

JUSTIFICATION TO UPGRADE ATEWA RANGE FOREST RESERVE TO A NATIONAL PARK



**LIVING WATER FROM THE MOUNTAIN
PROTECTING ATEWA WATER RESOURCES**



JUSTIFICATION TO UPGRADE ATEWA RANGE FOREST RESERVE INTO A NATIONAL PARK

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The contents of this report are the responsibility of A Rocha Ghana and do not necessarily reflect the views of the Dutch Ministry of Foreign Affairs. The analysis contained in this document is based primarily on reports of studies carried out by many organizations including those commissioned by A Rocha, Ghana under the Living Water from the Mountain Project (Save Atewa Project).

The reference to reports from the Forestry Commission, Conservation International as well as Conservation Alliance and other sources were meant to further improve the quality of the analysis.

Executive Summary

The Atewa Range Forest Reserve (Atewa), one of the forest reserves within Upper Guinea Hotspot, covers a total land area of 263km² and represents about 33.5% of the remaining closed forest in Ghana's Eastern Region. The ownership of the Atewa Range Forest Reserve is vested in the President of the Republic of Ghana in trust of the Akyem Abuakwa Stool. Politically, Atewa Range Forest Reserve is controlled by East Akyem District Assembly and West Akyem (Kwaebibirem) District Assembly. The Akyem Abuakwa Traditional Area within which the reserve lies, is surrounded by more than 40 settlements with an estimated population of about 75, 0180. The forest functions as the source of three important rivers – the Densu, Birim and Ayensu rivers, supports several communities who live on the forest fringes, as well as being home to a large diversity of plants and animals. Despite this status, the forest both inside and outside the Forest Reserve is steadily degrading due to illegal activities such as timber and non-timber harvesting and the encroachment of farms, gold mining and weak institutional arrangement.

Protected areas are identified as critical tools to conserve biodiversity in the face of the global crisis of species extinction and the loss of the world's natural capacity to support all life and human existence. The socio-economic, cultural and biological significance of Atewa at the global and national levels largely accounts for the call for its re-designation to a national park and subsequent development of its attractions into an ecotourism destination. This is to ensure the long-term security of the Atewa to sustainably provide efficient public goods and services to the people.

An analysis of field reports of activities commissioned by A Rocha Ghana in collaboration with the Forestry Commission have provided sufficient justification for re-designation of Atewa into a National Park. The 1992 constitution, a tall list of relevant environmental policies and Ghana's ratification of International conventions constitute significant pressure driving the development of a strong case for biodiversity conservation within Atewa. The recent siting of some faunal species including primates, birds, duikers etc., by scientists and communities after the seemingly high level of degradation gives indication of the continued biological richness of the reserve. The rate of recovery of degraded sites which resulted from agricultural expansion and illegal logging shows the resilience of the Reserve to recover from past 'shocks' when its management regime is changed to a national park where any such activity will be prohibited. The unique biodiversity, the strategic location, the impressive mountain landscapes and the rich cultural heritage of the Akyem Abuakwa Traditional Area are undeniable assets that form a strong foundation for the Atewa tourism industry with an estimated revenue of US\$5.4 million per year. The strong sense of identification with and the commitment of major stakeholders at the national, regional and local levels to the re-designation of Atewa provide additional legitimacy for a change in management regime.

A TEEB approach used historical data and projects changes to the Atewa Range (Forest Reserve plus a buffer zone around it) under four scenarios over thirty years, and estimated how these changes could affect the forest values in economic terms. The estimated

economic value of Atewa including the value of its ecosystem services (US\$40.6 million per year), animal and plants species (US\$12.4 million per year), the land used for cocoa production (US\$9.3 million per year), water for consumption (US\$25 million per year) and water for agriculture (US\$3.1 million per year) offer an opportunity for investing in its long term protection to realize these economic benefits. This is against the backdrop that gold deposit with an estimated average net-revenue (before taxes) of US\$2.2 million per year is far lower than the value any of the goods and services delivered by Atewa. In order to create a lucrative aluminum industry, (just mining the bauxite will not be sufficient), large investments need to be made to construct a refinery to produce alumina from the bauxite ore after which the alumina will be smelted to aluminum. With a capacity of 600,000 tonnes of bauxite, this would result in an annual net value of US\$36.3 million (excluding investment costs). This means that it will take almost 12 years to recoup the initial investment (US\$433 million) of an alumina production plant. In both economic and conservation terms, only the conditions provided by the National Park with a supporting buffer zone will catalyze an increasing trend in value in the long term with a low participation of illegal and unregulated gold mining and timber logging.

The absence of a comprehensive management regime is the source of the lack of commitment on the part of the various institutions resulting in many illegal and unregulated activities. A new management with a business approach is thus being advocated, where a logical and more practical business plan is included in the traditional management planning scheme that is currently being implemented by the Forestry Commission. Achieving sustainable financing of Atewa as a National Park requires the identification of financial sources (both private and public sources) and opportunities and to match these with the financial requirements of the park.

This report provides all the issues that need to be taken into consideration in terms of decision-making at the government level and all other levels related to the upgrading of the legal status of the Atewa Range Forest Reserve to a national park. The implementation of the National Park concept with a well-defined buffer zone, appropriate management regime and stakeholder collaborative participation, will go a long way to safeguard the ecological integrity of Atewa and its diverse functional roles as well as enhance sustainable benefits to various stakeholders.

List of Abbreviations

AEA	Agricultural Extension Agent
A Rocha	A Rocha Ghana
Atewa	Atewa Range Forest Reserve
CA	Conservation Alliance
CBA	Cost Benefit Analysis
CBAGs	Community Biodiversity Advisory Groups
CBD	Convention on Biological Diversity
CI	Conservation International
CREMA	Community Resource Management Areas
CSO	Civil Society Organizations
DI	The Development Institute
GOG	Government of Ghana
FAO	Food and Agriculture Organization
FC	Forestry Commission
FSD	Forest Service Division
GDP	Gross Domestic Product
GSBA	Globally Significant Biodiversity Area
GTDP	Ghana Tourism Development Plan
GWCL	Ghana Water Company Limited
GWS	Ghana Wildlife Society
HFZ	High Forest Zone
IUCN	International Union for Conservation of Nature
MLNR	Ministry of Land and Natural Resources
MMDA	Ministries, Municipal, District & Assemblies
MTDP	Medium Term Development Plan
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
NTFPs	Non-Timber Forest Product
Okyeman	Akyem Abuakwa Traditional Area
PA	Protected Area
RAP	Rapid Assessment Programme
SWOT	Strength, Weakness, Opportunity and Threats
TEEB	The Economics of Ecosystem and Biodiversity
WD	Wildlife Division
WRC	Water Resources Commission
WTO	World Tourism Organization
NTFPs	Non-Timber Forest Products
UNEP	United Nations Environmental Programme

Glossary of Terms

Biodiversity - Biological diversity - or biodiversity - is the term given to the variety of life on Earth and the natural patterns it forms. The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend. Biodiversity also includes genetic differences within each species - for example, between varieties of crops and breeds of livestock. Chromosomes, genes, and DNA-the building blocks of life-determine the uniqueness of each individual and each species.

Ecosystem Service - Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.
(<http://www.unep.org/maweb/documents/document.300.aspx.pdf>).

Ecotourism - Ecotourism is now defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education". Education is meant to be inclusive of both staff and guests. (<https://www.ecotourism.org/what-is-ecotourism>).

Biodiversity Offset - BBOP defines biodiversity offsets as "measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken (http://bbop.forest-trends.org/pages/biodiversity_offsets).

Protected Area - A clearly defined geographical space, dedicated and managed through legal or other effective means to achieve the long term conservation of nature with associated ecosystem services and cultural values
(<https://www.iucn.org/theme/protected-areas/about/protected-areas-categories>)

Rapid Assessment Programme - CI's Rapid Assessment Program (RAP) works to fill this void. RAP, founded in 1990, sends teams of experts on short expeditions into critically important field sites around the world. Experts at these sites evaluate the state of a region's biodiversity, the health of its ecosystems and the multiple benefits that nature provides to people. By doing so, RAP provides information that can guide effective decision-making about conservation
(<http://www.conservation.org/projects/Pages/Rapid-Assessment-Program.aspx>).

The Economics of Ecosystem and Biodiversity- The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on "making nature's values visible". Its principal objective is to mainstream the values of biodiversity and ecosystem services into decision-making at all levels. It aims to achieve this goal by following a structured approach to valuation that helps decision-makers recognize the wide range of benefits provided by ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, suggest how to capture those values in decision-making (<http://www.teebweb.org/about/the-initiative/>).

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Structure of the report

This report presents a methodological presentation of information that justifies the re-designation of Atewa Range Forest Reserve as a national park. The report is made up of 3 parts.

The first part is made up of chapters 1-4 which gives an introduction and general overview of Atewa, the status; the ecological, economic, and socio-cultural significance of Atewa. This part ends with cases studies from other reserves in the Upper Guinean Forest Block to show how the change in management regime of some protected areas has not only improved the biodiversity of the area but has also brought economic returns and social equity to the people living around the resource.

The second part gives an analysis for the justification Atewa as a national using data from studies commissioned as part of the Living Water from the Mountain Project (Save Atewa Project) and other existing information provided by stakeholders. Based on this analysis, a new management is proposed with its risks and opportunities taken into consideration.

The final part concludes the report with a summary of the key finding and the way forward. These conclusions and recommendations are expected to guide policy makers and state institutions charged with moving the agenda forward towards the re-designation of the Atewa into a National park.

1.0 Introduction

1.1 The Upper Guinean Forests of West Africa

The Guinean forests in West Africa comprises one of eight biodiversity hotspots in Africa. This includes two sub-regional forest blocks- the Upper and Lower Guinean sub-regional forest blocks. According to the Program of Forests (PROFOR) of the Food and Agriculture Organization (FAO) (2011), the Guinean forests ranks 4th on the list of biodiversity hotspots in the world with respect to intact area, 1st in animal biodiversity and 8th in plant biodiversity in the world. This remarkable natural resource spans five countries in West Africa- Sierra Leone, Liberia, Guinea, Cote d'Ivoire, and Ghana. Despite efforts by governments to implement sustainable forest management measures, it has not been adequate to address the challenges of deforestation

Remnants of the Upper Guinea Hotspot can be found in Ghana and classified as the High Forest Zone (HFZ). The High Forest Zone which includes Atewa Range Forest Reserve is made up of the forest under permanent reservation and those outside of the permanent estate referred to as the off-reserve forest. The permanent forest estates were established by the Forest Ordinance Act in the early part of the 20th century for various ecological and economic reasons. Chief among the reasons for the establishment of the reserves include timber production, protection of watershed and ecologically sensitive areas such as hills with steep slopes, fire belts, provision and sustenance of ecological conditions ideal for agricultural production. Notwithstanding these benefits, the hotspot is under threat from human and natural factors.

According to the United Nations Environment Program (UNEP) (2012), deforestation in Africa is twice the world rate with the loss of approximately 4 million hectares of forests per year. Africa's remaining biodiversity are concentrated in forests that have been classified as biodiversity hotspots around the continent. A number of threats to the survival of these forests have been identified. Significant amongst these threats are the issues of over-exploitation, unsustainable land use practices, wildfires, mining, and political unrest particularly in Sierra Leone, Liberia, and to some extent Cote d'Ivoire.

Continuing forest destruction results in habitat loss for faunistic and floristic elements, thus reducing biodiversity and accelerating soil erosion with its attendant low agricultural productivity and, consequently, deteriorating livelihoods of rural people. If the forests are not completely cleared and transformed into other forms of land-use, degraded or devastated vegetation cover remains. Ideally, under undisturbed conditions and over the course of long time spans, succession gradually restores forest-dominated ecosystems to something resembling the original composition.

Today, high pressure on natural resources from anthropogenic disturbances affects, and often interrupts, the succession process, with the consequence that the extent of secondary forests is rapidly increasing in the forest zone of West Africa. According to FAO (2006), the

proportion of secondary forests compared with the total forest cover in Guinea, Liberia, and Benin was 98%, 96%, and 95%, respectively. All other countries in the region reported a secondary forest cover of 90% or more. This provides evidence of the extent of forest loss within the Upper Guinean Hotspot and the urgent need for innovative interventions.

1.2 Tools and approaches for reducing biodiversity loss

Human societies have protected land and water long before the start of recorded history – to protect grazing pasture, maintain timber supplies, stop avalanches, provide game from hunting or allow secure places for fish to breed. People have also protected places for less tangible reasons: because they were considered sacred or simply because they were recognized as aesthetically beautiful.

A number of concepts for management of biodiversity has emerged over the years in response to the escalating rate of biodiversity loss globally. One such important tool is the protected areas approach where locations receive some form of protection due to their value (cultural, ecological, economic, etc.) (West, Igoe & Brockington 2006). Protected areas aim to maintain the benefits provided by natural ecosystems (Nasi, Wunde & Campos 2016), or in some cases long-established manipulated ecosystems, which cannot be replicated in intensively managed landscapes (Stolton & Dudley 2010).

Protected areas have taken different forms and varying levels of human interference. These forms are sometimes driven by a desire to stop species disappearing and manage resource use, as is the case with some of the colonially established parks in Ghana, but also because colonial masters were trying to retain remnants of the landscape for their own good. Protected areas are the cornerstones of national and international conservation strategies. They act as refuges for species and ecological processes and provide space for natural evolution and future ecological restoration, for example, by maintaining species until management elsewhere is modified to allow their existence in the wider landscape or seascape.

1.3 Contributions of protected areas (parks) to national development

Today protected areas are increasingly expected to deliver a wide range of cultural, social and economic benefits in addition to maintaining ecological processes and providing space for natural evolution. Assurances that protected areas will provide such benefits are often crucial to attracting the support needed for their creation. This has been facilitated by the development of a number of tools and approaches that has revealed the value of protected areas and also decision making on natural resources. Although different methodologies are used and different benefits valued, the indication is that the benefits of protection are likely to far outweigh the costs.

Protected areas are identified as critical tools to conserve biodiversity in the face of the global crisis of species extinction and the loss of the world's natural capacity to support all life and human existence. Throughout the history of protected areas, the common trend is the focus on providing for life now and into the future. Indeed, the Convention on Biological

Diversity recognizes protected areas as a fundamental tool for safeguarding biodiversity, life itself. The intrinsic values of biodiversity are arguably reason enough for safeguarding life through protected areas (CBD, 2008). Nature's genetic, species and ecosystem diversity is a source of fiber, food and ecosystem services, such as fresh water and clean air, assures the wellbeing of humans around the world. A sound environment with a full complement of species underpins economic stability and human livelihoods over time (CBD, 2008). Protected areas thus provide for life's essentials.

Protected Areas act as life's buffers while serving as sanctuaries and strongholds of species in the face of climate change. Retaining the full complement of species, keeps diseases in check and curbs the expansion of pests. Protected landscapes shelter humans from tsunamis, landslides and hurricanes that are subject to increased intensity brought on by climate change. Sound natural systems resist damaging erosion, soil loss, or water quality loss.

Protected areas are economic engines. They provide for life's jobs and livelihoods as a traditional destination for the global tourism industry. Outdoor equipment industries have sprung up and are critical to regional economies. Significant employment is dependent on parks and protected areas. The pharmaceutical industry has benefited greatly from the genetic diversity of species and safeguarding species in protected areas will ensure the possibility of discovery of future medicines (CBD, 2008).

Globally - protected areas serve as indicators of achievement of the Millennium Development Goals. At the local level, protected areas contain landscapes with a sense of place and meaning to nations and its people (CBD, 2008). Not to be overlooked is the spiritual and heritage value of protected areas. The cultural richness and layers of meaning of these areas yield intertwined stories of humans and nature living in harmony (CBD, 2008).

Furthermore, maintaining protected areas contribute to progress towards achieving the Sustainable Development Goals by directly contributing to Goal 12 on sustainable production and consumption, Goal 13 on combating climate change and Goal 15 on sustainable use of terrestrial systems. They also contribute to Goal 11, enhancing environmental resilience for human habitation and Goal 1 and 2, where local communities depend the sustainable harvest of natural resources from protected areas for livelihood support.

Raising the conservation status of these protected areas and converting them into useful products such as ecotourism, have proven effective in safeguarding the biodiversity integrity of the long terms' sustainability of these natural resources. One of such protected areas in Ghana that have come under severe threats from human activities, the Atewa Range Forest Reserve, constitute the focus of this exercise.

2.0 Term of Reference

2.1 Background

The Atewa Range Forest Reserve has seen a number of modifications to its management regime since its creation in 1925. These changes reflect the growing importance of Atewa as an important source of goods and services that serve both fringe communities and urban centers.

The socio-economic, cultural and biological significance of Atewa Range Forest Reserve has necessitated the call by many, both state and non-state for national actions and processes to ensure the long-term security of the Atewa Range Forest Reserve to sustainably provide goods and services, such as biological diversity, NTFPs for forest fringe communities, micro-climate stability functions for agronomic activities and more importantly the long-term security of its water provisioning functions.

Paramount amongst these calls is the assertion that the change in management regime of the Atewa Range Forest Reserve will be a good step towards consolidating the gains made at Atewa and also improving conditions of the reserve to further serve the people. An important step will be to provide a justification based on information available to support the upgrade of the status of Atewa. This document outlines all the necessary information including biophysical, socio-economic and cultural relevance for upgrading the Atewa Range Forest Reserve into a National Park.

2.2 Objectives

The general objective of this assignment is to prepare a comprehensive and concise document which the Forestry Commission could use as a justification for upgrading Atewa Range Forest Reserve into a national park. The document which will serve as part of several key deliverables to be presented to the Forestry Commission, will form the basis upon which The Commission will prepare a Memorandum for consideration by the Ministry of Lands and Natural Resources.

Specifically, this assignment will:

1. Collate and review data and information on the biological, socio-economic and cultural undertaken in the past and very recently.
2. Review and analyse results from just completed Atewa TEEB Studies commissioned by A Rocha Ghana and partners
3. Undertake stakeholder consultations at both local, regional and national level on the process so far and consensus among stakeholders
4. Propose a new management regime to be implemented at Atewa based on a comprehensive risk and opportunities analysis

Amongst these objectives, this document will also undertake a comprehensive analysis of the upgrading the status of Atewa based on already available information on the current threats on forest and water resources, the weaknesses of the current management regime and the associated risks for maintaining the business-as-usual scenario. This document will

further examine the opportunities and potential benefits for putting in place a new management regime and the measures that are needed to sustain the proposed new management regime.

2.3 Methodology

The analysis to justify the upgrade of Atewa commenced with a desktop study of related materials and reports. This was followed by an assemblage of the various field reports obtained from A Rocha (Annex A). Other studies such as the RAP report (CI, 2007), the Ecotourism strategic report (CI, 2002) and the Biodiversity Offset Feasibility Assessment Report (CA, 2015) which provided useful insights into the biodiversity status and economic potential of Atewa forest reserve were also assembled. A number of policy related documents including the 2012 Forest and Wildlife Policy, the National Tourism Development Plan and the Local Government Medium-Term Development Plan were found to be useful addition to the collection. The Management Plan of the Atewa forest reserve and other such plans/policies used by the Forest Services Division were put together to serve as reference guide.

The various reports and documents were carefully analyzed to identify the issues that are critical to the current proposal to transform the status of Atewa to a national park and an ecotourism destination. The identification and analysis risks and opportunities that the proposed management regime presents were based on the SWOT model. While the reports provided useful information, the TEEB study gave an indication of the economic value of Atewa (albeit limited). While the TEEB is a bold attempt to quantify the economic value of a protected area, there are few data gaps that will require some additional studies.

Additionally, a three-day field trip was made to the proposed projects sites to validate some of the information from the reports. As part of the validation process a number of meetings were held with a cross-section of the key stakeholders mentioned in various reports including traditional authorities, the local government, the FSD, community members (illegal miners, illegal loggers, farmers etc.). A visit to Atewa through the Sagyimase wing with three members of the CBAG members provided an “on-the-ground” view of the ecological health of the reserve. The justification for the upgrade or otherwise of the Atewa forest to a national park is presented after each report is carefully analyzed and a conclusion drawn.

3.0 Description of Atewa Range Forest Reserve

3.1 Area and Reserve Description

The Atewa comprises two forest reserves - the Atewa Range Forest Reserve and the Atewa Range Extension Reserve covering a total land area of 263km². The two forest reserves form a contiguous block between latitudes 5°58' to 6°20' North and longitudes 0°31' to 0°41' West.

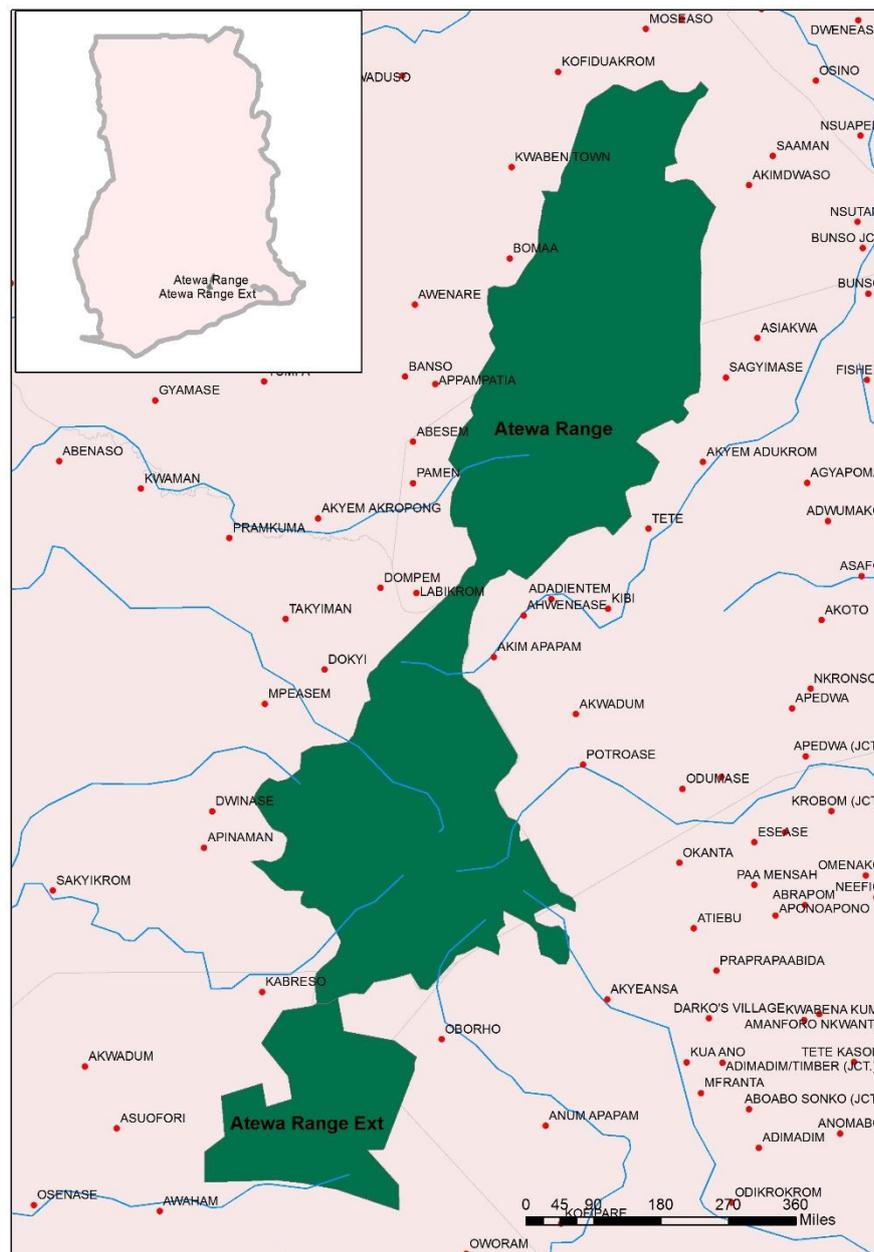


Figure 10 Map of Atewa showing the two forest blocks and adjoining communities

Atewa represents about 33.5% of the remaining closed forest in Ghana's Eastern Region (McCullough et al. 2007). Atewa lies in the Moist Semi-deciduous forest type which occurs

on isolated hill ranges 500-750 meters above sea level and steep slopes within an Upland Evergreen Forest (Hall and Swaine, 1981); one of the two kinds in Ghana. These steep slopes are dissected by numerous streams. Those on the east and south form the headwaters of the River Ayensu while those to the west form the headwaters of the Rivers *Supon* and *Amaw*, which drain into the *Birim* River. The headwaters of *Ayensu* (1,238 km²), *Birim* (3,922 km²) and the *Densu* (1,873 km²) river basins are sustained by the Atewa Range. The *Ayensu* River (103 km) and *Densu* River (116 km) flow south into the Atlantic, and the *Birim* River (175 km) makes a long detour north and southwest around the Atewa Range before joining the *Pra* river, which flows through agricultural and forest areas in the Akan lowlands into the Gulf of Guinea.

The forest is characterized by high temperatures and a double maxima rainfall regime. It has a mean monthly temperature of between 24 °C and 29 °C, and experiences a mean annual rainfall of between 1,200 mm and 1,600 mm. The first rainfall peak occurs in May-July, while the second one occurs in September-November (Swaine and Hall, 1977). A mild dry spell occurs from November to March each year.

There has been a series of management regimes in place over the past 90 years in response to varying classifications that has been accorded the area. These changes are due mainly to new initiatives by the Government of Ghana and her obligations to international conventions and not to any changes in Atewa's biodiversity or ecological values. The area was classified as a Special Biological 'Protection Area in 1994, a Hill Sanctuary in 1995 and one of Ghana's 30 Globally Significant Biodiversity Areas in 1999 (Abu-Juam et al. 2003). Designation as a GSBA is equivalent to IUCN's Category IV, a protected area mainly for conservation through management intervention (Dudley, 2008). In 2001, Atewa was listed as an Important Bird Area (IBA) by BirdLife International based on its avian diversity, one of 36 such areas in Ghana (Ntiamoah- Baidu et al., 2001).

Within the Forestry Commission, which manages the Forest Reserve, there is the intention to review and improve the management regime of the reserve to a National Park. An upgrade to National Park would imply a higher priority to conservation of the forest, an increase in conservation efforts and a possible shift of management from the Forestry Services Division to involve the Wildlife Division. It is expected that if such a paradigm shift is carried out, it could strengthen the protection efforts and further enhance biodiversity conservation and safeguard the ecological integrity of the reserve in the long-term. It also could also positively influence the current land-use practices towards sustainable natural resources management. There is enormous evidence of the unique ecological, social, cultural and economic significance of Atewa, at the national and global levels, to provide the justification for to upgrade its status to a national park.

3.2 Significance of Atewa

While the importance of the Atewa Range Forest Reserve is widely acknowledged, the extent of its significance differs widely. At the international level, the forest is recognized for its high biodiversity and the unique species it harbours (McCullough et al., 2007). It

represents about 33.5% of the remaining closed forest in Eastern Region and home to many endemic and rare species, including black star plant species and several endemic butterfly species (Hawthorne 1998, Larsen 2006).

At the regional and national levels, the Atewa Forest is the source of three rivers; Ayensu (103 km), Densu (116 km) and Birim (175 km). These rivers provide many of the inhabitants of the Eastern, Greater Accra and Central regions of Ghana with drinking water (i.e. over 1 million people in Accra alone). At the same time the rivers support numerous industrial and agricultural activities along the river's course as it travels downstream into the sea (GNWP, 2014). At the local level, the fringe communities depend on the upland forests in a variety of ways. This ranges from water supply, food, medicines, firewood, household equipment and building materials, to raw materials for processing enterprises. While the extent of the forest resource value varies, there is a general agreement on the ecological, economic socio-cultural significance of the reserve (GNWP, 2014).

3.2.1 Ecological Significance

A close look at the Atewa Range reveals a thick green closed canopy having all the three strata of a pristine forest. It has some of the tallest trees serving as emergent from the closed upper story that links with the second story which protects the fragile understory. All the stories provide the habitat and conditions that ensure the continual survival of the diverse life forms in the reserve. The physiology of Atewa makes the forest a critical component enhancing the environmental resilience of the surrounding area in terms of being able to withstand environmental stresses such as drought, mineral deficiencies, unfavorable temperatures, and air pollution.

3.2.2 Water and water resources

Among the three river basins that the Atewa Forest protects, the Densu River Basin is the most densely populated one. This basin also has the highest dependency in terms of water extracted for commercial and non-commercial uses (WRC, 2007).

Atewa therefore plays an important watershed protection function preserving quality and ensuring quantity of water reaching most homes in Accra and its environs. Approximately five million Ghanaians depend on these water sources and the critical watershed services provided by the plateau formations that soak up rain and mist and then hold, clean and discharge the water for all to utilize.

The Weija Dam, commissioned in 1978, blocks the Densu River, and has the main function to safeguard water supply to the city of Accra, though it was originally commissioned to also provide water for irrigation. GWCL operates water abstraction activities in the Weija Reservoir for all water utilizing sectors by dividing the water volume of the lake into maximum permissible abstractions per sector. As such, a maximum of 60% abstraction has been set for irrigation purposes, 30% for potable water, and 10% for environmental purposes (GWCL, 2015). The total capacity of the reservoir is about 133 million m³ (WRC, 2007). Aside providing portable water to

inhabitants of Accra, Atewa also provide water for domestic chores for people of the numerous communities living along its course. The people use the water for cooking, bathing, and other non-commercial uses like subsistence farming.

A number of industries also depend on water from the Densu River in a number of ways. They either use water as raw materials to produce bottled mineral water, or as a raw material for the production of goods, and others as part of their business processes. Another location where water is extracted from the Densu River is at Nsawam. There is no reservoir here, but water is directly extracted from the river behind a weir. Here, siltation has been reported to be an issue and in January 2016, the river dried up at Nsawam, illustrating the vulnerability of the area for climatic variations and siltation due to destruction of the buffer zone and upstream erosion (WRC, pers. comm, September, 2016.).

3.2.3 Ecosystem Services from Atewa

The Atewa Range provides benefits to diverse users in the Eastern Region of Ghana, from local communities situated in the range itself to the citizens of Accra in the downstream area. The reports have categorized these services into three including provisioning, regulatory and cultural.

Provisioning services: Atewa Range provides local communities with a broad range of products including food, medicine, materials for building, energy in the form of fuelwood, etc. where enough, communities are able to harvest these products for commercial purposes (McCullough et al., 2007). These products are mostly found in the forest or in cocoa plantations that are located within the buffer zone of the forest.

Approximately 350,000 m³ of timber and about 1,400 tonnes of other wood products are yearly extracted from the Forest Reserve (Ansah, 2014). Other timber products obtained from the forest include firewood, and wood for mortars and pestles (Ansah, 2014; Ayivor and Gordon, 2012). Cocoa plantations also supply part of the non-timber products to local communities that also benefit from the harvesting of cocoa itself. The herbaceous cover, however, provides suitable conditions for only part of the extensive list of non-timber products provided by forests and in most cases also in smaller amounts.

Regulating services: Atewa Range and its surrounding forests provide a number of regulating services including local micro-climate amelioration and air quality maintenance, moderation of extreme events, erosion prevention and maintenance of soil fertility, pollination and biological control of pest. One striking feature in terms of regulating services at Atewa is the Range's carbon sequestration potential. The vegetation in the Atewa Range, including forest, cocoa and herbaceous cover, contribute to capturing and storing carbon from the atmosphere, thus contributing to the maintenance of favorable global climatic conditions.

Cultural Services: Atewa Range has unique characteristics that create economic opportunities for tourism, recreation, mental and physical health, and aesthetic appreciation. The forest reserve represents a source of spiritual value and cultural identity to the Akyem Abuakwa Traditional Area. This includes a number of sacred groves located within the forest and a Royal Mausoleum at the Okyehene's Palace. Although tourism potential is not part of the current supply of ecosystem services, the potential is apparent and future developments can create new revenues from nature.

Socio-cultural significance: Information on the socio-cultural significance of forest resources can be gleaned from anthropological, ethnobotanical, geographic, ethnomedical, and linguistic studies. The variety of socio-cultural values, beliefs and symbolic functions ascribed to forests are as numerous and diverse as the communities and cultures within forest landscapes of Ghana.

Physically and mystically, forests have defined the environment of communities in the region throughout time (Falconer, 1993). The distinction that has been made between cultural values and the forest's functions is actually an artificial one. These values are not merely an additional layer of issues to consider as a constraint to normal management but are the vehicle through which the value to society of biodiversity is realized (Tabush, 2010). Tangibly and intangibly, forests feature in all aspects of culture: language, history, art, religion, medicine, politics, and even social structure itself and actually define people's sense of identity.

Atewa can be found within Okyeman (the Akyem Abuakwa Traditional Area), one of the richest areas in Ghana in terms of natural resources, including mineral resources, forest estate and biodiversity is located in the western part of Ghana's Eastern Region. The area is one of the most powerful kingdoms within the Akan traditional system in Ghana comprising 801 towns and villages which are organised into five Divisions (Adonteng – 155 towns and villages; Oseawuo – 288, Nifa – 113, Benkum – 218 and Gyasi – 27). It has a sophisticated traditional system of governance structure made up of the King (Okyehene) and three councils of elected chiefs, sub-chiefs, councilors and elders. The Councils correspond to the executive, state and county councils of western government (Owusu, 2012; CINRMP, 2003).

This kingdom boasts of the Atewa and sacred groves which are patches of forest set aside as sacred and strictly protected by customary laws (FRMP, 1999; Ntiamao-Baidu, 1995; Ntiamao-Baidu et al., 1992; Dwomoh, 1990). Locally the Atewa forest reserve is referred to as Kwaebibirem (which means the dark forest) typifying the dense and lush vegetation that once characterized the area. The culture of the Okyeman people particularly those living around the reserve is inextricably linked with the existence of the forest.

The forest has traditionally been regarded as the home of ancestral spirits who provide protection, success and progress to the Akyem Abuakwa Stool and the people of the Traditional Area. The forest symbols thus provide social structure and cultural identity in the rapidly changing environment to Okyeman. The trees, the links between the sky and earth, symbolize the links between the spiritual world of ancestors and people.

Rituals and ceremonies which draw on forest symbols serve to link the people with their cultural heritage, as well as their ancestral past (Calame-Griaule, 1970). A number of taboos, customs and other traditional norms are thus observed by the Stool and the Traditional Area to show reverence to the forest through regulation of the use of the forest resources. The forest is thus a source of stories, myths and local traditions which provide a strong justification for the continued protection and possible upgrade to a national park. The Atewa Range Forest Reserve also provides a range of products for traditional ceremonies from food and beverages to costumes and musical instruments. While some of these products are perhaps less often used on a day-to-day basis, they still form essential elements of a variety of cultural activities.

Some wild animals in Atewa are regarded as totems for some of the clans. Some streams and rivers are also regarded as gods by the fringe communities (CI-Ghana, 2002). The reverence for these resources account for the taboos and norms that prohibit hunting of these sacred animals. Several studies have established the commitment of the people within the landscape to support any measures that will contribute to the continuous existence of the forest and maintenance of its ecological integrity (CA-Ghana, 2015; A Rocha, 2012; CI-Ghana, 2002).

In particular, the Birim river considered to be the dwelling place of the river goddess (Birim Abena), is a cultural heritage and a symbol of unity for the entire Akyem Abuakwa Traditional Area. This is demonstrated in a popular compliment ('Akyemkwaa Onom Birim' meaning 'the son or daughter of an Akyem who drinks from the Birim River) often expressed by the vast majority of the people who associate with the river. Customary laws therefore mandate users to keep the Birim from being polluted because of its status as the dwelling place of the god (Abosom). In this regard, many individuals and institutions, quite apart from the indigenous people themselves, hold a stake in the continued existence of the reserve.

3.3 Socio-economic Significance

Atewa is surrounded by more than 40 settlements with an estimated population of about 75,180 (the figure excludes that for Adadientam, Awenare and Kobrisu) according to the 2000 national population and housing census report (MLF, 2002 quoted in the GSBA management plans 2007-2011). The distribution of the population in the districts by sex shows that females are in the majority. For example, in the East Akyem Municipal Assembly, females constitute 50.6% while male constitute 49.4%.

The District Medium Term Development plans (2014-2018) indicate that the population increase over time is reflected in the density of the population recorded in the year 2010. The land area of the East Akyem municipality (725 sq. km) was inhabited by 125,842 persons in 1970, 166,191 persons in 1984, 103,705 persons in 2000 and 167,896 persons in 2010. The increasing density in time shows the increasing pressure of the municipal population on the land and its resources (District Medium Term Development Plans (2014-2018). Notwithstanding, Atewa continues to provide a wide range of economic and social benefits to the people within the landscape.

Atewa provides alternative livelihood opportunities for most local community members, who are predominantly farmers. Farmers supplement their earnings and dietary needs with activities like hunting and gathering. Local handicraft industries acquire woods products from the forest to produce items like pestles, mortars and cane baskets. Chewing sticks and sponges, wrapping leaves used by market women and construction poles are also collected from Atewa. Other non-timber products extracted from the forest include wild honey, wild fruits, rattan, mushrooms, spices and herbs for medicine. Trade in bush-meat, including snails, is also a very lucrative venture in the area. Collectively, close to 95% of fringe communities engage in one or more of these activities for sustenance (District Medium Term Development Plans, 2014-2018). It also a source of employment through value generated from the processing and trade of forest products, and investments in the forest sector.

Traditionally, the Atewa Forest Reserve has been managed for water production and watershed protection. It has not been particularly managed for sustainable timber production, wildlife conservation and recreation. The social benefits also include the hosting and protection of sites and landscapes of high cultural, spiritual, or recreational value.

It is also the source of alternative land use such as gold mining that are not measured or fully taken into account when deciding how to manage the forest. Decisions taken around the management and use of the Atewa Range, both formal and informal, may therefore be sub-optimal.

Conclusion

The environmental, socio-economic and the cultural significance of Atewa have been clearly captured by all the studies. The striking feature of the field reports is the stakeholders' recognition of Atewa's contribution to the life of the people of the Akyem Abuakwa Traditional Area. Both tangible benefits such as water and intangible benefits such as carbon sequestration are known to be key services delivered to the communities.

The diverse but critical services delivered by Atewa to the vast majority of the people justify its continued protection through a national park arrangement. Further investigation into the value that the different category of stakeholders including the fringe communities place on Atewa and the services it provides could help in the development of appropriate management actions that ensures delivery of conservation outcome, distribution of social benefits and management effectiveness.

4.0 Threats to Atewa Range Forest Reserve

Forest loss and fragmentation, which generate various negative environmental and ecological consequences, have become widespread phenomena across Ghana. Motivation to investigate the underlying drivers is essential for land use planning and policy decision making. Addressing the threats to Atewa may be viewed from an understanding of the underlying drivers, deliberating on how these can be curtailed and deciding on the kind of actions at the national, local and individual levels that can be marshalled to address these. Several drivers at different levels are perceived to be behind the illegal activities in the Atewa forest. At the national level three main drivers including a) Conflicting policies compromising the protection of Atewa forest; b) Weak policy implementation and compliance by various actors; and c) Political interests, from local to national level to derive quick economic benefits from illegal logging and mining albeit against the conservation and management status of the reserve (Agyare, 2016).

At the local level, the drivers of the illegal activities within the Atewa forest include the perceived lack of meaningful participation of local stakeholders in decision making and management of the Atewa Forest Reserve and a lack of direct economic benefits from the reserve to the local communities (Agyare, 2016). These drivers largely account for the countless number of threats to the Atewa forest. Today, the frequency, intensity and effectiveness of these threats are shifting as a result of human activities and global climate change, making the forest ecosystem even more prone to damage.

The frequently occurring threats include:

- I. Illegal small scale mining/*Galamsey*, especially within the surrounding landscape
- II. Illegal farming and admitted farming in the forest reserve
- III. Illegal farms from encroachment into the forest reserve
- IV. Admitted farms have increased beyond original allotted areas in the reserve
- V. Illegal chain saw logging
- VI. Bush meat hunting (including poaching)
- VII. Overharvesting of Non-Timber Forest Products (NTFPs)
- VIII. Wildfires
- IX. Potential bauxite mining
- X. Pollution from Chemicals used in mining, agriculture
- XI. Legally permitted mining activities that are carried out right up to the boundary line of the forest reserve, leaving no buffer area.

4.1 Proposed Mining

Mining remains a major challenge to the sustainable management of the Atewa Range GSBA and the buffer zone around it. Areas once covered by agricultural crops such as cocoa farms have been converted to mining sites. Illegal and uncontrolled mining and ineffective management of the natural endowments of the area is causing huge social and environmental costs to thousands of people in the area. These endowments are gradually becoming a net drain on the area's health, wealth and sustainable development prospects. The proposed mining sites alone have an estimated area of 2,944.94 Ha (shown in red

polygon in *Figure 2*). These categories of mining areas are concentrated in the northern and north-eastern portion of the study area. They also occur in the valleys where alluvial deposits are found and water is readily available for washing the ore. The area represents approximately 1.2% of the 15km radius project area.

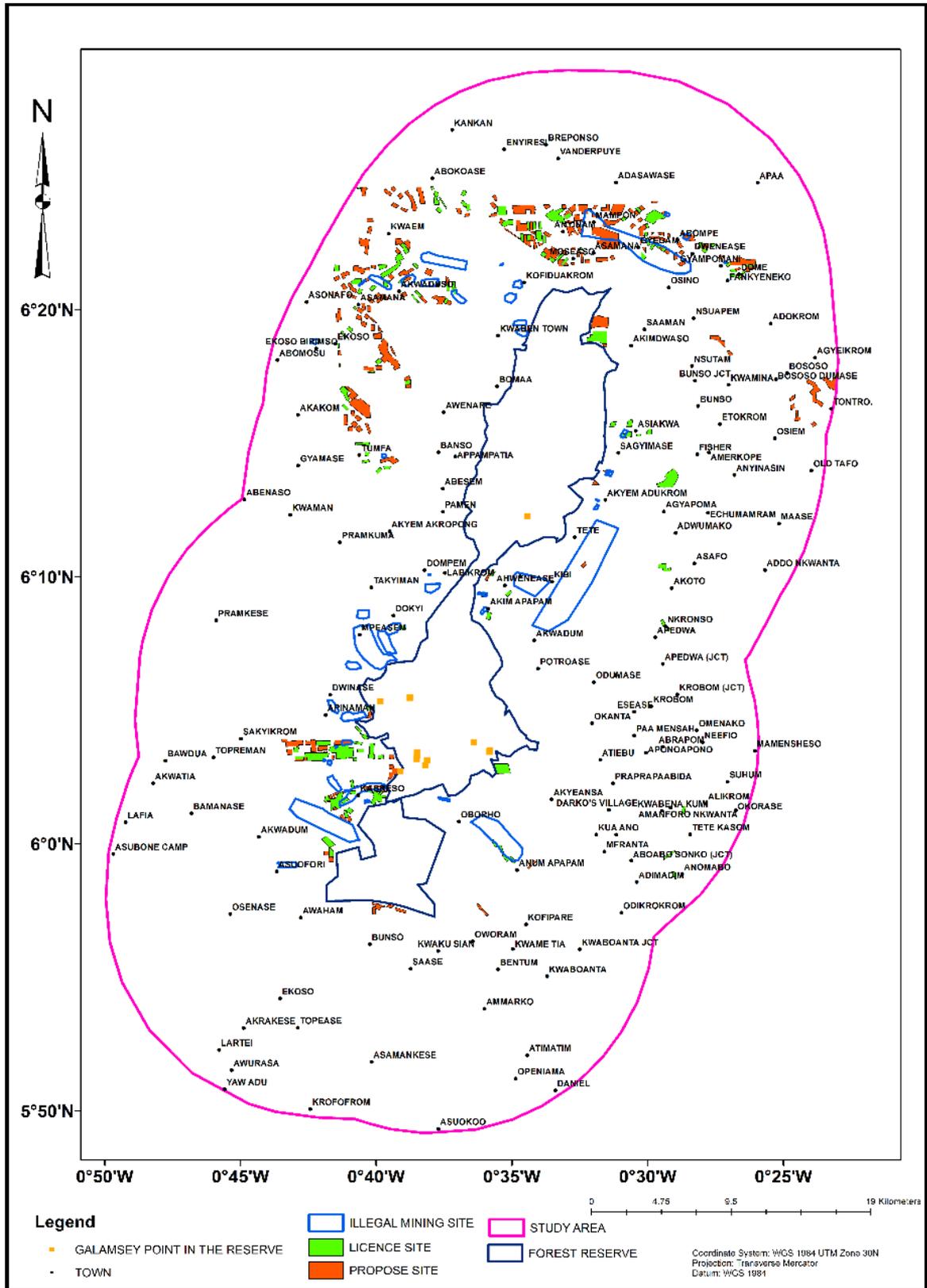


Figure 11 Composite Vector/Polygon Map of Proposed License and illegal mining site

The respective areas covered by these mining areas include Proposed areas (2,944.94 ha), License areas (2,027.87 ha) and illegal mining 5,365.71 ha. Proposed, licensed and illegal mining sites within 15km radius of the buffer cover an estimated area of 10,338.52 ha. This indicates that the scale of illegal mining is higher than legal mining activities. Unfortunately, there is very little information on total amount of extracted gold at a small scale, since production volumes of illegal miners, unregulated operations and subletted concessions are not regulated and have not been recorded (Minerals Commission, 2015).

4.2 Large-scale gold mining

The flanks of the Atewa Range Forest Reserve are now mostly covered with large-scale mining concession leases Active concessions, i.e. concessions that produce > 50,000 metric tonnes of unprocessed material per year (Aryee et al., 2002), are mostly in the hands of international mining companies like Xtra Gold Mining Co. Ltd. (Canadian owned, but the Government of Ghana has an interest of 10% in the company) and Med Mining Company (from Turkey). The processing method of the large-scale gold recovery is through separating the gold from the gravels efficiently in a wash plant using vibrating grizzlies, high pressure water beams, and rotating scrubbers (Goldenrae, 2006; MMC, 2005).

4.3 Small-scale gold mining (Galamsey)

While mining has been going on in the area for more than 50 years, the scale and escalating pace of small scale mining activities (< 50,000 tonnes of unprocessed material per year) over the past eight years have been made possible through the use of earth moving equipment (RMSC, 2016; Aryee et al., 2002). This phenomenon is expected to worsen if steps are not taken to reverse the trend in the area. Expansion of these mining activities will have immeasurable implications for watershed conservation, biodiversity, accessibility and cost of drinking water, local economy and health of local communities. It will also affect the national economy in view of the industries that depend on the Densu River; which takes its source from the Atewa Range GSBA (RMSC, 2016).

The trend of an increase in galamsey is also observed around the Atewa Range (Boateng *et al.*, 2014). Currently, galamsey concentrates in or around concessions in the upper reaches of the Birim River, mainly in the stretch just downstream from Kibi to Bunso (Osafo, 2011).

The illegal mining activities cover an area of 5,365.71 ha (2.04% of the total area) and mostly found close to the Atewa Range and its adjoining Atewa Range Extension Forest Reserves. While some of these illegal mining sites overlap with some of the proposed and the licensed mining sites, a few of them are located within the forest reserves. The illegal mining areas vary extensively in size from very large to small areas. The total area covered by illegal mining sites are about twice the total area of each of the proposed and licensed mining sites. Within the reserve, illegal mining activities in the form of manual operations are concentrated in the Southern portion. It is expected that most small-scale gold mining

operations are either illegal or part of the concessions of larger companies that have been sub-leased to smaller mining operators.

Spot light communities where illegal mining seems to be endemic include *Kobireso, Kibi, Segyemanse, Apapam, Akatin, Kwabeng, Boma, Esiakwa, Osino, Nsutam, Nsuapemso* and *Morso*. Extensive mining activities are taking place along perennial rivers and streams such as Suhien, Mor, Awusu, Merepong, Birim, Akusu, Pusupusu etc. Unlike the proposed and license sites which seem to be regulated and confined, the illegal sites are haphazardly scattered throughout the landscape.

A comparison of 2 time-series (2000 and 2014 Landsat image and Sentinel image for 2016) images shows the effect of mining on the vegetation and land-use classes (*Figure 3*). The low capital intensity of small-scale illegal mining makes the operation attractive to the rural poor who cannot afford the price of acquiring license and equipment. Areas once covered by agricultural crops have been converted to mining sites. Food crops and cash crops predominantly plantain, cassava, cocoa are among those affected.

It is widely held that unless measures are put in place to halt the rapid degradation of the forest and the buffer, Atewa risks losing its biological integrity within the next decades.

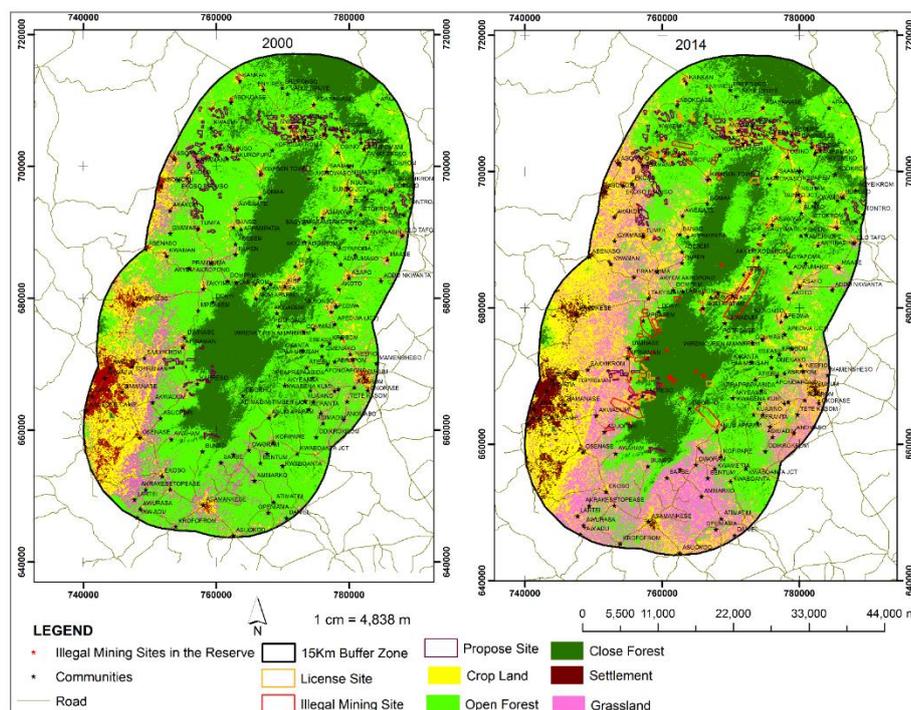


Figure 12 Land use Maps showing Mining in 2000 and 2014

4.4 Nature and characteristics of mining

Large and Small scale mining operations occur within the project area. Small scale mining is most predominant type of mining operations in the area. Gold is the most important mineral mined on a small scale in the area, although there is evidence of other minerals such as

bauxite. Alluvial mining is what is employed in the project areas and it involves mining mostly along water courses. The rationale is to ensure that there is enough available water to wash away the sediments to facilitate mineral extraction.

4.5 Impacts and Implications of Mining

Although mining is economically viable as it provides household incomes; reduce rural unemployment and poverty, however, the cost to environmental sustainability is very high in the long run. For instance, small scale gold mining is not cost effective in terms of environmental management.

4.5.1 Effect on biodiversity

The principal environmental problems caused by small-scale mining activity are mercury pollution from gold processing as well as forests and land degradation. As is the case in most developing countries, the mercury amalgamation technique is relied upon heavily as it is a cheap, dependable, portable operation for concentrating and extracting gold from low-grade ores. It is now well known, however, that the chemical, in sufficient quantities, poses a serious threat to human health and is deleterious to a wide-range of ecological entities. Once in the natural environment, mercury undergoes a change in speciation from an inorganic to a stable methylated state (MeHg) by non-enzymically and microbial action, and when ingested, eco-toxicological effects result. Abandoned pits and water pond may also become death traps for both wildlife and humans as well.

4.5.2 Pollution of river bodies

Pollution of water bodies is also a major problem associated with mining activities in the municipality. Seepage of heavy metals into underground water is a potential hazard from mining to the natural environment and human health. Some community water sources such as streams and rivers have been polluted. The common practice is that the tailings is discharged into previously mined pits to be used a number of times before they finally discharge them into surrounding rivers such as Birim and Ayensu.

The preservation of tailings in pits occurs at sites about a kilometer from the river banks. For mining sites, close to these rivers, the tailings are washed directly into the rivers without storage. As tailings enter the surrounding rivers, they pollute the rivers, changing the colour of water in the rivers to deep brown. The water becomes turbid and creates anoxic conditions affecting all forms of aquatic life. A typical example is the Birim River, Suhien, Mor, Awusu, Merepong, Birim, Akusu, Pusupusu Rivers. Pollution of streams and river bodies have serious economic cost for the treatment and supply of clean and quality drinking water. Most local communities depend on these streams as sources of drinking water and for other purposes, and therefore degradation of water quality affects a significant number of the rural population within the project catchment area. Most of the affected communities are very poor and therefore cannot afford the cost of treated water as an alternative. As a result of the high level of pollution, the cost of treating water for both

domestic and industrial use has become uneconomical to the extent that treatment plants like that of Kibi township are compelled to shut down frequently, causing hardships to the inhabitants.

Furthermore, normally clear-flowing streams have been converted into sediment-laden cesspools. Streams draining mining areas run blood-red and carry toxins and heavy metals like mercury to downstream towns and villages. The consequence is a polluted food chain thereby endangering the lives of thousands of peoples and other life forms.

4.5.3 Human Health and wellbeing

A combination of the effects of past mining activities and the more recent extensive surface mining operations have destroyed the quality of water, especially surface water in the study area. Many streams and rivers in the study area have been polluted thereby denying thousands of local people access to adequate clean water supplies. Many of the mining pits and dug outs have become filled with water and serve as breeding grounds for mosquitoes and other dangerous reptiles making available water not usable. Resident small-scale gold mining operations have, in fact, caused a disproportionate amount of damage to land.

Miners are often seen working on cliff tops as well as alluvial deposits within ponds and rivers. These areas have also played a major role in altering local hydrological patterns. This is even more dangerous as natural regeneration set and place become cover with vegetation. High levels of dust and pollution from surface mining in the project area are suspected to have contributed to serious local health problems such as increased and acute respiratory infections (ARI), diarrhea, skin diseases, malaria and acute eye infections. There are reports of people accidentally falling into some of the abandoned pits, many of whom either sustain serious injuries or died.

4.5.4 Forest degradation

The open cast method, which is practiced extensively and intensively has had devastating effects on the environment as illustrated in [Figure 4](#). Miners, who 'clear the vegetation' and then dig 'for mineral-bearing ore', have scarred the landscape with 'excavated pits and trenches', which in turn renders the 'land unsuitable for any other purpose' in the short to medium term. Through mining activities, hills have been graded down, vegetation covers of soils have been removed and deep pits have been created.

Large tracts of land have been extensively degraded by the activities of large-scale mining companies, licensed small scale companies and illegal operations in most communities. Trees are extensively cut down and used as props in mine pits; they are also used as fuel wood to dry the ore and to build shelter on most of the Atewa Small Scale Mining sites. The use of fuel wood and growth of settlements on mining sites have also contributed to the environmental degradation.

Most of the underground operations are constructed haphazardly, excavated to unsafe depths and supported flimsily by logs and branches. In certain areas, huge patches of forest

have been removed to establish quarters or 'resting grounds' for miners. Most forest patches along the forest reserves are fading away and this has serious implications for the Atewa Range Globally Significant Biodiversity Area in terms of encroachment and degradation if the pattern continues.

Some of the licensed concessions share boundaries with Atewa Range GSBA with no buffer zone between the two land-uses and this is likely to result in encroachment if not checked. This is likely to be the case as gold deposits become depleted in the off-reserve areas. As already indicated, pockets of mining activities have been registered in the forest reserve and this is likely to increase in the near future if immediate actions are not taken to make it unattractive. With a total estimated area of 7,393.58 ha under mining and an area of 2,944.94 planned for mining, it is anticipated that considerable areas will continue to be mined with new mineral discoveries in the future. It is critical that mining should not be allowed in the forest reserve in order not to compromise its ecological integrity.



Figure 13 Mining Scenes at Atewa

4.5.5 Impact on ecotourism

Gold rush that accelerated with the onset of the 2008 global recession compounded the woes of the tropical rain forests, spilling tons of toxic mercury into the air and water. The visual intrusion resulting from mining activities affects the aesthetic appeal of the surrounding areas. At stake are vast areas of wildlife-rich Upland Evergreen forest like the

Atewa Range GSBA which is an important biodiversity asset. If the scale of mining being witnessed off reserve is to spill over into the Atewa Range GSBA, it will degrade the environment and make it unattractive for investment and to potential eco-tourists. Digging of mining pits in the reserve could also become death traps and potential source of injury for tourists and other forest users.

4.5.6 Watershed conservation and other ecosystem services

The Atewa Range GSBA serves as headwaters for the Birim, Ayensu and Densu which are important source of water supply for people living Kibi, Accra, Winneba and surrounding areas (Forestry Commission, 2006). Therefore, encroachment by illegal miners in the reserve, if allowed to continue will seriously undermine the watershed and by extension water supply and provision of other ecosystem services to these areas. Declining water quality due to the degradation of forests along river banks may impose additional cost on water treatment and maintenance of equipment. This results in frequent shut downs of such treatment plants.

4.5.7 Effect on land productivity

Materials removed, also known as overburden, are dumped by excavators all around the pits with the various layers of soil lumped together with the top soil which contains humus for agriculture at the bottom followed by the subsoil in that order. Land contamination directly impacts agricultural productivity and food security of communities in the project area who grow crops and rear livestock.

The right to food includes availability of food but also access to food. However, pollution and removal of top soil has made extensive areas unfit for farming. If this cycle continuous, the poverty levels of communities within the project area will further be worsened. This right is well-established the Universal Declaration on Human Rights and the International Covenant on Economic, Social and Cultural Rights (1976) and a number of other instruments. The right to food has also been recognized under chapter five of the 1992 Constitution of Ghana. Illegal (and uncontrolled) mining and ineffective management of the natural endowments of the area are causing huge social and environmental costs to thousands of people in the area.

These endowments are gradually becoming a net drain on the area's health, wealth and development prospects. Mining among others remains a major challenge to the sustainable management of the Atewa Range GSBA and its surrounding management areas. Expansion of these mining activities will have immeasurable implications for watershed conservation, biodiversity, accessibility and cost of drinking water, local economy and health of local communities. It will also affect the national economy in view of the industries that depend on the Densu River; which takes its source from the Atewa Range GSBA. In view of these challenges, the Forestry Commission in collaboration with key stakeholders should facilitate the speedy conversion of Atewa into a national park to pave the way for the development of the ecotourism program.

4.6 Agricultural Encroachment and Illegal expansion of admitted farms

The economy of the Municipal and District Assemblies within which the Atewa Range Forest Reserves is located involves four broad sectors including agriculture, industry, trading and services sectors. Agriculture is the dominant sector and employs about 58% - 60% of the labour force. This is followed by the service and mining sectors which employ 34% and 6% of the total labour force respectively (Agyare, 2015).

The declining agricultural production and productivity within the Atewa landscape is accounted for by several factors including high cost of farming inputs, untimely supply of inputs for farmers; low prices of agricultural produce during peak of harvest and post-harvest losses estimated between 10-20% of total production. In recent times, however, poor extension services, illegal agricultural encroachment, expansion of admitted farms and illegal mining activities have become prominent challenges to agriculture.

The agricultural sector currently employs between 14-18 Agriculture Extension Agents (AEA) per district within 30 operational areas. Considering the large number of smallholder farmers within the Atewa landscape, the current AEAs to farmer ratio is poor and adversely affect agricultural service delivery. In the East Akyem Municipality for example the AEA to farmer ratio is 1: 3,480 farmers compared to the national average of 1:2000-2500. The implication is that there is inadequate AEA to support agricultural production resulting uncontrolled expansion of farms into forested areas within the landscape.

While there are some admitted farms within the reserve, the sizes of these farms have exceeded beyond the legal limits resulting in considerable loss of forest cover and biodiversity. The widely cultivated crops within the buffer that are gradually being extended into the reserve include cocoa, oil palm, food crops (maize, cassava, plantain, cocoyam, yam and vegetables) and on limited scale coffee and citrus.

This practice is assuming a proportion where some of the fringe community members consider the expansion of admitted farms and encroachment into the forest reserve as legitimate. The expansion of farms in the Atewa Range has been identified as a significant factor for land-cover change in the area and a significant threat to the biodiversity of the Forest Reserve (McCullough et al., 2007). Since the area experiences relatively high rainfall, removal of forest cover could readily lead to serious erosion and loss of topsoil.

This could easily disrupt the forest structure, loss of biodiversity and other forest ecosystem functions such as watershed protection. The favorable micro-climate that maintains agricultural activities could also be lost. The agricultural expansion in the area, together with timber logging, is thus likely to explain part of the change from forest to herbaceous lands observed in the Atewa Range between 1990 and 2010. The improvement in agricultural production through the provision of effective extension services could result in significant decline in agricultural extensification.

4.7 Illegal chainsaw logging

Illegal logging is the harvesting, transporting, processing, buying or selling of timber in violation of national laws. This definition also applies to harvesting wood from protected areas, exporting threatened plant/tree species, and falsifying official documents (WWF, 2014). Chain saw operation is the most important source of illegal logging within the Atewa Range Forest Reserve. With few or no rights in the reserves, nearby farmers and communities have had no incentives to protect, manage, or invest in the resource.

The increasing demand for timber and derivative products largely account for the increased illegal logging activities within Atewa. Economic trees that are targeted in the reserve include species such as Odum (*Milicia excelsa*), Wawa (*Triplochiton scleroxylon*), African walnut and African redwood. Whilst logging is not permitted in the Range, illegal logging activities especially with chainsaws is still prevalent and the impacts are evident.

Chainsaw milling operations as a whole has been black-listed in Ghana for the above reasons. The government in 1997 (Act 547 of 1997) and 1998 (and L.I. 1649) outlawed the use of chainsaw for lumber production as well as the sale and use of chainsaw lumber in Ghana. However, this action was taken after the failure of a legal provision -Trees and Timber (Chainsaw Operations) Regulations, 1991 legislative instrument 1518. Under the 1991 regulations, the chainsaw operators were legally recognized and their activities were supposed to be regulated by the District Assemblies and District Forestry Officers at the local level.

Resource allocation was decentralized under this management regime. The system led to indiscriminate felling of trees attracting public concern for resource depletion and environmental degradation. This culminated in the imposition of ban on chainsaw lumber production and trade. Following the ban measures to prevent chainsaw milling and trade in chain saw lumber for the purposes of sustaining timber resource use have become ineffective. This failure is attributed to several factors including corrupt practices of various governmental institutions entrusted with the management of forests and control of timber harvesting.

Illegal chain saw milling is not conducted under any standard working procedures. The timber removed by chainsaw operators is carried from the forest to accessible points by the roadside where they are loaded onto trucks. Of the many negative impacts associated with uncontrolled chainsaw operations are issues which border directly or otherwise on the maintenance of environmental quality of the forest. The increasing number of open canopies within Atewa is attributed to the indiscriminate removal of timber species through illegal activities (Lindsell, Opoku Nyame & Akom, 2016). A recent estimate indicates that there may be as many as 500 chainsaw operators in the Atewa reserve, with around 2,500 young men working as operators and lumber carriers (Owusu, 2012). In addition to the adverse impact of illegal logging on wildlife habitat and large animal population, the noise made by the logging machinery also disturbs wildlife species and facilitates in driving them to nearby landscapes where they become exposed to threats from hunters.

Furthermore, illegal logging has extended to areas considered to be sacred and was hitherto revered by local communities. For example, illegal logging, chain sawing and commercial

fuel wood harvesting is now a common site within the '*Okyemanpo*' (burial ground of the Kings of Okyeman), which used to be an excellent example of traditional forest conservation initiative in Ghana (GWS, 2006).

Unless measures are put in place to halt the illegal harvesting of timber, Atewa risks losing its habitat quality, extent and ability to provide ecological services. Since the operators are aided by the youth of the fringe communities, any strategy that breaks this alliance will reduce the illegal activities and significantly enhance the condition of the habitat. The long term sustainability of the Atewa will thus be dependent on its upgrade to a national park.

4.8 Bushmeat hunting and NTFP collection

Bushmeat constitute a major source of animal protein in most rural communities in Ghana. Certain species are considered a delicacy and are preferred over domestic meat while others are eaten as part of certain traditional rites. All varieties of wild animals are accepted as comestible, resulting in serious overexploitation that has led to very low population levels of all large mammal species. Large mammals in forest reserves and farmlands constitute an important protein source for the communities living along the fringes of the reserve.

In Atewa, 13 out of the 30 species of large mammals recorded in the reserve are regularly hunted as bushmeat, the rest being so rare that they do not feature in the hunter's regular catch (Owusu, 2012). While the trade is largely illegal, it is very profitable for local people who often lack other sources of income. A hunter can earn approximately \$300-\$1000 annually -- significantly more than the average household income in any region (JGI, 2015).

In addition to the bushmeat, the area is well known for other non-timber forest products (NTFP's) such as mushrooms and snails, which are heavily collected when in season and are sold at various points along the Akyem section of the Accra- Kumasi road. Thus, the Okyeman situation is a clear case of a traditional area with rich natural resources that are threatened by misuse and ineffective management, where national governmental efforts have not been able to contain the situation and where the traditional authorities claim they are keen to protect the resources for the survival of their people, but currently lack the capacity to be effective (Owusu, 2012).

The striking feature of the bushmeat trade is the range of methods used in hunting the wild animals. Conservation International (2004) noted that over 62% and 35.8% of the bushmeat in Ghana were hunted with automatic guns and chemicals respectively. Less than 3% of the bushmeat were killed using traditional methods including snares. The use of chemicals for hunting bushmeat has health implications for consumers. Since Anyinam, one of the important bushmeat market, receives the bulk of its supplies from Atewa, the sustained patronage of this market has dire consequences on the health of Atewa and consumers.

4.9 Wildfires

Wildfire is a common visitor of protected areas, leading to environmental degradation, including landscape destruction, soil erosion, nutrients depletion, biodiversity loss,

ecosystems change (vegetation and habitats, with implications for fauna sustainability), and air pollution. These changes can remain for from some months to several years. The ecosystem recuperation depends on the ecosystem vulnerability and resilience to this disturbance, vegetation pre/fire, topography, meteorological conditions, and human intervention (McKenzie 2010).

The Atewa reserve experiences occasional fires and relatively very few extensive incidents of wildfire occurrences have been recorded. Fires in the reserve mostly come from illegal farming activities that employ traditional farming system of slash and burn. Some of these fires sometimes get out of control and spread to non-target areas within the reserve. It is projected that the occurrence of wildfire in the reserve will increase due to the increasing accumulation of logging waste both inside and the adjoining off reserve areas and the number of illegal activities.

Since plant variety and abundance, flowering, fruiting, and leafing phenology of trees and soil nutrients status are essential features for ecological niches of wild animals, measures to reduce the occurrence and impacts of wildlife are critical.

4.10 Potential bauxite mining

Atewa is known to harbor mineralogical wealth including both gold and bauxite deposits, in addition to high biodiversity (McCullough, et al, 2007). While the bauxite deposit is yet to be mined, gold prospecting as well as small scale gold mining are widespread within the East Akyem Municipal and the Atiwa district. Three large companies are prospecting for gold at Adadientam, Adjapoma, Asiakwa and Asikam.

The Government of Ghana opened several forest reserves for mining in 2001, but Atewa was not included. However, the Government granted an exploration license to ALCOA to prospect for bauxite deposits in Atewa (McCullough, et al, 2007). Due to the fact that Atewa had been classified as a Globally Significant Biodiversity Area (GSBA), ALCOA (Aluminium Corporation of America) entered into an agreement with Conservation International (CI) to assist them in better understanding the biodiversity context of Atewa in order to incorporate biodiversity into the company's risk assessment and Environmental Impact Assessment of the project, should it proceed.

Its partnership involved applying CI's Initial Biodiversity Assessment and Planning (IBAP) methodology to increase understanding of an area's ecosystems and socio-economic dynamics and to provide recommendations for incorporating biodiversity considerations in the earliest stages of decision-making. Its partnership was formed in the spirit of providing significant gains for biodiversity conservation and industry, as well as for the government and people of Ghana.

Previously, ALCOA and CI had partnered successfully to utilize the IBAP methodology and conduct biodiversity surveys in Guinea (West Africa) and Suriname (South America). For Atewa, CI first worked with partners to conduct desktop and preliminary field research on Atewa's biodiversity in 2005, followed by a Rapid Assessment Program (RAP) survey in June

2006 to assess a wide range of taxa, as well as potential threats to and opportunities for conservation in Atewa. Following the RAP survey, a consultative workshop was held at the Palace of Paramount Chief Okyehene in Kibi on June 26, 2006 with participation from local community members and Chiefs, representatives from ALCOA and several NGOs, and the RAP scientists. At the consultative meeting, ALCOA demonstrated its commitment to protecting the biodiversity and the watershed of Atewa, while delivering economic benefits to the national economy.

In March 2011, Vimetco Ghana (Bauxite) Ltd., a 100% owned subsidiary of Vimetco N.V., (an international industrial group that focuses on the aluminium industry) obtained several prospecting licenses in Ghana. Based on these, they expected to receive exclusive rights for bauxite mining at Kibi (i.e. Atiwa Forest Reserve) and Nyanahin (i.e. Tano Offin Forest Reserve, with a total area of 468.66 sq. km) for the period of more than 50 years. They have carried out a comprehensive geological survey in these areas and are expecting to get confirmation of quite significant reserves of bauxite that can form the basis for a plant to provide alumina for their Chinese smelters (Vimetco, Annual Report 2011). In 2010 the company therefore commissioned a Pre-Scoping Environmental Hydrological and Topographical Study involving stakeholder consultation and the consent of local community leaders in Kibi and Nyanahin Concessions as part of their plans for an Integrated Bauxite Project in Ghana.

These projects were however not approved for implementation largely due to the ecological sensitivity of the site expressed by the majority of key stakeholders. The reserves of bauxite, although of relatively low grade, are a potential threat to the survival of upland evergreen forest type (Hall & Swaine, 1981; Forestry Commission, 2003; CINRMP, 2003).

4.11 Pollution from chemicals used in mining

The water resources within Atewa can basically be classified into surface and underground sources. The surface water sources include major river systems such as the Densu, Birim and Ayensu Rivers and their tributaries. The surface water sources mainly find use in the areas of industry, domestic and tourist purposes while the groundwater sources are the main sources of rural water supply systems. Mining is a major user of water and this is usually diverted from nearby rivers and streams for the purposes of mining operations (Allan & Fatawu, 2014).

Allan & Fatawu (2014) indicated that regulatory frameworks for the mining sector do not properly address the impacts of mining activities on the environment and water resources. This situation is exacerbated by the weak capacity of the agencies and departments responsible for the enforcement and problems arising from asymmetric information. Even the regulatory sanctions are not strong enough to deter mining companies as well as 'galamsey' operators from negatively impacting on rivers and water bodies. Thus, the illegal mining activities within the Atewa landscape have resulted in massive pollution and sometimes drying up of rivers and their tributaries. The pollution of these rivers and the tributaries has resulted in the restrictive utilization of these resources by communities.

Conclusively, managing the impacts of mining on water resources needs to consider the strict enforcement of environmental legislations and streamlining of the EIA processes and tying it up to the license and mineral right acquisition itself. Communities must be properly educated on the impacts illegal mining activities on them and their future generations. EPA must be strengthened to routinely monitor mining sites and ensure compliance.

Conclusion

The reports clearly captured the different and scale of threats to the Atewa forest reserve. The threats are multiple and complex and perpetuated by different category of individuals and groups from within the Abuakwa Traditional Area and from other parts of the country. In a related study, CA/RMSC (2015) observed differences in the category of persons or groups that were involved in illegal activities within the forest reserve.

The study revealed that most illegal logging and hunting activities were committed by people from communities that were located within 3-5km radius of the forest reserve. While the youth within 1-2 km were not directly involved, they facilitated the removal of the sawn timber from the forest. A clear knowledge of the characteristics of the operators of the various illegal activities (such as ethnicity, gender, level of education and operating site etc.) could help in the design of appropriate policies and mitigation measures. Since most of these activities are financed by well- structured external groups, it will be critical to establish the method of operation of these 'syndicates'.

The reports also gave comprehensive and useful information about the processes involved in the illegal activities especially illegal mining. Management strategy should secure information on the other processes and actors within the value chain apart from the process of extraction. Information about the individuals or groups (possibly at high places) within the value chain could help in guiding awareness creation programmes and enforcement of the laws.

There are records of extensive consultation with the traditional authorities particularly the chiefs over the future of Atewa. This is understandable considering their customary authority over land and natural resources within the traditional area. There is also evidence of wide consultation with individual land owners and family heads and records of the mode of lease/rent/sale of stool, private and neighbouring lands for illegal mining activities are available. While the government and Traditional Authorities may have little or no control over these lands, the use to which they are put should be of interest especially in relation to the impacts on Atewa. In view of the uncoordinated and uncontrolled use of the land bordering Atewa, a considerable portion of the buffer (at least 5km) should be integrated into the Atewa national park and ecotourism program to reduce edge effect and the vulnerability of the reserve to mining activities.

5.0 Justification for Atewa's Upgrade to a National Park

At the international level there is consensus on setting aside over a tenth of the planet's land surface for the protection of natural biological diversity. This already represents an extraordinary global recognition of the importance of wild nature. The suite of benefits that extend well beyond traditional conservation have motivated governments and conservation practitioners to work towards bringing unique landscapes under conservation with multiple benefits. More importantly, a number of such landscapes across the globe have benefitted from marked improvement of management regimes to deepen the delivery of conservation outcomes, distribution of social benefits and management effectiveness. The return on investments on protected area related tourism have also motivated governments to look beyond the change in management regime.

The case for Atewa National Park is firmly rooted on the following:

- Legal and institutional arrangement
- Biological resources
- Stakeholder consensus
- Ecotourism potential
- Socio-cultural (traditional) setting
- Economic value
- Other Potential Opportunities
 - Biodiversity Offset
 - Community Livelihood Options

5.1 Legal and Institutional Arrangements

There are a number of relevant policies and legislations governing management, development and conservation of natural resources in Ghana.

Additionally, Ghana's ratification of International conventions and agreements form an important backdrop to the issues surrounding biodiversity and they are a significant pressure driving the development of a strong case for biodiversity conservation.

The advocacy for upgrading Atewa therefore draws its legality from these national policies, legislations and ratified global conventions. (Include the National Biodiversity Strategy and Action Plan in the list)

NATIONAL POLICIES

- Forest Fees Regulations, 1979 (LI 1098)
- Forest Protection (Amendment) Law, 1986 (PNDCL 142)
- National Environmental Policy (1995)
- Timber Resource Management Act, 1997 (Acts 547)
- Local Government Act 462 (1993)
- Forest Development Master Plan (1996 -2020)
- National Land Policy (June 1999).
- Minerals and Mining Act (2006)
- National Water Policy (2007)
- Ghana National Climate Change Adaptation Strategy (2010)
- Riparian Buffer Zone Policy (2011)
- Ghana Forest and Wildlife Policy (2012)
- Ghana's iNDC (2015)
- Land use and Spatial Planning Act, 2016, Act 925

International Conventions

- Africa Convention on the Conservation of Nature and Natural Resource: *15 September 1968*
- Convention on Wet Lands of International Importance, especially Waterfowl Habitat *2nd February 1971.*
- Convention Concerning the Protection of the World Cultural Natural Heritage: *16 November 1972.*
- Convention on the Conservation of Migratory Species of Wild Animals: *23 June 1979.*
- International Tropical Timber Agreement: *18 November 1983.*
- Convention on Biological Diversity, *June 1992.*
- Convention to Combat Drought and Desertification, *October 1994.*
- Framework Convention on Climate Change, *June 1992.*

Source: DESK LEGISLATIVE AUDIT- Taylor Crabbe Initiative

While these policies offer great opportunity for the re-categorization of the Atewa Forest as a national park, some form of legislative interventions or a trigger of an already existing legislative provision will be needed.

The content analysis of the laws and treaties will provide the framework and guidance for the needed legislative intervention or activation for the categorization of the Atewa forest into a national park.

5.1.1 The law making process and hierarchy of laws in Ghana

The making of laws in Ghana is a process which admits inputs from the entire society. Many laws in Ghana have often been as a result of the active society and civil society activism. Thus, to be able to understand the needed legislative intervention and to unearth the pulse points for the advocacy towards categorizing Atewa Forest as a national park, there is a need for the appreciation of the law-making process in Ghana.

Different entities play roles in the law-making process. These include Non-governmental organizations, private citizens, public officers and sectors of the government such as the Attorney General's Department, the Law Reform Commission, and the Sector Ministries. Although these entities have distinct spheres of influence as well as varying levels of control, the power to actually construct and pass laws is distributed between parliament (which passes the bill) and the president (who assents the bill). The Drafting office of the Attorney General's Department often provides and drafts the laws to be deliberated.

Under Article 106(20) of the 1992 Constitution of the Republic of Ghana, a Bill for passage into law shall not be introduced in Parliament unless it is accompanied by an "Explanatory Memorandum" which sets out in details

- The policy and principles of the proposed law
- The defects in the existing law
- The remedies proposed to deal with the defects as leveraged; and
- The necessity for the introduction of the said Bill

This memorandum serves as basis for debate both in cabinet and particularly at the plenary of Parliament. The drafting of the Bill is often initiated by the sector ministry or department of state that requires the legislative action. This is first captured in terms of a policy statement or legislative proposals. Because most Bills in the history of Ghana have been at the behest of the executive, the statutory institutions, in collaboration with the appropriate sector Ministry, will have to prepare a Cabinet Memorandum to be able to get Cabinet approval for the drafting of the Bill. In essence this process is to get government backing for the legislative proposals.

The Cabinet consist of "the President, the Vice President and not less than 10 and not more than 9 Ministers of State." Once Cabinet approves the memorandum, the Secretary to Cabinet informs the Sector Ministry that first initiated the legislation. The Chief Director of the Sector Ministry then produces a set of drafting instructions which are delivered to the Attorney General's Department. The Drafting stage of the Bill may include public inputs or reliance only on the legislative instructions or the policy document. The practice as adopted by many state agencies is to involve as much as possible the public through consultations during the drafting of the Bill. A finalized draft of a bill is sent for another level of Cabinet discussion and approval. This ensures that Cabinet is satisfied that the bill is ready to go to Parliament. Upon Cabinet approval, the Bill is sent to the Government Printer (The Assembly Press), where copies are produced for Parliament and published in the Gazette. According to Article 106, clause (2), of the constitution "No Bill Shall be introduced in Parliament unless it has been published in the Gazette at least 14 days before the date of its introduction in Parliament." The bill, as published in the Gazette is introduced in parliament.

The legislative process in parliament can be classified in four stages: first reading, second reading, committee or consideration stage, and third reading.

The above process applies *mutatis mutandis* depending on whether the law being passed is an Act or a subordinate legislation.

Regarding subsidiary legislation, the 1992 Constitution provides that all such legislations to be laid before Parliament must be published in the Gazette on the day it is laid before Parliament. Article 11(7) (c) provides that such subsidiary legislation shall “come into force at the expiration of twenty-one sitting days after being laid unless Parliament, before the expiration of the twenty-one days or annulled by the votes of not less than two-thirds of all members of Parliament.” The source of Law in Ghana are provided for in Article 11 of the 1992 Constitution. That article further provides a certain hierarchy of the laws with the Constitution at the apex. In resolving conflicts arising out of clashes in laws, a vertical clash is resolved by a higher norm overriding lower norm while a horizontal clash is resolved by later norm (*lex posteriori*) overriding earlier norm (*lex anteriori*).

HIERARCHY OF LAWS IN GHANA

- The Constitution;
- Enactments by Parliament or other Legislative body such as Military Council;
- Subsidiary Legislation which comprises:
 - Constitutional Instruments
 - Legislative Instruments
 - Executive Instruments
 - Instruments of a Judicial Character
 - By-Laws
 - Notices
 - Statutes
 - Administrative Instructions (Cabinet Directives, Ministerial Directives, Etc.)
- Judge Made Law/ Case Law (Common Law and Equity)
- Assimilated Rules of Customary Law: Article 272, 1992 Constitution
- Customary Law
- Writings of Jurist and Publicists

Source: DESK LEGISLATIVE AUDIT– Taylor Crabbe Initiative

5.1.2 The Legal Regime- Establishment of Forest Reserves and national parks

In Ghana, the authority to demarcate forest reserves and national parks is an executive authority and is vested with the President. Article 58(1) of the 1992 Constitution provides that “The executive authority of Ghana shall vest the President and shall be exercised in accordance with the provisions of this constitution.” This authority has always resided with the executive branch – the President or a Minister conferred specifically with such powers. The process of demarcating same is mostly through the issuing and gazetting of an Executive Instrument. The analysis of the laws below will try to locate more particularly the power to demarcate and the procedure for such a demarcation.

- [Forest Act 1927 \(Cap 157\)](#)

The Forest Act 1927 is an act for the protection of forests and for the constitution of forest reserves to provide for related matters. Section 2 of Cap 157 clothes the President with the power to create forest reserves. The Act creates guidelines for the President acting on the

advice of the Forestry Commission to demarcate an area as a forest reserve. The overarching guiding principle for the creation of forest reserves is the principle that forests ought to be protected from injury or destruction in the public interest, or from further injury or destruction or that forest growth should be established on those lands. From the tenor and legislative intent of CAP 157, the creation of forest reserves is meant to specifically:

- Safeguard the water supply of the district;
- Assist the wellbeing of the forest and agricultural crops grown on those lands or in the vicinity of those lands; or
- Secure the supply of forest produce to the inhabitants of villages situated on those lands or in the vicinity of those land.

Similarly, the combined effect of Sections 3 and 4 of CAP 157 requires that the notification of the creation of a forest reserve will be done through gazetting and restriction will be placed on the acquisition of rights on any such land that is being turned into a forest reserve. The Act further makes provision for the maintenance and improvement of forest reserves through the creation of a fund known as the Forest Improvement Fund under Section 22.

- [Concessions Act of 1962 \(Act 124\)](#)

Section 16 of Act 24 requires that forest reserves and lands considered to be forest reserves or future lands that shall be proposed to be forest reserves, of which rights have been granted with respect to timber trees under a concession and the rights with respect to the timber or trees on a land other than land are vested in the President in trust for the people. This provision of Act 124 creates a trust relationship by the vesting of the land and reserves in the President.

- [Forest Protection Act of 1974 \(Act NRCD 243\)](#)

The 1974 Forest Protection Act inter alia, proscribes certain activities within a forest reserve and protected areas. The Act make it an offence to fell or uproot trees in a Forest Reserve. It further prohibits the obstruction of the channel of a river, stream, canal or creek. The Act sets a framework for the protection of areas declared as forest reserves.

- [States Land Act \(Act. 125\)](#)

The State Land Act vests the President with the authority to acquire any land the President considers to be in the interest of the Public. The Act provides that where it appears to the President in the public so to do, the President may, by executive instrument, specify the area as so acquired for the interest of the public. The State Land Act, however excludes from its ambit land subject to the Administration of Lands Act, 1962 (Act 123), as well as land acquired in the public interest.

However, where the President is satisfied that special circumstances makes it expedient that a particular land which is subject to the Administration of Lands Act, 1962 (Act 123) should be declared as land required in the public interest, the President may, by Executive Instrument (EI), declare that land as land required in the public interest, and the Administration of Lands Act, 1962 shall not apply to the land in respect of which the Executive Instrument has been made.

The executive instrument that acquires such land may contain particulars in respect of that date on which the land so declared as being in the public interest shall be surrendered and any other matter incidental or conducive to the attainment of the objects of the acquisition. The instrument will also include an assessment of the compensation that may be paid for the acquisition. The State Lands Act also prescribes some procedural rules for the issuance of the executive instrument. This includes the publication of the instrument in the gazette and its subsequent service on personally on a person having interest in the land, the traditional authority of the area in which the land is situated and that authority shall request the chief to notify the people of the area concerned, and a copy of the instrument shall be affixed at a convenient place on the land.

Thus, from the above legal framework, it is evident the national parks and reserves in Ghana are creatures of executive Instruments issued under the State Land Act 1962 (Act 125) and the Wild Animals Preservation Act (Act 62) of 1961. Similarly, Ghana's obligations under international laws enjoins the country to conserve biodiversity using various mechanism including the protected area concept.

- [The Wild Animals Preservation Act \(Act 62\) of 1961](#)

The Wild Animals Preservation Act of 1961, Act 62 provides for the creation of different categories of protected areas such as national parks, game reserves, wildlife sanctuaries and strict nature reserves. It also allowed the established of the wildlife management authority and the prescription of regulations such as the closed season during which no hunting is carried out. This gave rise to the creation of the Wildlife Reserves Regulations of LI 710 of 1971, by which all the categories of wild life reserves in Ghana, including 7 national parks, 6 resource reserves, 2 wildlife sanctuaries and 1 strict nature reserve were created. The Wildlife Conservation Regulations of LI 685 of 1971 which allows for the regulation of the use of wild animals off reserve and the creation of the closed season. Currently both the parent Act and all the accompanying regulations and emerging amendments are all under review to be consolidated into the new Wildlife Bill which is before the Parliament of Ghana.

5.1.3 International Obligations of Ghana

The African Convention for the Conservation Nature and natural resources came into force in 1968 and was revised in 2003. Ghana became a signatory to the convention in October, 2003 and ratified same in June, 2007. The objectives of this convention is to:

- Enhance environmental protection
- Foster the conservation and sustainable use of natural resources; and
- To harmonize and coordinate policies in these fields with a view to achieving ecologically rational, economically sound and socially acceptable development policies and programs.

Critical to Ghana's obligations under this treaty and significant to the activism for the creation of Atewa as conservation area is Article XII which states

"The parties shall establish, maintain and extend, as appropriate, conservation areas. They shall, preferably within the framework of environmental and natural resource

policies, legislation and programs, also assess the potential impacts and necessity of establishing additional conservation areas and wherever possible designate such areas, in order to ensure the long-term conservation of biological diversity, in particular to:

- *Conserve those ecosystems which are most representative of and peculiar to areas under their jurisdiction, or are characterized by a high degree of biological diversity;*
- *Ensure the conservation of all species and particularly of those which are: only represented in areas under their jurisdiction; ii) threatened, or of special scientific or aesthetic value; and of the habitats that are critical for the survival of such species.”*

5.1.4 Executive instruments

The creation of a forest reserve and national park in Ghana would require the issuance of an Executive Instrument by the President of the Republic. The Executive Instrument is a Subsidiary legislation and the practice is that Executive Instruments are not laid before Parliament though they are subsidiary legislation.

In case of *Republic v Minister of Interior; Ex. Parte Bombelli*, the Supreme Court sought to clarify the category of subsidiary legislation that is required to be laid before parliament. The court explained that the word “Orders” in Article 4 (7) (a) of the 1979 Constitution, (the equivalent of the 1992 Constitution) meant “orders” in the form of rules and regulations. Orders that are legislative in nature, not executive or administrative in character. Thus, Executive Instruments are a category of statutory instruments that do not need parliamentary approval since they are not legislative in nature. There is evidence that Executive instruments have been the main framework for the creation of forest as national reserves and national parks. Same was used for the creation of the Kyabobo Range National Park in 1993 and the Kakum National Park in 1997.

It appears from the above that to achieve the re-categorization of the Atewa Forest Range Reserve as a national park, the Minister of Lands and Natural Resources will have to be engaged since it falls within the domain of the sector minister to issue the executive instrument. Further, due to the tourism opportunities that the designation of the area will bring, the Ministry of Tourism and Creative Arts must also be engaged to offer support in making case of the re-categorization of Atewa. Similarly, an engagement with the parliamentary Select Committee on the prospects of re-categorization of the Atewa Forest Range and the benefits it will generate for the state will be important ally in the advocacy.

5.2 Institutional Arrangement

The ownership of the Atewa Range Forest Reserve is vested in the President of Ghana in trust for the Akyem Abuakwa stool. By an Act of Parliament (Forestry Commission Act 571 of 1999), the Forestry Commission is charged with the responsibility of protection, development, management and regulation of the forest and wildlife resources of Ghana, of which the Atewa Range Forest Reserve is a part.

The Forest Services Division of the Forestry Commission, with its District Forest Office located at Begoro, is directly responsible for the management and protection of the reserve, in collaboration with the Resource Management Support Centre of the Commission and relevant District Assemblies. The District Assemblies have a commitment to local sanitation issues, and assume responsibility for identifying environmental problems and prescribing solutions in consultation with the District Forestry Office.

Politically, Atewa Range Forest Reserve is under the jurisdiction of the East Akyem District Assembly and West Akyem (Kwaebibirem) District Assembly. Members of the District Assemblies are elected from the various towns and villages, which are grouped into electoral areas. Unit Committees, which are within the various communities, more or less assist the Assembly members within the area in executing their duties. There are sub-committees on environment and other issues of social concern, such as the provision of social services.

The Unit Committees form the basic structure of the local governance system. They are elective bodies with a legal basis in the 1992 Constitution of Ghana and associated decentralization laws (Ayee, 2003). A unit is normally a settlement or a group of settlements with a population of between 500 and 1000 people in rural areas and a higher population (1500 or more) in urban areas. Unit Committees, representing similar stakeholder groupings to those represented in the CBAG, are in close contact with the inhabitants and play critical roles including the protection of natural resources.

In view of the services provided by Atewa, fringe communities have demonstrated their commitment to its long-term protection.

Conclusion

While adherence to the legislative process for the re-designation of the Atewa is legitimate, there are evidences where success has been limited without the direct involvement of traditional leaders and communities. The importance of forests enjoins fringe communities to explore effective means of protecting these resources.

Dating back to creation, traditional natural resource management including protection of particular ecosystems or habitats (such as sacred groves and sacred rivers/pond); and protection of particular animals or plant species (such as totem and tabooed species) have helped to regulate interactions with the natural environment regardless of their use value. The practices concerned relate to trees, watershed, forests, wildlife and marine organisms (Rim-Rukeh, Ierhievwie & Agbozu, 2013). The environmental wisdom and ethics expressed through these traditional practices and religious beliefs are very useful tools in natural resource management.

The traditional value of Atewa and the support from communities could be the rallying point for the re-designate Atewa to a national park to ensure long term protection of the natural resources and the security of traditional practices. It is on records that the re-designation

of Kakum into a forest reserve was at the request of the rural communities and the Central Regional Coordinating Council. The protection of natural resources is considered an obligation under traditional norms and practices.

Additionally, the existing institutional arrangement for managing Atewa has proven less effective due to weak capacity of Forest Services Division staff and limited logistics for dealing with the myriad of threats and the various forms of illegalities. Any new management regime could still leverage on lessons learned to enhance management effectiveness. This institutional arrangement thus provides sufficient evidence for changing the management regime of Atewa to a national park to rake in the needed funding for effective management.

In Ghana, the management of national parks are within the mandate of the Wildlife Division of the Forestry Commission. In addition to the management staff, unlike forest reserves, all protected areas such as national parks are provided with trained armed guards or protection staff who are resourced and located at camps at various points in order to effectively patrol and ward off all illegal activities. This has made it possible for protected areas such as Mole and Kakum National Parks to be better protected than Atewa Range Forest Reserve. There is also no consumptive utilization of the resources of the national park. Thus regarding the enormous ecological, economic and socio-cultural importance of the Atewa Forest Reserve, there is the urgent need for the protection and safeguarding its ecological integrity through the upgrading it to the national park status where it will be afforded better protection and management than the forest reserves. This is the only way by which the ecological integrity of the Atewa Forest Reserve could be safeguarded for long-term conservation for it to continue to deliver the diverse tangible and intangible goods and services for livelihood support and environmental sustainability.

5.3 The Biodiversity status of Atewa

5.3.1 Plant richness and composition

The Atewa Range Forest Reserve Management Plan was developed in 2003 to reflect its status (Abu-Juam et al., 2003). In the reserve, 656 species of vascular plants have so far been recorded in Atewa. These include 323 tree species, 83 shrub species, 155 lianes and climber species, 68 herbaceous species, 22 epiphytes and 5 grass species. According to the star rating system (Hawthorne and Abu-Juam, 1995), a national equivalent of the IUCN red list system for the forest species in Ghana, the Forest Reserve is home to several important species for conservation. The total list of plant species within the Forest Reserve includes 5 Black Star species, which are species of global significance with the highest conservation priority in Ghana (Abu-Juam et al., 2003).

From these species, three have been assessed and classified on the IUCN red list namely: *Sapium aubrevillei* (vulnerable), *Neolemonniera clitandrifolia* (endangered) and *Lecaniodiscus punctatus* (endangered). In addition to these, 33 plant species from the Forest Reserve are classified within the Gold Star category, which means that these are fairly rare at an international and or local level (Abu-Juam et al., 2003). From this group, 23

species have not yet been assessed for the IUCN red list, 8 species are included in the list as vulnerable (i.e. *Alafia whytei*, *Calycosiphonia macrochlamys*, *Cussonia bancoensis*, *Drypetes afzelii*, *Piptostigma fugax*, *Placodiscus boya*, *Robynsia glabrata* and *Xylopia elliotii*) and two as endangered (i.e. *Okoubaka aubrevillei* and *Placodiscus attenuates*).

Available records indicate that various other extensive surveys have been conducted in the reserve which point to a high level of abundance and richness of plant species. While some of these spatial and temporal data derived Permanent Sample Plots (PSP) may not be immediately available, the high biodiversity level has been widely acknowledged.

5.3.2 Fauna

The Atewa Range Forest Reserve has a high faunal diversity in terrestrial and aquatic habitats. The most important data source for fauna species in the Atewa Range, and more specifically the Forest Reserve, is the Rapid Assessment Program (RAP) by McCullough *et al.* (2007). The results of the assessment (Table 1) only show the number of species recorded and therefore, it only indicates the minimum number of species expected in the Atewa Range from the corresponding group.

Table 1 Overview of the faunal diversity in the Atewa Range Forest Reserve

Group	Number of species	Source
Insects		
Odonata	approximately 120*	McCullough et al. (2007)
Lepidoptera	approximately 700*	McCullough et al. (2007); Larsen (2007)
Orthoptera	> 61**	McCullough et al. (2007)
Others	No information	-
Fish	> 19 freshwater species **	McCullough et al. (2007)
Amphibian	approximately 40-50 species *	As above
Birds	227 species	Dowsett-Lemaire and Dowsett (2011)
Mammals		
Chiroptera (bats)	> 12**	McCullough et al. (2007)
Rodentia (rodents)	> 16**	Decher (2004); Decher et al. (2005a, 2005b); Norris (2006) and Monadjem and Fahr (2007), cited in McCullough et al. (2007)
Soricomorpha (shrews)	> 7**	As above
Large mammals (e.g. duikers, squirrels, pangolins, porcupines, etc.)	> 22**	McCullough et al. (2007)
Primates	> 6*	McCullough et al. (2007)

* It corresponds to an estimate of the total number of species that potentially exist in the Atewa Range.

*** It shows the number of species recorded in surveys, and therefore, it only indicates the minimum number of species expected in the Atewa Range from the corresponding group.*

5.3.3 Insects

A total of 72 species of Odonata (dragonflies & damselflies) and previous records of six additional species have been established within the Atewa. Of the 120 odonate species that potentially occur in the Atewa Range, eight species were recorded in Ghana for the first time (McCullough et al., 2007).

At least 700 different species of Lepidoptera (butterflies and moths) are estimated to occur in the Atewa Range (Larsen, 2006; McCullough et al. 2007). This is the highest number of butterfly species for any location in the tropical forest of West Africa (Larsen, 2006). Of these, the RAP confirmed 143 species belonging to 55 genera in five families, and Larsen (2006) recorded 575 species. The RAP expedition also recorded 14 species that occur only in the West African sub-region and two endemic species to Ghana.

Additionally, a total of 61 orthoptera species (katydids or bush crickets) have been recorded; this is the highest number of katydids known from a single location anywhere in Africa. Of these, at least 8 were new to science, and 36 were not known in Ghana before the assessment (McCullough et al., 2007).

5.3.4 Fishes

A total of 15 streams within the Atewa forest and at sites just emerging out of the forest surveyed recorded 19 species of freshwater fish belonging to nine genera of five fish families: Mormyridae, Characidae, Cyprinidae, Cyprinodontidae and Cichlidae. All species encountered in the survey have been recorded in river basins in West Africa, but *Epiplatys chaperi spillamanni*, which was recorded in the Ayensu system, was previously known only from Côte d'Ivoire (McCullough et al., 2007).

5.3.5 Amphibians

A total of 32 species of amphibians have been recorded (McCullough et al., 2007). In total, it is estimated that Atewa Range may be home to 40-50 species of amphibians. Among other exceptional features, the amphibian community of the Atewa Range is largely dominated by forest species and comprises a high percentage of species that is endemic to the Upper Guinea forests. Furthermore, about one third of the identified species of amphibian in the Atewa Range is endangered according to the IUCN red list available at the time of such assessment (2007). The Atewa Range is believed to be one of the only habitats for *Conraua derooi*, a Critically Endangered (and possibly extinct) species (McCullough et al., 2007).

5.3.6 Birds

A total of 155 bird species have been recorded in the Atewa. However, the avifauna of the Atewa Range has been estimated at 227 species, of which 150 only occur within the Guineo-

Congolian biome (Dowsett-Lemaire and Dowsett, 2011). Of these, 10 are of conservation concern, amongst which four are classified as Vulnerable and six as Near Threatened on the IUCN Red List. In addition to these, recent personal records (J. Lindsell, in litt.) from the Atewa Range suggest the presence of another globally Vulnerable bird species in the area, the West Wattled Cuckoo-Shrike.

5.3.7 Other Invertebrates

A new species of spider tick (order Riciinulei, Arachnida) was discovered within Atewa. This new species represents only the 58th known species of this ancient, relict group of organisms, known only from a few sites in the northern part of the Neotropics and West Africa. This is also the largest known species in this group. Its presence at Atewa indicates that this site may play a role of a refuge to organisms that have vanished from surrounding areas due to habitat loss and/or climate change. In addition, 68 ant species were documented during the RAP survey

5.3.8 Small Mammals

A total of 12 bat species were recorded. Composition of bat species clearly reflects a forest assemblage, with no savanna species being observed. Two rarely recorded bat species (*Hypsugo crassulus bellieri* and *Pipistrellus aff. grandidieri*) are reported for the first time for Ghana, raising the total number of species for this country to 86.

Together with specimens from five localities in West Africa, *Pipistrellus aff. grandidieri* from Atewa might represent a species new to science. *Hypsugo [crassulus] bellieri* is endemic to the Upper Guinean forests. Zenker's fruit bat *Scotonycteris zenkeri* is ranked by the IUCN Red List as Near threatened (IUCN 2007). The three terrestrial small mammal species recorded during the survey are likewise forest-dependent and include two West African endemics: Edward's swamp rat *Malacomys edwardsi* and the shrew *Crocidura grandiceps*. The latter is ranked as Near threatened by the IUCN Red List and had not been recorded from Ghana since its description. The overall species composition of small mammals indicates high habitat integrity of Atewa, which constitutes the most significant block of Upland Evergreen forest in Ghana.

5.3.9 Large Mammals

Altogether, 22 species of large mammals have been recorded. Of the species recorded, Pel's flying squirrel (*Anomalurus pelii*) is ranked as Near threatened, Yellow-backed duiker (*Cephalophus silvicultor*), Black duiker (*Cephalophus niger*), Bay duiker (*Cephalophus dorsalis*), Maxwell's duiker (*Cephalophus maxwellii*) and Royal antelope (*Neotragus pygmaeus*) are classified as Lower Risk/Near threatened, and West palm squirrel (*Epixerus ebii*) is listed as Data Deficient on the IUCN Red List.

In addition to these species of international conservation concern, the African civet (*Civettictis civetta*), African palm civet (*Nandinia binotata*), Long-tailed pangolin (*Uromanis tetradactyla*) and Yellow-backed duiker (*Cephalophus silvicultor*) are nationally protected in Ghana. Interviews in fringe communities indicated that four additional mammal species are

possibly present in the reserve, while five others could now be locally extinct. Many illegal activities, especially related to hunting, were recorded during the assessment. It was also noted that deforestation along trail lines and occasional illegal farms could be a significant factor affecting the conservation of large mammals in Atewa.

5.3.10 Primates

Overall, six primate species belonging to four families have been recorded in Atewa, including two families of nocturnal prosimians represented by the Potto, *Perodicticus potto* and Demidoff's Galago, *Galagoides demidovii*. Four diurnal simians belonging to two families have also been identified, including two Red-Listed colobus monkeys: Geoffroy's pied colobus, *Colobus vellerosus* (VU) and Olive colobus, *Procolobus verus* (LR/nt) and as well as two cercopithecine monkeys: the lesser spot-nosed monkey, *Cercopithecus petaurista buettikoferi* and Lowe's monkey, *Cercopithecus campbelliloweii*.

The slopes and plateaus within Atewa appear to be the best sites for primates. Nevertheless, observations of left over fruit suggest that, in terms of primate diet, the gallery forest found in valleys constitutes an important habitat. The primate populations of Atewa require the integrity of this mountainous biotope (including plateaus, slopes and valleys) to survive.

Atewa constitutes the largest and most intact patch of Upland Evergreen forest in Ghana, representing at least 75% of this habitat type countrywide. This forest reserve is distinguished by one of the highest levels of biodiversity in Ghana, for butterflies the highest in the country and in all of West Africa (Larsen, 2006). Recent studies have stressed the importance of maintaining larger intact forest blocks like Atewa to protect the last strongholds of forest-dependent species in Ghana.

The rich and original upland ecosystem of Atewa is a relatively large and isolated forest fragment, which constitutes an irreplaceable refuge for six primate species including two threatened species of colobus monkeys (IUCN 2007). Given the particular context and history of Ghana, this forest reserve presently populated by unique species regardless of size, should be actively protected from further destruction and fragmentation. The species and their habitats could constitute unique attractions around which ecotourism could be developed for the long-term protection of Atewa.

Conclusion

Recent assessments have registered considerable loss of the biodiversity resources within Atewa through illegal activities in the reserve and its immediate environs. This is particularly the case in parts of the northern and southern portions of the reserve where weak patrol, ease of entry and weak enforcement of laws and lack of economic opportunities have served as motivation for illegal activities. This is consistent with the outcome of the TEEB report that established the decline in the size of the closed canopy forest cover in the Forest Reserve and the forest cover within the buffer over a period of 20 years. An earlier study had recorded evidence of illegal activities within the reserve; including logging, farming and hunting; and these could affect the integrity of the reserve (Lindsell, Opoku Nyame & Akom, 2016).

A large proportion of the forest reserve however remains intact and is evidenced by the reserve's continued protection of the watershed for the three major rivers and the delivery of other services to communities including NTFPs. The recent siting of some faunal species including primates, birds, duikers etc., by scientists and communities after the seemingly high level of degradation gives indication of the continued biological richness of the reserve. The rate of recovery of degraded sites which resulted from agricultural expansion and illegal logging shows the resilience of the forest to recover from past 'shocks' when its management regime is changed to a national park where any such activity will be prohibited.

5.4 Assessment of the Ecotourism Potential of Atewa

5.4.1 Overview of tourism industry in Ghana

The tourism industry has indeed become an important sector in Ghana's economy. Ghana's travel and tourism sector was valued at \$2.102 billion in 2012. The value of the sector is 5.2% of Ghana's gross domestic product (GDP) for the year 2012 (World Economic Forum, 2013). It forecasts that Ghana's tourism sector will contribute 5.4% to GDP from 2013 to 2022 (World Economic Forum, 2013). According to WEF, 'visitor exports' the revenue generated by foreign visitors to Ghana totaled GH2.09bn (\$580m) in 2013 or 5.7% of total exports. This makes tourism a particularly important earner of foreign exchange once commodities are stripped out. Oil, gold and cocoa are Ghana's major export earners but have volatile prices. By comparison, tourism earnings are steady and rising; visitor exports to rise by 2.4% annually to 2024.

Tourism development in Ghana is governed by the Tourism Act 2011 (Act 817) and the Ghana Tourism Development Plan 2013-2027 (GTDP, 2012). The Tourism Act of 2011 (Act 817) established the Ghana Tourism Authority (GTA) to replace the fragmented Ghana Tourist Board. The Tourism Act 2011 makes provision for 1% levy to be imposed on all tourism enterprises for the Tourism Development Fund. "The object of the Fund is to provide funding for tourism and tourism-related projects and programs." (Tourism Act 2010).

The GTA is also incubating links between the private sector and communities in areas with tourism potential. Under the Ghana Tourism Development Plan (2013-2027), the Metropolitan, Municipal and District Assemblies (MMDA) in Ghana that represent government at local level will collaborate with GTA to develop tourism within their jurisdictions. This tourism plan is to be captured within the Metropolitan, Municipal and District Medium-Term Development Plan and executed in line national development guidelines. This is a great opportunity for the East Akyem Municipal Assembly to include Atewa to its suite of tourism destinations and solicit support from GTA and the Tourism Development Fund to develop and implement a tourism plan.

These policies offer opportunity for accessing funds including those from public private sector investment in transforming the unique attractions within the Atewa Range Forest Reserve into a major ecotourism destination. For optimum results, the development of

tourism within Atewa should be linked up with tourism development within the entire country and especially the Eastern region.

5.4.2 Tourism development in the Eastern Region

The Eastern Region with an estimated population of almost 3.0 million (12% of Ghana's population) has a land area of 19,323 sq. km. The region's topography is dominated by the Akuapem highlands, the Atewa-Atwiredu range which ranges an elevation of 683m near Kyebi and the relatively low-lying Afram Plains. A considerable portion of the Volta Lake lies in this region. Temperatures in the region vary from 24°C to about 28°C with an annual rainfall between 1000mm and 1750mm.

The Eastern Region possesses a wide range of natural features of attractions with enormous potential for ecotourism development. The region's inventory of tourism resources includes the Volta Lake, waterfalls at Begoro and in the Atewa area, the Aburi Botanical Gardens, Shai Hills Resource Reserve, butterfly sanctuaries near Kyebi, unusual rock formations and areas of scenic beauty like the Akwapim, Atewa and Kwahu ranges, and the Klown Mountain. Others are the Akosombo Dam, the Basel Mission school buildings, the first Cocoa Farm, the Center for Scientific Research into Plant Medicine at Mampong, Bunso Arboretum and the recently developed canopy walkway, Okyehene's Palace, craft villages, colourful festivals, plantations, mines and sawmills are scattered all over the region. The increasing population within the region alone provides a potential market for the tourism industry.

In spite of these attractions, the region is yet to realize its full tourism potential. In the light of this, the region has identified the gaps and developed the Tourism Development Plan to promote investment in the sector. The Plan states:

"Tourism in the region must be developed on a sustainable basis and integrated into the overall development policy and planning. Tourism will be developed based on the combination of natural, historic and cultural attractions of the region, supplemented by special features and meeting and conference tourism. Emphasis will be given to conservation of natural and historic attractions and their development with appropriate visitor interpretation, facilities and services" (Ministry of Tourism, UNDP/WTO. 1996)

The proposed Atewa ecotourism project is well reflected within the Eastern Regional Tourism Development Plan that seeks to conserve the natural and cultural resources within the region. The ecotourism project will thus lead to better conservation of the Atewa Forest Reserves and the rich and unique historical heritage of the people of Abuakwa Traditional Area.

5.4.3 Ecotourism Attractions within Atewa Range Forest Reserve

The uniqueness of Atewa as a good destination for tourists is due to several characteristics including geographical location, ecological status, cultural and historical heritage, infrastructure, legal and institutional arrangement and socio-economic settings. The unique

biodiversity and the impressive aesthetic mountain landscapes are undeniable assets that form the foundation of the tourism potential.

5.4.4 Location

Atewa, located in the Eastern region of Ghana is about one and half hour drive from Accra on the Accra-Kumasi trunk road. The region's strategic location of sharing common boundaries with the Greater Accra, Central, Ashanti, Brong Ahafo and Volta Regions makes it an attractive tourist destination. The relatively short distance and the good road network to Atewa will motivate potential international and domestic tourists to make a day's trip to the attractions within Atewa. Within the reserve there are many trails that were previously used by bauxite and kaolin miners and these could provide easy access to the attractions within the forest. The efficient transport service from major towns/cities particularly Accra to Atewa provides additional reasons for its preference.

5.4.5 Biodiversity

Atewa is endowed with a variety of natural attractions, mountains and scenic beauty. The forest reserve covers an area of 215.7 sq.kms and it is home to several flora and fauna species. The area is also noted for beautiful butterflies including the largest African butterfly (*Papilio antimachus*). The forest is an upland wet evergreen forest with wet and cloudy conditions the year round. This has made it possible for the growth of some unusual plant species such as mosses and ferns drooping from branches of trees. For example, the tree fern (*Cyathea manniana*) is endemic to Upland Evergreen Forest in Atewa and elsewhere in the world. Other flora species include *Triplochiton scelorxylon*, *Antiaris Africana*, *Alstonia boni* and *Melicia excelsis*.

By 2005 Atewa Range was known to have 207 bird species; thus, with 20 additions since, the overall total was then 227 species. Of those, c. 150 are Guineo-Congolian biome species, as several have been added to the previous list: *Accipiter erythropus*, *Agapornis swindernianus*, *Ceyx lecontei*, *Merops gularis*, *Indicator exilis*, *Phyllastrephus albigularis*, *Zoothera princei*, *Cossypha cyanocampter*, *Erythropygia leucosticta*, *Melaenornis annamarulae*, *Anthoscopus flavifrons*, *Nectarinia minulla* and *Nigrita luteifrons*. Atewa is the only site in Ghana where the rare Nimba Flycatcher (*Melaenornis annamarulae*) has been found, in an easterly extension from Ivory Coast (cf. Demey & Hester 2008).

The conservation of Atewa forest is of the utmost importance for the survival of the special upland evergreen forest species, above all, *Nimba Flycatcher*, and also of several other species of conservation concern, particularly those found in only such Upland Evergreen Forests. Many bird tours and private individuals visit Atewa each year, as it provides an interesting variety of bird species, some of them unique in Ghana.

5.4.6 Water resources

The headwaters of the streams and rivers that drain Atewa form has scenic attributes that could play a vital role in the ecotourism development plan of Atewa. Also, there are a

number of waterfalls and steep river channels for surfing. There are a number of bottled water products available on the Ghanaian market today. As a marketing strategy, some of these companies pride themselves in informing the people who patronize their product of how environmentally friendly and natural their products are. This could be adopted since Atewa already has a global appeal that could be capitalized on to promote bottling and commercial sale of Atewa water.

5.4.7 Cultural heritage

The cultural of the people of the Akyem Abuakwa Traditional Area is closely linked with Atewa Forest Reserve. The Akyem have rich history and cultural traditions well known in the country. The historical attractions are the palaces, shrines and royal mausoleums. The Okyehene's palace museum is identified in the Eastern Regional Tourism Development Plan as having penitential for development of cultural tourism. Cultural activities documented include the *Ohum* festival.

An important event observed in recent times is the Okyeman Environment Week, an initiative of the current Okyehene, Osagyefo Amoatia Ofori Panin. This is celebrated each year to coincide with World Environment Day and to draw attention to the value of the environment especially Atewa. Even at this stage of development, this cultural heritage receives a host of both domestic and international visitors annually and thus provides justification for the Atewa ecotourism project.

5.4.8 Social factors

Understanding resident attitude towards tourism development and identifying probable positive and negative impacts on the "quality of life" of the host population will help project proponents to optimally shape ecotourism development to contribute to biodiversity conservation. One of the greatest assets of the Akyem Abuakwa Traditional Area is its people. As Ghanaians, they identify themselves with the proverbial Ghanaian hospitality and go to all length to ensure the security and comfort of visitors, sometimes, at the peril of their own life.

As a way of establishing the people's perception of the proposed Atewa ecotourism project, a resident attitude survey was conducted to guide planning (CI, 2010). A sample size of 400 respondents from 17 communities was interviewed. These include Kyebi, Apapam, Protase, Apedwa, Adadientem and Sagyimase. The others are Odumase, Amanfrom, Adukrom, Apinaman, Dompem, Labikrom, Dokyi, Tete, Akoko, Akwadum and Pameng. The views of the residents were categorized into issues ranging from conservation, social, economic to tourism development. Both qualitative and quantitative data were collected, organized and carefully analyzed to capture the views of different category of people within the area.

There was a general agreement among the vast majority of respondents (96.8%) about the need to develop the ecotourism potential of Atewa. About 90% of respondents agreed that tourism development would lead to an improvement in roads sewage system, electricity supply and other social amenities and therefore offered to participate in the process. While

a few of the respondents (20%) expressed concern about the possible loss of cultural identity, majority (95%) considered tourism development as a means of attracting investment to the area and safeguarding the integrity of the reserve.

The results of this study was consistent with the outcome of the various stakeholder consultations conducted between 2012 and 2016 by A Rocha where majority of the participants called for the conversion of Atewa to a national park to pave way for the development of its ecotourism potential. This is a further proof of the suitability of Atewa as a candidate site for ecotourism, not only by its ecological stature but the wide-scale adoption of the Atewa ecotourism concept by stakeholders.

5.4.9 Infrastructure and Services

While the area currently receives limited tourists, there is considerable infrastructure and services that could help boost visitation to the site. The road network is the most prominent physical infrastructure within the vicinity of the forest reserve. The main Accra-Kumasi highway lies just about 2km along the eastern side of the reserve, with the Anyinam–Pramkese trunk road on the western side of the reserves. There are other important roads, such as the Suhum - Asamankese, Asamankese - Kade and Anyinam-Kade trunk roads, which connect to the Atewa forest reserve. The Apapam-Dompin road traverses the reserve between boundary pillars 6-7 and 59-60 (Atewa GSBA Management Plans 2007-2011).

The service sector is arguably the fastest growing sector in the East Akyem and Atiwa District economies. A large number of small and medium scale service enterprises have sprung up in the Municipal and Districts quite recently. The services are mostly in the areas of ICT and the setting up of business centres, hair-dressing salons, repair shops (mechanics, electricians, sprayers etc), masonry, spare parts dealers, drug/chemical stores, pharmacies, supermarkets, drinking spots. Other known service providers are banking, telecommunication and postal services. A number of financial institutions operate in the districts. These include the Ghana Commercial Bank Ltd, Fanteakwa Rural Bank, Atiwa Rural Bank, Adonteng Rural Bank Agric Development Bank (ADB), Mamuadu Rural Bank and saving and loan schemes.

There are also a number of restaurants (continental and local) and drinking spots within the Kyebi township and along the main highway. From Apedwa to Asiakwa, a distance of about 15km, one can find about twenty drinking spots and restaurants. They offer a wide range of local and continental dishes. A highway rest stop, called 'LINDADOR' offers a wide range of foods, refreshments and toilet facilities for travelers and visitors. In recent times, other rest stop (with larger capacities and modern facilities including ATMs) than *Lindador* have sprung up in the area. In view of the long-term development of the tourism potential of the area and in particular the Atewa, the District Assemblies are collaborating with the relevant agencies and Tourist departments to upgrade the facilities to international standards. Market structures and recreational/social centres are inadequate and are the most needed facilities in the area (Mel Consulting, 2002 quoted in the GSBA management plans 2007-2011)

In recent times, the number of hotel accommodation has more than doubled in the towns of Apedwa, Apapam, Kyebi and Asiakwa. While the quality of services being provided has witnessed substantial improvement, the rates are still very competitive. Notwithstanding, the District Assemblies and the Tourist authorities are cooperating with hotel operators to further improve the quality of facilities and services. All of these accommodation units are highly patronized during funerals in that particular town or nearby towns. Rooms are fully booked during funerals and festivals. Government officials on duty tours, student researchers, and workers attending meetings and workshops in the district capital Kyebi are amongst the category of Ghanaians who utilize the accommodation facilities. Ghanaians constitute about 80% of the guests using these facilities.

The district hospital, located at Kyebi is well-equipped and has resident medical doctors and other permanent health practitioners. All cases including emergency ones are handled by the hospital. In addition, there three other good hospitals around the reserve, namely Suhum, Osino, Kade and Asamankese Government Hospitals, as well as the St. Dominic Hospital at Akwatia. There are also clinics at Asiakwa, Akyeansa, Anyinam and Kwabeng which are all being considered for upgrade to the status of Hospitals. In terms of safety and security, there are a number of security agencies in Kyebi and nearby town and villages. The town boasts of a district police stations, camps and posts, fire service station and a number private security agencies.

The provision of efficient utility services is crucial to tourism development. The improvement in the supply of electricity to most towns and villages have enhanced economic activities. There is a reliable supply of pipe borne water to Kyebi and some of the fringe communities. There are also boreholes and wells. The area is well networked in terms of telecommunications. All the 5 telecommunications companies have mobile reception and data services currently running in this area. Outlets for purchasing scratch cards and data bundles have also being established and currently serves as an income generating activity for graduates awaiting exams results to get into higher education.

Again, the district has a number of small scale industries engaged in the production of various items. Dressmaking, Carpentry, Metal, fabrication, Distillation of alcoholic beverages (akpeteshie and pito), Leather works Ceramics, Baking, Milling, Wood processing (saw mills) and Batik / tie and dye making dominate the sector. These production centers could be included in the tourism plan of Atewa and specialized centres, fairs, and trade shows organized to showcase how natural resource management could be coupled with economic development.

The district also boasts of a number of second cycle schools including Abuakwa State College and a university. The national park could thus serve as a resource centre for students and other researchers to gain insight into nature.

5.5 Potential contribution of ecotourism development at Atewa

5.5.1 Economic

Ecotourism has the potential to deliver economic, socio-cultural and environmental benefits to the national and local economies. It can be an alternative source of income for the local community. The NTDP (2015) noted “...in addition to direct benefits, it will serve as a catalyst for the expansion of other economic sectors...” (p.45).

There are several examples of how conversion of forests to Protected Areas and subsequent development of ecotourism has yielded substantial economic benefits to both the national and local economies. Similar benefits could be realized at Atewa if the various attractions within the landscape are fully developed and well-integrated into the regional ecotourism circuit.

The following include some of the economic benefits obtained from developing the ecotourism potential of forest reserves.

- A. The Kakum National Park is the only nature-based destination in Ghana with its canopy 33-metre high walkway built in 2007 drew 112,000 visitors in 200 created over 5,000 tourism-related jobs around the park and generated over \$350,000 as revenue through the Wildlife Division and the Ghana Heritage Conservation Trust. *(Protected Areas in Today’s World: their Values and Benefits for the Welfare of the Planet Secretariat of the Convention on Biological Diversity, <https://www.cbd.int/doc/publications/cbd-ts-36-en.pdf>)*
- B. The Maya Biosphere Reserve in the Petén region of Guatemala generates annual income of approximately US\$47 million and provides employment to 7000 people. The reserve is credited with almost doubling local family incomes *(Leveraging Opportunities for Sustainability Growth: IDB Biodiversity Platform for Latin America and the Caribbean, <http://www.povertyandconservation.info/biblio/C0035>)*
- C. An educational tourism is provided by three large travel agencies within the Praslin National Park, Seychelles (675 ha, IUCN Category II), generates about USD600,000 through direct and indirect revenues. (Emerton, L, J Bishop and L Thomas (2006); Sustainable Financing of Protected Areas: A global review of challenges and options. *(IUCN, Gland, Switzerland and Cambridge, UK)*
- D. Tourism in the park (Muritz - Seen Park Landscape in Germany- 30,000ha) generates over US\$17.7 million per year for the region, supporting an estimated 628 jobs. *(Birdlife International, Well-being through wildlife in the EU, Birdlife International, UK)*
- E. In 1999, the Bobiri Rainforest with a butterfly sanctuary as the main tourist attraction received 1,000 visitors with an average of 3 to 4 overnight stays. Shai Hills Resource Reserve which is 40 km from Accra attracts 16,000 visitors. The Boti Falls attracts 10,000 to 20,000 visitors yearly. The Boabeng-Fiema Monkey Sanctuary received 4,800 visitors and 450 overnight stays in 1999. The other monkey sanctuary at Tafi-Atome had 1,500 visitors in that same year. *(Forestry Commission of Ghana, 2006)*

While these ecotourism destinations received substantial revenue, in terms of the number and quality of attractions, they do not come anywhere close to the ecotourism potential of Atewa. The ecotourism project in Atewa could thus attract much higher revenue owing to its strategic location, its proximity to the capital city Accra with a shorter traveling time, its unique biological resources and its cultural attractions.

Since Atewa is endowed with numerous species of birds and butterflies, a specialized package of bird and butterfly watching tours could also generate \$150,000 from about 500 ecotourists annually. These projections have been arrived at based on a number of factors including the quality of attraction, quality of trip experience, competing attractions as well as complementary attractions, cost of travel time, and political stability.

5.5.2 Ecotourism Product Management

Managing an ecotourism business requires familiarity with ecological and social concepts and challenges. Products should be geared at bringing people in contact with nature without damaging the very attraction they are coming to see and clearly communicate these practices to staff and tourists. Managing ecotourism products will follow worldwide practices detailed operating procedures, sales plan, management plan, and personnel plan.

Butterfly Observation Area: The Atewa forest is endowed with high diversity of butterflies. In the entire country, Atewa is among the areas of highest butterfly diversity and this makes it unique to other butterfly area like Ankasa in the Western region and Bobiri in the Ashanti region. Currently butterflies are captured from here and exported. The uncontrolled collection of these butterflies has an effect on plant pollination. The area must be protected in order to protect these butterflies and the non-consumptive aspect enhanced.

Thus a butterfly observation area could be designed in their natural habitat and the area protected. A guided tour would be offered into the butterfly observation area. This would be educative but would be conducted in a relaxed and informal way whereby the life cycle and behavioral patterns of these insects would be interpreted by guides. There would be the need to also establish a butterfly laboratory where eggs of butterflies can be nurtured and hatched. The locals can be trained to do the interpretation at the facility.

Hiking panorama- “much to do, see and experience”. One cave in the Potroase area locally called “Obodan” or “hunters’ rock” could also be visited while two caves and a huge rock on the Apedwa side will provide adventure tourists with exciting climbs and panoramic views of several villages from the highest point on Apedwa Forest Reserve. The Range has an undulating topography with hills, ravines, valleys, plateaus, and plains which offer tourists beautiful sights of the reserve and communities around it.

Hiking trails through the forest to the waterfalls, and along the rivers and into caves and finally ending at a natural lookout point would be exciting for a tourist to undertake. Directional and interpretive signs would be developed along trails. Guided or self-guided walks would form part of the activities of the adventurous ecotourists or backpacker. A staircase or tree platform will be constructed along any of the trails so as to permit visitors to film, photograph or view spectacular features.

One such hiking trail could be from Apapam to Dopem. Apart from the Canopy Walkway in the Kakum National Park and the Bonsu Aboretum, the country does not have much significant adventure tourism infrastructure. Existing adventure include water sports at

Paradise Beach at Ada on the Volta estuary and at Captain Hook's in Takoradi. Numerous opportunities exist for adventurous activities in the Atewa area. Examples are air adventure, mountain biking and canoeing. With respect to this, it is proposed that an Armchair Rail Car is designed and developed for Atewa forest.

Mountain climbing is another activity that could increase the adventure aspect in the forest. Mountain bikes could be rented out to tourists. Bikes path can also be created and this would be an alternative to the hiking trails. Boat excursion can also be done on the wider section of the rivers found in the area. River rafting and fishing will be exciting activities for tourists to participate.

Armchair Rail Car: The Canopy Walkway at Kakum serves as the main tourist attraction to that tourist destination. It is proposed that an Armchair Rail Car be constructed at Atewa. The construction of the Armchair Rail Car in the Atewa forest could increase the adventure aspect for ecotourists. An armchair rail is an electronically operated mechanism whereby visitors can move from one end of the forest to the other supported in the air by a rail line. The target is to allow people to see the forest canopy and the rugged but impressive nature of the cloud forest terrain. The Armchair Rail Car would provide the unique experience of floating with the cloud on the top of the forest. Nothing of this kind is currently available in Ghana and so its construction here would act as a magnet attracting tourists to this area.

Retreat Center: The provision of a Retreat Center with conference facilities in the forest area could serve unique purpose. This conference center will serve institutions, groups and associations for their meetings and workshops. Domestic and international tourists can use the facilities as well. In recent times, holding meetings outside Accra is a preferred choice for conference organizers because there are minimal interruptions and meetings start on time as the participants are in residence.

Ofori Panin Fie Museum – “come experience authentic culture”: The Okyehene's Palace at Kyebi provides visitors an example of the traditional architectural structure of an ancient Akan palace with all the courts that are inviting to anthropologists and tourists. The palace which is currently under renovation, harbors features which give the history of the Akyme Abuakwa state. Based on the availability of these features and relics, palace tours must be developed.

The palace is a place where the rich culture of the Akyem is likely to be exhibited and so it should be promoted as such. Audiovisual interpretations and exhibitions of memorabilia could be mounted with the statues of past kings and queen mothers who exhibited bravery in times of war etc. A historical narration of legends and folklore is another kind of activity to be done there. Tours to the royal mausoleums could also be organized, not excluding cultural activities like festivals, indigenous drumming and dancing.

Ecolodge – “a place of fresh air and perfect peace”: local products would be used for construction of the ecolodge. Campsites, chalets or cabins which are rustic and simple in design would be constructed with only local and natural materials to reflect the architecture and lifestyle of the local communities. The location of the ecolodge must be strategically

positioned in the forest. Establishing the ecolodge at the southern portion could allow visitors lodging there to do more adventure tours and hiking to the scenic sites. This would also serve tourists who want to experience night time in the forest.

Other activities visitors could undertake include exploring the surrounding forests on foot or mountain bikes. Basic and simple facilities would be provided in these accommodation units. Mosquito nets and insect repellents would be provided in all chalets. Solar energy can also be used to generate electricity for lighting, refrigerating, cooking and hot water for bathing. Waste management must be taken into consideration. Grey water from the units could be processed for use as irrigation for vegetable farming. The ecolodge could be built to serve as a Retreat Center.

Such visitor receptive facilities are also applicable to the waterfall area. A relaxation area with catering facilities can be put up within the vicinity of the waterfalls. A bathing area can be constructed for visitors to have quick swim. Landscaping of the immediate surroundings of the falls could enhance the scenic beauty of the area.

The tree fern which is endemic to upland evergreen forest areas of the world, like the Atewa Range Forest Reserve is a potential attraction to visitors just like the biggest tree in West Africa which is said to be situated near Akim Oda. Since it cannot be found anywhere else in Ghana, it would be of interest not only to tourists but researchers as well. Meanwhile the demand for hotel services in the Eastern region, like other regions in Ghana, is mainly by tourists coming into the country and business travelers on visit to the region. There is the potential of establishing a hotel in the area which would serve the purpose of accommodation visitors.

Tree Fern Hotel – “a tourist’s haven”: This could be the first ecofriendly hotel in Ghana located possibly at Kyebi or another bigger town in the area. The hotel gets its name from the endemism of the tree fern to upland evergreen areas like Atewa. The basis for this accommodation establishment is taking care of its guests and the environment. In addition to being a profit oriented business, it is responsible for the conservation of the environment. The hotel will employ locals and instill in them awareness and the urge to protect the environment. As much as possible the hotel must be constructed with eco-friendly materials. The hotel can be in partnership with the environment-related event the Okyeman Environment Week.

Atewa Forest Conservation Center: The Atewa Forest Conservation Center is to be the hub of the ecotourism development in the area. This would serve the purpose of tourist information and education center. As the definition of ecotourism suggests, it is used as a tool for conservation. In the Atewa forest the diversity and uniqueness of the entire forest ecosystem, the natural landscape the presence of tree fern and other endangered flora and fauna species portray the importance of conserving these resources. It is the store house for botanicals and harbors numerous species for bio-prospecting. People need to be well informed, for instance on the ecological functions of the forest.

The Forest Conservation Center could be located at Asiakwa, whilst the visitors' centers established at Apedwa. Historical and cultural interpretive services at the Ofori Panin Fie museum at Kyebi would serve an additional purpose of information to visitors. It is strongly recommended that WD collaborates with a reputable organization to facilitate the Atewa Forest Conservation Center.

Atewa Mineral Water: Community-based ecotourism project is one of the tenets of developing ecotourism in an area. An ecotourism based enterprise is another source of income for locals. Springs have been identified in the Atewa forest. Being a source of pure, natural water free from chemicals, this resource could be tapped for mineral water production. This would benefit the community as a whole as inhabitants would secure employment from this venture. Tourists visiting would buy this water. It would also be supplied to tourism businesses in the area and even to other regions. This would have supported one of the objectives of ecotourism. Investors must be encouraged to venture into this business.

The beautiful scenery, the uniqueness of the attractions, the endangered flora and fauna species, together with good accommodation and well-organized activities would be the motive for tourists to visit the site. The development of these features by providing a variety of activities and services coupled with conservation awareness programs would advance the goals of ecotourism, particularly biodiversity conservation and promote socio-economic development in the communities.

Other related visitor-use infrastructures

First Aid and Safety Measures

Appropriate first aid information, equipment and supplies are essential to make tourists' stay safer. A first aid facility must be located at visitor's center. The provision of this would be in line with the NTDP's guidelines for visitor facilities in protected areas. First aid training must be included in the training program for the tour guides. Safety and security measures must be put in place to protect visitors from danger such as robbery. The local capacity such as the CBAGs can be well trained to provide protection against thefts and also educate the public about the benefits of ecotourism development. There could also be the re-introduction of forestry staff trained on weapon handling to assist in these areas.

5.5.3 Medium and long term development

Infrastructure: Infrastructure in the region must be well developed to attract visitors. The road network and other basic utilities must be adequate and in good condition. It is the responsibility of the East Akyem District Assembly to see to the development of infrastructure in the area.

Development of craft market: A modern woodcarving and craft center could be developed. Artisans can then have easy market to their products.

Expanded accommodation: Infrastructure for longer stays can be in the form of the star rated hotels and the Retreat Center recommended. The accommodation here must be

more elaborate, there must be the provision of improved facilities and a wider variety of cuisine.

Appropriate staff accommodation should be designed and constructed to ensure effective protection by the park staff. This should also include a main gate entrance where all visitors to the Park must pass through and records of them derived. In addition, office for the administration of the park should be constructed.

The map below provides the details of the visitor-use infrastructure that are proposed to make Atewa Range a major ecotourism destination in Ghana.

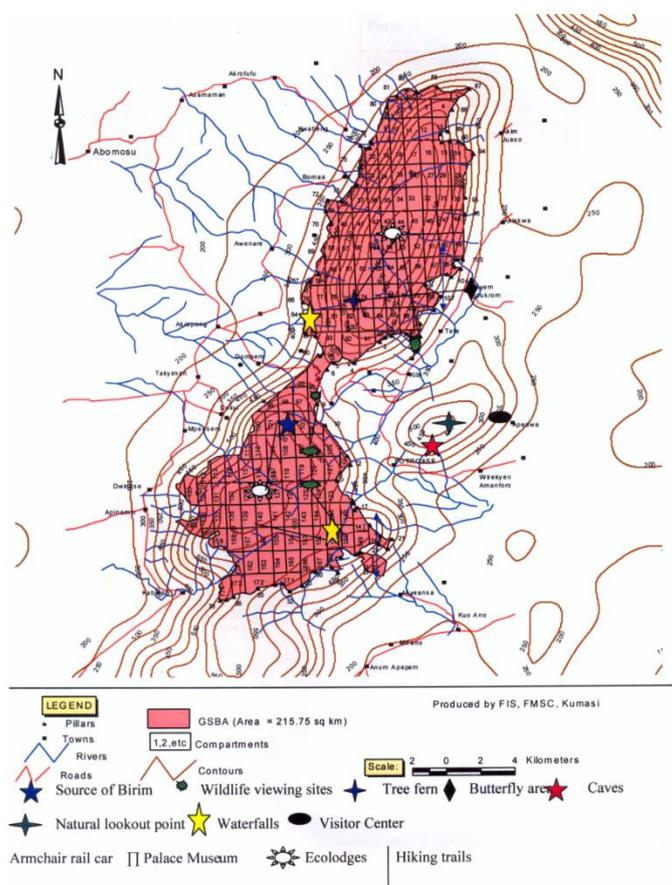


Figure 14 Tourism Development Map of Atewa

The potential market for Atewa includes:

Expatriates: 10% of the expatriate communities in Accra, Tema and Kumasi would be targeted to visit the Atewa area in the first year.

Cultural heritage tourists: the people with African descent especially the African-Americans can be targeted to visit Okyehene's palace and participate in other cultural activities in the area.

Ghanaian groups: the potential size of domestic tourists is estimated at 100 weekenders traveling for funerals and other social events in the area must be targeted to visit the attraction sites before leaving the area.

Bird and butterfly enthusiasts: owing to the diversity of bird and butterfly species found in the Atewa forest, this group of enthusiasts are targeted for the area.

Scientists and researchers: people from academic and research institutions will undertake research activities in the forest.

Backpackers and hikers: this category of tourists can spend up to three nights in the Atewa area and enjoy all the attractions that Atewa has to offer.

Visitation could occur any time within the year and on special days such as Christmas, New Year, Easter and other public holidays such as 6th March (Independence Day), 1st July (Republic Day), 1st May (Workers Day), Eid-ul-Fitr, and Eid-ul-Adha (Muslim holidays), and other statutory holidays as the state may prescribe. Weekends including Saturdays and Sundays could be important days for visitation by most Ghanaian visitors. But while we agree that by its strategic location, any innovative development could make Atewa a crowd puller comparable to Kakum, the appropriate infrastructure need to be provided to ensure that visitor numbers are maintained at such a level as not to degrade the aesthetic value.

Employment: With regards to employment, for every hotel room, 1 to 2 jobs are created, and so a 5-room hotel constructed at Atewa can translate into 10 jobs (CI, 2002). Apart from direct jobs, indirect jobs would also be created in other areas such as craft production and sale of local items. In the Atewa area, there are many well-educated but unemployed persons who could be absorbed in the hospitality sector as managers, tour guides, desk information officers, etc. Currently the multiplier effect on employment has been rated as 3.5%. As the local economy expands, the multiplier effect of tourism can be substantial, resulting from linkages with other economic sectors such as agriculture, construction, manufacturing, public utilities and transformation.

Revenue generation: The development of ecotourism is expected to generate direct income to the local communities. Locals are also expected to earn additional income through the multiplier effect and its linkages to other productive activities in the neighboring communities.

The contribution of tourism to government revenue is mainly from airports taxes and levies, hotel and restaurant license fees, profit taxes, income taxes, VAT, entrance fees, etc. in 1994, the corporate tax revenue generated within the hotel sub sector with a total number of 8,272 hotel rooms was ₵2.5 billion (\$625m). With the development of ecotourism at Atewa, it is estimated that government will derive a tax revenue of ₵20 million (\$5 million) a year from the accommodation units (e.g. 30-room hotel and 10-room ecolodges) which would be put up.

Conclusion

The development of an ecotourism facility within Atewa constitutes one of the effective measures for enhancing the socio-economic development of the area while protecting the rich biological resources. Ecotourism would act as a strong incentive to change the attitudes of the interest groups, like the hunters, chain saw and operators towards a more sustainable form of livelihood and biodiversity conservation. Based on the assessment, the following conclusions are made:

i. Only a tourism 'industry' is a substantial alternative to a mining industry and extractive activities. It also has enormous potential to stimulate socio-economic development in the rural communities. An economy of scale is needed to attract investments, jobs and development. A considerable flow of tourists is therefore needed. The conversion of the management regime of Atewa to a national park will not only guarantee its ecological health, preservation and availability of these attractions, it will also secure the viability of the ecotourism project and attract investment into the region.

ii. As illegal livelihood activities will be banned; short and mid-term alternatives need to be readily available. Ecotourism could generate employment and business opportunities, if the Atewa tourism activity is linked to the eastern region ecotourism network. The identification of the numerous livelihood opportunities and the support from government agencies could boost economic activities and discourage illegal activities within the reserve.

iii. For the majority of the fringe communities, conservation of Atewa and the environment is a priority. This should motivate the Forestry Commission and the allied agencies to push for the change in management regime of Atewa to a national park.

iv. A ban on illegal activities and landscape restoration in the fringes are crucial from an ecological, environmental and social perspective. Tourism investments can stimulate that process as part of a comprehensive approach towards sustainable, living landscapes. The presence of tourists discourages illegal activities.

v. When the ecotourism of Atewa is well developed and benefit to the communities and other stakeholder are apparent, it will further engender the support of all such stakeholder to safeguard the ecological integrity of Atewa and its water resources.

Based on the assessment, it is finally recommended that the existing ecotourism development strategy should be reviewed and when the appropriate financial mechanism is found, then the full cost estimates could be determined for the necessary investment. The development of tourism should be a joint investment arrangement between the private and the public sector institutions.

5.6 Stakeholder Agreements over Atewa Upgrade

The success of upgrading the status of a forest will depend substantially on achieving a strong sense of identification with and the commitment to its intended outcomes on the part of all stakeholders particularly the local communities, implementing partners and the government. It was therefore critical to establish productive and trusting relationship among various partners and community members during the stakeholder consultation phase of this exercise.

In collaboration with the Forestry Commission and other key partners including IUCN Netherlands and IUCN Ghana, A Rocha Ghana conducted series of stakeholder engagements and consultations between February 2012 and August 2016 to secure support and commitment of all stakeholders especially fringe communities regarding the upgrade of Atewa.

The broad objective of the stakeholder engagement and involvement process was to increase knowledge and build support for long-term and sustainable management of the Atewa Forest Reserve and to provide authorities, communities as well as all other interested and affected parties with the opportunity to identify issues, concerns and opportunities regarding the project, its objectives and proposed upgrade of Atewa forest to a national park.

Existing National Policy Requirements and Standards in relation to Stakeholder Consultation and Participation National environmental policies provide guidance and direction for issues related to management of natural resources areas and public and community participation and involvement and collaboration.

2012 & 1994 Forest and Wildlife Policies

Of particular importance is the 1994 Forest and Wildlife Policy which was formulated in Ghana to promote forest-dependent community participation in forest resources management. The 1994 Forest and Wildlife policy (section 3.2.15): state “the need to develop a decentralized participatory democracy by involving local people in matters concerned with their welfare” (Forest and Wildlife Policy, 1994).

In Ghana, the paradigm shift to participatory approach has been further strengthened as result of the new 2012 Ghana Forest and Wildlife Policy. The 2012 Forest Policy upholds the guiding principles of the 1994 Forest policy, but also places greater emphasis on the non-consumptive value of forests and amongst others the consolidation of good governance through accountability and transparency and enhanced active participation of communities and landowners in resource management.

The guiding principles of the 2012 Policy therefore recognizes multi-stakeholder interests in forests and wildlife and forging a common vision to protect, manage and use the resources. It also incorporates encouraging collaborative resource management among communities, government and other stakeholders. Additionally, it highlights the need for promoting good governance in the forestry and wildlife sector and promoting capacity

development for stakeholders in the forestry and wildlife sector (Ghana Forest and Wildlife Policy, 2012). A key Objective (1.1.4) of the policy is therefore to promote and develop mechanisms for transparent governance, equity sharing and citizens' participation in forest and wildlife resource management.

National Environmental Policy

The main objective of the 2012 Revised National Environment Policy (NEP) is to improve the environment, living conditions and quality of life for all Ghana's citizens. It aims to reconcile economic development with conservation and seeks to promote the sustainable use and maintenance of Ghana's natural resources. Key issues in the policy include land, forestry, and water management. Among the various principles underlying the policy, strategic goal (4) calls for the "establishment of mechanisms for public participation in environmental decision making".

International Forest Governance

This major multilateral International Environmental Agreements and conventions to which Ghana is a signatory provide guidance on stakeholder participation and involvement of people as a means to sustainable management of forest resources. These all have shaped the national forest policy that prescribed collaborative forest management as the way forward for Ghana. In the past two decades since UNCED, a majority of the world's countries have established or updated their national forestry laws and policies and are moving towards integrated approaches that balance environmental, economic and social aspects of forest management.

In many countries, significant steps have been taken in devolving forest management to local levels and to involve local people in decision-making. For these reasons, the government of Ghana must be seen to be upholding such global conventions with respect to ensuring sustainable development which is inclusive of the participation of all relevant stakeholders. These policies provided the legitimacy for securing the inputs of all stakeholders regarding the long-term protection of Atewa.

Categories of Stakeholders

Broadly, two main categories of stakeholders were identified and engaged throughout the consultation period. These included the primary and secondary stakeholders. The primary key stakeholders were defined as those to be directly affected by the proposed conservation intervention, i.e. they may either secure some benefits or adversely affected as a result of the upgrade of Atewa. The success of the initiative will be dependent on the level of commitment and support of the primary stakeholders.

The secondary stakeholders such as the media are usually external stakeholders that are not directly affected but can influence the adoption and implementation of the initiative. The inputs of these two levels of stakeholders were considered important in the drive towards the upgrade of Atewa to a national park. The ultimate beneficiaries and important stakeholder of this project are however the fringe communities whose livelihoods to some extent depend on the Atewa forest.

The primary stakeholders included;

- Forestry Commission (including National, Regional and District Forest Services Divisions, RMSC, Wildlife Division);
- Local Government Authorities (district/municipal assemblies);
- Akyem Abuakwa Traditional Authority;
- Local forest fringe communities which are directly affected by the project;
- Environment and natural resources sector regulatory institutions which may be involved or have direct interest including Environmental Protection Agency (EPA) and Water Resource Commission (WRC)
- Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGO's)
- Forest user groups (including chain saw operators, hunters, medicinal plant collectors etc.)
- Minerals Commission (MC)
- Mining companies and mining groups (including galamsey operators)
- Ghana Water Company Limited (GWCL)
- Ministry of Food and Agriculture - District offices
- Research (e.g. scientific, technical specialists) and academic institutions
- Development partners and donors
- Private sector industries and institutions
- The secondary stakeholders that were engaged included
- Media
- General public

Method of Engagement

The approach adopted for consultation with key stakeholders was informed by relevant national and local institutions and governance arrangements. Getting a broad stakeholder representation was of critical importance in the consultations. Generally, stakeholders identified for the program were engaged at three levels;

- National level -For consultations that involved Government Ministries, State Agencies/ Organizations/ Civil society/ Researchers and Academics/ Private sector and Industries. Most national level engagements also involved representation from development partners and donor agencies (e.g Dutch embassy and US Embassy) and in some cases international organizations.
- Regional and District level - Regional and local government institutions and officials (including district assemblies and their represented structures); as well as platforms for dialogue and information sharing
- Community level – consultation and engagement with forest communities

Depending on the unique situation and context, a range of different stakeholder engagement and public participation methods were employed.

The methodology employed included:

- One-to-one meetings with key officials, chiefs and opinion leaders;
- Structured Interviews with key institutional heads or officials;
- Public workshops and conferences
- Multi-stakeholder platforms and forums

- Community durbars and road shows
- Questionnaire administration
- Media engagements

A. National-Level Consultative Engagements

1. National Level Engagement with Civil Society Organizations

The engagements with Civil Society Organizations, which began in June 2012 culminated in the formation of CONAMA (Coalition of NGOs Against Mining in Atewa). While membership of CONAMA stood at eight at its inception, membership has increased to over 100 organizations to include Educational Institutions and Community Based Organizations. The founding members include:

- A Rocha Ghana (ARG)
- Conservation Alliance International
- Wassa Association of Communities Affected by Mining (WACAM)
- SAVE THE FROGS! Ghana
- Centre for Environmental Impact Analysis (CEIA)
- Forest Watch Ghana
- Ghana Wildlife Society (GWS)
- Rainforest Friends Ghana (RAFFS/G)

The Coalition campaigned against the threat of industrial mining and sought for long term protection of the Atewa forest reserve. The entire membership of CONAMA have therefore joined the call for Atewa to be upgraded into a national park.

2. Atewa International Summit, Accra, Ghana, 18th-19th November, 2013

As part of the efforts to draw national and global attention to the Atewa range forest reserve and to secure its long-term conservation, an international summit on saving the Atewa Range Forest Reserve was held at the Coconut Grove Hotel in Accra, Ghana, on the 18 – 19 November, 2013, under the theme “ATEWA FOREST, A HERITAGE AT A CROSS ROAD, WHAT FUTURE?”. The two-day summit brought together over 150 stakeholder delegates from local communities, local government authorities, traditional leaders, civil society groups, scientists, faith-based institutions, media agencies, representatives of the Forestry Commission (FC), representatives of state departments in the water and minerals sector, development partners, diplomatic missions, practitioners and development professionals from Ghana and abroad.

The main purpose of the Summit, addressed by the Minister for Lands and Natural Resources, Hon Alhaji Inusah Fuseini, was to come out with consensual resolutions to key stakeholders that would foster long-term actions and measures by state and non-state agencies directed towards the protection of the watershed catchment and biological resources of Atewa Range Forest Reserve.

At the end of the Summit, the participants agreed, among others, that the legal framework of Atewa should be changed and the protection status be upgraded to that of a national park status taking into consideration the new concept of National Parks that safeguards

biological and cultural values, allows ecotourism development and is community friendly (A Rocha, 2016).

3. Stakeholder Consultation and Engagements – Living Water Project Formulation, Inception Workshop and Launch Event

The project inception workshop, which was held on 13th November, 2014 at Miklin Hotel, Accra drew 36 participants from key stakeholder groups and institutions including IUCN-NL, IUCN Ghana Project office, Forestry Commission (FC), Dutch Embassy, Water Resources Commission (WRC), Community representatives, Permian Global, Ghana amongst others.

The workshop ended with a firm commitment on the part of all participants to work towards the conversion of Atewa into a national park status as a long terms strategy to protect its biodiversity. They agreed to draw lessons from the Kakum case where a delegation from the fringe communities sent a petition to the government to convert the Kakum forest reserve into a national park (Arocha, 2016)

4. The Economics of Ecosystems and Biodiversity (TEEB) Stakeholder Consultative Processes

The objective of the TEEB study was to assess the economic value of key ecosystem services notably water provided by the Atewa forest. Stakeholder workshops and field visits were therefore organized at various stages of the TEEB research process, including scoping data sharing, reviewing, outreach and dissemination. The intention was to maximize engagement and incorporate local knowledge and visions of policy makers, practitioners and local communities into the study. Throughout the activities included in the consultation process a wide range of stakeholders supported the project and provided researchers with relevant input.

The study, the first of its kind in Ghana sought to justify the improved protection of the Atewa forest, so as to safeguard its hydrological, ecological and socio-economic benefits. All the stakeholders expressed their support for the conversion of the biodiversity status of Atewa to a national park and thus provided valuable data to the research team.

Key among the stakeholders were:

- Forestry Commission	- ISODEC
- RMSC	- Various district assemblies
- Wildlife Division	- Ghana Tourism Authority
- Forestry Services Division	- Environmental Protection Agency
- Minerals Commission	- Water Resources Institute
- Ministry of Agriculture	- Kwame Nkrumah University of Science and Technology (KNUST)
- Ministry of Health	- Ghana Statistical Service
- CERGIS	
- Ghana Water Company limited	
- Water Resources Commission	

The study was conducted in partnership with the Institute for Environmental Sciences (IVM) of the VU University, Amsterdam, Wolfs Company and IUCN Netherlands (IUCN NL) as well as other local partners notably Water Resources Commission.

5. Stakeholder Consultation and Validation Workshop for Atewa TEEB Outcomes, 25th August 2016. Alisa Hotel

Following on from the TEEB study, a validation of the outcomes was organized for key stakeholders at Alisa Hotel on 25th August 2016. Present were representatives from a cross-section of stakeholder institutions from government institutions including Forestry Commission, RMSC, FSD, EPA, FORIG, Civil society representatives, Traditional authorities and community representatives. The outcome of the study was the development of three scenarios for policy consideration and key stakeholders' deliberation. These scenarios were the Business as usual scenario (1); National Park scenario (2); National Park and supporting buffer zone scenario (3); and Complete degradation scenario (4).

At the end of the consultative meeting, the participants opted for 3rd scenario but called for the introduction of suitable alternative and supplementary livelihoods for fringe communities and enforcement of existing laws and regulations.

6. Meeting of the Technical Project Implementation Committee on Living Water from the Mountains Project, Kibi, 14th July, 2016

On the 14th of July, 2016 a Consultative meeting was held in Kibi on the Living water from the Mountain project, during which time a Technical Implementation Committee (TIC) comprising representatives of all relevant stakeholder groups was inaugurated. The Focal Person at the Forestry Commission for the project and the Director, CPME/Projects, at the Forestry Commission presented the composition of the committee and the Terms of Reference for their work. There were presentations on the progress of the project implementation from FC Reps and from A Rocha. Stakeholder deliberated on a draft road map, after which a final one to serve as FC's blueprint for the conversion of Atewa Forest Reserve to a National Park was agreed on.

7. Consultations with Private Sector

Stakeholder Mapping of Private Sector Entities in Densu River Basin

In October 2015 Pricewaterhouse Coopers (PWC) were tasked to do a stakeholder mapping of private sector entities within the Densu River Basin. This was done for the purpose of identifying and assessing private sector enterprises whose activities directly or indirectly are dependent upon the priority ecosystem services of the Atewa forest and associated Densu River basin.

Following the assessment, the results were presented during the 3rd PWC Ghana Sustainable Business Forum on September 29th 2015, which saw the representation and participation 53 private sector, Chambers of Commerce, government, NGO/CSO and Donor agencies. Based on the study outcome, the participants called for a collaborative forest management which includes the participation of private sector operators whose businesses depend directly or indirectly on water from Atewa. There was a general agreement on the need to safeguard the ecological health of Atewa by converting its management regime to a national park.

Table 2 Company characteristics – Direct and Indirect stakeholder businesses identified through mapping

Direct Stakeholders	Indirect Stakeholders
<ul style="list-style-type: none"> - Ghana Water company limited - Intravenous Infusions Limited - Chinto Quarries Company Limited - Osiadan Tiles Factory Limited - Panbros Salt Industries limited - Voltic Ghana Limited - DC Alade Enterprise - Summit Industries Limited - C.S.I.R Mineral Water Company Limited - Xtra Gold Resources ltd - Blue Skies Company Limited 	<ul style="list-style-type: none"> - Nestle Ghana Ltd. - Kasapreko Company LTD - Benso Oil Palm Plantation - Twifo Oil Palm Plantations - Fan Milk Limited - Ernest Chemist - Ghana Oil Palm Development Company Limited - Guinness Ghana - Cocoa Processing Company - Accra Brewery limited - Textiles Ghana Limited

B. Regional-Level Consultative Engagements

1. Stakeholder Consultations with Local Government Authorities and Agencies

The district and municipal assemblies are the highest political, administrative and developmental bodies within the districts. They constitute critical stakeholder institutions for the development and implementation of the proposed conversion of Atewa conservation status. In view of their strategy importance, the project team held consultative meetings with the local government officials including Municipal and District Chief Executives, Coordinating Directors, Planning Officers and key staff of the five (5) relevant political and administrative districts that the Atewa Forest Reserve straddles. These are Atewa, Ayensuano and Denkyembour districts and East and West Akyem municipal assemblies. The meetings were used to highlight the goal of the proposed project and secure the support of the local government and their decentralized departments and agencies. The meetings also provided opportunity to identify and collaborate with other organizations especially those working under the GNWASH Programme in the district

While acknowledging the importance of the Atewa forest reserve, the local governments expressed concern about the potential threats to the long term protection of the reserve. They therefore expressed the commitment of the assemblies to the conversion of Atewa to a national park and called for the creation of other sources of livelihoods for the communities. The assemblies will also support the development of the ecotourism package of the programme to generate revenue for the districts. Based on these proposals, the assemblies have planned to incorporate the Atewa programme into the 2018-2022 District Assembly Development Plans.

2. Stakeholder Consultations with Forestry Commission and Government Regulatory Sector Agencies (MC, WRC and EPA)

During the period under review (January 2015), a series of regional meetings were held with the Forestry Commission and other government regulatory sector agencies including the Minerals Commission, Water Resources Commission and Environmental Protection agency.

The Eastern Regional Office and Begoro Forest District Office - Forestry Services Division (FSD) expressed concern about the illegal activities within the Atewa especially at the Potrase wing of the forest. The Mineral Commission's Inspectorate Division representatives took turns to explain how permits for mining are issued and mining activities monitored. The EPA representative highlighted the threats to the water resources from Atewa as a result of downstream activities. These stakeholders called for a collaborative approach involving traditional and opinion leaders, government and the private sector towards the conversion of Atewa into a national park.

C. Local-Level Consultative Engagements

1. First Round of Consultation with Local Communities and Traditional Leadership.

In 2012, a Consultation and Community Sensitization Programme was implemented in 30 local communities fringing Atewa Forest. The consultation took the form of community meetings and durbars, interfaith workshops and video road shows. The choice of the mode of consultation was informed by the results of the scoping assessment and level of literacy of most local forest community members. The events highlighted threats to the forest, created a platform to share and learn, built linkages and networks and galvanized religious, traditional and local government stakeholder support for the project's implementation. The selection of the 30 settlements were based on factors such as proximity to the forest reserve, accessibility and impacts of livelihood activities on the forest reserve

The community members expressed concern about some critical issues such as the perceived conflicting land use policy arising from the poor coordination between the different government agencies, lack of incentives for on-farm tree management, increased rate of illegal activities and the issue of license for bauxite prospecting within Atewa. While acknowledging these threats, a vast majority of the community members from the 30 communities expressed their willingness to participate in any activity that will enhance the conservation status of Atewa. They called for external support to speed up the process of converting Atewa into a national park to halt the decline of its biological resources and water bodies.

2. Second Round of Local Community Consultations and Sensitization

A second round of consultations and sensitization was organized and held for additional 40 Atewa forest fringe communities between October 2014 to June 2015. Similarly, meetings, durbars and video road shows were organized. About 10,000 fringe community members participated in these engagements.

The community members expressed concern about the weak enforcement of the laws regulating the use of natural resources. They also blamed the apparent lack of economic opportunities within the districts as the major cause of illegalities within Atewa. While

consenting to the conversion of Atewa to a national park, they called for the implementation of additional program that will enhance the economic wellbeing of the people.

3. Consultation with Traditional Authorities

In collaboration with the Forestry Commission (FC), A Rocha held consultation with the Okyehene, Ofori Panin Fie, Kyebi, on 8th April 2015. Present at the meeting were Osagyefo Amoatia Ofori Panin (Okyehene) and a cross-section of the Akyem Abuakwa Traditional Council. The FC expressed concern about the threats to Atewa and sought the support of the Okyehene in the implementation of the collaborative forest management project of the Atewa forest reserve and surrounding communities. The Okyehene expressed concern about the destruction of forests, pollution of streams and waterbodies and other illegal activities in the area. He however recounted the efforts in the past to protect the environment against degradation including the establishment of the Okyeman Environmental Foundation (OEF). While admitting to the limited success due partly to a number of political interferences, he expressed his commitment to supporting the long term protection of Atewa including its conversion to a national park.

4. Multi-Stakeholder Platforms and Forest Governance Structures Forest Forums

The non-existence of community participation in the protection and management of the Forest as well as poor community education were identified as key factors influencing the threats to Atewa forest. To equip and enable communities make more meaningful contributions to decision making processes in relation to the forest, two separate zonal workshops were organized to initiate forest forum platforms for the five (5) political administrative districts and communities that straddle the forest. The forum which draws participants from a broad range of stakeholders including the Forestry Commission, EPA, WRC, traditional authorities, MDAs, community representatives and Civil Society groups, provide opportunity for discussion on the fortunes of Atewa as a national park.

Interfaith Eco-Networks and Dialogue Platforms

Faith-based institutions constitute the most organized and largest global social network of people which can be harnessed to achieve tremendous behavioral and attitudinal change. As part of community consultations and sensitization programme three District (3) interfaith workshops were organized to build the capacity of faith based institutions and over 170 adherents in environmental stewardship. These adherents are drawn from communities fringing the Atewa forest reserve. While these networks acknowledged the environmental threats within their communities, they have nevertheless committed themselves to actions that will ensure the long term protection of Atewa including raising the conservation status.

5. Consultations of Atewa Environmental Governance Structures with Regional Forest Services Division and Regulatory Agencies, Koforidua, Tuesday June 13, 2016

The Atewa Environmental Governance Structure made up of the Interfaith Eco-Networks and the Forest Forums had a series of formal engagement and discussions with the Eastern Regional office of the Forest Services Division, the Environmental Protection Agency (EPA),

and the Water Resources Commission in Koforidua in June 2016. These engagements reinforced the threats to Atewa and the need to safeguard its biological and water resources for posterity. The participants expressed their commitment to the conversion of Atewa to a national park to reduce the level of degradation and ensure continued protection.

6. Capacity Building for Informed Participation

As part of effort to enhance the capacity of participants and community members, a number of training programs were organized for CSO's and communities; police prosecutors and Investigators; and Judges. The training was facilitated by Taylor Crabbe Initiative, a Ghanaian based Environmental Law Group supported by Client Earth an international Environmental Law Group that works to protect the environment through advocacy, research and litigation. The training equipped the participants with the knowledge of Ghana's environmental laws and skills for ensuring law enforcement around the Atewa Forest Reserve.

The project formulation process made it clear that capacity building was necessary to empower all the project stakeholders to participate equitably and effectively in the public consultation process and to facilitate the performance of their roles and responsibilities. Therefore, through the process, training on legal knowledge for the protection of the environment was carried out as part of efforts to ensure that law enforcement around the Atewa Forest Reserve is strengthened. Four categories of stakeholder groups benefited from the training and ensuing engagements. These are representatives from CSO's and communities; police prosecutors and Investigators; and Judges. The engagement was facilitated by Taylor Crabbe Initiative, a Ghanaian based Environmental Law Group supported by Client Earth an international Environmental Law Group that works to protect the environment through advocacy, research and litigation.

Outcome of Consultative Processes

The stakeholder consultative processes have served to enhance public knowledge, understanding and awareness about Atewa Range forest reserve. The process of securing a common understanding of the issues has sometimes been challenging, due to the different understanding, background, aspirations and often with diverse interests and agendas based on their institutional orientation. Nonetheless, the highly participative process of multi-stakeholder consultations did give a tremendous impact that has helped generate greater awareness and interests on the need for long term and sustainable provisions for the management of Atewa Forest Reserve. The general consensus among the broad range of stakeholders at the national, regional and local levels is that the long term protection of the Atewa Range forest reserve could be assured if and only if its management regime is raised to a national park. Concerns about potential environmental and social impacts could be addressed in the 'new' management framework.

5.6 Socio-Cultural Factors

The Atewa Range Forest Reserves has unique natural, cultural and historical resources that could be harnessed through improved management regime and ecotourism for the socio-economic development of the area. The traditions, culture, rites and lifestyle of the people surrounding the GSBA present a unique blend of the traditional interrelationships that exist between man and nature. This is not only represented in place names, songs, dances, rites, and names but also in the occupations and every other facet of the lives of the people.

Some of these attractions are:

- Palace of the Okyehene (*Ofori Panyin Fie*)
- Royal mausoleums
- Sacred groves
- Festivals & rites
- Funerals
- Folktales & legends, e.g. Okomfo Anokye's ram foot, etc.
- Music & dance performances
- Caves; Obodan
- Caves and Natural lookout points
- Breath-taking waterfalls, pools, rivers and streams
- Rivers/streams; The headwaters of Birim and Densu

These unique natural, cultural and historical features constitute enormous potential for ecotourism development and justify the upgrade of Atewa to a national park. The national park status which affords better protection of the socio-cultural, nature-based and historical attraction, will further safeguard these resource for the long-term. Since most of the traditional practices are linked to Atewa, any delay in enhancing its protection status could adversely affect these rich culture and thus rob Ghana of a unique heritage.

5.6.1 Case studies of Protected Area Upgrade within the Region.

The threats to Atewa are not peculiar to it alone; other forest reserves faced similar challenges until their management regimes were changed to attract considerable investments and improved management activities. Over the past 50 years, human activities have changed ecosystems more rapidly and extensively than at any comparable period in our history with more than 60% of the world's ecosystems already degraded (Millennium Ecosystem Assessment 2005). These changes have generated many economic gains but at a growing environmental costs, including biodiversity loss and land degradation, which in turn have resulted in many economic, social and cultural losses.

Communities that rely on the use of natural resources find themselves particularly vulnerable to biodiversity and ecosystem degradation. Evidence is however emerging that the long-term investments being made by national governments and communities in protected area systems globally are having a large pay-off. Protected areas are an efficient

and effective means to address biodiversity loss, help buffer society from the effects of climate change, and maintain the critical ecosystem services on which all societies depend.

As data on the value of biodiversity and ecosystem services has become more widely available, and increasingly incorporated into financial and economic analyses, these figures are beginning to be used to justify protected area budgets as part of development spending, and to make a development case for investment in protected areas for poverty reduction. In some cases, this has provided the impetus to recognize—and take action to reverse – earlier developments which have negatively impacted the livelihoods of the poor by destroying biodiversity. The benefits of protected areas extend beyond socio-economic and environmental to cultural and spiritual.

Protected areas harbour many species that are of direct subsistence value to people living in or around them. Protected areas can be valuable sources of bushmeat, fruit, nuts, berries, medicinal plants, drinking water and other crucial resources. For instance, 81 village communities depend on the Nam Et-Phou Loie area in Lao for non-timber forest products (NTFPs). The value of these resources is estimated at US\$1.88 million/year. Further, an assessment of NTFPs at the household level estimated their value at US\$250 per annum for each household living outside the conservation area, US\$500 for those on the border and almost US\$677 for those inside in the conservation area. By comparison the gross domestic product (GDP) for the province is \$180. Similarly, local communities in Cameroon set up a Prunus Harvesters Union to collect bark of *Prunus africana* (used in drugs for the treatment of prostate cancer) on the slopes of Mount Cameroon and tripled their profit in the first year (Davis, Arthy, Brown, Brown, Chalinder, Dewdney, Ellis, Herbert, Mabey, MacDonald, McGurk, Steele, Summer & West (2000);

There are a number of forest reserves, whose transformation resulted not only in marked improvement in its ecological health but economy of the fringe communities. These include the Kakum National Park in Ghana and the Banco National Park, Abidjan in Cote d'Ivoire

[Kakum National Park, Cape Coast- Ghana](#)

Kakum National Park, extends from the southern portion of the Moist Evergreen Forest type to the Moist Semi-Deciduous forest type in the northernmost portions of the Central Region of Ghana. Established in 1931 as a reserve, it covers an area of 356km² was gazetted as a national park only in 1992 after an initial survey of elephants and avifauna was conducted. It is one of only 2 locations in Africa with a canopy walkway, which is 350 metres (1,150 ft.) long and connects seven tree tops which provides access to the forest canopy.

The Kakum River originates within the park, and hence the park is named after the river. Its tributaries which flow through the park are Obuo, Kakum, Afia, Sukuma, Nemimi, Aboabo and Ajuesu. In 1931, the area drained by the headwater catchment of the Kakum River was declared a forest reserve and managed by the Forestry Division. During this period, logging operations were prevalent, particularly of the mahogany (*Khaya ivorensis*), Kako (*Lophira alata*) and Wawa (*Triplochiton scleroxylon*) tree species. The logging operations continued till 1989 when the management of the reserve was transferred to the Wildlife Department.

The uniqueness of this park lies in the fact that it was established at the initiative of the local people and the regional administration and not by the then Wildlife Department¹

A Feasibility Study and Preliminary 5-year Management Plan for the development of Kakum National Park as an ecotourism destination were developed in 1990 under a project conducted for the United Nations Development Program (Dudley 1990). The Feasibility Study included preliminary biodiversity assessments of the flora and fauna of Kakum Forest Reserve and adjoining Assin-Attandanso Forest Reserve, and an elephant population survey (Dudley 1990; Dudley, Mensah-Ntiamoah, & Kpelle 1992; Dudley 1995). Also the watershed protection functions of the then proposed Kakum National Park was also acknowledged.

The Feasibility Study and Preliminary 5-year Management Plan were developed in a collaborative and consultative process involving a consulting biologist, forestry officials, wildlife officials, local communities, Ghanaian universities, regional government officials, and other key stakeholders (Dudley et. al, 1992).

The upgrade of the conservation status of Kakum resulted in a significant socio-economic transformation of the neighbouring communities. Within the period of three years of its operation, primary school enrolment increased by 30%, number of rural roads went up by 12%, agricultural production increased to 28% due to increased demand and there was a significant rise in the number of services offered. In 2007, the park and its attractions generated \$350,000 from 180,000 visitors, 80% of whom were Ghanaians (CI, 2007).

Banco National Park, Abidjan- Cote d'Ivoire

The Banco National Park (5°21'-5°25' N; 4°01'-4°05' W) is a protected area of 3474 hectares located in the town of Abidjan along the northern freeway. This is one of the National Parks inherited from colonization and was gazetted as a National park in 1953 (Daget & Iltis 1965). A longer great dry season lasts from December to March, and is followed by the period with highest precipitation in March to July. A minor rainy season lasts from October to November.

The River Banco crosses the entire reserve over approximately 9 km. It has its source close to the northern edge of BNP and flows into the Ebrié lagoon. BNP mainly consists of moist, almost primary forest on predominantly sandy soils. The Banco forest is a habitat for many birds and monkeys. The Banco forest has a recreational value. Tourism has been developed there by allowing trails for walkers and accommodation for camping. Local communities used to go in this forest for their traditional ritual (worship).

Banco National Park was established to protect the Banco River which is an important water resources for the inhabitants of Abidjan (Britannica Encyclopedia 2016). Like the Densu River, River Banco is a source of water for domestic chores and drinking water for many of the inhabitants of the Capital. Whilst majority of the people get pipe-borne treated water, others get water directly from the river for many uses including drinking and domestic

¹ State Department responsible for wildlife preservation in Ghana. Later changed to Wildlife Division as part of the Forestry Commission of Ghana.

chores. The existence of the Banco forest allows a reliable groundwater recharge of the aquifer that fed the river; preventing its dry up during the dry season. It also protects this aquifer that supplies water for the population of Abidjan.

The Banco National Park has become an effective tool to maintain and secure water supplies from the Banco River and offer a higher quality water than watersheds under alternative land uses, because all other land uses have a greater human footprint: more intensive management, less complete cover (hence more soil erosion and sediment) and more application of pollutants (such as pesticides, fertilizer or toxic waste). These quality impairers may enter the headwaters or the lower stretches of the watershed. Protected forest watersheds (no logging, agriculture or mining) are unquestionably the best guardians of water quality.

This forest gives a lot of benefits for the surrounding population, such as plants for medicines and NTFPs for fringe communities. It also maintains the ecological balance and a high amount of rainfall in the area. In 2010, the Banco National Park generated revenue totaling over \$870,000 from tourists who visited and patronized the products.

Conclusions

The benefits that accrued to both the local and national economy from converting a forest reserve into a national park with an accompanying ecotourism program provides sufficient justification for the change in management regime of Atewa. There is sufficient evidence to prove that well managed protected areas with an ecotourism component returned higher economic, social and environmental benefits to justify investment.

5.7 Assessment of the Economic Value of the Ecosystem and Biodiversity

The contribution of renewable natural resources to Ghana's economy is very significant but is not adequately captured in national accounting systems. In particular, many of the benefits provided by the Atewa Range, such as its role in maintaining water to downstream users, as well as the costs of alternative land use such as gold mining, are not measured or fully taken into account when deciding how to manage the forest. Decisions taken around the management and use of the Atewa Range, both formal and informal, may therefore be sub-optimal. Economists have thus a variety of tools available to measure the market and nonmarket values of goods and services provided by natural resources. One of such tools is the internationally recognized The Economics of Ecosystems and Biodiversity (TEEB) approach.

5.7.1 The TEEB Approach

The TEEB presents an approach that can help decision makers recognize, demonstrate and where appropriate, capture the values of ecosystems and biodiversity such as those provided by the forest in the Atewa Range in national accounting system (TEEB 2013). While this analysis does not explain how these values can be captured by market mechanisms it helps to improve the understanding and evaluation of different landscape management options, including the implications – cost and benefits – for different stakeholders.

The analysis drew on established methods and best practices to classify and quantify the values of all the major products and services provided by the forest (ecosystem services) and land around the forest (e.g. crops and mines), building on ecological, hydrological and land use assessments. These values were then incorporated into an 'extended' cost benefit analysis, i.e. one that includes ecosystem services, of current developments and future scenarios. The assessment used primarily *market based methods* to estimate the values of different ecosystem services, supplemented by household surveys, avoided cost methods and transfer of values from similar studies ((Schep, Guzmán,, van Beukering, de Moel, Eiselin, Ayesu, Birikorang, & Bekoe Ansah, 2016).

By valuing changes in key ecosystem services, this study provided evidence for relevant stakeholders to support equitable management of the Atewa Range and its forest ecosystems. Furthermore, the findings of this study are expected to create awareness on the importance and value of the Atewa Range to the different beneficiaries from the Ghanaian society and the international community, thereby catalysing investment in the protection and restoration of the ecosystems in this area. It is also meant to support the Government of Ghana in its efforts towards the sustainable land use and forest management in this area, so as to safeguard the ecosystem services supply to both local and downstream stakeholders.

5.7.2 Objective

The main objective of this research was to provide insight into the economic value of the Atewa Range ecosystem and its river basins for local communities and downstream

beneficiaries. In order to achieve the main objective, the analysis presented in this study was built upon the following sub-objectives:

- Collect information to determine a baseline of the **state of ecosystems** in the study area, which is defined as the Atewa Range and its river basins. The study focused on the Densu River basin, because of its importance as a water source for an important part of the Greater Accra Region of Ghana.
- Undertake an assessment of the **hydrological status** of the Densu River Basin under different land use management regimes.
- Determine the **economic value** of the ecosystem services provided by the Atewa Range (including the Forest Reserve and its surrounding areas), to local and downstream stakeholders.
- Establish an **extended costs-benefit framework** to create more transparent choices and trade-offs for sustainable management of the Atewa Range, including the Forest Reserve and the surrounding area, and all relevant stakeholders for land use management decisions.

5.7.3 Geographic area

The prime focus of the study was on the Forest Reserve in the Atewa Range (Figure 6) green area). However, because the study area forms the headwaters of this river, which provides water resources to millions of people, including a large part of the city of Accra, also the downstream users of the Densu Basin (Figure 6; blue area) were investigated. The mountain range in which the Forest Reserve is located is larger than just the reserve itself. Next to the Densu water resources and the Forest Reserve area, this land surrounding the Forest Reserve, the so-called 'buffer zone' area, is also explicitly considered in the scenario analysis (Figure 1, light brown area). In consultation with stakeholders, an area above ~220 meters above sea level, designated as buffer zone was selected. This corresponds roughly to the entire Atewa Range.

This study also focussed on the ecosystem services of the Atewa Range. However, as the Atewa Range is part of the headwaters of the Densu river, providing fresh water for the Accra region, the Densu watershed is also taken into consideration. For the Forest Reserve and the buffer zone, specific land cover and land use were defined in different scenarios. For these scenarios, the effect on ecosystem services in the upstream (Forest Reserve and the buffer zone), the midstream (agricultural area around Nsawam) and downstream (Weija Lake, Accra, Densu delta) areas were assessed

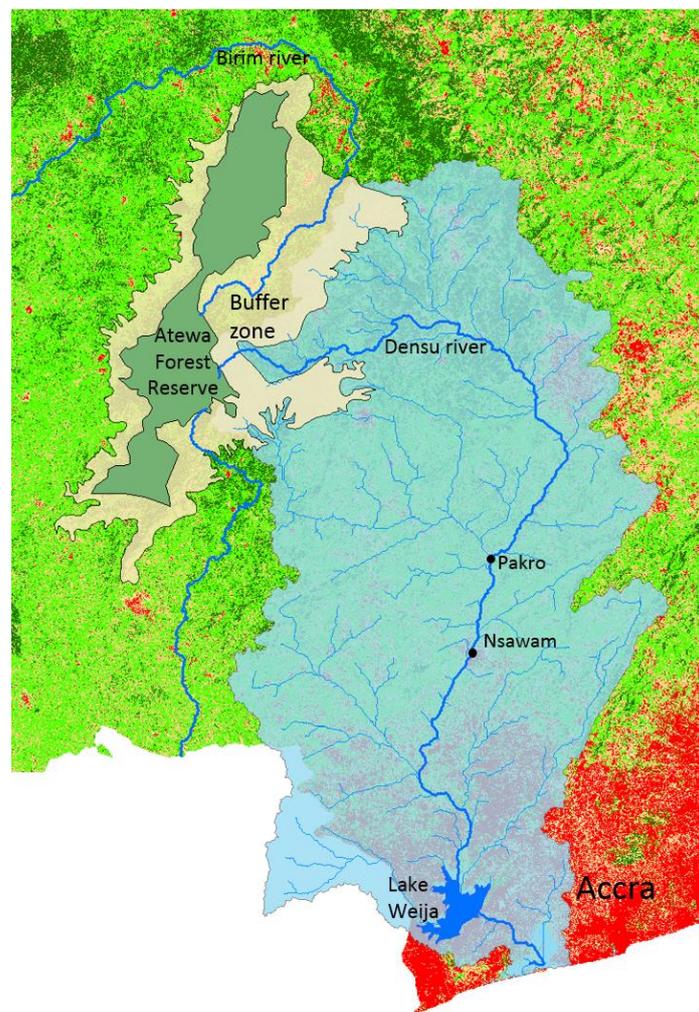


Figure 15: Overview map of the different geographic areas considered in this study

5.7.4 Cost-Benefit Analysis of land use change scenarios in the Atewa Range

Trends in Atewa Range

The TEEB study indicates that the closed canopy forest cover in the Atewa Range decreased from almost 88% (668 km²) of the total range area in 1990 to a little less than 60% (452 km²) in 2010. This change, however, is differently distributed over the range. The decrease in closed-canopy forest within the Forest Reserve boundaries has been clearly lower than in the entire Atewa Range: In 1990, the closed-canopy forest formed about 91% (212 km²) of the total reserve area; whereas in 2010, it decreased to around 81% (190 km²) of the Forest Reserve (Figure 6). This means that the closed-canopy forest in the reserve shrank by around 20 km² in 20 years. The analysis also established that as the buffer zone is not officially protected, it is expected that it might suffer from more severe degradation. Indeed, the available land-cover data suggest that the decline in closed canopy forest cover was much steeper than in the Forest Reserve: from little over 85% in 1990, closed-canopy forest decreased to nearly 50% of the total area of the buffer zone in 2010 (Figure 6).

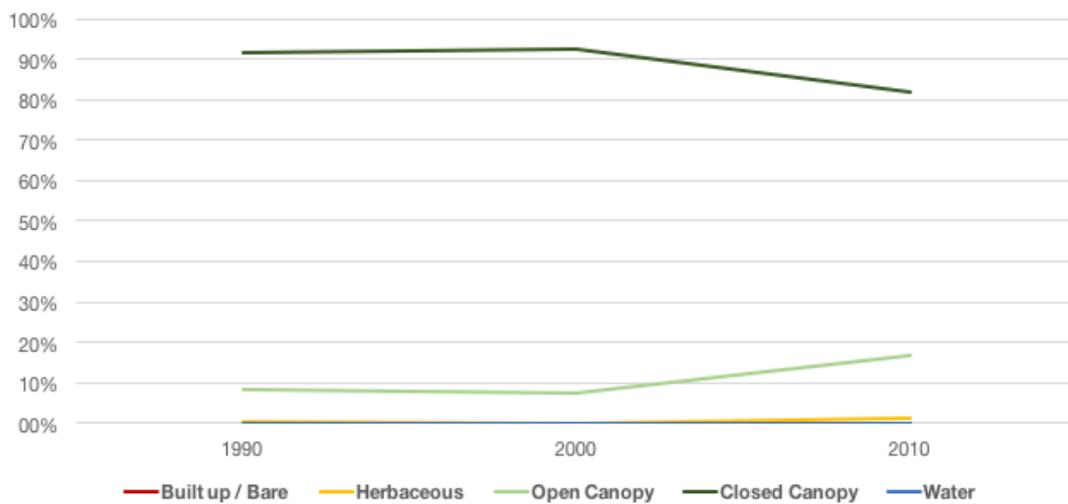


Figure 16 Land-cover trends inside the Forest Reserve

Since part of the area classified as forest in the buffer zone might actually correspond to tree crops, such as cocoa, the land-cover trend observed does not allow for detailed conclusions with regard to the degradation or replacement of the forest. The increase in the area of open-canopy forest, however, suggests that closed-canopy forest in the buffer zone has been subject to interventions that have affected tree density and biomass. These interventions can include the replacement of these areas by tree crops, which were classified as open-canopy forest in the land-cover layers, or selective timber extraction leading to a decrease in the forest canopy cover.

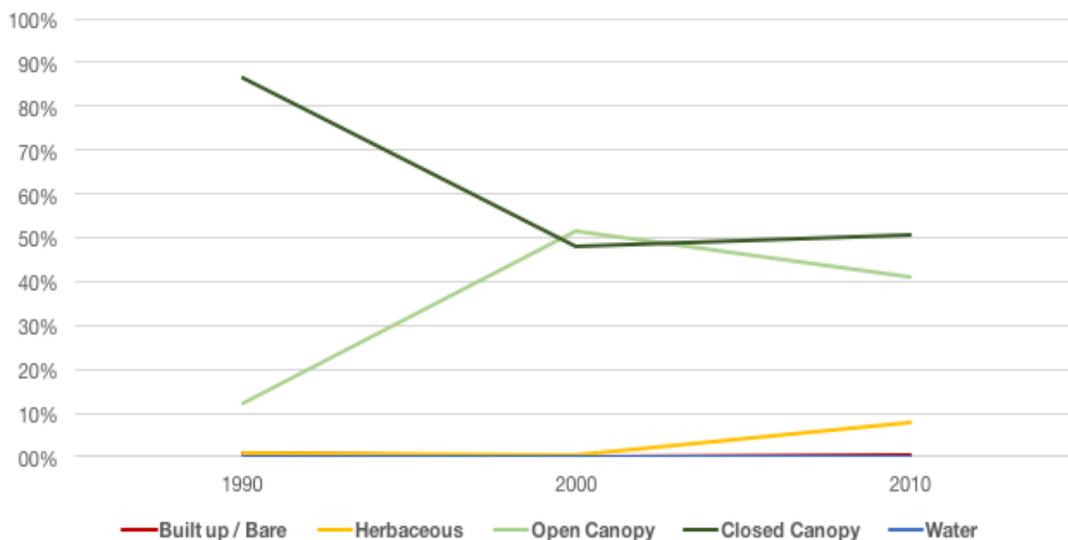


Figure 17 Land-cover trend in the buffer zone (outside the Forest Reserve)

The comparison of the trends presented above indicates that deforestation and forest degradation (from closed- to open-canopy forest) in the past two decades have been much higher in the area that surrounds the reserve than within the boundaries of the Forest Reserve.

Four possible scenarios for the Atewa Range

The TEEB study used a historical data and projects changes to the Atewa Range (Forest Reserve plus a buffer zone around it) under four scenarios over thirty years, and estimated how these changes could affect the forest values in economic terms. The study assessed the main scenarios, their extended costs and benefits, the timeframes of these costs and benefits, and how they affect different groups in different ways.

The study highlights four potential simplified scenarios for the future of Atewa:

- **Scenario 1:** Leave the Forest Reserve as it currently is, allow continued harvesting and mining, and let the forest steadily degrade with resultant downstream costs (Business as Usual);
- **Scenario 2:** Increase protection status of just the Forest Reserve area to a National Park;
- **Scenario 3:** Establish a National Park and create a buffer zone around it - find investment to phase out certain land use practices and restore the buffer zone;
- **Scenario 4:** Extract all the timber and mineral resources, including the bauxite that is located in the Forest Reserve, forego all of the forest and the forest benefits.

Table 3 provides an overview of the characteristics of the four scenarios. Scenario 3 represents the most 'green' scenario, Scenario 4 the most destructive scenario, and the Scenarios 1 and 2 are in-between scenarios. To quantify the change in the scenarios, use is made of information on historic developments in terms of population growth, mining development rates and land use change. This is especially important for the 'further degradation' parts in the scenarios 1 and 2. There is not a specific time horizon for the scenarios (as they are 'what if' scenarios), but to quantify changes for the 'further degradation' changes as observed over about **20 years** will be used.

Table 3 Overview of scenarios used in this study

Scenario / Area	Forest Reserve	Atewa Range
Baseline	Current situation	Current situation
1. Business As Usual (BAU; continued developments in the Atewa Range)	Further degradation	Further degradation
2. National Park (restoration only in current reserve)	Complete restoration	Further degradation
3. National Park and supporting buffer zone	Complete restoration	Partial restoration (outside urban areas)
4. Complete degradation (extreme case)	Complete logging for bauxite mining	Complete logging due to mining/logging

Outcome of Economic Assessment

Costs and benefits in Scenario 1 – Business as usual Scenario 1 (business as usual) occupies a higher position in the ranking of monetary benefits that will come to a few stakeholders, than other scenarios, but at the same time it allows for many illegal and unregulated activities. In

terms of total NPV, the business as usual situation provides larger monetary benefits and higher annual value than the Scenario 2 (National Park) in year 30. But the cost of mitigation of the environmental degradation such as restoration of water bodies and treatment of increased incidence of diseases will eventually far outweigh the benefits to be derived by few selected stakeholders. It is also worth noting that due to the dominance of illegality of the activities, not much is gained by government in terms of taxes and revenue, but government bears the brunt and the burden of the mitigation cost.

The benefits in Scenario 1, however, are largely obtained from illegal and unregulated activities such as timber logging in the Forest Reserve and informal small-scale mining. It is estimated that 28% of the NPV and 11% of the annual value in year 30 would arise from illegal or unregulated activities, being these some of the highest percentages of this type of benefits among the scenarios under analysis (Table 3).

It is thus likely that the lack of control over these activities, together with changes in the water regime, will have negative effects on regulating ecosystem services such as flood and drought mitigation in downstream areas. Furthermore, forest degradation, land-cover change, and hunting are expected to have a negative impact on spiritual and existence values associated to the biodiversity of the Atewa Range.

Costs and benefits of Scenario 2 – National Park

Scenario 2 (National Park) is favourable for cultural values of the Atewa Range, and entails strengthened control of illegal, unregulated and unsustainable activities within the boundaries of the National Park (former Forest Reserve area). Despite this, Scenario 2 is less attractive than others in monetary terms (Table 3).

In comparison with scenarios 1 (business as usual) and 4 (complete degradation), Scenario 2 has a stronger enforcement of regulations to prevent illegal timber logging and illegal or unregulated gold mining in the National Park area. This favours the recovery of the forest cover and leads to a decrease in illegal and unregulated revenues. However, this scenario consequently offers lower annual and present values than scenarios 1 and 4, where illegal or unregulated activities still make a big contribution in monetary terms. As land-cover change and ecosystem degradation still take place in the buffer zone, Scenario 2 provides lower monetary benefits compared to Scenario 3, in which the buffer zone is restored and managed sustainably.

Ecosystem restoration within the National Park boundaries in Scenario 2 represents an improvement with respect to scenarios 1 (business as usual) and 4 (complete degradation) in terms of the cultural and regulating services for which a monetary value is not assigned this study, but this improvement is limited in comparison with Scenario 3 (National Park and supporting buffer zone). It cannot also be safeguarded in the long-term due to vulnerability to encroachment and edge effects.

Costs and benefits of Scenario 3 – National Park and supporting buffer zone

Scenario 3 (National Park and supporting buffer zone) offers high monetary benefits with a low participation of illegal and unregulated activities in comparison with other scenarios.

Furthermore, this scenario has potentially favourable effects on benefits that have not been valued in monetary terms. Scenario 3 has the highest annual monetary value in year 30 and occupies the highest position in terms of NPV (Table 3). It is also sustainable in the long-term

Over the 30-year timeframe, illegal and unregulated activities are estimated to contribute with only 7% to the total NPV of this scenario. In year 30, it is expected that all the benefits from the Atewa Range will be obtained from legally permitted activities. Since deforestation is effectively controlled in this scenario, it is likely to observe a neutral (and possibly positive) effect on the ecosystem services that are not included in the monetary value, such as drought and flood control. The values of these services could also appreciate with time as restoration measures continue to improve ecological conditions in the both the buffer zone and reserve itself.

Furthermore, additional protection and restoration of ecosystems in the entire Atewa Range area is likely to have a positive effect on cultural ecosystem services related to spiritual and existence values.

Costs and benefits of Scenario 4 – Complete degradation

Scenario 4 (complete degradation) ranks as the second least favourable scenario in terms of total NPV and the annual monetary value in year 30 is similar to the one obtained in the business as usual situation (Scenario 1). The total NPV is obtained to a large extent from illegal and unregulated activities (32% of the total value) (Table 3).

The absence of benefits from illegal and unregulated activities in the total annual value in year 30 is explained by the depletion of timber and gold due to their extraction in prior years. The exhaustion of the majority of these and other resources, such as non-timber products, also determines a low annual value in year 30 in comparison with Scenario 3. Land-cover change and forest degradation in this scenario will most likely have negative effects in cultural and regulating services that were not quantified in monetary terms in this study.

Table 4 Net Present Value (NPV) for various scenarios in the Atewa Range (million US\$, 30-year period and discount rate of 5%)

	Scenario 1 – Business as usual	Scenario 2 - National Park	Scenario 3 – National Park and supporting buffer zone	Scenario 4 - Complete degradation
Provisioning services				
Non-timber products	\$ 189.1	\$ 98.8	\$ 107.51	\$ 111.9
Timber products (legally permitted timber logging in the buffer zone)	\$ 89.2	\$ 93.6	\$ 91.9	\$ 77.6
Timber products (illegal timber logging in the Forest Reserve)	\$ 285.2	\$ 83.8	\$ 83.7	\$ 232.9
Cocoa farming	\$ 140.1	\$ 140.1	\$ 156.5	\$ 71.3
Water for agriculture	\$ 37.8	\$ 38.1	\$ 49.8	\$ 27.1
Water for consumption	\$ 295.6	\$ 295.6	\$ 581.5	\$ 194.6
Regulating services				
Carbon sequestration	\$ -3.9	\$ -3.5	\$ -0.1	\$ -23.2
Cultural services				
Tourism (potential)	\$ -	\$ 2.8	\$ 76.4	\$ -
Mining benefits				
Bauxite alumina	\$ -	\$ -	\$ 12.4	\$ 58.0
Gold (legal extraction)	\$ 46.6	\$ 43.6	\$ 1.9	\$ 173.4
Gold (illegal and unregulated extraction)	\$ 25.1	\$ 23.5	\$ 1.0	\$ 93.4
Management costs				
Additional park management costs	\$ -	\$ -1.5	\$ -2.9	\$ -
Total NPV 30 years				
Including illegal and unregulated activities	\$ 1,104.8	\$ 814.9	\$ 1,156.6	\$ 1,017.1
Excluding illegal and unregulated activities	\$ 794.5	\$ 707.6	\$ 1,071.8	\$ 690.8
Annual value in year 30				
Including illegal and unregulated activities	\$ 35.4	\$ 26.1	\$ 92.7	\$ 37.2
Excluding illegal and unregulated activities	\$ 31.4	\$ 24.6	\$ 92.7	\$ 37.2

Trends in total annual value

Before 2020, the decline in annual value observed in scenarios 2 (National Park) and 3 (National Park and supporting buffer zone) is linked to the restrictions on the use of timber, non-timber products and mineral resources, that will be effectively implemented within the National Park by the 4th year. As observed in the figure, before the creation of the National Park, the annual values in these two scenarios are equivalent to the annual values in the business as usual situation (Scenario 1).

In the same initial period, a steeper decline in the annual value from Scenario 4 (complete degradation) is associated to first investments for bauxite mining. When analysing the main trends over the first 20 years of analysis (solid line), only Scenario 3 (National Park and supporting buffer zone) provides increasing annual benefits. All the other scenarios follow a decreasing trend. In the subsequent decade (from year 21 to year 30, depicted as a dashed line), based on the extrapolation of land cover changes and the outcomes of the hydrological model, the main trend remains the same for scenarios 1 (business as usual), 2 (National Park) and 3 (National Park and supporting buffer zone). In Scenario 4 (complete degradation), however, the annual value becomes constant, instead of following the decreasing trend of the previous decade. In this specific case, this trend reflects that the constant revenues from bauxite extraction become by far the main source of benefits in the Atewa Range after the depletion of gold reserves and forest products

Estimated economic value of non-timber products

Forest reserves in Ghana are traditionally used as production forests from which local communities obtain a broad variety of non-timber products for consumption and commercial purposes (McCullough *et al.*, 2007). The analysis was based on the most commonly used non-timber product within Atewa Range, bush meat, of which almost 370 tonnes per year are extracted (Ansah, 2014). Other products harvested in large amounts include snails, mushrooms, honey and fruits (Ansah, 2014; Ayivor and Gordon, 2012).

The estimation of the value of non-timber products in the reserve and buffer zone was based on a list of 13 products adapted from Ansah (2014). Most of these products are found in both forest ecosystems and cocoa plantations, although their quantity might differ according to canopy cover and land use type (i.e. open- or closed- canopy; cocoa or natural forest). Regarding the herbaceous type, it is assumed that only a few of the non-timber products can be found in herbaceous areas, and these are provided in smaller amounts than in forests.

Local prices and extracted amounts of non-timber products are the basis to estimate the value of the current supply of these products in the Forest Reserve. The amount of non-timber products extracted from the Forest Reserve includes household consumption and sales, and it is obtained from yearly estimates derived from approximately 1,950 households of 45 communities investigated by Ansah (2014) in the surroundings of the reserve. These data served to estimate the total economic value of the current supply of non-timber products in the Forest Reserve. The economic value per hectare and then total economic value of non-timber products in the buffer zone were derived from the factor of ecosystem services provision and the area of each land cover type.

Based on these calculations, the total economic value of the annual supply of non-timber products is estimated at approximately US\$6.9 million in the Forest Reserve and US\$5.4 million in the buffer zone. On average, the provision of non-timber products in one hectare is valued at US\$284.

Table 5 Total Economic Value of NTFPs in the Buffer Zone

Non-timber products	Average value per hectare (US\$/ha/year)	Total economic value Forest Reserve (US\$/year)*	Total economic value buffer zone (US\$/year)*
Snails	\$ 65	\$ 1,629,000	\$ 855,000
Honey	\$ 20	\$ 499,000	\$ 566,000
Mushrooms	\$ 11	\$ 288,000	\$ 151,000
Fruits	\$ 2	\$ 44,000	\$ 68,000
Rattans	\$ -	\$ -	\$ -
Cane	\$ 61	\$ 1,404,000	\$ 491,000
Chewing stick	\$ 7	\$ 160,000	\$ 56,000
Bath Sponge	\$ -	\$ -	\$ -
Chewing sponge	\$ 5	\$ 12,000	\$ 41,000
Spices	\$ 14	\$ 312,000	\$ 295,000
Herbs	\$ -	\$ -	\$ -
Wrapping leaves	\$ 3	\$ 59,000	\$ 91,000
Bush meat	\$ 96	\$ 2,437,000	\$ 2,827,000
Total non-timber products	\$ 284	\$ 6,950,000	\$ 5,441,000

Estimated economic value of timber products

The abundant regeneration of trees in the Atewa Forest has historically been a source of timber products for local communities (Hawathorne and Abu-Juam, 1995; McCollough *et al.*, 2007). According to data from local surveys, approximately 350,000 m³ of timber and about 1,400 tonnes of other timber products are yearly extracted from the Forest Reserve (Ansah, 2014). Other timber products obtained from the forest include firewood, and wood for mortars and pestles (Ansah, 2014; Ayivor and Gordon, 2012). In total, these quantities are extracted for both sale and household consumption.

In this study, the economic value of timber is estimated through market based techniques based on local prices and amount of products extracted. Cocoa plantations and the herbaceous cover are not considered sources of timber. To reflect differences in the availability of timber products in each land cover type, a factor of ecosystem service provision was selected and assigned to each type of timber product.

Local prices (Ansah, 2014; A Rocha, pers. comm.) and amounts extracted (Ansah, 2014) are first used to determine the total economic value of timber products for the Forest Reserve. This value, together with the factor of ecosystem services provision is then used to estimate

the economic value per hectare of forest, and this result is in turn used to calculate the economic value in the buffer zone.

As shown in Table 6, the total economic value of the annual supply of timber products is estimated at approximately US\$1,392 per hectare, US\$30.5 million in the Forest Reserve (from illegal timber logging) and US\$10.2 million in the buffer zone. From this amount, timber itself is the main contribution to the economic value, representing approximately 96% of the total.

Table 6 Total Economic value of the current supply of timber products in the Atewa Range

Timber products	Economic value per hectare (US\$/ha/year)	Total economic value Forest Reserve* (US\$/year)**	Total economic value Buffer Zone (US\$/year)**
Timber	\$ 1,336	\$ 29,257,000	\$ 9,741,000
Mortar (Ghanaian)	\$ 49	\$ 1,075,000	\$ 358,000
Pestle (Ghanaian)	\$ 5	\$ 101,000	\$ 34,000
Construction poles	\$ -	\$ -	\$ -
Fire wood	\$ 2	\$ 48,000	\$ 17,000
Total timber products	\$ 1,392	\$ 30,481,000	\$ 10,150,000

* Timber logging in the Forest Reserve is not legally permitted (Ansah, 2014; Abu-Juam *et al.*, 2003).

** The results are rounded to the nearest thousand.

Estimated economic value of cocoa (farming)

The buffer zone, covered by nearly 37,000 ha of these plantations, provides local communities with benefits from cocoa sales and consumption. The benefits obtained from cocoa sales and consumption in the buffer zone are calculated as the product of the harvested amount and the local price. For the area of cocoa plantations in the buffer zone and a yield of 0.3 tonnes per hectare (FAO, 2004), the total cocoa produce results in around 11,000 tonnes per year. As local price data are not available for this study, we use the average of annual producer prices in Ghana for the period 1991-2011 provided by FAO (FAOSTAT, 2016), calculated at US\$844.5 per tonne. Based on these data, the value of the total produce of cocoa in the buffer zone can be estimated at approximately US\$9,336,000 per year.

Estimated economic value of carbon

Due to lack of a complete baseline to estimate the current average value of carbon sequestration in the Atewa Range, this study does not estimate the current value of this ecosystem service. The carbon stock in the Atewa Range is spatially estimated on the basis of the above ground biomass provided in the Biomass Map of Ghana from 2008-2009 (Asare *et al.*, 2013) and a representative carbon price is selected from the international range of carbon offset prices (Goldstein and Gonzalez, 2014).

According to Asare *et al.* (2013), carbon corresponds to approximately one half of the biomass stored in woody vegetation. Following this conversion rule, we estimate carbon

content as half of the above ground biomass (i.e. conversion factor of 0.5). The average carbon content in the Atewa Range is thus calculated between 109 and 130 tonnes per hectare, depending on the land cover type. By using the absolute error map of the Biomass Map of Ghana (Asare *et al.*, 2013), an average error of 32.7 tonnes of carbon per hectare is calculated for the Atewa Range.

To estimate the economic value of carbon sequestration in the different scenarios analysed, a carbon price is selected from international pricing mechanisms. Carbon pricing mechanisms differ among countries and regions, varying from taxes to trading mechanisms. Consequently, carbon prices are distributed over a broad range. According to the state and trends report of the World Bank (2014) on carbon pricing, this range covers from under US\$1/tCO₂ to US\$168/tCO₂. In the majority of the trading schemes, however, prices are below US\$12/tCO₂. Forest Trends analysed 136 forest carbon offset projects in the period 2011-2014, and encountered carbon prices ranging from US\$1/tCO₂ to over US\$100/tCO₂. However, the average REDD offset selling price went from US\$7.8 /tCO₂ in 2012 to US\$4.9/tCO₂ in 2013 (Goldstein and Gonzalez, 2014). In this study, we use a carbon price of US\$6/tCO₂ as a representative estimate of existing trading schemes and the REDD offset selling prices.

Estimated returns on investment in tourism

Ghanaian national parks like Kakum National Park or Mole National Park demonstrate that sustainable economic development is possible through tourism. However, before tourism can generate profits, large investments in the infrastructure of touristic areas have to be made. One of the most crucial factors that adjudicate upon whether an area is worth investing in is the economic return. Although this is not part of the current supply of ecosystem services, potential tourism developments can add revenues arising from nature in the future.

Based on the Multi-Criteria Analysis (MCA) it was concluded that of all National Parks and Forest Reserve areas, the Atewa Range is the fourth most suitable area for the development of tourism, after Kakum National Park (most suitable), Digya National Park and Mole National Park. Therefore, it can be assumed that the revenues from entrance fees of Kakum National Park can be taken as a proxy for the potential revenues from entrance fees of the Forest Reserve gives an overview of the social and environmental similarities between both parks.

Table 7 Comparison of the Kakum National Park and Atewa Range Forest Reserve

	Kakum National Park	Atewa Forest Reserve
Size	350 km ²	232 km ²
Distance from Accra	2h50 / 175 km	1h25 / 93 km
Ecoregion	Eastern Guinea Forest	Eastern Guinea Forest
Mammal species	131	149
Bird species	402	415

Butterflies	405	575
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To quantify the tourism potential of the Atewa Range as a tourist destination, it is necessary to estimate the potential number of domestic and international visitors. The latest official data concerning international tourist arrivals is from 2011 and states the arrival of 827,501 international visitors in that year (Ghana Tourism Authority, 2011). If the growth of tourist arrivals continued the trend of the years prior to 2011 (>10%) it is safe to assume that more than one million visitors arrived in Ghana in 2015. Based on statistics from 2009, around 19% of arrivals comprise holiday travels (Ghana Tourism Authority, 2011). Therefore, approximately 190,000 international tourists should have arrived in Ghana in 2015 to spend their holidays in the country. The vast majority of these arrived by plane in Accra and will spend their time in the triangle of Accra – Kumasi – Cape Coast, which forms the core of tourism development and activity within Ghana (Ghana Tourism Authority, 2011).

The Atewa Range Forest Reserve lies within this triangle and is located close to the main route between Accra and Kumasi. Therefore, it has the ideal starting position to attract a large amount of domestic and international tourists. Furthermore, its location allows for daytrips from or to the Ada Foah Bird Sanctuary and the Akosombo Dam. Assuming that the reserve adopts a similar entrance fee structure as the one in the Kakum National Park, the Atewa Range Forest Reserve could generate approximate revenues of US\$443,750 from 100,000 visitors per year (compared to 160,000 visitors to Kakum National Park; (Table 7).

Additionally, tourist expenditures are a potential source of income that stimulates alternative livelihoods for the local communities around the Forest Reserve. If available, tourists are likely to spend money on souvenirs, food and beverages, accommodation and transport. This means that tourism can contribute significantly to the local economy in the Atewa Range. According to the Ministry of Tourism (2012), international tourists spend on average US\$144 per day while in Ghana. For the Cost-Benefit Analysis (CBA) it is assumed that this value will be half for international children (US\$72). It is also assumed that both domestic and international tourists stay on average 1.5 days in the Atewa Range. This will result in maximum potential tourist expenditures of US\$5.4 million per year.

Table 8 Potential Revenue from domestic and international tourism in the Atewa Range Forest Reserve area

	Visitors per year*		Entrance fee (US\$)	Revenue (US\$/year)
	Number	%**		
Ghanaian adults	15,000	15%	5	75,000
Ghanaian children	55,000	55%	1.25	68,750
International adults	20,000	20%	12.5	250,000
International children	10,000	10%	5	50,000
Total revenue entry fees	100,000	100%		443,750
Maximum potential tourist expenditures				5,400,000

* Assuming a third of the domestic and international visitors would visit the Atewa Range.

** Tourism Statistical Factsheet.

Spiritual value of the Atewa Forest

In 2014, a survey applied to 100 people from 10 different communities in the surroundings of the Atewa Range reflected part of the value described above. These results showed that at least 15% of the respondents carried out spiritual activities in the Atewa Forest (Ansah, 2014). People interviewed in these communities acknowledged a close spiritual and cultural connection with the forest. For them, the forest was perceived as the home of their ancestors. Parts of the forest were coherently described as sacred groves and burial places, whilst others were designated as palaces of the chief.

Since the vast spiritual significance of the Atewa Forest might be linked to complex and ancestral interrelations between people and nature, a monetary valuation does not represent a suitable approach to capture the full extent of this value.

Estimated economic value of gold mining

Assuming that the concentration of gold is similar across the entire gold reserve, it is estimated that this mined area relates to roughly 6% of the entire gold reserve. Considering that mining has been going on since 2010, this implies that on average 130 kg of pure gold has been harvested per year over the past 5 years.

For the cost-benefit analysis, the average gold price over the last 10 years is used to estimate the value of gold mining activities. Given an average gold price of US\$1,081 per Oz between 2005 and 2015², the average gross revenue results in US\$4.9 million per year. Costs of the current annual production amount to US\$1.9 million for labour and US\$0.8 million for capital and energy (Xtra Gold, 2006). The above implies an average net-revenue (before taxes) of US\$2.2 million per year for the gold production in the Atewa Range for the past 5 years (Table 9).

National estimates for Ghana indicate that roughly 35% of the gold production in Ghana is illegal or unregulated (Ghana Chamber of Mines, 2014). If this is representative of the situation in the Atewa Range, the total value of illegally mined gold would amount to US\$1.4 million (35% of the value used in the cost-benefit analysis), while the remaining benefits from legal gold production would amount to approximately US\$2.7 million (Table 9).

Table 9 Estimated economic value of annual gold production in the Atewa Range

Annual Gold production (Oz)	4,560
Average price/OZ from 2005-2015 (US\$)	\$1,080
Average industrial revenue per year (US\$)	\$4,929,000
Annual capital costs for the mining industry (US\$)	\$790,000
Annual wages in the mining industry (US\$)	\$1,935,000
Average annual profit of the mining industry (US\$)	\$2,203,000
Value of gold mining used in the cost-benefit analysis in chapter 6 (wages + Average profit)	\$4,138,000

² Source: Kitco (2016), retrieved: http://www.kitco.com/scripts/hist_charts/yearly_graphs.plx

% of gold illegal and unregulated production (i.e. small scale)	35%
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Estimated economic value of bauxite mining

Although only exploratory mining activities have been conducted in the Atewa Range, the idea of developing a bauxite mining site has been present for a long time. Since the first study by Patterson in the late 1960s (Patterson, 1967) various studies have been conducted to estimate the size of the entire Bauxite reserve, which is mainly located in the Forest Reserve area provides an overview of the different studies and the average of their estimates: 142.4 million tonnes of bauxite. According to results of exploratory drilling, the bauxite has an average grade of 44% Alumina (Al_2O_3).

In order to create a lucrative aluminium industry, however, just mining the bauxite will not be sufficient. Large investments need to be made to construct a refinery to produce alumina from the bauxite ore using the Bayer Process, after which the alumina will be smelted to aluminium using the Hall-Heroult process. According to the Minerals Commission (2006), investments for a production plant that will be able to process 600,000 tonnes of bauxite on an annual basis would amount to around US\$433 million. This would result in 132,000 tonnes of aluminium per year. Based on a global average, variable costs for the entire process (mine to the final product aluminium) amount to US\$1,275 for a ton of aluminium³. As this is an energy intensive process, the biggest costs category is energy.

The selling price of bauxite has been quite constant in the last few years between US\$1,500 and US\$1,600 per metric tonne⁴. This implies an added value of US\$275 per metric tonne of aluminium produced. With a capacity of 600,000 tonnes of bauxite, this would result in an annual net value of US\$36.3 million (excluding investment costs). This means that it will take almost 12 years to recoup the initial investment (US\$433 million) of an alumina production plant. However, the cost of mitigating environmental degradation, loss of reliable sources of water supply and the loss of the forest products and other benefits to the communities, when taken into consideration, far outweigh the benefits to be derived from the bauxite exploitation

Trends in the Densu Basin

The Densu River belongs to the coastal river system of Ghana and is one of the two main sources of water supply for the Accra urban area. The river takes its source from the Atewa Range and flows from its upstream section eastwards to the Akwadum-Koforidua area, from where it gradually changes its course and flows in southern direction past the town of Nsawam into the Weija Reservoir, which was created for water provision and irrigation. Within the 2,600 km² of the Densu River Basin, including part of the Atewa Range, the comparison of available land-cover data indicates a change in forest canopy cover in the past 20 years. Whereas 65% of the basin used to be covered by closed-canopy forest in 1990, only 20% of forest with this type of canopy cover remained in 2010.

³ Information retrieved April 2016: <http://aluminuminsider.com/global-aluminum-smelters-production-costs-on-decline/>

⁴ Information retrieved April 2016: <http://www.infomine.com/investment/metal-prices/aluminum/all/>

Between 1990 and 2000 the decrease in closed canopy forest coincided with an increase in open-canopy forest cover. Between 2000 and 2010, the closed-canopy forest area remained relatively unchanged, but the built up, bare and herbaceous landscapes increased at the expense of the open-canopy forest. It is likely that this development is caused by the increase in population, urbanization (reflected in the built up cover) and increase in agricultural activities (reflected in the herbaceous cover) within the Densu Basin in this period.

The loss of part of the vegetation cover in the Atewa Range might slightly increase the annual water availability in the Densu River, this situation would also determine a higher variability in the water discharge, which in turn would lead to a higher probability of facing droughts and floods. Furthermore, despite the uncertainty of quantitative change in downstream effects, it is almost certain that households and industries downstream will be negatively affected by an increase in pollution and sediment in the water bodies in scenarios with intensive and extractive activities in the buffer zone (Scenarios 1, 2 and 4). Decreased water quality in these scenarios will potentially affect the provision of fresh water, increase health costs and worsen the burden of water from other sources (e.g. sachet).

Benefits from downstream fisheries, microclimate regulation and genetic diversity are not included in the analysis due to a lack of data. However, as these ecosystem services also depend on a healthy Atewa Range and would be negatively affected by deforestation, additional data would most certainly confirm Scenario 3 (National Park and supporting buffer zone) as the option with the highest long-term value. In terms of beneficiaries, the CBA revealed substantial differences in benefits between the up- and down-stream areas in the different scenarios. On the one hand, conservation efforts upstream have consequences for the livelihoods of fringe communities, which currently benefit mainly from extractive land use activities. On the other hand, downstream beneficiaries would be negatively affected if intensive and extractive activities took place upstream in the Atewa Range.

Mid-stream area: agricultural land in the Densu Basin

The midstream area includes part of the lower areas of the Atewa Range and the agricultural lands downstream. In the Densu Basin, the downstream area extends southwards, from the buffer zone towards the Weija Lake. Water for agriculture is valued at approximately US\$1.2 million per year in the Densu Basin and US\$3.1 million per year if benefits in the Ayensu and Birim basins are also included through extrapolation.

Value of agricultural produce

The agricultural value is estimated as the product of the agricultural produce and the local price of each crop. Prices of cocoa and other crops for the period 1991-2011 in Ghana are obtained from the database of average annual prices available on FAOSTAT (2016), and also from local information provided by the West Akim and East Akim District Agricultural Officers of the Ministry of Food & Agriculture.

Additionally, the net producer income is obtained by subtracting costs of production from the total value of the agricultural produce. Costs of production are found in external sources for maize (NAFCO, 2012), rice (NAFCO, 2012), yam (Osei-Adu *et al.*, 2016) and cocoa (Yahaya

et al., 2015), either as an absolute value or as a percentage of the producer price. Since no information could be obtained for cassava and cocoyam, the costs of production are estimated as a percentage of the producer price, based on the average for other crops in the area.

Table 10 presents the prices used in the analysis, the agricultural value in the irrigated and floodplain areas, the costs of production and the net agricultural income that depends on water from the Densu River.

Table 10 Value of annual agricultural produce that depends on water from the Densu River

Crop	Price (US\$/tonne)	Total (gross) value of agricultural produce (US\$/year)		Costs of production (US\$/tonne)	Net income (US\$/year)*
		Irrigated*	Floodplain*		
Maize	\$252	\$34,000	\$216,000	\$152	\$99,000
Rice	\$467	\$6,000	\$35,000	\$223	\$21,000
Cassava	\$100	\$133,000	\$841,000	\$60	\$391,000
Yam	\$300	\$99,000	\$629,000	\$198	\$248,000
Cocoyam	\$234	\$46,000	\$290,000	\$140	\$135,000
Plantain	\$263	\$99,000	\$626,000	\$157	\$291,000
Cocoa	\$845	\$-	\$158,000	\$553	\$54,000
Total	-	\$417,000	\$2,795,000		\$1,240,000

* The results are rounded to the nearest thousand.

Value of water for agriculture

Since the length of the Ayensu River is equivalent to the Densu River and the Birim River corresponds to approximately half this length, the total value of water for agriculture could potentially be around 2.5 times as large as the value calculated in the Densu Basin, being thus estimated at US\$3,100,349 per year.

Downstream area: Accra

For this basin, the benefits from water for consumption amount to US\$21.3 million per year. In the final step of the calculations, this estimation is extrapolated to the Ayensu and Birim basins with the purpose of providing an approximation to the full extent of benefits obtained from water transported from the Atewa Range to downstream water users. The total value of water, including this extrapolation, is thus estimated at approximately US\$25.1 million per year.

In addition to the water provisioning service for urban areas, this section also examines the existence value (i.e. non-use value) of the Atewa Forest for the citizens of Accra.

Water for consumption. According to data from the Water Resources Commission (WRC, 2007), approximately 211 million litres of water are daily abstracted in the Densu Basin for urban water supply. Deducting water losses of about 27%, the available amount for urban water supply results in approximately 154 million litres per day (GA CMA, 2014; GA SMA, 2014; GA WMA, 2014).

Available information about approved rates by the Ghana Water Company (GWC) from June 2014 (GA CMA, 2014) is used for obtaining the total expenditure in urban water services, including domestic and industrial users. Based on the previous rates, the yearly expenditure on water from the Densu River represents approximately US\$8.7 million for the industrial sector and US\$16 million for domestic users in urban areas

Willingness to pay for the supply of drinking water from the Atewa Forest

The willingness to pay for the protection of the Atewa Forest and the Densu River, and thereby the supply of drinking water to Accra, is investigated through a household survey conducted in the period from February to June 2015.

The average willingness to pay of respondents that answered yes to the previous question was US\$2.8 on top of the monthly water bill. The resulting total willingness to pay (or consumer surplus) when these figures are extrapolated to the total number of households that use water from the Densu River for consumption (i.e. 266,969). This figure is estimated at around US\$5.5 million per year by assuming that approximately 60% of the total households is willing to pay for the protection of the Atewa Forest for water provision.

Economic value of water for consumption

The total economic value of the current supply of water from the Densu River for human consumption includes the economic value for domestic and industrial use, and the consumer surplus expressed in the willingness to pay an additional amount on top of the household water bill. Based on the previous results, the total economic value of surface water from the Densu River for water consumption is estimated at approximately US\$21.3 million per year

Non-use or existence value of the Atewa Range

Biodiversity is generally valued by an international audience (MEA, 2005). Various Ghanaian and international organizations spend resources to protect the existence of unique Atewa Forest ecosystem in line with the Convention on Biological Diversity (CBD). Furthermore, this ecosystem provides habitat to many endangered species that are listed on the IUCN red list or are otherwise recognized for its. International sponsors supply funding to protect this ecosystem because of their motivation to conserve biodiversity. However, it remains impossible to estimate this value in monetary terms, since the total amount spent in the conservation of the Forest Reserve is unknown.

Overall conclusion

In this study, the effects of four different land use scenarios in the Atewa Range were investigated by assessing changes in the value of ecosystem services. The results of an 'extended' cost-benefit analysis indicate that increasing protection in the existing Forest Reserve and managing a buffer zone around it more sustainably (Scenario 3) would yield the highest benefits for the people that depend on the Atewa Forest and the Densu, Ayensu and Birim rivers.

These results revealed that a shift from the business as usual approach towards additional conservation efforts in the entire Atewa Range has the potential to provide economic benefits and protect cultural values for various stakeholders. In monetary terms, only the conditions provided by the National Park and the supporting buffer zone (Scenario 3) would lead to an increasing trend in the annual net value. Furthermore, this setting would offer the highest net present value over a 30-year period and by far the highest annual value by the end of this period.

Also in terms of non-monetary values Scenario 3 seems more favourable than the other options analysed. The implementation of the National Park would strengthen the protection of culturally significant areas, while additional management efforts in the buffer zone would ensure that traditional activities of local communities continue to develop in a sustainable manner. At the same time, these conservation efforts would protect the existence value that the Atewa Forest has for people in other areas of Ghana and for the international community.

In addition to the monetary and non-monetary benefits described, Scenario 3 has the potential to create jobs in the tourism sector and for the management of the National Park. In this scenario, the new status of the area would bring multiple local benefits such as new opportunities for the local economy, for awareness raising and education, and for the local livelihoods.

In contrast to the conditions offered in Scenario 3 (National Park and supporting buffer zone), the cost-benefit analysis suggests that the total value of ecosystem services would steadily depreciate if unsustainable practices remained in place. In fact, Scenarios 1 (business as usual), 2 (National Park) and 4 (complete degradation) all face decreasing benefits in the long run due to the maintained extractive activities in the buffer zone. In scenarios 1 (business as usual) and 2 (National Park), forest degrading practices in the Forest Reserve and/or the buffer zone hamper the implementation a sustainable solution for the management of the Atewa Range in the long run. Bauxite mining in Scenario 4 yields benefits to mining companies that, although will continue over a long time span, would be lower than the benefits to the entire society offered by ecosystem services in the other scenarios.

Although the hydrological model has shown that losing part of the vegetation cover in the Atewa Range might slightly increase the annual water availability in the Densu River, this situation would also determine a higher variability in the water discharge, which in turn would lead to a higher probability of facing droughts and floods and water available in forms that cannot be utilized. Furthermore, despite the uncertainty of quantitative change in downstream effects, it is almost certain that households and industries downstream will be negatively affected by an increase in pollution and sediment in the water bodies in scenarios with intensive and extractive activities in the buffer zone (Scenarios 1, 2 and 4). Decreased water quality in these scenarios will potentially affect the provision of fresh water, increase health costs and worsen the burden of water from other sources (e.g. sachet).

It has to be noted that benefits from downstream fisheries, microclimate regulation and genetic diversity are not included in the analysis due to a lack of data. However, as these ecosystem services also depend on a healthy Atewa Range and would be negatively affected by deforestation, additional data would most certainly confirm Scenario 3 (National Park and supporting buffer zone) as the option with the highest long-term value.

In terms of beneficiaries, the CBA revealed substantial differences in benefits between the up- and down-stream areas in the different scenarios. On the one hand, conservation efforts upstream have consequences for the livelihoods of fringe communities, which currently benefit mainly from extractive land use activities. On the other hand, downstream beneficiaries would be negatively affected if intensive and extractive activities took place upstream in the Atewa Range.

The TEEB analysis has attempted to put an economic value on Atewa, the buffer and ecosystem services it delivers. The amount quoted appears to be far lower than the actual value of the reserve due to the difficulty of securing data and/or measuring the value of certain assets. For instance, genetic resources, fisheries and microclimate regulation are not analysed in this study due to lack of data. The analysis could not capture the traditional and cultural practices and attractions due to apparent lack of appropriate methodologies and data. Flood control and erosion control are partly analysed, but available data are insufficient to estimate their monetary value.

The effect of mining on water quality was difficult to assess, though its potential impacts can be very disturbing, even at small quantities. These have not been quantified. The relatively high economic value of Atewa against the lack of adequate data and the inability to determine the actual value of some resources justify the need to upgrade Atewa to a national park and develop its ecotourism potential. While the TEEB analysis enhances the appreciation of the values of the goods and services generated by the Atewa Range Forest Reserve, it is more apparent that their loss will result in unbearable hardships to the local communities as a result of environmental degradation and loss of economic, socio-cultural and ecological benefits.

5.8 Overview of the economic value of ecosystem services from the Atewa Range

[Table 11](#) presents the ecosystem services from the Atewa Range for which a monetary value was calculated. These results encompass the economic value of the current supply of five ecosystem services, potential benefits from tourism, and benefits from gold and (potentially from) bauxite mining.

The total area of supply corresponds to the relevant geographic areas. The upstream area (Forest Reserve and buffer zone) represents the total supply area of: non-timber products, timber products, gold, bauxite (potential) and tourism (potential) benefits. The midstream and downstream areas, on the other hand, receive benefits from water for agriculture and water for consumption. The area of supply of water for agriculture includes the irrigated lands and floodplain areas that extend from the buffer zone to the mid- and downstream stages of the Densu, Ayensu and Birim basins. The supply of water for consumption includes urban residents and industrial users that are situated in the mid- and down-stream areas of the Densu, Ayensu and Birim basins.

Besides the total economic value, [Table 11](#) also presents the economic value per hectare for ecosystem services supplied in the upstream area (i.e. Forest Reserve and buffer zone), where the link between area and the provision of the service is directly observable.

Table 11 Overview of the economic value of the current supply of ecosystem services and other benefits from the Atewa Range

Ecosystem services and other benefits from the Atewa Range	Economic value	
	In the total area of supply (US\$/year)	In one hectare (US\$/ha/year)
Provisioning services		
Non-timber products	\$ 12,390,228	\$ 284
Timber products (legally permitted activities in the buffer zone)	\$ 10,150,000	\$ 1,392
Timber products (illegal timber logging in the Forest Reserve)	\$ 30,481,000	\$ 1,392
Cocoa (farming)	\$ 9,336,000	\$ 253
Water for agriculture*	\$ 3,100,000	n/a
Water for consumption*	\$ 25,100,000	n/a
Cultural services		
Tourism (potential revenues and expenditures)	\$ 5,844,000	n/a
Other goods and services		
Mineral resources		
Gold (legally permitted)	\$ 2,700,000	n/a
Gold (illegal and unregulated)	\$ 1,400,000	n/a
Bauxite (potential net value, excluding investment costs)	\$ 36,300,000	n/a

* The economic value of water for agriculture and consumption includes actual estimates for the Densu Basin and extrapolated values for the Ayensu and Birim basins

From the analysed services, timber products represent the highest economic value per year, with approximately US\$40.6 million, respectively. This value reflects the dependence of local communities on timber for both consumption and sales. It is important to notice, however, that an important part of the timber benefits is illegally, and potentially unsustainably, obtained from the Forest Reserve. For the purpose of this analysis, it is estimated that all the economic benefits obtained from timber harvested in the Forest Reserve correspond to illegal and unregulated activities, which provide approximately US\$30 million per year (75% of the total economic benefits from timber).

Also in the upstream area, cocoa farming in the buffer zone provides additional benefits to local communities that amount to around US\$9.3 million per year. Part of the cocoa production might also come from illegal activities (McCullough *et al.*, 2007), but the available information does not allow to estimate the percentage of these benefits that can be linked to these activities.

The valuation of water for consumption shows that the industrial sector and domestic households in the Densu, Ayensu and Birim basins might obtain combined economic benefits of approximately US\$25 million per year. Furthermore, water for agriculture provides benefits that account for approximately US\$3.1 million per year in the irrigated lands and floodplains of these basins. In addition to the current supply of the ecosystem services described above, the potential for tourism of the Forest Reserve is estimated at approximately US\$5,844,000 from 100,000 visitors.

The combination of profits and wages earned in the gold mining industry sum up to US\$4.1 million per year. According to estimates from the Ghana Chamber of Mines (2014), around 35% of the gold production in the country comes from illegal or unregulated small-scale mining activities. If this is representative of the situation in the Atewa Range, the total value of gold illegally mined would amount to US\$1.4 million. Although bauxite mining has not been developed, the potential annual value of a bauxite mining industry is estimated at US\$36.3 million per year (excluding investments in the alumina refinery). In all these scenarios the cost of mitigation of environmental degradation and loss of socio-economic benefits have not been taken into consideration.

This analysis shows that different discount rates determine some changes in the ranking of NPVs among scenarios. With low discount rates (<7.5%), the scenarios are ranked, from the highest to the lowest NPV, in the following order: Scenario 3 (National Park and supporting buffer zone), Scenario 1 (business as usual), Scenario 4 (complete degradation) and Scenario 2 (National Park). However, if higher discount rates are used, the NPV of Scenario 3 falls to the second position. With a discount rate of 15%, on the other hand, Scenario 2 climbs to the third position, while Scenario 4 becomes the lowest in the ranking of NPV.

5.9 Potential opportunities for conserving Atewa

5.9.1 Biodiversity Offset

In recent times, Atewa has generated a lot of attention among conservation practitioners due to the threats its unique biological resources and watershed and its potential to attract new funding opportunities. A number of recent publications have suggested ways to develop and implement conservation related projects within Atewa in order to maximize the socio-economic and environmental benefits to the global, national and local communities (BBOP, 2012; TBC, 2015)

Some companies operating in the extractive industry in Ghana are required to take steps to mitigate the impacts of their operations on biodiversity. A small portion of Akyem's operations of Newmont Golden Ridge Resources (Newmont) reside in an area of the Ajenjua Bepo Forest reserve. This portion – 74 hectares out of more than 18,000 hectares of forest reserves – has been classified by the Ghanaian Government as a productive forest, which means exploration and mining for mineral deposits is permitted in that portion of the forest. Over the last 14 years, independent scientific experts conducted a number of studies to assess the reserve's biodiversity and environmental importance to ensure necessary management initiatives and plans are in place. Newmont's commitment

to stewardship of the environment and stakeholder engagement informed the decision to compensate for the residual impact of their activities by implementing a biodiversity offset program.

Biodiversity offset is a way to demonstrate that an infrastructure project can be implemented in a manner that results in no net loss and if possible a net gain of biodiversity. BBOP defines biodiversity offsets as “measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people’s use and cultural values associated with biodiversity”. The benefits of the offset to local people may involve the provision of alternative sources of biodiversity resources to replace those affected by the project or to reduce pressure on areas considered of important conservation value. The benefits from the offset package can also include incentive measures such as payments for environmental services.

Many conservation practitioners have identified Atewa as a potential site for the implementation of biodiversity offset to fulfil the obligation of Newmont in particular and other extractive industry operators under the planning system’s mitigation hierarchy. The choice and approval of Atewa as a candidate site will deliver both economic and environmental returns. It will help in the conservation of Atewa, raise it to higher biodiversity value than those being lost. This could be an addition to the current effort at mitigating the threats and improving the conservation status. Before developers contemplate offsets, they should have first sought to avoid and minimise harm to biodiversity (ten Kate, Bishop & Bayon, 2004).

The benefits of an offset program could be fully realized when a forest has an adequate legal protection to secure the offset investments. This should motivate the Government to upgrade Atewa to a national park to allow for the implementation of such initiatives that will enhance the conservation and economic benefits to Ghana.

5.9.2 Community Livelihood Options

Many opportunities abound in the districts that hold a lot of promise for developing the secondary livelihood skills of the local people, helping them to set up their enterprises and managing them successfully. The local communities have demonstrated the willingness to receive skills training for local economic enterprise development.

The districts have organizations that can galvanise a pool of resource persons with the appropriate expertise to offer the requisite training and post training extension support. The organizations include the Business Advisory Centres (BAC) of the National Board for Small Scale industries and the Ministry of Food and Agriculture that has a pool of Agriculture Extension Agents (AEAs). The BAC manages a Rural Enterprise Programme (REP) that provides skills training and set up support to successful trainees and as a result has the necessary experience in setting up the needed structures for training, setting up

of the enterprises and coordinating them, providing value chain support and appropriate market information.

On the other hand, the AEAs have the mandate of providing extension support (in both the traditional and non-traditional agricultural enterprises) to farmers within their various areas of jurisdiction. AEAs as well supply improved planting material free of charge or on very soft terms and are prepared to participate in the relevant livelihood interventions and to do more as required. However, the organizations need to be given the necessary support and motivation to ensure successful enterprises. This is even more important given the fact of the insufficient number of AEAs in the Districts and the need to encourage them to focus some more attention on the trainees/beneficiaries of the enterprise development initiative. Some individual resources persons who are already engaged in some of the enterprise in the districts can also be identified to provide training and offer training support services for the local beneficiaries.

The Municipal and District Assemblies identify strongly with the livelihood enterprises and the need to train local people to create wealth within their areas of jurisdiction. This is evinced by provisions in their respective medium term development plans and hence any appropriate livelihood skills training and development will necessarily court the support of the local government officials.

Ghana Regional Appropriate Technology Industrial Service (GRATIS) Foundation operates in Koforidua in the Eastern Region. This Foundation produces locally customized machinery for agro processing and assists with installation and training of prospective users in their products. It can also help with after sales maintenance.

These initiatives could offer opportunities for addressing the livelihood options of the vast majority of the people within the landscape. Majority of the community members are farmers, producing crops that range from food crops to tree crops such as cocoa. Other economic activities include hairdressing, driving and masonry. However, these activities are done as a supplementary livelihood activity to agriculture because of the low patronage. Enhancing the skills of the existing skill holders will help improve the conduct of business and household incomes. Skill development could focus among other on promotion of best agronomic practices, dry season farming, gari processing, palm oil and cassava chip production. Other potentially viable agro processing opportunities include cassava starch and flour processing, ground nut and soybean processing, cocoa husk processing to support soap making and fruit processing. Rearing of small ruminants, poultry, and piggery as the traditional agriculture ventures of choice. As regards non-traditional enterprises beekeeping and grasscutter rearing are the preferred enterprises by all the communities. These are followed by snail rearing and soap making.

Notwithstanding the challenges that are associated with these enterprises, there are a number of opportunities such as the BAC and REP, which could be harnessed to improve the viability of these enterprises. Additionally, the upgrade of Atewa to a national park and the development of an ecotourism programme could help expand the economic base of the area to improve livelihoods and human wellbeing. This is evidenced by the presence of an existing good environment for successful enterprise growth and development.

The natural capital of the districts or the fringe communities is very conducive for the development and growth of both the traditional and non-traditional agricultural enterprises. These include good arable land, diverse water bodies and good vegetative cover although surface mining is threatening the ecological integrity of these resources and future livelihoods.

The products from the enterprises are such that they can be consumed locally by the communities in times of need. Additionally, many small and large market centres abound within and next to the municipal and district assemblies where the products can be sold. Indications are that a number of restaurants and schools are located within the districts that require the products for use provided they can have fluid and timely supplies. The NBSSI and MoFA officials have committed the institutions to providing the necessary market information and also facilitate and coordinate the requisite supplies.

6.0 The Existing Management System

6.1 Background

The Atewa Range Forest Reserve was constituted in 1925 under the Akyem Abuakwa State Native Authority bye-laws and duly approved on January 5, 1926 under section 40 and 41 of the Native Ordinance. Due to ineffective and improper management under the Native Ordinance, the Governor of the then Gold Coast appointed a Reserve Settlement Commissioner with the intention of reconstituting the reserve under the Forest Ordinance. The Reserve was subsequently gazetted in August 1933 under Section 5 (1) of Cap 63. In October 1935, the Atewa Range Forest Reserve was duly constituted.

The primary objectives for the reservation were to:

- i. protect the headwaters of Birim, Densu, Ayensu and their tributaries;
- ii. maintain a forest cover on the steep slopes of the hills to prevent excessive erosion;
- iii. halt shifting cultivation and extension of the boundaries of existing cocoa farms.

In the early 1960s the Government acquired all rights over an approximate area of 6010 hectares of the reserve by appropriation. The acquired area covers the western limit from Forest Reserve Boundary Pillar (FRBP) 93 through the central portion of the range to compartment 80 and continues in an eastward direction to the midpoint between FRBPs 108 and 110. The Eastern line starts from about 0.8km to FRBP 94 through compartments 12, 15, 25 and 29 to the centre of compartment 49 and continues in a southwards direction to FRBP 104.

Communal Rights to the reserve as given by the Reserve Settlement Commissioner (*Gazettement and Schedules*) was entered as second schedule in the Forest Ordinance. The rights include hunting, fishing, snail collection, fire wood collection, chew-stick (tweapea), cane, raffia and rattan cutting. Some of these rights were unlimited but others were exercisable by obtaining permit from the Forest Officer of the Forestry Department (now Forest Services Division). Other communal rights included access to sacred places and hunting camps in the reserves, farming and washing of gold provided it did not interrupt the course of a river or stream. In addition, 15.425 acres of the reserve was released for food crop farming whilst 697.725 acres was granted for unrestricted farming.

In spite of its diverse use, the Atewa Range Forest Reserve and its extension have not had any documented management plans since gazettment. This notwithstanding, the two reserves remained under Protection Working Circle until recently when some portions were given out for exploitation and plantation development. Little or no silvicultural improvements were carried out in the past, apart from attempts at establishing plantations through the taungya system. Out of a total of 103.8 hectares of taungya plantations established, only about 3.04 hectares were successful. The timber resource in Atewa Range Forest Reserve has been recognized as potentially viable. However, commercial timber extraction has not been a major activity because of its nature and terrain. Nevertheless, between 1966 and 1998, about 5 or 6 contractors were granted concessions to operate inside the reserve by the statutory owner (ABMP, 2007).

The ownership of the Atewa Range Forest Reserve is vested in the President of the Republic

of Ghana in trust of the Akyem Abuakwa Stool (Gazette Supplement 1935, page 1105). By an Act of Parliament (Forestry Commission Act 571 of 1999), the Forestry Commission is charged with the responsibility of protection, development, management and regulation of the forest and wildlife resources of Ghana, of which the Atewa Range Forest Reserve is a part. The Forest Services Division of the Forestry Commission, with its District Forest Office located at Begoro, is directly responsible for the management and protection of the reserve, in collaboration with the Resource Management Support Centre of the Commission and relevant District Assemblies.

Politically, Atewa Range Forest Reserve is controlled by East Akyem District Assembly and West Akyem (Kwaebibirem) District Assembly. Members of the District Assemblies are elected from the various towns and villages, which are grouped into electoral areas. Unit Committees, which are within the various communities, more or less assist the Assembly members within the area in executing their duties. The Akyem Abuakwa Stool is responsible for the management of the various traditional attractions within the reserve, including the sacred groves, the royal mausoleum. The Akyem Abuakwa Traditional Area within which the reserve lies, is surrounded by more than 40 settlements with an estimated population of about 75,0180 (2000 census) (*excluding Adadientam, Awenare and Kobrisu*) (MLF, 2002). These institutions play diverse but coordinated roles to ensure the continued protection of the Atewa reserve.

6.2 Atewa GSBA Management Plan

Under the leadership of the Forestry Commission, the reserve has gone through several changes in designations on the basis of conservation status. It was designated as a Special Biological Protection Area (SBPA) by the Forestry Department in 1994 and classified as a Hill Sanctuary under the Protection Strategy proposals in 1995 (Hawthorne & Abu-Juam, 1995). Through extensive forest inventories carried out in the early '90s, some thirty (30) forest reserves including Atewa, identified as having exceptionally high levels of biological diversity, especially in floral content, were re-designated Globally Significant Biodiversity Areas (GSBAs). The Atewa forest reserve thus became one of the 34 areas designated as Globally Significant Biodiversity Areas (GSBAs) (NRMP, 1999), and among the 36 Important Bird Areas (IBAs) of global significance, declared in Ghana under the Important Bird Area Project implemented by the Ghana Wildlife Society (Ntiamao-Baidu et al, 2001).

It was recognized that management plans were key to the effective management of these biodiversity rich areas. For the first time in the Forestry Commission, Biodiversity Management Plans were developed and formulated through an elaborate process involving all stakeholders; donors, state agencies, NGOs and community groups. These plans were made to fit into the framework of the National Biodiversity Strategy. The Biodiversity Management Plans essentially differed from the conventional forest management plans in terms of structure, processes of implementation and emphasis.

The primary goal of the management prescriptions was to ensure the continued existence and integrity of the Atewa Range Globally Significant Biodiversity Area for the benefit of all segments of society. There are six primary objectives for managing the Atewa GSBA namely to:

Protect and conserve the biological and socio-cultural resources within the GSBA
 Develop its eco-tourism potential
 Ensure optimum flow of benefits to the local people.
 Encourage and promote education and research into the GSBA
 Promote revenue optimization for the management of the GSBA
 Enhance the environmental services such sink for carbon sequestration, protection of soils and water on sustainable basis.

Although the change in management regime from a forest reserve (Protected area Category VI, IUCN) to a national park (Protected Area Category II) would drastically change the legal status, the management framework and the *modus operandi*, it is still relevant to assess the current management framework in order to glean lessons for the new management regime under Atewa national park. Good management is achieved when the individual conditions related to a protected area, are carefully planned, implemented and regularly monitored, leading to changes in management as required.

6.3 Assessment of Management Effectiveness

The assessment of management is based on six elements of the management cycle which gives understanding of how effectively protected areas are being managed. These elements provide the relevant background information needed to plan and implement management and to shape and focus an evaluation on the most important aspects of management. They include:

- **Context** including its values, the threats that it faces and opportunities available, its stakeholders, and the management and political environment;
- **Planning process**: establishing vision, goals, objectives and strategies to conserve values and reduce threats;
- **Inputs** (resources) of staff, money and equipment to work towards the objectives;
- **Actions** according to accepted **processes**; and
- **Outputs** (goods and services, which should usually be outlined in management plans and work plans)
- **Outcomes**, hopefully achieving defined goals and objectives.

Assessments of each of the elements (and the links between them) provide a relatively comprehensive picture of management effectiveness. This kind of evaluation is regarded as having greater 'explanatory power' because it permits examination of the possible links between performance in different parts of the management cycle (for example, what is the influence of budgets or staff numbers on the processes or on outputs of management)

Context: Understanding the context is an essential first step in both the management and the evaluation cycles. Protected areas are established to conserve special values, so understanding these values and their significance at global, national or local scale is vital for both management planning and evaluation. At the same time, it is important to know how secure these values are, what threats they face and about external influences, including stakeholders with a particular emphasis on local communities. Some context elements are

likely to be fairly constant, but others will change over time – for instance some threats may recede while new pressures emerge and this will have major implications for management.

All issues relating to its value, threats, opportunities and stakeholders have been well documented. This is reflected in the management plan of Atewa and It provides the relevant background information and a clear strategy to effect protection. There is also shared information about measures to secure community support through education, capacity building and socio-economic development of the landscape for the long term protection of the reserve. A log frame to address any challenges, which have only become more serious over time was well documented.

Within the current context, the threats posed mainly by human activities including illegal logging, mining and agricultural encroachment have rendered the management strategy ineffective. This has resulted in the adoption of an ad hoc approach including the establishment of ‘Rapid Respond Taskforce’ to address the myriads of threats and secure the remnant forest and the goods and services it provides. The ‘Rapid Response Taskforce’ is a special armed unit to tackle illegal activities in protected areas (forest reserves and parks) of the country.

Planning: A protected area that suffers from fundamental design flaws is unlikely to be ineffective. However, efficiently the managing body operates and regular assessment of the quality of planning therefore underpins much of what follows. It is paramount therefore to consider the design features of a protected area– the physical, legal and institutional factors which determine whether its management will be relatively straightforward or complicated.

The management of Atewa is set within a well-defined policy and institutional framework that acknowledge the relevance of institutional collaboration. The policies of the key institutions including the Minerals Commission, Water Resources Commission and District Assemblies are not well aligned towards the protection of Atewa and this largely accounts for their uncoordinated actions. Externally, local communities and civil society have not been actively involved in the development and management of the reserves. The involvement of all relevant parties in the planning process can help ensure sustainable forest management, minimize costs, create trust, empower local stakeholders and build local capacities. Only with strong stakeholder involvement can an equitable development of the Atewa Range and its downstream river basins be achieved.

Inputs Allocation: Repeated assessments of protected area effectiveness suggest, not surprisingly, that is the level of resources available for management often has a major impact on effectiveness. This is can also be correlated with the relative importance that is attached to the forest by policy makers and other stakeholders. But this is also a difficult and somewhat subjective issue and virtually all managers will claim (and believe) themselves to be under-resourced. A clear and unbiased picture of the inputs available are related to identified gaps and shortfalls (or waste and over-spend if this is occurring) in the management of the reserve. Input assessments investigate the adequacy of resources – human capacity, facilities, information, operational money and equipment – for effective management. Demand for resources cannot be properly estimated without understanding

the objectives of management and the current state of the biological, social and cultural environment (i.e. the context and outcomes).

While the existing structure provides for a collaborative management of Atewa among the key institutions including the district assemblies, there is no defined strategy for covering the cost of managing Atewa. The district offices of FSD receive periodic defined allocation of funds from the Forestry Commission to cover the cost of management and other related activities. Managers have often complained about the inadequacy of funds allocated to them and their inability to secure logistics and human resources for effective day to day management of the park. Managers have therefore made deliberate decisions about which protected areas are managed to 'best practice' standards and which are managed to just acceptable standards. This has been more profound in areas where the forests do not have any additional source of income in the form of collection of fees and other income generating activities. Objective estimation of personnel and resource needs of management can strengthen proposals for funding from government, donors and other sources of support. Information on the extent and adequacy of resources available for management allows changes in staff and resource availability to be monitored and gaps addressed.

Management processes: Even well-planned and supported protected areas need sound management processes if they are to be effective. In the past, many protected areas were managed by people with excellent knowledge of ecology and wildlife but no training in management. This sometimes led to problems as staff numbers increased and expectations were raised. Today, managers are expected to deal with an increasing range of issues, including some – such as community relations, workplace safety and management of sacred sites within protected areas – that have gained a greater emphasis in the last few years. In addition, higher levels of accountability are often expected.

The establishment of benchmarks or best practice guidelines for management can provide a good basis on which to assess management process. Some agencies have defined benchmarks for a wide range of protected area management activities through policies, procedures, manuals and best practice guidelines. These give staff – and evaluators – a very clear idea as to what is expected. Where a protected area or protected area agency has defined its own benchmarks, or has explicitly stated that it follows some more broadly defined guidelines and codes of practice published by organizations such as IUCN, then assessment is made much easier.

Management processes within Atewa may not have kept up with all these changes. There are no records of management effectiveness in dealing with emerging issues even though these illegalities were predicted within the plan. Management process within Atewa is not context based; it originates from the old and obsolete schedules that the Forestry Commission uses in the protection of wildlife. It also follows the same operational measures that forestry staff are supposed to adhere to. The result is that, animals that are not protected now warrant protection due to the level of destruction of their habitat and the decline in their numbers. Secondly, the schedule of fines for forest offences are not deterrent enough and do not correspond to the extent of damage that is done by forest offenders. Some have argued that, this is due to little or no information on the monetary

value of these species especially if it is not known to the law makers. Additionally, interferences from politicians and traditional leaders adversely affect the enforcement of laws governing the protection of wildlife and their habitats.

Presently, the role of local forestry staff has been reduced to protective function with little being done about building community relations and collaborations through information sharing and awareness creation. The absence of clear definition of standards and indicators for measuring current management effectiveness provide justification for a regime change.

Outputs: Outputs are the penultimate part of the assessment – determining if protected area managers and other stakeholders achieved what they set out to do. This has been a common approach in reporting and evaluation of conservation programmes and often forms the core information presented in annual reports and other reviews. This type of information is most useful for evaluation purposes where pre-existing plans, targets or standards have been established against which achievement can be measured – in an ideal situation there will be a management plan or work plan with a clear set of targets that have either succeeded or failed, although in many cases rather more work will be needed to collect this information.

The assessment of outputs looks at the number or level of products and services delivered; and the extent to which stated actions, tasks and strategies were implemented. This information is currently available for the Forestry Commission as a corporate body with lesser emphasis on the individual divisions that make the commission. This is even more difficult for district regional and offices let alone individual forest reserves.

Where evidence of reviews of extent to which outputs have been accomplished exists, these are broad-scale reviews of implementation of planning commitments that are often as a result of donor requirements rather than for institutional planning. This type of output assessment is important in establishing accountability.

The management regime has clearly defined the work programmes and timelines for all stated outputs for its effective implementation. One of the visible activities is the effort at harnessing support for the development of ecotourism around the unique attractions. A review of the reports shows that the ecotourism program is yet to be designed and implemented even though the reserve receives a small number of tourists. The challenge with insufficient staff, logistics, incoherent policies as well as the complex stakeholder interest and needs could be attributed to the inability of managers to develop specific plans for implementing objectives described in the plan. With this investors will not be able to determine their risks, opportunities, and the right level of investment that is need at Atewa. The re-designation of Atewa and the accompanying ecotourism program provide a unique opportunity to enhance the management effectiveness.

Outcomes: Outcome assessment is vitally important because it measures the real effects of management actions: whether management is maintaining the core values for which the protected area was established. Even if other aspects of management are assessed as highly effective, a protected area will fail if it loses its core values (this would suggest that problems beyond the protected area boundaries need to be addressed.) Evaluations of outcome need

to be based upon a clear understanding of what management is aiming to accomplish and what specific values are to be conserved.

Management is explicit on what it seeks to achieve through its clear aim and objectives. However, it does not clearly state its expected outcomes. Nevertheless, at this stage there is little evidence that the plan has achieved considerable outcomes based on the level of reported cases of illegalities, the continual loss of habitat for protected species, and the inability to resource managers to generate resources for the management of the forest reserve. The upgrade of Atewa to a national park would provide the opportunity to achieve effective management of the forest. Management effectiveness of national parks should therefore be of priority to the Forestry Commission and the outcome could provide useful lessons for Atewa national park.

6.4 Associated risk for maintaining the business-as-usual management regime

The management of the reserve is a joint responsibility of the District FSD, RMSC and the relevant local government and community members. These institutions are expected to work in concert to efficiently manage Atewa and the goods and services it provides. While the management role of most of these institutions including the District Assemblies are well articulated within the management plan, there is no evidence of any effective collaboration to address the threats and management challenges of Atewa. Indeed, the management of Atewa and its ecosystem services are not reflected in the MTDP of the District Assemblies which guide the development pattern of the districts. Notwithstanding its ecological importance, safeguarding Atewa is not given prominence within the development plans of the district and the allied institutions.

Cultural heritage values and objectives relate to both material culture (art sites, buildings, traditional roads and pathways etc.) and non-material aspects such as people's connections to land, ceremonies, stories, songs, dances and ways of life. Of particular importance to local and Indigenous communities are the recognition and maintenance of traditional rights and land tenure, the existence of effective dispute resolution mechanisms, involvement in management decision-making processes, and the incorporation of traditional ecological knowledge into planning. There is little evidence of an effective integration of the traditional conservation management system into the existing management arrangement. If a primary conservation objective is to conserve the key values and incorporate traditional system into management regimes, then it will be very useful for a new management regime to be put in place through the upgrade of Atewa.

The absence of a comprehensive management regime is the source of the lack of commitment on the part of the various institutions resulting many illegal and unregulated activities. It is thus likely that the lack of control over these activities, together with changes in the water regime, will have negative effects on regulating ecosystem services such as flood and drought mitigation in downstream areas. Furthermore, forest degradation, land-cover change, and hunting are expected to have a negative impact on spiritual and existence values associated to the biodiversity of the Atewa Range.

A recent analysis of stakeholders within the Atewa landscape revealed a number of obstacles that need to be addressed to make these public sector institutions more effective in forest management. Inadequate funding and weak capacity of staff posed great challenges to continued protection of the reserve. The local government authorities and the FSD that are supposed to enforce environmental byelaws seem helpless and incapable of ensuring observance of good environmental ethics and practices. Maintenance of this regime could further worsen the ecological state of Atewa. Bearing in mind that FSD Atewa has not been generating formal benefits since 1993 when logging was banned, it looks as if, despite the management regime that places emphasis on the importance of conservation, management ambitions have been reducing as a consequence little impact and limited presence of FSD is found on the ground.

While the area still receives a number of tourists, some elements of the proposed ecotourism destination such as the wildlife habitat are under threats from illegal activities. Tourism depends on cultural, historical heritage and intact natural resources and requires good governance. It requires a national park status, land use planning and sustainable landscapes, with a management regime that could effectively address the threats and challenges. Unless these illegal activities are curtailed through re-designation of Atewa, the reserve risks losing significant portions of its tourism attractions and tourists. There is an urgent need to reverse these negative trends through the conversion of the status of the reserve into a national park to allow for effective protection and the development of an ecotourism programme.

Agriculture is one of the major threats to the ecological health of Atewa. While admitted farms have expanded beyond the legal limits, farmers within the buffer have also carved out portions of the reserve for crop production. Additionally, illegal lumbering (chainsawing) and small scale surface mining (galamsay) and other short term “fast money making enterprises” that are carried out in and outside of the Atewa Forest Reserve represent an unrelenting assault on the natural capital of the area and probably rendering the future bleak as no visible investments are being done with proceeds from these activities to secure the future. Unfortunately, the regulatory authorities appear helpless in ensuring that the appropriate measures are taken to restore and protect the land. A business as usual practice could result in total eradication of the forest in few decades. The positive attitude displayed by communities towards the ecotourism project and the upgrade of Atewa should provide the relevant motivation to explore livelihood opportunities for the communities.

The current management arrangement generates little financial and logistic support for protection of Atewa. Until ecotourism and related activities, biodiversity offsets and other sustainable income generating activities are developed to generate additional resources through the national park concept, the reserve risks losing its current ecological health to the diverse illegal activities. The re-designation of Atewa to a national park and the development of a new management strategy could not have come at any better time.

7.0 Proposed management strategy

Protected areas management worldwide have had a shift from the business-as usual scenario towards ensuring effective and sustainable management and securing sufficient financial resources to be able to provide benefits and fulfil their role in biodiversity conservation. Traditionally, protected areas have been managed by government agencies and thus tend to rely mostly exclusively on government coffers, taxes and fees collected from people and industry extracting resources from the forest. This has however been ineffective since funding for forestry issues would have to compete with pressing demands from other sectors such as education, infrastructure, and health.

There is a need to change the present institutional arrangement for the management of protected areas in Ghana. New models are emerging where voluntary organizations are supporting with protected areas management. Even though such arrangement will offer greater flexibility and be more innovative, it does not ensure a sustainable financial pathway for protected areas management.

In the current context, a business approach is being advocated for where a logical and more practical business plan is included in the traditional management planning scheme that is currently being implemented by the Forestry Commission described in the Manual of Procedures for Forest Resource Management Planning in the High Forest Zone of Ghana. Achieving sustainable financing of Atewa as a National Park requires the identification of financial sources (both private and public sources) and opportunities and to match these with the financial requirements of the park.

7.1 Assessment of proposed management regime

A new and improved management strategy for the proposed Atewa National Park is being proposed. The aim is to improve management effectiveness at Atewa, thereby promoting biodiversity conservation, social benefits and economic gains to fringe communities. This will promote good management since it will give a thorough understanding of the practical conditions at Atewa. Based on this, the plans will be developed and implemented at Atewa with regular monitoring, leading to changes as it may require.

The first step will be to understand the context in which the protected area exists. Information from previous studies and more recently the Atewa TEEB will aid in this analysis. A SWOT approach where the internal and external variables that are likely to affect the proposed management regime is documented and assessed. These variables are also taken into account in the formulation of planning strategies for Atewa.

Table 12 SWOT Analysis of Atewa

	Positive	Negative
Internal	<p>Strengths</p> <p>S1. High diversity and species of conservation interest</p> <p>S2. Unique ecosystem for watershed protection and scenery</p> <p>S3. Acceptance of importance of conservation by local people</p> <p>S4. Sustainable financial mechanism for park activities</p>	<p>Weakness</p> <p>W1. Large mineral deposits</p> <p>W2. Inadequate community participation in resource management and protection</p> <p>W3. Inadequate community awareness on conservation issues</p>
External	<p>Opportunities</p> <p>O1. Local people's interest to participate in management</p> <p>O2. Support of traditional authorities for conservation activities</p> <p>O3. Ecotourism potential and attraction (major feature in tourism circuit in Eastern Region)</p> <p>O4. High potential as an ecological research facility</p> <p>O5. People's interest in alternative livelihoods</p>	<p>Threats</p> <p>T1. Dependency of local people on forest resources</p> <p>T2. Presence of Illegal forest users (farms, poachers, chainsaw operators, gamamsey operators, etc.)</p> <p>T3. Incompatible land uses along forest fringes</p>

7.2 The Aim, Goals and Objectives of the proposed management regime.

Aim: To protect the ecological integrity of the natural processes at Atewa with special reference to the watershed protection function of the forest and other supporting environmental process, and promote education and ecotourism.

Primary Objectives:

1. To manage Atewa in order to preserve, its natural state as possible, representative examples of the High Forest Zone (HFZ), its biotic communities, genetic resources and unimpaired natural processes;
2. To maintain viable and ecologically functional populations and assemblages of native species at densities sufficient to conserve ecosystem integrity and resilience in the long term;
3. To contribute to national development and local livelihood support by developing the ecotourism potential of Atewa. This should be done through the efficient management of visitor use for inspirational, educational, cultural and recreational purposes at a magnitude that will not cause significant biological or ecological degradation to the natural resources;
4. To take into account the needs of fringe communities, including subsistence resource use, in so far as these will not adversely affect the primary management objective;

Based on these primary objectives, operational objectives, prescriptions will be outlined through a strategic stakeholder consultation process. A management plan will subsequently be developed for Atewa National Park through a consultative and iterative process. This plan will cover the entire protected area and the associated buffer that will be considered. The management plan will be accompanied by the following plans:

- Operational Plan- This include detailed information on how and when specific management actions will be carried out. An operational plan for Atewa is important due to the complex nature of stakeholders involved in the day to day management of the protected area. It is expected that the operational plan for Atewa will be short-term, preferably annual, and will be renewed based on information gathered during monitoring.
- Corporate Plan-This explains and documents how the Atewa management structure will interact with the overall management structure of the Wildlife Division and the Forestry Commission as whole. It will include inputs from the budget allocation, workplan, and key performance indicators the sector (Ministry for Lands and Natural Resources) has set and also that of the Forestry Commission.
- Business Plan- It is expected that private equity will be sort to give Atewa a sustainable financial mechanism. This can only materialize if there are a robust business plan detailing goods and services, marketing and implementation strategy for Atewa.
- Park Infrastructure Development Plan: Location accommodation park protection staff, offices and related visitor use facilities.

7.3 Governance (Proposed Management Structure)

Underlying several elements of the changing perspective on protected areas is a new concern for social equity in conservation. This is driven by practical considerations (in many circumstances conservation cannot and will not happen without the support of the relevant communities) but also widely shared ethical and moral concerns.

Governance, the means for achieving direction, control, and coordination, determines the effectiveness of management. There is much diversity and scope in the governance models employed to deliver parks, recreation, and tourism (PRT) services. Currently there are five models that are being implemented worldwide- fully public, public utility, outsourcing, private, non-profit ownership, and private for profit ownership. In recent times a mix of these models are being implemented in response to developing issues and trends in PA management.

7.4 Integrated Management System

An integrated system of governance is being proposed for Atewa. Under this system, Government through Article 157, of the 1992 Constitution will hold in trust the Atewa National park for the people with a split of management between public and for-profit private organizations, under the current public-private-partnership programme of the country and a split of finance between taxes and user fees. This is already being implemented by the Wildlife Division in Mole National Park, Kakum National Park and the proposed Accra Eco-Park Project.

The split in management between public and identified for-profit private entities with proven track records, typically involves public management of resources and private management of tourism services. Simply put, the management of resources is paid for by taxes, while the private management of tourism is paid for by user fees. However, the

financial lines are often blurred with some income from taxes going into tourism management and some tourism income going to resource management.

The governance system being proposed should carry the consensus of majority of the stakeholders and more especially public participation. The general public, more especially local people should own the initiative and participate fully. If this is not secured, there is bound to be conflicts between management and local people which could lead to confrontations between communities and visitors to the park.

Governance should also be geared towards achieving the strategic vision, and objectives including human development and historical, cultural and social complexities that exists at Atewa. Management should be responsive to stakeholders and effective in undertaking activities spelt out in the management plan. Accountability is key and encourages people's involvement in park management. The rule of law, equity and transparency should all prevail and must be expressed in the day-to-day activities of the park.

7.5 Finance

Various policies, strategies and agreements are in place, at global, regional and national levels, which underline the need for and importance of funding PAs. Many countries have ratified international conventions which set the basis for protected areas and biodiversity conservation, and as such are obliged to abide by their provisions. Almost all of these conventions call in some way for Contracting Parties to allocate funds to biodiversity.

Traditionally, PAs have been funded with funds from the Government of Ghana, international and local conservation and funding agencies and sometimes supported by funds from the international community and private companies. But these sources especially from government allocations have not been adequate due to competing demands from other sectors (healthcare, infrastructure, etc.).

The following financing model for Atewa should be mostly business-based and should exhibit the following characteristics:

- *Diverse Source of Income*: it is important that a number of sources are identified for funding activities at Atewa. These sources should come to compliment what government is already providing. Sources of funding would be diverse, stable and secure at least to the medium term. This will minimize risks and fluctuations that could delays activities at Atewa. To compliment government sources of income, research activities could be financed by the international community, donor agencies, for long term research that is prioritized by the country.
- *Improving Financial administration*: This is to ensure that there is value for money and funds allocated are spent on exactly what they are supposed to be used for. To ensure this, Atewa's finances should be done in an inclusive manner, transparent and data available for verification by all. This increases credibility and gives private donors the edge to finance activities of the park.
- *Balancing Costs and benefits*: planning should take a comprehensive view of costs and benefits: covering the full range of PA costs, ensuring that those who bear PA costs are recognized and adequately compensated, and that those

who benefit from PAs make a fair contribution to their maintenance. It also means that those who cause environmental degradation should also be made to pay for the cost of restoration or mitigation

- Capacity Building and Mainstreaming: Mainstreaming and building capacity to use financial tools, management and collaborative mechanisms: factoring financial analysis and mechanisms into PA planning processes.

PA funding should be judged not just in terms of its quantity, but also its quality. Financing plans and funding mechanisms can help address a variety of PA management challenges. In line with this focus on strengthening management effectiveness, this document argues that PA financial sustainability is the capacity to secure stable and sufficient long-term financial resources, and to allocate them in a timely manner and appropriate form, to cover the full costs of PAs (both direct and indirect) and to ensure that PAs are managed effectively and efficiently with respect to conservation and other objectives. The adoption of sound business principles and financial plans is an essential part of this process. Atewa stands the opportunity to showcase an innovative financing mechanism that can fill the funding gap in PA management in Ghana.

8.0 Risk and Opportunity Assessment

8.1 Environmental Risks

Risks identified and discussed here are based on review of existing information on the biodiversity and ecosystem functions of Atewa. This has been complimented with forecasts of changes in biodiversity and ecosystem dynamics, function, and structure that persists now and likely to occur within the next 20 years highlighted by the TEEB result.

Documents including management plans, reports of surveys, and monitoring data were reviewed. This information consists of already existing information that has been synthesized during the desktop review and confirmed with expert/ stakeholder interviews and field visits. These assessments are hierarchical and examines a broad range of issues affecting biodiversity and the natural environment in broad terms. It also takes into consideration the interactions between the natural environment and people that depend on it.

Atewa lies in the moist semi-deciduous forest zone of Ghana together with much of Ghana' prime forests (High forest Zone of Ghana). This area is threatened by agricultural expansion particularly cocoa production.

Specifically, the following risks have been identified:

1. **Higher protection status:** Ghana follows the IUCN Protected Areas Categories System for the classification of reserved lands. Under this system, protected areas are classified according to their management objectives. These categories are recognised by international bodies such as the United Nations and by many national governments as the global standard for defining and recording protected areas and as such are increasingly being incorporated into government legislation. There are other designations/categories that are only nationally recognized. These include the numerous traditional conservation areas such as sacred groves other community initiatives that are contributing significantly to biodiversity conservation in Ghana. Atewa qualifies to be a national park as it meets the criteria set by the IUCN for the application of such a management category. The change in management regime of Atewa from a protected area with a GSBA to a National Park will have both financial and management implications.

By law, the Wildlife Division of the FC is responsible for all national parks in Ghana. Even though their system of day to day management of the park have been acclaimed as superior to other management styles, it has implications of logistics, human resources and increased restrictions to the removal of forest resources by communities. Rangers and Wildlife Guards will have to be employed to beef-up the number of guards at the park. There will also be the need to provide these guards with ammunitions and protective clothing. More camps will have to setup at flash point communities where forest offences and offenders are common. There are financial implications to this as the park is currently not generating enough income to finance these huge and recurrent expenses.

Since the main objective of a national park will be to protect natural biodiversity along with its underlying ecological structure and supporting environmental

processes, and to promote education and recreation, there will be added restrictions to where local communities can access and the magnitude of NTFPs that could be harvested from the park. There will be confrontation between park staff and communities if adequate education and awareness creation is not done. The incorporation of community spiritual linkages in management planning is key to further reduce any conflicts between community members and park authorities.

2. **Commercial Mining Interest:** Over the years, there have been many prospecting and exploration projects by different companies including ALCOA (Aluminium Corporation of America) in 2006. In March 2011, Vimetco Ghana (Bauxite) Ltd., a 100% owned subsidiary of Vimetco N.V., (an international industrial group that focuses on the aluminium industry) obtained several prospecting licenses in Ghana. Based on these, they expect to receive exclusive rights for bauxite mining at Atewa Forest Reserve Tano Offin Forest Reserve, with a total area of 468.66km² for the period of more than 50 years.

Vimetco and other commercial mining entities that have mining interest in Atewa have been able to come up with market values of the bauxite and other minerals that is in Atewa. These values are pleasing to political leaders who may be looking for economic development opportunities to satisfy the local people and also win their commitment by approving mining at Atewa. Until recently, natural heritage advocates have failed to present convincing estimates of the value of any protected area, and have also tried to put an argument for the conservation rather than mining/development of these forests. Even though the Atewa TEEB is a first step, the next has to be financial analysis of the needed investments in Atewa and how much and when these investments will be reaped.

3. **Artisanal Mining (Galamsey):** Artisanal mining, popularly called *Galamsey*, is a very important income earning activity throughout the districts that border Atewa. Virtually all of the gold mining is focused on alluvial occurrences in river valleys, especially the upper reaches of the Birim River, just downstream from Kibi. These small-scale mining activities by unlicensed individuals and groups are increasing and causing serious problems like water pollution, food contamination, abandoned traditional farming systems and land management practices for local communities. Most affected is the Birim River which suffers from pervasive sediment loading. There is also extensive, legal, small-scale mining along some of the major valleys such as the Suhen and Emuo (also Amaw) rivers, on the South-western side of the Range.

With the change in management regime of Atewa into a National Park, there will be stricter regulations on the kind of activity that could be undertaken in the park and its fringes. There is bound to be confrontation between these illegal miners and park staff since these illegal miners will feel their livelihoods have been taken away from them. These kind of conflicts have occurred in other places and sometimes led to the loss of lives and as such should be managed very well.

With the flushing out of illegal activities out of the park and its fringes, there is a possibility of people engaged in these illegal activities relocating to other places around Atewa. This if not mitigated will result in a net effect of zero or the transfer of illegal activities to other places. Alternative livelihood programs should be developed and implemented to target these people so that illegal activities are not relocated to other reserves.

Lands that fringe most forest reserves are privately managed with no interference from government. This becomes a challenge if a new buffer is to be created. The bigger the buffer the more difficult it is to maintain. Nevertheless, lessons could be drawn from the Kakum experience where through the interventions of Conservation Alliance and its partners the boundaries of the park have been secured through the promotion of sustainable cocoa production. Through this project over 23km² of cocoa agroforestry plantations have been established and over 2500 farmers engaged.

4. **Agricultural Encroachment:** The Reserve is under constant threat of illegal farming. Within the reserve are farms which were admitted when the reserve was created, but some of these farms are being expanded, and new farms are being established within the reserve boundaries, leading to additional habitat degradation. Since these farms have not been monitored and surveyed over the years they continue to expand and invite people from outside (especially migrants) to come in to farm. The designation of Atewa will require that legal boundaries of the admitted farms are either maintained or the farms are relocated. This could result in serious confrontation between management and community members.
5. **Bushmeat Trade:** Ghana's largest roadside bushmeat market is at Anyinam, at the fringe of the Atewa, where bushmeat is sold throughout the year. A 2001 bushmeat market survey conducted Conservation International and partners, targeting Accra and Kumasi, indicated that a large percentage of the bushmeat comes from Atewa. Hunters are known to use guns, poisonous chemicals, traps and fire, targeting anything edible, including species which have legal protection in Ghana, such as *Colobus vellerosus* (Black and white Colobus), *Nandinia binotata* (Spotted Palm Civet), *Smutsia gigantean* (Giant Pangolin) and *Phataginus tetradactyla* (Long-tailed Pangolin). With the decline of large mammal species that featured prominently on the list of these hunters, they now resort to not-common species like some medium to small birds, ungulates, and mammals. The upgrade of Atewa and the subsequent enforcement of laws on hunting could force hunters to move to nearby forest reserve.
6. **Unsustainable Logging (legal and illegal chain sawing):** Unsustainable exploitation of forested areas, coupled with the relatively high prevalence of bush fires, has resulted in the depletion of important timber species such as *Milicia regia* (Odum), *Triplochiton scleroxylon* (Obeche), and 'mahogany', abundant before the 1960s, but now locally rare. Illegal logging occurs throughout the forest reserve. Due to the weak system of monitoring and poor implementation of regulations, illegal logging

by chainsaw operators has been prevalent in Atewa, especially since the 1990s. Logging has escalated so much that at times the army has had to be called in.

8.2 Socio-Cultural/ Economic Risks

In recent times serious concerns have been raised about indiscriminate destruction of the tropical forest throughout the World. Research has shown a strong correlation between the socio-cultural setting within which a protected area is found and the health of the forest. A number of factors including population pressure, increasing demand for agricultural and forest products at local market and for export, over-capacity of forest industries, policy failures and weak institutions in the timber sector as some of the causes of the decline of forests in Ghana.

The Akyem Abuakwa Stool occupied by the Okyehene has been known for their commitment to conservation initiatives. The stool has made efforts through the Okyeman Environment Foundation and have been instrumental in the fight against mining particularly in Atewa which falls entirely under his stool. Despite these efforts the following socio-cultural risks were identified during the analysis:

1. *Demographic pressure:* There are over 15 communities within the 2km radius of the forest reserve. These communities are engaged in farming mainly cocoa and a few food crop fields. In recent times, the population dynamics has changed with the influx of more youth between the ages of 15- 40 years engaged in artisanal mining and other nationals from neighbouring countries.

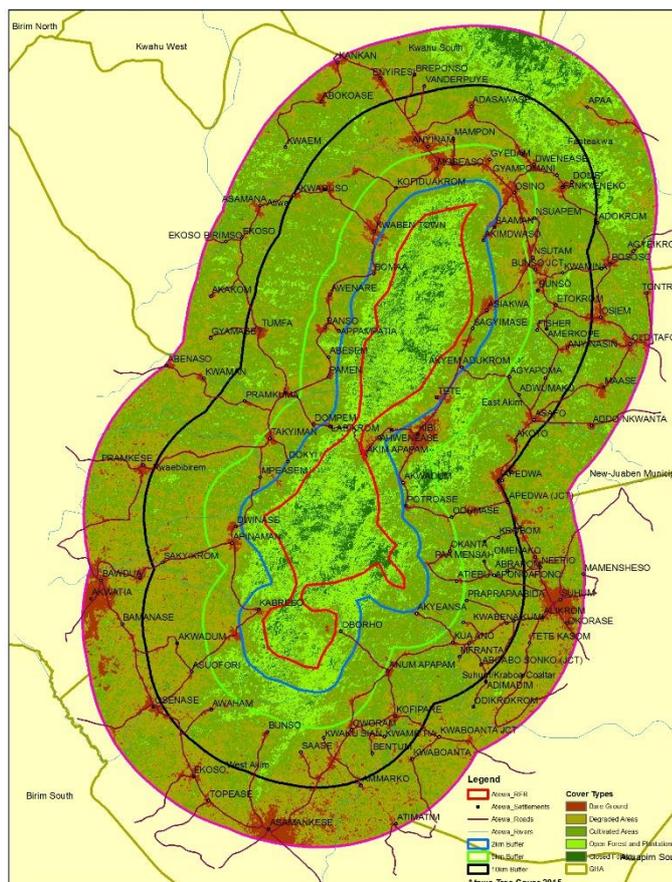


Figure 18 Map of Atewa showing fringe communities within 2km, 5km, 10km, and 15km radius

These mining activities are done both on and off reserve and involves the removal of farms and other forms of vegetation including primary forests. Rivers and streams are also polluted with toxic chemicals that are used in the mining process. The conversion of forest to non-forest uses is at a rate higher than the national average and its mainly at the periphery of the Globally Significant Biodiversity Area at ARFR.

Even though the change in management regime will create additional jobs for the local people, these jobs will not be enough to absorb most of the unemployed youth. Until there is enough investment in hotels, tourist attraction and livelihood programs to absorb these youth, they may resort to engaging in illegal activities.

2. **Land scarcity:** Atewa cover over 233km² of forest. With increasing pressure on off reserve areas for mining and other developmental activities, local people resorted to portions of the forest reserve for farming. A survey by Conservation Alliance in 2008 discovered large tracts of cocoa farms and plantain plantations at the cap of the three hills that make up the forest range. According to the Kibi Forest District Manager, there has been several requests by the local people for reserved lands to be converted to agricultural lands.

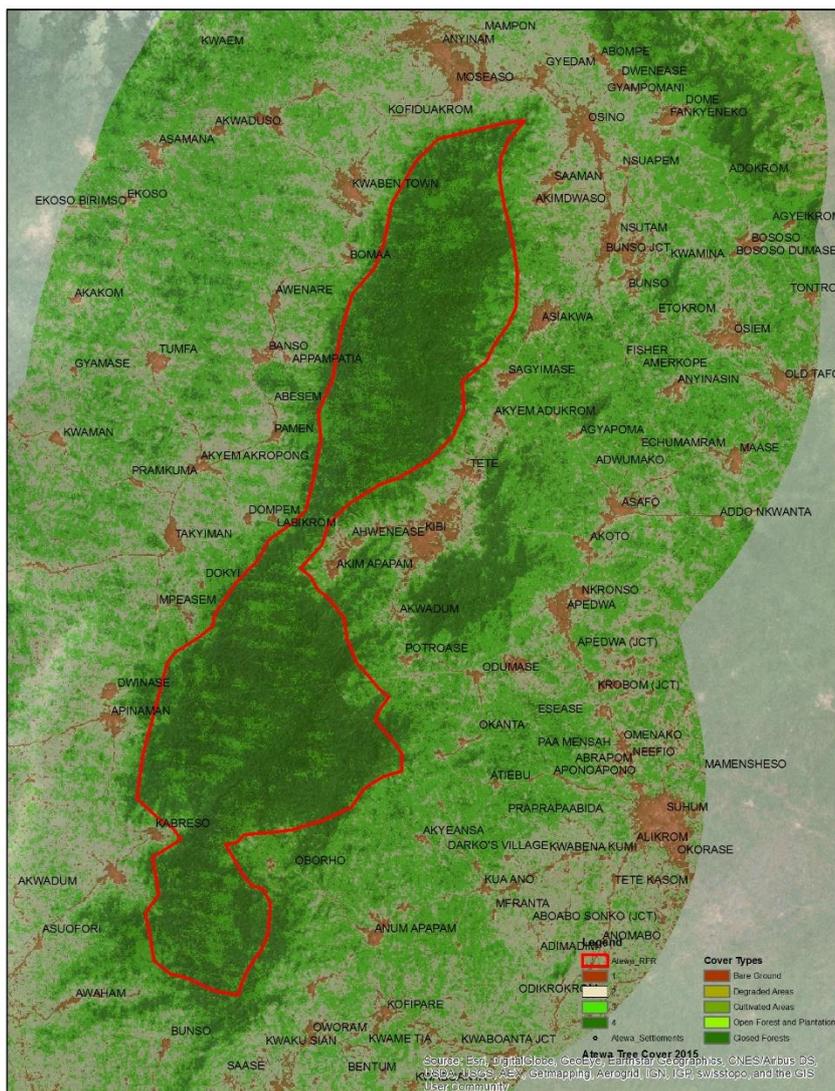


Figure 10. Map of Atewa showing fringe communities

This has implications for the success of the proposed buffer around the national park and the kind of activity that will be proposed. Community education and awareness creation is key to stimulate change in behaviour.

3. *Few non-agricultural based opportunities*: The local economy of communities fringing Atewa and the surrounding districts as a whole is agricultural based. This makes non-agricultural based opportunities scarce in the vicinity of the forest. People depend on farming, Non Timber Forest Products (NTFPs), and other wood-based products as a source of livelihoods. This is becoming limited as forest and forest resources are on the sharp decline as a result of unsustainable farming practices and overexploitation.
4. *Declining productivity*: Off-reserve lands under agricultural production have become infertile as a result of continuous cropping over the years and unsustainable farming practices (including unsafe use of chemicals on farms). According to some community members interviewed during CA's survey of ARFR in 2008, the lands in the off reserve areas are able to yield one-fifth of what is obtained from the reserved lands. As a result,

some of them disregard warnings from the local forest authorities and go into the reserve to clear lands for agriculture.

8.3 Opportunities

8.3.1 Environment

1. **Watershed protection and Provision of Clean water to Urban Centres:** Atewa provides clean water for many of the inhabitants of Accra and other parts of the Greater Accra region. This is because Atewa contains the headwaters of three river systems: The Ayensu, Densu and Birim rivers. These rivers are the most important sources of domestic, agricultural and industrial water for local communities as well as for many of Ghana's major population centres, including Accra. Five million Ghanaians depend on these water sources and the critical watershed services provided by the plateau formations that soak up rain and mist and then hold, clean and discharge the water for all to utilize.
2. **Carbon sequestration potential:** Tropical forests are of global importance for the sequestration of carbon. As forest areas degrade and shrink, the amount of sequestered carbon reduces, ultimately affecting global climate regulation and contributing to ongoing climate change processes. On the other hand, the change in management regime of Atewa will promote the reforestation of degraded areas and the carbon pool in areas can be expected to increase. Unlike other ecosystem services analysed in Atewa TEEB, carbon sequestration does not yield a continuous annual benefit; there is only a change in value in the case of changes in biomass. Therefore, continuous protection and prevention of leakages will result in an increase in biomass that would determine a positive change in this service, with the consequent benefits of a more stable climate to society.
3. **Contribution to Biodiversity Conservation:** Atewa is, together with Tano Offin Forest Reserve, one of only two Forest Reserves in the country at which this forest-type occurs and these two reserves together hold c.95% of the upland evergreen forest in the country. This rare biome houses species unique to Ghana and also the Upper Guinea Hotspot. Atewa has many plant species not found elsewhere in the country; *Celtis durandii* was recorded in Ghana from this area. Six endemics butterfly species *Mylothris atewa*, *Deudorix* sp. nov., *Cupidesthes* sp. nov., *Anthene aurea*, *A. helpsi* and *Acraea kibi*, from a total of 460 also occur here—the largest number of species yet recorded from a single small forest anywhere in West Africa. This gives ARFR a global appeal and therefore change in management regime of this forest will also give a global recognition of contributing to biodiversity conservation in Ghana and internationally.

Private companies have made commitments (either voluntarily or by law) to do a biodiversity offset. These companies will therefore seek forest that are adequately protected (have a management objective that prevents extractive use), and places where the companies can consolidate their gains. Also when correctly estimated, carbon credits could be issued out to companies who need to offset their carbon.

8.3.2 Socio-Economic

1. **Ecotourism Potential:** Earlier assessments done by the Forestry Commission of Ghana has revealed that Atewa has unique natural, cultural and historical resources that could be harnessed through ecotourism for the socio-economic development of the area. Some of the attraction present include:
 - Wildlife habitats in Sagyimase, Potroase, Apapam areas which present good viewing sites for tourists.
 - Breath-taking waterfalls & pools
 - Rivers & streams such as the headwaters of Ayensu, Birim and Densu
 - Caves & natural lookout points
 - Rich butterfly areas in Sagyimase,
 - Palace of the Okyehene (Ofori Panin Fie)
 - Royal mausoleums

9.0 Conclusions

Atewa has performed relatively well in securing water supplies to urban centers including Accra, maintaining forest cover to protect representative samples of biodiversity patterns (distribution of species, communities and ecosystems) and supporting the livelihoods of fringe communities. This remains inadequate for the continuous conservation of the ecosystem processes in terms of the goods and services it provides to support the local economy and biodiversity conservation in the wider landscape.

Analysis of results from studies commissioned by Arocha and its partners, and already available information suggests that Atewa plays a vital role by offering higher quality and quantities of water to communities than any other watershed under alternative land uses. This is because other land uses have greater human footprint i.e. more intensive management, less complete cover (hence more erosion and sediment run-off) and extensive application of pesticides. Notwithstanding these issues of intensive management of the landscape, Atewa also faces other challenges in terms of illegal activities (logging, mining and agriculture), and unsustainable resource removal. The current management regime is not adequate to deal with these threats and challenges. Hence the need for a paradigm shift.

The resources at Atewa stand to be secured if there is a management regime shift from forest reserve to national park status. This has been proven to be economically, socio-culturally, ecologically, and legally feasible. As a national park, the area would be managed in its natural state as possible, to preserve a good representative sample of the Upland Evergreen Forest type of the larger Upper Guinea High Forest Zone of Ghana. With the development of the ecotourism potential of the area, visitor use for inspirational, educational, cultural, and recreational purposes will be managed in such a way that ecological or biological significance will not be undermined. By this, the local economy stands to grow, through the provision of jobs, establishment of local business and the regulation of resource use at Atewa. The Atewa TEEB study has shown that a national park with a viable buffer zone and related protection and management approach is the appropriate management regime to be adopted for Atewa. The laws of Ghana also provide for the establishment of national parks by executive instruments, through the presidency, and also provides adequate institutional backing for the management of the proposed national park.

The proposed buffer zone for the Atewa national park will further increase the resilience of the park and the surrounding areas to climate change impact. area will be managed with varying degrees of consumptive and non-consumptive uses. Sustainable production system for tree crop (cocoa), and food crops is being proposed not just to create a secondary-like forest protecting the boundaries of the park but also bringing economic benefits to fringe communities through commodity certification schemes (UTZ, Rainforest Alliance, Fairtrade), biodiversity banking schemes, etc.

10.0 Recommendations

Buffer Zone: A number of scenarios are being considered for the creation of a buffer zone around the proposed Atewa National Park. These scenarios consider a 5km, 10km, and 15km radius around the park. It will be important to determine the most appropriate buffer size to be considered in management planning for the proposed national park. Key determinants of an appropriate buffer size include the prevailing land use system around the park, socio-economic conditions, available funds for the management of the buffer area since it will not be under the direct management of the WD of Forestry Commission. A collaborative management arrangement would need to be put in place for the agreed buffer zone

A number of stakeholders have proposed the establishment of community-led forestry initiatives. Examples can be drawn from other parts of the country where these initiatives have helped secure the boundaries of protected areas. The Kakum example where cocoa agroforestry with the potential of expanding into a sustainable cocoa production initiative could be implemented. The Community Resource Management Areas concept being promoted by the Wildlife Division of the Forestry Commission could be implemented in the buffer zones. This initiative will not only secure the boundaries of the park but also bring economic returns to farmers living in fringe communities in the form of increased yields and premium from the sale of cocoa beans.

Stakeholder Engagement: Extensive work has been done to identify and engage enough stakeholders for Atewa. However, some gaps exist in interactions between land owners outside the reserve. These landowners have often complained of inadequate and fertile lands for agriculture and other use. To introduce alternative land use systems that are sustainable, land owners need to understand why they have to put their lands under this new management option and the anticipated economic returns they stand to benefit.

Involvement of MMDAs in the management of the proposed national park: There are five district assemblies that border Atewa and its proposed buffer area. Currently, these districts have no plans within the MTDP to either halt the threats facing Atewa or develop its tourism potential.

Because ecotourism will be an important aspect of the financial mechanism of the proposed park, it will be important to put in place a plan towards the development of the ecotourism potential of the park. This will include searches for potential private companies, partnerships and collaborations so that economic returns from the park will not lag behind.

Strengthening Community Participation: The role of community members and their leadership is vital for the success of the development of the national park. This could be achieved if communities are well informed, and participate in initiatives that seek to protect the park.

This report provides all the issues that need to be taken into consideration in terms of decision-making at the Forestry Commission and all other levels related to the upgrading of the legal status of the Atewa Range Forest Reserve to a national park. The implementation of the National Park concept with a well-defined buffer zone, appropriate management

regime and stakeholder collaborative participation, will go a long way to safeguard the ecological integrity of Atewa and its diverse functional roles as well as enhance sustainable benefits to various stakeholders.

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