

Context for landscape approach implementation in the Western Wildlife Corridor Landscape (Northern Ghana)

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Introduction

West African forest and savannah ecosystems contain important biodiversity that provides numerous goods and services to local people. However, these landscapes are increasingly under enormous anthropogenic pressures, leading to habitat fragmentation and the concomitant loss of biological diversity. Climate change further constrains the conservation of natural resources (Dimobe 2017) and associated challenges of food insecurity and poverty have made the sustainable management of tropical landscapes an urgent priority (Reed et al. 2016; Barlow et al. 2018). Indeed, one of the major challenges of the 21st century is to overcome conflicts between biodiversity conservation, food production and livelihoods (Ouko 2018).

Since the 1970s, several initiatives such as biosphere reserves and community-based natural resource management (CBNRM) have been used worldwide to simultaneously address the challenge of biodiversity conservation and poverty alleviation, while putting local communities at the centre of decision-making (Clay 2016; Ouko 2018; Green 2016). In Ghana, this is reflected in the establishment

of Community Resource Management Areas (CREMAs). These 32 CREMAs¹, spread throughout 26 districts of the country, are managed under a community governance regime, involving community institutions, the district assembly and other local administrative structures (Agyare et al. 2015; IUCN 2017; Foli et al. 2018; Murray et al. 2018). The concept was developed in the 2000s as an alternative to the exclusive and centralized model of wildlife governance and as a means to reduce pressure on national parks and wildlife reserves (Foli et al. 2018). The scheme has been applauded for empowering local communities around protected areas in governing their landscapes, in the hope that they will actively contribute to reconciling conservation objectives with those related to their livelihoods (Agyare et al. 2015). However, like any CBNRM scheme, the Ghanaian model also faces constraints related to the plurality of actors with diverse interests, objectives, perceptions and expectations (Agyare et al. 2015). Sectorial interventions persist, particularly among those in charge of agriculture, livestock, mining and natural resource management, thus increasing conflicts over the use of landscape resources (Foli et al. 2018). These constraints compromise the achievement of conservation and development outcomes and inclusive governance (Agyare et al. 2015).

Sectorial approaches are considered insufficient to address complex social, environmental, economic and political challenges in the current context of strong growth in demand for food and natural resources (Godfray et al. 2010; Foley et al. 2011; Tscharntke et al. 2012; Green 2016). Hence, the call for integrated and adaptive landscape approaches as a solution for landscape management (Reed et al. 2016). Such an approach requires enhanced collaboration between local government, populations, and other stakeholders involved in the landscapes of concern (Lindsay 2018). Indeed, the success of landscape approaches is closely linked to inclusive and participatory negotiation between the various stakeholders and the involvement of rural communities (Reed et al. 2017).

With a view to operationalizing this approach, the Center for International Forestry Research, through its COLANDS initiative (Collaborating to Operationalize Landscape Approaches for Nature, Development and Sustainability), has targeted Ghana, Zambia and Indonesia as research sites. This chapter presents and analyzes the Ghanaian context, based on a review of scientific and grey literature; a scoping study during which we interviewed representatives of government agencies, NGOs, as well as representatives of the local population; and considering the ten landscape approach principles by Sayer et al. (2013) as a guiding conceptual framework. We pay attention, respectively, to the general, biophysical and socioeconomic characteristics of the study site (Sections 8.1-8.3), local governance structures, including the CREMA system (Section 8.4), and both the potential and the limitations of existing multi-stakeholder platforms (Section 8.5). Section 8.6 concludes the chapter.

1 Ghana has thirty-two CREMAs. Twenty-four of these are certified for devolution of authority and responsibility for natural resource management, and are fully operational. Eight are at various stages of development and have not yet received their certificates of devolution. The CREMAs are located in about twenty six districts in seven regions of Ghana (IUCN, 2017).

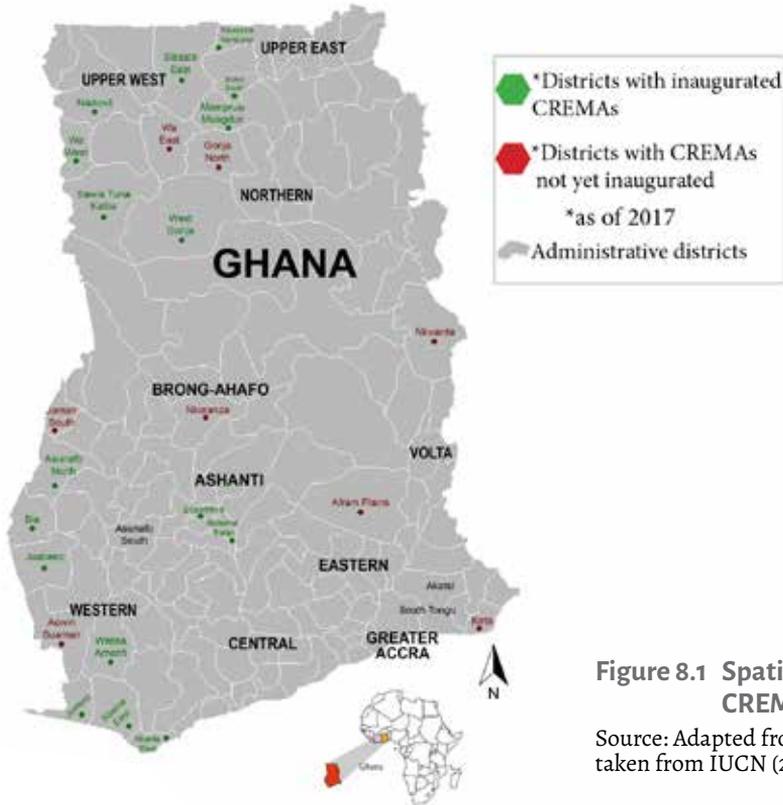


Figure 8.1 Spatial distribution of CREMAs

Source: Adapted from Agyare (2017) and taken from IUCN (2017)

8.1 The Western Wildlife Corridor

8.1.1 General information and CREMA setting

The Western Wildlife Corridor (WWC) in the north of Ghana was selected as the focal landscape of the COLANDS initiative, based on the presence of CREMAs, multiple stakeholders in the landscape, and potentially conflicting uses of landscape resources. The WWC is a vast ecosystem covering approximately 3,713 km², stretching from the Ranch de Nazinga wildlife reserve (Burkina Faso) in the North to the Mole National Park (Ghana) in the South. With a length of 104 km, it is essentially comprised of natural forests, some of which are classified as forest reserves under the jurisdiction of the Ghana Forestry Commission. The Corridor was established through the implementation of the Northern Savanna Biodiversity Conservation (NSBC) project. This project, implemented by the World Bank/Global Environmental Facility, aimed to improve the environment, livelihoods and health in the northern savanna zone of Ghana through the conservation and sustainable use of natural resources. The global environmental objective was to identify, monitor and conserve key components of the biodiversity of the northern savanna zone. The WWC is one of the two corridors—along with the

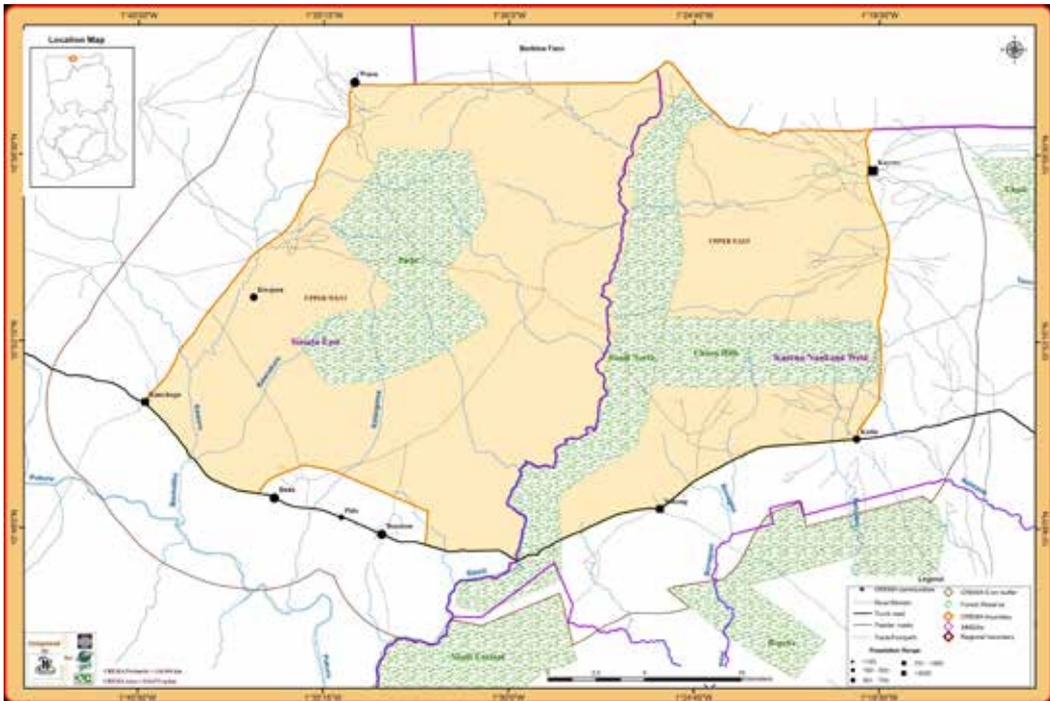


Figure 8.2 The Sanyiga Kasena Gavara Kara (SKGK) CREMA

Source: Wildlife Division of the Forestry Commission of Ghana

Eastern Corridor—implemented by the project (which ran from 2002 to 2008) to facilitate/enable the migration of wild animals from Burkina Faso to Ghana.

The WWC contains three official CREMAs, each with a certificate of devolution of authority and responsibility for natural resources management. They are distributed over four districts and two administrative regions. The Sanyiga Kasena Gavara Kara (SKGK) CREMA, shared between the Kassena Nakana West and Sissala East Districts, and the Builsa Yenning CREMA in the Builsa South District, are both located in Upper East Region. The Moagduri Wuntaluri Kuwosaasi CREMA in Mamprugu Moagduri District is located in the North East Region.² Maps 8.2, 8.3 and 8.4 show the location of these CREMAs.

Each of these CREMAs is comprised of a number of communities that exploit the landscape's resources for their livelihoods, and contribute to the management of these resources through local governance bodies. Several villages and permanent farms have been set up along the WWC (Bouché 2007). The CREMAs are characterized as follows (Table 8.1).

² The North East Region was part of the Northern Region until 2018, when the number of administrative regions in Ghana increased from 10 to 16 by splitting some large regions. The former Northern Region was split into three: the Northern, Savannah and North East Regions.

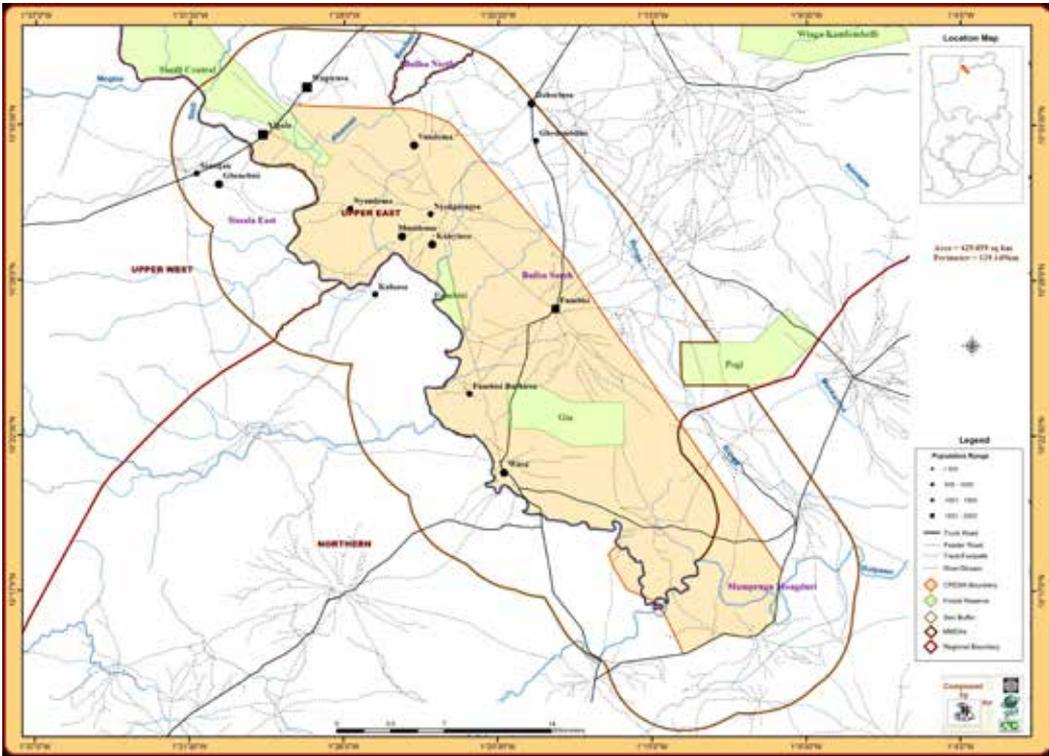


Figure 8.3 The Builsa Yenning CREMA
 Source: Wildlife Division of the Forestry Commission of Ghana

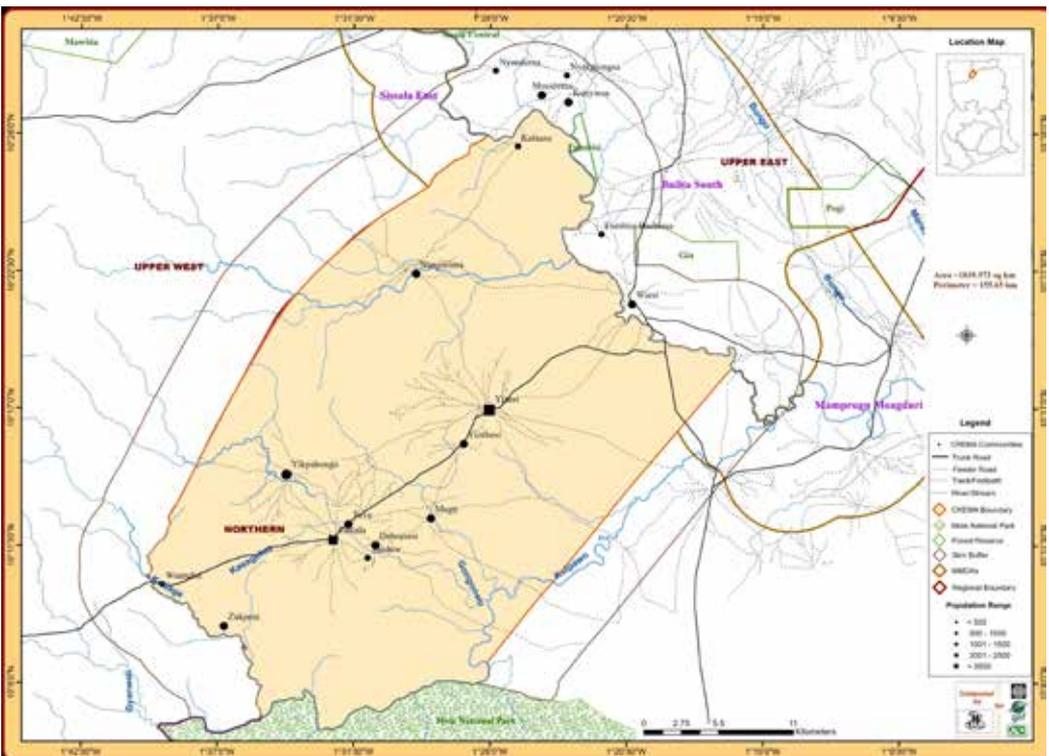


Figure 8.4 The Moagduri Wuntaluri Kuwosaasi CREMA
 Source: Wildlife Division of the Forestry Commission of Ghana

Table 8.1 Characteristics of CREMAS.

Name of CREMA	Size	Villages	Geographical limits
Sanyiga Kasena Gavara Kara (SKGK)	587 km ²	Katiu, Nakong and Kayoro in Kasena Nankana West District; and Basesam, Pido, Baliu, Kunchoro, Kwapun and Wuru in the Sissala East District	Between longitudes 1°18' 00" W and 1°39' 00" W, and latitudes 10° 45' 45" N and 11°00' 12" N
Builsa Yenning	430 km ²	Gbedembilisi, Wiesi, Bachiesa, Fumbisi, Kunyingsa, Musidema, Vundema, Kalasa, Nyandema and Nyankpiengsa	Between longitudes 1° 10' 30" W and 1° 32' 00" W, and latitudes 10° 14' 30" N and 10° 34' 25" N
Moagduri Wuntanluri Kuwomsaasi (MWK)	1,040 km ²	Yezesi, Yezebisi, Tantala, Mugu, Tandow, Dabozesi, Tuvuu, Yikpabongo, Zukpeni, and Wuntobri Nangruma	Between longitudes 1° 17' 00" W and 1° 39' 45" W and latitudes 10° 4' N and 10° 28' 30" N

Source: Mamprugu Moagduri District Assembly (2017)

8.2 The biophysical context of Western Wildlife Corridor

The WWC shares the same biophysical conditions that characterize the entire Northern Ghana region.

8.2.1 Climate

Northern Ghana has a tropical climate, with only one rainy season and one dry season. The rainy season is from April to October, when the monsoon is a humid wind. The average annual rainfall is around 900 mm in Bolgatanga to 1,100 mm in Mole National Park, but its distribution in time and space is unpredictable (Braimoh and Vlek 2005; Bouché 2007). The dry season is marked by the harmattan, a dry wind from the Sahara, and lasts from December to March. During this period, the days are very hot and the nights are cool. The average annual temperature is about 27°C, with extremes of 10°C and 40°C (Wilson 1993; Bouché 2007).

8.2.2 Soil, relief and hydrography

As a whole, Ghana is a country of low plateaus. In the northern and south-eastern parts, altitudes do not exceed 500 m. Specifically in the WWC, the altitude varies between 120 m and 490 m (Bouché 2007). In terms of hydrological networks, Northern Ghana is crossed by the Black Volta and White Volta Rivers, which join to form the Volta River that flows southward. Its waters have been retained in the country's south-east to create the Akosombo hydro-electric dam, thus creating Lake Volta, 550 km long and with a surface area of 8,502 km².

Lake Volta is one of the largest artificial lakes in the world. However it is affected by recurrent droughts and a decrease in rainfall, which induce a progressive decrease of its water level.³

3 <http://www.atlas-monde.net/afrique/ghana/>

The soils in Northern Ghana are characterized by a layer of iron sandstone, which has developed from sandstone materials. Plant roots develop with difficulty at shallow depths. Generally sandy and not very acidic, the soils in the study area are very poor in organic matter, nitrogen and phosphorus (Braimoh and Vlek 2005).

8.2.3 Ecological context: fauna and flora

Northern Ghana covers an area of 97,702 km² or 41 percent of the national territory. Ecologically, it is part of the savannah zone (Braimoh and Vlek 2005)⁴. Although this area is the driest part of the country, due to its proximity to the Sahara Desert, it has rich and varied ecosystems. Dominated by a Guinean savannah, it is characterized by grasslands and both open and closed woodlands (Braimoh and Vlek 2005). The area is considered to be one of the most important wildlife sanctuaries in Ghana, with species such as the elephant (*Loxodonta africana*), roan antelope (*Hippotragus equinus*), patas monkey (*Erythrocebus patas*), baboon (*Papio anubis*), green monkey (*Cercopithecus aethiops*), many reptiles and amphibians and numerous resident and migratory birds (Owusu-Ansah 2018). The woody species encountered are mainly *Vitellaria paradoxa*, *Combretum* spp., *Acacia* spp., *Anogeissus leiocarpa*, *Azelia africana*, *Burkea africana*, *Isoblerlinia doka*, *Terminalia* spp., *Adansonia digitata*, *Boscia senegalensis*, *Calotropis procera*, *Lannea microcarpa*, *Parkia biglobosa*, *Pterocarpus erinaceus*, etc. forming most of the woody savannas. Forest galleries border the main rivers and host species such as *Daniellia oliveri*, *Terminalia* spp., *Anogeissus leiocarpa* and *Khaya senegalensis* (Bouché 2007; Owusu-Ansah 2018).

The main nature reserves located in Northern Ghana are:

- Gbele Game Production Reserve and Bird Sanctuary (565.4 km²): established in 1975 by the Sissala East District Assembly in collaboration with the Wildlife Division of the Forestry Commission. It partly covers the districts of Wa, Nadowli and Sissala East. The Gbele Reserve is located 61 km from the town of Tumu (Sissala East District) and 89 km from the town of Wa (Wa District) in the Upper West Region (Yahaya and Venkateswar 2016);
- Mole National Park (4,840 km²), the largest reserve in Ghana, is located in Damango in the West Gonja District of the Savannah Region of Ghana. The park was originally established as a hunting reserve by Kwame Nkrumah (Ghana's first president) in 1958 and became a national park in 1971 (Apagrimchang 2018);
- Forest reserves: Northern Ghana has several forest reserves. Of Ghana's 280 forest reserves (Husseini et al. 2015) 57 are located in the Northern Savannah zone, of which 22 are shared between the Northern, Savannah and North-East regions, 19 in the Upper East region and 16 in the Upper West region (IUCN 2014). These include, among others, the Red Volta West, Red Volta East, Gambaga scarp West, Gambaga scarp East, Yakombo, Damongo scarp, Tamale Waterworks, Sinsanblegbini, Daka Headwaters and Kenikeni forest reserves. (Anderson et al. 2006; Husseini and Issifu 2015).

4 Ghana has six agro-ecological zones from south to north: the high rainforest zone in the southwest and the coastal savanna zone in the south and southeast; the semi deciduous forest zone; the forest-savanna transitional zone; the Guinea savanna zone; and the Sudan savanna zone (Germer and Sauerborn, 2008).

The Eastern and Western wildlife corridors were established on the basis of these wildlife and forest reserves, with the aim of preserving the wildlife and plant biodiversity that inhabits these areas, and with a view to improving the livelihoods of local communities (Bouché 2007).

8.2.4 Main environmental challenges: land degradation, deforestation and water scarcity

Savannah landscapes such as the WWC are seen as multifunctional areas that can contribute toward reducing rural poverty, supporting the local economy and achieving local, national and international objectives for maintaining biological diversity (IUCN 2012). Natural resources are essential for improving the livelihoods of the world's poor people, 75 percent of whom live in rural areas and depend on natural resources to make a living (Anderson et al. 2006). However, the conservation and sustainable use of natural ecosystems are subject to numerous pressures related to livestock, agriculture and forest resource exploitation, resulting in severe degradation (Barlow et al. 2018).

The main constraints undermining Ghana's natural resource base include land degradation, deforestation, inappropriate agricultural practices, forest fires, unsustainable harvest (World Bank 2009) and mining activities (Kwame 2014). The northern savannah zone additionally suffers from demographic pressure, agricultural expansion, livestock pressure, and constant removal of trees and shrubs without adequate replacement (World Bank 2009; Marchetta 2011).

In Northern Ghana, water is scarce due to the few water courses that flow there, and decreased rainfall due to climate change. Combined with insufficient irrigation systems and the inadequacy of existing hydraulic structures (dams and artificial dugouts for agriculture), this leads to difficulties for agricultural and pastoral production (Marchetta 2011).

Interviews conducted during the scoping study with local communities and institutional actors operating in the study area revealed that the main problems they face in relation to natural resources are bush fires, illegal logging – particularly of rosewood (Box 8.1) – charcoal production (a profitable activity for many young people), poaching of wildlife, gold panning, agricultural extension into forest reserves, and pastoralism by Fulani herders.

The forest administration is understaffed, creating a problem for efficiency of the Forestry Commission throughout the national territory. Northern Ghana is not spared from these difficulties, which adversely affect the remaining forest reserves and corridors. Moreover, the natural resource governance sector is often confronted with challenging situations, such as corruption (Ameyaw et al. 2015).

Political interference in natural resource governance is also a major constraint: some administrative and/or traditional authorities use their power to pursue their own commercial interests. They interfere in resource allocation issues in stumpage procedures, and in sanctions against offenders (Ameyaw et al. 2015). In this context, the enforcement of legal measures to protect the integrity of natural ecosystems becomes very difficult. Our interviews revealed that some village chiefs authorize logging in their communities, despite legal prohibitions. Because of their status as “traditional chiefs”, they have a certain influence that protects them from prosecution.

Box 8.1 Rosewood between local community livelihoods and export product

African rosewood (*Pterocarpus erinaceus*) is a plant species found in the northern part of Ghana, predominantly in the forest-savanna, Sudanese savannah and Guinean savannah transitional ecological zones. It is exploited by local communities for firewood and charcoal production, but also for the manufacture of musical instruments such as the xylophone. In addition, the leaves are used for cattle fodder, and the branches are used in the construction of houses.

Interest in this multi-purpose plant is likely to expand, due to the strong demand expressed by China, a major export market for rosewood since 2004/2005. Ghana has become one of the main suppliers of rosewood to China, leading to excessive exploitation of the species as of 2010. As of 2014 it has been the second-largest supplier of rosewood in Africa (after Nigeria) to China and the fourth largest in the world. This will lead to an exponential increase in illegal logging, violation of national laws and regulations for timber exploitation and trade, and endangerment fragile landscapes in savannah ecological zones that harbour the rosewood, such as the Western Wildlife Corridor. Illegal operators armed with chainsaws, as well as fraudulent rosewood merchants, have reportedly besieged the northern regions of Ghana, cutting all the rosewood they can find^a. This strong pressure constitutes a threat to natural resources and the conservation of biodiversity, and a constraint on improving the livelihoods of local communities.

Note:

a <https://www.modernghana.com/news/455161/rosewood-face-risk-of-extinction-in-northern-ghana.html>.

Source: Dumenu & Bandoh (2016) and Abdul-Rahaman et al. (2016).

If no action is taken, all these difficulties could, in the long-term, lead to the destruction or even disappearance of emblematic ecosystems such as the Mole National Park and other nature reserves that contribute to the formation of the WWC.

8.2.5 Development challenges related to climate change

At the national and regional levels, constraints related to social, economic and environmental governance hinder Ghana's development and could negatively affect the implementation of integrated landscape approaches. Brown and Crawford's (2008) analyzes of the impact of climate change on the economic stability of Ghana and Burkina Faso show that there are five main challenges to be considered in Ghana. These are addressed in the following sub-sections.

The North-South divide

Ghana is characterized by a pronounced social divide. Poverty is concentrated in the northern part of the country, particularly in rural areas, while the southern regions are experiencing better socio-economic development. In addition, the North is not as well served as the South in terms of public and government services, and the rural North has



Figure 8.5 Bags of charcoal for sale at the outskirts of the Mole National Park.

Photo: Eric R.C. Bayala.



Figure 8.6 Clearing of new farms in Northern Ghana (CREMA of Murungu-Mognoré).

Photo: Eric R.C. Bayala.

long suffered from climate variability. Correlated with population growth, the demand for water in the North is increasing rapidly. Indeed, it appears that the demand for irrigation water in the dry regions of the North could increase twelvefold by 2050 due to climate change and population growth. This will be a significant development challenge that the government will have to face.

The allocation of water between energy in the South and agriculture in the North

The North-South divide would also play out in the allocation of water resources between the different regions. The trade-off between the use of water for agriculture in the North and its use for hydropower generation in the South remains a crucial issue.

Management of regional water sources

Climate change, declining rainfall and runoff could lead to regional tensions between Burkina Faso and Ghana over the sharing of water from the Volta River. The river, which serves six riparian countries, first crosses Burkina Faso before reaching Ghana, and together these two countries make up 85 per cent of the catchment area. To avoid future conflicts that could arise over water sharing, the six riparian countries (Burkina Faso, Ghana, Togo, Benin, Mali and Côte d'Ivoire) have come together to create a mechanism for managing the basin. This should prevent a number of disasters such as the floods that displaced about 285,000 people in Northern Ghana in September 2007, following the opening of the gates of the Bagré dam in Burkina Faso to release surplus water (Brown and Crawford 2008).

Economic stability and the structure of the economy

Ghana's economy is strongly linked to the production of cocoa, which is mainly produced in the humid forest zone by rural communities for whom it represents an important source of income. This crop, for which Ghana is among the world's leading producers, contributes 3.4 percent to Gross Domestic Product (GDP) (Läderach et al. 2013). However, according to some analysts, Ghana's climate could be unsuitable for growing

cocoa by 2080. This would fundamentally change the Ghanaian economy and affect economic stability in unforeseen ways. However, other more optimistic scenarios reveal the fact that although climate change will have a negative impact on cocoa growing in Ghana, some areas such as the Kwahu Plateau in the south of the country will see an increase in production (Läderach et al. 2013; Schroth et al. 2016).

Instability at the borders

Conflicts caused by the impacts of climate change beyond Ghana's borders could lead to waves of human displacement and migration across borders. This, in turn, could lead to regional economic disruptions, problems of social coexistence between refugees and local communities, etc.

8.2.6 Configuration of the Western Wildlife Corridor landscape

The Western Wildlife Corridor is characterized by a sub-landscape formed by the CREMAs of Builsa Yenning and Moagduri Wuntaluri Kuwosaasi, and a micro-landscape formed by the CREMA of Sanyiga Kasena Gavara Kara. These two entities (sub-landscape and micro-landscape) are in turn composed of natural spaces, and spaces shaped by human activity. In this respect, the scoping study identified the following land uses: swidden agriculture, fallow, agroforest (parklands), rangeland, and small-scale cash crop gardens and plantations (cashew, citrus, mangos). In terms of management regimes, the landscape encompasses the wildlife corridor, forest and wildlife reserves, the national park, and CREMAs.

8.3 Socioeconomic context and livelihoods

The vast majority of the rural population in northern Ghana is affected by extreme poverty, with some of the highest rates in the country (Abdul-Moomin et al. 2016). Agriculture is the main livelihood activity, employing about 80 percent of the population and is mainly rainfed and dependent on soil fertility. The main crops grown are cereals (maize, sorghum, millet), legumes (soybeans, groundnuts and cowpeas), yam and cotton (Owusu-Ansah 2018). However, this activity is carried out primarily on small farms averaging about 1 ha in size. The decline in soil fertility resulting from continuous cropping and monoculture has led to reduced yields of some crops such as maize, sorghum and groundnuts (Braumoh and Vlek 2005).

In addition to agriculture and petty trade (food processing and weaving), local communities in the study site, in common with other communities in northern Ghana, earn a living from hunting, charcoal production, gold mining, livestock raising and the exploitation of timber and non-timber forest products, displaying a large dependence on natural resources (Marchetta 2011). Savannah woodlands are a source of medicinal plants; the main source of medicines for communities living there. In addition, the woodlands provide roofing thatch, fence posts, and food items such as bushmeat and fruit.⁵ As such, the ecosystems of Northern Ghana contribute significantly to people's

5 <https://www.thegef.org/project/northern-savanna-biodiversity-conservation-nsbc-project>.

living conditions. The savannah woodlands contribute to up to 70% of Ghana's firewood and charcoal, and constitute the main source of livelihood for about 80% of charcoal producers (Obiri et al. 2014)

In Northern Ghana, women control non-timber forest products, such as shea (*Vitellaria paradoxa*) nuts, néré (*Parkia biglobosa*) fruit, baobab (*Adansonia digitata*) fruit and tamarind (*Tamarindus indica*). These are harvested for food, health and fodder needs; but above all, these provide women with an income. Some of these products are further processed, such as shea nuts that are transformed into butter, baobab fruit into biscuits, tamarind fruit into syrup, etc. In addition, the collection of firewood and charcoal production are economic activities in which women are engaged (Tetteh et al. 2011).

In summary, the landscapes of Northern Ghana offer a variety of livelihood sources and as such, are a source of socio-economic development, despite the challenges faced.

8.4 Landscape governance

Governance is a concept considered as a collective process, both formal and informal, on which decision-making processes and public regulatory and institutional frameworks depend (Maindo et al. 2015). In other words, governance is a participatory and decentralized exercise of power (Pitseys 2010). In Ghana, natural resource governance reforms have been aimed at involving local populations in the management of natural resources (Agyare et al. 2015), creating a dynamic collaboration between conservation stakeholders and landscape users. This is how the model of resource governance through CREMAs was developed.

8.4.1 The CREMA system⁶

The CREMA system is an innovative mechanism set up by Ghana's Forestry Commission through its Wildlife Division and partners to engage local communities in the governance and management of natural resources, notably near wildlife reserves and national parks. It represents a profound change in the national policy for the governance of natural resources, which allows local populations to govern the CREMA and benefit in kind or in cash from the forest and wildlife resources that it provides. The CREMA system has been in place in Ghana for almost 20 years; initially, going through a pilot phase and later scaled up, with a legal and institutional framework in place, allowing the Wildlife Division to transfer authority and responsibility for wildlife to rural communities.

The CREMA implementation process

Establishing a CREMA is a process that can be time-consuming (three to five years). It starts with the identification of a geographical area endowed with natural resources, where local communities have organized themselves for resource conservation. This is

6 Information in this section is based on: Wildlife Division, 2000; Agyare, 2013; Asare et al. 2013; Baruah et al., 2016; Foli et al., 2018; Murray et al., 2019.

Box 8.2 Shea: an under-valued source of income

The production of shea butter is the main source of livelihood for more than 900,000 rural women in northern Ghana. Generally excluded from access to land, women have engaged in activities such as collecting shea nuts and processing these into butter. This activity, which they practice freely, is recognized as a traditional activity. Even if they benefit least from the final value of the product, the production of shea butter remains a life-saving income-generating activity for rural women, as it helps reduce their economic vulnerability.^a

Shea has the potential to contribute to poverty reduction in rural areas, but little attention is paid to it in terms of creating a processing and marketing industry (Abdul-Moomin et al. 2016). More than 60 percent of the shea nuts available in Northern Ghana are not harvested, and thus rot in the bush. However, increasing shea production and improving the processing rate of the nuts into butter, accompanied by the restructuring of the shea market, could create a rural transformation dynamic capable of reducing endemic poverty in northern Ghana (Laube 2015).

Note:

a <https://www.inclusivebusiness.net/node/4037>.

followed by a series of consultations and exchanges between the various stakeholders (NGOs, Wildlife Division representatives, community leaders) to assess the eligibility of the geographical entity proposed as a CREMA. Eligibility criteria include the structure and level of organization of the community, existing land tenure systems, land-use practices, and the uses made of landscape resources. Where a positive evaluation is made, and if the community leaders agree to engage in the CREMA process, a series of studies of the area would be conducted under the auspices of the Wildlife Division to establish the baseline in terms of land use, natural ecosystems, socio-economics, ethnography, etc. Once this prerequisite is completed, implementing agencies organize awareness and capacity building sessions as a prelude to the establishment of management structures.

Local management/governance structures

The first entity to be created is the Community Resource Management Committee (CRMC), mandatory for each community or group of communities. A CRMC usually consists of 5-13 people (men and women) appointed or elected in a village-wide meeting. Their role is to assist in planning and implementation of the CREMA activities. This committee serves as an intermediary between the community and the CREMA Executive Committee (CEC). Together with traditional chiefs, the CRMCs are responsible for drafting the CREMA “constitution”⁷, which is then submitted for

⁷ In the context of CREMA, a constitution is a social contract that establishes the organizational structure, defines the “community” and its purpose, and sets out the basic rules and regulations by which everyone should abide (Asare et al. 2013) and deforestation rates have increased in recent years. Mitigation initiatives such as REDD+ are widely considered as potentially efficient ways to generate emission reductions (or removals)

review and adoption by all stakeholders (traditional authorities, Wildlife Division representatives, NGOs, CRMCs).

The CEC is the supreme body that directs and supervises decision-making, the design of CREMA development plans, and the definition of benefit-sharing arrangements. It is also responsible for clearly specifying the physical limits of the CREMA. It is comprised of CRMC members, including resource persons from the district, the Wildlife Division and NGOs. Thus, the CRMC ensures implementation of activities and respect for management rules in their respective community territories, and report to the CEC.

The CEC, with support of the Wildlife Division, traditional authorities, and District Assembly, should verify the alignment of CREMA rules and regulations with national and district laws. Those rules and regulations are then submitted to the District Assembly for formalization. Conclusion of the CREMA creation process is marked with an inauguration ceremony following the receipt of a devolution certificate issued by the Ministry of Lands and Natural Resources.

This was the process through which six CREMAs have been established in the WWC area: Moagduri Wuntanluri Kuwomsaasi; Sanyiga Kasena Gavara Kara; Builsa Yanning; Sissala-Kasena Fraah; BulKawe; and Chakali Sungmaaluu. To date, only the first three CREMAs have obtained a certificate of devolution and are operational.

8.5 Multi-stakeholder platforms: opportunities and challenges for the implementation of landscape approaches

8.5.1 Preliminary stakeholder mapping

Through the scoping study, we identified several types of actors intervening in Northern Ghana's landscapes, particularly in the study area. These were grouped into three main categories according to their interests (see Table 8.2). These stakeholders participate in one way or another in the governance of the CREMA in which they are involved.

8.5.2 Existing multi-stakeholder platforms

Multi-stakeholder platforms provide a framework for dialogue, consultation, compromise, and decision-making on conservation and development priorities as essential elements of landscape governance (Kusters et al. 2018; Ros-Tonen Reed et al. 2018). The platforms facilitate processes in which stakeholders from various sectors collaborate and jointly plan actions to achieve a common objective. The objective of multi-stakeholder processes is to promote better decision-making by ensuring that all relevant perspectives are considered at all stages of dialogue and consensus building (Warner 2007). Multi-stakeholder platforms are therefore essential for the implementation of integrated landscape approaches (ILAs), and thus, for the development of a concerted, participatory and adaptive landscape governance process.

In the WWC, we identified the following main platforms during the scoping study:

The Community Resource Management Committee (CRMC)

This is the CREMA governance body at the local level and closest to the communities. At each CREMA constituent community, a CRMC exists to bring together community interest groups and to facilitate exchanges and decision-making at this level. These interest groups include hunters, youth groups, NTFP actors (shea and baobab), women's groups (for savings and loans), *tindamba*⁸, chiefs and others, depending on what exists in a particular community. One or two people represents each interest group at the CRMC, demonstrating how it offers an example of a local multi-stakeholder platform.

The number of CRMCs depends on the number of communities within the WWC. For example, Sanyiga Kasena Gavara Kara CREMA is composed of nine communities and therefore has nine CRMCs. The CREMAs of Builsa Yenning and Moagduri Wuntanluri Kuwomsaasi each have 10; hence, the total of 29 CRMCs in the WWC.

The CREMA Executive Committee (CEC)

The CEC is the second local multi-stakeholder platform, but unlike the CRMC, it operates at the CREMA level. Thus, in each of the CREMAs constituting the WWC, there is one CEC, resulting in a total of three CECs in the Corridor.

The CEC brings together the various members of the CRMCs (considered as primary members), as well as traditional authority(ies), district representatives and institutions concerned with CREMA governance (secondary members). Where decisions are reached by vote, only the principal members are entitled to vote. The CEC lead team has five members, including at least two women, elected as president, secretary, organizer and treasurer. The CEC members are elected by the CREMA membership. CEC functions are determined by its statutes.

The District Planning Coordinating Unit (DPCU)

This platform operates at district level and provides a framework for exchanges and development planning between district officials and those of all decentralized government structures, as well as civil society organizations and NGOs in the district. At the WWC level, there are four DPCUs, as the Corridor spans four districts. However, our study interviews revealed that the DPCUs are not very active due to political and logistical constraints.

The Sustainable Land and Water Management Project Learning Workshop Platform

This platform was created within the framework of the Sustainable Land and Water Management project, funded by the World Bank and implemented in the Northern Savannah Ecological Zone. Its main purpose is to facilitate project actors exchanging ideas

⁸ *Tindamba* (singular: *tindana*) are landowning families descendent from the first settlers in an area, who hold land in custody for other community members and, as such, are allodial title holders of the land under their (customary) jurisdiction (Abdulai and Ndekugri 2007).

Table 8.2 Preliminary stakeholder inventory in the study area.

Actor type	Interest	Entities
Institutional actors	Their main interest is to ensure the conservation of natural resources and the preservation of biological diversity. This is achieved through research, awareness-raising, capacity building and support for implementation of conservation actions. These actors intervene at the national level.	<ul style="list-style-type: none"> • Forestry administration: Forestry Commission (notably, the Wildlife Division; Mole National Park management; Forest Services Division); Environmental Protection Agency • Ministry of Food and Agriculture: Water Resources Commission District Agricultural Offices • Universities and research centres: Forestry Research Institute of Ghana (FORIG); University for Development Studies (UDS), Faculty of Natural Resources and Environment • Local authorities: District assemblies
NGOs and private sector	They support implementation of the national policy on conservation of natural resources. To this end, they develop projects to preserve biodiversity, improve livelihoods, and raise public awareness of environmental issues. NGOs are non-profit organizations, whereas the private sector is in search of profit.	<ul style="list-style-type: none"> • NGOs: A Rocha Ghana; Coalition for the Development of Western Corridor of Northern Region (Northcode); TreeAid Ghana • Private sector: Savannah Fruits Company (SFC)
Local actors	Their main interest is to improve their livelihoods through the exploitation of natural resources.	<ul style="list-style-type: none"> • Local communities • Fulani (Fulbe) herdsmen

around the project objectives, sharing experiences and identifying new orientations for the project. It is therefore a platform designed for project follow-up.

However, with its multi-regional scope and the great diversity of its stakeholders, this platform could also serve as a framework for exchanges on other themes, such as the governance of multifunctional landscapes. Indeed, this platform brings together key institutions such as the Forestry Commission (Wildlife Division), the Environmental Protection Agency (EPA), and the Ministry of Food and Agriculture (MOFA). It could be an asset for the management of the WWC landscapes.

In short, the WWC benefits from a number of multi-stakeholder platforms distributed at the village, CREMA and regional levels. If properly utilized, these bodies could lead to more effective conservation of biodiversity in the CREMAs, and thus, to better governance of the WWC. Moreover, the existence of multi-stakeholder platforms is already a good basis for the implementation of landscape approaches. Indeed, the integrated landscape approach and multi-stakeholder platform concepts are intimately linked, such that proponents of ILAs suggest these platforms offer entry points for the implementation of a landscape approach (Ros-Tonen et al. 2018). ILAs generally aim to strengthen landscape governance through the establishment of multi-stakeholder platforms (Kusters et al. 2018).

8.5.3 Opportunities for the implementation of landscape approaches

Several opportunities exist in the WWC for implementation of landscape approaches. From the analysis of data from field observations, interviews and literature, the following key points emerge:

- Several environmental NGOs are active in Northern Ghana (see Table 8.1), particularly in the WWC. Their presence is a financial and technical asset for the functioning of the multi-stakeholder process. These, NGOs could provide opportunities for financing projects falling within the framework of natural resource management, and hence, the CREMAs. In the technical field, the interventions of these NGOs related to sensitization and capacity building of local populations on environmental issues constitute a definite advantage for the implementation of a landscape approach. This aligns with Principle 10 of the landscape approach (strengthened stakeholder capacity) (Sayer et al. 2013).
- Collaboration between various stakeholders involved in the WWC provides an advantage for the implementation of landscape approaches and is a key objective of the Ten Principles framework. This enhances Principle 6 to achieve a negotiated and transparent change logic (Sayer et al. 2013).
- Interviews with institutional actors show that they have a good understanding of the landscape approach and are convinced of its potential for improving landscape governance. This would facilitate their engagement in a multi-stakeholder process for landscape governance, including those of the WWC.
- As the WWC landscape is organized in CREMAs, with governance structures such as CRMCs and CECs, this facilitates the stakeholder consultation process at several scales: village, CREMA, and region/sub-region (Principle 3 of landscape approaches on multiple scales). There is also a plurality and diversity of stakeholders engaged in the governance of the WWC landscape (Principle 5 of landscape approaches on multiple stakeholders) (Sayer et al. 2013).

8.5.4 Challenges to the implementation of landscape approaches

Landscape approaches have emerged as a form of landscape governance based on negotiating trade-offs between biodiversity conservation and local development (Reed et al. 2017). However, their implementation requires a number of prerequisites that can sometimes be a constraint, or even a challenge. In the WWC zone, the main constraints or challenges include the following.

Financial constraints

Today, the CREMAs of the WWC are barely active due to a lack of financial and logistical support necessary to make the governance bodies work. Committee meetings, including in the CRMC and CEC, are difficult to organize, as are community patrols to monitor natural resources. Interviewees said the CREMAs only function effectively when external projects are implemented; the end of a project also marks the end of the CREMA operations.

Thus, financial constraints appear to be a major challenge to the proper functioning of the CREMAs, and the implementation of landscape approaches. Creation of a national fund to support the long-term development of the CREMAs would greatly benefit landscape governance.

A lack of a solid multi-stakeholder platform

At the level of the WWC, there are four types of multi-stakeholder platforms. However, these operate sporadically or are temporary (project-related). Moreover, even if there are multi-stakeholder platforms, they are often dedicated to only a portion of the actors affected by or affecting landscape governance. Yet, with landscape approaches, all key stakeholders must be brought together around the table for exchanges, negotiations and decision-making. Therefore, the establishment of a solid multi-stakeholder platform, based on long-term sustainable funding, with the capacity to convene all the key stakeholders in landscape governance, is a necessity for the implementation of a landscape approach in the context of the WWC.

Conflicts between pastoral and agricultural communities

In Northern Ghana, pastoralism is mainly practiced by Fulani herders. This community of nomadic pastoralists is strongly stigmatized by the other actors in the landscape with whom they sometimes maintain conflictual social relations. Some communities, particularly farmers who do not own livestock, are hostile to their presence in the same landscape (Tonah 2006). During interviews, the Fulani were always cited as a danger, threatening the sustainability of natural ecosystems because of the damage caused by their livestock (trampling of riverbanks, forest degradation, and crop destruction). The latter is the most frequent cause of conflicts between farmers and herders in Northern Ghana, and a serious hindrance to multi-stakeholder collaboration. The Fulani are also marginalized from natural resource governance processes – an exclusion that constitutes a major constraint to the development of landscape approaches, for which inclusion and collaboration between all the main actors in the landscape are fundamental principles.

8.6 Conclusion

The Western Wildlife Corridor in Northern Ghana is an area characterized by savanna ecosystems, with the presence of bush and woodland savannas, as well as gallery forests. This part of the country, despite the enormous pressure on natural resources, contains a rich biodiversity of flora and fauna relevant for local livelihoods. At the same time, Northern Ghana is marked by a problematic socio-economic and climatic context, with high poverty rate. This leads the local population to be highly dependent on natural resources. Hence the strong pressure on natural ecosystems, leading to landscape degradation and fragmentation. In addition, the WWC faces constraints linked to the governance of the CREMAs of which it consists. Among these, conflicts between landscape users, the malfunctioning of management bodies, the absence of a solid multi-stakeholder platform to facilitate collaboration and concerted decision-making between all key landscape stakeholders remain issues that threaten the sustainability of ecosystems in the WWC.

Although these constraints also put limits to the implementation of integrated landscape approaches, there are certainly opportunities to improve the governance of this landscape through such approaches. The organization of the landscape in CREMAs, the

existence of platforms (CRMCs and CECs), and the presence of environmental NGOs in the area could provide a good basis for setting up a governance mechanism that favours consultation in decision-making, negotiation of compromises, and collaboration between all the key actors of the landscape, around an inclusive and sustainable multi-stakeholder platform. This is the essence of implementing landscape approaches.

References

- Abdulai RT and Ndekugri IE. 2007. Customary landholding institutions and housing development in urban centres of Ghana: Case Studies of Kumasi and Wa. *Habitat International* 31(2): 257-267.
- Abdul-Moomin A, Issahaku A. and Motin B. 2016. The Shea Industry and Rural Livelihoods among Women in the Wa Municipality, Ghana. *Journal of Social Science Studies* 3(2): 40-56. <http://doi.org/10.5296/jsss.v3i2.8706>.
- Abdul-Rahaman I, Kabanda J. and Braimah MM. 2016. Desertification of the savanna: illegal logging of rosewood, causes and effects on the people of Kabonwule, Northern Region. *Saudi Journal of Humanities and Social Sciences* 1(3): 48-54. <https://doi.org/10.21276/sjhss.2016.1.2.3>.
- Agyare A. 2013. Polycentric Governance and Social-Ecological Performance of Community Resource Management Areas in Ghana. PhD thesis, University of Victoria, Canada. <https://doi.org/10.1017/CBO9781107415324.004>.
- Agyare A, Murray G, Dearden P and Rollins R. 2015. Conservation in context: Variability in desired and perceived outcomes of community based natural resources governance in Ghana. *Society and Natural Resources* 28(9): 975-994. <https://doi.org/10.1080/08941920.2015.1042127>.
- Ameyaw J, Arts B and Wals A. 2015. Challenges to responsible forest governance in Ghana and its implications for professional education. *Forest Policy and Economics* 62: 78-87. <https://doi.org/10.1016/j.forpol.2015.07.011>.
- Anderson J, Benjamin C, Campbell B and Tiveau D. 2006. Forests, poverty and equity in Africa: New perspectives on policy and practice, *International Forestry Review* 8(1): 44-53. 2006. <https://doi.org/10.1505/ifor.8.1.44>.
- Apagrimchang AA. 2018. The woes of the forest of Northern Ghana, a national challenge. Should the charcoal industry be banned? *Modern Ghana* 28-01-2018. <https://www.modernghana.com/news/831002/the-woes-of-the-forest-of-northern-ghana-a-nation.html>.
- Asare RA, Kyei A and Mason JJ. 2013. The community resource management area mechanism: A strategy to manage african forest resources for REDD+. *Philosophical Transactions of the Royal Society B: Biological Sciences* 368: 20120311. <https://doi.org/10.1098/rstb.2012.0311>.
- Barlow J, França F, Gardner TA, Hicks CC, Lennox, GD, Berenguer E, Castello L, Economo EP, Ferreira J and Guénard B. 2018. The future of hyperdiverse tropical ecosystems. *Nature* 559(7715): 517-526. <https://doi.org/10.1038/s41586-018-0301-1>.

- Baruah M, Bobtoya S, Mbile P and Walters G. 2016. Governance of restoration and institutions: Working with Ghana's Community Resource Management Areas. *World Development Perspectives* 3: 38–41. <https://doi.org/10.1016/j.wdp.2016.11.008>.
- Bouché P. 2007. Northern Ghana elephant survey. *Pachyderm* 42(42): 58–69. <http://hdl.handle.net/2268/91445>.
- Braimoh AK and Vlek PLG. 2005. Land-cover change trajectories in northern Ghana. *Environmental Management* 36(3): 356–373. <https://doi.org/10.1007/s00267-004-0283-7>.
- Brown O. and Crawford A. 2008. Climate change: A new threat to stability in West Africa? Evidence from Ghana and Burkina Faso. *African Security Review* 17(3): 39–57. <https://doi.org/10.1080/10246029.2008.9627482>.
- Clay N. 2016. Producing hybrid forests in the Congo Basin: A political ecology of the landscape approach to conservation. *Geoforum* 76: 130–141. <https://doi.org/10.1016/j.geoforum.2016.09.008>.
- Dimobe K. 2017. Dynamique, séquestration de carbone et modèles de variation des savanes soudaniennes du burkina Faso et du Ghana (Afrique de l'ouest). Doctoral Dissertation, Université Ouaga, Ouagadougou, Burkina Faso.
- Dumenu WK and Bando W. 2016. Exploitation of African rosewood (*Pterocarpus erinaceus*) in Ghana: A situation analysis. *Ghana J. Forestry* 32: 1–15.
- Foley JA, Ramankutty N, Brauman KA, Cassidy ES, Gerber JS, Johnston M, Mueller ND, O'Connell CO, Ray DK, West PC, et al. 2011. Solutions for a cultivated planet. *Nature* 478(7369): 337–342. <https://doi.org/10.1038/nature10452>.
- Foli S, Ros-Tonen MAF, Reed J and Sunderland T. 2018. Natural resource management schemes as entry points for integrated landscape approaches: Evidence from Ghana and Burkina Faso. *Environmental Management* 62(1): 82–97. <https://doi.org/10.1007/s00267-017-0866-8>.
- Germer J and Sauerborn J. 2008. Estimation of the impact of oil palm plantation establishment on greenhouse gas balance. *Environment, Development and Sustainability* 10(6): 697–716. <https://doi.org/10.1007/s10668-006-9080-1>.
- Godfray HCJ, Beddington JR, Crute IR, Haddad L, Lawrence D, Muir JE, Pretty J, Robinson S, Thomas SM and Toulmin C. 2010. Food security: The challenge of feeding 9 billion people. *Science* 327(5967): 812–818. <https://doi.org/10.1126/science.1185383>.
- Green KE. 2016. A political ecology of scaling: Struggles over power, land and authority. *Geoforum* 74: 88–97. <https://doi.org/10.1016/j.geoforum.2016.05.007>.
- Husseini R and Issifu H. 2015. Natural forest reserves in the northern region of Ghana: Description and management status. *Research journal's Journal of Forestry* 2(6): 1–15.
- IUCN 2012. *Livelihoods and Landscapes Strategy. Results and reflections*. Gland, Switzerland: International Union for Conservation of Nature (IUCN).
- IUCN 2014. Assessing Forest Reserve Conditions in Ghana through Crown Cover Mapping. Technical Report, (July): 1–8. Available at: https://www.iucn.org/sites/dev/files/import/downloads/mapping_ghana_forest_reserve_condition__pre_publication_report_draft__july_2014.pdf.
- IUCN 2017. The CREMA concept Upscaling Community Resource Management Areas as a Delivery Mechanism for REDD+ Implementation in Ghana International Union For

- Conservation of Nature. https://www.iucn.org/sites/dev/files/content/documents/upscaling_community_resource_management_-_ghana.pdf. (June): 1–6.
- Kusters K, Buck, L, de Graaf M, Minang P, van Oosten C and Zagt R. 2018. Participatory planning, monitoring and evaluation of multi-stakeholder platforms in integrated landscape initiatives. *Environmental Management* 62(1): 170–181. <https://doi.org/10.1007/s00267-017-0847-y>.
- Kwame BF. 2014. The economic cost of environmental degradation: A case study of agricultural land degradation in Ghana. *SSRN Electronic Journal*, (January 2014). <https://doi.org/10.2139/ssrn.2534429>.
- Läderach P, Martinez-Valle A, Schroth G and Castro N. 2013. Predicting the future climatic suitability for cocoa farming of the world's leading producer countries, Ghana and Côte d'Ivoire. *Climatic Change* 119(3–4): 841–854. <https://doi.org/10.1007/s10584-013-0774-8>.
- Laube W. 2015. Global shea nut commodity chains and poverty eradication in Northern Ghana: Myth or reality? *UDS International Journal of Development [UDSIJD]* 2(1): 128–147. <http://udsspace.uds.edu.gh/handle/123456789/456>
- Lindsay A. 2018. Social learning as an adaptive measure to prepare for climate change impacts on water provision in Peru. *Journal of Environmental Studies and Sciences* 8(4): 477–487. <https://doi.org/10.1007/s13412-017-0464-3>.
- Maindo A, Tulonde JL and Amuri F. 2015. Guide de bonne gouvernance forestière APV-FLEGT: Exploitation et commerce légaux du bois, une affaire de tous en Province Orientale, RD Congo, *Tropenbos International RD Congo*. https://www.tropenbos.org/file.php/1940/forest_governance_tbi_fao-flegt.pdf.
- Mamprugu Moagduri District Assembly. 2017. Community Resource Management Areas (CREMAs) Bylaw. [https://ghalii.org/gh/LGB No.12.pdf](https://ghalii.org/gh/LGB%20No.12.pdf).
- Marchetta F. 2011. On the move: livelihood strategies in Northern Ghana. <https://halshs.archives-ouvertes.fr/halshs-00591137>.
- Murray G, Agyare A, Dearden P and Rollins R. 2018. Devolution, coordination, and community-based natural resource management in Ghana's community resource management areas. *African Geographical Review* 38(4): 296–309. <https://doi.org/10.1080/19376812.2018.1426022>.
- Obiri BD, Nunoo I, Obeng E, Owusu FW and Marfo E. 2014. The charcoal industry in Ghana: An alternative livelihood option for displaced illegal chainsaw lumber producer. Wageningen, the Netherlands: Tropenbos International. <https://www.tropenbos.org/file.php/1681/3-charcoal.pdf>
- Ouko EM. 2018. Contextualising integrated conservation and development projects: Restoring the lost “harambee” link in Kenya. *Geoforum* 92: 81–91. <https://doi.org/10.1016/j.geoforum.2018.04.002>.
- Owusu-Ansa N. 2018. Assessing how collaborative resource management impacts victims' perspectives on wildlife crop raids. *Journal of Natural Resources and Development* 8: 115–124.
- Pitseys J. 2010. Le concept de gouvernance. *Revue Interdisciplinaire d'Études Juridiques* 65(2): 207–228. <https://doi.org/10.3917/riej.065.0207>

- Reed J, Van Vianen J, Deakin EL, Barlow J and Sunderland T. 2016. Integrated landscape approaches to managing social and environmental issues in the tropics: Learning from the past to guide the future. *Global Change Biology* 22(7): 2540–2554. <https://doi.org/10.1111/gcb.13284>.
- Reed J, Van Vianen J, Barlow J and Sunderland T. 2017. Have integrated landscape approaches reconciled societal and environmental issues in the tropics. *Land Use Policy* 63: 481–492. <https://doi.org/10.1016/j.landusepol.2017.02.021>.
- Ros-Tonen MAF, Reed J and Sunderland T. 2018. From synergy to complexity: The trend toward integrated value chain and landscape governance. *Environmental Management* 62(1): 1–14. <https://doi.org/10.1007/s00267-018-1055-0>.
- Sayer J, Sunderland J, Ghazoul J, Pfund J-L, Sheil D, Meijaard E, Venter M, Boedhihartono KA, Day M, Garcia C, et al. 2013. Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences of the United States of America* 110(21): 8349–8356. <https://doi.org/10.1073/pnas.1210595110>.
- Schroth G, Läderach P, Martinez-Valle AI, Bunn C and Jassogne L. 2016. Vulnerability to climate change of cocoa in West Africa: Patterns, opportunities and limits to adaptation. *Science of the Total Environment* 556: 231–241. <https://doi.org/10.1016/j.scitotenv.2016.03.024>.
- Tetteh AB, Atosina AM, Adongo AA. 2011. Charcoal production in Gushegu District, Northern Region, Ghana: Lessons for sustainable forest management. *International Journal of Environmental Sciences* 1(7): 1944–1953.
- Tonah S. 2006. Migration and farmer-herder conflicts in Ghana's Volta Basin. *Canadian Journal of African Studies / Revue canadienne des études africaines* 40(1): 152–178. <https://doi.org/10.1080/00083968.2006.10751339>.
- Tscharntke T, Clough Y, Wanger TC, Jackson L, Motzke I, Perfecto I, Vandermeer J and Whitbread A. 2012. Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation* 151(1): 53–59. <https://doi.org/10.1016/j.biocon.2012.01.068>.
- Warner J, ed. 2007. *Multi-Stakeholder Platforms for Integrated Water Management*. Ashgate Studies in Environmental Policy and Practice. Aldershot: Ashgate Publishing Limited.
- Wildlife Division (WD) 2000. Wildlife Division policy for collaborative community based wildlife management. <http://www.fcghana.org/library.php?id=19>.
- Wilson VJ. 1993. Zoological survey in Mole National Park. Final Report. North-Western Ghana part 1 large mammals. Forest Resource Management Programme/ Game and Wildlife Dept/IUCN project 9786_Accra Ghana: 124.
- World Bank. 2009. Implementation completion and results report. Northern Savanna biodiversity conservation project. 102(SUPPL. 1). <https://doi.org/10.1179/136485908X337463>.
- Yahaya AK and Venkateswar C. 2016. Are modern institutions effective in the conservation of the forest flora of Gbele resource reserve in the Upper West Region of Ghana? *International Research Journal of Environmental Sciences* 5(3)(March): 42–53. Available at: www.isca.in, www.isca.me.