

CASE STUDY

#03



GHANA

Landscape degradation and interactions of agriculture, deforestation, illegal mining, and water pollution in the Atewa Range Forest Reserve and fringe communities

CASE STUDY BRIEFS

Series on agriculture driven nature loss



Case Study #03: Ghana - Landscape degradation and interactions of agriculture, deforestation, illegal mining, and water pollution in the Atewa Range Forest Reserve and fringe communities.

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CASE STUDY

#03

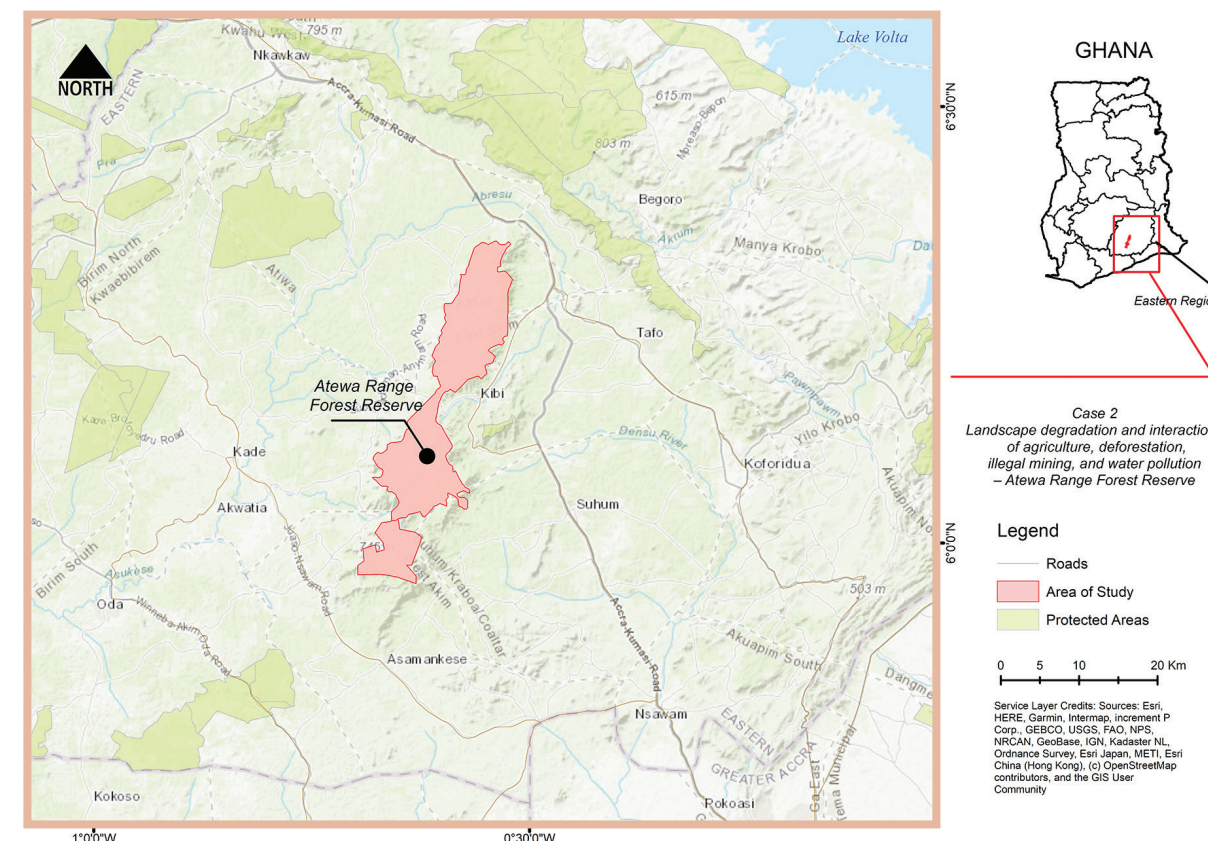
GHANA

Landscape degradation and interactions of agriculture, deforestation, illegal mining, and water pollution in the Atewa Range Forest Reserve and fringe communities

This is one a series of eight case studies under the Mitigating the Agricultural Drivers of Nature Loss study implemented by the CGIAR for the World Bank that provides examples of opportunities to address the drivers and impacts of agricultural driven nature loss in different country contexts for specific case studies. Each brief is the result of an extensive review, expert consultations, and a listening session with key stakeholders. This case study brief specifically deals with landscape degradation and interactions of agriculture, deforestation, illegal mining, and water pollution in the Atewa Forest Reserve and fringe communities in Ghana.



The Atewa Range Forest Reserve and the Atewa Range Extension Reserve covering a total land area of 263 km²	The reserve is endowed with a rich biodiversity of rare flora and fauna.
Atewa was designated as a special biological protection area in 1994, Globally Significant Biodiversity Area (GSBA) in 1999 and an Important Bird Area (IBA) in 2001.	



Overview

The Atewa Range Forest Reserve (Atewa) comprises two forest reserves, namely the Atewa Range Forest Reserve and the Atewa Range Extension Reserve covering a total land area of 263 km². Atewa is a moist semi-deciduous forest located in the Eastern Region of Ghana at latitudes of 0° 58 to 6°20 North and longitudes 0°31 to 0°40 West. It is a mountain range, which peaks at 842 metres with a north-south orientation and characterized by series of plateaus. It was designated as a Forest Reserve and established in 1926 to protect the mountains within it that house the headwaters of three major rivers namely, Birim, Densu and Ayensu. These rivers are the sources of drinking water to an estimated 6 million people from the Eastern and Greater Accra Regions of Ghana, including capital Accra. Atewa was designated as a special biological protection area in 1994, Globally Significant Biodiversity Area (GSBA) in 1999 and an Important Bird Area (IBA) in 2001. Atewa is surrounded by more than 40 settlements with an estimated population of about 75,180. The forest reserve has a significant impact on the

microclimate of the neighbouring communities and enhances their environmental resilience in terms of being able to withstand environmental stresses such as drought, unfavourable temperatures, and air pollution. Because of its natural beauty, Atewa has a significant potential for tourism.

Atewa lies within the Upper Guinean Forests of West Africa, one of the eight biodiversity hotspots in Africa. The reserve is endowed with a rich biodiversity of rare flora and fauna. It has 656 species of vascular plants of which 323 are tree species, 83 are shrub species, 155 are lianas and climber species, 68 are herbaceous species, 22 are epiphytic species and 5 are grass species. Atewa is home to many endemic and rare species, including 5 Black Star plant species which are of global significance and are the highest conservation priority in Ghana. Atewa has more than 12 Chiroptera (bat), 16 Rodentia (rodents), 7 Soricomorpha (shrews), 22 large mammal, 6 primate, 19 freshwater fish, 40-50 amphibian, 227 bird, 69 invertebrate, 120 Odonata (dragonflies & damselflies), 700 Lepidoptera (butterflies and moths) and 61 Orthoptera (katydids or bush

Figure 1:
MAP OF THE
CASE STUDY
LOCATION

crickets) species. The invertebrate species include a new species of spider tick (order *Ricinulei*, *Arachnida*) which is the 58th known species of this relict group of organisms. One of the fish species recorded in the Ayensu River (*Epiplatys chaperti*) was previously known to occur only in Côte d'Ivoire. The 700 species of Lepidoptera recorded in Atewa is also the highest for any tropical forest in West Africa. Several species in Atewa have been classified as either Vulnerable, Near Threatened, Threatened, Endangered or Critically Endangered by the IUCN Red List. In fact, the presence of the endemic Afia Birago's Puddle Frog, which is only found in this reserve, that is listed on the IUCN Red List has placed Atewa on the Alliance for Zero Extinction list.

Even though Atewa has been designated for protection, human activities continue to impact the reserve and its catchments leading to deforestation and degradation. The reserve and surrounding areas have mineral deposits of gold, bauxite and other minerals. Gold has attracted illegal small-scale mining (galamsey) in and off the reserve. The Ghanaian government has also outlined plans to mine bauxite in Atewa as part of an infrastructure development programme. Many civil society groups, NGOs, professional institutions and some community members have opposed the project. They have instead proposed that the reserve be upgraded to national park to protect it. An upgrade to a National Park would imply greater protection and an increase in conservation efforts. Currently, there is a pending lawsuit against the government's decision to mine bauxite in the reserve. Other pressures on the reserve include illegal logging, hunting and overexploitation of non-timber forest products (NTFPs). Parts of the reserve have also been encroached on for agricultural production such as for plantains, cocoa and subsistence annual and vegetable crops.^{0.7}



Key drivers of nature-agriculture conflict (fig. 2)

The underlying drivers of deforestation landscape degradation in Atewa are multiple and interdependent. They include the **exclusion of fringe communities in the management** of the reserve; **population growth, unemployment and poverty**; **lack of direct financial benefits** from the reserve combined with the **attractiveness of large financial benefits** from logging and mining; a mix of conflicting policies, **weak policy implementation and compliance**; and **political interference** at the subnational and national levels. The competition for land between monoculture agriculture and gold mining also exacerbates the conflict, as both activities require clearing forested areas, leading to deforestation, land degradation and loss of biodiversity.

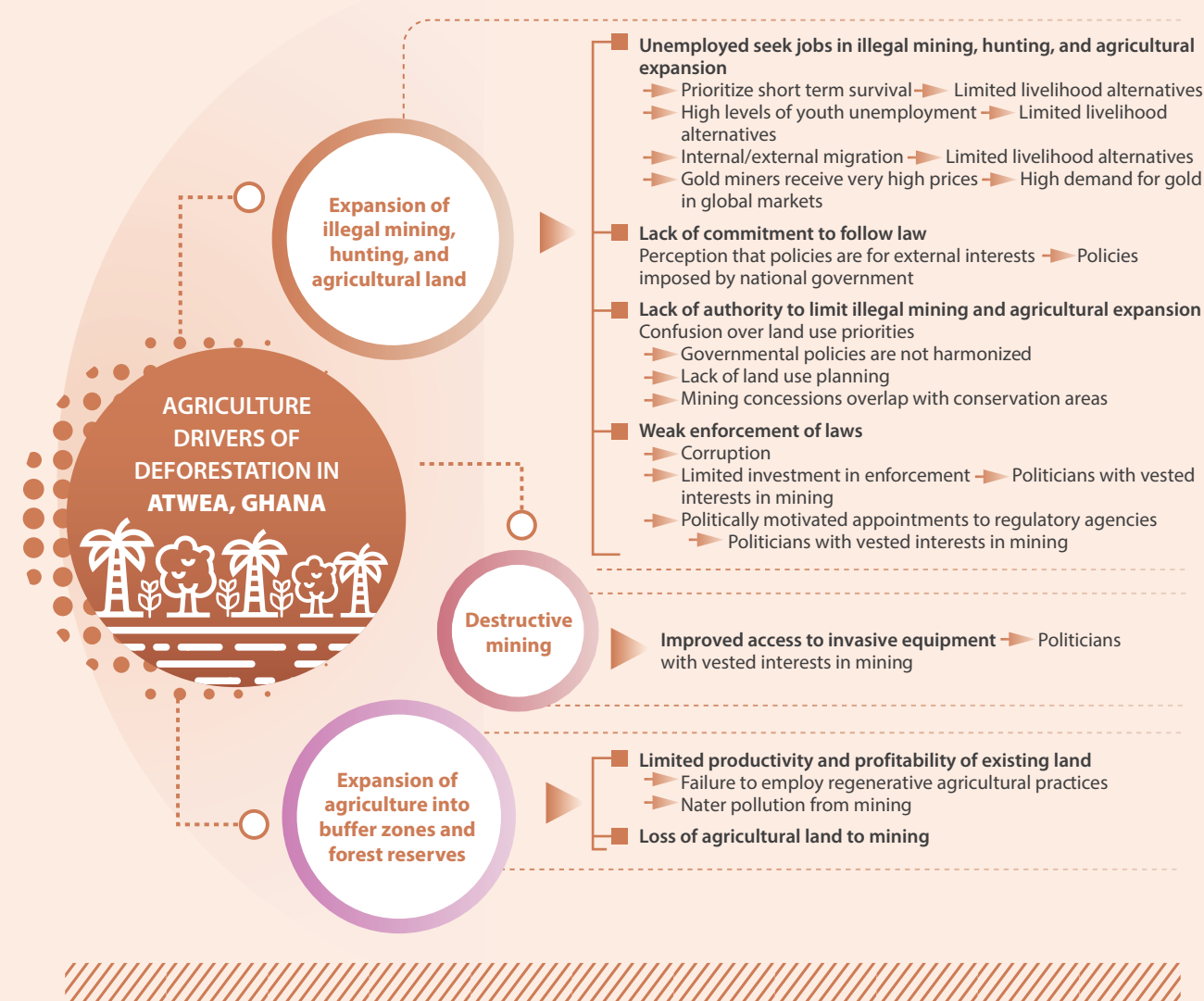
Forest management

The current forest governance regime does not encourage fringe communities to participate in the management of the reserve. Local communities feel excluded because they are not involved in any way in the management of the reserve. The result is that they feel that **conservation laws are imposed on them** without their input or consent. This has led to a **lack of ownership and commitment to these laws**, making them less effective and more difficult to enforce. Exclusion from decision-making have also fosters distrust between local communities and the Forest Services Division (FSD) of the Forestry Commission. Communities **perceive the policies as serving external interests** rather than their own, leading to resistance against conservation efforts and a preference for illegal mining, logging, hunting, and agriculture expansion in the forest reserve as a means of asserting control over their livelihoods.

Population growth, unemployment and poverty

Many fringe communities of the Atewa Range Forest Reserve are poor and rely heavily on natural resources for their livelihoods. When faced with poverty, **communities prioritize short-term survival over long-term environmental sustainability**. Illegal gold mining, logging, and hunting, although dangerous and environmentally destructive, offer quick financial returns. **High unemployment rates among youth** in Ghana leaves them with few alternatives for survival, especially young men, but to move to areas such as Atewa to undertake illegal mining. Not all the illegal miners are from the Atewa area. **Migration** from as far as northern Ghana, Côte d'Ivoire, Togo, Burkina Faso and other neighbouring countries. In the last two decades, there has also been a significant influx of Chinese migrants to Ghana, primarily to engage in illegal mining. This has exacerbated deforestation and land degradation as these migrants have the resources to employ excavators and bulldozers in the mining process. **"Land hunger"**, a situation where the population of forest fringe communities increase, with a resultant need for additional land to meet social and income needs is also driving agriculture expansion into the forest reserve. While some fringe communities around Atewa are genuinely land hungry, for others the expansion of agriculture into forested areas is motivated by the **forest soils being more fertile, the loss of land due to mining activities, and severe pollution of water sources from mining** that has left agricultural lands unviable with

Figure 2:
CASUAL PATHWAY OF INTERRELATED DRIVERS



limited restoration options. Livelihood interventions rolled out by government and other development agencies in the Atewa area are not attractive enough to lure people from illegal mining. The **lack of viable livelihood alternatives** also forces people to exploit timber and other NTFPs unsustainably, leading to further degradation.

Financial opportunities

The problem of population growth, unemployment and poverty is compounded by the **lack of direct economic benefits from the reserve to the fringe communities**. The majority of inhabitants of the fringe communities do not gain any tangible benefits from the conservation of the forest as there are no economic incentives linked to conservation such as payments for ecosystem services (PES), revenue from ecotourism, or sustainably harvesting NTFPs. The lack of direct monetary benefits from conservation efforts pushes people towards illegal mining, logging, hunting and agricultural expansion. This is aggravated by the **high demand for gold in the global market and the availability of mining equipment and technology**. Many inhabitants also view

conservation as a luxury they cannot afford, especially when struggling with poverty, food insecurity, and unemployment.

Policy environment

Governments sectoral policies for mining, agriculture and natural resource conservation are not harmonised. For instance, there are agricultural policies that encourage the production of cash crops like cocoa, rubber and oil palm while mining policies also promote gold extraction, both of which require land that overlaps with conservation areas and conflict with subnational regulations and authorities. This policy conflict has created **confusion over land use priorities**. This challenge is exacerbated by a **lack of land use planning** to order and regulate land use in an efficient way. This misalignment aggravates the pressure on the forest reserve as

each sector pursues its goals without considering the environmental impacts. Governmental policies also appear to **favour mining relative to conservation**. The fact that the same minister oversees both the mining and forestry sectors often leads to forestry regulation being prioritized after mining policy. This preference is demonstrated by the lack of political will to fight illegal mining and the passage of laws such as the Environmental Protection (Mining in Forest Reserves) Regulation 2022 (L.I. 2462) which grant unrestricted access to all forest reserves for mining purposes.

Even where policies are well-crafted, **weak enforcement** allows illegal activities such as unregulated farming and mining to proliferate in the protected area. A clear example is the inability of the FSD to protect the forest reserve from illegal mining, logging and farming despite having a clear mandate to do so. The FSD which is responsible for protecting the reserve have insufficient funding and inadequate personnel and equipment to do so. The illegal miners often have better security equipment than FSD officers and in certain instances control access to the reserve. This reality hampers the FSD's ability to monitor activities, enforce laws and respond to illegal activities. The result is a **gap between policy intentions and on-the-ground reality**, with destructive activities continuing with little resistance. Law enforcement agencies sometimes accept bribes in exchange for turning a blind eye to illegal mining, hunting and agricultural expansion. In some instances, they even provide protection to the miners. **Corruption** not only encourages these illegal activities but also creates a culture of impunity, where miners believe they can operate without consequence.

Political interference

Some political leaders, driven by personal gains have **prioritized mining** in the Atewa area over environmental conservation. At the country level, political pressure has led to the issuance of small-scale mining licenses to several companies to mine gold around the reserve, making the Atewa Range Forest Reserve an "island in a sea of mining". Some of these **concessions even overlap with lands which were originally part of the reserve**. Political interference has weakened the ability of environmental regulatory bodies such as the Environmental Protection Agency (EPA), the Minerals Commission and the Forestry Commission to enforce their own laws and regulations. At the subnational level, politicians exert pressure on law enforcement agencies to **overlook illegal activities**, particularly if those illegal activities are being undertaken by powerful subnational actors. **Politically motivated appointments** of individuals to key regulatory or administrative positions have also led to a lack of action against illegal mining, logging and agricultural expansion. These appointees often are more inclined to serve political interests rather than uphold environmental laws, leading to a lack of enforcement and increased illegal mining activities in and around the forest reserve. **Politicians with vested interests in mining** have blocked or delayed the designation of Atewa as a national park despite its biological resources, cultural significance and its importance as a watershed. These actions have undermined efforts to protect the forest and create legal frameworks that could restrict mining activities in and around it.

Core impacts of the nature-agriculture conflict

Food contamination

The Atewa Range Forest Reserve is a source of wild food such as bushmeat, snails, honey, mushroom, fruit, and medicinal plants and raw materials such as timber, fuelwood, rattans and canes. The availability of food, subsistence and livelihood products have been compromised due to unregulated mining and wanton destruction of the forest, putting local populations which are dependent on these resources at risk. The Atewa Range Forest Reserve is also a source of water for domestic, agricultural and industrial use, serving approximately 6 million Ghanaians. These rivers are currently polluted with heavy sediments loads and heavy metals such as mercury because of unregulated mining, making the Ghana Water Company spend about 60% of all the chemicals procured for water treatment for domestic and industrial use on these three rivers. A study by the Department of Plant Biology and Conservation Science of the University of Ghana revealed that all the major wildlife caught for bush meat in the area are contaminated with mercury above the WHO thresholds. Similar contaminations have also been observed in crops cultivated in the area. If these containments are found in Ghana's cacao and other export crops, the country could find itself unable to sell them in the European Union and other regions with similar restrictions on heavy metals in its food supply.

Ecosystem services

Ecosystem services provided by the Atewa ranges from watershed protection, runoff control, erosion control, groundwater recharge, rainfall regulation, windbreaks, air purification, carbon sink and pollinator habitat. The forest protects the sources of three major rivers, namely, the Densu, Ayensu and Birim Rivers. The ongoing degradation of the reserve has compromised its ability to protect these watersheds. Illegal mining activities has led to deforestation and soil erosion, which has increased the risk of flooding, sedimentation and pollution of the rivers. The hills of the reserve have occasionally been farmed by the fringe communities causing serious degradation of the slopes with erosion leading to further water pollution. The destruction of the forest cover due to illegal mining, logging and agriculture expansion has diminished the carbon sequestration capacity of the forest and contributed to higher atmospheric CO₂ levels. The loss of forest habitats and disruption caused by mining and agriculture expansion has also



negatively affected pollinator populations, with its consequential impact on crop yields. Furthermore, the loss of forest cover due to mining and agriculture expansion has disrupted the climate-regulating functions, leading to changes in local weather patterns as observed by the local inhabitants. The interaction of the loss of all these ecosystem services has undermined the resilience of ecosystems and communities making them more vulnerable to climate change.

Habitat conservation

The Atewa Range Forest Reserve is a biodiversity hotspot, gene bank for endemic species and home to a diverse range of flora and fauna, including many endangered and endemic species. Atewa also provides unique habitat for special species of ferns, mosses and butterflies found only in tropical forests in this region. Illegal mining activities and deforestation from agricultural expansion and logging have disrupted the natural habitats and illegal hunting has threatened the existence of certain species particularly mammals, leading to loss of species and reduced biodiversity. The destruction of forest cover and fragmentation of habitats have also pushed wildlife out of their natural habitats, affecting ecological balance.

Cultural importance

Atewa holds cultural, spiritual, and recreational value for the local inhabitants, especially the chiefs and people of the Akyem Abuakwa Traditional Area. The paramount chief of the

traditional area prides himself as being the "King of the Forests" due to the Atewa Range Forest Reserve and several other forest reserves scattered across their homeland. Important rites are performed in the reserve during cultural events and festivals. Part of the forest is also used as a burial place for paramount chiefs. The continuous destruction of the forest due to illegal mining and logging and agricultural expansion has diminished these cultural and recreational benefits.

Effective management approaches and solutions available (fig. 3)

Several options could be considered to improve the socio-economic status of the inhabitants of the fringe communities of the Atewa Range Forest Reserve while preserving its natural resources. These include the **conversion of the Atewa range Forest Reserve into a national park**, the **creation of value-added agricultural enterprises** to employ the unemployed youth, provision of **alternative livelihood programs, real time monitoring** of the Atewa Range Forest reserve, **exclusion of biodiversity hotspots from mining, restoration of degraded areas, decentralization of the mining licensing regime** and **development and enforcement of land use plans**. While these proposed options are not exhaustive, the implementation of these solutions must be comprehensive and not piecemeal to have full effect in protecting the forests and biodiversity of the region.

Conversion into a national park

Recent assessments have recorded considerable loss of biodiversity within Atewa due to illegal activities such as mining, logging, farming and hunting, especially in the northern and southern sections. There is weak patrolling, which allows inhabitants of fringe communities and others to easily enter Atewa and undertake illegal activities. A large proportion of the forest reserve, however, remains intact, which is evidenced by its continued protection

Figure 3:
CASUAL PATHWAY OF INTERRELATED SOLUTIONS



of the watershed for three major rivers and the provision of ecosystem services and production of NTFPs. Recent sightings of some faunal species including primates, birds, and duikers even with the concerning high level of degradation gives indications of the continued biological richness of the reserve. To halt the decline of the biological resources, there is the need to **change the management regime from a forest reserve to a national park**.

Converting Atewa to a national park will also allow for Ghana to take advantage of **tourist revenue** from the forest. It is a tourist destination not just because its biodiversity and impressive aesthetic mountain landscapes but also due to its location, ecological status, cultural and historical heritage, infrastructure and overall social importance to Ghana. Atewa is about one and half hour drive from Accra and two and half

hours' drive from Kumasi. The relatively short distance and good road network from the two major cities in Ghana could motivate potential international and domestic tourists to make a day's trip to the attractions within Atewa. The headwaters of the rivers that drain the reserve has scenic attributes that could attract tourist to the park. There are also many waterfalls and steep river channels which could be used for surfing. There are historical attractions such as palaces, shrines and royal mausoleums in the Akyem Abuakwa Traditional Area which tourists visiting the Atewa National Park could also visit. Tourists could also participate in the Ohum and Odwira festivals celebrated by the people of the area.

Ghana is a signatory to the African Convention for the Conservation Nature and Natural Resources. As a signatory, one of the country's obligations is to **establish, maintain and extend, as appropriate, conservation areas** which are most representative of and peculiar to areas under the jurisdiction or are characterized by a high degree of biological diversity. Signatory countries are also required to ensure the conservation of all species. They must protect the critical habitat of species that are only represented in areas under

their jurisdiction; threatened; or of special scientific or aesthetic value. Converting Atewa into a national park, apart from protecting the biodiversity and improving the livelihoods of the residents in the fringe communities through ecotourism, will also ensure that Ghana fulfils its international obligations. Conversion of Atewa into a national park and developing its tourism potential could yield substantial economic benefits to both the national and subnational economies. Benefits will accrue from the creation of several tourism-related jobs in and around the park and revenue generation from visitations. The national park could also be used to **attract investments in carbon and biodiversity credits**. Conserving Atewa will ensure that habitats necessary for the survival of unique species are preserved, a genetic reservoir vital for the resilience of ecosystems is maintained, ecosystem services continue to function and additional carbon is sequestered.

Improved livelihood options

Youth unemployment remains one of the biggest challenges to the degradation and deforestation of Atewa. Much of the youth face limited income generating opportunities. Thus, they turn to illegal mining, logging and hunting despite the dangers associated with them, as many of the youth feel like they have no other option to survive and build a future for themselves. Many would prefer safer income generating opportunities that protects the important ecosystem services they enjoy in their communities. Investments in **technical assistance in agriculture production** to provide trainings in the use of more sustainable and profitable practices in livestock and crop production (e.g., agroforestry, silvopasture systems, organic inputs, integrated pest management) would make agricultural production a more attractive opportunity. Additionally, **accessing higher quality or more lucrative organic or other niche markets** for these products would make sustainable production more attractive. A particular opportunity exists in promoting **value-added agricultural enterprises** that utilize locally produced agricultural commodities like cocoa, rubber and oil palm or other businesses that can up value **sustainably harvested spices, medicinal plants, mushrooms, honey and other NTFPs**. Providing training and developing markets for the use of **sustainably produced timber and related products** that would provide employment opportunities for youth in the area. Youth could be trained to cultivate and process bamboo and rattan for furniture, crafts, and construction materials.

Supporting youth owned enterprises or cooperatives through accessible credit and providing them with entrepreneurship, business management, and vocational training (e.g., carpentry, masonry, plumbing, mechanics) would spur them to develop innovative products to market in Ghana, its regional neighbours and beyond. These businesses would also create additional employment opportunities, providing them with alternatives to illegal mining, logging, hunting and agricultural expansion. However, lessons must be learned from earlier efforts that did not achieve the desired results (i.e. reduce the dependency on illegal mining, logging, hunting and agricultural expansion) because interventions were too small to make any meaningful impact. For any livelihood intervention to achieve the desired results they must be implemented at scale, monitored and evaluated. These

efforts in supporting youth to produce these goods must be coupled with **thorough market analysis and value chain development** efforts to target the economic opportunities that have the highest potential for success and address potential bottlenecks before investments occur as well as a focus to ensure that women and other marginalized groups are fully included.

Real time forest monitoring

Real-time monitoring using satellite imagery and remote sensing technologies will allow for the early detection of illegal activities such as mining, logging, hunting and agriculture expansion into the reserve. Changes in the forest cover and unusual land disturbances can be identified quickly, enabling the FSD and other authorities to intervene before significant damage occurs. The use of drones equipped with cameras and sensors will also provide real-time aerial view of the forest. This will help in identifying illegal activities that may be hidden from ground patrols, such as small-scale illegal mining operations or logging in remote areas.

Monitoring systems could be **equipped with algorithms** that detect anomalies or unauthorized activities and send real-time alerts to forest rangers, law enforcement and subnational authorities. Such calibrations will enable a swift response to illegal activities, increasing the likelihood of apprehending offenders and preventing further damage. Real-time data could be used to direct mobile patrol units to specific locations where illegal activities are detected. The use of this technology will reduce the time lag between detection and response, making it more difficult for illegal mining, logging, hunting, and agricultural activities to operate.

Improved mining regulatory institutions

Decentralizing the mining licensing process allows decisions to be made closer to the affected communities and ecosystems. Subnational authorities, who have a better understanding of the area's ecological and social context, can ensure that licenses are granted only in areas where mining can be conducted without harming critical ecosystems like Atewa. With decentralization, **district assemblies and communities can monitor mining activities** more effectively. This close monitoring helps in quickly identifying and addressing any violations of environmental regulations or encroachments into the reserve, thereby preventing illegal



mining. When communities are involved in the licensing process, they are more likely to support legal mining operations and collaborate with authorities to prevent illegal activities. This empowerment can lead to better protection of the reserve as communities become active stewards of their natural resources.

Use of technologies like sluices, shaking tables, and centrifugal concentrators which separate gold from ore without the use of mercury should be promoted. These methods rely on the difference in density between gold and other materials, reducing the environmental and health risks associated with mercury use. Currently, the government of Ghana is promoting the use of “Gold Katcha”, a centrifugal concentrator to reduce the use of mercury in gold mining. This effort should be intensified so that all legal small-scale gold miners adopt the technology.

Restoration of degraded areas

Afforestation could be used to restore degraded areas within the Atewa Range Forest Reserve, where illegal logging, mining and agricultural expansion has led to habitat loss. By replanting native tree species, these degraded areas could be rehabilitated, allowing ecosystems to recover and providing habitats for various plant and animal species. However, the current Modified Taungya System of **agroforestry** practiced in Ghana where farmers are allowed to cultivate crops on designated plots in degraded reserves of land while simultaneously planting native tree seedlings with the goal that once the trees are mature the farmers will curtail farming, allowing the land to be conserved as a forest. Unfortunately, this strategy has not worked very well as the farmers impede the growth of the native trees so that they can stay on the land for longer periods. There is a need for a rethinking of that system so that the primary aim of restoring the degraded areas is not sacrificed for farmers’ individual interests. **Regenerative forestry** which

uses natural processes to regenerate forests could be used to complement the afforestation effort.

Implementing and enforcement of integrated land use plans

Implementing and enforcing integrated land use plans is a powerful strategy to prevent mining and logging in biodiversity hotspots by systematically guiding human activities, protecting critical ecosystems and ensuring sustainable development. Integrated land use plans could formally designate biodiversity hotspots as protected areas, where mining, logging, agricultural production and other destructive activities are prohibited. This legal status will provide a clear framework for conservation and helps to safeguard the ecological integrity of these areas. Plans could also **establish buffer zones around biodiversity hotspots**, where only low-impact activities are allowed. These buffer zones will help reduce the edge effects and protect the core areas from the indirect impacts of nearby development activities. By allocating specific areas for development, agriculture, forestry and conservation, land use plans can direct mining and logging activities away from biodiversity hotspots to less sensitive areas. This will ensure that economic activities are conducted in locations that are less ecologically valuable.

Once biodiversity hotspots are identified in land use plans, laws and regulations can be enacted to enforce these plans. **Penalties and fines for illegal mining, hunting and logging** could be established, and **authorities could be empowered to act against violators**. Effective enforcement relying on monitoring systems will ensure compliance with land use plans. Land use plans could include **biodiversity offsetting**, where if development occurs in one area, conservation efforts are intensified in another to ensure no net loss of biodiversity. By coordinating land use planning across different sectors (e.g., agriculture, forestry, mining), conflicts between conservation and development goals can be minimized. This integrated approach ensures that mining and logging do not occur at the expense of biodiversity.

Policy and investment reforms (fig. 4)

The **Land Use and Spatial Planning Authority** (LUPSA) was established in accordance with Section 2(1) of the Land Use and Spatial Planning Act, (Act 925) 2016. The objectives of the Authority are to enhance the attainment of Ghana’s decentralization programme and create an enabling environment for District Assemblies to better perform the spatial planning and human settlements management functions to ensure the sustainable and judicious use of land. Fully implementing the LUPSA would allow the communities and subnational authorities to better monitor and control illegal mining, hunting, and logging.

Pursuant to the fight against illegal mining, the government of Ghana introduced the **community mining schemes** in 2021 to address the destruction caused by illegal mining. The aim is to replace illegal mining with CMS. The thrust of this policy is to create jobs and improve livelihoods in mining communities. Further, it strives to improve the working conditions of the mining operators

Figure 4:
TIMELINE OF MAIN POLICIES AND REFORMS





and minimize environmental degradation caused by illegal SSM over the decades. The CMS is being implemented by the Minerals Commission and supported by the Environmental Protection Agency (EPA), Water Resources Commission (WRC), Forestry Commission (FC), Ghana Geological Survey Authority (GGSA), Metropolitan, Municipal and District Assemblies (MMDAs) and the security agencies. If implemented well, this could be the game changer in sanitizing the small-scale mining space.

In June 2022, the president of Ghana commissioned 100 Mercury-Free Mineral Processing Plants (Gold Kacha) for artisanal and small-scale miners in the country. Commodity Monitor, an extractive solutions provider introduced the new mercury-free machine into the Ghanaian mining sector. **Gold Katchas** are pieces of equipment designed to help small-scale miners to extract gold from the ore without the use of mercury. The mercury-free mining equipment efficiently recovers more gold for artisanal and small-scale miners in Ghana without using any chemicals like mercury, which is one of the principal heavy metals present in the polluted rivers.

To promote conservation and forests across the country, the Ghanaian government introduced the **Green Ghana Day**. This celebration promotes an aggressive national afforestation/ reforestation programme to restore the lost forest cover of Ghana and to contribute to the global effort to mitigate climate change. The first one was held on June 11th, 2021, where an estimated 7 million tree seedlings were planted across the nation.

The national government has intervened in the gold market, which could have the potential increase the demand for gold, possibly making the national government dependant on it and encouraging increased mining. The Bank of Ghana (BoG) started implementing a **gold purchase programme** in September 2022 to strengthen its foreign exchange reserves. Under the programme, the BoG purchases a portion of gold mining companies' output at world market prices while paying in Ghana Cedis. The **Gold for Oil programme** which commenced in January 2023 allows the purchase of imported oil products using gold, either through direct barter or converting gold into cash. The programme aims to ease pressure on the dollar and prevent price hikes caused by cedi depreciation.

In June 2022, the government introduced the **Environmental Protection (Mining in Forest Reserves) Regulation 2022 (L.I. 2462)** to provide statutory procedures for mining in forest reserves and

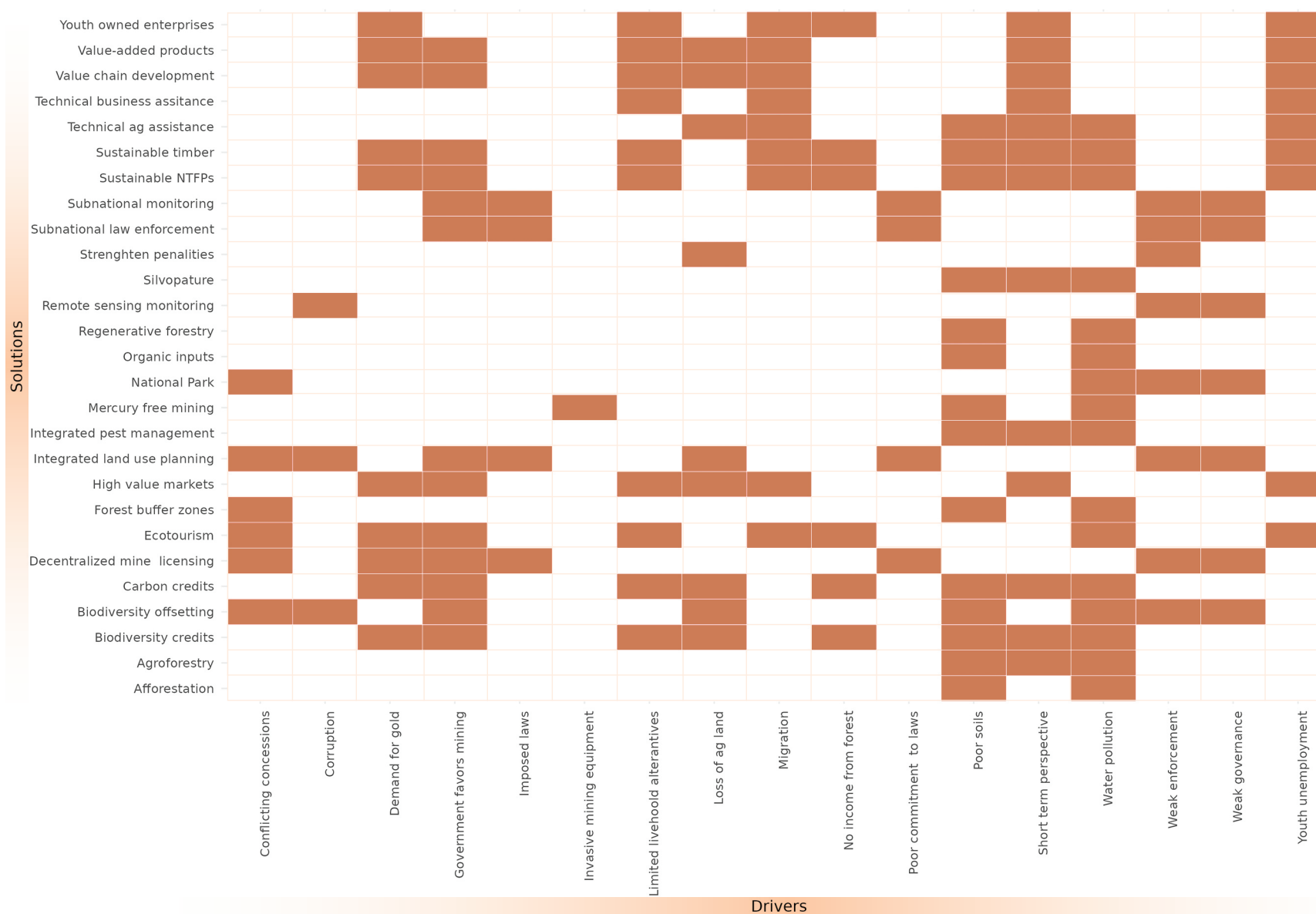
remedial actions for mitigating the impacts of such actions. The regulation derives its authority from Section 62(1) of the EPA Act, 1994 (Act 490) that empowers the minister responsible for environmental regulation to make rules generally for the implementation of the EPA Act, 1994 (Act 490). L.I 2462 is specifically designed to address the environmental impacts of allowing mining activities within forest reserves. Prior to the enactment of L.I.2462, government's policy on mining in forest reserves was contradictory. Whereas the National Land Policy 1999 bans mining in forest reserves, the Environmental Guidelines for Mining in Production Forest Reserves (2001) and Forest and Wildlife Policy (22014) imply that mining is permitted in forest reserves, within limits. L.I 2462 now appears to permit mining in all forest reserves in Ghana.

Highlights and key messages (fig. 5)

Atewa is a biodiversity hotspot. The Atewa Range Forest Reserve is gene bank for endemic species and home to a diverse range of flora and fauna, including many endangered and endemic species. Because of its unique states, all efforts must be made to preserve it. However, degradation of the Atewa landscape is severe and long-lasting. Illegal mining, logging, hunting and agriculture expansion into the reserve has caused significant damage to the ecosystem of the Atewa landscape. The destruction of forest cover, soil erosion and water contamination highlight the severe environmental impact of such activities. Restoring these areas is challenging, complex, and requires long-term commitment and resources. It requires significant financial resources, technical expertise, and commitment to restore ecological functions and biodiversity, indicating that the most cost-effective strategy is to limit the footprint of mining so that only restoration efforts are required.

Financial incentives are a major driver of illegal mining, logging, hunting and agriculture expansion into the reserve. Many individuals and communities engage in these activities in the reserve due to poverty and lack of alternative livelihoods. Addressing these livelihood drivers through sustainable development and alternative income sources is crucial providing more attractive options to these illegal activities. Programs that support sustainable agriculture, eco-tourism, and other non-extractive activities can help reduce dependence on illegal mining, logging, hunting, and agriculture expansion into protected areas. These options must be

Figure 5:
MATCHES BETWEEN DRIVERS AND SOLUTIONS



sustainable and inclusive. Investments need to be made at a large scale, not just pilot programs. They must be based on thorough market analysis, and ensure that all (i.e., women, youth) participate. Furthermore, raising awareness about the environmental and social impacts of illegal mining, logging, hunting and agriculture expansion into protected areas can help build support and advocates for conservation efforts. Educational campaigns targeting both local communities and broader national and international audiences can foster a greater understanding of the consequences of illegal mining, logging, hunting and agriculture expansion into protected areas.

Strengthening legal frameworks, increasing penalties for violations, having an adequate and well-equipped security force, and ensuring consistent enforcement are critical for tackling illegal activities effectively. Enforcing laws and regulations in remote and ecologically sensitive areas is difficult for the FSD and other law enforcement agencies. The complexity of monitoring and the need for frequent patrols

highlight the importance of investing in technology, enhancing surveillance and increasing the capacity of enforcement agencies. So, better monitoring and data collection are key. Reliable data and monitoring are essential for understanding the scope and impact of illegal mining, logging, hunting and agriculture expansion into the reserve. Investing in technologies such as remote sensing and geographic information systems (GIS) could improve monitoring capabilities and support informed decision-making. The situation on the ground can change rapidly, and strategies must be flexible and adaptable. Regular assessments and adjustments to policies and enforcement strategies are needed to respond effectively to evolving challenges.

One of the most important aspects in addressing this challenge is ensuring collaboration and coordination among the various stakeholders, including government agencies, NGOs, local communities and the private sector. Coordinated efforts ensure that resources are used efficiently and that strategies are comprehensive. Integrating conservation policies with broader land use and development policies that includes input from stakeholders and subnational authorities to ensure they take ownership of the natural resources and, thus, have a stake in conserving these resources is necessary. This integration ensures that conservation goals are aligned with economic and development objectives.

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