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Payments for Environmental Services (PES) as innovative financing mechanism for adaptation to climate change in Ghana

Centre for Advanced Training in Rural Development on behalf of the 'Centre for International Forestry Research' (CIFOR) and the Advisory Service on Agricultural Research for Development of the 'German Technical Cooperation' (GTZ/BEAF)

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The findings, interpretations and conclusions in this report are those of the authors. They do not necessarily represent the views of GTZ/BEAF or CIFOR.

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Foreword

The Centre for Advanced Training in Rural Development (Seminar für Ländliche Entwicklung, SLE) at the Humboldt University in Berlin has trained young professionals in the field of German and international development cooperation for more than forty years.

Consulting projects conducted on behalf of German and international cooperation organisations form part of the one-year postgraduate course. In multidisciplinary teams, young professionals carry out studies on innovative future-oriented topics, and act as consultants. Including diverse local actors in the process is of great importance here. The outputs of this “applied research” are an immediate contribution to the solving of development problems in rural areas.

Throughout the years, SLE has carried out over a hundred consulting projects in more than seventy countries, and regularly published the results in this series. In 2008, SLE teams completed studies in Ghana, in Peru, in Tunisia and Morocco, all of which dealt with topics relevant to the most recent discussions in international cooperation.

The present six-month study was commissioned by the Advisory Service on Agricultural Research for Development of the ‘German Technical Cooperation’ (GTZ/BEAF) and the ‘Centre for International Forestry Research’ (CIFOR). The study is located in the framework of the Tropical Forests and Climate Change Adaptation (TroFCCA) project.

The SLE consultant team was composed of one tropical ecologist, one landscape planner, one agricultural economist, one geographer, one member with a M.A. in public administration (all participants of the 46th annual training course), one agroforest engineer, two development planners (all from Kwame Nkrumah University of Kumasi), and one forest engineer (team leader).

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Furthermore we would like to thank all the other persons who made it possible to carry out our study; especially Mr. Kofi, our driver, who made it possible to reach the remote communities around the Ankasa Conservation Area.

Executive summary

The objective of this study is to analyse the potential and constraints of Payments for Environmental Services (PES) as a mechanism to finance adaptation measures to climate change in Ghana. It was conducted on behalf of the Centre for International Forestry Research (CIFOR) and the Advisory Service on Agricultural Research for Development of the German Technical Cooperation (GTZ-BEAF). The core idea of PES is to create financial incentives for local land users to adopt sustainable land- and resource uses that secure the conservation and/ or restoration of an ecosystem. Land users (service providers) have a direct impact on the ecosystem through their land use practices and therefore on the provision of environmental services (ES). External beneficiaries of ES compensate service providers (e.g. farmers) through direct payments for securing the provision of these services.

In the tropics the rural population not only has a direct impact on the ecosystem but usually depends heavily on ecosystem services derived from tropical forests. Tropical forests for example contribute to the livelihoods of the poor through the provision of food, fodder and building materials, the diversification of income, the regulation of extreme weather events, and the provision of option values of biodiversity. This enables the local population to better cope with climate changes. Their dependency on these ecosystem services makes them more vulnerable to climate change induced environmental degradations. Considering this logic, strategies that secure the conservation or restoration (through afforestation and reforestation) of tropical forests and thus biodiversity can be seen as measures to increase the adaptive capacity of the rural population to climate change impacts. Within the proper institutional framework PES is a tool, which can finance this kind of adaptation measures.

In our study we conducted a general assessment of the institutional framework and key stakeholders on national level 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 for our local case study on biodiversity-related PES was the fringe area of the Ankasa Conservation Area (ACA) in the south-western region of Ghana. The ACA belongs to the Upper Guinean Rainforest, one of the remaining biodiversity hotspots. For our data collection, we randomly selected 14 spots in the forest fringes of the ACA to conduct focus group discussions and ecological assessment. Semi-structured interviews were conducted with key stakeholders on local and national level.

Our findings indicated that PES itself is already discussed by state and non-state stakeholders. But there is a lack of interest in conservation issues in Ghana.

The promotion of economic sectors like the cocoa and timber industry competes with the goals of a biodiversity related PES scheme. We also assessed a lack of awareness about the contribution of forests to adaptation to climate change and missing coordination between stakeholders in adaptation processes. However, there is awareness on the connection between intact forest ecosystems and livelihoods of the local population. We identified stakeholders from state and non-state institutions that are engaged in projects and programmes concerning biodiversity conservation, such as the promotion of community-based natural resource management.

For the set up of any future PES scheme in Ghana, up-front funding must be provided, including the funding of feasibility studies, training programmes, and capacity building measures. The sources of funding comprise government funds, international funds and funding through international NGOs. The Official Development Assistance (ODA) for the sector of natural resources and environment is subject to budget funding. Therefore the chance to ensure up-front funding for PES through the Ghanaian Government strongly depends on the priorities of the funding agreements between the government and its development partners. In the case of bilateral donor funding, up-front funding for PES schemes could fit into the cross-cutting issues climate change and biodiversity. Possible global funding could entail funds from the World Bank, the Global Environmental Facility or from international conservation NGOs.

Concerning the payments for environmental services our findings indicated, that watershed protection gains higher interest on national level (governmental institutions as potential buyers), while buyers for biodiversity protection and restoration are located on international level (payments by multilateral funds and international conservation NGOs). Therefore the bundling of watershed and biodiversity related environmental services seems to be the most promising approach for a potential PES scheme in Ghana. Linking forest related environmental services and adaptation funding options for PES from international adaptation funds might be possible.

For the implementation of a biodiversity-related PES scheme in the fringes of the ACA we identified several constraints. The most fundamental are:

1) **Existent drivers for deforestation:** Commercial (over)exploitation of natural resources that imply high opportunity costs and underlying structural reasons which cannot be altered by a PES scheme (e.g. population growth, migration processes).
2) **Small dispersed native forest patches:** Due to the existing disincentives towards the conversion of forestland into farmland only few native forest patches are left in off-reserve areas that could be of interest for conservation

through PES. The dispersed locations and the small sizes of landholdings require the organisation of farmers, which causes high transaction costs.

3) **Present land tenure system:** The traditional authorities have the power over land- and resource use practices on stool land and must be involved in any decision making process concerning land use changes. Farmers do not have real land use options and risk losing their land if they do not cultivate it. Our study also indicated a low level of trust between landowners and land users.
4) **Present benefit sharing system:** The present benefit sharing system does not secure payment flows towards the service providers (farmers), especially concerning timber revenues. Conservation and restoration of forests is thus not considered as an attractive option for most land users.
5) **Weak law enforcement and lack of effective monitoring regarding the trade of bush meat and illegally extracted NTFP:** This fact undermines the additionality of land use changes through PES around the ACA for biodiversity benefits on-reserve.

Based on our findings we consider farmers to be the most appropriate service providers for the implementation of a PES scheme in the fringe areas of the ACA, as they are most likely to secure service provision through land use changes and opportunity costs are most likely to be moderate. The land use change options to secure the provision of ES around the ACA considered in this study are afforestation, reforestation and other sustainable land use practices like agroforestry. Concerning afforestation and reforestation farmers would only provide uncultivated parts of their farmland, while improving or intensifying the agricultural productivity on the cultivated parts. For the introduction of sustainable land use practices like agroforestry the major constraint is that farmers are lacking experience while at the same time the agricultural extension service is lacking capacities.

Concerning the local institutional framework PES can only work on stool land if the traditional authorities that are landowners are willing to participate in such a scheme. As land users and landowners would act as providers of ES, this would increase the transaction costs of a potential PES scheme. Therefore it seems more promising to induce land use changes on private or family land, where the landowners themselves can decide on land use practices themselves. A precondition is the access to land titles and the official registration of planted trees. Furthermore for a potential PES scheme a reform of the present benefit sharing system would be necessary to ensure that revenues reach the communities on local level. On local level, there are several institutions (e.g. NGOs, Community Resource Management Areas) that could act as

intermediaries to facilitate negotiation processes, monitor the agreements and manage payments.

Our ecological study indicated that there is little connection between the land use pressure off-reserve and the ecological intactness of the ACA. The ecological state seems only to be determined by former logging activities in the reserve, the law enforcement activities, and the willingness of the fringe communities to accept the protective status of the ACA. We conclude that a biodiversity related PES needs to be based on biodiversity rich forest patches, which e.g. could be found in a buffer zone with comparably low protection status. Unfortunately there is no gazetted buffer zone around the ACA. Therefore it will be difficult to find potential buyers to finance a biodiversity-related PES scheme around the ACA. Thus, for a PES scheme that is related to biodiversity conservation and adaptation to climate change other sites should be taken into consideration. For example the Global Significant Biodiversity Areas (GSBAs) seem to be appropriate sites. As we were able to assess through the ecological field study, monitoring costs are low and not a limiting factor for the implementation of a PES scheme.

Zusammenfassung

Das Ziel der vorliegenden Studie ist die Analyse der Potentiale und Risiken von Zahlungen für Umweltleistungen (Payments for Environmental Services - PES) als Finanzierungsmechanismus für Maßnahmen zur Anpassung an den Klimawandel in Ghana. Sie wurde im Auftrag des Internationalen Waldforschungsinstitutes CIFOR und der Beratungsgruppe für entwicklungsorientierte Agrarforschung der Deutschen Gesellschaft für technische Zusammenarbeit (GTZ – BEAF) durchgeführt.

Die Kernidee von PES ist es, lokalen Landnutzern durch finanzielle Anreize eine nachhaltigere Land- und Ressourcennutzung zu ermöglichen, die den Schutz und/ oder die Wiederherstellung von Ökosystemen und ihren Umweltleistungen sicherstellt. Landnutzer (Bereitsteller der Umweltleistungen) haben einen direkten Einfluss auf ein Ökosystem durch ihre Landnutzungspraktiken und daher auch auf die Bereitstellung von Umweltleistungen (Erosionsschutz, CO_2 Bindung, etc.). Externe Nutznießer von Umweltleistungen kompensieren die Bereitsteller (z. B. Bauern) durch direkte Zahlungen für die gesicherte Bereitstellung der Umweltleistungen.

In den Tropen hat die ländliche Bevölkerung nicht nur einen direkten Einfluss auf das Ökosystem, sondern hängt gleichzeitig auch stark von den Umweltleistungen tropischer Wälder ab. Tropische Wälder tragen durch die Bereitstellung von Nahrung, Tierfutter und Baumaterialien maßgeblich zu den Lebensgrundlagen der Armen bei, sie regulieren extreme Wetterereignisse und erhöhen durch ihre Biodiversität die Handlungsmöglichkeiten für die zukünftige Generationen (option values). Dies ermöglicht der lokalen Bevölkerung, die Folgen des Klimawandels besser zu bewältigen. Ihre Abhängigkeit vom Ökosystem macht sie zugleich anfälliger gegenüber Umweltzerstörungen, die durch den Klimawandel ausgelöst werden. Strategien, die auf den Schutz oder die Wiederherstellung (durch Aufforstung) tropischer Wälder und damit der Biodiversität abzielen, können nach dieser Logik als Maßnahmen betrachtet werden, welche die Anpassungsfähigkeit der ländlichen Bevölkerung an die Folgen des Klimawandels erhöhen. PES ist ein Instrument, mit dem diese Art von Anpassungsmaßnahmen finanziert werden können.

Unsere Studie besteht aus einer Untersuchung des institutionellen Rahmens und der Identifizierung von Schlüsselakteuren auf nationaler Ebene sowie einer lokalen Fallstudie, in der wir die Hauptkomponenten eines möglichen PES-Modells analysiert haben (mögliche Umweltdienstleistungen, Bereitsteller, Käufer und lokaler institutioneller Rahmen). Der Untersuchungsraum (Study Site) für unsere lokale Fallstudie zu einem Biodiversitäts-bezogenen PES-Modells ist die Randzone des Schutzgebietes Ankasa (Ankasa Conservation Area – ACA) im Südwesten Ghanas.

Das Schutzgebiet gehört zum „Upper Guinean Rainforest“, einer der noch existierenden „Hotspots“ der Biodiversität. Zur Datenerhebung haben wir durch Zufallsauswahl 14 Orte in der Randzone der ACA ausgewählt, um Fokusgruppen-Diskussionen und ökologische Untersuchungen durchzuführen. Zusätzlich haben wir halb-strukturierte Interviews mit Schlüsselakteuren auf lokaler und nationaler Ebene geführt.

Unsere Ergebnisse zeigen, dass sowohl staatliche als auch nicht-staatliche Akteure das Instrument PES bereits diskutieren und in Betracht ziehen. Gleichzeitig haben wir in Ghana ein Mangel an Interesse für Biodiversität identifiziert. Die Förderung ökonomischer Sektoren wie des Kakaoanbau und der Holzindustrie steht in Konkurrenz mit den Zielen eines Biodiversitäts-bezogenen PES-Modells. Darüber hinaus haben wir ein mangelndes Bewusstsein bezüglich des Beitrages von Wäldern zur Anpassung an den Klimawandel identifiziert. Zudem besteht eine mangelnde Koordinierung zwischen denjenigen Schlüsselakteuren, die an den politischen Prozessen im Bereich von Anpassung an den Klimawandel beteiligt sind. Jedoch herrscht Bewusstsein über den Zusammenhang zwischen intakten Ökosystemen und den Lebensgrundlagen der lokalen Bevölkerung. Sowohl staatliche wie nicht-staatlicher Akteure beteiligen sich mit Projekten und Programmen am Schutz der Biodiversität, beispielsweise durch die Förderung von gemeindlicher Nutzung natürlicher Ressourcen.

Die Einführung eines PES-Instruments benötigt eine Vorfinanzierung für Machbarkeitsstudien, Fortbildungen und den Aufbau von Kapazitäten. Mögliche Finanzierungsquellen sind bilaterale oder internationale fonds sowie die Finanzierung durch Internationale Nichtregierungsorganisationen. Die multilateralen Entwicklungshilfemittel für Umwelt- und Ressourcenschutz in Ghana werden in Form von sektoraler Budgethilfe geleistet. Daher hängt die Möglichkeit zur Vorfinanzierung von PES-Instrumenten in Ghana stark von den Prioritäten und Finanzierungsvereinbarungen der Ghanaischen Regierung und ihren Gebern ab. In der bilateralen Entwicklungszusammenarbeit könnten Mittel aus den Querschnittsbereichen Klimawandel und Biodiversität für die Vorfinanzierung von PES Mechanismen mobilisiert werden. Für eine Finanzierung von PES aus globalen Mitteln in Ghana kommen Fonds der Weltbank, der „Global Environmental Facility“ und von nichtstaatlichen internationalen Naturschutzorganisationen in Frage.

Bezüglich der Vermarktungsmöglichkeiten von Umweltleistungen kommt unsere Studie zu dem Ergebnis, dass Wasser-bezogene Umweltleistungen ein hohes Interesse bei den Akteuren auf nationaler Ebene genießen (Regierungsinstitutionen als potentielle Käufer), während Käufer für den Erhalt von Artenvielfalt auf der globalen Ebene zu finden sind (Zahlungen durch multilaterale Fonds und

internationale Nichtregierungsorganisationen). Die vielversprechendste Strategie zur Sicherstellung von Biodiversität durch PES in Ghana wäre daher die gemeinsame Vermarktung von Wasser- und Biodiversitäts-bezogenen Umweltdienstleistungen. Durch den Beitrag von Umweltleistungen des Waldes zur Anpassung an den Klimawandel kämen außerdem globale Anpassungsfonds als Käufer in Frage.

Für die Implementierung von PES im Bereich Biodiversität in der Randzone der ACA zeigt diese Studie mehrere Einschränkungen auf. Im Folgenden werden die relevantesten aufgeführt:

1) **Bestehende Ursachen für Entwaldung:** Die kommerzielle Nutzung von natürlichen Ressourcen mit hohen Opportunitätskosten im Falle einer Umstellung der Landnutzung sowie strukturelle Ursachen der Entwaldung (Bevölkerungswachstum, fehlende Umsetzung von Gesetzen), die durch PES nicht verändert werden können.
2) **Ursprüngliche (Primär)Waldflächen sind klein und fragmentiert:** Auf Grund bestehender Anreize für die Umwandlung von Wald in Agrarflächen existieren in der Randzone der ACA nur noch wenige, kleinflächige Primärwaldstücke, welche für Schutzmaßnahmen im Rahmen eines PES - Modells in Frage kämen.
3) **Landbesitz:** Die traditionellen Autoritäten haben die Macht über Land- und Ressourcennutzung auf sogenanntem “stool land” und müssen daher an jedem Entscheidungsprozess über Landnutzungsveränderungen beteiligt werden. Bauern haben dadurch keine echten Landnutzungsoptionen und riskieren den Verlust ihres Landes im Falle einer Nicht-Bewirtschaftung. Entsprechend haben wir in unserer Studie ein geringes Vertrauen zwischen den befragten Bauern als Landnutzern und den traditionellen Autoritäten als Landbesitzern identifiziert.
4) **Verteilung von Gewinnen aus natürlichen Ressourcen:** Im bestehenden System zur Verteilung von Gewinnverteilung aus natürlichen Ressourcen wird der Zahlungsfluss an die lokale Bevölkerung nicht gewährleistet, beispielsweise im Fall von Holzerträgen. Aus diesem Grund ist für die meisten Landnutzer der Schutz und die Wiederherstellung (und nachhaltige Bewirtschaftung) von Wäldern keine attraktive Handlungsoption.
5) **Ungenügender Gesetzesvollzug und fehlende Kontrolle von Handel mit Wildfleisch und illegaler Entnahme von Nichtholz-Waldprodukten:** Diese Tatsache schmälert den Mehrwert Landnutzungsänderungen durch PES (Additionality) zum Schutz der Biodiversität in der ACA.

Auf Grundlage der erhobenen Daten identifiziert diese Studie die Bauern als die geeignetsten Bereitsteller von Umweltleistungen in einem zukünftigen PES-Modell in der Randzone der ACA. Sie können durch die Umstellung ihrer Landnutzungspraktiken die Bereitstellung von Umweltleistungen am besten gewährleisten und sind gleichzeitig mit relativ moderaten Opportunitätskosten konfrontiert. Die möglichen Landnutzungsoptionen zur Sicherung der Umweltleistungen in der Randzone der ACA sind (Wieder)Aufforstung und nachhaltige Landnutzung wie Agroforstsysteme (Waldfeldbau). Im Falle von (Wieder)Aufforstung würden Bauern eher ihre nicht kultivierten Flächen zur Verfügung stellen und gleichzeitig die Bewirtschaftung kultivierter Flächen intensivieren. Die größte Einschränkung für die Einführung von Agroforst-Systemen besteht in den mangelnden Kenntnissen der Bauern und der unzureichenden Kapazität landwirtschaftlicher Beratungsstellen.

Auf Grund des institutionellen Rahmens auf lokaler Ebene kann PES nur dann funktionieren, wenn traditionelle Autoritäten bereit sind, an einem solchen Mechanismus teilzunehmen. Damit würden die Landbesitzer und Landnutzer als Bereitsteller von Umweltdienstleistungen fungieren, was die Transaktionskosten eines möglichen PES-Modells erhöhen würde. PES als Anreiz für Landnutzungsänderungen auf privatem Land oder sogenanntem „Familienland“ ist vielverprechender, da hier die Landnutzer selbst über ihre Landnutzungspraktiken entscheiden. Grundvoraussetzung ist die Vergabe von zu Landtiteln und ein vereinfachtes Verfahren zur Regisiteriung von gepflanzten Bäumen. Für ein funktionierendes PES-Modell wäre zudem die Reform der bestehenden Praxis zur Gewinnverteilung erforderlich, um sicherzustellen, dass die Einnahmen aus nachhaltiger Waldbewirtschaftung die Gemeinden auf lokaler Ebene erreichen. Auf lokaler Ebene gibt es eine Reihe von Institutionen (z. B. Nichtregierungsorganisationen und Organisationen der gemeindlichen Nutzung Natürlicher Ressourcen), die in einem PES System Zahlungsflüsse regeln, Vereinbarungen überwachen und Vertragsverhandlungen gestalten könnten.

Unsere ökologische Feldstudie zeigt, dass ein geringer Zusammenhang zwischen dem Landnutzungsdruck außerhalb der ACA und der ökologischen Unversehrtheit des Schutzgebietes besteht. Der ökologische Status der ACA scheint vielmehr allein durch folgende Faktoren bestimmt zu sein: durch frühere forstwirtschaftliche Aktivitäten bzw. Abholzungen im Reservat, durch den (mangelnden) Vollzug der Schutzbestimmungen sowie durch die Bereitschaft der umliegenden Bevölkerung,

den Schutzstatus der ACA anzuerkennen. Ein Biodiversitäts-bezogenes PES-Modell ist am wirkungsvollsten im Fall von Waldgebieten mit hoher Artenvielfalt, die in ihrem Fortbestand gefähret sind, beispielsweise Pufferzonen mit niedrigem Schutzstatus. Um die ACA ist allerdings keine Pufferzone ausgewiesen. Die Gewinnung von potentiellen Käufern von Biodiversitätsbezogenen Umweltleistungen in einem PES-Modell in der Randzone der ACA wird sich daher als schwierig erweisen. Die vorliegende Studie empfiehlt daher, dass ein mit Biodiversität und Anpassung verbundenes PES-Modell in anderen Gebieten Anwendung finden sollte. Geeignete Gebiete könnten zum Beispiel sogenannte „Globally Significant Biodiversity Areas“ sein. Die Entwicklung eines Instruments zur Untersuchung der ökologischen Unversehrtheit der ACA im Rahmen dieser Studie hat zudem gezeigt, dass die Kosten für die Überprüfung der Bereitstellung der Umweltdienstleistungen relativ gering sind. Diese sind daher keine Beschränkung für ein zukünftiges PES-Modell in Ghana.

Acronyms and abbreviations

ACA	Ankasa Conservation Area
CATIE	Tropical Agriculture Centre for Research and Higher Education
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CCU	Climate Change Unit of the Forestry Commission
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 of the Ministry of Food and Agriculture
Dbh	Diameter at breast height
EAP	Environmental Action Plan
EI	Ecological Intactness
EPA	Environmental Protection Agency
ES	Environmental/ Ecosystem Service
EU	European Union
FC	Forestry Commission
FGD	Focus Group Discussion
FORIG	Forestry Research Institute of Ghana
FR	Forest Reserve
FSD	Forest Services Division of the Forestry Commission
FWP	Forest and Wildlife Policy
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHC	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
IRR	Internal Rate of Return
IUCN	International Union for Conservation of Nature
KNUST	Kwame Nkrumah University of Science and Technology
LAP	Land Administration Project
MLFM	Ministry of Lands Forestry and Mines
MoFA	Ministry of Food and Agriculture
MoFEP	Ministry of Finance and Economic Planning
MWRWH	Ministry of Water Resources, Works and Housing
NE	Negative Ecological Impact
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 Services
PNDC	Provisional National Defence Council
REDD	Reduced Emission through avoided Deforestation and Degradation
SA	Stakeholder Analysis
SDAP	Sustainable Development Action Plan
SLE	Centre for Advanced Training on Rural Development
TIDD	Timber Industries Development Division of the Forestry Commission
TroFCCA	Tropical Forests and Climate Change Adaptation Project
UNCBD	United Nations Convention on Biological Diversity
UNFCCC	United Nations Framework Convention on Climate Change

VPA	Voluntary Partnership Agreement
VRA	Volta River Authority
WAPCA	West African Primate Conservation Action
WB	World Bank
WD	Wildlife Division of the Forestry Commission
Yr	Yard

Table of contents

List of boxes

List of figures

List of tables

1 Introduction

Global change is among the most demanding problems mankind faces today (IPCC 2007). Climate change, biodiversity loss, and destruction of natural ecosystems have already started to cause casualties, in particular in developing countries with high poverty rates (e.g. MC MICHAEL et al. 2004). All of the processes involved are amplifying each other: destruction of natural ecosystem accelerates climate change impacts (CRAMER et al.: 2004), climate change destabilizes ecosystems and reduces their biodiversity (KREFT and JETZ 2008; NIELSEN et al. 2007), ecosystem malfunctioning is causing poverty (SANCHEZ 2000), poverty further enhances ecosystem destruction (BROOK et al. 2008), and therefore in the end climate change, and so on. To break this vicious circle several approaches have been developed and discussed (overview in: MARKANDYA et al. 2008; SUKHDEV et al. 2008).

Implications of the experiences with 'classical' sustainable resource management were to change incentives towards economically based kinds, such designing green investment schemes generating 'real' profits (BOYD and BANZHAF 2007). One of the most recent offsprings in the fields of environmental and ecological economics is 'Payments for Environmental Services' (PES), a financing tool taking intrinsic ecosystem values to new perspectives by breaking them down to tradable ecosystem services (e.g. ENGEL et al.: 2008). Such environmental services can be clean water, improved air quality or landscape beauty, etcetera (WALLACE 2007; WUNDER 2007). Who uses these services is supposed to pay a fair amount. Who helps to maintain and supply these services continuously, e.g. by ecosystem management is supposed to receive the payment (for detailed definition of PES schemes see Box 1).

The severity of climate induced impacts depends on the exposure to climate change and the adaptive capacity of affected ecosystems (ROUGET et al. 2006). This exposure to climate change is high in tropical forest ecosystems resulting in an enhanced vulnerability of the local population whose livelihoods primarily depend on the provision of various ecosystem goods and services. In this connection PES schemes could be an appropriate strategy to finance adaptation measures to climate change, thus improving the adaptive capacity of the rural poor forest dwellers. The adaptive capacity of affected forest ecosystems towards adverse climatic events is often set to zero, since even ecosystems of global importance like e.g. tropical forests are still destroyed over large areas at alarming rates (BROOKS et al. 2002).

Responses to climate change are classified as mitigation and adaptation measures (TroFCCA 2006). Mitigation and adaptation are complementary especially in the forest sector. Even though emphasis in the international debate is put on mitigation,

without adaptation there will be less forests available for mitigation. Technical as well as socio-political adaptation is necessary to ensure that forest ecosystems are able to provide goods and services also under a changing climate. Beside the goods and services provided for local livelihoods one of the benefits of adaptation in tropical forests for the global community can be related to maintained option values. In this context it should be mentioned that one of the ecosystem services provided, especially in tropical forests is biodiversiy. Among the numerous adaptation measures this study concentrates on afforestation, reforestation and conservation as defined core adaptation measures in tropical forests financed by PES schemes (LOCATELLI et al. 2008). In the tropics, biodiversity peaks and thus provides manifold option values. Many of the world's biodiversity hotspots are found in the tropics (MYERS et al. 2000).

In tropical West Africa one of these hotspots is about to vanish, the Upper Guinean Rainforest (BENHIN and BARBIER 2004). A comparably high deforestation rate in combination with special climatic constraints makes this forest especially vulnerable. The whole ecological niche of West African tropical forest depends on a sub-Saharan rain belt of fragile nature strongly affected by climate change (CAMBERLIN et al. 2001). However, climate predictions for West Africa show a temperature increase between 2.0 and 6.0°C by 2100 and at least in the northern belt a decrease of annual precipitation by 6 to 20% by 2025 (IPCC 2007). Although a direct relation between forest cover and precipitation is often questioned, there is remarkable similitude between locations of African deforestation and those with projected growing periods drastically shortened (up to 113 days for West Africa) by drought (modelled 2000-2050; JONES and THORNTON, 2002: 89).

One of the international projects dealing with this high vulnerability of people and forests in the western African Ecoregion is the EU-financed project 'TROFFCA'- Tropical Forests and Climate Change Adaptation. TroFCCA is carried out by the international research centres 'CIFOR' – Centre for International Forestry Research, and by 'CATIE' – Tropical Agriculture Centre for Research and Higher Education. It extends over seven countries in Asia, Central America and West Africa (Burkina Faso, Mali and Ghana).

The objective of TroFCCA is to contribute to national policy dialogues regarding adaptation to climate change, in particular efforts to streamline adaptation into development through the assessment of vulnerability (TroFCCA 2006). Most vulnerable to climate change impacts are poor people in tropical countries, as they are engaged in climate sensitive sectors such as (rain fed) agriculture, fishery or pastoral practices (SARFO-MENSAH and ODURO 2007). They directly depend on environmental, often forest-based products like woodfuels, building materials, fruits,

herbs or other non-timber forest products (NTFPs) (NKEM et al. 2007). A World Bank study emphasises the direct link between forests and poverty, “as over 1.6 billion people living in extreme poverty depend on forests for some part of their livelihoods” (WORLD BANK 2004; WRI 2005).

TroFCCA tries to equilibrate between mitigation and adaptation in forestry matters. “As a high percentage of the world’s poorest directly depend on the forest for subsistence, forests deserve to be a major factor and entry point for adaptation” (NKEM et al. 2007). This makes the assessment of appropriate instruments to finance climate change adaptation to a subject of major concern to TroFCCA. One of these potential financing tools could be PES (LOCATELLI et. al. 2008). Until today, no PES scheme has been materialised in West Africa. Therefore we examined the marketable opportunities of PES in Ghana by a multilevel approach combining a general assessment of stakeholders on national level and a local case study.

Our objectives were i) to identify environmental services (ES), their pricing and monitoring, providers and buyers of ES’, and institutional arrangements and framework, ii) to assess the potential of PES as an instrument to finance adaptation measures in Ghana, iii) to identify national and global actors that have the capacity and show the willingness to support PES schemes to finance adaptation measures in Ghana, and iv) to communicate the results to relevant stakeholders and potential resource persons.

The most important collaborating Ghanaian research partners were the Forest Research Institute of Ghana (FORIG) and the Kwame Nkrumah University of Science and Technology in Kumasi. In a very close cooperation technical knowledge and information was exchanged continuously. It was FORIG that suggested to select biodiversity as environmental service and to conduct our case study in the surroundings of the Ankasa Conservation Area (ACA). This is one of the last remaining biodiversity hotspots in Ghana and seemed ideal for setting up a PES scheme since plenty of ongoing projects and programmes could provide useful baseline data on biodiversity related issues. Finally we presented our final results to an interested audience at the premises of FORIG.

Box 1: Concept of Payments for Environmental Services (PES)

In this study PES is defined according to WUNDER (2005) as:

1. A *voluntary* transaction where
2. a *well-defined* environmental service (or land-use likely to secure that service)
3. is being "bought" by a (minimum one) *service buyer*
4. from a (minimum one) *service provider*
5. if and only if the service provider secures service provision (*conditionality*).

A genuine PES scheme needs to fulfil all five criteria. Those compensation schemes that satisfy several but not all of these criteria are referred to as "PES-like schemes" (WUNDER 2007: 50).

Environmental or ecosystem services (ES) are "the benefits people obtain from ecosystems. These include provisioning services such as food and water, regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits" (CAPISTRANO 2005: 3). Current PES scheme transactions are dominated by four ES types: (1) payments for carbon sequestration and storage, (2) biodiversity protection or restoration, (3) watershed protection, and (4) landscape beauty (WUNDER 2005: 2).

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: 664 f). Landowners and land users are those who have a direct impact on the ecosystem through their land use practices and therefore affect the provision of ES (e.g. farmers or tree fellers). Environmental service users on the other hand are external beneficiaries of ES, such as a downstream population that benefits from the provision of water services of an upper stream forest. Frequently, service providers receive higher benefits from land uses that have a negative impact on the environment (e.g. the conversion of forests to cropland) than they would receive from conservation-friendly land uses (Figure A). The reduction or loss of the ES, however, will impose costs on external beneficiaries of the service. Thus, ENGEL et al. (2008: 665) note 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.

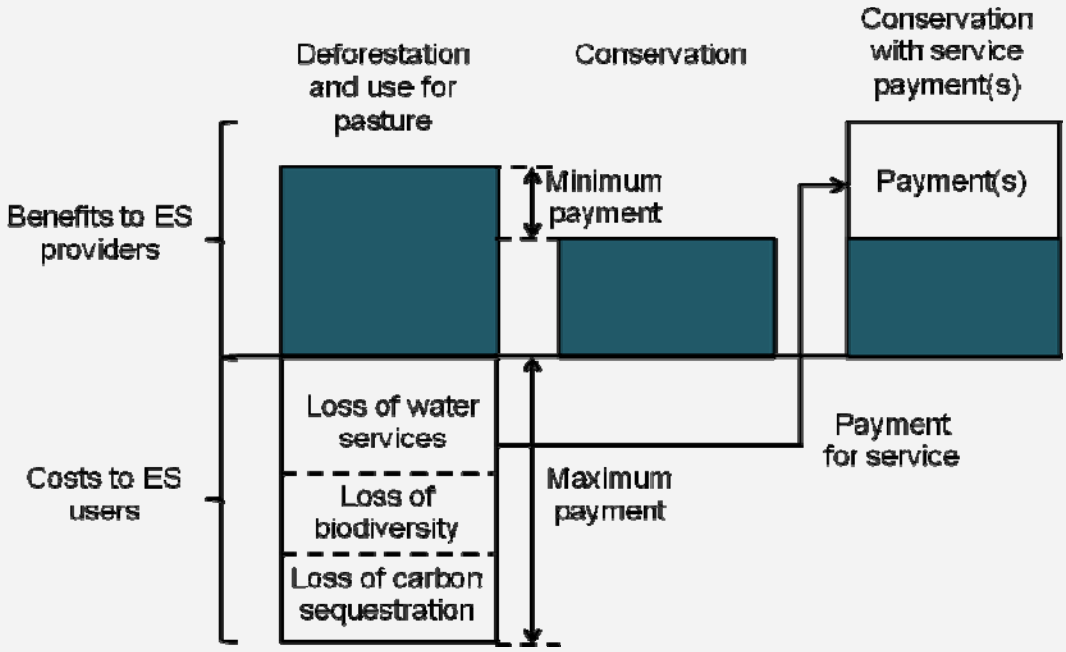

Figure A: The logic of payments for environmental services. (Source: ENGEL et al. 2008: 665).

PES schemes can either be 'user-financed', in which the buyers are the actual beneficiaries of the ES, or they can 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 (ENGEL et al. 2008: 666).

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: 51). WUNDER refers to additionality as "the difference in service provision between the with-PES scenario and the without PES-baseline".

Therefore it is necessary "to construct some counterfactual service baseline" (Figure B), showing what would hypothetically happen over time without the PES scheme (WUNDER 2005: 8). Choosing the right baseline is essential for the effective evaluation of the environmental impacts of a PES and thus ensuring the willingness to pay for the ES (conditionality)

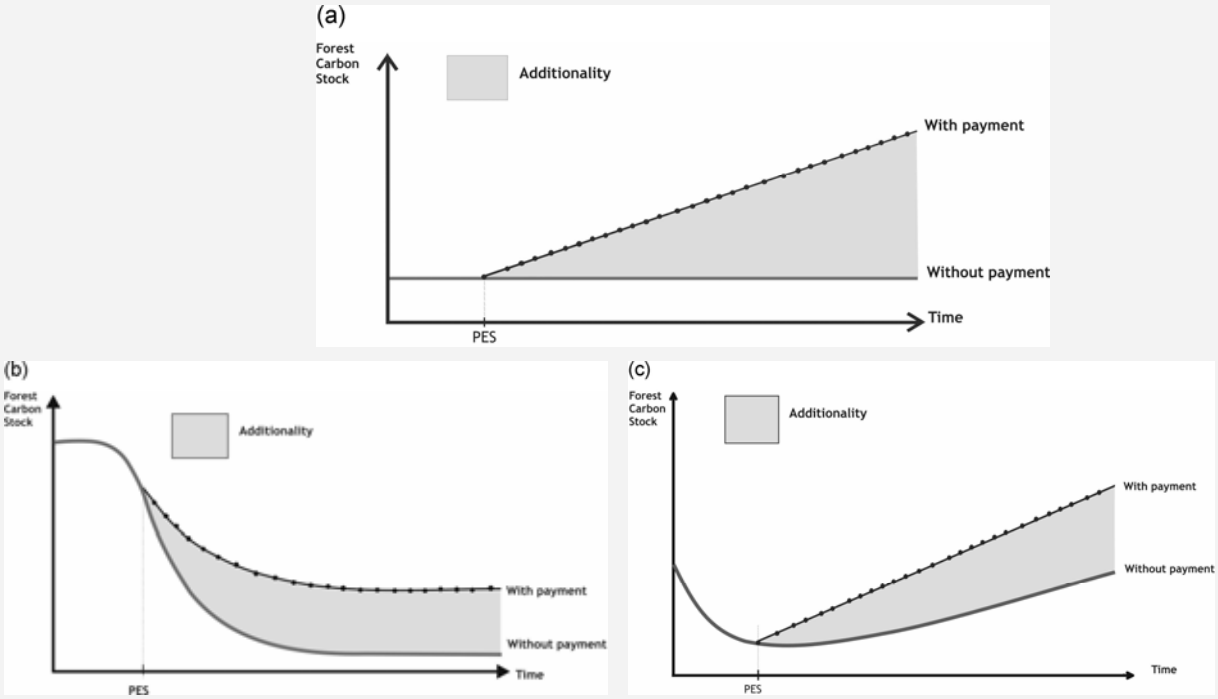

Figure B: Three different PES scenarios: (a) static, (b) deteriorating, and (c) improving service-delivery baseline. (Source: WUNDER 2007: 9).

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 (e.g. avoid the logging of the reforested area after the end of PES; WUNDER 2005: 9).

According to (WUNDER 2007: 52), "PES efficacy also depends on transaction costs, that is, the costs to start up (search, negotiation, contracting) and run a PES scheme (administration, monitoring, enforcement)". Transaction costs are to be shared among buyers, intermediaries and sellers. One key challenge in establishing a PES scheme is to keep transaction costs low in order to optimize the use of resources collected from buyers. The administrative costs for users have to be low to ensure their involvement by receiving sufficient benefits from the system.

In conclusion, PES is only relevant where there is an existing (or potential) conflict of interest between environmental service users and providers. These conflicts mainly occur in areas with increasing pressures on natural resources. However, where land use practices that threaten the ES provision, are legal or where the state fails to enforce the law, PES can help to achieve environmental objectives (WUNDER 2007: 49).

2 Materials and methods

2.1 Study site

National level

The Republic of Ghana is considered as one of the most politically stable and economically prosperous countries in West Africa. In the democratic constitution of 1992, Ghana is defined as a presidential democracy with the president as the Head of the State and Head of the Government of Ghana (GoG). On sub national government level there are 10 regions subdivided into 138 districts. District Assemblies (DAs) have been introduced in 1988 and legalized by the 1992 constitution and the Local Government Act of 1993. The Regions have their own government, administration and judiciary and are headed by the regional minister who is directly appointed by the GoG. In 2006 Ghana has received over 100 million USD. Official Development Assistance (ODA) (WORLD BANK n.d.). Ghana's economy has grown substantially over the last years reaching an official growth rate of 6.3% in 2007 (GoG 2005). The forecasts for the coming years predict a stable annual growth rate between 6 and 7% (THE ECONOMIST 2008: 7). Sectors that heavily depend on exploitation of natural resources like agriculture - including forestry and cocoa –, hydroelectric power, water and tourism contribute to over 50% of Ghana's GDP (WORLD BANK 2007: 16). Agriculture accounts for over 40% of Ghana's export earnings with cocoa being the major export product.

The natural resources in Ghana "are disappearing at an alarming rate" with already more than 50% of the original native forests being converted to agricultural lands (WORLD BANK 2007: 17). The annual deforestation rate is about 2% and the loss of forest cover in between 1990 and 2005 amounts to 1.9 million hectares (MDBS n.d.: 10). The currently existing productive forests cover amounts to 1.8 million hectares as against more than 10 million hectares 50 years ago. Estimates made by the World Bank underline the severity of the depletion of natural resources for the whole nation. The cost of devastation of natural resources and environmental degradation is in the order of approximately 10% of the GDP (WORLD BANK 2007: 21).

In Ghana, land areas are divided into on-reserve areas and off-reserve areas. Off-reserve areas are lands where agriculture has priority over forestry and remnants of forest patches are converted into agricultural lands and pastures. On-reserve areas are earmarked for forest management and are not allowed to be transformed into other

land use practices. Here further classifications into productive forest reserves, resource reserves, protected areas and others specify the land use practices allowed for each category. Totally, Ghana has 10.500 km² of protected areas. These are areas of outstanding natural value, not altered essentially by man (WORLD BANK 2007: 24).

Case study

As site for our case study on biodiversity-related PES we chose the fringe area 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. It covers an area of 509 km². The conservation area is managed by the Wildlife Division (WD), the national entity in charge of conservation area management and wildlife regulation in Ghana. Use of natural resources like timber extraction or hunting is completely prohibited in the ACA.

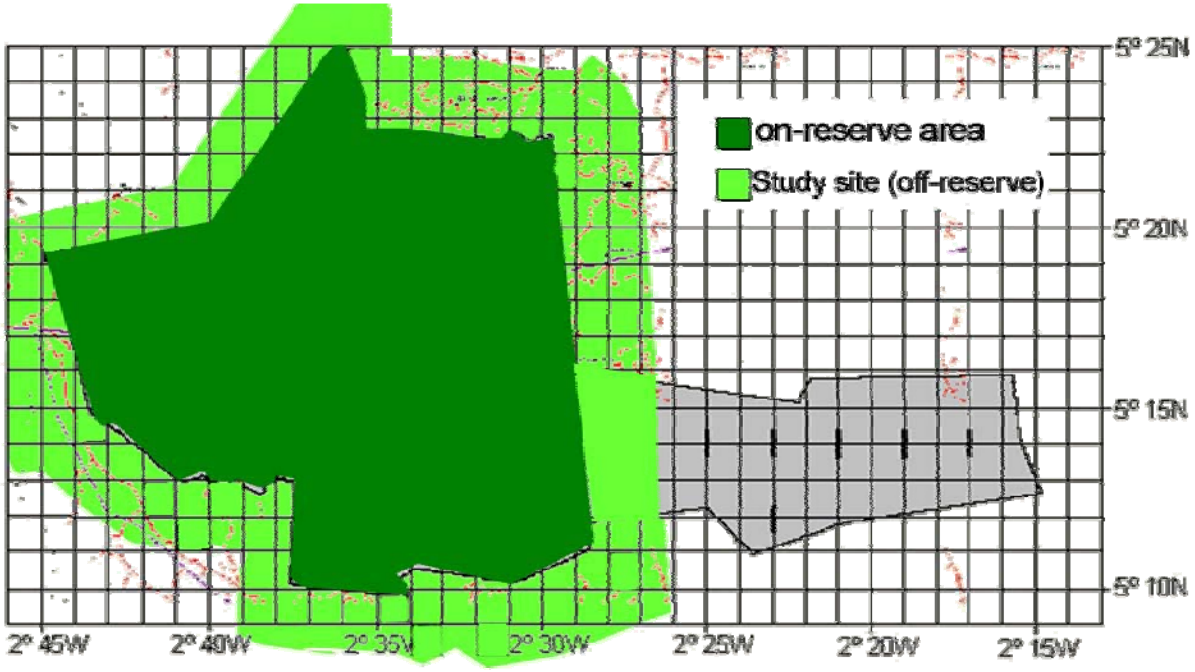

Figure 1: Location of the study site (part of the Ghanaian off-reserve area) shown in contrast to the on-reserve area of the Ankasa Conservation Area (ACA). (Source: Basic map including GIS-layers and grid was taken from DANQUAH (2007).

On-reserve area

The ACA protects what is considered to be the most significant remnant of Upper Guinean Forest in Ghana. The Upper Guinean Forest reaches from Senegal to Togo and harbours around 12,000 vascular plants of which 6400 are endemic (BEENTJE et al. 1994). Therefore, it is considered to be a biodiversity hotspot that should receive special attention in terms of conservation (MYERS et al. 2000, Figure 2).

Figure 2: Global biodiversity hotspots (red). (Source: MYERS et al. 2000).

Biodiversity surveys suggest that the Ankasa reserve is the most biodiverse among the remaining Ghanaian Rainforests, a fact which is related to the hilly nature of the terrain, offering a broad variety of ecological niches, mostly on relatively poor soils (PADP 1999 a). This three storey wet- evergreen rainforest receives up to 2500mm precipitation a year, illustrating its importance for watershed protection (HALL and SWAINE 1981). The ACA harbours a comparably low number of larger commercial forest species. Thus, logging rates remained relatively low until 1976 when it was completely banned at the foundation of the Nini-Suhien National Park (HAWTHORNE and MUSAH 1993). The NP nowadays is strictly limited to its protected and therefore respected core zone. Around ACA a relatively high number of neighbouring forest reserves (FR) are situated (Figure 3; Mamiri FR, Fure River FR, Boi Tano FR, Krokosua FR, most of them having a Global significant Biodiversity Area as a core zone, and Bia CA).

Off-reserve area

The Ankasa Conservation Area has no off-reserve buffer zone in the strict sense. The Park Management is only in charge of the on-reserve area. However, environmental education and awareness campaigns towards the fringe communities conducted by the Park Management 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 (PADP 2000 a).

Figure 3: Location of the study site in western Ghana close to the border of Cote d'Ivoire. Dark areas at satellite image indicate remaining forest patches (including forest plantations). (Source: google earth).

The ACA is located within five districts, out of which two have been set up recently and have not been completely demarcated. 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. 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.

During the last decades people from other regions of the country, especially from the drier and poorer northern regions and the Central Region moved to the Western Region in order to lease land. Therefore, the population around Ankasa can be subdivided into natives and settlers. So called "Settler farmers" form the majority with over 70% of the total population. A demographic survey of the population living around ACA in the year 1998 indicated 25.000 people in 2.200 settlements living in the 7 km surroundings of ACA with an annual growth rate of 5.5% (PADP 1999 c). This high population growth has lead to an increased land pressure that has devastated the adjacent rainforest (Figure 4).

The predominant land use around ACA is agriculture. Over 90% of the people in the fringe communities make their living with farming. The communities around ACA suffer from poor infrastructure with bad roads, limited access to schools, health services, markets and agricultural extension services. According to a PADP survey, 35% of the fringe communities' population never attended school (PADP 1999 c)

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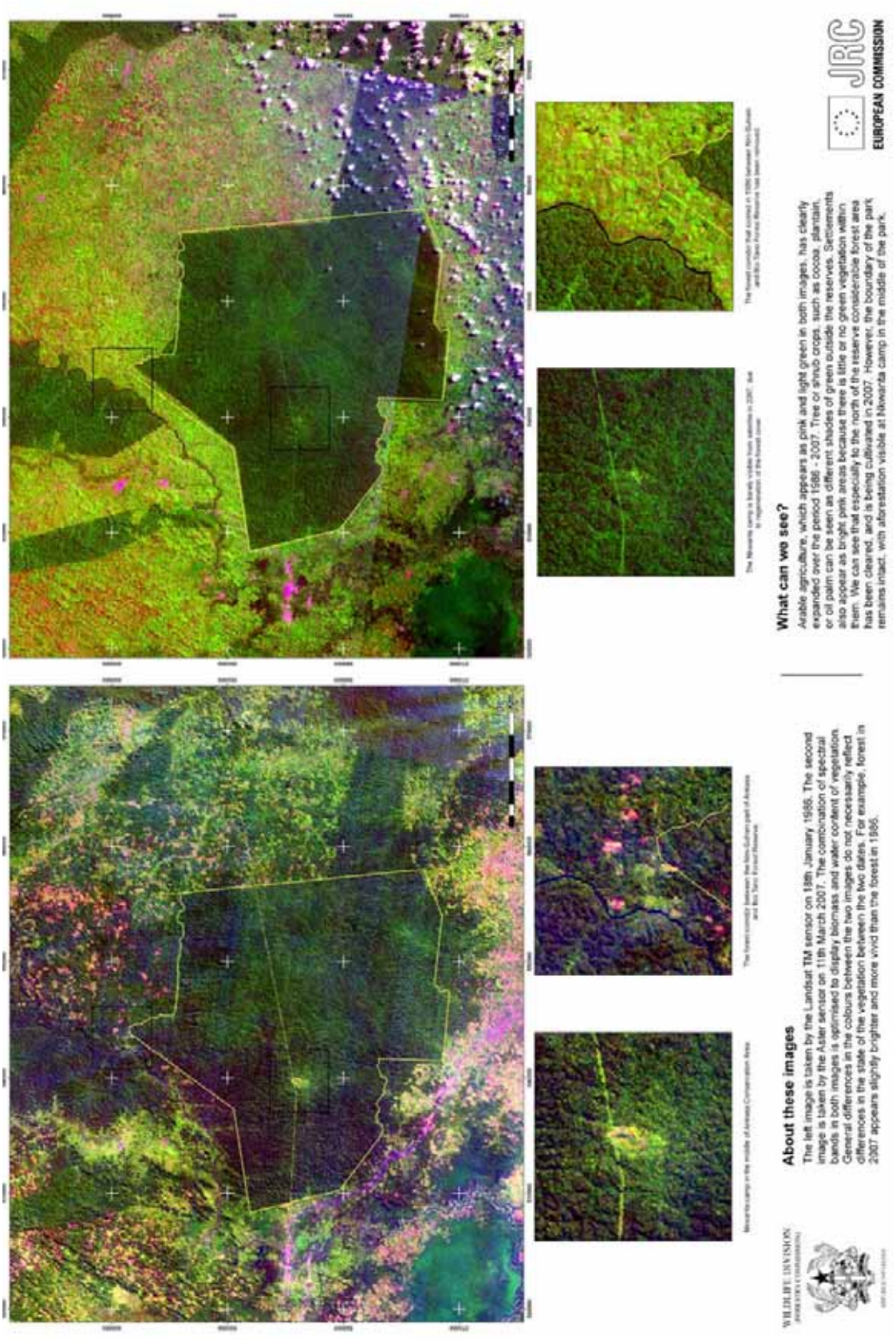

Figure 4: Deforestation around the Ankasa Conservation Area. Left 1986, right 2007. (Source: WILDLIFE DIVISION 2007).

2.2 Overview of methods

Our scoping study basically follows a qualitative methodological approach. The term “Scoping” implies a preliminary assessment of facts, opinions and perspectives. In order to analyze the potentials and constraints of a PES scheme data sources comprise relevant literature, ecological assessment, focus group discussions and interviews. To crosscheck the validity of assessed data the study group made use of triangulation by approaching multiple sources and applying a mix of data collection instruments, including quantitative ecological data. Table 1 gives an overview of the data collection instruments, key issues and the output.

Table 1: Overview of data collection instruments, output, and key issues.

Data collection instrument	Output	Key issues
Ecological transect walk	10 transect walks with 29 surveys	• Ecological intactness • Ecological pricing and monitoring of the Upper Guinean rainforest
Focus group discussions	11 focus group discussions with 157 participants	• Stakeholder Analysis: Identification of key stakeholders • Livelihoods and forest • Potential provider and buyer • Institutional setting • Institutional arrangements
Semi structured interviews	59 interview partner	

2.3 Sampling

For our ecological field study and the focus group discussions (FGD) we randomly chose 13 sample sites out of a basic population of a priori defined geographical locations in order to avoid channelled or forced sampling.

The geographical locations forming the basic population were defined as the area described by the intersections of two adjacent whole arc minutes (both longitude and latitude) in between 5°25’N to 5°10’N and 2°45’W to 2°15’W, if their distance to the boundary of the Ankasa Conservation Area was less than two arc minutes (thus falling into zone of less than ~5km enclosing ACA, Figure 5).

We purposely chose another sample spot (‘X’, Figure 5) for harbouring a community in the range of vision to the forest edge despite the overall remoteness of the area. Data obtained at ‘X’ were exclusively used for qualitative analyses for being obtained besides the random sampling scheme.

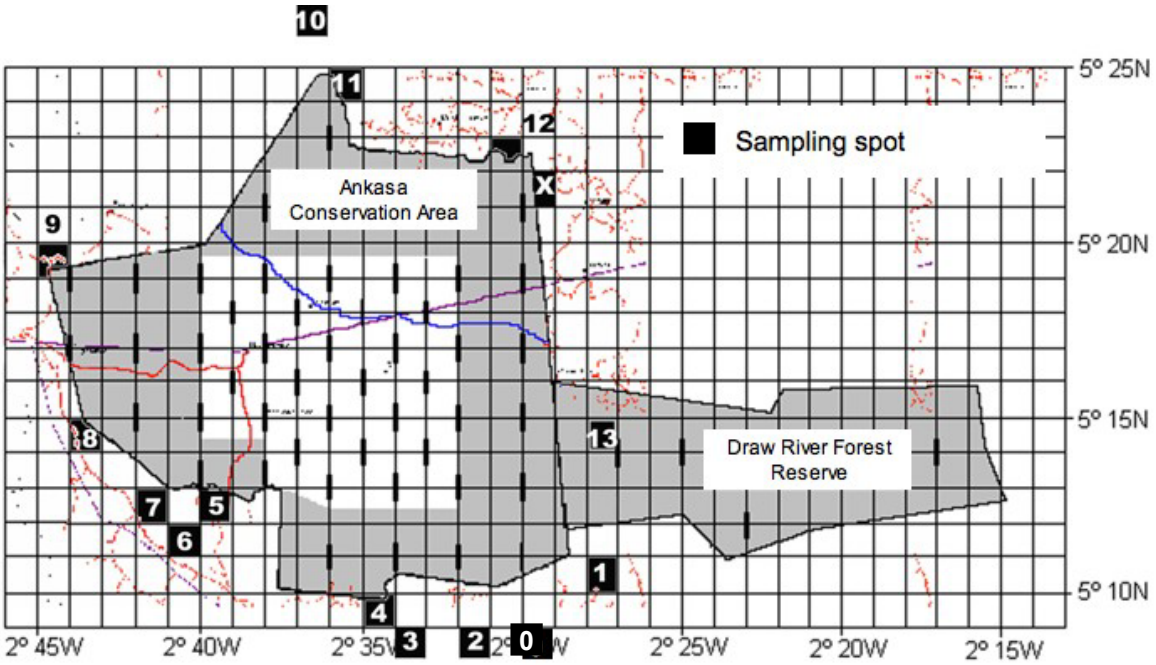

Figure 5: Indication of the 14 randomly chosen sampling spots (numbered black squares) enclosing the Ankasa Conservation Area. The area of the Conservation Area itself (including the Draw River Forest Reserve extending from roughly 2°31' W to the east) is graphically divided into a grey zone with strong human interactions in terms of poaching (= technically the buffer zone) and a low impact zone in white (= technically the core zone). (Source: Basic map including GIS-layers and grid was taken from DANQUAH (2007).

2.4 Ecological field study

Successful pricing and monitoring of biodiversity related management of ecosystem services in the Upper Guinean Forest Zone requires simple, cost efficient, and easy-to-use tools. The development of such simple analysis tools is strongly complicated by the generic complexity of biodiversity-, habitat-, or ecological analyses required for generation of the necessary data.

To overcome this contradiction between complexity of the study subject and simplicity of the product aimed at, we were forced to exclude all particular concerns and reduced all questions on biodiversity, habitat intactness and valuation of the ecosystem-bits arising to a simple one: What do we see that shouldn't be there if the ecosystem were pristine? This includes in reverse: What do we not see that should be there. Thus, the results of this undertaking also serve for triangulation purposes of the field interviews concerning land use pressure as they might answer the overall question: Is setting up a PES scheme in a particular region really worth the effort?

Since the tool would ideally aim at users with no further specialisation than a short introductory course, options for the subjects of investigation were limited. Therefore

we tested a set of easy-to-estimate variables and properties for their suitability to depict our specialists' rating of the ecological intactness of the same area closely enough to be considered valid and to serve for pricing and monitoring purposes. The variables all refer to indigenous forests (not forest plantations, nor agricultural or pastoral lands etc.), since the natural vegetation in the Upper Guinean Forest Zone is tropical rainforest. After a short time (< 5yr) left for regeneration even fallows can be addressed as (degraded secondary) forests.

The variables and properties estimated in the field at each plot of 100m^2 were:

I. number of canopy storeys
II. heights of canopy
III. density of canopy cover [% cover]
IV. number of large timber trees >0.3m dbh (diameter at breast heights)
V. dbh largest timber tree
VI. dbh largest pioneer tree
VII. number of pioneer bushes
VIII. number of pioneer trees
IX. number of vines.

The 100 m^2 plots were selected applying the following procedure: Starting at the selected sampling sites (see Figure 5) we used the direct approach (shortest possible) to the boundary of the ACA. This geographical point was marked using a GPS system and acted as the point of reference for two different types of transects: one 300 m distance parallel- and another of 500 m distance rectangular to the conservation area boundary, latter crossing the agriculturally used fringes of the conservation area. On the transect parallel to the boundary of the conservation area, the forest was entered each 100 m to the extent that the microclimatic and radiation-related effect of the forest edge was absent (between 10 and 20 m of the forest edge penetrating rectangular into the conservation area). At this location a 10*10 m plot was established (resulting in four 100 m² forest plots for each sampling site).

On the transect crossing the agriculturally used fringes of the conservation area every secondary forest patch qualified for setting up a 100 m² plot similar to those at the forest edge. Areas used for agricultural purposes were geo-referenced in transect direction and type and intensity of land use was assessed.

The obtained ecological intactness data were furthermore tested for correlation or qualitative resemblance in other data- patterns with the socio-economic data obtained at the sample sites' community interviews.

2.5 Focus group discussions

Focus group discussions form one part of the qualitative research methods used in this study. Apart from the collection of data, this method ensures the discussion, opinion and knowledge sharing among participants.

The focus group discussions aimed at collecting data on the livelihoods of the rural population in the fringe area of ACA and their dependency on the forest as well as their willingness and potential to participate in future potential PES schemes.

The selection of communities for the focus group discussions was based on the defined samples described before (chapter 2.3). Field visits were undertaken to firstly identify the location of settlements within the fourteen selected sampling spots via Global Positioning System (GPS) and secondly to organise the group discussions. In seven cases, settlements could be found directly in place of the sampling spots (sampling spots 0, 1, 5, 8, 9, 10, 11, and 12; Figure 6). In two cases sampling spots were located very closely to each other and therefore focus group discussions were held together (sampling spots 2, 3, and 4; as well as 6 and 7). At spot number 13 no focus group discussion was undertaken. As a result of the field visit, an additional focus group discussion was held due to the proximity of the settlement to the forest edge of Ankasa Conservation Area (sampling spot X).

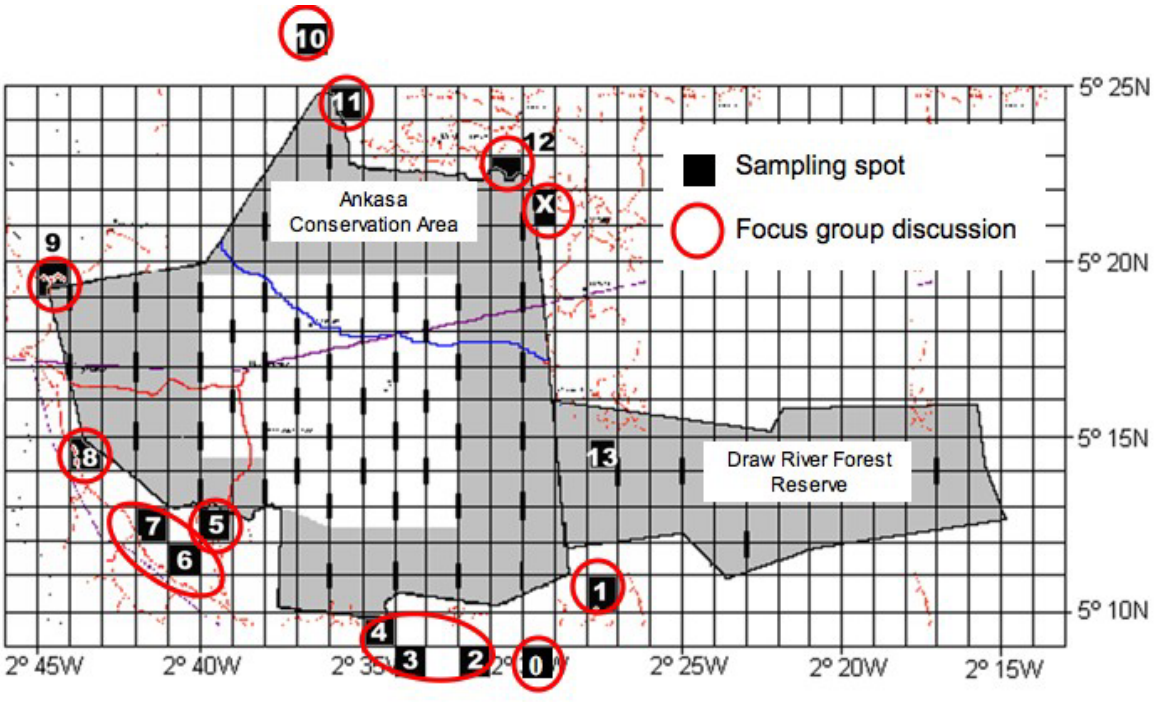

Figure 6: Location of focus group discussion and adjacent ecological transects. (Source: Basic map including GIS-layers and grid was taken from DANQUAH (2007).

The target group of the focus group discussions consisted of land users, mostly farmers, located in the fringe communities of Ankasa Conservation Area. The first person approached was always the representative of the traditional authority, a chief or Odikro (village chief), who had to approve our mission. A contact person was asked to invite up to 15 land users for a focus group discussion.

Eleven focus group discussions were realised among land users in the fringe communities of ACA. The average number of participants was 14, at a range from 3 to 24 participants. Altogether, 157 participants were involved, 118 male and 39 female (Annex VIII)

A guideline with detailed questions was elaborated concerning land size and tenure, agriculture, non-timber forest products, land- and resource use change and forms of agreements (Annex VI).

The Ghanaian counterparts held the group discussions in Twi, one of the local languages. After a short introduction on the objectives of the research study, participants were given the opportunity to answer questions and discuss their answers later on. The results were recorded and thereafter documented in an aggregated way.

2.6 Semi-structured interviews

The qualitative method of semi-structured interviews with key resource persons and relevant stakeholders was applied in this study. We identified the important actors for a potential PES scheme with focus on biodiversity and adaptation to climate change. Interview partners were asked for contacts to further relevant stakeholders. This method ensured the collection of relevant information as well as their opinion. Semi structured interviews consisted of an interview guideline that allowed to be fine-tuned for each respondent. This enabled a flexible use of the guiding questions whenever necessary and appropriate. Key aspects were formulated in open questions, giving the respondent enough room to answer. The interviews were both conducted for the data collection on local and national level. Interview guidelines were elaborated for different groups of respondents (Annex IV and V).

On local level interview partners comprise the Park Management of ACA, project staff working in and around ACA, local opinion leaders and representatives from traditional authorities, farmer associations and representatives of the Community Resource Management Area (CREMA), district administration, and district agricultural extension officers. On national level interviews were conducted with

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. In comparison to the interviews held on the local level, the interviews on national level did not only embrace the prepared guiding questions from the interview guideline but left room for further discussions on relevant issues.

Totally, 59 interviews were conducted with 59 interview partners, out of which 23 were held on local level and 36 on national level (Annex VII). Duration of the interviews was between thirty minutes and two hours. A pre-test of the interview guideline was carried to verify the appropriateness of the method. Interviews were held in Twi, English, or German, and were translated into English if necessary. Notes of each interview were taken and in some cases recordings and transcriptions were made whenever considered appropriate by the interviewers. Source data of the interviews were treated in the study confidentially. Data was analyzed in an aggregated way. Therefore, the notes or transcriptions of the interviews and FGD were arranged according to the key topics which had been created by the study team. The clustered answers and the frequency of mentions formed the basis of our field data analysis.

2.7 Stakeholder Analysis

A core research objective of this study is the identification of key stakeholders that potentially could participate in PES schemes or have an influence on their implementation and functioning. Among the different definitions applied for ‘stakeholder’, we use the term for “any group of people, organised or unorganised, who share a common interest or stake in a particular issue or system” (BILLGREN and HOLMEN 2008).

Stakeholder analysis (SA) was one of the central tools in our research work. It repeatedly turned out to address the issues of natural resource management (NRM) in a suitable way (GRIMBLE and WELLARD 1997). The reason is that NRM settings are “characterised by a complex web of interests and trade-offs between interacting sets of local people, government departments, national and international planners and professional advisers” (GRIMBLE and WELLARD 1997:177).

The goal of the SA within our study was the identification of key stakeholders who are influential in terms of setting up a forestry related PES scheme in the surroundings of ACA. It included the assessment of the stakeholders’ formal and informal decision-making power addressing a possible implementation of PES

schemes. Furthermore, the stakeholders' interest in PES and their willingness to participate was described. This information was backed by an assessment of the stakeholders' resources to contribute to a potential PES scheme. Thus, winners and losers of potential PES schemes were identified.

The SA consisted of five steps adapted from the forest-related "policy power tools" of the Institute for International Environment and Development (MAYERS 2005a, 2005b, MAYERS and VERMEULEN 2005) and the "Participative Actor Analysis"-tool of the German Agency for Technical Cooperation (GTZ n.d.):

Step 1: Identification of key stakeholders for PES in Ghana

Step 2: Investigation of stakeholders` interest in PES, conservation and adaptation

Step 3: Assessment of stakeholders` power and their potential to contribute to PES

Step 4: Assessment of stakeholders` relations and conflicts

Step 5: Identification of actors that could participate in PES schemes and definition of the possible role they could play.

Concerning data collection, each interview and guideline of focus group discussion included relevant questions for the SA. Additional sources were existing stakeholder analyses in the area of forest and natural resource management, both with national coverage (KOTEY et al. 1998, WILDLIFE DIVISION 2008 and WORLD BANK 2007) and for the surroundings of the ACA (WILDLIFE DIVISION 2003).

3 Findings and discussion

3.1 National institutional framework

A key determinant for the potential of PES is the institutional framework in which the scheme will be embedded. In developing countries, the legal and policy framework often is an obstacle for the markets of environmental services because of uncertainty or absence of law enforcement mechanisms or over-regulation of markets (WUNDER et al. 2005: 11f and LANDELL-MILLS/ PORRAS 2002: 62ff). This is of special importance in the case of biodiversity, since markets for biodiversity are dominated by the public sector.

The strong involvement of the state is also true for the forestry and environmental sector in Ghana. Ghana's on-reserve forests and naturally occurring timber trees in off-reserve areas are managed by the Forestry Commission (FC) under the Ministry of Lands, Forestry and Mines (MLFM). The FC is further subdivided into the Forest Services Division (FSD), the Wildlife Division (WD) and the Timber Industries Development Division (TIDD) (see Figure 7). The FSD is in charge of the management of all on-reserve production forests and naturally occurring timber trees off-reserve: The division conducts inventories, issues licences for timber extraction and collects royalties and stumpage fees for felled timber trees. Only trees planted off-reserve in commercial plantations and by farmers are private property after having them registered at the FC. Forestry statistics from the MLFM show that production forests make up 45 percent of the remaining 1,44 million hectares of Ghanaian forests (MLFM 2008a). Protected Areas (PAs) with their wildlife, timber resources and NTFPs are under the responsibility of the Wildlife Division of the FC. PAs compromise national parks, resource reserves, wildlife sanctuaries and strict nature reserves. They account for about 20 percent of Ghana's High Forest Area (ibid.).

As a result of strong influence of public institutions in this sector, nearly all large-scale activities concerning protection of forest and biodiversity are state-led. The FSD is in charge of commercial on-reserve plantation programmes. The WD executes donor-funded programmes like the Protected Areas Development Programme (PADP) in the Western Region. Financial donor assistance for the environmental and natural resources sector is increasingly executed as multi-donor sector budget support for government programmes which are agreed between both sides in the Natural Resources and Environmental Governance sector group (NREG) (MoFEP 2008; see Figure 7).

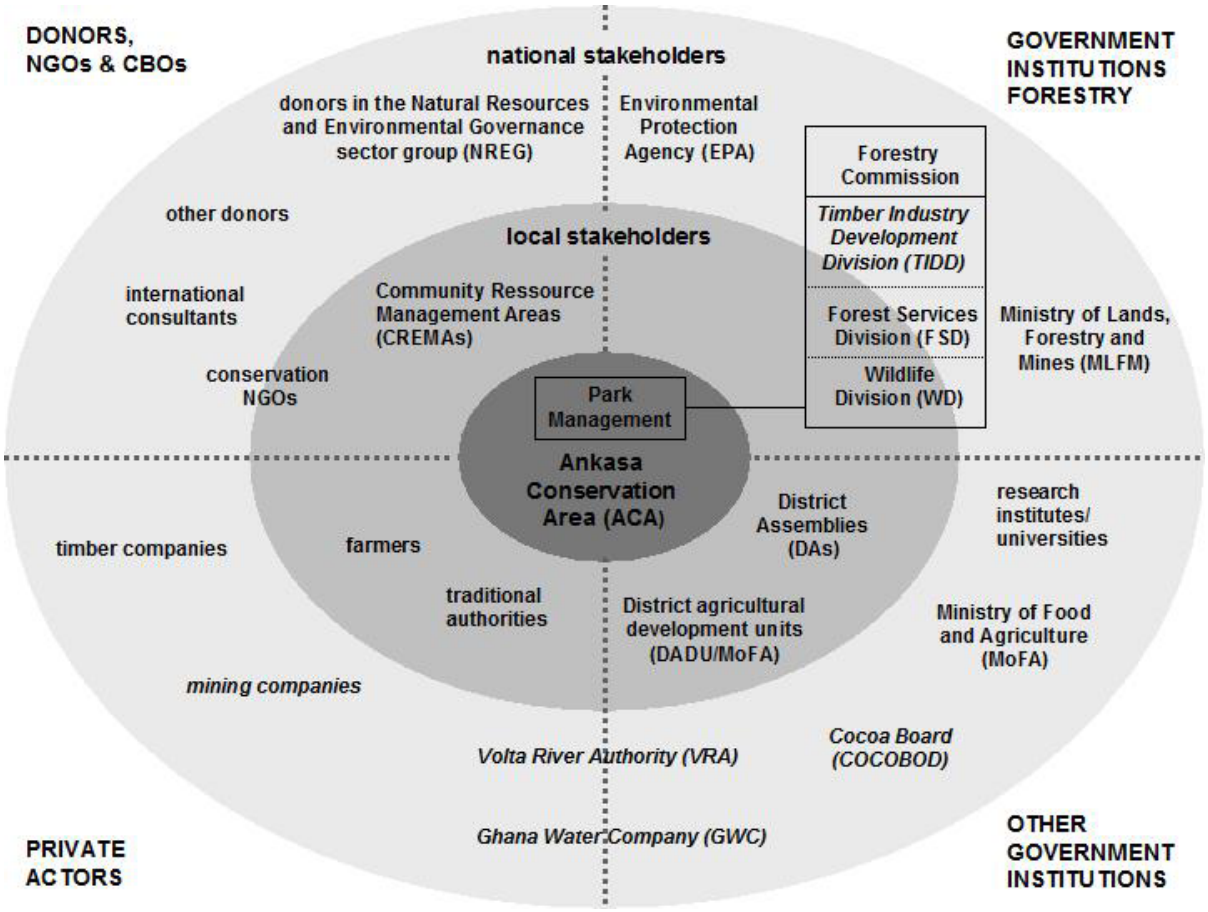

Figure 7: Local and national stakeholders and stakeholder groups relevant for the set up of a PES scheme for forest and biodiversity related adaptation measures. Stakeholders in *italic* have not been approached during our field research, but were indicated as important stakeholders by our respondents.

Since the state dominates the forestry sector, the potential of a forest related PES scheme to finance adaptation measures in Ghana strongly depends on:

(i) Whether key stakeholders are aware of the need for adaptation to climate change and whether adaptation processes are already in place;

(ii) whether PES is already discussed in the political arena;

(iii) whether key stakeholders are committed and capable to protect biodiversity and forests and laws and whether policies are enforced and implemented on the ground;

(iv) whether the existing laws and policies provide or limit incentives for forest and biodiversity protection.

(i) Adaptation processes in Ghana

Respondents from ministerial level to staff level on the ground confirmed that the discussion on climate change issues in Ghana is rather new and focused on mitigation.

Ghana has signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1994. The GoG submitted a National Communication on Climate Change in 2001 (GoG 2001) but a requested Ghanaian National Adaptation Programme for Action (NAPA) has not been developed yet. There are two state agencies that contributed to the development of the national communication. They are the National Focal Point on Climate Change at the Environmental Protection Agency (EPA) and the Climate Change Unit (CCU) within the Forestry Commission. Both are members of the national climate change committee, a voluntary body of interested stakeholders which meets irregularly.

The national focal point at the EPA has the lead in coordination of Ghana's attempts for adaptation to climate change. Unlike other stakeholders, a representative from the EPA listed a variety of activities for adaptation in Ghana. The agency:

- facilitates studies on vulnerability through the impacts of climate change.
- tries to promote adaptation as a cross-cutting issue, especially in the agricultural, fishery and health sector.
- coordinates activities to avoid negative effects from adaptation to other sectors. For instance it assesses whether a shift of cultivation of various crops from the north to the southwest has impacts on livelihoods.
- addresses the improvement of agriculture and water management, for example in the Central Region.

A representative from the EPA talks of a "strong network on adaptation in Ghana". This network concentrates around the focal point and includes EPA staff, development partners that have financed the above listed activities as well as researchers who have contributed to assessments on the people's vulnerability to climate change and climate change induced impacts on agricultural production (e.g. NELSON/AGBEY 2005, BAFFOE-BONNIE et al. 2006, ANIM-KWAPONG/ FRIMPONG 2006, SAGOE 2006 and GYASI et al.: 2006).

But analysing the interviewees' responses, coordination between other relevant stakeholders for adaptation seems to be lacking. Although within the forestry and biodiversity sector stakeholders are working on climate change issues, their work is not directly linked to the efforts of the national focal point at the EPA and its cooperation partners. A representative from the Climate Change Unit (CCU) at the

FC claims that the agency was not invited to the dialogue on adaptation at the recently held UNFCCC summit in Accra. The unit works only on mitigation and presently tries to raise funds from international donors for carbon sequestration projects in Ghana. The most promising programme is the Reduced Emission through avoided Deforestation and Degradation (REDD), an initiative of the World Bank. Ghana is one of the 14 countries selected by the bank for the REDD process. At the moment the FC is collaborating with the Ghana office of the International Union for the Conservation of Nature (IUCN) on a demonstration site. Interviewed stakeholders have participated in workshops that discussed the readiness of developing countries for REDD. Although REDD is about mitigation measures, staff of the CCU is aware of the connection between tropical forest and adaptation to climate change and therefore declares national forest rehabilitation and plantation programmes as adaptation measures.

Apart from those actors explicitly working on climate change, none of the interviewed stakeholders stated to have activities that they would define as adaptation measures to climate change or did participate in discussions on the issue. This is also true for staff from the Wildlife Division or international NGOs who are engaged in biodiversity conservation. Most of the respondents were not aware of the existence of a national communication on climate change worked out by the GoG. Interviewed representatives from state agencies and non-governmental organisations in the forestry and wildlife sector also did not clearly differentiate between mitigation and adaptation to climate change. However, several interviewed stakeholders stressed the importance of forests for securing future livelihoods and option values. After having reflected the connection of conservation of forest and biodiversity and climate change adaptation, some respondents changed their statements and pointed out the contribution of their activities to this issue.

(ii) Experiences with PES in Ghana

Especially within the Wildlife Division, PES is discussed on all levels. The agency has to face that wildlife management is very costly. So far not enough income generating activities have been put in place. PES is considered within the WD as means to reduce the dependency on foreign funding, which is presently the main financial source of wildlife protection in Ghana. On political level at the FC headquarter, PES is considered as an attempt to “convince policy makers that wildlife resources have a big importance for the country and have to be put into value”. During several workshops PES was discussed as an integral component of business plans for protected areas. An external consultant for business plans proposed PES as one

option to raise “money out there that is easy to get”. According to WD staff only few attempts have been made to identify the potential for PES schemes in Ghana.

In 2007 a PES related cabinet proposal by the Ministry of Lands, Forestry and Mines was rejected because a clear concept was missing. The technical director for forestry in the MLFM stated that the cabinet paper was not approved because “the concept was not comprehensive and was lacking baseline data”. Thus, most of the interviewed staff from WD clearly expressed the need for basic information and baseline data for PES. One respondent from donor side demands: “There must be some valuation for the real costs. Until now, there was no real assessment of the price of environmental services. The cabinet, to accept a cabinet paper, would require a more convincing documentation.”

Despite the non-succession in cabinet, PES is still in the discussion within the Natural Resources and Environmental Governance sector working group (NREG). In NREG, donors and the GoG have agreed on “the development of a draft SDAP [sustainable development action plan, the authors] with action plans and budgets, including attention to biodiversity and payment for environmental services (PES)” (NREG 2008). It is not clear whether PES is of concern for both parties within NREG or if it was “pushed through by the development partners”, as one respondent from the non-governmental sector stated.

(iii) Political commitment, enforcement of laws and implementation of policies for forest and biodiversity conservation

The policy framework for biodiversity and forest conservation is the 1994 Forest and Wildlife Policy (MLFM 1994). On national level, nearly all interviewed key stakeholders referred to this policy as the most important one. Even critical NGOs who work in the forestry sector confirm that “the policy as such is a good policy because it is an integrated framework for forest laws.” Apart from timber and wildlife, it makes provisions on NTFPs and community participation in management of forest and wildlife resources.

But the assessment of policy implementation is mixed. The Wildlife Division considers the Forest and Wildlife Policy as an adequate framework for their work, especially for the development of their collaborative wildlife management policy and the installation of Community Resource Management Areas (CREMAs) around conservation areas (WILDLIFE DIVISION 2000 and 2008). An international expert on participatory resource management assesses this policy as “perhaps the best community based wildlife management policy in Africa”. Statements given by NGO representatives differ. One respondent from an NGO working together with the WD

clearly states that the FWP “aims at using innovative technologies to get the maximum benefit from biodiversity conservation”.

But respondents from other NGOs and from donor agencies criticise that the policy is not implemented in large parts and therefore has to be revised. Their critic is towards the fact that only the part on timber resources has been fully implemented into laws with the 1997 Timber Resources Management Act after lobbying of the timber companies. They complain that laws regulating collaborative resource management, extraction of NTFPs or non-commercial use of timber are missing or inadequate. It is uncertain whether this will be changing in the near future. Currently the WD prepares a new wildlife bill which will give community based resource management a legal basis.

Beside the Forest and Wildlife Policy, respondents named the National Biodiversity Strategy as key document dealing with biodiversity conservation in Ghana. Ghana has elaborated this policy as part of its obligation by signing the United Nations Convention on Biological Diversity (UNCBD) in 1992 (MES 2002). The policy is only defined relevant by those respondents who are actively working on biodiversity conservation issues. According to them, the strategy follows the main elements of the CBD and has the goal that in the end all members of the society benefit from it.

Indeed, the policy is comprehensive and implementation reports issued by the Ghanaian Government clearly point out the deficiencies with regard to biodiversity conservation in Ghana. The third national report on the implementation of the UNCBD issued in 2005 names for example the lack of appropriate laws and policies, missing resources and institutional capacity to act and to enforce laws, as well as a lack of understanding of ecosystem approaches as main challenges for biodiversity conservation in Ghana (MES 2005: 7-11). The strategy is unknown to those respondents who do not work directly on biodiversity protection but in related fields like community based resource management and forestry research. This fact draws the conclusion that the Biodiversity Strategy is a document with low political impact.

Recent action that followed the objectives of the Forest and Wildlife Policy and the biodiversity strategy is the introduction of 30 so called Global Significant Biodiversity Areas (GSBAs) within existing productive forest reserves throughout the country. They are protected and are supposed to have a management plan.

Overall, respondents attested weak law enforcement by the responsible state agencies. The forest cover in Ghana is still declining, even in on-reserve areas. Although different underlying causes for deforestation in Ghana where mentioned by

the interview partners, there is a general agreement that illegal logging is still problematic.

The Ghanaian Government has recently signed a Voluntary Partnership Agreement (VPA) with the European Commission to combat illegal logging since 60 percent of the timber is exported to EU countries. But as one NGO member states, presently the Forestry Commission does not combat illegal activities effectively, granting the timber industry complete impunity in its systematic violation of permit regulations. One expert in forestry accused the FC for “just looking at timber and taking it even though illegal logging took place“.

The explanations for the lack of law enforcement are different. Interview partner from NGOs and research institutions observe a missing political willingness of the Ghanaian Government in relation to forest and biodiversity conservation. While this is denied by officials on ministry level, a Member of Parliament claims that “environment is not taken as determinant when it comes to certain decisions”. Economic growth and development is favoured by the GoG and its development partners. Environmental NGOs criticise the government’s inattention to the fact that the basis for all economic activities in Ghana are the natural resources. Those responsible for wildlife protection on the ground feel this prioritisation directly. One respondent claims: “Apart from donors giving us money and the sustainable funding, there is no way we can find money, because the central government would never give money for conservation when they are looking for health and education.”

The reason for the low priority of environmental issues is backed by the common opinion that Ghana faces bigger problems than biodiversity conservation. Elections can not be won with activities for nature protection. Policy makers committed to biodiversity conservation therefore face difficulties to balance economic development and environmental protection. For example, precedence is given to enlarge cocoa plantations because it generates high income through the rising cocoa price. This is promoted by the very powerful Ghana Cocoa Board (COCOBOD) (see Figure 7).

Another indicator for the low relevance of biodiversity and forest conservation in Ghana is the fact that those state institutions responsible for conservation are powerless and lack financial, technical and human resources. The WD is seen as having a very weak position against the FSD. According to one interviewed wildlife protection expert, it has “some committed personnel, but there is little help from the government.” Wildlife Division staff claims that in comparison to other units of the FC, wildlife conservation can not generate own revenues though they are supposed to generate money: “Wherever there is timber business involved, there is money. But in wildlife: forget it!”.

One expert in wildlife protection states that the unit has additionally lost weight through its integration into the FC in 1999. FSD and WD have different interests. The FSD was formerly exclusively involved in timber extracting what changed only recently with the GSBAs located in forest reserves. Coordination between the two divisions is missing. This is obvious in the field of community based natural resource management. Here, both divisions have their own concepts instead of having an integrated approach combining timber management with the management of wildlife. Wildlife Division staff assessed the cooperation with the FSD as good. But respondents indicated to have differences when it comes to determine the authority over naturally occurring trees in those areas where they work with communities on resource management.

(iv) (Dis-)Incentives for conservation: the benefit sharing of timber resources

One of the main constraints that the legal framework in Ghana poses for a potential PES scheme are the existing regulations on benefit sharing of timber and natural resources. On both national and local level, most of the interviewed key stakeholder considered the present benefit sharing of timber resources as an obstacle for forest conservation because there are no financial incentives for land users to leave trees standing or to plant new trees.

According to Article 267(6) of Ghana's constitution, revenues from stool land on which forest reserves are located have to be shared as following: after allocating 10 percent to the office of the administration of stool lands, 55 percent of the remaining amount goes to the District Assembly, 25 percent through the traditional authority to the stool as landowner and 20 percent to the traditional authority themselves.

But in reality this benefit sharing is only applied to a minor part of the timber revenues. The Forestry Commission, more specifically the FSD, collects 60 percent of the total revenues from forest reserves as management costs. This is regulated by the MLFM and can be altered by the ministry itself. Thus, only a small share of the benefits originally laid down in the constitution officially goes to those entities that should and are able to forward it to the communities. But respondents from various stakeholders confirm that even from these shares the single farmer is not benefiting. These regulations are criticised as having been established by appealing to an "invented tradition which has been changed constantly to fit evolving socio-economic conditions" (AMANOR 1999: 68). The criticism is directed towards the fact that the local communities as original owner of the forests are disregarded. Traditionally the local stool symbolized by the chief represents the community. Therefore, the chief has to forward the payments he receives to the communities, what often does not work.

Thus, stakeholders state that the formula for benefit sharing is not bad, but the problem is that it is not implemented. Respondents agreed that in reality the private sector, traditional authorities and the FC are sharing the revenues among themselves without regarding the local communities. This is made easy because of the lack of any provision made in the constitution or other laws on how money from timber resources should be transferred to communities.

Many stakeholders considered the fact that in the existing benefit sharing practices communities are disregarded as one underlying cause for deforestation in Ghana. From the farmers' point of view it leads to perverse incentives for forest conservation. Farmers do not protect naturally occurring trees on their farms because they do not belong to them. They cut them down purposely because they will not receive any benefit from them. More importantly, they try to avoid that harvesting of timber will destroy their crops. Although compensation should be paid, respondents in our interviews as well as recent studies validate that adequate compensation is only paid in few cases (MARFO et al. 2006). The only way land users can ensure their rights in obtaining benefits from trees on their land is to plant them and register afforested land at the FC. In this case a recent regulation issued by the MLFM shifts the benefit sharing of timber trees planted by farmers in off-reserve areas to individual land lease agreements (MLFM 2008b).

But problems in this case are also manifold. First, experienced project staff noted that the registration of trees has big bureaucratic hurdles and demands big efforts by the single farmer. Second, farmers are not aware of the necessity to get certificates for the planted trees and run into danger of loosing the property rights to the trees. Third, a representative from the FC commented that existing experiences with plantation projects showed that "benefits [from trees] take too long to come up and thus farmers cut down the trees to plant annual food crops".

Potentials and constraints of the national institutional framework for PES in Ghana

Based on the findings discussed above, we have identified the following potentials and constraints for PES concerning the national institutional framework:

Potentials for PES

- Interviewed stakeholders are generally aware on the connection between intact forest ecosystems and the livelihoods of the local population. But this is not discussed as adaptation of forests to climate change or strengthening of the adaptive capacities of the local population.

- PES is discussed by state institutions at all levels. One pilot programme is the REDD initiative which is defined by some stakeholders as a PES scheme in which carbon sequestration is marketed as environmental service. This initiative is in the initial phase, but may provide future insights on opportunities and drawbacks for implementing PES schemes in Ghana.
- The Forest and Wildlife Policy (FWP) is a comprehensive policy framework since it includes provisions like community participation in natural resource management, the access to NTFPs and the non-commercial use of timber. This could be a basis to generate incentives for farmers to engage in alternative land use practices and could lower their vulnerability to climate change. Thus, the full implementation of the FWP into laws and programmes could create a policy environment consistent with the goals of PES and adaptation to climate change.
- Our research has identified stakeholders from state and non-state institutions that are committed to conservation of biodiversity. Currently numerous projects and programmes are implemented which try to strengthen local livelihoods through access to forest resources as well as try to promote community based natural resource management. Further studies on PES or attempts for the implementation of such schemes can built on these stakeholders and their knowledge on biodiversity protection in Ghana.

Constraints for PES

- Discussions on forests and climate change are focused on mitigation measures. Key stakeholders from the forestry and biodiversity sector are not aware of the contribution of forests to adaptation to climate change. Coordination between stakeholders relevant and responsible for adaptation processes in Ghana is lacking. Unless these constraints are not tackled, it seems unlikely that a PES scheme or other financing mechanism for forest related adaptation measures is implemented.
- The strong role of the state in biodiversity and forest conservation implies a strong regulation or participation of state institutions in PES scheme. This is not a constraint for PES as such. But it could threaten the efficient functioning of a PES scheme when the implementing and regulating state institutions are those who currently do not enforce conservation laws and policies efficiently, are underfunded and lack capacity. This would imply a government-led PES scheme which includes considerable technical and financial assistance to governmental institutions and would be seen as an additional source to generate self-funding of the government agencies. Thus, PES schemes would be designed like traditional

policies without considering the lessons learnt from former obstacles. Moreover, it would increase the transaction costs of a PES scheme to such a high level which probably could not be covered by voluntary payments from environmental service users.

- Most of our interview partners confirmed that biodiversity protection is not prioritised by the Ghanaian Government. Since policy actions are directed towards economic growth, priority is given to sectors like cocoa and timber production that partially conflict with the goals of a biodiversity related PES scheme.
- One of the major threats for the functioning of PES schemes in Ghana, may it be government or private run, is the present benefit-sharing system from timber resources. For land users any single incentive for conservation is negative. It is therefore not probable that PES schemes can generate those payments that could alter the present conservation-unfriendly incentive structure unless farmers directly benefit from timber resources or own the trees themselves.
- Within the present benefit sharing system, the valuation of ecosystem services and their marketing may have adverse effects. Those stakeholders who are benefiting from the present situation will probably see the opportunity to transfer these mechanisms from the timber sector to other environmental services. This could lead again to an “elite capture” of revenues and a large land grab by private companies and state and traditional authorities as experienced in the forestry sector.

3.2 Local institutional framework

There are several institutions on local level that have varying impact and authority on the management of natural resources on- and off-reserve. Their influence and interaction is discussed in this chapter in order to estimate the opportunities and constraints for PES around Ankasa Conservation Area (ACA). It is important to assess:

(i) whether the park management of ACA is capable to enforce conservation laws and policies to manage natural resources on-reserve and to secure biodiversity conservation;

(ii) whether the existent formal laws and traditional rules regulating land use and property rights allow land users to have real land use choices and therefore effectively manage natural resources off-reserve;

(iii) whether there are existent structures around ACA to manage natural resources in an integrated approach that could be used in a PES scheme.

(i) The management of natural resources on-reserve

The park management of ACA is the local representation of the Wildlife Division (WD) and consists of the senior park manager, the law enforcement department including the wildlife guards, the community outreach team, and the tourism officer. The financial and personal resources of the wildlife department are very limited, due to little interest of the central government in conservation issues.

Owing to increasing external pressures on the conservation area and increasing illegal activities within the reserve, the park management started a management planning process, which culminated in the formation of the “Protected Areas Development Programme Southwest Ghana” (PADP) (PADP 2000a: 10). The European Community funded programme, which is currently in the second phase (PADP II), started in 2006 and will end in 2009. The programme aims at improving the infrastructure and management of three protected areas in the Western Region of Ghana including ACA. Besides that, an important component of the PADP programme is to examine and define the relationship between the protected area and the surrounding communities. Hence, PADP II seeks to incorporate communities into park planning and administration, as also how communities can manage wildlife in a sustainable manner and benefit from wildlife resources in their own areas.

In our interviews with different stakeholders we tried to evaluate the relationship between the park management and the fringe communities of ACA. When asked to

evaluate the performance of the park management in general, most of the interviewees deemed it to be good since the implementation of PADP. Particularly the awareness raising campaigns were named to have a positive impact on the fringe communities. However, trying to find out the extent of awareness on the restrictions concerning ACA in the surrounding communities we obtained contradictory statements. The park management and CREMA representatives stated that the communities around the ACA are very well aware of the restrictions on entering the conservation area and the harvesting of forest products. But in several Focus Group Discussions (FGDs) the respondents disagreed on whether there is actually a law protecting the ACA. They also had different opinions regarding the restrictions on the use of forest resources. Whereas some respondents stated that it is completely forbidden to extract forest products out of the ACA, others believed that it is possible to ask for permission: “If you need something you go for a permit and a ranger will escort you to take what you requested for. No fee is charged.”

The penalty for entering the conservation area illegally involves a minimum fine of 200 GHC and/or 12 – 28 months of imprisonment. As we were told by the park management about 50 persons have been imprisoned in the last two years. Even though the participants of the FGDs knew about the punishments for entering the reserve, several of them did not seem to be aware of the reasons for the strict protection status of the ACA. In all FGDs the villagers assured that they do not enter the protected area, even in those communities that were pointed out by the management of the ACA to be especially troubling. In the FGDs poachers were always indicated as persons who are not community members themselves. However, as we were told by the park management, there are some people in the adjacent communities of ACA whose only occupation is hunting. The main reason was named to be poverty. As wildlife has been reduced significantly in the off-reserve areas, they go into the reserve to poach. As we were told by the park management one of the communities will even block the road if one of their members is caught inside the reserve, so that the chief can try to intervene.

Regarding the monitoring of ACA, our interviews indicated that it has significantly improved since the initiation of PADP II, even though there are still some problems to be solved. The park management has a monitoring team of 24 wildlife guards, who are in charge of protecting five geographical areas in the ACA. However, as indicated by several stakeholders the wildlife guards have not been able to hinder intruders to penetrate into the reserve, especially at night. Bushmeat and non-timber forest products (NTFPs) are still taken out of ACA. Particularly, the northern part of ACA (the Nini-Suhien National Park) suffers the greatest threats since the access for monitoring patrols to the area is very difficult. One local representative of the Ministry

of Food and Agriculture (MoFA) stated the following: "…so they [the community people] go in there and illegally hunt these animals, whose environment [off-reserve] is being destroyed for cocoa."

The motivation of the wildlife guards is rather limited due to the work conditions and the low salaries (minimum of 60 GHC). The salaries are paid by the government, but as we were told by the park management, they have not been paid for the last twenty months. Until now the guards have only received some allowances paid by PADP II. This situation is a big incentive to collaborate with poachers. Some of the wildlife guards also come from the fringe communities and therefore might be tempted to warn their people before patrols take place.

In order to facilitate the management of the ACA, the park management tries to provide a link between the protected area and the fringe communities. The objective is to improve the image of ACA through capacity building programmes, support of income-generating activities and infrastructural projects (supply with electricity and water boreholes). In the perspective of an expert for community-based wildlife management, the infrastructural support is likely to attract new settlers and thus should just be given as an incentive for conservation activities. Furthermore, the sustainability should be guaranteed by keeping external funding at an absolute minimum and not to fund everything what the communities request for.

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(ii) The management of natural resources off-reserve

Traditional authorities and land tenure system

In Ghana the traditional authorities can be seen as a second branch of government as they play an important role on all land related issues (PADP 2000a: 21). For the implementation of a PES scheme land tenure security is an important precondition. Therefore, the analyses of the traditional land tenure system in the adjacent areas of ACA constituted an important part of this study. Annex IX gives a general overview of the traditional authorities in Ghana.

The Traditional Authority is the custodian of traditional practices and customs of a particular area. The Traditional Council is headed by the Paramount Chief and involves Divisional Chiefs and Village Chiefs ('Odikros'). The lowest level in the hierarchy is the Odikro with the highest being the Paramount chief (Omanhene) or the King depending on the area. In between are the divisional chiefs and sub-chiefs. Each divisional chief has control over their stool lands. The Odikro in some communities may be representative of the chief who oversees land in the villages on behalf of the chief. He may be the head of a number of farmsteads/hamlets.

The three traditional authorities that concern ACA are the following:

- Western Nzema Traditional Council, which covers the area of Jomoro District, and which contains also the entire area of ACA that formerly belonged to this traditional authority.
- Eastern Nzema Traditional Council; which covers the same area as the Nzema District at the eastern boundary of ACA.
- Wassa Amenfi Traditional Council, which covers the area of the Wassa-Amenfi District at the north of ACA.

It should be noted, that at the time when ACA was gazetted, land was "leased out" from the farmers and compensation to the traditional landowners was thought to be paid. Yet, compensation payments to the stool were never made in full (PADP 2000a: 22). This fact has contributed to the distrust of the communities towards the WD, as pointed out by the park management.

Concerning wildlife conservation the traditional authority has an important role to play (PADP 2000a: 21). Due to its social structures it is possible to partly define and delineate the existing community structures, which is an essential factor for a community-based wildlife management approach. But most important traditional authorities have the power to decide over land use issues on the stool land and to determine which land is allocated to settlers (for detailed information on the present land tenure system in Ghana see Box 3).

Box 2: Land rights and land tenure system in Ghana

Land rights in Ghana

The present land tenure in Ghana is fragmented as result of various historical influences (AFROL NEWS, 2002). Land tenure in Ghana may take many forms. According to (LARBI, 2006), these are broadly categorized under customary and common law.

The customary land system comprises of stool, skin, family and individual lands. The major characteristics of customary tenure are that the land is regarded as belonging to the whole social group and not to an individual (FISHER, 1993 as cited in MENDS and DE MEIJERE, 2006). Ownership of land is therefore vested collectively in a family, lineage or clan, and the individual members enjoy rights of use.

About 78% of the total land area in Ghana consists of both stool and family lands. Family lands together with individual lands form about 35% of the total lands in customary ownership (MLFG, 2003 as cited in MENDS and DE MEIJERE).

The traditional land-owning authorities (stool/skin chiefs, clan heads) hold allodial (absolute ownership) title to land in trust for the community.

Family lands are held in trust by the family heads on behalf of the family members. Lands acquired by the Government are held for the public interest.

In Ghana, land can only be leased or rented but not officially be bought. Leases and rentals for economic activities must involve the permission of the allodial titleholders. However, the land must revert to the community or the allodial titleholder at the end of the lease (ASUMADU, 2003). Family and individually owned lands are normally passed on to the succeeding generations through an elaborate system of inheritance. Inheritance by succeeding generations is an integral part of the Ghanaian culture and can be matrilineal or patrilineal.

Acquisition of land by non-natives for agricultural purposes

Migrant/settlers/tenant farmers are also named as non-natives. Basically these categories of farmers have access to agricultural lands through the following tenurial arrangements: Share cropping (consisting of two systems), outright purchase, and through gifts.

Share cropping system

The two share cropping systems are known locally as abunu and abusa. Under the abunu tenancy, the proceeds from the harvest or the farm may be divided equally between the tenant and the landowner.

In the case of the abusa, the ratio of the tenant farmer's acreage to that of the landowner is two to one. After the sharing the following three scenarios may apply: In many cases, the landowner takes care of his share of the farm and harvests the crops himself. In some cases, however, the tenant farmer is employed to harvest the crop and take care of the farm for one-third of the harvest. In other cases an entirely new person may be hired to take care of the farm under similar terms.

An important feature of the share cropping agreement as observed by BENNEH (1988), in his study of land tenure and agrarian system in the Wassa Akropong, was that there were relative contributions of labour and capital by the tenant farmer and the landowner. In the case of abunu, the landowner is expected to contribute labour, capital, and seedlings. This varies, however, with the individual agreements.

In the case of abusa, however, the landowner contributes nothing apart from the tract of land; the share cropper is expected to use one third of the harvested crop to finance the cost of operations on the farm and the other one-third as his personal remuneration, while the landowner receives one-third as his rent for the land.

Under the share cropping tenancy, the tenant farmer is not free to cultivate any crop he likes without the consent of the landowner.

Access to land through gift or marriage

Access to land may also be obtained through gift grants by landowners to migrant farmers. This is done if the migrant farmer can establish that he belongs to the same clan as the landowning clan of the new community. He pays nothing in return; he has only to discharge his civic responsibilities as a clan member. However, it must be noted that this practice was common in the past when the demand for agricultural land was not high. The migrant farmer may also obtain a grant of land through marriage. No restrictions are placed on the crops which can be cultivated on the land.

Access to land through "outright purchase"

Land may also be obtained through outright purchase. In this process, a migrant farmer requests land for farming from a chief. When the request is granted, an area is demarcated upon the payment of an agreed sum of money referred to as area "drink" money. The payment of this money grants the migrant farmer access to the land. Farmers then prepare documents and plans covering their plot of land. However, controversies exist between landowners (chiefs) and migrant farmers as to whether this process gives legitimate title of the land to the migrant farmer. Hence for the transaction to be complete and valid, indentures are then made and jointly signed by all parties namely: the migrant farmer, the divisional chief and the paramount chief of the area.

The major part of the farming land around ACA is stool land (60%), which belongs to the traditional authority (PADP 2000a: 24). The land tenure system does not comprise the management of natural resources (wildlife and natural grown trees), as they belong to the State or landowners and are managed by the Forestry Commission through licensing and permits. Therefore, security of tenure does not impart any claim to the wildlife on the land.

The FGDs showed that many land users in the surroundings of ACA do not have any formal land titles. As stated by some chiefs, usually no tenancy agreement exists when the land is given out to native community members. Tenancy agreements

apply only to migrant farmers, but not even all tenant farmers have written agreements. The absence of well documented, demarcated and permanent boundaries between landowners often leads to boundary conflicts. This is also compounded by the practice of multiple lease of land by some chiefs.

Apart from the boundaries the tenancy agreement also indicates which crops are to be cultivated on the acquired land. Tenant farmers usually do not have the right to change the crop. Any farmer willing to change from one perennial crop to another must seek the consult and approval of the landowner. As land cultivation is driven by commercial production of profitable crops, the fringing areas of ACA are dominated by mono-cultural plantations (PADP 2000a: 24). Besides that, farmers often do not have enough land to grow food for domestic consumption. However, there are numerous different agreements between tenants and landowners.

In Ghana the perennial or cash crop such as cocoa, rubber, oil palm etc. is referred to as “property”. Only the ‘property’ planted on the land belongs to the farmer and is inheritable; the land itself will always belong to the original landowner. In order to gain usufruct rights to the land, tenants have to farm it, which means that they have to clear the forest and plant perennial field crops. “An abandoned land can sooner or later be reassigned to the stool” (PADP 1998: 6). During the FGDs tenant farmers pointed out that the main reason for cultivating all their farmland is because they are afraid that the landowners will take back the uncultivated portions and re-allocate them to other farmers. Therefore, just few of the respondents in the FGDs still have some portions of land uncultivated. This fact was confirmed by the park management: “When people have title to their land, they can decide to reserve their land. But where there is panic that at any time the chief can come for the land, you will clear everything even if you will not grow anything on it.”

In particular when it comes to resolve conflicts involving land tenure the traditional authority has to play an influential role. As stated in the management plan the few occasions where farmers encroached into the reserve the stool ordered them to abandon the area without any compensation (PADP 2000a: 21). Besides that, as stated by the park management, mining companies have tried twice to get a concession for mining in the ACA, but the traditional authority prevented them from entering the reserve.

The present land tenure system has lead to a low level of trust between the landowners themselves and between the landowners and land users, as all our interview partners confirmed.

Local state agencies

There are two local state agencies that have varying impact on the management of natural resources off-reserve. However, in relation to the role of traditional authorities their influence seems to be restricted.

District Assemblies

The District Assembly (DA) is responsible for the implementation of government programmes and policies. They pass and enforce by-laws including those related to environmental protection. Representatives of the DAs said that budget priorities are addressed to the education and health sector. Environmental issues do not play an important role and are limited to sanitation projects. Furthermore, the DA issues licenses to trade bushmeat and permits to operate chop bars.

Each DA has the mandate to constitute an Environmental Sub-Committee where it is necessary (Local Government Act 462, of 1993, section 24). Two out of the three Assemblies we interviewed had installed an Environmental Sub-Committee. However, its performance seems to be very poor. As stated by the park management: “The District Assembly has an environmental committee but we have never seen them on the ground to see what is happening around here”. The Sub-Committee has an Environmental Action Plan (EAP) which contains the key environmental issues, but as we were told by a representative of the DA none of the objectives stated in the EAP have been implemented so far due to limited financial resources. Environmental related issues are also dealt within the District Medium Term Development Plan. But representatives of the Assemblies pointed out that no conservation policies were set up for the planning period of 2006 - 2009.

District representation of the Ministry of Food and Agriculture

The District Agricultural Development Unit (DADU) is the representation of the Ministry of Food and Agriculture (MoFA) on district level. Its main objectives are the improvement of agricultural productivity, and the creation of income and employment opportunities. The DADU is partially responsible for the conversion of forests to agriculture, as it has actively boosted cocoa plantations in the surrounding areas of ACA even though in most parts the soils are unsuitable for sustainable cocoa production (PADP 2000a: 24). Main financial incentives for the cocoa farmers around the ACA are the favourable pricing system and the provision of fertilizer and scholarships for their children. As stressed in the management plan of ACA this has led “to a massive change in land cover, pollution of streams and degradation of soils”

(PADP 2000a: 20). A representative of DADU stated that there is a lack of knowledge and practical experience to implement agroforestry systems. Notwithstanding the extension officers try to enhance the introduction of agroforestry cultivations in the region.

Many of the farmers living next to the reserve are migrants that settled to derive some benefits from the agricultural production systems. Even though it would be necessary to pursue a holistic approach to achieve an integrated system of sustainable land use, there has been little interaction between the Ministry, WD and Forest Services Division (FSD) so far.

(iii) Integrated approach towards the management of natural resources

Community Resource Management Areas

The concept of the Community Resource Management Areas (CREMAs) is based on the experiences of other African countries in community based wildlife management approaches (PADP 2001: 1). It aims to improve the sustainable use of natural resources, especially wildlife, in the off-reserve areas.

Each CREMA is established as body corporate within the existing traditional structure and develops a constitution with the community that defines the geographical boundaries, membership rules, and other regulations. Important legal instruments for the CREMAs are the by-laws gazetted by the District Assembly, which recognize their demarcation and structure. Based on the constitution the WD recognizes the CREMA and devolves authority over wildlife management to it. The organizational structure of a CREMA consists of an Executive Committee as the highest management body. Members of the Executive Committee are selected from the communities that constitute the CREMA. On community level the representation is made by the Community Resource Management Committees. Negotiations and representative functions are usually carried out by the chairman and the secretary of the CREMA.

The WD has a Collaborative Resource Management Unit which is responsible for the establishment of CREMAs. Donors and NGOs try to support the identification and implementation of CREMAs throughout Ghana. The WD considers the surroundings of protected areas as the priority regions for the establishment of CREMAs. CREMAs have the potential to act as a buffer zone since they improve the availability of natural resources within the CREMA area and thus reduce external pressure on protected areas. Additionally, it seems easier to deal with the CREMA, which represents several communities, as with each community separately.

Therefore, the WD has been promoting the formation of CREMAs in the communities adjacent to the ACA. However, up to now there is only one officially recognized CREMA around ACA, the Amokwa CREMA, which was established in 2003 and involves nine communities located at the western boundary of the reserve. Several other CREMAs of varying sizes are still in the process of formation. Some of them have already implemented their institutional structure, but they still need to develop a constitution and wait to be officially recognized by a by-law.

CREMAs are supposed to be self-financing, but as pointed out by the park management, for now they still depend on PADP II as they have not been able to generate their own revenues yet. Only the Amokwa CREMA collects a monthly fee of 20 Pesewa from each member above the age of 18 years, as stated by a CREMA representative. Some of the members, however, do not contribute. The collected money is mainly spent for travelling costs of CREMA representatives, the purchase of seedlings, and capacity building activities. Other CREMAs where we conducted interviews consider a membership fee in the future but for now they hope to find financial support from NGOs. All CREMA representatives indicated financial support to be the main necessity. As illustrated by one CREMA representative: “Finances and logistics are our number one problem. Our people cannot control the area if they get nothing to eat for this day. They cannot work with an empty stomach.” Finances were also mentioned to be necessary to introduce alternative income-generating projects in the communities like snail farming and the installation of fish ponds.

With regard to the advantages of CREMAs some communities stated to see them as a chance to secure land tenure. At the present time CREMAs can only secure access to wildlife and thus might hinder foreigners to extract natural resources within their area. As discussed at a CREMA workshop in Accra, as long as there is no written agreement with the divisional chiefs to secure the land rights of CREMAs, they will not be able to take independent decisions on land use changes. It is particularly difficult when CREMAs are situated on the landholdings of two divisional chiefs. For the Amokwa CREMA for example there is an existent conflict between two senior divisional chiefs who claim overlapping jurisdictions, as an expert for community-based wildlife management mentioned.

When asked to name their main tasks, interviewed CREMA representatives mentioned educational activities to teach the communities on the importance and need to conserve the forest and on how to use natural resources in a sustainable manner. For example, as one CREMA representative stated, community members are educated to plant trees along river banks to prevent rivers from drying out. Furthermore, the CREMA representatives named restoration of degraded lands through afforestation as an important task to create habitat for wildlife and to secure

forest ecosystem services. Yet afforestation is restricted to marginal and degraded lands, where it does not compete with farming land.

Another important aspect of CREMAs is the introduction of agroforestry systems into the farming communities. Besides that, CREMAs are supposed to monitor the abundance of wildlife on farm and forest lands through regular visits and thus try to prevent illegal exploitation. As stated by the park management, they try to encourage all CREMA residents to report illegal entry and exploitation in the conservation area.

The park management has its own community outreach team to provide technical support to the CREMAs on different levels, for instance the development of management and institutional capacity and the development of effective monitoring systems. According to the constitutional terms, members have to request a permission to hunt wildlife and extract NTFPs within the CREMA area. Therefore the CREMAs are supposed to realize an annual wildlife census to set a hunting quota based on the counted animals. The park management provides training for the CREMA members in how to conduct wildlife surveys and how to analyze the collected data.

Apart from the park management there are several NGOs implementing projects to facilitate the constitution of CREMAs in the fringe areas of ACA. Their projects involve the improvement of land use planning systems and land security, the promotion of income-generating activities, e.g. NTFPs, and marketing strategies for farmers.

Potentials and constraints of the local institutional framework for PES around Ankasa Conservation Area

Based on our findings dealing with the management of natural resources on- and off-reserve, the following potentials and constraints are important for the implementation of PES schemes.

Potentials for PES

- Even within the existent land tenure system, there is a certain potential for the set-up of a PES scheme around the ACA, if the higher chiefs are convinced to participate. Taking into account the influential role of the traditional authorities, they have the power to monitor compliance of the farmers with a potential PES scheme. However, the traditional authorities need to be involved at an early stage of the set-up process. Furthermore, to convince the chiefs to enrol in a PES scheme, service payments have to be divided between the landholder and the land users. In a PES transaction the landowners need to receive at least the

same benefit as they receive from leasing out the land through share-cropping or rent.

- CREMAs are formally registered associations with constitutionally backed community-based resource management strategies. It empowers communities to control access to resources by external users. The common property regimes involving natives and settlers may foster social control of compliance. In particular this favours the implementation of PES schemes. Furthermore, for PES schemes transaction costs could be lowered significantly due to a reduced number of participating smallholders and strengthened land use rights. If CREMAs succeed in involving the divisional chiefs in the land use agreements and manage to obtain authority over timber resources they have a great potential to be involved in a PES scheme.

Constraints for PES

- One of the main constraints is the prevailing land tenure system around the ACA. Tenant farmers do not have free land use choices. Any land use change induced by a PES scheme will therefore require authorization from the landowner, since they have the right to decide which farming activities have to be carried out on the land.
- Considering the insecure and weak land tenure system and the missing control of timber resources farmers cannot prevent others from occupying their land and harvest their trees. This, however, is an essential precondition for PES schemes. As long as farmers have no land security the risk of losing the land may be too high to get involved in a PES scheme.
- Furthermore, it is uncertain how the funding of ACA will be secured after the end of PADP II in 2009. It is predicable that from next year onwards the law enforcement activities could be significantly reduced, thus external threats for ACA might increase. The park management might therefore be less capable to enforce the law and secure biodiversity conservation in the ACA. The control of compliance with on-reserve regulations would be diminished drastically, what is especially important for PES schemes.
- Regarding the lack of interest of the District Assemblies in conservation issues and the negative incentives from local state agencies leading to deforestation in the surrounding areas of ACA it is unlikely that the local government institutions could be successfully involved into a government-financed PES.
- There are certain limitations in the case of inducing CREMAS in a PES scheme. In case the local decision-making structures are not identified correctly or the

communities are deeply divided over other issues this could result in a powerless CREMA. Additionally, until now it has not been possible to guarantee the sustainable funding of the CREMAs.

- Due to the low level of trust between landowners and land user, initial trust building measures may be necessary to convince both sides to participate. This is especially important if the landowner fears that the set-up of a PES scheme will be the first step towards land expropriation (WUNDER 2008: 10).

3.3 Environmental Services

Tropical forests provide a wide set of environmental services (ES) which also may have economic value. These economic values can be distinguished between use values, such as the provision of forest goods, regulating functions and option values, and none-use values that refer to bequest and existence values (Figure 8).

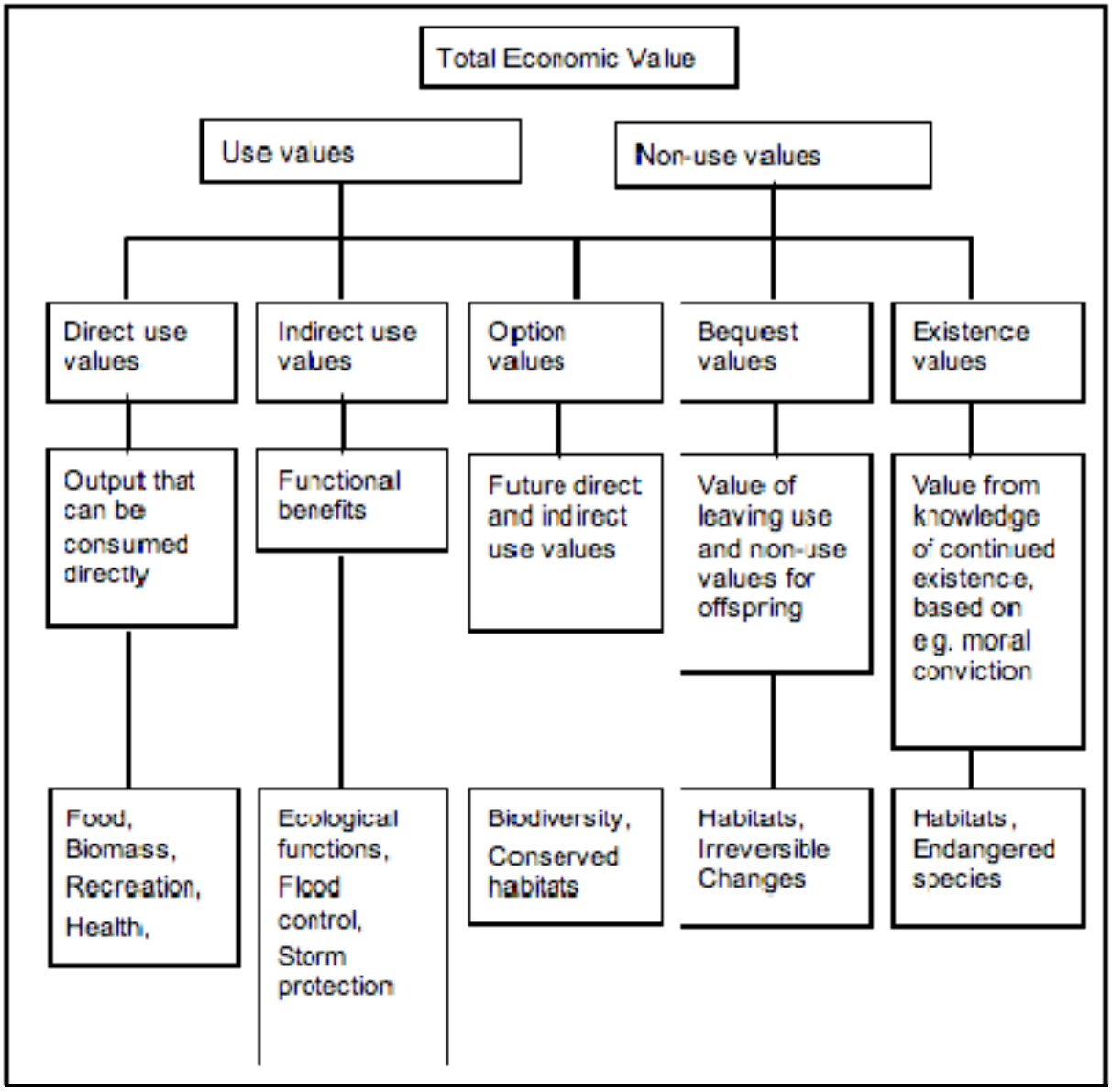

Figure 8: Economic value of forests (adapted from LANDELL-MILLS 2002: 14).

The perceived value of Environmental services differs according to the various levels on the demand side. On local level direct use values as the provision of food, herbs and construction materials play an important role for the livelihoods of the rural population. Indirect use values are more likely to raise national interests, as they

contribute to improved agricultural productivity, the quantity and quality of water supply, hydroelectric power generation and improved health.

Further indirect use values like biodiversity protection or carbon sequestration and option values, bequest and existence values are of international interest, as the beneficiary of these environmental services is the global community.

But how can these services be traded? Due to ongoing environmental changes e.g. climate change, degradation of natural resources and loss of biodiversity "Environmental Services previously provided for free are becoming increasingly threatened. This emerging scarcity makes them potentially tradable" (WUNDER 2007: 49). Beneficiaries of the various levels should therefore be willing to pay land users for securing these services, which is described in the PES-logic as the internalization of externalities (ENGEL et al. 2008).

In the context of climate change, environmental services play an important role especially in tropical countries, which are particularly vulnerable to climate change impacts. The livelihoods of the poor are "highly dependent on climate-sensitive sectors of the economy such as subsistence agriculture, fisheries, pastoral practices, and on forests for household energy, food security, water supply and traditional medicines" (NKEM et al. 2007: 3). Due to the projected temperature increase by 2.0 to 6.0°C for West Africa and greater frequency and intensity of rainfall, the agricultural production will be affected in terms of crop quantity and quality and indirectly through the increase of diseases, insects and weed effects (NKEM et al. 2007: 5). Apart from their importance for mitigation through carbon sequestration, forest related environmental services strengthen the adaptive capacity of the rural population as they contribute to their livelihoods trough the provision of food and NTFPs, the diversification of income, the regulation of extreme weather events and as the high biodiversity of tropical forests provides option values for future direct and indirect uses.

For the set up of a PES that aims at financing adaptation to climate change, the following questions have to be taken into consideration:

(i) Which environmental services are marketable on the different levels?

(ii) How are Forest environmental services related to adaptation?

(iii) In which way are environmental services threatened?

(i) Key environmental services

The main ES types defined by WUNDER (2005) like carbon sequestration and storage, biodiversity protection or restoration, watershed protection and landscape beauty have been discussed with stakeholders at various levels to assess potentials of marketable ES in Ghana. Table 2 gives an overview on environmental services concerning the Upper Guinean Rainforest with focus on ACA identified by interview partners from local and national level.

Table 2: ES types (according to WUNDER 2005) and their services mentioned by our interview partners-

ES types	Services and livelihood benefits
Biodiversity protection or restoration	• Local climate amelioration • Provision of NTFPs • Species protection
Watershed protection	• Improved quantity and quality of water supply • Reduced flooding and soil erosion • Hydroelectric power generation
Carbon sequestration and storage	• Mitigation of climate change
Landscape beauty	• Income from ecotourism • Recreation

Biodiversity protection or restoration

Interview partners from national and local level consider the protection of endangered species as a very important issue. Especially on the national level respondents showed concern about the ongoing extinction of species.

Some international experts claimed that the protection and ecological status of ACA is poor. Because of hunting activities many species are close to extinction, for example primates like Miss Waldrons Red Colobus (*Procolobus badius ssp waldroni*) are already extinct in wilderness, while Roloways Diana-Monkey (*Cercopithecus Diana ssp roloway*) and White-Naped Mangabey (*Cercocebus atus lunulatus*) are supposed to be extinct soon.

Marketable potentials for a biodiversity related PES scheme are seen in the provision of wildlife and especially NTFPs. Respondents on all levels stressed the importance of provisioning services of forests, as livelihoods strongly depend on NTFPs for subsistence as well as for commercial use. One representative of an international NGO recommends: “If people are supposed to stop cutting bamboo, rattan or chewing sticks, they have to be paid for this”.

The majority of respondents mentioned that biodiversity is the least marketable environmental service because the Ghanaian population shows little interest in conservation issues. A representative of an international NGO recommends: “Biodiversity, that’s where it ends up. But [for a PES scheme in Ghana] (…) start with something people know and then you scale it up to biodiversity related issues.”

Watershed protection

Interview partners on all levels classified water related services as the most promising ES for PES in Ghana, taking into consideration the following reason: On national level basic needs are of top priority. Interview partners emphasized the importance to maintain or ameliorate quality of drinking water especially in the transition zone. Hydroelectric power provision is considered to be equally important. Forest reserves and protected areas contribute to secure the provision of water resources. One representative from the park management stated, that 20% of the forest area has been protected to secure watershed services.

Interview partners from national level mentioned that rainfall patterns changed in the past. Though, the respondents have different opinions whether the local population is aware of changing microclimate patterns. While some respondents expressed their doubts whether the local population understands the link between forests and microclimate, a local respondent stated: “The clearing of the forest has led to less rainfall and this results in more diseases affecting our food crops”. Compared to biodiversity, the local connection between provision and use of water is more understandable to the people. One representative of an international NGO argues for water as service in a PES scheme: “start with water. We have a large water problem; everybody knows that, everybody cares. Water is close to the communities. Microclimate or NTFPs, all these things are not appreciated by the people until they have vanished. Start with water, make it work and then go for the other issues, after people saw it working”.

Carbon sequestration and storage

Due to the international discussion on the Clean Development Mechanism as a mitigation tool to climate change, some respondents referred to carbon sequestration as a potential for the set up of a PES scheme in Ghana.

Landscape beauty

In view of cultural services, especially for the potential of ecotourism, the opinions differ largely. An international expert assessed no, or just poor ecotourism potentials for West Africa, as people do not travel around the world just to enter a rain forest, where they hardly see any wildlife. Respondents from national level agree that the ecotourism potential of ACA is rather low due to the remote location in the southwest of Ghana, the insufficient infrastructure around and in the ACA and the extinction of wildlife. On local level some respondents hope that nationwide tourism can generate some revenues and consider ecotourism as a big potential for the ACA.

(ii) Forests and adaptation

The livelihoods of the local population are highly dependent on goods and services provided by the forest (PADP 1999b, PADP 2000b), especially wild fruits, bush meat and water supply. Respondents were found aware of the importance of ecosystem goods and services for their daily needs. Farmers complained about the diminishing availability of these goods and services through ongoing deforestation. So far climate change induced impacts as external drivers for ecosystem degradation were not specifically mentioned. Asking what people derive from the forest some respondents mentioned that they depend on bush meat as their sole source of meat protein. Apart from alimentation and medicinal purpose, Non-timber forest products (NTFP) play an important role as building materials. They serve to fabricate daily household items like furniture, mats, baskets, traps and pestles. Table 3 provides an overview of given answers during our focus group discussions. It must be stressed that the following table is not in line with the scientific categorization and allocation of technical terms but is based on the practical understanding how different forest benefits are graded by the participants in our focus group discussions

Regarding conservation, reforestation and afforestation as strategy to adapt to climate change, we asked what farmers gain from planting or conserving trees. The respondents referred to the following benefits in order of decreasing importance:

- NTFPs: In eight out of eleven communities the provision of non-timber forest products was considered to be of high importance. As these have become scarce over the past years, the rural population would benefit from securing NTFP provision through conserving forests.
- Economic value: In six communities, economic considerations were of major importance, as planted trees contribute to their income: “growing trees depends on tree species: teak is good for electricity poles and can be sold to private companies”. Some respondents see more value in planting rubber trees as these take only about eight years to mature. Another advantage of growing trees is that

(compared to agriculture) they need less attention to develop after the first few years of planting. Commercial trees further serve as an assurance in times where cocoa outputs fail, one farmer said. One respondent mentioned that forest conservation might attract tourists and therefore generate additional income.

- Regulation services: In five communities the effect of forest on rainfall patterns has been discussed. One community mentioned to the protection of rivers: “River bodies will not dry up if we grow trees”. Three communities referred to fresh air and the improvement of soil fertility. Further functions that have been discussed were reduced soil erosion, establishment of windbreaks and reduction of bush fires. One farmer stated that diseases that affect humans would decrease, as there is a belief that proximity to natural environments induces healthy lives.
- Option, bequest and existence values: During the focus group discussions, the tree plantations were considered future resources for the next generation: “Even if I don’t gain anything for growing commercial trees today, my children are going to benefit as these trees become their property”. Another respondent stated: “It is very important for children to see animals and plants in nature and not just in school books”.

Table 3: Direct and indirect use values mentioned by FGD participants. Representatives of traditional authorities, Community Resource Management Areas (CREMA), farmers association and the park management confirmed the responses.

	Forest benefits	Specific goods/ services	Use
Direct use values	Timber	Timber Firewood/charcoal	• Construction materials • Household items • Cooking • Traditional food production (e. g. pestles) • Saving account (natural capital)
	Non-timber forest products	Palm leaves, rattan/cane, bamboo	• Construction materials, drying mats (for cocoa), baskets, traps, etc.
		Wild fruits and plants Chewing stick Mushroom	• Medicine • Spices • Hygiene • Food
		Bush Meat: rat, grass cutter, antelope, wild dog, fish, snail	• Source of animal protein • Commercial purposes
	Water shed protection	Water from streams	• Drinking water • Hygiene and health improvements

Indirect use values	Regulation services	Rainfall patterns, fresh air, soil fertility, wind breaks, avoided soil erosion, reduction of bush fires	• Improved agricultural production • Health improvements
Non-use values	Option, bequest and existence values	Wildlife and natural resources	• Education • Direct and indirect use values for future generations

Perceived change in the provision of environmental goods and services

In ten out of eleven focus group discussions, respondents reported about the decline of environmental goods and services. Especially NFTPs such as cane/ rattan, chewing sticks and snails are considered to have become scarce. Farmers complain that bush meat is rarely found, unless they enter the conservation area. One CREMA representative stated that the number of antelopes dropped dramatically between 50 and 70% during the last three years. Another view was given by the park management, affirming that the data of the past two years show growing numbers of wild animals due to improved management activities.

One representative of traditional authority mentioned that forest products used to be very important for the livelihoods of rural communities, but since the ACA has been protected, they are no longer allowed to enter the area. According to WIGGINS et al. (2004: 1939), policies designed to conserve natural resources may impose additional costs “on the poor who can least afford to bear them, and that those affected may thus ignore or deliberately contravene environmental policy measures to defend their livelihoods”, thus limiting also their adaptive capacities.

Due to the high demand for NTFPs, the restrictions put on the use of forest resources and the decline in availability of off-reserve areas, NTFPs have become more expensive, especially cane and chewing sticks. As a result, people are forced to refrain from using NTFPs: “Because of shortage of natural roofing materials, farmers are being compelled to use aluminium roofing sheet”. Another respondent stated that because of decreasing fish population, farmers now depend on fish from the market. Otherwise people extract forest products illegally, as confessed by some respondents: “you need to go to the reserve if you need cane”.

Perceived change in agricultural productivity

Farmers complained about a significant change of yield from not fertilized cocoa and food crops during the past 10 years and observed delayed maturity of their field crop. Regarding cassava, yields are decreasing in terms of output and size compared to the past. One farmer stated that also coconut output has decreased: “in the past one could get 5000-6000 dried coconuts on three acres, nowadays just 1500”. Among the reasons for the change in yields, respondents first of all accused the loss of soil fertility due to continuous cropping and short fallow periods. Some mentioned that rainfall has declined in frequency. These facts enhance the vulnerability of the population living around the ACA. In case of assumed climate change impacts their need to seize further adaptation measures is stressed.

(iii) Threats on the provision environmental services

In order to set up a PES scheme, the identification of threats on environmental goods and services is crucial. These threats have to be reduced by future providers through land- and resource use change. Based on our findings two main threats concerning the degradation of forest cover and the loss of forest related environmental services can be distinguished: (1) Commercial exploitation of natural resources and (2) unsustainable land- and resource use practices.

Exploitation of natural resources

Timber logging

Non sustainable logging of timber is an important driver for deforestation, stated one representative from Forest Service Division. An interview partner from an international timber company reports about strong incentives on illegal logging: companies that don’t have concessions have to buy them from off-reserve areas or log illegally. As illegally logged timber is cheaper, communities that need timber for construction tend to buy it illegally. Also farmers raised concern about exploitation caused by logging companies: “Even though some of these companies claim they plant a tree for every tree felled, this is not enough because felling a single tree causes damage to several other trees.”

Mining activities

Whereas mining is of no importance in the southern districts around ACA, one representative of a northern district of ACA stated that small-scale gold mining (galamsey) is one important environmental problem affecting the streams. Small-scale gold miners use cyanide and mercury compounds to wash gold, which are very harmful to aquatic life and damage entire water bodies. Further the current system of

land tenure and benefit sharing is being blamed, as one MoFA representative stated: “the mineral belongs to the chiefs who are the landowners. They are benefiting and the settler farmers are suffering on their farm.” Another incentive on surface mining concerns initial costs, as mining activities are free from taxes for the first five years.

Unsustainable land- and resource use practices

Agriculture

Our findings confirmed the key threats, identified by PADP in 2000, which are seen in the rapid and uncontrolled conversion of forests to agriculture. „The loss of habitat, the degradation of streams, soils and natural resources have rendered the reserves as an island of biodiversity concentration in a sea of mono-culture plantations and secondary growth“ (PADP 2000b: 14). As described by NKEM et al. (2005: 6) Decreasing per hectare yields are also contributing to the conversion of forests and other remnant vegetation areas into new croplands, thus jeopardizing the provision of essential ecosystem services”. Due to the loss of soil fertility and decline in yields the pressure on natural resources is increasing. Remaining forestland is cleared for crop cultivation, which causes further soil degradation. One representative of the park management confirmed: “The conversion of forest in favour of agricultural purposes is one of the biggest threats affecting Ankasa”.

Cocoa production is one of the main drivers for deforestation around the Ankasa conservation area. PADP already stated in 2000 (15) “perverse pricing of cocoa encourages cultivation on non-suitable areas leading to degradation”. Cocoa is traded via the national cocoa board, which fixes the producer price. Even though cocoa production might shift to southern countries due to climate change, as predicted by an international expert, the Ghanaian Government has set up the goal to increase the current national cocoa production of 670.000 tons to 1 million tons in 2011 (representative of MoFA). Hence cocoa cultivation has to be intensified to satisfy the growing demand. Referring to The Ghanaian Times (Sat. 06.09.2008) the producer price has been increased from 1,200 GHC to 1,632 GHC per ton (= 75 GHC per bag, which corresponds to 50,- € at an exchange rate of 0,66). The assured income is a strong incentive for farmers to convert forestland into cocoa plantation. Since trust has been developed among farmers and traders, another argument is social capital. In case of financial shortage, farmers e. g. ask traders to advance some money to pay the school fees for the farmers children.

Rubber plantations are currently expanding for the following reasons, given by various stakeholders: Rubber is the most profitable crop with about 1150 GHC/year/ha, it is cheap to plant and maintain, as it requires almost no further investments and meets an assured demand on the world market. Rubber is planted

in monocultures. Intercropping with food crop is not allowed. In order to harvest the latex, undergrowth and ground vegetation is frequently eliminated.

Land use practices

Farmers themselves considered land use practices such as slash and burn/ bush burning and the use of chain saws to be responsible for the loss of forest related goods and services. Despite the awareness of the detrimental effects, slash and burn practice is applied widespread since short-term economic interests prevail: “Burning has brought many current problems we face, but it enables cocoa, which is the common crop here, to grow well”, a representative of CREMA stated. Some other respondents regret the lack of knowledge on alternative land use practices: “We get no education on environmentally friendly ways of preparing the land for cultivation. As cocoa farmers, whatever practice we can adopt to make our crops grow is what matters to us”.

Some farmers blame the application of herbicides, pesticides and other chemicals for the reduction of wild herbs and furthermore for the decline of wild animals, whose habitats are being destroyed. Representatives of MoFA confirmed: “Chemical pollution from agriculture is a nationwide problem”. Along with the cocoa industry, a lot of pesticides, especially insecticides to control capsids, but also fungicides and herbicides have been introduced. Due to inappropriate application these chemicals finally pollute streams and groundwater. While various stakeholders on local level (MoFA and District Assembly) put emphasis on the decline of water related environmental services, the pollution and drying out of streams have scarcely been discussed during the focus group discussions, probably due to the lack of awareness. Farmers do not seem to be aware that most of their health problems are probably related to the use of chemicals and subsequently water born diseases. They do not even use the proper protection clothing. The water used for mixing these chemicals and cleaning the spraying equipment is taken out of the streams around the farms. Streams where farmers used to get crabs and fish are now ecologically dead water bodies.

Livelihood needs

As described above communities around the Ankasa Conservation Area use a lot of natural materials for their livelihoods, “but as they have converted all forests into farmland, everything they need, they nowadays collect in the ACA, including hunting” as one representative of the park management mentioned. He further stated: “I do not know anyone who has planted some [NTFPs]. They are all coming from the reserves”. Just few statements were given on the sustainable use of natural

resources: “It is however easier to find leaves for roofing as they are usually found along river banks which we normally do not clear for cultivation. Besides, in harvesting the thatch we do not fell the whole tree but cut just parts of it so it can still be of use later”. Among farmers the continuous hunting with traps, guns and hunting dogs was considered to be the main factor for the decline of wild animals.

Underlying reasons

Apart from the identified threats, underlying reasons and structural aspects are drivers of deforestation. These factors can hardly be influenced by PES schemes and hence affect the success of a future PES scheme.

Population growth

Population growth and a great influx of settlers to the Western Region in the early 90s have increased the pressure on natural resources as reported in PADP (2000a: 22 ff.). One respondent said: “There has been a decrease in forest cover due to increasing population. Initially we were not many but now we have brought forth children and have to give them part of the land. We are increasing in numbers but the land is still the same and fixed”. Settler farmers have moved from other parts of the country to the fringes of Ankasa as forestland is considered to be promising for cash crop cultivation, as described by one farmer: “the most pressing reason why we came to settle here is to cultivate cocoa, oil palm and coconut”. The immigration has changed the traditional settlement pattern (PADP 1999b). Formerly settlements were constituted of small villages. But with the influx of immigrants of different ethnic groups the new settlements are now more dispersed. The higher expanded demand for land led to a more widespread clearance of forests.

Land tenure and benefit sharing

As already described in the previous chapters, the current systems of benefit sharing (see 3.1) land tenure (see 3.2) put strong incentives on deforestation. Farmers have no land security and fear the allocation of uncultivated fields. Furthermore they do not benefit from tree growing and in most cases do not even receive compensation for the destruction of crop resulting from the logging process. Subsequently farmers tend to cut down trees. One representative of the donor community stated that new forestry legislation could solve many problems: “If a farmer got economic revenues from tree harvest, than they would be the best people to protect the forest. Better than any state agency could do”.

Weak law enforcement

Even though most respondents mentioned that it is prohibited to enter the conservation area, illegal activities take place, (see 3.4 Provider). During the transect walks traps were found along the park border (off-reserve) (Figure 9) and hunting dogs were seen in almost all the communities. Apart from the lack of an effective monitoring system concerning the extraction of NTFPs from the ACA, laws are not

enforced regarding transport, processing and trading of these goods. One representative from the park management confirmed that the trade of illegally harvested NTFPs has become a lucrative business: “People extract them out of ACA, especially in the north where monitoring is weak. And then they convey them to the big market centres in Takoradi and Kumasi. There are middlemen, who buy them from the harvesters and sell them. If you walk around Takoradi you see a lot of cane, because it is so important. And handicrafts, bags, chairs, beds, everything”. This accounts also for bush meat. One representative of MoFA complains: “it is not displayed in the open for you to see the bush meat marketing is going on. But the customers know themselves, so they just direct you to a secret place, where they sell and also manage to parcel it and put it in a cocoa sack to camouflage the law enforcement team and then it goes. And even the driver will say, this is bush meat so put it somewhere where I will not have problems on the way (…). They arrest you when you are carrying it from the bush. But the moment it gets to the chop bar and ends up in the soup nobody checks its legitimacy”. Environmental pollution is also not prosecuted since adequate bylaws are missing: “you can wash your spraying equipment in the stream, you can’t cause arrest, unless it is based on a law”. The process to set up bylaws is very complicated and takes a long time, as they have to be gazetted in Accra, as stated by representatives of District Assemblies.

Figure 9: Traps found along the park border during a transect walk.

Potentials and constraints of forest related environmental services

Potentials

- Due to interest and awareness in the national discussion, water related services are the most promising services for a PES in Ghana, especially for the maintenance or amelioration of water quality and hydroelectric power provision.
- On local level, major awareness and interest referred to the provision of timber and NTFPs, which contribute to the livelihoods and the diversification of income. Timber trees (if registered as property) serve as guarantee in times of crop failure and regulation services (such as nutrient cycling, micro climate) promote the agricultural production. Therefore securing the provision of forest related ES strengthens the populations' adaptive capacity.

Constraints

- Missing interest in conservation issues in Ghana, the extinction of wildlife, illegal extraction and trade of NTFPs and the lack of awareness among the population bear constraints for PES schemes that deal with biodiversity and landscape beauty. Furthermore the potential for ecotourism is considered to be rather low as adequate infrastructure is lacking. Even if a sustainable land- and resource use around ACA is established through PES, the lack of an effective monitoring system and weak law enforcement regarding the trade of bush meat and illegally extracted NTFP undermine the additionality of the measures for biodiversity benefits on-reserve.
- Large-scale agricultural production such as monocultures of cocoa and rubber and commercial exploitation of natural resources by timber and mining companies are accused for the ongoing degradation of forest cover and the loss of ES. High opportunity costs regarding the change of these land- and resource use practices towards more sustainable ones limit the potentials for a PES in this sectors.
- Further underlying reasons such as current system of land tenure and benefit sharing, population growth and migration processes and the perverse pricing of cash crops threaten the success of a PES that aims at financing conservation, afforestation and reforestation.

3.4 Assessment of the ecological intactness for pricing and monitoring of environmental services

Successful implementation of PES is not exclusively determined by the willingness of the involved stakeholders. It also depends on:

(i) whether the ecologically status of the study site is suitable for the implementation a PES scheme that can produce a considerable additionally in the provision of biodiversity-related ES through land use change. This is of special importance when donor funds are bound to environmental conservation.

(ii) whether the expected running costs of monitoring of consecutive provision of environmental services and their pricing is a limiting factor in a potential PES scheme. Therefore, a cost-efficient monitoring plan is a prerequisite for sustainable agreement on a contract.

In order to assess the ecological state, triangulate statements of the FGDs, and to develop a cost efficient tool for monitoring and pricing of ES (specifications of design in chapter 2.2) in Upper Guinean Rainforest we made 29 single assessments of forest stands on 10 transects associated with the randomly chosen sampling spots (sampling spots in Figure 5, associated transect locations in Figure 6). Our samples extended from primary to completely degraded secondary forests. Ranges of the monitored parameters are presented in Table 4 and more detailed data found in Annex X.

Table 4: Ranges of the assessed parameters between 29 samples of tropical forests in different ecological states at the boundary of the Ankasa Conservation Area.

Parameter	Unit	Range
canopy storeys	[number]	2-3
Heights of canopy	[m]	15-45
Canopy cover	[%]	20-80
Timber trees	[number 0.01ha^{-1}]	0-14
Secondary trees	[number 0.01ha^{-1}]	0-25
Dbh largest timber tree	[m]	0.75-2.4
Dbh largest secondary tree	[m]	0.1-1.4
Secondary bushes	[number 0.01ha^{-1}]	0-140

vines	[number 0.01ha^{-1}]	12-470

Benchmark for designing the calculation of the ecological intactness (EI) of the monitored forest stands is the order (ranking) of ecological intactness as estimated by two tropical ecologists in the field (summarized in Table 5, listed in the order of estimated intactness). In other words: we tried to meet the appraisal of people highly trained in assessing the ecological status of forests by setting up an easy calculation paralleling their ranking with only these parameters which appear in Table 4,

Table 5: Monitored forest stands listed in order of their estimated ecological intactness (EI) and description of the reasons for ranking decision.

Sample site No.	Estimat. order of EI	Description of reasons for ranking decision
X	1	Primary forest, harbouring a great number of large timber trees. Secondary trees and bushes only occur in natural canopy gaps.
7	2	Secondary forest high in its succession towards primary forest. Single secondary forests clearly remnants. Dense three storey canopy with overstanding trees, light undergrowth.
11	3	Recently invaded primary forest, thus samples are heterogeneous. One sample primary forest ranging higher than sampling spot 7, one slightly impacted towards secondary forest by local selective logging and two strongly degraded with high abundance of *Musanga cecropioides* (typical pioneering/secondary tree).
6	4	Very similar to sampling spot 7, but large overstanding trees and third storey missing in one of four samples.
5	5	Comparable to 6, although old strip clearing, promoting dense vine curtains at that time, still visible today. Good succession, healthy natural regeneration, timber trees abundant.
9	6	Invaded secondary forest, two storeys with single larger trees. *Musanga cecropioides* and *Drypetes spec* occurring. Natural regeneration started. One sample healthy secondary forest in transition.
8	7	Secondary forest with poor secondary storey and low canopy cover, often overgrown by vines. Single huge trees growing directly at the shore of a small tributary which due to local believe will fall dry if trees are felled. Dozens of traps indicate severe bushmeat hunting.
2	8	Invaded secondary forest, high abundance of *Musanga cecropioides*, *Myrianthus arboreus*, and *Drypetes spec*, latter delivering majority of seedlings for natural regeneration.
Second-dary patch	9	Whole stand *Musanga cecropioides* with vine-overgrown herb storey as second storey. Hard to be called a forest at all. Only existing because of protecting small brook (local believe). This secondary patch was found on a transect crossing the agriculturally

		used fringe of the ACA.
13	10	No forest, only Cocoa-plantations.

We developed and tested simplified mathematical approaches in order to produce good congruence between the results calculated this way and the ranking of the different forest stands concerning the ecological intactness as estimated by us. The simplest formula tested already produced good congruence, expressing the 'percentage missing to be a primary forest':

Formula 1:

$$((storey_x * cover_x) *(storey_{prim}* cover_{prim})^{-1}+ timber_x*timber_{prim}^{-1}+dbh_x*dbh_{prim}^{-1}) * 3^{-1}$$

where *storey* is the number of canopy storeys, *cover* the percentage of canopy cover, *timber* the number of timber trees and *dbh* the diameter at breast height of timber trees, for $_x$ being the tested forest stand and $_{prim}$ a primary forest selected for purposes of comparison. In our case the ecologically best preserved forest stand is represented by sampling site X represented by the best preserved single spot at this sampling site.

We decided to weigh the canopy cover by the number of storeys as also a highly degraded forest can produce high canopy cover rates, especially when vines are involved, thus deteriorating the measure. Canopy heights were dropped as a measure of ecological intactness as they basically turned out as a function of natural differences between the ecological niches.

Abundance and diameter of timber trees should serve as a suitable proxy for ecological intactness, as they are among the first victims when a forest is used.

Formula 1 represents the positive approach by describing what is left over from a primary forest. Furthermore, we decided to address the question of change in terms of secondary and pioneer species by altering formula 1 to:

Formula 2:

$$((storey_x * cover_x) *(storey_{prim}* cover_{prim})^{-1}+ timber_x*timber_{prim}^{-1}+dbh_x*dbh_{prim}^{-1})+ (1-(sectree_x*sectree_{prim}^{-1}+secbush_x*secbush_{prim}^{-1})))* 5^{-1}$$

where *sectree* is the number of secondary tree and *secbush* the number of secondary bushes. The newly introduced term to formula 2 is the reciprocal to the abundance of individuals of secondary species and thus interpreted as measure of non-realized negative ecological impact (NE).

The also assessed diameter of secondary trees was without use for the cause as it quickly turned out that a large secondary tree does not lead necessarily to lower ecological intactness. He could be the only one, closing a natural canopy gap. The same problem occurred with the number of vines. Once they were found at the forest stands clearly because of degradation processes, the other time because of natural gaps. Therefore vines only serve as measures of ecological intactness when species are addressed, what was clearly too complex for our purposes.

We considered our calculations to be suitable to display reality if both formulas yielded comparable results. This was the case (r = 0.91, y= 1.29; Figure 10). Since simplicity was of major concern in the development of our monitoring tool, we considered formula 1 as best choice.

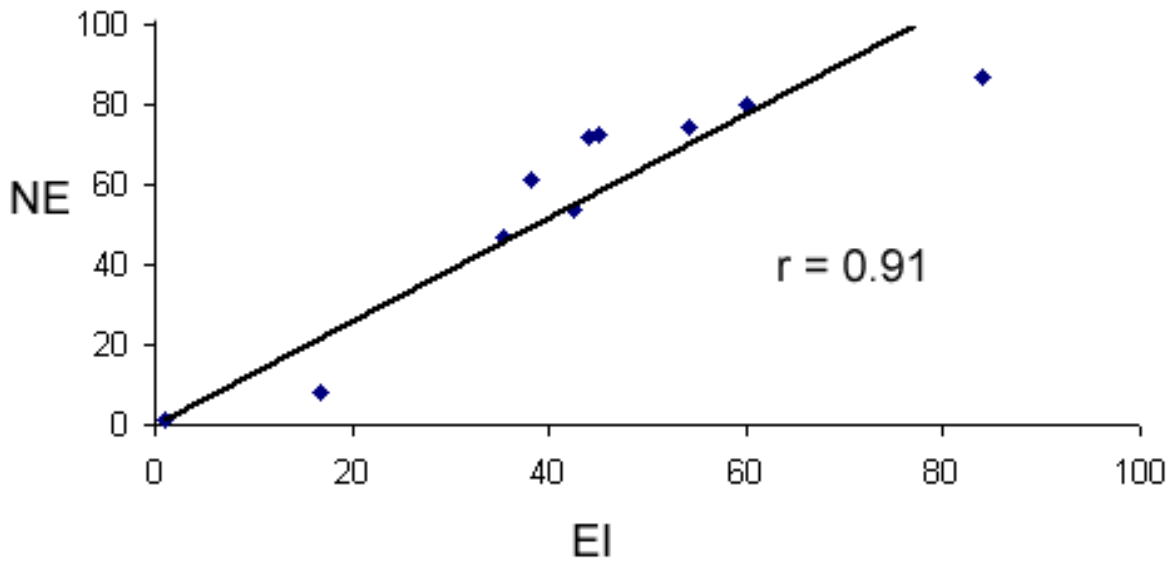

Figure 10: Comparison between the results of formula 1 (ecological intactness, EI) and formula 2 (non-realized negative ecological impact, NE)

Disagreement between estimation and calculation of ecological intactness was low and only occurred twice, mixing two pairs with very similar values calculated (Figure 11). Therefore formula 1 seems to be a suitable tool to assess the ecological intactness of a forest stand in Upper Guinean Rainforest without causing high monitoring costs. Thus, PES in Upper Guinean Rainforest is not limited by monitoring costs. Box 3 gives some examples of forest pricing and monitoring.

Figure 12 gives an overview of the ecological intactness of forest stands close to the forest edge of the Ankasa conservation area.

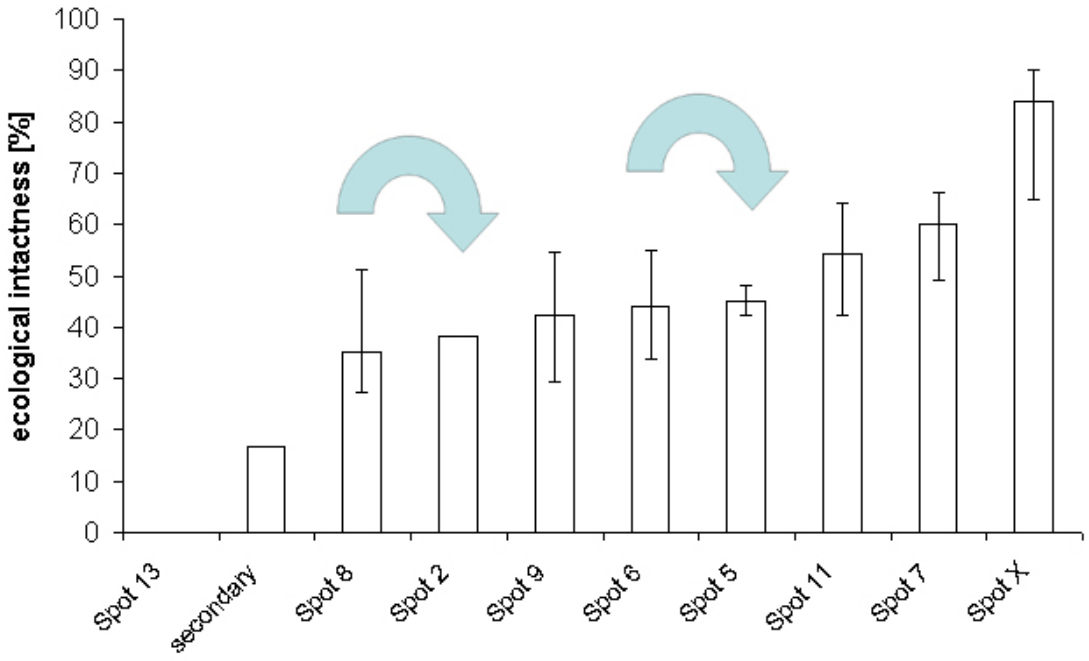

Figure 11: Average ecological intactness of forest stands along transects at the border of the Ankasa conservation area. Spot indicates to which sampling spot the particular transect belongs. Blue arrows indicate discrepancies between the estimated and calculated rankings (Table 5). This means spot 8 was estimated by the tropical ecologists to be more intact than spot 2, and spot 6 more than spot 5. This discrepancy is without any drawbacks to the calculation method since both pairs of columns are not significantly different (=almost share the same value). Error bars are ranges of the samples of a given transect.

The other type of transect performed, crossing the agriculturally used fringes of the ACA for 500m in right angle to its boundary produced no specific results beside one: the predominantly grown crop at the fringes is Cocoa. Farmers grow Cocoa at the fringes of the ACA because Cocoa grows better under the microclimatic influence of an existing rainforest (oral communications with people caring for their Cocoa in the field). This is just another example how environmental services can attract users who subsequently alter the pressure on natural ecosystems directly.

Another impression: if the Ankasa Conservation Area loses its legal protection status it will quickly end up as a Cocoa plantation.

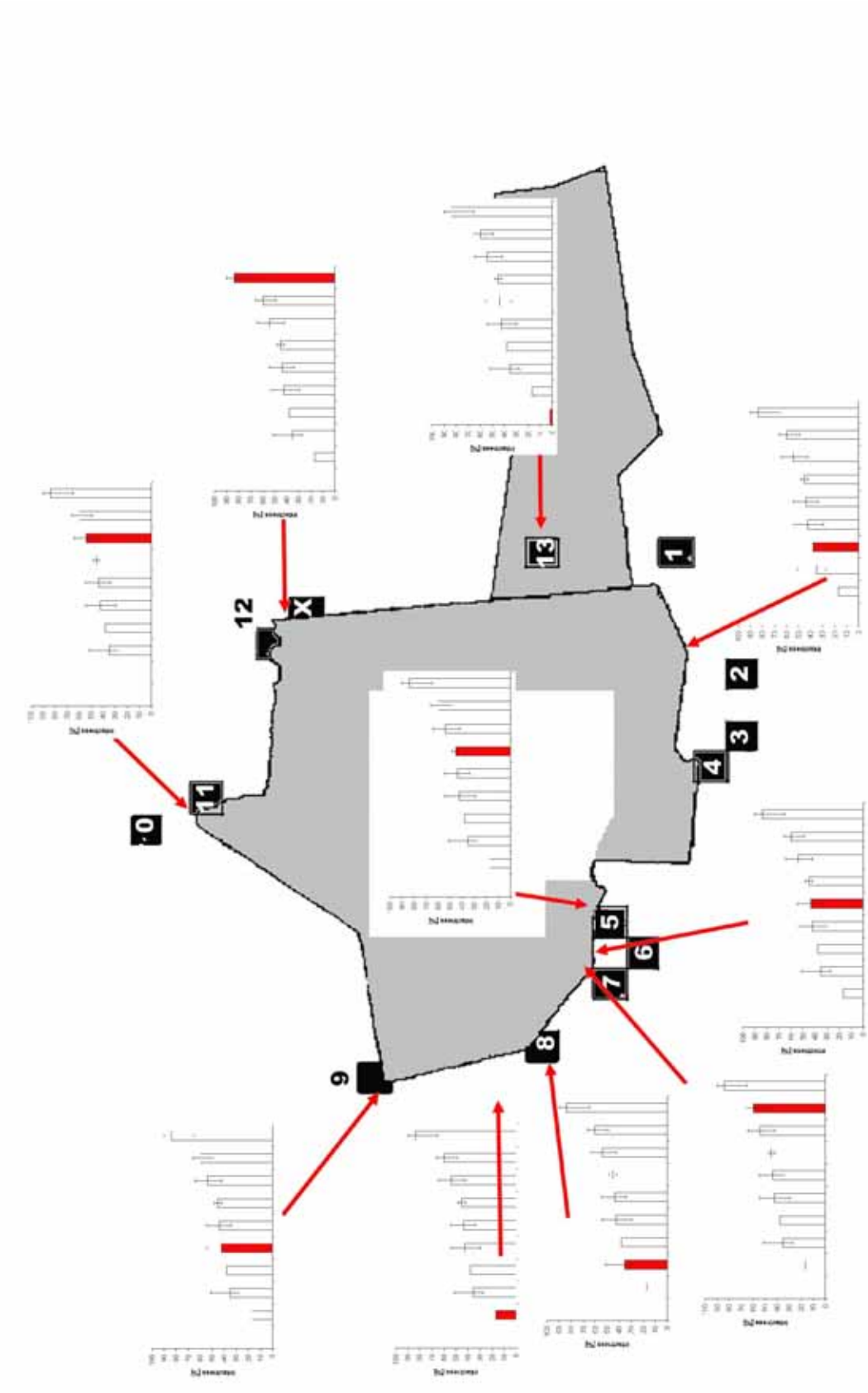

Figure 12: Overview of the ecological intactness of forest stands at the border of the Ankasa conservation area. There is a difference to be observed between north and south. Relatively high values of transects belonging to sampling spots 5, 6, and 7 are probably due to the direct proximity of the guards headquarter and additional protection by a river.

Comparing verification of ecological and socio-economic data obtained.

Where there was qualitative data obtained at transects which was found suitable to support and discuss socio-economic findings from the focus group discussions it already appeared in the pertaining chapters. In particular the “official” local version concerning poaching and the situation in the field often did not meet.

Most of the ecological status of the forest plots was explained by their location. It is determined by the grade of remoteness (e.g. road excess). Furthermore the ACA is composed of a pristine northern part and still degraded southern part caused by former thinning activities (Figure 12). A further reason for the ecological status is terrestrial properties like shielding by a river which is difficult to cross often forming the boundary of the Conservation Area. But there is some evidence of socio-economic influence, especially in sampling sites 5-7, where a high ecological intactness in a relative poor surrounding is maintained by the combination of a river, the relative proximity to the ACA headquarters (higher risk to do illegal activities), proximity to a CREMA, and a local chief who is committed to conservation of nature, protecting stretches of vegetation along the riverbanks in the agriculturally used landholdings outside the ACA.

Furthermore, we calculated some trends concerning the lifespan of local settlements, the total area of their agricultural landholdings, and how intense they are using it. It must be stated that the data base for this trend analyses is questionable, since only the sampling site but not the persons interviewed where chosen randomly, yielding an also poor n (number of sampling sites) of seven. Trends were the following:

(i) the longer settlers stayed in an area the better was the ecological state of the adjacent forest in the ACA. This surprising trend might point towards a higher identification with ‘one’s own turf’ leading to advanced ecological sensitivity, growing with the years of permanence ($y=0.35$; $r=0.55$; $n=7$).

(ii) Both, permanence of settlements and area of land owned correlate highly significantly ($y=0.3$, $r=0.96$, $n=7$). This means that the chiefs allocated larger landholdings to early settlers and that the size of leased area declined over the years.

(iii) The obvious assumption that smaller leased areas lead to a higher percentage of farmlands per leased area (=less fallows) is not supported by our data. On the contrary, the more land settlers lease, the more intense they use it ($y=0.37$; $r=0.61$, $n=7$). A possible explanation might be that the late settlers had not sufficient time yet to cultivate all their land.

(iv) Land use pressure in the fringe area of the ACA seems somehow decoupled from the ecological intactness of the adjacent forest, thus illustrating that the boundary of the ACA is a real border by all means: the higher the area cultivated per lease, the better was the ecological state of the adjacent forest in the ACA (y=0.35, r=0.43, n=7) which is against any expectations for unprotected fringe communities close to primary forests.

Box 3: What to do with the ecological intactness index: pricing and monitoring of biodiversity- related environmental services

Formula 1 looks complicated, but in fact it isn't. It is just based on the assumption that in a secondary forest there is something missing to become a primary forest. For example: one has found 5 timber trees >0.3m dbh per 100m^2 in a secondary forest which is monitored, but it is known that e.g. on average 10 timber trees per 100m^2 are found in local primary forests. This means that this secondary forest already contains 50% of the trees it takes to become a primary forest. If one calculates the percentage for every of the four parameters in formula 1 (don't forget that the canopy cover is weighed by the number of storeys), and thereafter calculates the mean value of the results, one obtains the "ecological intactness (EI)". Formula 1 is written in such way that results will be between 0 and 1, so for example "0.63" means 63% EI.

Likewise, the pricing is easy: If one knows that a primary forest is of a certain value for the biodiversity oriented donor, under the assumption 1000$ per hectar and year (again: this number is not a real amount and was chosen for explanatory purposes), your EI of 0.63 (or 63%) means in comparison that your forest has a value of 630$.

The alternative land use to just let your secondary forest become a primary forest is slashing it down to plant hybrid cocoa. Just like it is practised around the ACA. One can produce 2250$ worth of Cocoa beans a year (real amount given by a representative of a farmer association), and the internal rate of return (IRR) of unshaded hybrid cocoa is 55% (Obiri et al. 2007). This means returns of roughly 1230$ per ha and year. Therefore, the opportunity costs are 1230$ minus 630$ leaves 600$ (providing somebody is willing to pay 1000$ for one hectar of primary forest as in this example). This opportunity costs should at least be covered by a PES to create an incentive not to destroy the forest by making a better deal for the landowner and the land-user now acting as land-manager (not necessarily the same person).

Another example: the environmental service provider has agreed on maintaining a huge forest area in at least the same ecological status it has been when the contract was signed. The average EI of 5 randomly chosen samples was 0.83 or 83% at this

time. Whenever one comes back for monitoring, again 5 (or less) sampling sites are chosen randomly.

The monitoring itself will take you about ten minutes per sampling site provided the people are trained. Although this does not count the time needed to approach the area.

If the provider of the ES in this example thinks he can take advantage by keeping the visible parts of the forest intact and log the trees, he faces the risk that such spots are randomly selected during the next monitoring, dropping the EI of the whole region, that is also his payment. In this way a strong incentive is created to care for the whole area and not just the accessible parts. So if one finds the EI at 0.64 during the next monitoring one knows that something went wrong. Penalty fees for each drop of e.g. 10% of EI could be agreed upon in the celebrated contract. This does not violate conditionality if both parties agree upon a sanction system. Generally it must be stressed that the basis of assessment for such penalties shouldn’t be smaller than 10%, as the described monitoring method also produces some variation.

3.5 Provider and land use change

When discussing who could be a potential provider for environmental services, the following questions have to be taken into account:

(i) Who causes a tangible threat on environmental goods and services and could therefore ensure the further provision through land- and resource use change?

(ii) Does the provider have the capacity to change his land- and resource use in a sustainable way?

(iii) What should the provider do to receive the payments and does this contribute to further service provision (conditionality)?

After giving an overview over potential providers resulting from our interviews with key stakeholders, a closer look will be taken at the local population of the fringe communities of ACA and their potentials to act as possible providers.

(I) Threats and potential providers

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. Table 6 gives an overview over the threats identified in chapter 3.3, their effects on forest related ES and potential providers who were considered to be responsible for reducing the threats.

Timber and mining companies

Due to overexploitation of natural resources, timber and mining companies are accused for the ongoing degradation of forest cover and subsequently the loss of ES. High profits resulting from commercial land- and resource use practices imply high opportunity costs. These high opportunity costs limit the probability to find potential buyers and thus exclude companies from being a provider in PES schemes. One representative of the management of an international timber company stated that his company is not interested in PES as they are already involved in Cooperate Social Responsibility projects. He is more interested in carbon sequestration projects (e.g. Clean Development Mechanism) since they are more promising in view of internal returns.

Table 6: Identification of threats and potential providers of environmental services.

Threats	Effects	Responsibility/ potential provider
Commercial overexploitation of natural resources		
• Timber logging	Deforestation	Timber companies GoG (FSD)
• Gold mining	Deforestation Pollution of streams	Mining companies
Unsustainable land- and resource use		
• Agriculture (cocoa, rubber)	Deforestation	Land users Land owners
• Unsustainable land use practices	Deforestation (slash and burn) Loss of soil fertility Pollution of soil, groundwater and streams	Land users Land owners
• Livelihood needs	Extinction of wild life Decrease of NTFPs on-reserve	Land users
Underlying reasons		
• Population growth and migration	Deforestation (high land use pressure)	Not specified
• Land tenure and benefit sharing	Deforestation (perverse incentives)	GoG
• Weak law enforcement	Deforestation Biodiversity loss (poaching) Pollution (missing bylaws)	GoG (FC) Park Management
• Promotion and perverse pricing of cash crops	Deforestation	GoG (e.g. COCOBOD), Ghana Rubber Estate

State Agencies of Ghanaian Government

According to their responsibility for managing the forests and therefore ensuring watershed protection the Forestry Commission (FC) defined its role as provider of environmental services (representative of the FC). Their major interest in PES is to raise money for sustainable forest and wildlife management. Also the park management of ACA saw itself claimed the role to be a provider of environmental services. Concerning government agencies as recipients of payments one representative of an international NGO saw the challenge to ensure that payments reach the local service providers. Reconsidering the findings on weak law

enforcement and missing capacity of state institutions (chapter 3.1 and 3.2), we conclude that it is highly questionable whether additionality of a PES can be secured by paying state agencies for performing their tasks.

Land owners (traditional authorities)

As the traditional authorities have the power over current land- and resource use on stool lands, they are of great importance for service provision. On the 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, e. g. tenant farmers are not supposed to cultivate along river banks. Some of these regulations are based on traditional beliefs that help conserve nature, such as trees on riverbanks are sacred. 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, e. g. one chief mentioned that he has already planted trees but that it is difficult to convince farmers to follow his example if they do not benefit from tree planting. The same respondent showed a great interest in sustainable land- and resource use and expressed his willingness to contribute to a PES scheme.

Land users (farmers) and CREMAs

Since Community Resource Management Areas (CREMAs) introduce sustainable land use practices and set up rules on local land and resource use, respondents often referred to them as potential providers within a PES scheme. CREMA representatives showed interest in afforestation and agroforestry, as one representative mentioned: "We are essentially interested in afforestation, there is a potential of around 100 acres (40,5 ha) in our CREMA. But this has to be paid for". As already shown, CREMAs are still in the phase of constitution and lack human, financial and technical resources and are not recognized by the whole population. Nevertheless they could serve as an organisational structure and entering point for the establishment of a PES scheme.

An interview partner from the MLFM stated, "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. And they are aware, ready to react and willing to help and cooperate". 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.

Our findings match the assumption of WUNDER (2007: 53), 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, timber and mining companies disqualify because of high opportunity costs and low interest. Therefore we concentrate on farmers who significantly affect the provision of environmental goods and services through their current unsustainable land- and resource use practices. We therefore take a closer look at their power, capacity and willingness to change their land use.

(II) Farmers' capacity

To estimate the farmers' capacity to contribute to a PES scheme we assessed their access to land, their economic activities, their current land preparation practices, and their ideas on opportunity costs.

Size of landholdings

With 48 respondents, the majority of the farmers we interviewed own small land holdings less than 20 acres. 13 respondents cultivate up to 40 acres of farmland and seven even more than 50 acres (Table 7). Besides that, various farmers possessed fields at different locations. Only two communities, which were dominated by settlers, had all fields located at one place.

Table 7: Land size of farmers around ACA.

Land size in acre	No of respondents (N=75)	In %
1-9	26	34,7
10-19	22	29,3
20-29	7	9,3
30-39	6	8
40-49	3	4
> 50	7	9,3
No statement	4	5,3

Economic activities

The main occupation of the participants involved in the focus group discussions was farming. The main cash crop is cocoa, which was grown in all communities. Beside cocoa, they cultivate oil palm, rubber and coconut. Furthermore, plantain, cassava and pineapple are regarded as important, which are both commercial and food crops. Yam, cocoyam, maize, tomato, onions, garden egg, beans, okra, chilli pepper, ginger and citrus are produced at a smaller scale for subsistence farming and small-scale trading (petty trading).

Whereas just a few farmers are engaged in off-farm employment (palm wine tapping, chain saw operating, carpenters, drivers) small-scale trading plays an important role to women who sell foodstuff on local markets. The importance of non-timber forest products for the farmers' livelihood systems and the farmers' perception of their decreasing availability have already been discussed in chapter 3.3 environmental services.

Current land preparation practises

Slash and burn was the most common land use practice, applied to convert forestland to cultivate cash crop. Most tenant farmers initially cleared all their fields, whereas some cultivated their land step by step, as one farmer described: "we can't cultivate the whole land we acquired in the first year. At least every year we cultivate three acres and this is done successively till the entire land given to you is under cultivation". The clearing process was described as followed: the farmers fall trees using chain saws or axes. Bigger trees are cut into pieces and used for charcoal or firewood. After burning, the land is allowed for one or two rains/ up to one month to fallow before cultivation starts. During the first three years after initial clearing intercropping with food crops is carried out to provide shade for the cocoa trees. Then only cocoa remains while all other crops are removed.

With regard to secondary forest or bush land farmers clear the vegetative cover without burning it. Farmers sow their seeds, leave organic material to decompose and further apply organic manure or fertilizer.

Foodstuff production usually implies a three to five year fallow period, but the duration of fallow has reduced due to increasing land use pressure. The time land is left as fallow depends on the farmer's access to land and the availability of fertilizer. Just a few farmers practise a four-year land rotation cycle on the piece of land that has been set aside for cultivation of food crops.

Opportunity costs

For successfully establishing PES schemes, it is crucial to identify the opportunity costs and see what yields higher returns at the local level. Experience shows that farmers are more likely to participate in a PES scheme when foregone costs are modest, e.g. if the crop cultivated on their land does not give good yields. In case of low opportunity costs small payments can “tip the balance” to make conservation the more attractive land use option (WUNDER 2005). “A farmer will always grow cocoa if it brings the best revenues. But, opportunity costs also include the whole package: social, cultural, environmental and technological aspects“, one representative of the government mentioned.

The farmers had specific ideas on the amount of payments. Different factors for determining the amount of payments were named. Farmers stated that “compensation” payments for setting aside farmland should cover the foregone revenues of the specific crop or the number of timber logs to be cut on the land. Some communities suggested linking the payments to the yield and the life span of the crops. For example, one representative of a farmers association indicated that he gets 60 bags of cocoa from 40 acres. Payments therefore should cover the income from the 60 bags multiplied by the lifespan of his plantation, which he estimated to be about 50 years. In case native farmers become providers, respondents mentioned that the number of family members that depend on the cultivation of land should be taken into consideration.

Other farmers suggested input based payments that are bound to the number of trees planted or the size of the afforested land. Farmers furthermore requested for technical advice and inputs such as seedlings.

Another option to calculate payments for land use change is based on the contribution made to protect biodiversity. The valuation of biodiversity friendly land use could be based on a biodiversity conservation index as suggested by PAGIOLA et al. (2002), that scales the most biodiversity-poor land use and the most biodiversity-rich land use (primary forest). This form of output-based payments may cause high transaction costs, as the level of provision is difficult to be observed by land users (ENGEL et al. 2005). A cost efficient suggestion for pricing and monitoring is given in Box 3/ chapter 3.4.

(III) Farmers' willingness to change land use

To secure biodiversity related environmental services, farmers have to change their land and resource use practices towards more sustainable ones. "Forest conservation, reforestation, afforestation and agroforestry projects (...) can potentially help mitigate climate change, support local livelihoods, provide biodiversity benefits and restore watershed functions" (REID and SWIDERSKA 2008: 4). At the same time, these measures contribute to the adaptive capacity of the rural population to cope with future changes. Three options of land use change, that have been considered in our focus group discussions and interviews were analysed, regarding the farmers' willingness:

a. Conservation and avoided deforestation
b. Reforestation and afforestation
c. Sustainable land use and agroforestry

Box 4 gives an overview on how to define the quality and quantity of land use change.

Box 4: How to define quantity and quality of land use change

As defined by WUNDER (2005) environmental services or a land-use likely to secure that service have to be well defined in terms of quantity and quality. In an area-based scheme, the quantity would be specified through land- and resource-use agreements on a defined number of land units, e. g. the restriction of logging and poaching activities and the extraction of NTFPs at a selected area. In product-based schemes, consumers pay for environmental friendly production as a "green premium" on top of the market price (WUNDER 2007: 51), e. g. shade-grown cocoa, certified timber or eco-tourism. These schemes, however, depend on market access and price fluctuations (ibid.).

Regarding the quality of land use change, it should be noted that different forms of land use have a different effect on the provision of ES „ranging from relatively inhospitable systems such as monocultures with heavy agrochemical use to relatively hospitable systems such as organic coffee grown under a diverse shade canopy of native species" (PAGIOLA et al. 2004: 9). Furthermore, the measures might have adverse effects on different environmental services. "While large-scale monoculture plantations might be effective carbon sinks, their biodiversity benefits are minimal and they are more vulnerable to pest attacks, which could cause the loss of planted trees. If the reforestation projects replace native grassland, wetland, shrub- or

heathland, dramatic biodiversity losses may result while leaving any boost in carbon sequestration open to question" (REID and SWIDERSKA 2008: 4). Nevertheless commercial tree plantations off-reserve may contribute to the protection of biodiversity on-reserve, as the cultivation of overexploited NTFPs like rattan may reduce the pressure on forests.

Therefore the quality of afforestation/ reforestation measures can be specified by the variety of planted tree species, whether the species are indigenous or exotic and where the activities are located. Biodiversity-friendly land use practices are the more likely to contribute to the provision of biodiversity related ES the closer they are located to the park frontier. Furthermore the establishment of riparian forests or closing gaps between existing forest patches create bio corridors (PAGIOLA et al. 2004: 9). The agreement should further comprise, whether and to which extend a sustainable resource use is allowed and how this can be monitored.

a. Conservation and avoided deforestation

In seven out of eleven communities, the farmers had already cultivated the majority of their fields, only in four communities there were more remaining uncultivated fields. Due to loss of soil fertility and increasing demand for agricultural lands there is huge pressure on forest resources, as farmers stated during the discussions: "We have already used all our fields to cultivate crops and as you can see our population is increasing resulting in increased demand for farmland". As a result there is not very much forest remaining off-reserve that could be interesting for a PES aiming at conservation.

Concerning Forest Reserves, a representative of MoFA critically remarks, that the population is excluded and has no direct benefit of conservation. Farmers' concern that the government would claim the ownership over (naturally occurring) forest trees limits their willingness to participate in conservation programmes: "In the case of conservation, I will sell the land after the land has become forest", one farmer stated. Experiences with conservation based PES schemes show, that maintaining the forests tend to reduce labour demand. Therefore farmers are more likely to participate in changing land use practices (reforestation and afforestation or sustainable land use and agroforestry) (ENGEL et al. 2008). Furthermore, the foregone costs for avoided deforestation might be higher than retaining land uses.

b. Reforestation and afforestation

Even though farmers are aware of the manifold benefits they gain from forests (3.3 Environmental services), they have to face several constraints when taking part in afforestation or reforestation programmes. When asking farmers what they would lose by planting trees on their land, the following arguments were given:

- *Loss of land tenure:* Farmers are very concerned to lose access to their land if they do not cultivate it (see 3.2.).
- *Loss of property:* Even though a farmer might not be the owner of the land he cultivates, tree cash crops that remain on the land for a longer period of time, such as cocoa, oil palm, rubber, coconut are referred to as his property. As most respondents have already cultivated all their land, it is not likely that they participate in an afforestation/ reforestation programme if they have to cut down their property that serves as their natural capital.
- *Food security:* In six out of the eleven communities, respondents express their concerns about food security: “If you put aside your land to grow trees, where will you get land to cultivate enough food crops? Even if you grow trees to get money you will still need to buy food, hence growing trees on the land could push you into a tight corner”.
- *Loss of crop and further economic considerations:* In six communities, farmers expressed their concern about shading trees that would affect food crop yields. In two communities the effects on rainfall patterns were seen critical: “If we plant trees we will get excessive rains because we are closer to the forest”. Some farmers fear the increase of pests and plant parasites. Regarding the occurrence of single native timber trees on their farms, farmers fear the destruction of their crop when timber is harvested by contractors: “When your crops are destroyed through the tree harvest you receive a compensation of only GHC 5. So when timber species start to grow on our fields, we cut them down”.
- *Further economic considerations* refer to the duration of tree growing until first revenues can be obtained. While cocoa takes about three years to mature, forest trees take about 30 years before they can be harvested. Meanwhile, farmers will not have enough land to cultivate food and cash crops: “You will lose a lot because one acre of cocoa plantation can yield between GHC 250-300 per month”.

Farmers suggest integrating tree growing on uncultivated parts of their land: “We should not cultivate all our fields. We should reserve the uncultivated portions for tree planting while maintaining the cultivated ones by weeding, clearing and applying

fertilizer". Regarding existing experience with agroforestry, one representative of MoFA stated that in his district farmers attended a workshop, where they were told to grow timber species on their farms (*Terminalia avorensis, Mahogany, Cedrella odorata, Entandophragma angolense*). Farmers stressed that they would only participate in afforestation issues, if seedlings as well as the necessary knowledge were provided to them, since producing own tree seedlings is very difficult because most native forest species need mycorrhizal seed beds.

c. Agroforestry and sustainable land use practices

During our focus group discussions, land users were asked how to change their land- and resource use practices towards more sustainable ones. Most farmers favour more sustainable farming practices and suggested the following measures to secure ES: Land clearing practices and 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 the farm when they planted cocoa, but in these days everything is cut down and direct sun light will harm the cocoa trees. Some trees should therefore be left on the farm to prevent this trouble". Multipurpose trees should be cultivated to deliver NTFPs such as chewing sticks, thatch, etc. which have become scarce in the region.

Interview partners from the district assemblies and MoFA suggested the following approaches: collaboration between WD and farmers should be intensified, regarding the protection of the environment, the reduction of the rate at which wild life is being hunted and the creation of opportunities for sharing the benefits from the protected areas. In relation to law enforcement, farming on the riverbanks should be prohibited to prevent silicification and drying out of rivers. Keeping dogs in the forest area should be banned as they are mostly used to hunt wild animals. Farmers should rear domestic animals instead of hunting wild life. One representative from the District Assembly stated in an interview that demonstration farms should be built up to provide knowledge on sustainable land use practices.

Most respondents do not have specific experience with agroforestry systems. It seems that they have difficulties to distinguish agroforestry from commercial tree planting or other forms of intercropping. Information generated from MoFA disclosed, that some NGOs have introduced agroforestry in co-operation with the CREMAs. One CREMA representative mentioned that in his community four acres of bamboo plantation exist since an international NGO trained people on how to grow bamboo

and chewing stick. Examples given by farmers comprise the plantation of shade trees like coconut among cocoa trees and the plantation of rattan in addition to cocoa to provide construction materials.

The discussions with the farmers revealed the need for technical assistance to put them into a position to change their current land- and resource use practice. Others required knowledge on agroforestry because currently cultivated crops do not do well: “The government should provide us with tree species that we can integrate into our food crops avoiding negative effects, and at the same time help protect the crops and make the soil more fertile. We cannot simply stop farming”. Modern farming techniques, application of fertilizer and chemicals, education on environmental issues and the introduction of alternative livelihood programmes were further required. Some farmers stressed that extension officers should intensify their campaigns.

Most respondents have not benefited from the services of extension agents during the past years. One representative of MoFA explains that in his district there are six extension officers who have to care for more than 1000 farmers. A district planner confirms that only about 40% of the farmers have access to extension officers. However, those farmers who approached the extension agents were given information on sustainable ways of cultivation, plantain propagation and identification of plant diseases. MoFA is further engaged in the introduction of alternative livelihoods and the promotion of forest conservation along the rivers and along the border with Cote d’Ivoire.

Education on the sustainable use of natural resources is further realized through CREMAs. One farmer stated “CREMA is providing us with education on how to protect the forest and how to conserve useful trees, which could be beneficial in future. CREMA has also introduced to us how to produce snails, mushrooms and bee keeping.” He added that because they are busy farming their land, they do not have enough time to grow trees but have planted bamboo and chewing sticks. During the focus group discussions farmers in CREMA communities show a better understanding and awareness of environmental issues than in communities without CREMAs. Further activities concerning alternative livelihoods like fish farming, pig and poultry rearing, growing chilli pepper and planting timber trees have been promoted by an international NGO. Therefore some respondents might have difficulties to distinguish between government extension services and NGOs activities.

Regarding existing PES schemes, it is difficult to get large parcels of land for large-scale agricultural farming especially when perennial crops are grown. This requires

often difficult, frustrating and sometimes expensive negotiations with a large number of allodial title holders (ASUMADU, 2003). Due to experience (ENGEL et al. 2008) a collective of PES providers requires intra-community distribution of payments and hence causes higher transaction costs. Thus the question comes up, whether the ES benefits are sufficient.

Box 5: Shade grown cocoa as an example for agroforestry

One example of sustainable land use that serves to provide ES is shaded cocoa. Compared to other perennial agricultural crops shaded cocoa has been described as the crop that "in some way preserves a forest environment and its biodiversity" (RUF and SCHROT 2004). Shaded cocoa contributes to farmers' livelihoods by income generation through cocoa and timber, as well as the provision of NTFPs. Further benefits are a high soil quality that prevents farmers from clearing new land and reduces the quantity of applied chemical fertilizer and pesticides (LANDELL-MILLS and PORRAS, 2002: 45). According to OBIRI et al. (2007) trials with shaded cocoa plantations in the Ashanti Region in Ghana did not only show reduced damages to cocoa by pests, but the shade grown hybrid variation is economically profitable achieving an Internal Rate of Return (IRR) of 57%. Furthermore the authors estimate that Ghana should reforest 25% of its land area to favour cocoa production.

Further research is needed regarding a cost benefit analysis of specific land use options and the assessment of additionally, leakage and other side affects in respect of a potential PES scheme.

Potentials and constraints of potential providers for PES

Based on our findings we found the following constraints and potentials for PES concerning the potential providers:

Potentials

- The traditional authorities (chiefs) possess the power over land- and resource use of Stool Lands and must be involved in any decision making processes concerning land use change.
- The land users (farmers) themselves are considered to be the most appropriate providers of ES in the fringes of the ACA as they cause a tangible threat on the service provision through unsustainable land- and resource use practices. Due to their awareness of environmental changes and the impacts of their activities on ES and the moderate opportunity costs, farmers have the capacity to provide ES.

If they get paid for growing/conserving trees and receive the necessary knowledge and technical support, they are willing to participate in a PES.

- Farmers are more likely to participate in a PES scheme, if sustainable forms of land use and food production are still possible. Therefore agroforestry and the change of agricultural practices towards more sustainable ones are seen as more promising. Some farmers show interest to set aside the uncultivated parts of their land for afforestation and reforestation, which is only possible while improving/ intensifying the agricultural productivity on the rest of their farmland. The cultivation of exploited NTFP off-reserve may reduce the pressure on forests and contributes to the livelihoods and strengthens the adaptive capacity of the local population through the diversification of income.
- Around the ACA, there are some institutions that have experience to built up capacities among the land users through technical assistance, agricultural consultancy and provide education on natural resource management. These are the extension service, non-governmental organisations and the CREMAs. Especially CREMAs have the potential to strengthen the capacities of the land users to implement land use changes, to create awareness on environmental issues and to organize farmers.

Constraints

- High opportunity costs regarding the commercial exploitation of natural resources by timber and mining companies as well as lack of interest limit their probability to contribute to a PES as a provider of ES.
- Despite government agencies such as the FC show interest in being paid for securing ES, it is still to answer how cash flows towards the local service providers can be secured. This also accounts for traditional authorities. Chiefs have high economic interests in the applied land- and resource use on their land, as it is their source of income. If they are intermediary or recipients of payments, payment flow towards the farmers has to be secured.
- The small landholdings of the interviewed farmers are mostly dispersed at different locations. This demands the formation of farmer associations to realize the land use change, which in turn increases the transaction costs. Apart from this, the tenure agreements differ between the communities. The current systems of land tenure and benefit sharing limit the farmers' power and interest to participate in PES.

- According to the existing strong incentives towards the conversion of forestland only few farmers have left forest patches off-reserve that could be of interest for conservation through PES.
- Concerning afforestation and reforestation, farmers are less likely to participate in a potential PES scheme, if they convert their agricultural land into forest, from which they will not get any revenues in the current benefit-sharing system. Due to limited land size and high land pressure, farmers see tree growing as a threat to their food security. The necessity to buy food instead of planting it pushes them into the "tight corner". Even if the farmer receives an adequate compensation, it is a matter of trust in the institutional arrangement of the PES scheme, whether he is willing to set aside his natural capital to rely on compensation payments.
- In most communities, land users do not have sufficient experience with agro-forestry. Farmers fear the destruction of their property (cash crop trees) and the decline in quantity and quality of their crops if they integrate trees into their land use practice (agroforestry). At the same time, the agricultural extension service that would be necessary to change land use practices is lacking capacities. The additionality of agroforestry off-reserve on biodiversity on-reserve is questionable.

Box 6: Technical recommendations for afforestation and agroforestry systems around the Ankasa Conservation Area

Since the surroundings of the ACA are almost completely used as farmlands, recommendations for afforestation are centered at two strategies: Replacing farmland by forest, preferably native forest, or combining farmland with trees in agroforestry systems.

Replacement of farmlands by forest

The majority of the cultivated land is planted with cocoa, a cash crop. Preconditions for a conservation oriented PES with afforestation (e.g. excluding rubber plantations) include that new forest areas are more biodiverse than the replaced cocoa plantations and are connected to the ACA in a way that alters the habitat of indigenous animals and vegetation. Thus a preferable solution realizes the creation of bio-corridors on farmlands.

Our field study around the ACA proved that succession on fallows is quick and healthy. Comparably biodiverse secondary forests seem in reach of some decades, provided that the once regenerated vegetation would not be treated as natural fertilizer by burning it down after some years to start another cocoa plantation.

Another management service is the selective logging of individual trees, particularly those pioneer species which form closed canopies in the early succession stages, in order to alter the speed of succession towards climax state by creating artificial canopy gaps offering chances for slow growing shade tolerant species. Especially *Cecropiaceae* were found to form closed canopies around ACA. These secondary forests are poor in species diversity and therefore would not meet the requirements of the conservation oriented buyer.

Bio-corridors could offer further positive side effects for the population in the fringe communities of ACA. Our analyses of the direct use values from the forest showed that several NTFPs and bushmeat are short in supply because they are only found in the ACA, which makes their use an illegal activity. In case of the described bio-corridor solution, these ES were produced outside of the ACA and could be managede and used in a sustainable way.

Agroforestry systems

Agroforestry is considered a collective term for those land use practices in which trees and shrubs are combined deliberately on the same piece of land with agricultural crops and/or livestock in spatial arrangements or temporal sequences (Raintree 1987).

Thus, farmers are able to produce food, fodder, NTFP, fuelwood and building materials on their farms without clearing new land for cultivation, thus minimizing land use pressure on natural ecosystems. Based on the current land use practices and socio-economic conditions in the study area various agrisilvicultural systems can be suggested. It is to be stressed that all the proposed land use systems do not displace existing food crop production practices in the area but rather complement food crops by planting trees. Thus, additional income is obtained by planting forest or fruit trees on the same piece of land.

First, perennial trees, especially those that grow tall or have small canopies are allowed to grow among the cocoa trees. Secondly, fast growing and high-yielding leguminous trees, preferably nitrogen fixing species, are introduced into rotational fallow systems. Additionally the natural vegetation also installs itself. Thirdly, field and land boundaries can be clearly marked by planting trees along the boundary. Farmers and local villagers know best which multipurpose trees, shrubs and fruit trees can be used for what purposes: wood for construction material and fuel, leaves and small branches for medicine and fodder, and fruit and nuts as food for people.

However, it is necessary to consider both the benefits and limitations of agroforestry interventions relative to monocultural cropping methods of land use. The environmental, economic, and social advantages of agroforestry include:

- Make more efficient use of natural resources. Trees help stabilize the soil, improve soil fertility by fixing nitrogen, conserve water and ameliorate the microclimate.
- Increase overall yields and improve the quality of food production
- Improve the socio-economic conditions by creating employment and income
- Be a tool for the settlement of landless shifting cultivators, thus avoiding further deforestation for food production.

Possible limitations of agroforestry include:

- Competition of trees and shrubs with food crops for space, sunlight, soil moisture and nutrients, which can reduce food crop yields
- A potential of trees and shrubs to serve as hosts to insects and diseases that are -harmful to food crops
- Resistance by farmers to the displacement of food crops with trees and shrubs
- Uncapability to promote complex biodiversity patterns and some NTFP (e.g. shade tolerant herbs, medicinal plants) analogous to existing native forest formations.

Furthermore, small scale afforestation schemes, so-called woodlots, are especially suited for local farmers in the study area. A woodlot mainly contains woody perennials and serves as a principal source of fuelwood and minor construction materials. Since a woodlot conserves soil and water, provides improved habitats for wildlife and above all reduces the utilization pressure on natural forests around or inside ACA it is an appropriate technology to combat ongoing environmental degradation.

Likewise agroforestry systems, woodlots are not able to restore complex and diverse native forest ecosystems. On the whole all the proposed cultivation techniques are more ecologically and economically complex than the practised traditional monocultural production systems and thus contribute to improved biodiversity patterns in the area surrounding the ACA.

Planted trees in agroforestry systems and woodlots belong to those who have planted them.

Nevertheless, international donor money is required for closing the profitability gap of the described agroforestry systems since these are not likely to compete economically with the unshaded cultivation of hybrid cocoa (OBIRI et al. 2007).

Table A: Some multipurpose trees and shrubs for agroforestry systems around the Ankasa conservation area (humid lowlands).

Species	Soil conservation	Fodder	Food/ Medicine	Indigenous
Albizia adianthifolia	X	X		
Acacia auriculiformis	X			
Cassia siamea	X	X		
Ceiba pentandra	X	X	X	
Kaya senegalensis	X	X		X
Leucana leucocephala	X	X		
Magnifera indica (Mango)	X	X	X	
Psidium guajava (Guava)	X	X	X	
Terminalia superba	X		X	X
Cola nitida			X	
Chlorophora excelsa (Odum)	X	X	X	X

3.6 Buyer and funding

This chapter deals with our findings concerning potential buyers of ES in Ghana and up-front funding possibilities for potential PES schemes. The findings result from interviews with key stakeholders from both local and national level.

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. The logic of a PES scheme is that someone pays for the provision of an ES. 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, e.g. for the monitoring of the provision of the ES.

Therefore, the willingness to pay is one crucial aspect of a PES. One hypothesis of our study was that willingness to pay is directly connected to the awareness on the necessity to secure certain ES. Therefore, interview partners were asked about the importance and functions of ES.

Respondents from NGOs stated that only few people in Ghana have the knowledge and the awareness about ES. The environmental services most probable to receive the highest attention of the Ghanaian population are related to water such as watershed protection and safeguard of water quality. But, interview partners stated that the link between declining forest cover and sufficient water supply is not well understood by the population. As a first step they suggested awareness rising on ES when introducing PES in Ghana. The findings underline what WUNDER (2005) describes as one key obstacle for mainstreaming PES in the tropics. In his view, the demand for ES is limited because the links between land use and ES provision are often badly understood.

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 buyers 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 this scoping study is to assess opinions who could have an interest in paying for

ES in Ghana. This assessment does not solely refer to the case study area ACA. On the national level interview partners 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 8 shows the potential buyers of different ES mentioned by the interview partners.

Table 8: ES types (according to WUNDER 2005) and potential buyers mentioned by interview partners

ES types	Potential Buyers
Biodiversity protection or restoration	International community Companies (e.g. timber, mining, mobile phone) Ghanaian Government International NGOs Global chocolate consumers
Watershed protection	Ghanaian Government Ghana Water Company Ghana Electricity Company Water Resources Commission
Carbon sequestration and storage	Companies, industrialized countries and international funds on the carbon market
Landscape beauty	Tourism companies

Biodiversity protection or restoration

The potential buyer who was mentioned most frequently for biodiversity related ES is the international community. Interview partners listed funding by international governments, e.g. the GEF (Global Environmental Facility), donor budgets or so called “debt for nature swaps”.

The private sector consisting of national and international companies was mentioned as further potential buyer. Mining and timber companies are mainly seen as those enterprises that use the natural resources in a 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, interview partners 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”, e.g. by eco-taxes or fines. But some interview partners clearly stated the importance to involve the private sector in conservation issues.

One already existing example is a partnership between a national conservation NGO and several companies by sponsorship for endangered animals. According to one staff from the NGO, this enables companies to improve their reputation and give themselves a “green face”.

The government 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 were also named as potential buyers. NGO staff based in Ghana showed a real interest in PES. However they made clear that in any case a possible implementation would have to be decided at the respective headquarters.

Other actors mentioned as potential buyers for biodiversity are the global chocolate consumers. They are made 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”. Environmental friendly and/or organic products are discussed in PES as they are produced jointly with an ES. One respondent from a fair trade organisation suggested that consumers pay higher prices for organic products and “green premium” payments for the environmental friendly land use which secures ES.

Watershed protection

Clean water derived from efficient watershed protection is another ES which might gain the interest of potential buyers. Most interview partners mentioned the government as potential buyer, more specifically the Ghana Water Company (GWC) that supplies urban industries and households with water.

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. The Commission is an authority under the Ministry of Water Resources, Works and Housing (MWRWH). It is in charge of the overall management of surface and groundwater reservoirs (WORLD BANK 2007: 140).

Unlike biodiversity, water is considered as national good mainly Ghanaian companies could pay for. Water and electricity companies as buyers are examples for a typical user-financed PES. In the case of the GoG, interview partners 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.

Landscape beauty

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

Carbon sequestration and storage

Although carbon is a forestry related ES, only few interview partners mentioned actors on the carbon market as a potential buyer for PES.

Our interview partners indicated a range of potential buyers, especially for biodiversity and water related ES, ranging from national to global actors and from user-financed schemes to buyers who act on behalf of the people.

In view of our local case study around a protected area, two options for the design of PES schemes concerning the potential buyers arise: The design of a PES based on the supply of environmental services provided by agroforestry or other environmental friendly land use systems with the effect of lowering the vulnerability of the local population is of interest for the 'pro poor' oriented donor. A PES scheme creating incentives to convert farmlands to close-to-nature forests to expand the area of the ACA itself is of interest for the conservation oriented buyer, e.g conservation NGOs. Since PES was originally designed to raise the money of biodiversity oriented buyers this is an additional funding source which nowadays often is not taken into account.

Up-front funding

No PES scheme has been realized in Ghana until 2008. For the initiation of any future PES scheme up-front funding must be provided. Implementation and set up activities for PES schemes comprise feasibility studies, training activities and capacity building measures. For example this means to improvement to provide adequate extension services to the participating farmers. The following overview of funding possibilities accounts mainly for the upfront funding but could in some cases also entail payments in a PES scheme.

The sources of funding can be grouped into government funds, international funds, and funding through international NGOs. The international funds provided by donors can be further split up into bilateral and multilateral funds.

As our study deals with PES as a financing mechanism for adaptation to climate change, in turn the funds for the set up of such a scheme could be derived from international adaptation funds.

Government funding and donor budget funding

The ODA for the sector of Natural Resources and Environment in Ghana is subject to budget funding. It is coordinated through the sector working group on Natural Resources and Environmental Governance (NREG). It consists of donors who are funding the environmental protection and natural resource management activities in Ghana and the ministries and state agencies responsible for these issues. The head of the donor group is recently represented by the Royal Embassy of the Netherlands. The five year support given to the GoG amounts to US$ 80 million for NRM (MDBS n.d.: 10). In the NREG donors and state agencies are negotiating the contents of state actions that will be financed through budget support. The possibility of the GoG to support up-front funding or engage itself as a buyer in a PES scheme depends largely upon the political priorities. According to interview partners the GoG would only be able to finance PES through the budget funding by NREG.

This approach of development assistance is raising some questions, especially for NGOs that are no longer eligible to receive direct donor funding but could only be sub-contracted through the Ghanaian Government. Interview partners mentioned this issue as a critical one that needs to be tackled as they fear that all the decision power will be concentrated in the GoG. If it was funded by the government, NGO staff fears to loose their independence to make own decisions as well as the ability to criticise the government. The budget funding leads to a strong involvement of the GoG in any potential future PES scheme. This is further enhanced by the lack of financial support to non-state institutions. Therefore, it is questionable whether NREG funding could also be made available for PES schemes set up by NGOs or private companies. The only funding possibility for PES that was clearly mentioned by representatives from NREG was the support for further research on PES in Ghana. Sustainable funding mechanisms for PAs that are recently considered by the GoG are taxes, direct revenues, international funds and PES (chapter 3.1). Concerning funding mechanisms for adaptation measures to climate change interviewees from public agencies were asked about their assessment for the setting up of a national adaptation fund, which met their interest. In their views, such a fund could work, but transparency, little bureaucracy and sustainability are important preconditions.

Bilateral donor funding

In the case of bilateral donor funding, the respective donor and the GoG together set up a portfolio. For example, the present portfolio of the German-Ghanaian technical and financial cooperation does not entail environmental issues. Representatives from German donor organisations stated that funding for future PES schemes could only be put in place by specific national funds earmarked for the cross-cutting issues climate change and biodiversity.

Nor is environment a focus of the European Commission's large scale donor funding mechanisms. According to European Commission personnel, there are only limited funding possibilities through micro projects. Project proposals from NGOs related to nature conservation and community natural resource management could be funded.

Multilateral Funds

The international funding comprises the funding of PES schemes through multilateral agencies like the World Bank or the GEF. Possible funding entities mentioned were the GEF especially its adaptation fund which might be available next year, the Forest Carbon Partnership Facility from of World Bank, and the Global Forest Partnership. As already mentioned in chapter 3.1, Ghana is actually engaged in the REDD process. Adaptation funds that exist on international level are listed in Annex XI.

NGO funding

International conservation NGOs as important stakeholder and advocates for environmental issues have the expertise and the strong interest to work in the field of conservation in the most efficient way. Creating markets for ES could be a suitable alternative and therefore be of much interest for conservation NGOs. International NGOs can take on the role of big conservation players. For instance, they have the possibility to promote PES in media campaigns and use donations for funding of PES schemes.

To summarize, several possible funding mechanisms and buyers for PES from national to international level have been identified. The chance to receive financing for PES schemes through donor budget support depend on the priorities set in the NREG working group. If PES is of national interest, NREG has to intensify their work on PES and specify possible options. Understanding and enhancing the link between forests and adaptation entails funding options for PES from international adaptation funds.

Potentials and constraints concerning buyers and up-front funding for PES

To sum it up, the main conclusions concerning potential buyers and funding options for PES are the following:

Potentials for PES:

- For watershed protection as a traded environmental service our interview partners named service buyers on national level. There have already been attempts to agree on payments between service providers and users. Here, at least the informed stakeholders have awareness on the determinants for service provision.
- For biodiversity as s traded ES, the willingness to pay was mainly identified on global level by multilateral funds and international conservation NGOs. The latter expressed their interest to engage themselves in a biodiversity-related PES scheme directly.
- PES is integrated in the goal matrix of NREG and is thus eligible for funding through donor budget support.
- Multilateral funds for adaptation and biodiversity conservation seem to be promising upfront-funding sources for PES schemes in Ghana.

Constraints for PES:

- On national level, there is little awareness on the link between ES and land and resource use could lower the possibility to find willingness to pay on national level.
- Since donors are increasingly turning towards budget support, the up-front funding possibilities strongly depend on the priorities agreed in NREG.

3.7 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. Experiences show that for implementation and functioning of a PES scheme, the development of certain institutional arrangements is crucial. First of all, agreements have to be negotiated between users of environmental services and landowners as well as land users. Furthermore financial transactions have to be managed. This is especially difficult in developing countries where mechanisms of law enforcement are poorly endorsed "so that payment always has to be tied to the periodic monitoring of contract compliance" (WUNDER et al. 2005: 12). In case small scale land users want to participate in PES schemes, they have to organise themselves in associations to lower transaction costs. Trust is another precondition between buyers and providers of environmental services (WUNDER 2005: 21). Depending on the level of trust and social capital, intermediaries could be eligible to facilitate negotiations, management of payments, or process and impact monitoring.

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
(iv) monitoring of contracts.

The findings of this chapter strongly build on experiences from comparable initiatives and on projects already realized around the ACA. Additionally the study refers to best practices from other schemes in Ghana that are situated in a similar socio-economic and institutional context.

(i) 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.

As discussed in chapter 3.3, 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 loosing their farmland, since any land use change without authorization of the landowner constitutes a break of the present agreement. Thus, any PES scheme that implies land use changes by tenant farmers like afforestation or reforestation might only be implemented by adopting those agreements.

The interviewed chiefs stated that nowadays the agreements are presented in a written form. Since more and more farmers become 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. This is considered as a problematic issue by several stakeholders. One respondent from a farmers association answered that he is generally not satisfied with the agreements, because “at the beginning the chief determines the amount the tenant farmers have to pay, but later he often demands more.” Therefore the trust between land users and chiefs as landowners is rated as very low by many respondents.

One key demand of farmers to ensure their participation in potential PES schemes is the transferability of the agreements. Farmers favour a written contract with a clause to make the payments transferable to the successor (bequest value). It should include a document demarcating the land so that in future no landowner is able to claim its ownership. This is especially stressed for the issue of conservation of existing forest patches. For example one farmer states: “In situations where the trees are not to be cut, I have to continue to enjoy the payment of the compensation for the rest of my life and be extended to all my descendants so that the forest will continue to be there”.

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, timber companies are working with farmers on the introduction of agroforestry systems around their plantations to avoid that uncontrolled slash and burn practices destroy 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 are oriented towards the traditional benefit sharing systems Abunu and Abusa (see Box 3 land tenure). Similar agreements were used in another large-scale project on establishing woodlots with farmers in off-reserve areas. In this case, most of the land was private family land or community land.

(ii) 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. Who acts as a witness, however, seems to differ. A CREMA representative said 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. A chief named the head of the community as witness in the agreements he makes with the farmers. For negotiation processes in projects, which imply land use change on stool land, the chiefs are usually approached first. Project staff working with the forest fringe communities all stressed the importance to involve the traditional authorities.

As chapter 3.2 shows, the park management implements the strategy to negotiate with the higher chiefs first, for example in the process of establishing Community Resource Management Areas (CREMAs). They also cooperate with chiefs in negotiation processes with communities when they find it difficult to negotiate directly with the people concerning compensation payments: “The farmers think we have so much money. So we have to bring in the chiefs to help us to negotiate”. 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 of one 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 timber 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 seize 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.

(iii) Transfer, management and sharing of payments

The farmers have clear ideas on the amount of payments and how these should be transferred to them. As the findings in chapter 3.5 show, 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, which were favoured by all farmers, the answers included access to loans, but also infrastructure like houses, vehicles and schools. Some farmers demanded the ownership of the tree as a form of payment and the a “training on what trees to grow and how to grow them”. In the case of conservation of existing forest patches some farmers named payments like an award in the form of a recognition, scholarships for children’s education or air tickets and visa for the entire family to travel abroad.

For the frequency of the payments, the farmers proposed various intervals ranging from daily to yearly. Some farmers also proposed singular payments, mentioning that thereafter they would leave the place.

In one community farmers said that payments should start at least three years after plantation when intercropping with food crops is not possible anymore. They also proposed that it would be reasonable that the farmers start with their own money “to avoid that some people take money and not do the work”.

Stakeholders on local and national level stressed the importance of a proper organisation of payment mechanisms. Some stakeholders argued for the need of intermediaries as receiver of payments who should forward this to communities or single farmers. Wildlife Division staff in the headquarter in Accra consider their agency as a potential recipient of money in a payment scheme who makes it then available to land users. Other interview partners favour direct payments to the land users. Park managers experienced that the farmers have no trust in government workers, including their own staff. This was confirmed by many stakeholders. Therefore, only payments that are paid directly to them could be a motivation to engage in protection of forest and wildlife resources. One respondent referred to an example from Cameroon, where communities manage their own forests. Here, the money from harvested timber is going directly to them and is not transferred via the government “so they can put something in their pocket”. The same problem occurs in the case of traditional authorities. Because the land around the ACA is stool land, they probably participate in PES schemes as landowners who decide on the land use. But stakeholders see the danger of traditional authorities as the recipient of

payments since in a lot of cases money is not transferred from the stool to the communities. In one project an NGO selected key persons to transfer the payments to the communities. They made sure that these were explicitly not the traditional authorities. Direct payments to the chiefs would include another problem for tenant farmers. If chiefs realize that they can make money out of setting aside land for forest, they probably do it by their own.

A crucial point mentioned by stakeholders was the impact of high payments in cash on community structures. As potential losers of a PES scheme the park management indicated the poor farmers who do not own land. They are mostly illiterate and often excluded from decision-making processes. Women were especially named as potential losers from a scheme “because they are doing all the work and they will not get any benefit”. NGO staff named two ways how 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 also marginalized groups can benefit, e.g. from schools, health posts or community houses. But at the same time, farmers would lose some of their cultivated land and are not compensated for lower income. Another example to manage common financial resources is to work with a community fund as one 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.

With the present benefit-sharing systems, traditional authorities and the Forestry Commission would be the winners of a PES scheme, even if the payments originally were dedicated for the land users. Therefore, the benefit sharing arrangements in contracts are very crucial for farmers when deciding whether PES is an interesting option for them. As chapter 3.5 shows, farmers are only willing to afforest their land if they get enough shares from the trees. The benefit sharing in those agreements is therefore important for the functioning of PES schemes in Ghana and around the ACA in particular. Only if such schemes have a defined benefit sharing system they would work. According to NGO staff the share communities or single farmers get from the revenues of the trees should be much higher than the present value. If it was not clearly regulated who received which amount single farmers fear that the Forestry Commission will keep everything.

(iv) Monitoring of agreements

Those stakeholders that already discuss on PES schemes in Ghana stress the importance of monitoring mechanisms for agreements. One representative of an international affiliated conservation NGO says that at an initial state of signing the agreement, the quality of the environmental service has to be proved. On the long run, there should be a clause for an annual review to ensure the quality. He also stresses that only an independent person can monitor and secure the contract.

Monitoring activities on local level are mainly carried out for the tenancy agreements between chiefs and farmers and within the CREMAs. The chiefs have appointed surveyors which they send out to the fields to monitor the compliance of the farmers with the agreed land use. In CREMAs, members do the monitoring of the compliance with specific regulations on natural resource use for this area. CREMA representatives consider patrol walks very necessary because otherwise people will not stick to these rules. They also see the value of constant interaction with the communities through this type of monitoring which maintains their awareness on the CREMA concept. Projects that work on the establishment of CREMAs around the ACA therefore currently built up capacity to do the monitoring on community level. The CREMA members also collect data on existing animal and timber species within the area and pass it on to the Wildlife Division. CREMA members acknowledge that the monitoring activities depend on just financing which is currently lacking. One NGO staff working with CREMAs has the experience that the monitoring is very costly since “people in the communities are very used to ask for money for each little thing they do”, for example for showing the community boundaries.

In nearly all communities, farmers are well aware about the necessity of monitoring mechanisms in agreements on payments for afforestation. They argue for a yearly monitoring to ensure that provided seedlings are planted. They propose that agreements should include “sanctions for farmers who fail to grow and protect the trees after entering into the agreement and collecting money”. They make also clear that “if no money comes, we will cut the trees down”.

Since the monitoring of the contract can only be done by neutral actors, it is important to choose those which have the trust of all stakeholders involved in the potential PES scheme. In our case study the analysis of stakeholder relations revealed that NGOs already carrying out projects are the most trusted entities by the farmers. CREMA representatives name the NGOs as those stakeholders with which they have good relations through their support for the CREMA concept. Also one chief attested the NGOs to be “trustworthy and credible compared to others as they mostly delivered on their promises”. NGO staff itself indicates good relations with communities, the wildlife division, traditional authorities and the District Assemblies.

The relationship between land users and other stakeholders seems to be difficult. There is a strong distrust especially between tenant farmers and chiefs because of insecure land tenancy. Statements on the relations between farmers and the Wildlife Division differ. Some members from the park management see an improvement in its relations to the communities through the establishment of the CREMAs and the increased communication with communities by the community unit. This is also confirmed by members of CREMA executive committees. But other WD staff state that they do not trust community members, because they even have caught CREMA secretaries in ACA. From this point of view, NGOs seem to be those actors who could be an appropriate, hence a neutral institution responsible for the monitoring in a potential PES scheme.

Potentials and constraints of institutional arrangements for PES:

Concerning the institutional arrangements that have been discussed in this chapter we can highlight the following potentials and constraints for PES.

Potentials for PES schemes

- Around the ACA a variety of institutional arrangements exist by which PES schemes could be developed. This includes long-term agreements on land use between farmers and chiefs that can be adapted in PES schemes. Furthermore, through the establishment of community based natural resource management plans, organizational structures of land users exist which are necessary for a PES scheme dealing with subsistence farmers as ES sellers.
- NGOs are most trusted by the majority of stakeholders including farmers, the park management, and traditional authorities. 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.
- Farmers have clear demands on what they expect from agreements on afforestation measures. This implies how high payments should be, the duration of payments, and how they should be transferred to them.

Constraints for PES schemes

- One big constraint for using existing agreements in PES schemes is the missing land security of tenant farmers. A lot of farmers do not have any or only oral agreements with the chief. Therefore an agreement within a potential PES

scheme has to be written and approved by witnesses and must include a clause on transferability of the agreements to the successor.

- All in all, there is a high level of distrust between farmers and the traditional authorities when acting as landowners. This poses constraints on PES schemes since both sides have to agree upon a scheme that implies land use change on stool land.
- The present crop and revenue sharing in existing agreements disqualifies them for adopting them in a PES scheme. Since the chief has to agree to the scheme he is probably only willing to do so if he gets enough benefits from the received payments. But existing benefit sharing arrangements in schemes like Abunu and Abusa probably will not create incentives for the tenant farmers to agree on land use changes since payments would be diminished significantly. This can only be tackled through changing the mindsets of chiefs to get to an appropriate benefit sharing where money is forwarded down to the lower level. Farmers also made clear that they only participate in schemes where agreements include a fair benefit sharing of the revenues from trees.

4 Recommendations

1. Environmental services, buyers, land use change

ES related to biodiversity protection and restoration, as well as ES related to watershed protection seem to be promising ES for a potential PES scheme in Ghana. On the national level awareness and willingness to engage in watershed protection is higher than in biodiversity related ES. For the latter there is an interest in protection and restoration on international level. Thus, a bundling of ES concerning watershed and biodiversity protection could be a promising strategy for PES schemes in Ghana. A PES scheme that seeks to secure biodiversity may be financed through payments for benefits like water shed services, as these are of national interest. At the same time the local population that secures forest related ES additionally benefits from NTFPs that contribute to their livelihoods and strengthen their adaptive capacity. Enhancing the link between forests and adaptation entails possible up-front funding options for PES from international adaptation funds. Since the ACA is also not located in a highly relevant water body, locations for the establishment of PES schemes for water-related services probably could be the catchments of Lake Volta.

Conservation of native forests around ACA is limited to only few forest patches. For a potential PES scheme in the surroundings of the ACA, afforestation and sustainable land use practices such as agroforestry are the most applicable land use changes that could ensure the provision of ES. Since, compared to afforestation and agroforestry, conservation of forests has the highest additionality for biodiversity provision and protection, biodiversity-related PES schemes are more recommended in other areas than the ACA. From an ecological point of view, we therefore recommend to investigate whether the appropriate sites could be the Globally Significant Biodiversity Areas (GSBAs) being the core zones of several forest production reserves in Ghana. PES is especially suitable for comparably low protected buffer zones, which show rising ecological intactness towards the core zone. Therefore forest reserves around GSBAs seem to be suitable sites for restoring biodiversity.

Considering the potential buyers in a PES scheme in the surroundings of an already existing protected area, one option for financing a PES scheme related to biodiversity conservation are international donor funds. Precondition of such a conservation oriented PES include that the new forest areas are more biodiverse than the replaced land-use and that they are connected to the protected area in a way that alters the

habitat of indigenous animals and vegetation. Thus a preferable solution would be the creation of bio-corridors.

2. Provider and institutional arrangements

Afforestation, reforestation and agroforestry as PES related land use changes are most recommended on private or family land, where the farmers and family members themselves can decide on the land use and thus serve as providers. A precondition is that farmers are willing and able to register planted trees and can obtain land titles. This can only be achieved if the responsible authorities remove existing bureaucratic barriers to register planted trees and to obtain land titles. Registration should also be extended to natural regeneration of forest trees to ensure ownership.

On stool land, PES schemes can only work with the consent and inclusion of the traditional authorities as landowners, thus having both land users and landowners as providers of ES. This increases the transaction and opportunity costs of a potential PES scheme and as a consequence reduces the incentives of land users and service users to engage in the potential PES scheme. To make a PES scheme efficient and applicable on stool land, the existing land lease agreements between chiefs and farmers could be adapted to serve as contracts in a potential PES-scheme. They should:

- be in a written form.
- include a just sharing of benefits from payments and revenues between landowners and land users.
- be long-lasting and inheritable to ensure that land use changes are sustainable.
- include a payment mechanism through which farmers – individually or collaboratively – receive payments directly from a trust person and not via the landowner.
- include regulations on independent monitoring by a third party.

3. Local stakeholders and their potential role in a PES scheme

CREMAs have the potential to act on behalf of providers in a PES scheme. They involve natives and settlers and hold instruments for collective action. So they have suitable organisational structures including operating rules to secure conservation goals. To be an appropriate organisation body of providers in a PES scheme, they have to be strengthened through:

- the devolvement of authority over all natural resources to enable an integrated approach to resource management and guarantee the access to benefits for the local population,
- the involvement of the higher chiefs in the process of establishing CREMAs to get their consent to land use changes and to give the farmers more land tenure security.
- the establishment of rules and mechanism on the common use of financial resources or their transfer to community members.

Preconditions for PES schemes are appropriate trust building measures on local level, particularly to tackle the perceived distrust between landowners and farmers. In this case the eligible stakeholders are the NGOs which are currently working with the communities in the forest-fringes of the ACA, since they have the highest trust from both state and traditional authorities and the farmers. Therefore they are also those actors who would be qualified to facilitate negotiation processes between land users and landowners and to monitor the contracts in a PES scheme.

4. Institutional framework

A biodiversity or forestry related PES scheme is only possible after a reform of the present benefit sharing system on timber resources. Under the current legal framework we only see limited opportunities for the conservation and expansion of existing forest patches through a PES scheme, since various disincentives for forest conservation are in place and therefore opportunity costs of land use change are immense. Therefore, policy reforms should include:

- a review of the present benefit sharing system of timber resources to ensure that revenues reach the communities on local level .
- a full implementation of the Forest and Wildlife Policy in the sense that the local population has regulated access to NTFPs and non-commercial use of timber.

This would increase the incentives for land users to conserve forests and enhance the adaptive capacity of the local population through their access to forest ecosystem goods and services. For a potential PES scheme this would imply lower opportunity costs of changing land use towards conservation, afforestation or reforestation.

A PES scheme that is related to the issues of biodiversity conservation, forestry and adaptation to climate change requires increased coordination between the stakeholders responsible for these issues. Since this coordination is currently lacking in Ghana, following steps would be necessary to create a more enabling institutional framework:

- Increased coordination between the different agencies that work on adaptation, especially between the environmental protection sector (EPA) and the forestry and biodiversity sector (FC).
- Increased coordination between the Wildlife Division and Forest Services Division, especially on community-based resource management. This could be achieved by developing a joint concept for community based resource management which includes authority over both wildlife and timber resources.

Further information is required to transmit the economically oriented logic of PES to Ghanaian stakeholders. Very often the idea of PES is mixed up with conventional donor funded command and control projects or other, non-market driven compensation payment schemes.

5 Outlook

Our results demonstrate that Payment for Environmental Services can support financing of adaptation to climate change. This proved to be especially true when adaptation is linked to forest restoration. Given the vulnerability of the Upper Guinean Rainforest, and therefore the whole West African evergreen ecosystem, special emphasis should be put on further verification of our results in Ghana as well as on scaling them up beyond the Ghanaian context. This is best done by conducting further research on the suitability of PES for the whole eco-region with its threatened population counting in millions. These further research needs comprise the setting up of guidelines and standards for the assessment of additionality and institutional framework parameters, as well as the geo-referencing of land tenure, benefit sharing, and land use data to simplify the comparing identification of promising (hence low opportunity-cost-) options for local PES solutions in tropical West Africa. Furthermore, the ‘ecological intactness’ monitoring approach should be verified in other areas of Upper Guinean Rainforest, and maybe also the semi-deciduous forests of the transition zone. In case of Ghana future analyses on willingness to pay analysis have to be conducted. Additionally, the continuative assessment of the potential and willingness to transform timber concessions valid for the Productive Forest Reserves around GSBAs into PES contracts dealing with biodiversity conservation seems rewarding. In general, investments in PES research should not be postponed because any thereby successfully realized PES scheme in West Africa helps to soften the impact of global change on local level.

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Annex

Annex I. Glossary

Abunu	Share cropping system. The harvest is divided equally between the tenant farmer and the landowner.
Abusa	Share cropping system. The ratio of the tenant farmer's acreage to that of the landowner is two to one.
Acre	Land measuring unit: 100 acres = 40,46873 ha
Adaptation	A process by which strategies and actions to avoid, moderate, cope with and/or take advantage of the consequences of climate events are developed, enhanced and implemented.
Adaptive capacity	The potential or capability of a system to adjust, via changes in its characteristics or behaviour, in order to cope better with existing climate variability and change. It is possible to differentiate between adaptive potential, which is a theoretical upper boundary of responses based on global expertise and anticipated developments within the planning horizon of the assessment, and adaptive capacity, which is constrained by the existing information, technology and resources of the system under consideration.
Additionality	The difference in service provision between the with-PES scenario and the without PES-baseline.
Afforestation	The establishment of a forest by planting trees or their seeds on land that is not a forest or that has not been a forest for a long time.
Agroforestry	The combination of trees and shrubs with crops and/or livestock to create diverse, productive, profitable and sustainable land-use systems.
Assantehene	King of Asahanti
Biodiversity	The term biodiversity is the short form for biological diversity and it is defined by Article 2 of the Convention of Biological Diversity (CBD) as: "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, between species and of ecosystems".
Biological resources	Genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.
By-law	A by-law is a regulation passed by a non-sovereign body, which derives its authority from another governing body.
Cash crop	Crops grown for cash. Cash crops are usually crops that attract demand in developed countries and therefore have export value e.g. coffee, cocoa.
Clean Development Mechanism	Arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own counties.
Climate change	Any change in climate over time, whether due to natural variability or because of human activity

Climate risk	The result of the interaction of physically defined hazards with the properties of the exposed systems – i.e. the systems' sensitivity or (social) vulnerability. Risk can also be considered as the combination of an event, its likelihood and its consequences – i.e. risk equals the probability of climate hazard multiplied by a given system's vulnerability.
Climate variability	Variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may result from natural internal processes within the climate system (internal variability) or from variations in natural or anthropogenic external forcing (external variability).
Command and control	The policy framework in which environmental and resource management rules are prescribed by the regulator, leaving little flexibility for actors in the implementation.
Debt for nature swaps	This involves the purchase of discounted developing country debt, which is exchanged for domestic financial resources to invest in conservation. Payments are made in a number of ways, generally by the central bank. Funds may be channeled through trust funds, or local NGOs that act as intermediaries. These intermediaries will have detailed instructions on how funds are to be spent to achieve biodiversity conservation. Swaps have become less popular in the late 1990s as debt has become more expensive and redemption rates offered by debtors less attractive.
Direct use value	In the total economic value framework, the benefits derived from the goods and services provided by an ecosystem that are used directly by an economic agent. These include consumptive uses (e.g. harvesting goods) and non-consumptive uses (e.g. enjoyment of scenic beauty). Agents are often physically present in an ecosystem to receive direct use value. Compare indirect use value.
District Assemblies	A District Assembly is created as the pivot of administrative and developmental decision-making in the district and the basic unit of government administration. It is assigned with deliberative, legislative and executive functions and is constituted as the planning authority for the district.
Ecological or ecosystem function	A set of processes whereby an ecosystem maintains its integrity (such as primary productivity, food chain, and biogeochemical cycles). Ecosystem functions include such processes as decomposition, production, nutrient cycling, and fluxes of nutrients and energy.
Environmental or ecological economics	A subfield of economics concerned with environmental issues, quoting from the National Bureau of Economic Research "[...] Environmental Economics [...] undertakes theoretical or empirical studies of the economic effects of national or local environmental policies around the world [...]. Particular issues include the costs and benefits of alternative environmental policies to deal with air pollution, water quality, toxic substances, solid waste, and global warming"

Environmental or ecosystem service	The benefits that people obtain from ecosystems. These include "provisioning services such as food and water, regulating services such as regulation of floods, drought, land degradation, and disease; supporting services as soil formation and nutrient cycling; and cultural services as recreational, spiritual, religious and other nonmaterial benefits". The concept "ecosystem goods and services" is synonymous with ecosystem services.
Globally Significant Biodiversity Areas GSBAs	Areas with high genetic concentrations. These areas are protected to maintain the global interest in the conservation of rare species of flora and fauna. In 1990, 29 forest reserves were designated as GSBAs. The purpose of the institution of GSBAs was to shift the focus of conservation of forest reserves from the traditional timber production and/or watershed and hill protection.
Impacts	Changes induced in a system (physical ecological or social) resulting from climate change or climate variability which have significant deleterious effects for its composition, resilience and/or productivity.
Incentives	Factors that motivate human behaviour. These can be positive and foster certain behaviour, but they can also act as disincentives and deter people from doing something.
Indirect use value	The benefits derived from the goods and services provided by an ecosystem that are used indirectly by an economic agent. For example, an agent at some distance from an ecosystem may derive benefits from drinking water that has been purified as it passed through the ecosystem. See also: direct use value, non-use value.
Livelihood	A livelihood comprises people, their capabilities and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access.
Non timber forest products (NTFPs)	These include medicinal plants, resins, mushrooms, rattans and other non-wood goods obtained from forests
Non-use value	The value to humans derived purely from the fact that an environmental or cultural asset exists, even if they never intend to use it or see it in person. It is can be further sub-divided into existence value and bequest value. See also: use-value, indirect use value
Odikro	Village chief
Omanhene	Paramount chief
Opportunity Costs	The benefits forgone by undertaking one activity instead of another
Polluter pays principle	In environmental law, the polluter pays principle is the principle that the party responsible for producing pollution should also be responsible for paying for the damage done to the natural environment.
Property	Tree crops that remain on the land for a longer period of time, such as cocoa, oil palm, rubber, coconut are referred to as property, even though a farmer might not be the owner of the land which he cultivates. Property trees serve as "deposits on a savings account" as they are of long lasting value that can be transferred to the children.

Reforestation	The reestablishment of a forest after its removal
Share cropping	System of agriculture in which a landowner allows a tenant to use the land in return for a share of the crop produced on the land
Total economic value	The sum of all types of use and non-use values for a good or service
Traditional Authority	Form of leadership in which the authority or an organisation or a ruling regime is largely tied to tradition or custom
Transaction costs	The costs, other than price, incurred in the process of exchanging goods and services. These costs include the costs of negotiating and enforcing contracts, and the costs of collecting charges for goods and services provided. The scale of economic and financial transactions costs can affect the market structure for a good.
TroFCCA	TroFCCA (Tropical Forests Climate Change Adaptation) is a four-year global project under the Center for International Forestry Research (CIFOR) and the Tropical Agriculture Center for Research and Higher Education (CATIE) funded by the EC. Participating regions and countries include Burkina Faso, Ghana and Mali.
United Nations Framework Convention on Climate Change (UNFCCC)	192 countries around the world have joined an international treaty that sets general goals and rules for confronting climate change. The convention has the goal of preventing “dangerous” human interference with the climate system. The UNFCCC was one of the three conventions adopted at the 1992 “Rio Earth Summit”. The others, the Convention on Biological Diversity and the Convention to Combat Desertification involve matters strongly affected by climate change. Attempts are being made to coordinate the work of the three agreements.
Use value	A value obtained through the use of an environmental or cultural asset. See also: non-use value, indirect use value
Vulnerability	The degree to which a system is likely to be affected by climate change or climate variability; this degree is expressed as diminishing values for specified indicators linked to a probability.
Willingness to pay	The amount—measured in goods, services, or dollars—that a person is willing to give up to get a particular good or service

Annex II. Terms of Reference

Terms of Reference

for a study of the Centre of Advanced Training in Rural Development (SLE) on

Payments for Environmental Services as innovative financing mechanism for adaptation to climate change

Opportunities and limits: the example of Ghana with respect to forest ecosystem services on behalf of CIFOR and GTZ/BEAF

1. Aim

Aim of the study is the assessment of potentials and barriers for the use of 'payments for environmental services' (PES) as innovative mechanism to finance adaptation to climate change. The specific focus will be on forest ecosystem goods and services to minimize the risk of growing vulnerability for the population in Ghana. Methods for the assessment of PES potential will be tested and will serve as guidelines for a pre-module 'scoping' for the implementation of PES.

2. Background

In times of fundamental changes and shifts in institutional, political and economic structures at various scales, climate change and variability exert a strong pressure on the resilience of social-ecological systems (IPCC, 2007). The IPCC states that African countries will be affected most by future climate change, since (among other factors), widespread poverty, demographic changes, constrained institutional realities, and inadequate political strategies are significantly limiting local adaptation capabilities (DFID, 2006; World Bank, 2006). In West Africa, livelihoods highly depend on forest ecosystem goods and services (FEGS), often in interplay with agricultural and livestock production systems. To counteract the local population's vulnerability to climate change and maintain tropical forest ecosystem services for the local and the global community, the climate change discourse highlighted in the last years the importance of adaptation to climate change, realizing the need for more than mitigation efforts since thresholds have been crossed irreversibly and responses are needed to the already arrived and coming changes.

To finance adaptation measures various possibilities exist from local and private initiatives to global adaptation funds. In this context, payments for environmental services (PES) offer potential for innovative financing of adaptation measures

(including reforestation, afforestation, conservation of forests) but also facing challenges related to the provision of goods (problems of measurement), the payments (monetary and non-monetary), buyers and sellers (private, public, willingness to pay) and the institutional dimensions (procedures, institutions, governance, market failures).

3. Important Guiding Questions

The here given brief description is not meant prescriptive but can be adapted to the specific context in Ghana. The research follows a multi level approach and will start on the national level for the general assessment, followed by a case study on the potential of PES on the local level. The main questions guiding the research are related to opportunities and barriers for PES in the following areas:

- Scale and existing experiences with PES in Ghana and other financing instruments used for adaptation
- Nature of forest goods and services relevant for PES
- Actors and payment schemes
- Institutional challenges

some specific questions are:

- What are the causes for the vulnerabilities of the people?
- What environmental goods and services are particularly affected by climate change and increasing variabilities of the climate?
- Which are the local problems regarding forest ecosystem services?
- Which services do we want to promote and which goals do we want to achieve?
- What are the achievements exactly and how can they be measured and evaluated?
- Who demands for services (locally, regionally, national, internationally)?
- Who are the producers of the services?
- How high are the real opportunity costs?
- What options of land use exist and where are the direct relations to environmental services?
- Are the payments really dependent on a formerly delivered service?
- How is the payment capacity and readiness to pay?
- How are prices negotiated?

- How much is paid and to whom?
- What are the payments used for?
- How large is the political readiness to implement such financing mechanisms?
- What external problems exist (governance, failure of institutions or markets)
- What strategies help to overcome such identified constraints?

4. Implementation

The study will be realized by a group of five students of the postgraduate study and research programme of the Center of Advanced Training in Rural Development of the Humboldt University of Berlin and an experienced team leader. The team leader should bring along experience in following fields:

- Working experience as consultant
- Profound knowledge of the forest sector (governance and forest policy)
- High capability of teamwork and personal experience in leading interdisciplinary teams of young professionals
- Regional experiences in West Africa.

The group of students should be ideally composed of following disciplines:

- Agricultural science, agro ecology
- Economics
- Geography
- Environmental sciences and resource management
- Biology and tropical ecology
- Social and political sciences

5. Partner

CIFOR/TroFCCA

TroFCCA (Tropical Forests and Climate Change Adaptation) is a global research project carried out by CIFOR and CATIE and financed by the EU. Research activities are ongoing in different regions and countries (West Africa, Asia, and Central America) since 2006. Overall aim of TroFCCA as a research project is to support mainstreaming of forests and adaptation to climate change into policy. TroFCCA emphasizes a policy-science dialog integrated in decision making processes rather than offering technocratic solutions (Forner et al, 2006). In West Africa TroFCCA

works in three different countries (Burkina Faso, Ghana, Mali) on the topics water, bio energy and NTFPs like fodder resources, all of them related to forest by specific FEGS. TroFCCA combines bio-physical with socio-economic and institutional research and is using a systemic approach.

The study of the SLE is closely linked to the in TroFCCA integrated BMZ funded research project on 'Tropical forests, climate change, and vulnerability: Mainstreaming adaptation strategies into policy"

University partnership in Ghana

Kwame Nkrumah University of Science and Technology in Kumasi/Ghana.

Other partners in Ghana

It is intended to check on possible cooperation with the "UNFCCC national focal point", the Ministry of Lands, Forestry and Mines, the Forestry Commission, the Forestry Research Institute of Ghana, the Water Resources Commission, the Basin Office of the Minister of Water Resources, Works and Housing, the Water Directorate, the Environmental Protection Agency (EPA), projects of the official development cooperation and others.

6. Preliminary schedule

14.5. – 28.5.2008	Preparatory mission of team leader (Identification of possible projects, logistics)
	Detailed TOR's for consultancy team
19.5. - 23.5.2008	First working session on the topic of the project team
05.06. -06.06.2008	Teambuilding course
09.06.-25.07.2008	Research and consultancy methodology and execution plan developed and agreed with partners
	Analysis of the literature
28.07 -24.10.2008	Execution of research and consultancy in Ghana (research: institutions, stakeholder analysis, reports, workshops, manual)
17.11. -18.11.2008	First draft of final report and presentation of it in Berlin
December 2008	Delivery of final report and presentation

Annex III. Working plan

When?	Where?	What?
01.06. – 28.07.	Berlin	**Preparation** • Literature analysis on PES and adaptation • Elaboration of procedure and methods • Presentation of study concept
28.07. – 31.07.	Accra	• Interviews national stakeholders (representatives of donor community)
01.08. – 08.08.	Kumasi	• Workshop with Ghanaian students • Interviews national stakeholders (representatives of research institutions, NGOs)
11.08.	Takoradi,	• Presentation of the study concept to local stakeholders (WD, PADP)
09.08. – 07.09..	Nkroful, Ankasa	**Data collection/ local case study** • Elaboration of interview- and FGD guidelines • Random sampling, identification of sampling spots • Focus group discussions, interviews with local stakeholders (DA, MoFA, PM, experts, NGOs, local authorities) • Transcription and translation of interviews
25.08. – 03.-09.	Accra	**Data collection/ national and international level** • Interviews with national an international stakeholders (representatives of donor community, state agencies, experts, NGOs)
08.09. – 12.10.	Takoradi, Busua	**Data analysis & report writing** • Data analysis and synthesis • First draft • Preparation of presentations
13,10. 15.10. 17.10	Nkroful Kumasi Accra	**Presentation of results in Ghana** Presentation to local stakeholder Presentation to national stakeholder at FORIG Presentation to national and international stakeholder at GTZ
18.10. – 31.10.		*Excursion*
01.11.	*Accra*	*Departure*
02.11. 12.12.-	Berlin	**Revision of results** • Preparation of final presentations • Elaboration final report
18.11. 25.11.	Berlin Frankfurt	**Presentation of results in Germany** Presentation at Humboldt University Presentation at GTZ

Annex IV. Interview guideline national level

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 (else) 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?	
K	…companies (timber, mining) and government agencies?	

10. With whom do you cooperate in your projects on the management of natural resources?
11. How would you define the relationship between you and …. (cooperation partners mentioned above)?

Annex V. Interview guideline local level

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: Facilitator: Name of respondent: 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? 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?
9. Why are these land use practises applied by the local population?

Buyer

General assessment (a, b, c)

10. Who are the users/ beneficiaries of these services?
11. 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 activities of the PM?
   6.2. What are the main difficulties for the management of ACA? What are the reasons?
   6.3. How are these difficulties addressed and solved?
   6.4. In your opinion, how could the protection of ACA be 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 to corporate with the management of ACA? If yes, who?
   7.4. Does the PM enhance the work of NGOs/ CBOs 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 does 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 to 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. Who manages common financial resources of farmers?
17. How are payments and resources transferred to your target group?
    17.1. Who receives the payments?
    17.2. In which tranches do you pay land users or farmers?

18. Do you think this way of managing payments could be adapted in potential PES schemes? If not, how could it be designed?
19. Which obstacles for financial management have you experienced and would it lower the potential of a PES scheme in Ankasa/Ghana?
20. 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)

21. 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?
    - 21.1. If yes, do you think that could be an option to finance conservation of ACA?
    - 21.2. Have you heard of anyone else who is planning to introduce PES schemes around ACA?
22. Who might have disadvantage of land and resource use change implicated with a PES scheme?
23. Can you imagine contributing to an 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?

Annex VI. Guideline focus group discussions

Basic information
Place/ community:
District:
GPS Nr:.
Nr. of respondents (male/ female):
Date:
Facilitator/ recorder:

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; did you note erosion, loss of soil fertility, loss of forest cover 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 practises?

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?
2. What is the punishment of infringement into the conservation area?

Land- and resource use change

1. What needs to be done to change your land/resource use into a more sustainable one?
   1.1. What could you do to reduce negative effects of your land/resource use on the environment? (If negative effects are identified)
   1.2. Which assistance would you need (technical assistance, resources …)?
2. Are you willing to participate in conservation, afforestation and agroforestry program if you did not lose any income or got 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/ if my foregone costs would be compensated/ 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?

Annex VII. Interview partners on national and local level

(Including interviews of the preparatory trip of the team leader and the commissioner)

Interview partners on national level

	Institutions
State Institutions	Forestry Comission Wildlife Division Forest Services Division MoLFM MOFA 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

	Institution
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

Annex VIII. Overview over focus group discussions

Name	Nr. of sample	Position (GPS)	Nr. of participants male/ female	Date
Settlement/ Tikobo Nr. 2	Sample 0	N 05°09'52,8'' W 02°29'56,6''	8/0	16.08.
Ehwia Madwen	Sample 1	N 05°10'23,2'' W 02°28'58,9''	8/4	19.08.
Iyibuzule (cassava mill)	Sample 2/3/4	N 05°8'44,4'' W 2°31'19,4''	11/4	20.08.
Old Ankasa	Sample 5	N 05°12'41,8'' W 02°38'55,9''	15/0	20.08.
Aqui Allah	Sample 6/7	N 05°11'31,5'' W 02°41'29,4''	2/1	21.08.
Susuka	Sample 8	N 05°14'50,0'' W 02°43'56,1''	10/4	23.08.
Domeabra Apatase	Sample 9	N 05°19'29,4'' W 02°44'12,6''	10/14	21.08.
Apatase Damoa	Sample 10	N 5°25'27,5'' W 2°36'02,9''	10/4	27.08.
Apatase Asoredanho	Sample 11	N 5°25'18,6'' W 02°35'34,8''	18/1	27.08.
Beske	Sample 12	N 5°12'30'' W 2°28'35''	11/5	26.08.
Sowodadiem	Sample x	N 05°21'52,1'' W 02°29'15,9''	14/2	27.08.

Annex IX. Traditional authorities in Ghana

The traditional authorities - the chieftaincy institution in Ghana is believed to be one of the oldest traditional institutions in Ghanaian living memory. Chiefs are leaders of their communities and by custom members from the royal family. According to the 1969, 1979, 1992 and the Chieftaincy Act of 1979 (Act 370), a chief is "a person hailing from the appropriate family who has been validly nominated, elected, enstooled or enskined as a chief or queen mother in accordance with the prevalent customary law and usage" (Article 277 of 1992 Constitution). Hence, membership of the royal family lineage system is a condition for being made a chief (NABILA, 2006). Besides traditions, the continued existence of the chieftaincy institution has been safeguarded by constitutional guarantee. Particularly, article 177 (1) of the 1979 and 270 (1) of the 1992 constitutions state that “the institution of chieftaincy together with its traditional councils as established by customary law and usage is hereby guaranteed”.

There are three tiers of traditional authorities recognised by law. These are the Traditional Councils, Regional and National Houses of Chiefs. The Traditional Councils are headed by paramount chiefs and have divisional and sub-chiefs as its members. They discuss developmental issues of the traditional area and handle chieftaincy matters except those the paramount chief has to care for.

The Regional House of Chiefs is composed mainly of paramount chiefs from the Traditional Councils in the region. On behalf of the Traditional Councils they nominate, select, install and remove chiefs. They also have original jurisdiction over paramouncy.

The National House of Chiefs consists of five elected paramount chiefs from each region. Among other tasks it provides regulations on matters of succession and disposition, and also liaises between the chieftaincy and government institutions.

Functions of traditional authorities

In its early days, the chieftaincy institution played a number of roles in all matters of societal life. The institution served as a vehicle for mobilising people for communal development. In line with traditions, the chief is assisted in performing these functions by his council of elders and other communal groups. Chiefs were therefore seen as the embodiment of both, spiritual and secular lives of their societies.

However, over time the functional role of the chieftaincy system has changed. The chiefs in modern day Ghana primarily function as agents for development and conflict resolution. This viewpoint is also echoed by BOAFO-ARTHUR (2001); he informs us

that “there are many instances, at the rural level, where societal conflicts are referred, first and foremost, to the traditional ruler for arbitration. In most cases, it is where parties are not satisfied by the judgement of the traditional arbitration system that the case is taken to court.The delays associated with the court system have equally made the role of the chiefs in traditional arbitration indispensable”. The chief is therefore expected to lead his people in initiating and organising self-help programmes and projects in the areas of health, education and economic development to complement the development efforts of the local and central government.

Another significant role of the chieftaincy institution is the role of chiefs as custodians of properties notably land. The 1969 Constitution vested all stool lands in the appropriate stools. Article 164 (1) states that “all stool lands in Ghana shall be vested in the appropriate Stool on behalf of, and in trust for, the subjects of the Stool”. Article 18 (1) also provided that “no property of any description shall be compulsorily taken possession of, and no interest in or right over property of any description shall be compulsorily acquired by the State…”. All land is therefore vested in the Paramount Stool through the allodial title. By these constitutional provisions, chiefs have major stake in land.

Types, hierarchy and succession of the traditional authorities

In most traditional areas and particularly among the Akan societies, the lowest level in the hierarchy of the chieftaincy system is the village chief (Odikro) with the highest being the Paramount chief (Omanhene) or the King depending on the area. In between are the divisional chiefs and sub-chiefs. Each divisional chief has control over their stool lands. The Odikro in some communities may be representative of the chief who oversees land in the villages on behalf of the chief. He may be the head of a number of farmsteads/hamlets. "Every village has its headman who exercises a sort of patriarchal rule over a few inhabitants. He, as well as the villagers, is subject to some chief who has control over three or four more villages; and this chief is again a subject of the chief or king of a large village" (CHALMERS, 1872 as cited in NABILA, 2006). In some traditional authorities, there are queen mothers for all levels of the structure, namely: the paramount, divisional and the sub-divisional. There are also various elders or sub-chiefs who take charge of specific functions in a chief’s palace. They form the council of elders. Thus the existing chieftaincy structure promotes devolution of power in the traditional state.

Succession, that is, nomination, selection, enstoolment or enskinment in the chieftaincy institution varies and depends on the system of inheritance (matrilineal/patrilineal). In the matrilineal societies such as the Akans, the queen mother nominates who would be chief for approval by the kingmakers. However, the kingmakers have the cumbersome task of selecting the nominee to be enstooled.

The institution has however come under barrages of criticisms in recent times on account of being despotic and producing leaders whose legitimacy is ascribed only by birth. There are also allegations of indiscriminate sale of land, misuse of community resources without impunity, opulent life style and above all arrogance.

Conclusion

It should be noted that the chieftaincy institution has suffered a lot of interference and manipulations both in the colonial and the post independence era. As BOAFO-ARTHUR (2001) has remarked, “the traditionally unfettered powers of chiefs have undergone transformation as a result of formal colonial rule and the introduction of parliamentary democracy after independence”. The Administration of Lands Act, 1962 (Act 123) among others was passed aimed at defeating the powerful chiefs and to enable the government take over stool lands away from the few people in the collective interest of the masses. This affected the economic base of the chiefs. Similar strategies were again carried out under the PNDC’s (Provisional National Defence Council) populist idea of power to the people which also affected the institution.

But in spite of all these the chieftaincy institution has proved resilient and still remains sacrosanct and respected traditional institution in Ghana. Chiefs still wield a lot of influence and power over their subjects. This explains why ruling governments and opposition parties all try to win the support of chiefs at all times.

Annex X. Ecological field study

Trans./ spot	GPS-data	No. of storeys	Heights of canopy [m]	Cover of canopy [%]	No large timber trees >0.3m	dbh biggest timber	dbh non-timber	No. sec. bushes	No. sec. trees	No. of vines
9/1	N 5°19'17.1"; W 2°44'07.3"	2	20	48	1	1.6	1	120	10	210
9/2	N 5°19'15.4"; W 2°44'06.0"	2	15	20	1	1.4		80	0	190
9/3	N 5°19'15.8"; W 2°44'03.3"	2	20	70	7	1.2	0.4	140	7	20
9/4	N 5°19'10.6"; W 2°43'57.6"	2	20	60	3	1.5	0.6	130	6	12
8/1	N 5°14'55.0"; W 2°43'29.1"	2	16	45	5	0.8	0.5	15	6	35
8/2	100m to the right of 8/1 in WSW direction	2	18	45	1	0.8	1	30	25	70
8/3	200m to the right of 8/1 in WSW direction	2	18	45	1	0.8	0.6	15	10	150
8/4	300m to the right of 8/1 in WSW direction	3	35	35	3	1.9	0.7	2	14	50
7/1	N 5°13'19.5"; W 2°39'37.3"	2	20	75	3	1.4	1.2	0	0	30
7/2	N 5°13'22.4"; W 2°39'37.2"	3	27	75	4	1.2	1.3	0	0	20
7/3	N 5°13'23.5"; W 2°39'36.5"	3	30	80	3	1.7	0.5	0	0	80
7/4	N 5°13'25.5"; W 2°39'33.0"	3	25	75	5	1.5	1.2	0	0	100
6/1	200m westerly of spot 6/3	3	25	68	3	1.3	1.2	0	0	30
6/2	100m westerly of spot 6/3	2	20	60	2	1.1	1	0	0	100
6/3	N 5°13'15.1"; W 2°39'19.0	2	20	80	2	1.4	1.1	0	0	15
6/4	100m easterly of spot 6/3	2	15	60	1	1	1	0	0	40
5/1	N 5°13'04.2"; W 2°39'02.7"	2	15	57	4	1.5	1	0	0	150
5/2	ca 100m west of spot 5/1	2	15	60	3	1.4	1.4	0	0	120
5/3	ca 200m west of spot 5/2	2	18	70	2	1.2	1.2	0	0	130
2/1	N 5°10'15"; W 2°30'43"	2	27	60	2	1.1	1.4	37	5	470
11/1	N 5°24'35.9"; W 2°35'55.2"	3	35	55	7	0.95	0.3	5	1	60
11/2	N 5°24'34.0"; W 2°35'53.0"	3	30	60	7	1.5	0.18	9	8	50
11/3	N 5°24'34.0"; W 2°35'53.0"	3	30	60	8	0.8	0.25	8	1	50
11/4	ca 100m NW of 11/3	3	26	40	6	0.75	0.14	3	0	40
X0	N 5°21'52.1"; W 2°29'15.9"									
X1	100m to the left of X2	3	45	60	9	2.4	0.6	12	6	36
X2	400m W of X0	3	40	70	10	2.3	1	54	3	36
X3	100m to the right of X2	3	40	50	6	2	0.7	2	4	63
X4	200m to the right of X2	3	37	80	14	2.2	0.1	0	1	15

Annex XI. Multilateral funding for adaptation

The Global Environment Facility (GEF) Trust Fund

The GEF, as an entity entrusted to operate the financial mechanism of the UNFCCC, established the Strategic Priority on Adaptation (SPA) under its Trust Fund. The objective of the SPA is to reduce vulnerability and to increase adaptive capacity to the adverse effects of climate change in the focal areas in which the GEF works. The SPA supports pilot and demonstration projects that address local adaptation and at the same time generate global environmental benefits.

The Special Climate Change Fund (SCCF)

The SCCF aims at supporting activities in the following areas: (i) adaptation, (ii) technology transfer, (iii) energy, transport, industry, agriculture, forestry and waste management, and (iv) economic diversification. Adaptation activities to address the adverse effects of climate change have top priority for funding under the SCCF.

The Least Developed Countries Fund (LDCF)

The LDCF was established to support a work programme to assist Least Developed Country Parties (LDCs) carry out, inter alia, the preparation and implementation of national adaptation programmes of action (NAPAs). NAPAs represent an effort launched after the seventh conference of parties (COP7) held in Marrakech in 2001 for the LDCs. In order to address the urgent adaptation needs of LDCs, NAPAs focus on enhancing adaptive capacity to climate variability, which itself would help address the adverse effects of climate change. NAPAs are prepared through a participatory process, involving, in particular, local communities. After consultations, a national NAPA team develops prioritized proposals for urgent adaptation activities, which is subsequently funded from the LDC Fund.

The Adaptation Fund under the Kyoto Protocol

The Kyoto Protocol Adaptation Fund will be financed from the share of proceeds of the clean development mechanism (CDM) and other sources.

Funds under other Multilateral Environmental Agreements (MEAs)

Some funding is also available under other MEAs whose areas of work could be synergetic with adaptation, including the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the Ramsar convention on the conservation of wetland resources.

(Source: Elasha et al. 2006: 38)

Annex XII. Research team

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