

Research Article

# Innovative Conflict Prevention Strategies for Sustainable Development in Boké's Bauxite Mining Sector, Republic of Guinea

Issiagha Camara<sup>1,\*</sup> , Jiang Deyi<sup>1</sup>, Li Lin<sup>1,2</sup>, Daouda Keita<sup>2</sup> ,  
Ibrahima Kalil Kourouma<sup>2</sup>

<sup>1</sup>School of Resources and Safety Engineering, Chongqing University, Chongqing, China

<sup>2</sup>Institut Supérieur des Mines et Géologie de Boke (ISMGB), Boke, Guinée

## Abstract

Mining conflicts in Boké, Guinea, have persisted due to extensive bauxite extraction activities, leading to environmental degradation, socio-economic inequalities, and a lack of adequate infrastructure. Despite government interventions, such as the Local Economic Development Fund (FODEL) and the National Agency for Local Development (ANAFIC), these initiatives have fallen short due to transparency issues, governance challenges, and limited community involvement. This study evaluates the effectiveness of current conflict prevention strategies by integrating field data, government reports, and stakeholder interviews. It also compares Guinea's efforts with successful models from other mining regions, particularly Ghana and Botswana, which have implemented robust systems for transparent resource management and community engagement. Using international best practices as a guide, the research proposes innovative strategies to enhance transparency, governance, and sustainable development. Key recommendations include improving infrastructure, promoting alternative livelihoods, and empowering local communities through greater participation in decision-making processes. By balancing mining operations with the socio-economic needs of affected communities, these strategies aim to foster long-term peace and stability in Boké's bauxite mining areas. This study offers a conflict prevention model adaptable to similar contexts in other resource-rich regions.

## Keywords

Mining Conflict, Prevention, Bauxite, Guinea, Governance, Livelihoods, Community

## 1. Introduction

Boké, a key region in Guinea's bauxite mining sector, plays a crucial role in the nation's economy, contributing 80% of Guinea's bauxite production and 90% of its export revenue [1-3]. Despite this economic importance, the local communities in Boké continue to face significant socio-economic challenges, including water scarcity, electricity shortages,

environmental degradation, and limited infrastructure. These issues are exacerbated by [4] the perception that mining benefits are not equitably shared, fueling tensions [2] between the local population, mining companies, and the government [5]. This disconnect between resource extraction and local development is a primary driver of the frequent conflicts in the

\*Corresponding author: [issiaghaismgb@gmail.com](mailto:issiaghaismgb@gmail.com) (Issiagha Camara)

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region.

The Guinean government has introduced several conflict prevention strategies to address these challenges, including the Local Economic Development Fund (FODEL) and the National Agency for Local Development (ANAFIC). These programs aim to redistribute mining revenues to local communities for development projects that address infrastructure, education, and socio-economic development [6]. However, as numerous studies have shown [7], these initiatives have fallen short of their objectives. Poor transparency, governance issues, and the limited involvement of local communities in decision-making have hindered the effective implementation of these programs [3-8]. As a result, local grievances persist, contributing to the ongoing unrest in the region [9].

Mining operations have not only affected socio-economic structures but have also had significant environmental impacts. Water scarcity and pollution have emerged as critical [7] issues in Boké where mining activities have depleted water sources and contaminated rivers, exacerbating health risks and agricultural losses [10, 11]. Fraser (2018) highlights that in mining regions worldwide, access to water resources is often a central point of conflict, particularly in areas where mining operations degrade or reduce local water availability [6]. This challenge is particularly acute in Boké where the lack of adequate water management exacerbates tensions between mining companies and local communities.

As a member of the Extractive Industries Transparency Initiative (EITI) [12] since 2005, Guinea has committed to improving the transparency and accountability of its mining sector [13]. However, the full potential of EITI membership has yet to be realized, particularly in regions like Boké where the governance of mining revenues remains weak. To address these shortcomings, Guinea can learn from the experiences of other EITI member countries that have successfully integrated transparency and accountability mechanisms into their mining sectors [14]. For example, Ghana's Mineral Development Fund (MDF) ensures that mining revenues are distributed equitably and used for community development projects, while Botswana's long-term resource management strategies, including the creation of the Pula Fund [3], have ensured that mining benefits are reinvested for the future, minimizing conflict [6-15].

In addition to country-specific frameworks, broader thematic studies provide valuable insights into how resource wealth can be managed effectively. Andrew Bauer's Managing the Public Trust [4] offers a framework for evaluating the effectiveness of natural resource funds, emphasizing the need for equitable distribution of benefits among citizens [6]. Human Rights Watch's (2018) report on bauxite mining in Guinea further underscores the human rights implications of mining, advocating for stronger regulatory oversight and responsible corporate behavior to protect the interests of local communities. Furthermore, the nexus between mining, water resources, and community well-being has been emphasized in research by Fraser (2018), who argues that water scarcity,

aggravated by mining activities, often becomes a flashpoint for conflict in regions like Boké

The International Council on Mining & Metals (ICMM) has also made significant contributions to the discourse on mining and development. Their report Mining, Communities, and Sustainable Development outlines best practices from mining projects worldwide, offering guidelines for minimizing negative impacts and maximizing benefits for local communities. The report highlights the importance of proactive engagement with communities, transparent governance, and environmental management to foster sustainable development in mining regions [16, 17]. Such practices, if implemented effectively in Boké could significantly reduce the socio-economic tensions that have plagued the region.

This study seeks to build on previous analyses by assessing the effectiveness of current conflict prevention strategies in Boké and proposing new measures to mitigate mining-related tensions. By integrating qualitative data from field reports, government assessments, and stakeholder interviews with lessons drawn from international case studies, the research aims to offer a comprehensive evaluation of existing frameworks and suggest innovative strategies for sustainable development. The study proposes a conflict prevention model that balances the needs of local communities with the operational priorities of mining companies, ensuring that mining operations contribute to both economic growth and social peace in Boké. By adopting best practices in transparency, governance, and community engagement from countries like Ghana and Botswana, Guinea can enhance its conflict prevention mechanisms and promote long-term stability in its mining regions.

## 2. Methodology

This study employs a mixed-method approach, combining qualitative and quantitative [18] research methods to assess the efficacy of conflict prevention strategies in Boké. The research design includes field surveys, document analysis, and stakeholder interviews to capture the perspectives of local communities, government officials, and mining company representatives. Data were gathered between 2015 and 2021, with a focus on mining localities most affected by socio-environmental conflicts.

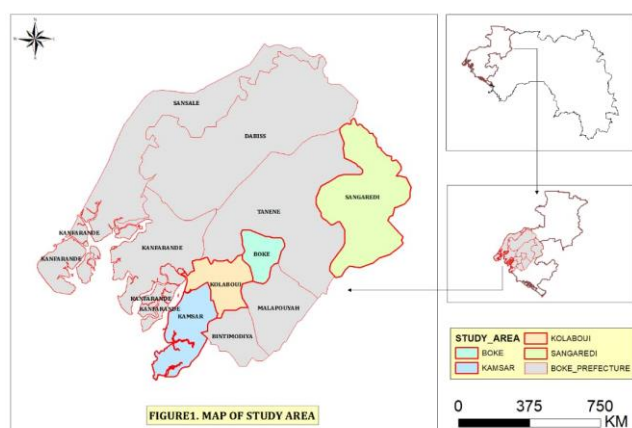
### 2.1. Data Collection

#### 2.1.1. Document Analysis

Government reports, policy documents (such as the Guinean Mining Code and FODEL procedures), and previous studies on Boké's mining conflicts were systematically reviewed. This provided context on the current state of conflict prevention mechanisms and informed the development of new strategies.

### 2.1.2. Field Surveys

Quantitative data were collected through surveys administered to 500 local residents across several municipalities in Boké including Dabiss, Tanene, Kamsar, and Sangaredi represented in [Figure 1](#) below. The surveys focused on community perceptions of existing projects, the effectiveness of local development initiatives, and the socio-economic impacts of mining. The data were used to evaluate the satisfaction rates and identify areas of improvement.



**Figure 1.** Map of the Study Localities.

### 2.1.3. Stakeholder Interviews

Semi-structured interviews were conducted with key stakeholders, including local government officials, community leaders, youth representatives, and mining company executives. These interviews provided qualitative insights [19] into the decision-making processes, the challenges in implementing FODEL projects, and the efficacy of conflict resolution mechanisms.

## 2.2. Data Analysis

### 2.2.1. Quantitative Analysis

The survey data were analyzed using descriptive statistics to assess community satisfaction with the implementation of development projects. Comparisons between municipalities were drawn to evaluate disparities in project outcomes and fund distribution. The results were used to identify correlations between inadequate infrastructure development and conflict outbursts.

### 2.2.2. Qualitative Analysis

Interview transcripts were coded using thematic analysis to extract key themes related to governance, transparency, and community participation. These themes informed the design of the proposed conflict prevention strategies. Additionally, case studies from other mining regions, such as the Peru,

Botswana and Ghana, were compared to draw lessons for Bok é Guinea.

### 3. Results and Discussions

### 3.1. Identification of Government Conflict Prevention Strategies

Boké mining-associated conflicts are often driven by environmental degradation, reduced access to natural resources, and socio-economic issues. The government's role in mitigating these conflicts has been essential through various conflict prevention strategies.

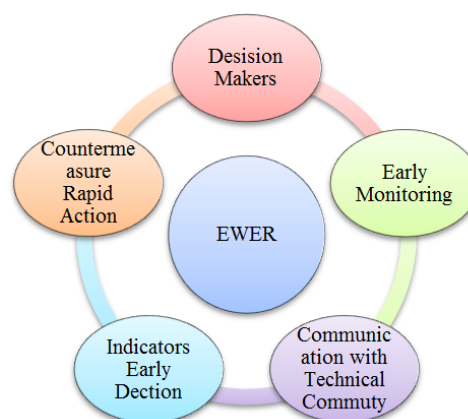
### 3.1.1. Conflict Drivers and Prevention Mechanisms

Bok é has a long mining history, spanning over half a century. However, continuous mining activities have resulted in environmental damage, community frustration, and anti-mining sentiments. The major causes of conflict include water scarcity, health risks from pollution, land dispossession, unfair compensation and revenue distribution. According to Jocelyn Fraser (2018), water scarcity is often a triggering factor in these disputes.

The government's role involves overseeing mining operations to ensure sustainability, adherence to environmental regulations, and promoting social peace. Measures include the Early Warning and Response System (EWRS), which helps identify and mitigate conflict triggers before they escalate.

### 3.1.2. Early Warning and Response System (EWRS)

The EWRS was piloted in seven villages of the Bok é Special Economic Zone (SEZ). It collects data through community-based monitoring and supports local conflict resolution efforts. This system has proven effective in addressing conflicts related to land, mining, and basic social services like water and electricity. The [figure 1](#) below represents the operating mechanism of the EWRS in Bok é



**Figure 2.** EWER Mechanism Applied in Bok éRegion, Guinea.

Figure 2 shows how local conflict indicators are communicated from village monitors to the municipal technical committee, ensuring timely intervention.

### 3.1.3. Government-Initiated Economic Development

Another preventive mechanism includes the government's efforts to stimulate local economic development. The estab-

lishment of the FODEL ensures that communities benefit directly from mining revenues. As seen in Table 1, FODEL distribution has supported economic, social, and youth-focused projects across various prefectures, promoting local development and mitigating conflict triggers.

**Table 1.** FODEL 1st Distribution in Guinea Mining Areas.

Prefecture	CLD (\$)	Economic Projects	Social Projects	Youth Projects	Women's Projects
Boké	41.3	28	28	216	249
Siguiri	80.3	18	59	224	194
Dingiraye	12.4	18	61	219	97

This table illustrates the substantial financial support allocated to various project types aimed at improving local communities' well-being.

### 3.1.4. Social Initiatives and Local Economic Development

Mining companies and the government have collaborated to develop social initiatives aimed at strengthening local economies and improving living conditions. For instance, Figure 3 illustrates a successful social project organizing women's market gardening groups in Boké which contributes to both economic empowerment and social stability [6]. This initiative, along with similar efforts, has been funded through contributions from mining companies toward local development. The funds are allocated to support youth and women, as well as to promote active Income-Generating Activities (IGA) in the mining municipalities. However, these initiatives failed because of fund mismanagement, lack of transparency and accountability, embezzlement of fund. This is why the new government, established on September 5, 2021, suspended the operations of FODEL and ANAFIG<sup>1</sup> in all municipalities.

The figure 3 visually represents the involvement of local women in sustainable economic activities, a key conflict prevention measure by the government.



**Figure 3.** Organizing Women's Market Gardening Groups in Boké.

### 3.1.5. National Fund for Local Development (FNLD)

The National Fund for Local Development (FNLD) was established in 2016 to provide broader socio-economic benefits to all Guinean communities. Funds from this initiative, managed by ANAFIC, are distributed across various regions to improve local infrastructure and provide essential services, as illustrated in Table 2 below.

**Table 2.** Funds Transferred to Local Collectivities by Region in 2019.

Region	Collectivities	AIP (\$)	Transferred Amount (\$)
Boké	37	6,095,953.61	3,450,490.68
Faranah	42	6,393,915.74	3,866,779.15
Kankan	58	9,993,852.70	5,822,701.72

<sup>1</sup> On July 10, 2024, the National Agency for Local Government Financing (ANAFIG) organized the official launch of the new phase of the Local Economic Development Fund (FODEL) in Boké. This relaunch follows the signing of a standard local development agreement and a joint decree by the Ministries of Territorial Administration and Decentralization and Mines and Geology. These new agreements aim to strengthen the governance of mining revenues in Guinea, so that the exploitation of natural resources can truly contribute to the country's socio-economic development, particularly at the local level. A particular emphasis will be placed on strengthening peace and social cohesion between mining companies and local communities affected by projects, as highlighted by the Minister of Mines and Geology, Bouna Sylla.



This table shows the financial distribution to local communities, enhancing the infrastructure and social services, which directly addresses some of the conflict triggers, such as lack of access to resources.

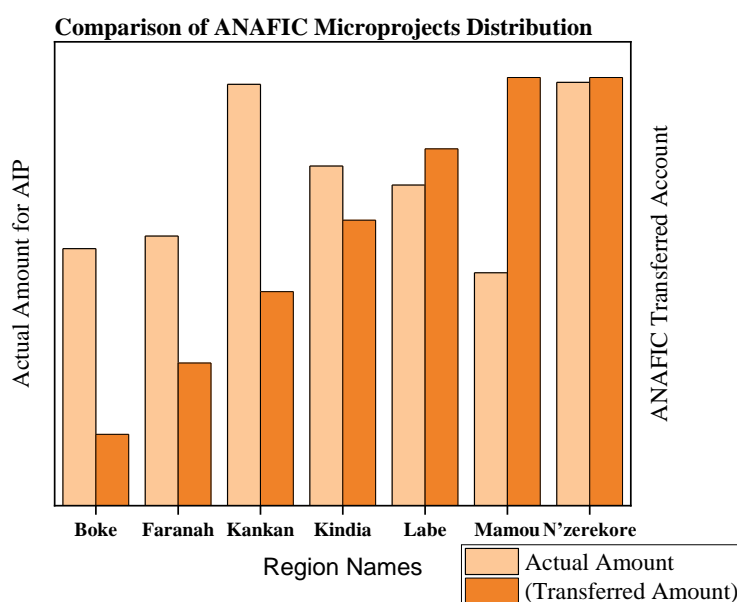
### 3.2. Analysis of the Conflict Prevention Strategies Implemented in Boke Localities

This study provides an analysis of conflict prevention strategies in Boké focusing on the effectiveness of mechanisms like the Local Economic Development Fund (FODEL) and ANAFIC. Boké, as a central region in Guinea's bauxite mining sector, faces socio-economic challenges due to the environmental and social impacts of mining [20]. Despite the government's efforts to mitigate these issues through various development programs, the region still struggles with conflicts fueled by inadequate infrastructure, insufficient trans-

parency in fund distribution, and the growing gap between community needs and government responses.

#### 3.2.1. Overview of ANAFIC and FODEL Implementation in Boké

The analysis highlights that Boké, despite being Guinea's largest bauxite producer, receives disproportionately fewer resources compared to other regions, contributing to community dissatisfaction. The ANAFIC microproject initiative, as shown in Figure 4: Comparison of ANAFIC Microprojects Distribution, reveals a mismatch between community needs and project allocations. While other regions benefit from significant fund transfers, Boké which suffers the most from mining's negative impacts, sees fewer resources allocated to addressing pressing social issues like water and electricity shortages. This disparity has exacerbated latent conflicts.



**Figure 4.** Comparison of ANAFIC Microprojects Distribution.

#### 3.2.2. Water and Electricity Scarcity as Conflict Triggers

Water and electricity shortages are increasingly recognized as significant conflict triggers in resource-rich regions like Boké Guinea. As a key hub for bauxite mining, Boké experiences heavy industrial activity, which exacerbates competition for scarce water and energy resources between mining companies, local communities, and the government [21, 22]. This competition often escalates into disputes, protests, and sometimes violent conflicts. This is evidenced by the increase in protests and demonstrations since 2016. According to the results of surveys and the consulted ANAFIC and FODEL reports, only one rural electrification project has been im-

plemented, insufficient to meet the region's demands. This issue worsened during the COVID-19 pandemic, when the government was forced to subsidize water and electricity to prevent further social unrest.

Below is an analysis of how water and electricity shortages contribute to these tensions, supported by tables (Table 3 and Table 4 respectively) showing the demand and supply gaps in both sectors.

##### (i). Water Shortage as a Conflict Trigger

In Boké water is essential for both domestic use and industrial operations. However, due to over-extraction, pollution, and inadequate infrastructure, many communities struggle to access clean drinking water. The competition be-

tween industrial (mining) water needs and local consumption often leads to resentment, fueling protests and conflicts.

#### Key Drivers of Water Shortage Conflicts:

- 1) Competition for Water: Mining companies use significant amounts of water, often leaving insufficient resources for local communities, causing social tensions.
- 2) Contaminated Water Sources: Mining operations can

lead to the contamination of rivers and groundwater with toxic chemicals, further limiting access to clean water for communities [21].

- 3) Government Inaction: Communities often feel neglected by the government in their calls for improved water access and water quality regulations, which can lead to civil unrest.

**Table 3.** Water Demand and Supply Gap in Bok é Prefecture.

Sector	Water Demand (m <sup>3</sup> /day)	Water Supply (m <sup>3</sup> /day)	Shortfall (m <sup>3</sup> /day)	Comments
Domestic (Rural Areas)	12,000	5,000	7,000	Rural communities rely heavily on river water, which is often polluted or drying up.
Domestic (Urban Areas)	25,000	15,000	10,000	Significant shortfall in urban areas, with limited access to potable water.
Agriculture	10,000	2,000	8,000	Irrigation is severely impacted by water scarcity, which has reduced crop yields.
Mining Industry	20,000	20,000	0	Mining operations meet their water needs, but often at the expense of local water availability.
Total for Bok é	67,000	42,000	25,000	Shortfalls in water supply contribute to social unrest and community grievances.

Source: Meteorology National Service of Guinea

#### Key Causes of Water Scarcity:

**Mining Activities:** The rapid expansion of bauxite mining in Bok é has escalated water consumption and competition for limited resources. Mining companies utilize vast amounts of water for processing bauxite, diverting it from natural water bodies, which local communities rely on. Additionally, the mining process often results in water contamination, making what little water remains unsafe for drinking and irrigation [22].

**Government Inaction:** Communities often feel neglected by the government in their calls for improved water access and water quality regulations, which can lead to civil unrest.

**Poor Water Management:** Bok é lacks the necessary infrastructure, such as sufficient wells, boreholes, and water storage facilities, to capture and distribute water efficiently. Moreover, governance structures to regulate and monitor water usage are weak, leaving mining companies free to overuse and contaminate water without much oversight.

**Climatic Changes:** Climatic variability has led to inconsistent rainfall patterns, leaving groundwater sources depleted. The dry seasons are now more prolonged, with rivers and ponds drying up at a faster rate due to rising temperatures. This reduction in water availability has compounded the

challenges of meeting the needs of both the local population and the mining industry.

#### (ii). Electricity Shortage as a Conflict Trigger

The availability of electricity in Bok é is also a major issue, especially as industrial demand outpaces the supply of energy. Frequent power outages and the diversion of electricity to industrial operations leave local communities with limited access, creating frustrations. The Kaleta hydropower plant, which was expected to alleviate these issues, has not been able to meet rising energy demands.

##### Key Drivers of Electricity Shortage Conflicts:

**Industrial Priority:** Mining companies are given priority access to the energy grid, which leaves households and small businesses with inconsistent electricity supply.

**Frequent Power Outages:** Unreliable electricity disrupts daily life, education, healthcare services, and economic activities in both urban and rural areas.

**High Cost of Alternative Energy:** As access to grid electricity becomes unreliable, households are forced to rely on expensive and unsustainable alternatives like diesel generators, deepening poverty.

**Table 4.** Electricity Demand and Supply Gap in Bok é Prefecture.

Sector	Electricity Demand (MW)	Electricity Supply (MW)	Shortfall (MW)	Comments
Domestic (Urban Areas)	50	30	20	Power outages in Urban areas, and inconsistent access to electricity, leading to dissatisfaction and protests.
Domestic (Rural Areas)	20	5	15	Rural areas lack access to the grid and often rely on costly and inefficient generators.
Mining Industry	80	80	0	Mining sectors are prioritized in electricity distribution, the rest of the population underserved.
Small Businesses	30	10	20	Small businesses experience power outages that limit operational hours, affecting economic growth.
Total for Bok é	180	125	55	The electricity shortfall is a significant source of discontent, especially in areas near mining sites.

Source: Guinea Power Company

### 3.2.3. FODEL: A Double-Edged Sword

**Table 5.** Statistics of FODEL Project in Bok é (2015-2018).

Locality	Social Projects	Economic Projects	Youth Projects	Women Projects	Total Funded Projects	Funded Amount (\$)
Dabiss	4	5	45	24	85	577,904.35
Tanene	3	4	17	15	49	489,433.38
Malapua	1	1	9	9	26	89,863.03
Kolabui	7	4	9	10	43	224,889.09
Bok é	6	4	22	32	74	500,259.57
Kamsar	3	2	16	22	60	213,093.46

The FODEL<sup>2</sup> initiative, designed to distribute mining revenues for local development, has been a crucial element of conflict prevention. However, as illustrated in Table 6: FODEL Project Statistics (2015-2018), the implementation of FODEL-funded projects has not always met expectations. Discrepancies between planned and executed projects, especially in critical areas like water and sanitation, have led to community dissatisfaction. For example, the urban municipality of Bok é only completed 50% of the planned projects. Table 5 outlines the distribution of FODEL funds among various municipalities, revealing discrepancies between funds allocated and actual project implementation.

### 3.2.4. Mismanagement and Lack of Transparency

The paper highlights significant governance challenges, including mismanagement and lack of transparency in fund distribution. Many community members are unaware of how much funding their municipalities are entitled to, and irregularities in fund disbursement have led to delays and project failures. As noted in Table 6: FODEL Shares for Boke Municipalities (2015-2019), some municipalities like Sansale received only 1.3% of the total funds, raising concerns about equitable distribution. This table 6 demonstrates the imbalance in fund distribution, which has been a source of tension within the Bok é community.

<sup>2</sup> This fund, designed to catalyze local development, accounts for 0.5% of the turnover generated by active mining companies.

**Table 6.** FODEL Shares for Boke Municipalities (2015-2019).

Municipality	San	Bin	Mal	Kam	Kan	Sang	Kol	Tan	Dab	Bok
FODEL Share (%)	1.3	1.8	2.9	6.8	7.4	7.9	8.4	20.3	20.4	22.8

N. B: We reduced the table's dimensions by abbreviating municipalities' names to their first three letters, except for Sangaredi, which had four letters. It was used for Sansale, Bintimodia, Malapouya, Kamsar, Kanfarande, Sangaredi, Kolaboui, Tanene, Dabis, and Boke.

### 3.2.5. Evaluation of FODEL Outcomes

The evaluation of FODEL's first implementation, as outlined in Table 7: FODEL First Exercise Assessment Outcomes, shows that while some municipalities like Kolaboui

achieved a 100% completion rate for their projects, others, such as Bok é city, struggled to implement even half of the planned initiatives. This inconsistency has led to widespread dissatisfaction and fueled further conflict in the region.

**Table 7.** FODEL First Exercise Assessment Outcomes.

Municipality	Social Projects Planned	Social Projects Executed	Economic Projects Planned	Economic Projects Executed	Completion (%)	Satisfaction Level
BOKE CITY	5	3	3	1	50	Middle
DABIS	4	0	4	2	25	Low
TANENE	3	2	4	4	86	Good
KAMSAR	3	3	2	2	100	Good
KOLABUI	7	7	4	4	100	Very Good

### 3.3. Comparative Analysis of Mining Conflict Prevention: Lessons from Ghana and Botswana, Peru for Bok é Guinea

Guinea, as a burgeoning player in the global bauxite market, faces significant challenges in mitigating social conflicts associated with resource extraction. To navigate these complexities effectively, it is imperative to examine the conflict prevention strategies employed by other African nations renowned for their successful management of extractive industries, such as Ghana and Botswana, as well as the South American nation of Peru who has been dealing with the same mining-related conflicts. These countries have demonstrated a commitment to transparency, sustainability, and equitable resource distribution, which has proven to be instrumental in minimizing social unrest. By analyzing their approaches, Guinea can glean valuable insights into refining its own conflict prevention strategies within the context of its bauxite mining sector. As a member of the Extractive Industries Transparency Initiative (EITI) [12], Guinea is well-positioned to leverage international best practices and implement measures that promote responsible mining and

foster harmonious relationships between the government, communities, and mining companies.

#### 3.3.1. Comparison of Mining Revenue Management and Transparency

Mining revenue management and transparency are critical to preventing conflicts in resource-rich countries. Botswana, Ghana, and Peru have adopted different approaches to managing mining revenues and ensuring that communities benefit from extractive activities.

Ghana, a stalwart member of the Extractive Industries Transparency Initiative (EITI) since 2003, has implemented robust mechanisms to ensure the equitable distribution of mining revenues. The Mineral Development Fund (MDF), a cornerstone of Ghana's transparency initiatives, allocates a portion of mining revenues directly to communities impacted by mining operations [15-24]. By mandating public disclosure of revenue allocations and conducting rigorous project audits, Ghana has significantly enhanced accountability and minimized the potential for conflict. This innovative approach has not only fostered trust between mining companies and local communities but has also demonstrated the tangible benefits of responsible resource management.



Botswana, a model for resource management, has successfully harnessed its diamond wealth through transparent governance and long-term planning. By establishing the Pula Fund, a sovereign wealth fund, and ensuring transparent reinvestment of mining revenues, Botswana has minimized the risk of conflict and promoted sustainable development [25]. The country's approach to resource management, characterized by stable institutions and a focus on public services, infrastructure, and community development, offers valuable lessons for other extractive industries, such as bauxite.

While Guinea, through FODEL and ANAFIC, aims to redistribute mining revenues to local communities, there have been issues with transparency and fund management. Mismanagement of funds, delays in project implementation, and lack of community involvement have been reported, exacerbating conflicts in mining areas such as Boké. Despite being an EITI member since 2005, Guinea has not yet achieved the

level of transparency found in Ghana and Botswana.

*Peru:* As a major player in global copper, gold, and silver mining, Peru has faced frequent conflicts between mining companies and local communities, often centered on environmental concerns. To address these issues, Peru has introduced the Canon Minero, a revenue-sharing mechanism that allocates 50% of mining royalties to the regions where mining takes place [26, 27]. Although this initiative has improved revenue distribution, conflicts persist due to environmental degradation and uneven development. The Peruvian government has increased efforts to improve transparency and has implemented a Prior Consultation Law that mandates dialogue with indigenous and local communities before mining operations begin. The Table 8 illustrates how Botswana and Ghana's strong transparency mechanisms correlate with lower conflict incidence compared to Guinea and Peru, where challenges in revenue distribution persist.

**Table 8.** Transparency Comparison in Mining Revenue Management.

Country	Transparency Mechanisms	Community Involvement	Conflict Incidence
Ghana	Public audits, revenue reporting, MDF	High	Low
Botswana	Transparent governance, long-term planning and investments	Medium	Very Low
Peru	Canon Minero, prior consultation, regional revenue-sharing	Medium	Medium
Guinea	Limited transparency in project FODEL/ANAFIC	Low	High

*Key Outcomes:* Guinea can enhance its mining revenue distribution system by adopting Ghana's model of public audits and project transparency, as well as Botswana's focus on long-term sustainable development planning. Transparent, community-centered revenue management will reduce conflict risks and ensure fair benefits for all stakeholders.

### 3.3.2. Governance and Institutional Capacity Building

Effective governance and local capacity building play a crucial role in preventing mining conflicts, particularly in regions where extractive activities have significant environmental and social impacts.

*Ghana:* The country has implemented comprehensive capacity-building programs aimed at empowering local governments to manage mining revenues. The MDF is administered by both central and local governments, with community participation mechanisms to ensure transparency in project selection and implementation [23, 24]. This decentralized approach has been effective in mitigating conflicts, as local governments are better equipped to address community needs.

*Botswana's* strength lies in its well-established institutions, which have been designed to manage mineral wealth with a

focus on long-term socio-economic stability. The Ministry of Minerals, Energy, and Water Resources works closely with local authorities to ensure that mining revenues are used to improve infrastructure, education, and health services [25]. Unlike in Guinea, where local governance remains weak, Botswana's central and local institutions operate with high levels of transparency and accountability, contributing to national cohesion and low conflict levels.

In Guinea, Boké local governance is often weak, with limited capacity to manage large-scale development projects funded by mining revenues. The mismanagement of funds and lack of transparency have eroded trust between the local population and the government, contributing to frequent protests and unrest. Guinea's governance challenges highlight the need for stronger institutional capacity-building at both the national and local levels [13].

Peru's governance of its mining sector has been complicated by tensions between central and regional authorities. While the Canon Minero provides significant resources for local development, the lack of capacity at the regional level to manage these funds has led to inefficiencies and underutilization of resources. Additionally, environmental governance in Peru has been criticized for its weak enforcement of regulations, contributing to community dissatisfaction and

conflict [26-28]. Table 9 demonstrates how Botswana and Ghana's strong governance and capacity-building programs

have fostered higher community engagement and reduced conflict compared to Peru and Guinea.

**Table 9.** Governance and Local Capacity Building Comparison.

Country	Local Governance Capacity	Capacity Building Programs	Community Engagement
Ghana	High	Extensive	High
Botswana	Very High	Long-term institutional support	High
Guinea	Low	Limited	Low
Peru	Low	Limited	Medium

**Key Outcomes:** Guinea should prioritize capacity-building initiatives similar to those in Ghana to empower local governments to manage mining revenues effectively. Botswana's strong governance and anti-corruption frameworks also offer valuable lessons for ensuring that mining profits are used for community development.

### 3.3.3. Alternative Livelihoods and Sustainable Development

An important strategy for preventing conflicts in mining regions is the development of alternative livelihoods, which reduce communities' dependence on mining and provide stable income sources when mining activities fluctuate.

- 1) *Ghana:* The country has implemented successful alternative livelihood activities, such as the Alternative Livelihood Program (ALP), which focuses on providing skills training and financial support for agricultural and small-scale enterprises in mining regions. These programs help communities reduce their reliance on mining and create sustainable sources of income, thereby minimizing the social impact of mining activities.

- 2) *Botswana:* Although Botswana's economy remains heavily reliant on diamonds, the government has prioritized economic diversification through initiatives like Botswana's Economic Diversification Drive (EDD) [29, 30]. This program promotes industries such as agriculture, tourism, and manufacturing. By diversifying its economy, Botswana has reduced the potential for social unrest linked to the resource curse and created a more resilient economic base.

- 3) *Guinea:* In Boké alternative livelihoods have not been sufficiently promoted, leaving many community members heavily dependent on mining jobs. The lack of economic diversification in the region contributes to social tensions, especially when mining operations disrupt local agricultural activities or when environmental degradation affects traditional livelihoods.

Table 10 illustrates how Ghana's extensive alternative livelihood programs have significantly reduced conflicts, while Botswana's diversification strategy has contributed to long-term stability. Guinea's limited progress in this area correlates with higher levels of conflict.

**Table 10.** Effectiveness of Alternative Livelihood Programs.

Country	Diversification of Livelihoods	ALP	Conflict Reduction
Ghana	High	Well-established	Significant
Botswana	Medium	Emerging	Very Low
Guinea	Low	Limited	Low

**Key Lesson:** Guinea can adopt Ghana's approach to developing alternative livelihood programs and Botswana's strategy for economic diversification to reduce dependence on mining. Promoting sustainable agriculture, eco-tourism, and artisanal industries in Boké will provide communities with alternative sources of income, reducing the potential for

conflict.

### 3.3.4. Environmental Governance and Conflict Mitigation

Environmental degradation is a key driver of mining con-

flicts, as communities often suffer from water pollution, deforestation, and loss of agricultural land [31]. Effective environmental governance is therefore essential for preventing conflicts.

- 1) *Botswana*: Although Botswana's mining sector is primarily focused on diamonds, the country's environmental regulations are among the most stringent in Africa. The government has implemented a strict environmental management framework, ensuring that mining companies adhere to sustainability standards. This proactive approach has minimized the environmental impact of mining and prevented large-scale conflicts [29].
- 2) *Ghana*: The Ghanaians has faced environmental challenges due to illegal small-scale mining (Galamsey), which has led to water pollution and deforestation. To combat these issues, the government has introduced stricter regulations and enforcement mechanisms, including military interventions to close illegal mines. While these efforts have reduced environmental damage, conflicts between illegal miners and the government persist.
- 3) *Peru*: Environmental concerns are central to mining conflicts in Peru. Communities often accuse mining companies of polluting water sources and destroying

ecosystems. The Peruvian government has responded by implementing stricter environmental regulations and requiring environmental impact assessments (EIAs) for all mining projects. However, enforcement remains weak, and conflicts over environmental issues continue to arise.

- 4) *Guinea*: In Boké, environmental degradation, particularly water and air pollution, has been a major source of conflict. The lack of stringent environmental governance and weak enforcement of regulations has exacerbated tensions between mining companies and local communities. There is a pressing need for Guinea to strengthen its environmental governance framework to mitigate the impact of mining on local ecosystems [11-21].

*Key Lesson*: Guinea can draw from Botswana's proactive environmental governance and Peru's environmental impact assessment (EIA) practices to prevent mining-related environmental conflicts. Strengthening environmental regulations and ensuring their enforcement will be critical for reducing community grievances in Boké.

The Table 11 highlights the effectiveness of environmental governance in preventing conflicts, with Botswana leading in environmental regulation enforcement, while Guinea and Peru continue to face challenges in this area.

**Table 11.** Environmental Governance and Conflict Mitigation.

Country	Environmental Governance	Enforcement of Regulations	Conflict Incidence
Botswana	Strong	High	Low
Ghana	Moderate	Improving	Medium
Peru	Weak	Limited	High
Guinea	Weak	Limited	High

### 3.4. Proposed Conflict Prevention Strategies

#### 3.4.1. Community-Centered Infrastructure Development

While water and electricity shortages often ignite conflicts, their underlying causes stem from inadequate infrastructure. To mitigate these crises, it is imperative to prioritize infrastructure projects that directly address the needs of commu-

nities. By constructing solar-powered water treatment plants, we can ensure a continuous supply of clean water, while decentralized solar grids can alleviate rural electrification challenges, reducing reliance on centralized power grids. These strategic investments will not only mitigate immediate shortages but also bolster long-term sustainability and resilience in affected regions. Table 12 shows solar-powered water treatment facility projects, which could help alleviate water scarcity and associated conflicts in the Boké region.

**Table 12.** Proposed Infrastructure Projects for Conflict Prevention.

Project	Estimated Cost (\$)	Target Communities	Expected Outcomes	Completion Time
Solar-Powered Water Treatment	1.5 million	Dabiss, Tanene	Improved water access, reduced water-related conflicts	2 years
Decentralized Solar Grid System	3 million	Bintimodia, Bok é	Reliable electricity, improved living standards	3 years

### 3.4.2. Enhanced Transparency and Monitoring Systems

To enhance transparency, accountability, and the overall effectiveness of resource allocation, it is recommended that the management of the FODEL (Local Economic Development Fund) be entrusted to the ANAFIC (National Agency for Local Government Financing). ANAFIC, with its proven expertise in public finance management and commitment to good governance, can centralize the fund's administration, leading to more efficient resource distribution, enhanced oversight, and a reduced risk of misuse.

A key concern has been the opacity surrounding fund disbursement and project execution. To address this, it is proposed to establish a transparent, publicly accessible moni-

toring system that would allow for real-time tracking of fund allocation and expenditure (Table 13). This system could take the form of an online platform or mobile application, empowering communities to actively monitor FODEL and ANAFIC fund utilization and ensure alignment with local development priorities.

Additionally, to further strengthen accountability, the introduction of third-party audits is recommended to verify both project completion and fund distribution. Along with mechanisms that involve local authorities in decision-making, these measures will collectively improve transparency, promote efficient resource use, and ensure that development initiatives meet the specific needs of communities in the Boke region.

**Table 13.** Transparency and Monitoring Tools for Fund Allocation.

Tool	Function	Responsible Entity	Expected Outcomes
Online Fund Tracking Portal	Public access to real-time data	Ministry of Mines	Improved transparency, reduced conflict
Third-Party Audit	Independent verification of funds	NGO/External Auditors	Accountability, trust-building

### 3.4.3. Capacity Building for Local Governance

A critical deficiency in the preceding analyses is the insufficient capacity of local governments to effectively administer substantial development funds. Augmenting the capabilities of these entities through training in financial management, project implementation, and conflict resolution is imperative.

A proposed solution involves the regular convening of workshops for municipal authorities to address financial management and transparent governance. Additionally, the establishment of a dedicated conflict resolution unit within local governments would proactively mitigate disputes. A proposed capacity building program is presented in Table 14 below.

**Table 14.** Proposed Capacity Building Programs.

Program	Target Group	Duration	Key Outcomes
Financial Management Workshop	Municipal officials	3 months	Enhanced financial literacy and accountability
Conflict Resolution and Mediation Training	Local government units	6 months	Faster resolution of disputes, reduced tension

### 3.4.4. Community-Led Monitoring and Decision-Making

To cultivate a more equitable and transparent relationship between local authorities, mining companies, and the populace, it is imperative to empower communities to actively participate in decision-making processes and project oversight. The formation of community development committees (CDCs) within each municipality offers a viable strategy to achieve this objective. Composed of local residents, youth, and women's groups, community representatives (religious, elders, traditional Chief, etc....), these committees would

serve as platforms for collaboration between government entities and mining companies, fostering a shared responsibility for project prioritization and monitoring. By granting communities a more significant voice in determining the direction of development initiatives, we can significantly enhance trust and mitigate potential conflicts arising from perceived disparities in power and influence. Table 15 outlines the proposed involvement of community-led monitoring committees in decision-making processes for local development projects and conflict prevention.

**Table 15.** Proposed Community-Led Monitoring Committees.

Committee Name	Function	Members	Expected Impact
Bok é CDC	Oversee local project implementation	Residents, local leaders	Improved accountability, reduced conflict risk
Tanene Youth Committee	Represent youth in decision-making	Youth leaders, community	Increased youth engagement, conflict reduction
Women's Empowerment Group	Ensure inclusion of women's economic interests	Local women, NGOs	Gender-inclusive development, empowerment

### 3.4.5. Promotion of Sustainable Livelihoods

To mitigate the adverse effects of resource-dependent economies, particularly those prone to conflict, the diversification of livelihoods is paramount. By fostering alternative economic sectors, such as agriculture, fisheries, artisanal crafts, and eco-tourism, communities can establish more resilient and sustainable income streams. This transition necessitates strategic interventions, including the establishment of agricultural

cooperatives that prioritize sustainable farming practices and the provision of training and support for small-scale, community-based tourism initiatives. Such initiatives not only diversify revenue sources but also contribute to environmental conservation and social cohesion. A proposed Alternative Livelihood program for Boke mining localities is presented in Table 16 below.

**Table 16.** Proposed Alternative Livelihood Programs for Boke.

Program	Target Beneficiaries	Resources Required	Expected Outcomes
Sustainable Agriculture	Farmers, youth	\$500,000	Reduced mining dependency, food security
Community-Based Tourism	Local entrepreneurs	\$300,000	Employment opportunities, preservation of heritage

## 4. Conclusion

The bauxite mining sector in Bok é Guinea, has played a significant role in the region's economic development, yet it remains a persistent source of socio-economic and environmental conflict. Issues such as environmental degradation,

inequitable distribution of mining revenues, poor infrastructure development, and inadequate community involvement have fueled tensions between mining companies, the government, and local communities. Despite government initiatives like the Local Economic Development Fund (FODEL) and ANAFIC, challenges related to transparency, governance, and social inclusion continue to undermine sustainable de-



velopment in the region.

This study has highlighted both the successes and shortcomings of existing conflict prevention strategies, revealing a need for more inclusive, transparent, and accountable systems of governance. By examining best practices from other resource-rich African nations, such as Ghana's emphasis on revenue transparency and Botswana's focus on sustainable development, the study outlines how Guinea can refine its approach to managing mining-related conflicts.

To achieve long-term peace and stability in Boké it is essential that Guinea prioritizes the empowerment of local governance, enhances transparency in the management of mining revenues, and fosters alternative livelihoods for affected communities. These strategies will not only reduce socio-economic tensions but also ensure more equitable development outcomes for present and future generations.

## 5. Recommendations

### 5.1. Strengthen Infrastructure Development

*Water and Electricity Projects:* Invest in solar-powered water treatment systems and decentralized solar grids to address water scarcity and electricity shortages in mining-affected areas like Dabiss, Tanene, Bintimodia, and progressively in the remaining localities.

*Monitoring Mechanisms:* Implement real-time monitoring platforms for infrastructure projects, enabling communities to track progress and hold contractors accountable.

### 5.2. Enhance Transparency and Accountability

*Fund-Tracking Platforms:* Create a publicly accessible online platform that allows citizens to monitor the distribution and use of FODEL and ANAFIC funds, reducing corruption and building trust among stakeholders.

*Independent Audits:* Mandate third-party audits of all mining-related development projects to ensure funds are used effectively and transparently.

### 5.3. Build Local Governance Capacity

*Training Programs:* Offer ongoing training for local government officials in financial management, project oversight, and conflict resolution to strengthen their capacity to manage development projects.

*Conflict Resolution Units:* Establish conflict resolution teams within local government structures to mediate disputes between mining companies and communities before they escalate.

### 5.4. Increase Community Involvement

*Community Development Committees (CDCs):* Form CDCs in mining-affected areas to involve local leaders,

youth, and women in the planning, execution, and monitoring of development projects, ensuring community priorities are addressed.

*Inclusive Decision-Making:* Encourage mining companies to collaborate with CDCs, ensuring community concerns are reflected in project planning and development initiatives.

### 5.5. Promote Sustainable Livelihoods

*Diversification of Local Economies:* Promote alternative economic activities such as sustainable agriculture, eco-tourism, and artisanal crafts to reduce local dependence on the mining industry and provide stable incomes.

*Support for Women and Youth:* Develop targeted programs to create employment opportunities for women and youth, fostering more inclusive economic growth.

### 5.6. Conduct Ongoing Impact Assessments

Regularly assess the socio-economic impact (*Periodic Reviews*) of mining and the effectiveness of conflict prevention measures in collaboration with international partners and local stakeholders. Adjust strategies as necessary to improve development outcomes and conflict mitigation efforts.

By implementing these recommendations, Guinea can enhance its conflict prevention strategies, reduce socio-economic disparities, and promote sustainable, inclusive development in Boké's bauxite mining communities.

## 6. Limitations

This study focuses on specific localities in Boké and may not capture the full complexity of conflict dynamics in other mining regions of Guinea. Additionally, the reliance on self-reported data from surveys may introduce biases. However, the triangulation of quantitative and qualitative data mitigates these limitations and strengthens the study's findings.

## 7. Future Research Directions

Future studies should focus on assessing the long-term impact of these recommended strategies, particularly their effectiveness in reducing conflict and improving socio-economic conditions in mining-affected communities. Additionally, research should explore the applicability of these strategies in other mining regions across Guinea and similar contexts in sub-Saharan Africa to provide broader insights into sustainable conflict prevention in resource-rich regions.

## Abbreviations

ALP	Alternative Livelihood Program
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ANAFIC	National Agency for Local Development
CDC	Community Development Committee
EITI	Extractive Industry for Transparency Initiative
EWRS	Early Warning Response System
EDD	Economic Diversification Drive
EIA	Environmental Impact Assessment
FNDL	National Fund for Local Development
FODEL	Local Economic Development Fund
IGA	Income Generating Activities
ICMM	International Council on Mining and Metals
MDF	Mineral Development Fund
SEZ	Special Economic Zone

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## Author Contributions

**Issiagha Camara:** Conceptualization, Data Curation, Methodology, Software, Writing—original draft preparation, Investigation, Writing—review and Editing, Resources

**Jiang Deyi:** Formal Analysis, Methodology, supervision, review, Resources

**Li Lin:** Formal Analysis, Supervision, Review

**Daouda Keita:** Formal Analysis, Review, Resources

**Ibrahima Kalil Kourouma:** Review, Resources

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The data is available from the corresponding author upon reasonable request.

## Conflicts of Interest

The authors declare no conflicts of interest.

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## Research Field

**Issiagha Camara:** Sustainable Mining 1-1, Environmental Impact Assessment 1-2, Geological Mining-3, Machine Learning Applied to Mining 1-4, Mining Engineering 1-5.

**Jiang Deyi:** Mining Engineering 1-1, Energy Storage 1-2, Mining Safety-1-3

**Li Lin:** Underground Mining Engineering 1-1, Mining Economics 1-2, Energy Storage 1-3, Tunneling

**Daouda Keita:** Mining Engineering 1-1, Mineral Processing and Valorization 1-2, Mining Health and Safety Engineering 1-3, Exploration and Applied Geology 1-4, Mining Economic and Project Management 1-5.

**Ibrahima Kalil Kourouma:** Mining Engineering 1-1, Mine Blasting 1-2, Environmental Mining and Safety Engineering 1-3, Exploration and Applied Geology 1-4, Mining Economic 1-5References