WEST AFRICA EXPLOITABLE CONDITIONS MODEL

WAECM

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SMA Strategic Multilayer Assessment

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INTRODUCTION

In the 21st century, understanding the increasing complexity of the operational environment (OE) is crucial for navigating interconnected domains, better anticipating threats, identifying opportunities to advance United States (US) national interests, and strategically aligning objectives with those of allies and partners. To further understand the dynamic relationships among the multitude of factors that will shape the future OE, in December 2021, the Strategic Multilayer Assessment (SMA) office launched the Anticipating the Future Operational Environment (AFOE)—Modeling Exploitable Conditions effort at the request of the Joint Staff (J7). Its purpose was to provide Joint Staff and Geographic Combatant Command (GCC) decision makers, analysts, planners, operations staff, and assessors with a broad view of the environment and how it impacts strategic options for the US, its allies and partners, and its adversaries.

EXPLOITABLE CONDITIONS MODEL DEVELOPMENT

Phase I of the effort produced the initial global system-of-systems model—the Global Exploitable Conditions Model (GECM)—that reflects the interdependencies among a broad and diverse set of social, political, economic, environmental, technological, and human factors that characterize the current and future OE (see Astorino-Courtois, 2022).

THE OVERARCHING QUESTIONS DRIVING THE SMA AFOE EFFORT

- What types of capabilities and activities must the Services be able to field in defense of US interests in a competitive future international environment?
- What types of activities should GCCs plan for?

Phase II marked advancement, as the global model was refined into a more granular, continent-specific model—the AFRICOM Exploitable Conditions Model (AECM)—tailored to specifically reflect the general conditions across the 53 countries in USAFRICOM's area of responsibility (AOR) (see Lindquist, 2023). Additionally, this phase introduced the development of applications that utilized the model's capabilities, allowing for targeted analysis and actionable insights at the continental level.

Phase III represents further refinement, scaling the model from the continental to the sub-regional. The West Africa Exploitable Conditions Model (WAECM) is tailored from the AECM to reflect a regional analysis of the 15 countries that make up the region of West Africa. This report describes the WAECM and how it was generated and offers an analytical application of the model. Understanding the OE in West Africa and how it impacts strategic options for the US, its allies and partners, and its adversaries requires a model that identifies both critical challenges and how they might be addressed.

WAECM APPLICABILITY

OVERVIEW

The WAECM is an empirical, concept-based, system-of-systems model tailored to the region of West Africa, as defined by USAFRICOM's interactive AOR map (https://www.africom.mil/military-presence). Developed from the AECM, it identifies various variables or factors (nodes) and their linkages through direct connections to one another (edges), representing the complex conditions and dynamics of the OE in West Africa.

While the AECM is broadly applicable to the countries comprising West Africa, the WAECM incorporates regional model tailoring to account for specific West African conditions and regional dynamics—including key characteristics, attributes, and/or contexts—ensuring relevance and responsiveness to regional complexities.

The WAECM, consisting of 157 nodes and 1,067 edges, offers a systems view of the complex, interrelated conditions in the region, encompassing economics; energy; environment and climate change; technology, communication, and information; military and security; societal conditions; and governance factors.

As a thinking tool, the WAECM aims to improve a user's ability to identify and understand critical conditions and dynamics of complex systems in West Africa; anticipate their impacts and effects; and, ultimately, devise ways to address them to produce desired outcomes. During the model development process, the research team also explored select critical conditions relevant to the political stability of West Africa, the initial findings of which are presented in the story map featured in Part II (see p. 5).

REGIONAL ANALYSIS: FROM AECM TO WAECM

Regional analysis serves as the foundation for this tailoring. Regional analysis is an interdisciplinary approach that examines and interprets various conditions—the physical, societal, political, and economic characteristics—of a geographic region, highlighting similarities and differences. This **"why of where"** framework offers a comprehensive understanding of the interconnectedness and interdependence of different places in an area, even when the area appears highly diverse at first glance (Isard, 2017). Regional model tailoring involves modifying an existing generic framework, like the AECM, to address a specific geographic area and provide system-level insights to contiguous countries or areas that share common characteristics in selected criteria distinguishable from other regions or areas.

The academic discipline of geography, which focuses on spatiality—the set of practices constituting interactions between phenomena in particular places—supports customizing the AECM to West Africa (see pg. 3). A structured regional analysis was used to explore and understand conditions and patterns at work in the region.

A key focus of regional analysis is geographical knowledge, which produces a contextualized understanding of the conditions of a place and how they relate to other conditions in the same place. Emphasizing geographic knowledge allows for a deeper investigation into how to value and understand the conditions within a region. It also clarifies the specific individual systems involved and the types of interactions and relationships that drive the behaviors of those systems in a region. So, we asked, **"What makes West Africa different?"**

THE WHY OF WHERE IN WEST AFRICA

Common characteristics in West Africa that make the region particularly viable for this type of regional analysis include:

- **Historical Legacy:** The region's colonial history and its enduring effects on governance, economic development, and societal structures provide a shared historical context.
- **Cultural & Ethnic Ties:** Despite its vast diversity, the region is united by strong cultural and ethnic ties, with many countries sharing common ethnic heritages, like Hausa, Yoruba, and Fulani; shared traditions; and social structures, which contribute to shared societal characteristics.
- **Economic Integration & Interdependence:** The Economic Community of West African States (ECOWAS), the primary institution fostering cooperation in the region, has created a highly integrated and interdependent regional economic zone by promoting free trade, reducing barriers to movement, investing in shared infrastructure (e.g., regional transport networks), and aligning economic policies among West African states.
- **Security & Instability Issues:** Shared concerns over rapidly increasing insecurity dynamics, including terrorism, communal violence, illicit economic activity, and the rise of political instability, are recurrent issues in West Africa.

GEOGRAPHIC THOUGHT & SYSTEMS THINKING

In many ways, geographic thought is well suited to system-of-systems model tailoring:

- Long-standing practices of grounding complex phenomena in place(s) (e.g., a region) using mixed methods.
- Sensitivities to interactions between conditions and factors allowing the identification of patterns and relationships.
- Emphasizes interconnectedness and local activity can have cascading effects across systems and multiple relationships.
- Offers a clear perspective and set of tools for identifying boundaries in analytical inquiry.

HARNESSING GEOGRAPHIC & SYSTEMS THINKING FOR REGIONAL ANALYSIS

In particular, the following qualities make regional analysis a useful framework for analyzing and tailoring complex systems:

Regional analysis provides a pragmatic way to define the boundaries of a system. It clarifies the interactions within and across an area that can or cannot be included.

Each region has specific physical, societal, political, and economic characteristics influencing how systems operate and respond to change. Regional analysis emphasizes the importance of tailoring systems to these specific contexts.

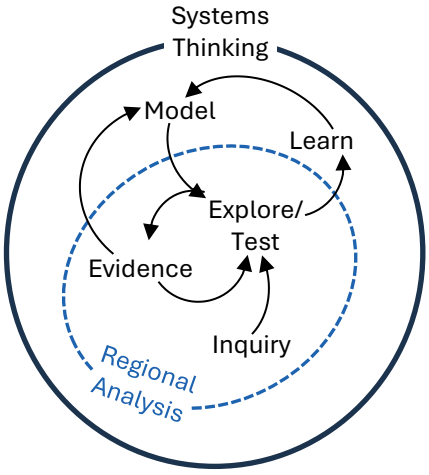
Regions serve as intermediaries between local and global scales, making regional analysis vital for understanding multi-scale system dynamics. For example, climate change impacts all of Africa, but its impact in West Africa is specific to the environmental conditions and how they interact with other conditions in the region.

Regional analysis embodies a method that looks at how parts fit within a whole and recognizes the importance of how the different segments of the system are interconnected.

WAECM TAILORING APPROACH

While the WAECM has a clearly defined geographic scope, delimiting boundaries around often diffuse conditions in the model requires greater attention. This process necessitates systematically evaluating the concepts within the generic model to identify those needing further research and refinement for practical application to the chosen location to represent West Africa's evolving landscape accurately. Like previous AFOE phases, tailoring required extensive research. The research process had two goals:

1) Account for specific regional dynamics or conditions identified during the exploratory research phase (i.e., regional analysis).
2) Refine portions of the AECM that were underspecified at the continent level but could be appropriately tailored to the region level.



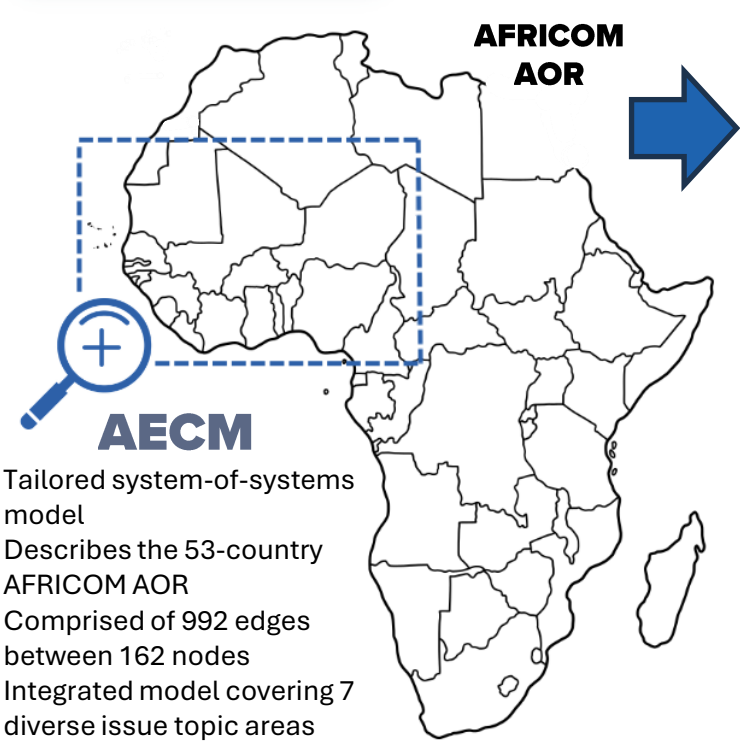
Over 1,100 peer-reviewed articles, reports, and databases were consulted and analyzed for exploratory research, regional analysis, and validation. Additionally, the team consulted local West African experts to incorporate diverse local perspectives and enhance the validity of key regional dynamics, helping tailor the model for West Africa. Based on existing team expertise, West African subject matter expert (SME) elicitation, and initial exploratory research, the team identified 22 regional conditions or dynamics specific to West Africa that differed to some degree from those of the continent.

Next, the team created a crosswalk that maps identified regional West African conditions to possible equivalent AECM concepts to determine and document if and how existing AECM nodes or subsystems were conceptual matches. Conceptual matches were continuously reviewed to determine confirmatory evidence during tailoring.

The team further researched unmatched or weakly matched regional conditions or dynamics to establish the approximate degree of variation from the AECM, characterized on a 4-point scale (1 = not very different, 2 = slightly different, 3 = moderately different, 4 = very different). Conditions or dynamics characterized as a 3 or 4 were identified for substantive research and priority tailoring. This approach took project financial and temporal constraints into consideration.

The team also identified priority conditions or dynamics of high interest to USAFRICOM, which required careful consideration in tailoring and included political stability, insecurity and conflict, migration, climate change, and economic challenges. Research into related nodes and subsystems aimed to understand the instantiation of the condition in the region and examine the evidence for connections (edges).

Overall, the WAECM tailoring team identified approximately 64 nodes and 6 systems requiring in-depth research and subsequent tailoring. During priority tailoring, node definitions were revised, new connections between nodes were created, and unnecessary ones were eliminated. In a few instances, the tailoring process uncovered the need to add new nodes to reflect the West African context.



AECM

- Tailored system-of-systems model
- Describes the 53-country AFRICOM AOR
- Comprised of 992 edges between 162 nodes
- Integrated model covering 7 diverse issue topic areas

WAECM

- Regional, tailored system-of-systems model
- Describes the 15 countries of West Africa, defined by AFRICOM
- Comprised of 1,067 edges between 157 nodes
- Integrated model covering 7 diverse issue topic areas

AFRICOM AOR—West Africa

APPLICATIONS OF THE WAECM

Understanding regional complex systems is crucial for addressing the interconnected challenges and opportunities that shape West Africa's future. Deeply comprehending these systems *as systems* enables stakeholders to anticipate potential disruptions, adapt strategies to local contexts, and promote collaboration. The WAECM can be used to help planners and analysts explore how to:

- Better anticipate and understand the unintended consequences of actors and factors in the system.
- Provide new indicators or warnings by identifying antecedent or "upstream" factors and conditions.
- Assess the implications of competitor activities, both positive and negative.
- Maximize the effectiveness of engagement activities by understanding how those activities impact a complex system.
- Help better allocate resources and improve assessments by identifying potential intervention points where actors may have leverage in a system, as well as when other nodes may mitigate the intended impact of US Government (USG) activities.
- Improve coordination across the interagency by showing where non-Department of Defense (DOD) entities may be well-positioned to drive desired outcomes.
- Generate a common situational overview within commands, between agencies, and with partners.

Note also that while research supports the regional model as a whole, the dynamics in a particular country at a particular time may well vary from the model. Additionally, like the previous AFOE models, the WAECM should be considered as a "living model" that will require periodic review, maintenance, and possibly refinement as new research becomes available. Regional conditions change more rapidly than continental or global conditions.

THE WAECM STORY MAP

Maps are powerful storytellers and organizational devices illustrating patterns, trends, and relationships between data, evidence, and their geographies. Maps provide a concise and easily digestible way to consume information quickly (Gershon & Page, 2001).

There are parallels in how maps and system loop diagrams represent dynamics, factors, and relationships. Story maps, a geographic-based deliverable type, can be used to understand and visualize regional issues and their geographic scope. They help form a common situational overview and can also be shared with partners inside and outside of the USG.

The story map for the WAECM (see pg. 5) showcases key trends and findings derived from the research underlying the regional analysis, alongside system loop diagrams from the concept-based complex system model itself. It translates evidence-based analysis into visual representations, offering insights at the system level:

- Showing dynamism in examining different scales and levels of analysis (through spatial dimensions) relevant to a regional tailoring effort.
- Orienting the reader to a particular map extent and scale of system factors/conditions and their linkages.
- Grounding model factors/relationships in particular places/spaces.

WHAT IS A "STORY MAP"?

Story maps are reference maps that locate phenomena, places, and/or events in combination with narrative text and other graphics to depict the dynamism and flows of phenomena within a particular area that shape interpretation and meaning (Denil, 2017; Kelly, 2022).

Story maps embrace collating and presenting visual storytelling techniques (text, maps, photos, videos, audio, charts, graphs, infographics) to communicate complexity in a more relatable and legible way (Roth, 2020).

Story maps can also be used to create interactive atlases of different topics or issues, highlighting the interrelated nature of phenomena (Pearce, 2008).

The WAECM story map brings together different types of data, evidence, and information concerning model conditions and factors and how they are represented. It serves as a tool to contextualize and explore specific system dynamics within the West African region, supporting the synthesis of complex information and aiding in the analysis of regional modeling. Notably, the following WAECM story map should not be viewed as a definitive analysis of WAECM; instead, it highlights a priority tailoring issue—political stability—that the team explored during the regional analysis and subsequent tailoring process.

SYSTEMIC RISK IN WEST AFRICA: COMPOUNDING CHALLENGES

While the early 1990s were characterized by considerable optimism about West Africa's growth, it is undeniable that from the West Coast to the Sahel, the region has experienced and continues to experience instability and widening conflict (Marc et al., 2015). The operational environment in West Africa is becoming increasingly complex, shaped by a confluence of geopolitical, security, environmental, and socio-economic factors and challenges. It is a region marked by a delicate balance of conditions that creates a multifaceted environment where rapid growth and rising instability coexist.

Increasingly, that balance is tipping toward instability in key systems. Flashpoints—critical factors or conditions well-positioned to transfer shocks across a system—pose significant strains to crucial buffers that support political, social, and environmental stability. If these systems continue to face mounting strains without adequate buffers, the risk of compounding negative impacts grows, potentially undermining growth and leading to more widespread economic, political, and/or social instability.

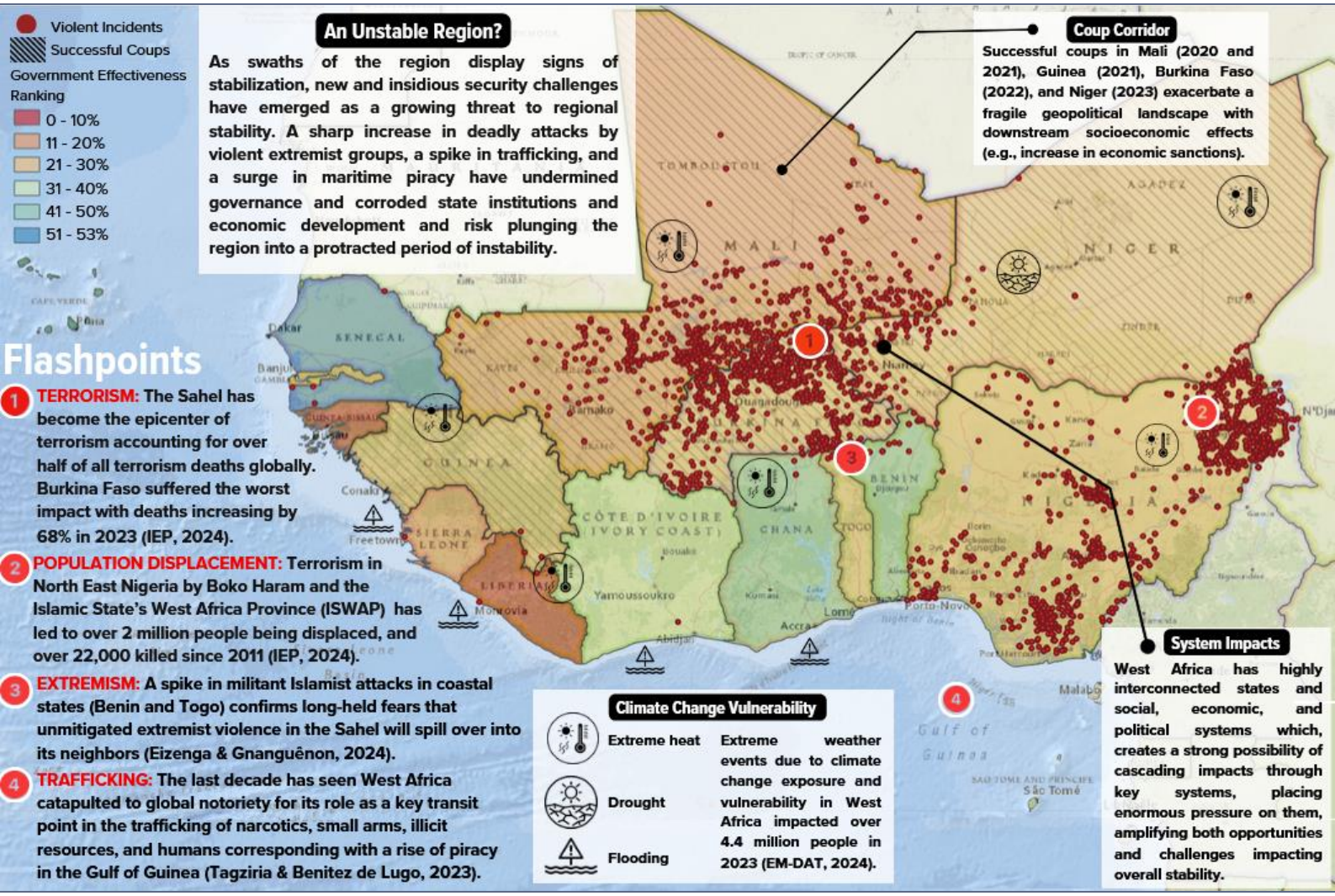


Figure 1: A map capturing the multiple and overlapping challenges and risks to stability in West Africa.

THE ISSUE

The United States is navigating a complex landscape in West Africa, balancing multiple pressing priorities: combating violent extremism and illicit economic activity, addressing democratic retreat, confronting climate change impacts, and managing strategic competition. Understanding the systemic nature of the risk can assist with prioritization, given the challenge of limited resources and necessary trade-offs.

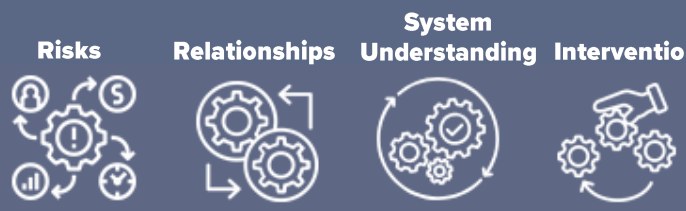
A SYSTEM VIEW OF INSTABILITY RISK IN WEST AFRICA

Flashpoints and buffers exist in a complex, interrelated system, and the way impacts cascade through that system has the potential to both *mitigate* and *amplify* the risks to political stability (Schweizer, 2021). Thinking about this *systemic risk* means considering a high level of complexity with respect to casual relationships and careful consideration of contextual factors (Axelsson & Kobetski, 2018; Renn et al., 2020). This report examines instability dynamics using the WAECM—a regionally-tailored complex system model that is designed to capture both the *complexity* and *context* essential for exploring systemic risks. The following examination of key flashpoints with the WAECM provides a useful analytic basis for managing this kind of risk and demonstrates the power of this approach.

SYSTEMIC RISK & POLITICAL STABILITY IN WEST AFRICA

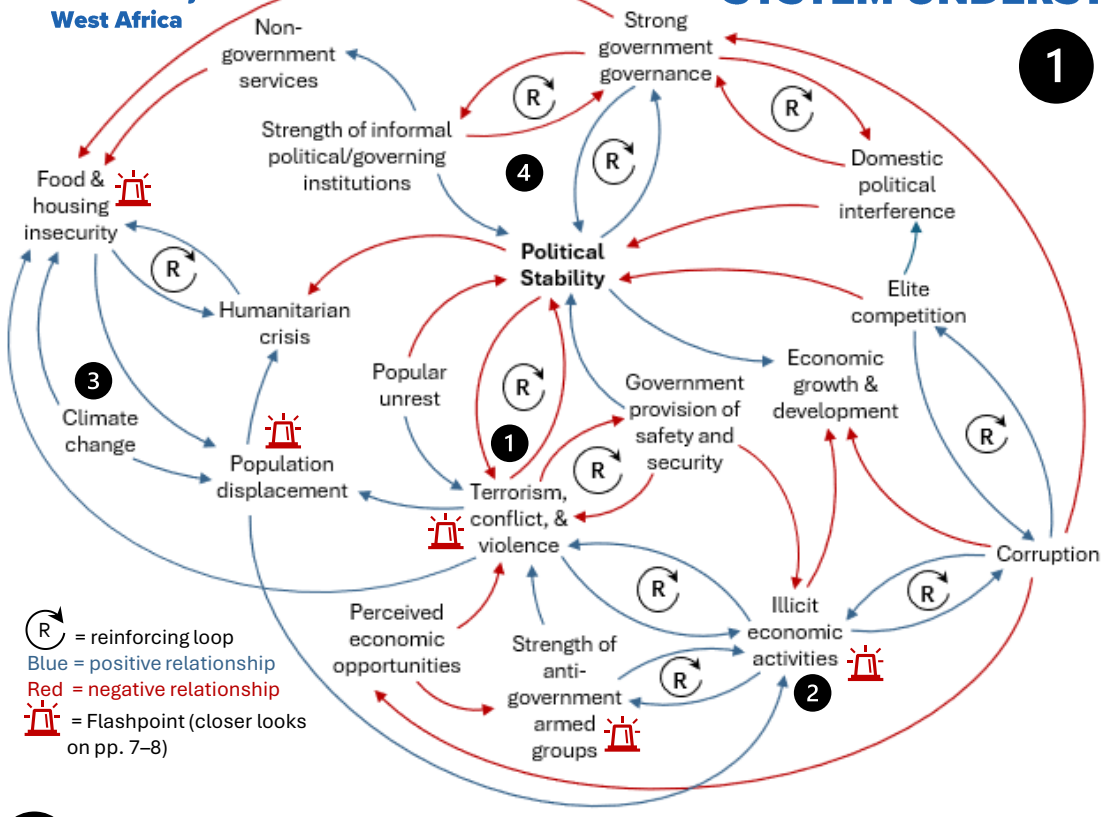
The analysis of systemic risks to political stability in West Africa embraces recognizing the ways that risk can 'travel' through the system, impacting connections and other system factors or conditions. Identifying drivers that may cause strain, leading to increased risk of instability, and buffers that strengthen resilience to risk in the system is crucial to better understanding how intervening in the system to reduce risk may play out. While a multitude of conditions and factors impact stability in West Africa, the primary systemic risk emerges from the region's sharp increase in terrorism and violent conflict and corresponding flashpoints that increasingly overwhelm governments' capacity to provide strong (versus weak) governance, safety, and security.

WHAT TO LOOK FOR IN WAECM SYSTEMS



- **Risks:** Conditions, Factors
- **Relationships:** Reinforcing cycles, Interactions, Interconnections, Interdependencies
- **System Understanding:** Complexity, Tipping points, Cascading effects, Non-linearity
- **Interventions**

System Surrounding Political Stability in West Africa



SYSTEM UNDERSTANDING TAKEAWAYS

1 The scope and intensity of terrorism, conflict, and violence cause the most considerable, direct strain on the system around political stability in West Africa. This is a system where impacts are amplified through reinforcing cycles with few buffers. Since 2013, with the rapid rise of militant Islamist violent extremist organizations (VEOs) like Al-Qaeda in the Islamic Maghreb (AQIM), Jama'at Nusrat al Islam wal Muslimeen (JNIM), and Boko Haram, terrorist incidents and casualties have risen by 239% and displaced over 5.4 million people (IEP, 2024; CPA, 2024). The annual number of violent incidents involving VEOs within 50 kilometers of the Sahel's coastal West African neighbors has also surged by over 250% in the past two years, exceeding 450 events, indicating an expanding zone of terrorism and conflict in the region (Eizenga & Gnanguênon, 2024).

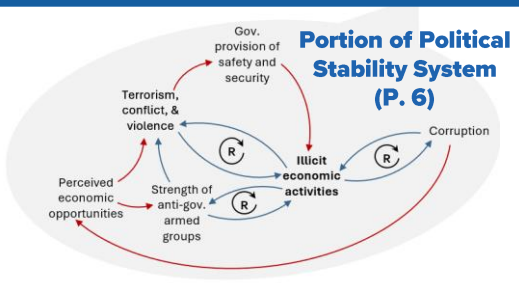
2 The persistent and growing strength of militant Islamist VEOs is driven by an explosion of illicit economic activities, such as drug and arms trafficking, in the region (Hunter, 2022). The emergent nexus between illicit activity and VEOs creates an entrenched, mutually reinforcing cycle whereby illicit activities help fund VEOs, which, in turn, strengthens their operational capacity, eroding government provision of safety and security and creating a permissive environment for the illicit economy to thrive (Pandit, 2024; ENACT, 2023). The illicit economy is further bolstered by widespread corruption in the region as elites compete by leveraging their positions of power to control resources, influence political processes, and maintain patronage networks (Taylor & Williams, 2008).

3 Climate change is an escalating strain on political stability in West Africa, intensifying environmental degradation (e.g., desertification) and extreme weather events like flooding. These impacts drive population displacement and worsen food and housing insecurity. In conflict zones, these pressures deepen tensions over livelihoods and resources (e.g., access to food) and exacerbate displacement. In 2024, over 30 million people in West Africa faced severe food insecurity—4 million more than in 2023—and 44% of the approximately 8 million forcibly displaced persons in West Africa were people impacted by climate change-related disasters (Cadre Harmonisé, 2024; IRC, 2024), highlighting the growing risk of climate-induced humanitarian crises in the region.

4 Strong government governance (e.g., government legitimacy, responsiveness, and provision of safety and security) and informal political institutions are vital buffers in the system, directly increasing political stability. Many West African states, regardless of regime type, are facing increased stress on their governing capacity due to increased strain on the system. Widespread corruption and growing interference by external malicious actors (e.g., domestic political interference) also strain this critical buffer. Where government governance is weak, informal institutions often fill essential gaps, providing needed services to populations and even short-term stability but also complicating the governance picture for central authorities.

FLASHPOINT: ILLICIT ECONOMIC ACTIVITY

West Africa's geographic position, widespread corruption, and conflict dynamics help make it a central hub and transit point for illicit economic activity, such as trafficking, resource extraction, transnational organized crime (TOC), and illegal trade (UNODC, 2013). This confluence of factors amplifies the mutually reinforcing and tightly linked relationship between illicit economic activities; the strength of anti-government armed groups; and terrorism, conflict, and violence (i.e., the crime-terror nexus) (Abatan & Assanvo, 2023). In the last 5 years, regional VEOs have developed highly strategic engagement with illicit economies that underpin their financing, expansion into new geographies, retention of influence in areas of control, and resilience to disruption (Nsaibia, 2023). While this crime-terror nexus is concentrated in a specific area (the Sahel), it is a critical flashpoint, sending destabilizing shocks through the political stability system and impacting the region more broadly.



> *"Illicit activities that do not cause direct harm to communities tend to be perceived by many as a legitimate source of livelihood in the region [...]"*
>
> – SME Interviewee (July 2024)

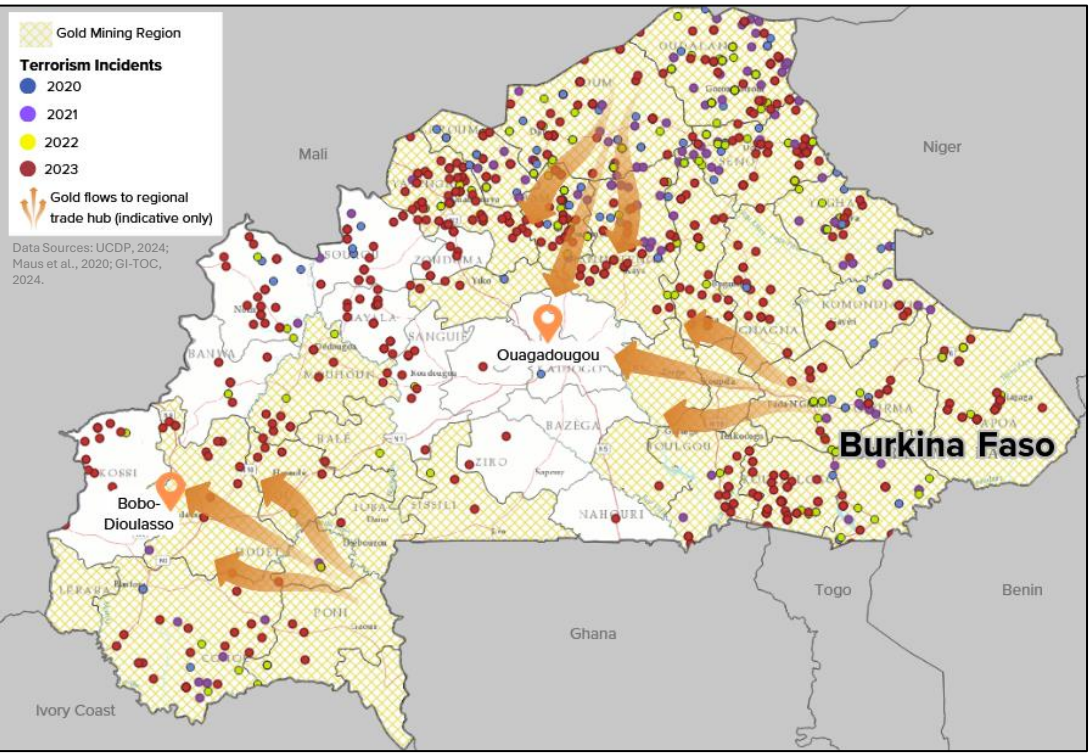


Figure 2: *A map highlighting the growing intersection of gold mining regions and terrorism incidents in Burkina Faso between 2000 and 2023.*

ILLICIT ECONOMY & CORRUPTION

In West Africa, illicit economic activity and corruption are deeply intertwined, creating a vicious reinforcing cycle that fuels corrupt practices (e.g., abuse of power, bribery, patronage). Corruption, in turn, enables illicit operations to grow by thwarting efforts to establish regulated and monitored practices and allowing them to operate with general impunity (Hunter, 2022). Also, corruption exacerbates tensions within communities as financial interests are often prioritized over community interests, decreasing perceived economic opportunity, which anti-government armed groups like VEOs exploit (Assanvo et al., 2019). This means that security forces may have trouble responding due to both local corruption and the economic importance—at least in the short-term—of these activities for local livelihoods.

ZOOMING IN: VEOS & GOLD MINING

Over the past decade, there has been a rapid increase in gold production—a key economic sector that provides a livelihood to over 1.8 million people—and artisanal and small-scale gold mining (ASGM) in Burkina Faso, Mali, and Niger (RLI, 2021). High levels of informality and illegality characterize the sector because it often occurs on unlicensed and undeclared mining sites and is difficult for the government to regulate and monitor, leading to widespread exploitation (Hunter, 2022). Increasingly, that exploitation includes conflict financing for anti-government armed groups, including VEOs. As VEOs consolidate power, especially in Burkina Faso (see Fig. 2), they increasingly serve quasi-regulatory roles in certain illicit economies, including gold production (Nsaibia, 2023). The Sahelian 'gold rush' offers new funding sources and recruitment opportunities for VEOs, which sustain their troops, maintain their operational capacity, and increase their influence in areas under or near their control (Abatan & Assanvo, 2023). Control of gold mining territories and resources provides several critical revenue streams for VEOs (UNODC, 2023):

Directly engage in illegal mining and smuggling themselves, leveraging their clandestine network to sell goods and earn profit.

Target gold mining operations (both licit and illicit) for takeover, extortion, or theft.

Control transportation routes to enforce taxes on convoys of goods transiting through an area under their control.

Provide security and/or transportation escorts for a cost.

Revenue generated from these activities is, in turn, used to fund operations, creating cycles of violence and illicit activity that spur negative consequences that cascade across the region, straining the system around stability. Understanding the broader system around illicit economic activity and terrorism is crucial for creating effective and targeted interventions.

FLASHPOINT: DISPLACEMENT

Population displacement has emerged as another critical flashpoint in West Africa. The region is facing escalating, compounding crises fueled by multiple interrelated factors, including conflict and violence, food insecurity, and increasing impacts of climate change, driving unprecedented levels of displacement. Almost 8 million people were forcibly displaced in 2024 (UNHCR, 2024). Given the systemic nature of risk, a coordinated response that recognizes the complex and context-specific conditions of the system around displacement is required to move toward greater stability.

MULTIPLE APPROACHES TO IMPACTING THE DISPLACEMENT SYSTEM

Diplomacy

The US Department of State coordinates humanitarian policy and diplomacy, providing life-sustaining assistance, working with multilateral organizations to build global partnerships, and promoting best practices in humanitarian response.

Development

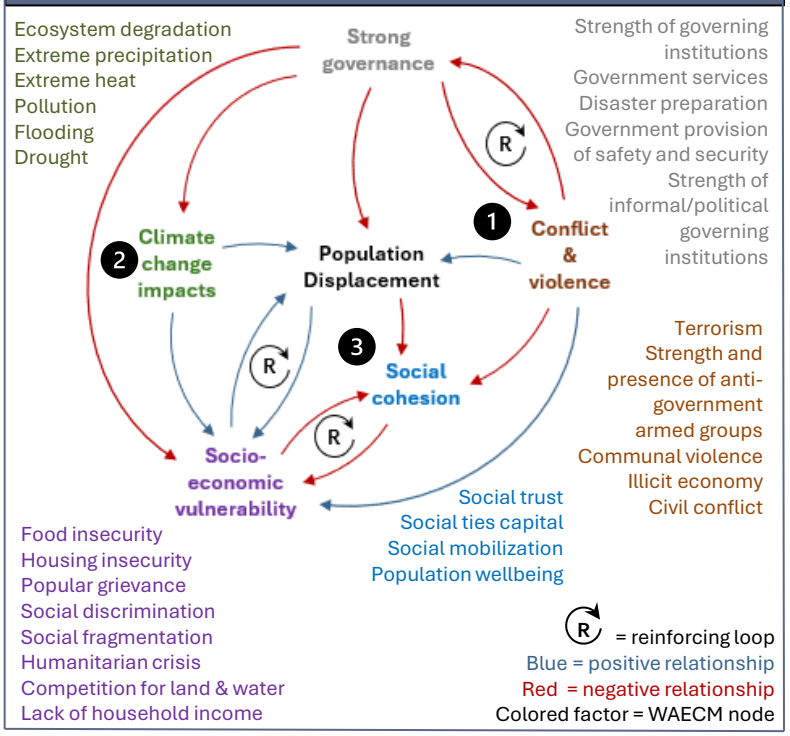
The US Agency for International Development provides capacity-building support and humanitarian assistance—food, water, shelter, emergency healthcare, sanitation and hygiene, and critical services—to displaced persons.

Defense

USAFRICOM programs include security cooperation activities that support partner nations' provision of essential services while addressing humanitarian crises. Diplomatic and development efforts depend on security. DOD presence enables inter-agency activities in locations where security is at risk.

1 Terrorism, conflict, and violence are the main drivers of displacement in West Africa. Conflict severely impacts food security beyond the immediate threat of harm, disrupting agricultural production, distribution, procurement, and consumption (Ujunwa & Kalu, 2019). These combined pressures amplify the vulnerability of displaced populations, creating a cycle of instability. Reducing drivers by promoting and maintaining security provides a buffer for displacement.

WAECM POPULATION DISPLACEMENT SYSTEM



2 Climate change impacts, like drought or weather extremes, act as a threat multiplier, further worsening regional displacement. For example, increased drought decreases the viability of agricultural lands and increases food insecurity, and extreme weather disrupts livelihood activities, increasing socio-economic vulnerability. Government services and disaster preparation are crucial buffers that reduce both short-term and long-term impacts of climate change, reducing vulnerability and enhancing community resilience and the ability to cope with adverse situations.

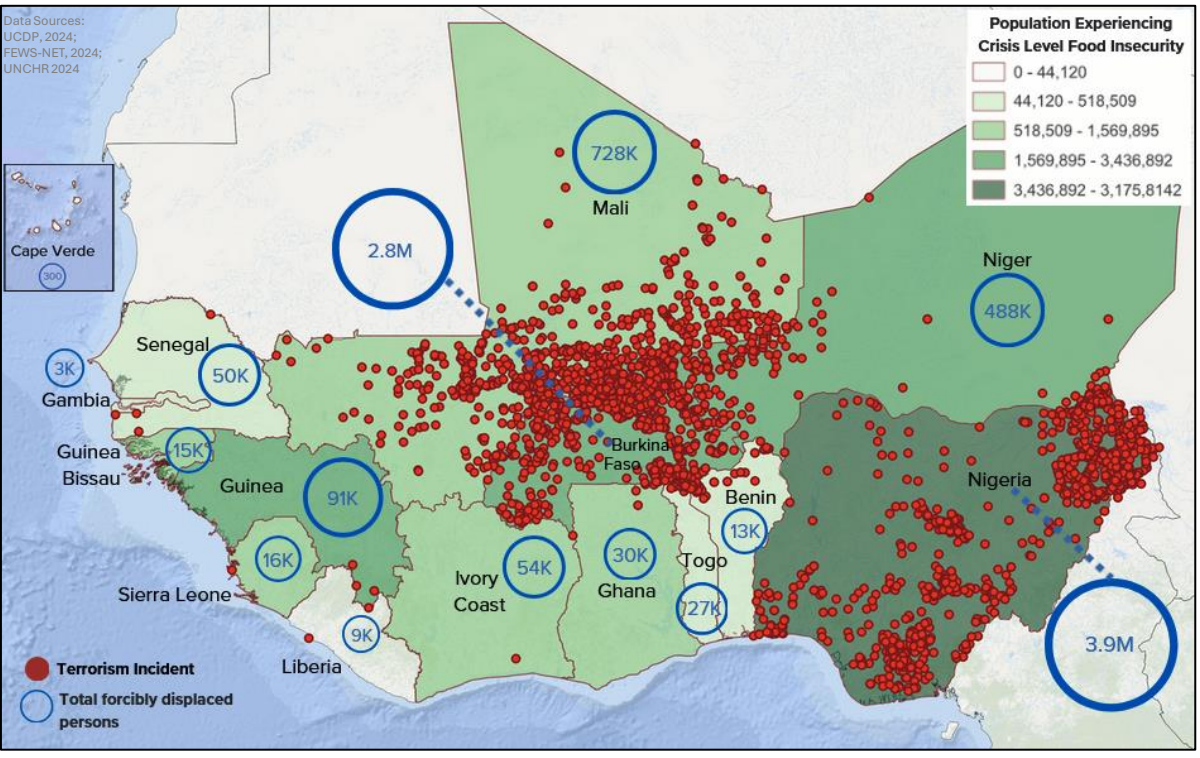


Figure 3: A map depicting key compounding crises in West Africa and the number of forcibly displaced persons in each country.

3 Displacement undermines social cohesion and fuels socio-economic vulnerability. The loss of social ties and capital from displacement can lead to social order breakdown as affected people are often disadvantaged or excluded from basic needs and resources and marginalized in host communities (George & Adelaja, 2022). As a result, social fragmentation and discrimination can quickly lead to popular grievances. VEOs in the region often exploit these negative social dynamics to garner support and enhance recruitment opportunities (Henkin, 2022). Coordinating policy and programming that brings diverse groups together to build social trust can improve social cohesion and reduce instability.

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MAP DATA SOURCES

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