Habitat conversion intensifies human–elephant conflict in the Eastern Wildlife Corridor, Ghana

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Introduction

Ghana was ranged by fairly large herds of elephants up until the 1970s (Douglas-Hamilton 1979). At one time elephants were found throughout the country but, as elsewhere on the continent, elephant habitat contracted during the 20th century. Today both the African savannah elephant (*Loxodonta africana*) and the African forest elephant (*L. cyclotis*) are still found, respectively, in the savannah and forest zones of Ghana. However, the populations are now confined to a few Protected Areas (PAs) and isolated remnant habitats, mainly due to human population pressure and related land use and land cover changes (AfESG 2000). Elephants are also killed illegally by poachers for the ivory trade, which dates back to ancient times (Parker 1973). By 2000, there were only eleven elephant population ranges in the country, with an estimated population of 1,000–2,000 individuals (WD 2000). These trends call for drastic and far-reaching elephant conservation efforts, including effective anti-poaching measures with more supportive legislation, and community-based land-use planning to foster harmonious human–elephant coexistence (HECx) in the country.

Ghana has exhibited zeal for the conservation of the African elephant, both domestically and on the international front. Ghana was the first country to propose listing of African elephants in Appendix 1 of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). The country is also signatory to other international conventions, including the Convention on Biological Diversity (CBD), Ramsar Convention on Wetlands of International Importance, Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) and the United Nations Framework Convention on Climate Change (UNFCCC), among others. In July 2008, Ghana entered into a bilateral cooperation agreement in the form of a memorandum of understanding (MOU) with the Republic of Burkina Faso for the purpose of conserving natural resources shared by the two countries, including savannah elephants.

In 2000, the Wildlife Division of the Forestry Commission of Ghana, in collaboration with the World Wide Fund for Nature (WWF) and IUCN's African Elephant Specialist Group (AfESG), developed an Elephant Conservation Strategy as a guide to ensure the conservation and survival of viable elephant populations and their habitats throughout the country. This strategy informed studies conducted of elephant migratory corridors by the Northern Savannah Biodiversity Conservation Project (NSBCP), under the auspices of the Global Environment Facility (GEF) and the World Bank, between 2002 and 2009. These studies identified two main elephant migratory routes between Burkina Faso and northern Ghana, which were designated the Eastern and Western Wildlife Corridors (EWWC). The forests and wildlife in the corridors are jointly managed by the Forest Services Division (FSD) and Wildlife Division (WD) of the Forestry Commission.

This article provides a summary description of the EWWC, presents data on human–elephant conflict in the Eastern Wildlife Corridor, and discusses approaches to mitigate conflicts and ensure the survival of the elephant population in the corridor.

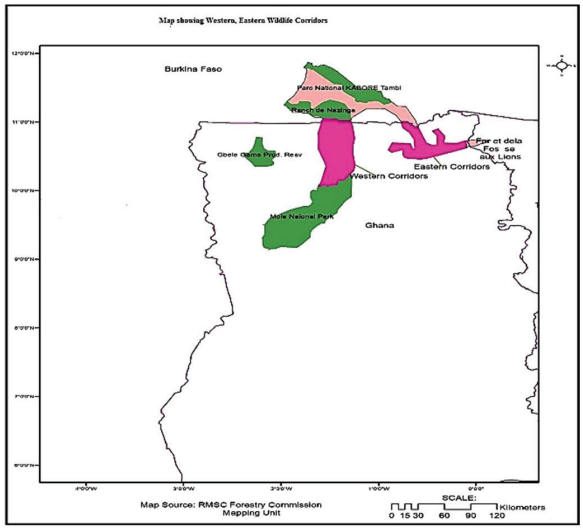
The Eastern and Western Wildlife Corridors

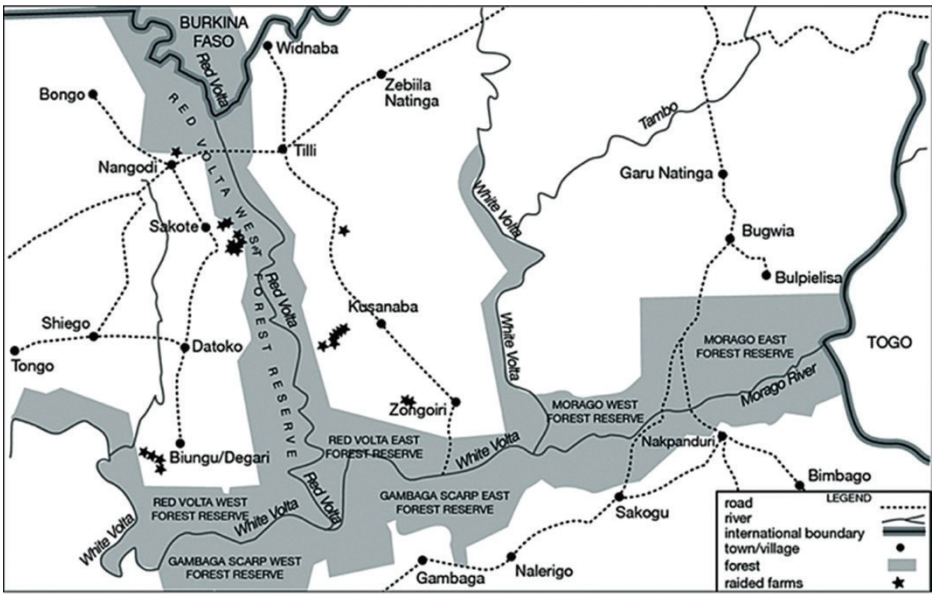
The Northern Savannah Biodiversity Conservation Project (NSBCP) was designed with the primary purpose of improving the environment, livelihoods and health of the people of the northern savannah ecological zone of the country through the conservation and sustainable use of natural resources (NSBCP 2000).

Studies conducted during the implementation of the NSBCP demonstrated that savannah elephants and other species of ungulates migrate between conservation areas in southern Burkina Faso and the northern savannah ecological zone of Ghana. These studies confirmed the accounts of chiefs and local people (Adjewodah 2004), and earlier research by the Wildlife Division's Elephant Conservation Strategy (WD 2000). The studies further identified two main elephant migratory corridors within northern Ghana that were designated as the Eastern and Western Wildlife Corridor (EWWC).

The Western Wildlife Corridor (WWC) covers a length of approximately 143 km within Ghana, connecting Nazinga Game Ranch in southern Burkina Faso through Gbele Resource Reserve to Mole National Park (NP), the country's largest protected area (PA). The WWC incorporates the watersheds of the main tributaries of the Sissili and Kulpawn Rivers that flow into northern Ghana from Burkina Faso and encloses several gazetted forest Reserves (FRs) in the areas of habitat that span these two PAs. The corridor encompasses nineteen traditional community areas in four regions of Northern Ghana. The Eastern Wildlife Corridor (EWC) covers approximately 80 km, from Kaboré Tambi NP in Burkina Faso along the Red Volta River Valley as far as its confluence with the White Volta River. Here the corridor branches out, westwards and eastwards, encompassing parts of the watersheds of the White Volta and of its tributary, the Morago River, which connects in the east with Fôret de la Fosse aux Lions NP in the Republic of Togo. The whole area of these river valleys comprises gazetted FRs, which are bordered by community-owned lands, and is collectively often referred to as the Red Volta Valley (Fig. 1).

The ecological corridors and adjoining landscapes are bio-networks, containing major river bodies, gallery





Above and Below. Figure 1. Location of the Eastern and Western Wildlife Corridors of northern Ghana and southern Burkina Faso (*Source: RMSC, Mapping Unit, FC and Adjewodah 2014*).

Above left. Figure 2. WD field rangers on patrol in the corridor (*these and following photos taken by WD Rangers, 2021*). **Above right.** Figure 3. Savannah Elephants in the Eastern Wildlife Corridor.

forest and savannah, and other natural ecosystems that bridge PAs, FRs and isolated remnant habitats. Three of the four of the elephant ranges in the northern savannah overlap with the Corridors: the Sissili and Tumu, and Mole NP ranges in the WWC, and the Red Volta Valley range in the EWC. These corridors facilitate connectivity among these elephant populations that seasonally migrate across northern Ghana and southern Burkina Faso, and occasionally into the Republic of Togo, thereby facilitating rescue efforts to enhance gene flow (Sam 1994).

The corridors are also agrarian landscapes containing community-owned lands on which the local communities largely depend for their livelihood and sustenance. They constitute a human–elephant interface that requires careful management to achieve a viable balance between development, food security and biodiversity conservation. This is the task facing the Forest Services and Wildlife Divisions of the Forestry Commission that jointly manage the landscapes as ecological corridors (Fig. 2).

Human–elephant conflict in the Eastern Wildlife Corridor

Scientific data on elephant population numbers in the Eastern Wildlife Corridor in the last century seem to be lacking; however contemporary accounts of hunters and the local people in the area suggest that the corridor contained fairly large numbers of migratory elephants during the 1970s (pers. comms. 2021). The EWC, or Red Volta Valley range, currently harbours the third most abundant savannah elephant population in Ghana, estimated at 80–120 individuals (WD Field Staff estimation 2021), and is considered to be one of the few viable populations of savannah elephants remaining in the country (Fig. 3).

However, the elephant population in the EWC is affected by human–elephant conflict (HEC) that continues to undermine elephant conservation efforts by the WD. According to IUCN, HEC is mainly caused by competition for natural resources and space between humans and elephants, where elephants and humans happen to share the same landscape (IUCN 2003). HEC in the EWC is not so different; the conflicts are mainly caused by competition over natural resources between humans and elephants due partly to the rapid transformation of the landscape for human livelihood needs. HEC in the corridor is a threat to food security for the people living in and around the corridor, as well as a major threat to the survival and conservation of the elephants in the area.

As elsewhere in Africa and Asia, HEC in the EWC seems to have intensified in recent years, primarily due to increasing human population pressure, expanding human settlements and other infrastructure into traditional elephant habitat, and associated conversion of the landscape for cultivation and pastoral activities. Other impactful human activities include illegal logging for lumber, cutting of trees for charcoal burning and fuelwood (Fig. 4), annual bushfires, slash and burn agriculture, and the cutting and harvesting of grasses, medicinal herbs, straw and canes for various domestic uses. The area is also affected by small-scale artisanal mining and mineral prospecting activities (known locally as *galamsey*) and the attendant habitat depletion, including pollution of rivers (through panning and mineral processing activities). Residual mining pits (Fig. 5), vestiges of past *galamsey* activities, are hazards for elephants and restrict their movement within the

Above left. Figure 4. Trees cut and piled to be burnt into charcoal;
Above right. Figure 5. Impact of galamsey: residual mining pit holes.

corridor.

Furthermore, there is apprehension that the construction, currently underway, of the Pwalugu Multipurpose Dam across the White Volta River could further escalate HEC, in addition to its unavoidable negative impacts on ecological networks and biotopes, and their animal populations, including elephants.

Crop raiding by elephants is known to be the most prevalent form of HEC, and can result in devastating economic losses for farmers, loss of human lives and killing of elephants (Parker, 2001). Table 1 shows incidents of crop raiding in the EWC in 2017–2021, based on reports received by WD staff. In addition to damage to crops, elephant raids can reduce farm productivity for farmers who have to spend more time guarding their crops. Elephants in the EWC also cause destruction of economic trees, including shea (*Vitellaria paradoxa*) and dawadawa (*Parkia biglobosa*). Added to these, there are the fear and panic among the locals caused by unexpected encounters with elephants, and in extreme situations unfortunate loss of human lives resulting from elephant attacks (with four fatalities recorded during 2017–2020).

In retaliation, affected farmers are reported to liaise with elephant hunters, some of whom are believed to have links to the illegal wildlife trade. Seven elephants were illegally killed by poachers in 2017–2021. If not checked, this cycle of elephant crop raiding and apparent retaliatory killings has the potential to decimate the elephant population in the Red Volta Valley range, to the detriment of the country's efforts to conserve its remnant elephant stocks.

Table 1. Incidents on elephant crop raiding in the Eastern Wildlife Corridor (EWC). The districts affected are indicated by stars on the inset map in Figure 1

Year	No. of incidents reported	No. of farmers affected	Estimated area affected (ha)	Crops most affected	Theses
2017	75	51	39.7	Maize, guinea corn, rice, groundnut, sweet potato	Nabdam, Bawku West Talensi
2018	86	66	44.2	Maize, guinea corn, rice, potato	Nabdam, Talensi, Bawku West, Garu
2019	95	51	32.8	Maize, guinea corn, rice, cowpea	Nabdam, Talensi, Bawku West
2020	71	25	39.4	Maize, guinea corn, cowpea	Nabdam, Bawku West, Talensi, Garu and Tempane
2021	64	52	25.9	Maize, guinea corn, cowpea, rice, groundnut, millet	Bawku West, Talensi
Total	**391**	**211**	**182.0**		

Note: All defendants in ivory trials initiated in 2017 pleaded not guilty.

Discussion and recommendations

HEC constitutes both a major security threat for local people living in and around the corridor, and a major threat to the survival and conservation of elephant population in the transfrontier landscape. Negative interaction between the local community in the corridor and the elephants increasingly and unavoidably undermines elephant conservation efforts by the WD.

While much of the conflict occurs on community-owned lands, an increasing number of incidents are recorded on the adjoining gazetted FRs, both in Ghana and Burkina Faso, indicating a growing problem of illegal human encroachment into these reserves. The occupation of forest reserves that were supposed to be core biodiversity conservation zones in the corridor and safe havens for elephants is resulting in the rapid transformation of the entire landscape in the EWC. The degradation, loss and/or fragmentation of habitats in the FRs is exacerbating conflicts within the landscape. Elephants are long-lived animals, with their survival depending to a large extent on regular migration over large distances to search for preferred diet, water and social, as well as reproductive partners (Barnes 1999). It is estimated that an African elephant family herd requires, on average, a home range size of 11–500 km² (Roth and Douglas-Hamilton 1991). The degradation of FRs is rapidly reducing the elephants' home range, cutting off ancient migratory pathways, and reducing the availability of their traditional diet.

In a study promoting carbon services produced by wild animals, the authors forecast that if current populations of African elephants are protected, their services to African economies will be worth $20.8 billion and $25.9 billion for the next 10 and 30 years respectively; with the possibility of financing anti-poaching and conservation programmes (Berzaghi et al. 2022).

Certainly, in response to the above threats, wildlife legislation in the country ought to be improved, to provide the basis for effective law enforcement, and active community involvement in wildlife and natural resources management. Accurate and up-to-date information on population and habitat variables for all elephant population ranges is required for effective management and decision-making, as well as improved awareness of elephant conservation issues at all levels in the country. Many of these measures are envisaged in the new Wildlife Resources Management Bill (2014). Unfortunately, the passage of the Bill into an Act of Parliament has been long delayed and, at the time of writing, it is still undergoing parliamentary review.

The EWC is a wildlife–agrarian landscape, and as such a promising way forward for conservation of elephants could be the adoption of a more dynamic and harmonious human-elephant co-habitation approach (HECx). This will involve concerted efforts to safeguard both habitat for elephants and farmers' livelihoods from elephant attack. One way could be through the establishment of community resource management areas (CREMAs) in the corridor. CREMAs aim at encouraging and empowering community resource governance and ownership towards sustainable resource utilization. The concept was developed by the Wildlife Division of the Forestry Commission of Ghana to promote collaborative and participatory wildlife management in the country (Balaya et al. 2020) and has been recognized by IUCN as fulfilling the criteria for 'other effective area-based conservation measures' (OECMs) for effective in-situ conservation of biodiversity outside PAs (Dudley et al. 2018). The establishment of CREMAs in the EWC would facilitate creation of additional livelihood sources for communities in the corridor that are resilient to elephant attacks. In this regard the plan to establish three CREMAs in the EWC as part of the World Bank's ongoing Ghana Landscape Restoration and Small-Scale Mining Project (GLRSSMP) is a step in the right direction. Another HECx strategy could be the establishment of viable community-based ecotourism schemes leveraging the presence of elephants to attract tourists and generate revenue to offset the effects of elephant attacks on farmers' livelihoods. In the longer term, adoption of this approach aims to create adequate habitat for elephants by curtailing all forms of encroachment and illegal activities in FRs in the corridor.

Additionally, farmers must be encouraged to continue with the adoption of simple traditional methods, introduced by the WD, to guard their farms and crops and deter marauding elephants. These methods include use of carbide cannons, clashing metal objects together, lighting bonfires, flashing lights during the night, applying chilli grease to fences, and placing elephant dung laced with chili around cultivated areas, among others. Modern surveillance techniques that involve the combined usage of elephant infrasonic call detectors with mobile phones for rapid communication among farmers and between farmers and WD officials may also

have to be explored in the future. Looking forward, long-term capital-intensive mitigation strategies could include translocation of affected farmers, with an appropriate compensation package, similar to a scheme which has been operating in the Chyulu Hills/Tsavo West/Amboseli complex in Kenya for several years (Okello et al. 2016). All such measures should form part of an integrated landscape management approach that involves engaging all relevant stakeholders at the national and local levels in managing and mitigating HEC in the EWC. Ultimately, a resilient community livelihood base is needed to ensure both food security and elephant conservation in the corridor and other similar elephant ranges across the country.

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