the participation in a PES scheme be an option for your future activities? If yes, which role could you play?
6. Would the up-front funding to implement PES schemes in Ghana fit in your portfolio? If yes, what would be the prerequisites?
7. Which characteristics (of ES) would be the most important for you?
 - a) Price
 - b) Quality
 - c) Secure contract
 - d) Monitoring possibility

Key stakeholders for conservation of biodiversity and forests and adaptation in Ghana

8. If we take the whole range of stakeholders that are relevant for conservation of forest and biodiversity and adaptation into account, which actors...
 - a. are interested or engaged in conservation and adaptation?
 - b. have conflicting interests concerning conservation and adaptation?

Trust

9. Please rank the level of trust between following actors on a scale between 1 and 5, whereby 5 is high trust and 1 is pronounced mistrust:

	Actors	Level of trust (1-5)
A	...donors and relevant state agencies?	
B	... donors and Ghanaian environmental NGOs?	
C	... donors and companies (timber, mining)	
D	... donors and traditional authorities?	
E	... donors and local population?	
F	... donors and private sector like timber and mining companies?	
G	...Wildlife Division and Forestry Service Division?	
H	...Ghanaian NGOs and government agencies?	
I	... traditional authorities and government agencies?	
J	... companies (timber, mining) and local population?	

APPENDIX B

INTERVIEW GUIDELINE FOR STAKEHOLDERS AROUND ACA

This guideline contains all questions from the interviews on local level addressed to interview partners from the following institutions. Further on, the letter in brackets indicates which interview partners were asked which respective topics and questions.

- a) ACA Management (WD)
- b) PADP staff
- c) CARE international local staff
- d) Traditional authorities
- e) CREMA representatives
- f) Farmers associations representatives
- g) Members of District Administration
- h) Agricultural Extension (DADU/MoFA)

Basic information

Community:

District:

Date:

Name of respondent:

Institution:

Position:

Main Interest of the actor (all)

1. What are the main aims and objectives of your institution/ organisation?
2. What activities do you do to reach this?
3. Who are the members of your organisation/ institution?
4. How many members do you have?

Environmental Services

General assessment (a, b, c)

1. What do you think, which forest ecosystem services from ACA could be marketable in a potential PES scheme?

Forest goods (a, b, c, d, e, f)

2. What do the people get from the forest?
3. What do they need these forest products for?
4. Are they aware of any restrictions in the use of the forest products?

Impacts on ACA (a, b, c, d, e)

5. Which changes in the environment do you observe?
6. Have you noticed any change in the number of animals or plant species from the forest over the last 10 years? Which forest goods are exploited?
7. What are the main impacts or threats on ACA?
8. Which land use practices in the communities affect the natural resources in a long term? In which way?

Buyer

General assessment (a, b, c)

9. Who are the users/ beneficiaries of these services?
10. Could the users serve as potential buyers (financial resources, willingness)?

Provider

General assessment (a, b, c)

1. Who could ensure the provision of these services?

Economic activities/ agricultural production (d, e, f, h)

2. What crops do farmers cultivate? Which animals do farmers keep?
 - 2.1. Do farmers produce for subsistence or for commercial purpose?
 - 2.2. What is the output per crop/ per acre?
 - 2.3. What is the total cost incurred in crop cultivation (seedlings, fertilizer, pesticides etc.)?
 - 2.4. For what prices do farmers sell their products?
3. What land preparation processes do farmers carry out before planting?
 - 3.1. How many years do farmers leave the land to fallow?
 - 3.2. Which measures do farmers undertake to increase the crop yield?
4. What other activities do farmers undertake for living apart from farming?
5. Do farmers have access to extension services?
 - 5.1. How often does the extension officer come around?
 - 5.2. Is the advice from the extension agent helpful?
6. Did farmers already take part in an afforestation programme?
7. Do farmers have any experiences with agroforestry?

Land- and resource use change

Land/resource use change (c, d, e, f, g, h)

1. What could farmers do to reduce negative effects of their land use?
2. Which assistance would they need?
3. What is necessary to ensure the sustainable land/resource use in future (land title, tenure, agreements with land owner etc.)?

Local institutional framework

Conservation status of ACA (a, b, d)

1. What are the most important ecological functions of ACA?
2. Which endangered species do exist in ACA (endemic, protected)?
3. Have you noticed any change over the last 10 years?
 - 3.1. Do you have update data on the changes (decline or increase) of endangered species?
 - 3.2. Do you have update data on poaching activities?
 - 3.3. Did you recognize occurrence of new (not typical/invasive) species?
4. Which part of ACA suffers the greatest pressures?

5. How do you define the conservation status of ACA?
 - a. good (no pressure/ threats)
 - b. average (some smaller threats)
 - c. bad (high pressure/ threatened ecosystem)

Management of ACA (a, b)

6. What management strategies are adopted to ensure the integrity of the conservation area?
 - 6.1. What are the main difficulties for the management of ACA? What are the reasons?
 - 6.2. How are these difficulties addressed and solved?
 - 6.3. In your opinion, how could the protection of ACA is guaranteed in a long-term perspective? (Which measures have to be undertaken, which resources are needed?)
7. Is there a business plan for ACA or are you working on a business plan? If yes, what strategies are planned to guarantee the sustainable financing of ACA?
 - 7.1. How high are the present entrance fees for tourists?
 - 7.2. How much staff has the Park Management (PM)?
 - 7.3. Does the PM contract agencies corporate with the management of ACA? If yes, who?
 - 7.4. Does the PM enhance the work of NGOs around or in ACA?
 - 7.5. In your opinion, do you think that it will be possible to achieve a part-retention of park-generated revenues?
8. Which are the regulations concerning the use of the natural resources in ACA and in the off-reserve area?
 - 8.1. Which of them do the local population mostly violate? And why?
 - 8.2. Which kind of punishment is given to offenders/illegal users of ACA?
 - 8.3. Does the park management promote activities in natural resource management for the local population?

(c, d, e, g)

9. How would you assess the management of the Ankasa Conservation Area
 - a. very good
 - b. good managed
 - c. poorly
 - d. very bad managed
 - 9.1. If poorly or bad managed, what are the reasons for this?
 - 9.2. How do you think these deficiencies should be addressed?
10. Do people living around ACA participate in activities to manage natural resources? If yes, in what kind of activities?
11. Which activities do you have in forest/environmental conservation and management of natural/ forest resources? Do you have any activities that ...
 - a. promote the provision of forest ecosystem services? If yes, which ecosystem services and why did you choose them?

- b. include market-based approaches for conservation?
 - c. promote adaptation strategies?
12. What are your plans for future activities in relation to environmental conservation and natural resource management?

Ecotourism (a, b)

13. Have you been able to implement some of the goals stated in the Five-Year Tourism Action Plan for ACA?
14. Which are the institutional roles for ecotourism activities? Which mechanisms for collaboration do exist between the institutions?
15. Is there an interest of local tour operators (to invest) in ecotourism opportunities?
- 15.1 How could the private sector be involved?
 - 15.2 Does the PM have concession arrangements and/or modalities for attracting necessary investment (in form of tourism concessions, conservation concessions, tourism joint ventures, short-term leases or long-term leases)?
 - 15.3 What kind of marketing strategies are planned?
16. How could the local communities be involved and which modalities could ensure local benefits?
- 16.1 Which are the key communities around ACA that should be considered for ecotourism projects?
 - 16.2. Who should be addressed with ecotourism training?

Stakeholder analysis

Power and Potential of the actors (a, b, c)

1. Which additional resources (financing, staff, knowledge etc.) are needed to guarantee the protection of ACA?
2. Do you contract other agencies to fulfil your duties in conservation? If yes, whom do you contract?

(d, e)

3. Do you set rules or regulations on land use for the protection of natural resources? If yes, which?
4. Do you have to follow rules or regulations for the protection of forest resources? If yes, who sets these rules? Are they adequate?
5. Do you have financial resources to engage in management of natural resources? What are the sources of your funding? Are they adequate for the role you have in NRM?
6. Which human resource capacity do you have for management of natural resources?
7. Do you need assistance to increase your activities in the protection of forest resources? If yes, which?

Relationships, Agreements and Trust (a, b, c, d, e, g)

8. Which entities work in and around the ACA?
 - 8.1. Do you cooperate on projects and programmes (partnerships and financial relationships) with other actors (NGOs, government institutions, private sector)?
9. Do you have contracts or agreements with other actors? If yes, with whom?
 - 9.1. Are these agreements written or oral?
 - 9.2. How long do these agreements last in average?
 - 9.3. Who are the witnesses in these agreements?
 - 9.4. Are you satisfied with these agreements? Why/ Why not?
10. Please rank the level of trust between the actors you cooperate with on a scale between 1 and 5, whereby 5 is high trust and 1 is pronounced mistrust:
 - a) ...among the land owners?
 - b) ...land owners and land users?
 - c) ...land users and traditional authorities?
 - d) ...traditional authorities and local and district administration?
 - e) ...PM and communities?
11. Which strategies do you use to build up trust between different stakeholders that are relevant for your activities?

Negotiation and Monitoring (a, b, c, d, e)

12. Are you participating in...
 - a) negotiation processes on agreements or contracts?
 - b) monitoring of land use activities?
 - c) conflict resolution activities concerning land use, land ownership or the use of natural resources?
 - d) interest articulation or organisation of land users?
13. If yes, do you see yourself as a potential contributor to a PES scheme in one of these areas?
14. If you are not participating in this, who is responsible for this or acts on behalf of you in these issues?
15. Do you think the responsible institutions could also be responsible for negotiation, monitoring etc. in a potential PES scheme? If not, who else could do this?

Management of Payments (c, e)

16. How are payments and resources transferred to your target group?
 - 16.1 Who receives the payments?
 - 16.2 In which tranches do you pay land users or farmers?
17. Do you think this way of managing payments could be adapted in potential PES schemes? If not, how could it be designed?
18. Which obstacles for financial management have you experienced and would it lower the potential of a PES scheme in Ankasa/Ghana?
19. Do you see yourself as a potential actor for managing payments in a PES scheme?

Specific PES questions (if informed about PES) (a, b, c)

- 20 PES has been discussed in the Forestry Commission/ WD as an instrument to acquire additional financial resources for forest conservation. Have you heard about this?
- 20.1 If yes, do you think that could be an option to finance conservation of ACA?
- 20.2 Have you heard of anyone else who is planning to introduce PES schemes around ACA?
- 21 Who might have disadvantage of land and resource use change implicated with a PES scheme?
- 22 Can you imagine contributing to a PES scheme by...
- a) organising groups of providers of ES?
 - b) facilitating negotiations on agreements between providers and buyers?
 - c) carrying out monitoring activities?
 - d) managing the flows of payments?
 - e) providing expertise on land use change?



APPENDIX C

GUIDELINE FOR FOCUS GROUP DISCUSSIONS

Basic information

Place/ community:

District:

GPS No:

No. of respondents (male/ female):

Date:

Provider

Land size and Tenure

1. How long have you been living here? (<1; 1-4; 5-9; 10-14; 15-19; >20)
2. How many acres of land do you have in this area? (1-9; 10-19; 20-29; 30-39; 40-49; >50)
3. How many fields do you cultivate?
4. Do you have any uncultivated fields with wild forest/trees? How did you acquire the land on which you grow your crop? What kind of tenancy agreement do you have? (Abunu, Abusa, other)
 - 4.1. Is it written or oral?
 - 4.2. Who are the witnesses in these agreements?
 - 4.3. How long does your land tenure agreement last? Is it inheritable/?
 - 4.4. If you want to change your crop from one to another, whom do you seek permission from?

Economic Activities

5. Which are the most common crops grown here?
 - 5.1. Which crops are for subsistence/ for commercial purposes?
 - 5.2. What is the output per acre?
 - 5.3. What is the price per crop?
6. Do you rely on off-farm employment?
7. Which farming practices do you adopt?
 - 7.1. How many years do you leave your farmland to fallow?
 - 7.2. Do you have access to extension services? How often does the extension officer come around? Is the advice from the extension agent helpful to you?
 - 7.3. Do you have any experience with agroforestry?
 - 7.4. Have you ever participated in an afforestation programme? (What knowledge do you have on seed growing, plantation, ...)

Environmental Services

Forest Goods

1. What resources do you derive from the environment?
 - 1.1. Which ones are for subsistence/ for commercial purpose?
 - 1.2. For what prices do you sell your products? (If commercial)
 - 1.3. How long does it take to get these environmental products? (Time and distance)

Perceived Changes & Threats

2. Have you observed any (negative) change in the environment?
 - 2.1. Have you noticed any change concerning the environmental products you mentioned above over the last 5 years? (Decrease/increase of animal/plant species)
 - 2.2. Have your yields changed over the last 5 years? (Decline, increase; etc.)
 - 2.3. What reasons do you think account for this environmental change?
3. Which land use practices affect the environment most? In which way?
4. Which are the reasons for applying these land use practices?

Local Institutional Framework

ACA Management

1. Are you permitted to enter the conservation area to extract forest resources?
 - 1.1. What time of the year? Which resources do you extract?
 - 1.2. Do you need a permit to...
 - a. extract NTFPs (specified above)?
 - b. extract timber?
 - c. hunt?
 - d. sell bush meat?
 - 1.3. If yes, whom do you get this permit from? What processes do you have to go through to get it?

Land and Resource Use Change

1. What needs to be done to change your land/resource use into a more sustainable one?
2. Are you willing to participate in conservation, afforestation and agroforestry program if you did not lose any income or get compensation?
 - 2.1. What would you gain/lose if you integrate afforestation into your current land use practice?
 - 2.2. Under which circumstances would you plant trees/ conserve forest on you land? (if I had more land than I need or if my foregone costs would be compensated or if I were allowed to use the forest products in a sustainable way...)
 - 2.3. What kind of compensation would you suggest if you changed from growing crops to growing forest trees? How do you want compensation to be administered? By whom?

APPENDIX D

A LIST OF INTERVIEWED PARTNERS

Interview partners	Institutions
State Institutions	Forestry Commission Wildlife Division Forest Services Division MoLFM MOFA GWC VRA/ ECG Members of Parliament Environmental Protection Agency
Donors	EU commission KfW office Accra GTZ office Accra Dutch Embassy (lead of NREG)
Environmental NGOs	Ghana Wildlife Society IUCN office Accra Friends of the Nation Forest Watch Ghana Tropenbos Global Witness UK
Experts	Consultants
Companies	Samartex
Research Institutes	FORIG KNUST

Interview partners on local level

Entities working in and around ACA	ACA Management (WD) PADP CARE international WAPCA
Local representatives	Traditional Authorities CREMA Farmer Association
Local administration	District Planning Officer District Environmental Sub-committee Agricultural Extension

APPENDIX E

THE NAME, POSITION AND CONTACT INFORMATION OF INTERVIEWED PARTNERS

italics= interviewed

Bold & Underlined = talked

Name	Position	Contact
Traditional authorities		
<i>Nuba Chief</i>	Paramount Chief	Nana Paniaka IV Senior Divisional Chief P. O. Box 5, Nuba, Mpataba Western Region, Ghana 020-8891447
<i>Tikobo # 2 Chief</i>	Paramount Chief	
CREMAs, opinion leaders		
<i>Zacharia Akyerem</i>	CREMA vice chairman in Amokwaw	
<i>James Anyimah</i>	Farmer's association, Cassava Mill, Tikobo Area	
<i>John Kanga</i>	CREMA secretary in Tikobo no. 2	
Local and district administration		
<i>Mr. Doudu</i>	District Planning Officer Jomoro	0244776846
<i>Mr. Ekoba Kwan</i>	Chairman of Environmental Sub Committee Jomorro	027-5443031
<i>Mr. Boadi</i>	Director of MOFA Jomorro	024-424 88 66

<i>Mr. S.K.E. Arthur</i>	and staff (ex-extension officer)	020-83 12 145
<i>Mr. Hearnest</i>	District Planning Officer Wassa-Amenfi West	
<i>Mr. E. Aboagyeh-Agyrem</i>	Director of MOFA Wassa Amenfi West and staff	020 -8198711

WD and Park Management

<i>Mr. Moses Sam</i>	Head of WD Takoradi	
<i>Mr. Abdul Kareem Fuseini</i>	Head of ACA Management, Park Manager	yambafuka@yahoo.com
<i>Victor</i>	Law Enforcement Unit ACA	

Project Staff around ACA

<i>Mr. Phil Marshall</i>	Team Leader PADP	Marshall_phil2000@yahoo.co.uk
<i>Mr. Hanson</i>	PADP ACA	

NGOs

<i>Mr. Ntiri</i>	Care Ankasa	0249739329
<i>Adewale Adeleke ("Wale")</i>	IUCN, FLEGT Project Facilitator	Adewale.adeleke@iucn.org
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