

# River Transport Disasters and Systemic State Vulnerability in the Democratic Republic of Congo: Evidence from the 2025 Équateur Shipwrecks

DONAT-SOFT MUKUNA MUYA

**Abstract:** River transport disasters are recurrent in the Democratic Republic of Congo (DRC), yet they are often treated as isolated humanitarian events rather than symptoms of broader systemic vulnerabilities. Based on fieldwork conducted between 2023 and 2025 in Équateur province including 47 interviews, participant observation, and analysis of incident documentation; this study examines five major shipwrecks in 2025 that resulted in an estimated 734 deaths. Using a multidimensional vulnerability assessment framework, the article demonstrates how recurrent river disasters emerge from failures in governance capacity, infrastructure regulation, territorial oversight, and information integrity. The findings show that these events contribute to cumulative erosion of state legitimacy, socio-economic resilience, and territorial cohesion, while creating structural exposure that could be exploited by non-state actors. The article argues that river transport governance should be understood as a key vector of state fragility and a strategic priority for resilience-building in the DRC.

**Keywords:** river transport; disaster governance; vulnerability; state fragility; Équateur province

## Introduction

River transport constitutes a central mode of mobility, trade circulation, and social connectivity for millions of inhabitants in the Democratic Republic of Congo (DRC), particularly in provinces where terrestrial infrastructure remains limited or absent.<sup>1</sup> In Équateur province, waterways function as the primary transportation corridors linking dispersed rural settlements to administrative, commercial, and health service nodes. Yet, despite their structural importance, river transport systems are characterized by chronic safety deficits, lack of regulatory enforcement, and infrastructural deterioration. These conditions have produced recurrent mass-casualty events, including five major shipwrecks in 2025 alone, resulting in an estimated 734 deaths. Rather than representing isolated incidents, these events reflect persistent systemic failures embedded in governance, institutional capacity, and socio-economic dependency patterns.<sup>2</sup>

Literature on state fragility emphasizes the link between weak public goods provision and declining state legitimacy and territorial cohesion.<sup>3</sup> The dependence on river transport in Équateur province cannot be understood as a matter of convenience but rather as a structural necessity. Alternative transportation modalities are severely constrained by geography, cost, and state capacity limitations. Domestic air transportation, which constitutes the main alternative to river mobility, costs approximately US\$ 150-250 per

**Donat-Soft Mukuna Muya** is a doctoral candidate in Strategy, Defence and Security, Collège des Hautes Études de Stratégie et de Défense (CHESD – Kinshasa) and Research Associate, LAPODEV Laboratory, University of Kinshasa.

<https://journals.flvc.org/ASQ>

passenger, a sum beyond the economic reach of the vast majority of rural inhabitants whose annual income is estimated between US\$ 300-600. Furthermore, regional air transport is operated by private companies with limited oversight and accident rates exceed international safety standards.

Road infrastructure, which could theoretically represent a viable alternative, remains fragmented and unreliable. Major highways are frequently impassable during the rainy season and maintenance deficits significantly increase travel time. Distances that river transport can cover in 6-12 hours often require 24-36 hours or more by vehicle. In many regions, road connectivity to distant settlements and rural areas is simply absent. This structural dependency on river transportation creates an inherent vulnerability dynamic. The population relies on river transport to access essential services such as markets, health facilities, and administrative centers. At the same time, the river transport system itself is characterized by systemic safety deficits and governance failures, producing a situation in which exposure to risk becomes unavoidable.

In the DRC, research has largely centered on security dynamics in the east, leaving civilian mobility infrastructure analytically peripheral.<sup>4</sup> Disaster governance literature similarly highlights how vulnerability and institutional insufficiency shape the human impact of hazards.<sup>5</sup> However, most studies focus on natural hazards rather than recurrent preventable technological failures.<sup>6</sup> Hybrid threat scholarship shows how adversarial actors may exploit governance gaps and social fragmentation.<sup>7</sup> Yet this literature typically presupposes intentional hostile action rather than examining how governance failure itself generates exploitable vulnerabilities.<sup>8</sup>

This article addresses these gaps by analyzing recurrent river transport disasters as indicators and generators of multidimensional state vulnerability in fragile contexts. Using Équateur province as an empirical case, we examine how systemic transport governance deficiencies produce cascading vulnerabilities in governance legitimacy, social cohesion, economic interdependence, territorial control, and information environments.<sup>9</sup> The analysis does not seek to attribute causality or demonstrate coordinated exploitation in specific incidents. Instead, it evaluates the structural conditions under which recurrent infrastructural disasters may create opportunities for exploitation by state or non-state actors.<sup>10</sup>

This article contributes to three major strands of scholarship by situating river transport disasters within broader debates on governance and state vulnerability. First, it engages with studies on state fragility by demonstrating how failures in the provision of basic public services can operate as strategic multipliers of vulnerability. In contexts where essential infrastructure, regulation, and oversight are weak, such failures generate not only immediate human and economic losses but also reinforce deeper structural weaknesses that undermine the resilience and legitimacy of the state. Second, the article advances research on disaster governance by framing recurrent and preventable disasters as systemic phenomena rather than isolated events—instead of interpreting each incident as an exceptional occurrence, the analysis emphasizes how persistent institutional shortcomings, regulatory gaps, and governance deficits produce conditions in which similar disasters repeatedly occur. Third, the study contributes to debates on hybrid threat theory by proposing a conceptual distinction between adversary-driven threats and vulnerability generation within state systems. In this perspective, vulnerability does not necessarily arise from direct hostile action but may emerge from internal governance failures that create exploitable weaknesses, thereby expanding the analytical scope of hybrid threat scholarship

to include structurally produced vulnerabilities that could later be leveraged by external or non-state actors.<sup>11</sup> By analyzing river transport disasters as structural indicators of resilience erosion, this study advances a framework for assessing how routine infrastructural failures may contribute to long-term governance and security degradation in fragile states.<sup>12</sup> While this article analyzes river transport disasters as indicators of systemic state vulnerability, a separate methodological study develops the River Transport Vulnerability Index (RTVI) to quantitatively assess vulnerability across river transport corridors.

## Literature Review

Research on state fragility underscores how limited state capacity to deliver basic public goods undermines legitimacy and territorial cohesion, particularly in large and infrastructurally constrained polities.<sup>13</sup> In the DRC, scholars have emphasized the persistence of a juridical state with uneven empirical authority over its territory, where governance functions are frequently delegated, fragmented, or informally negotiated.<sup>14</sup> However, this literature has overwhelmingly concentrated on security sector dynamics and conflict economies in eastern provinces, leaving civilian transport infrastructures analytically peripheral despite their foundational role in sustaining economic and social integration across the national territory.<sup>15</sup>

Disaster governance research has demonstrated that the severity of humanitarian crises is shaped less by the hazard event itself than by underlying vulnerabilities linked to institutional capacity, inequality, and exposure.<sup>16</sup> Yet, this body of work has largely focused on natural hazard events such as flooding, landslides, and pandemics, rather than recurrent technological and infrastructural failures that emerge from routine governance deficits.<sup>17</sup> These preventable disasters, occurring within normalized conditions rather than exceptional events, challenge analytical frameworks that conceptualize disasters as episodic shocks rather than systemic outputs of institutional decay.<sup>18</sup>

In parallel, hybrid threat scholarship has shown that state and non-state actors may exploit governance failures, social fragmentation, and information vacuums to incrementally erode state authority without overt military confrontation.<sup>19</sup> However, this literature typically presupposes intentional adversarial strategy, leaving limited conceptual space for understanding how vulnerabilities may accumulate and become exploitable even in the absence of deliberate external intervention.<sup>20</sup>

The specific contribution of this study lies in bridging these three literatures by treating recurrent river transport disasters in the DRC not as isolated humanitarian events, nor solely as governance failures, but as predictable systemic outputs that generate multidimensional vulnerabilities with strategic implications.<sup>21</sup> In doing so, the analysis reframes recurrent infrastructural disasters as both symptoms and accelerators of state fragility in regions where waterborne transport constitutes the primary mechanism of territorial integration.<sup>22</sup>

## Methodology

This study employs a qualitative research design based on fieldwork conducted in Équateur province between March 2023 and December 2025. Data was collected through 47 semi-structured interviews with river transport operators, shipwreck survivors, and government officials, as well as through systematic participant observation at five river ports. The research also included the analysis of incident documentation from provincial authorities

and media sources, and a comparative historical review of shipwreck records. Data analysis employed a multidimensional vulnerability framework organized around five domains: governance capacity, social cohesion, economic resilience, territorial control, and the information environment. Additional methodological details are provided in Appendix A.

## Results

### *Overview of the 2025 Shipwreck Events*

Five major mass-casualty river transport disasters were recorded in Équateur province between April and September 2025.<sup>23</sup> These incidents occurred on Congo, Tumba, Ntomba, and Maringa river systems and involved large wooden passenger boats (*baleinières*) and motorized canoes used for civilian transport and commercial circulation. All incidents resulted in vessel loss and significant human casualties.

Table 1 presents the demographic and professional characteristics of the 47 interview respondents across four stakeholder categories: survivors (n = 15), river transport operators (n = 18), and government officials and humanitarian workers (n = 14). The data reveals significant variations both within and between groups that illuminate differential exposure to disaster risks and patterns of engagement with governance institutions. The survivor sample exhibits a male dominant gender composition (80%), consistent with gender employment patterns in transport sectors throughout sub-Saharan Africa. The median age of survivors was 41 years, with substantial variation across the range (22 to 67 years). Nearly all survivors (93%) had previous experience with river transport, though the frequency of travel varied considerably—47% reported traveling monthly or more frequently, 27% traveled occasionally (2 to 4 times annually), and 26% had traveled rarely (once per year or less). Of particular significance, 73% of survivor respondents reported having experienced or witnessed a previous shipwreck event. This finding indicates that the current cohort represents experienced—rather than naïve—risk accepters who had accumulated disaster exposure. This prior victimization likely shapes both their hazard perceptions and their apparent resignation to ongoing vulnerabilities, themes explored in the qualitative analysis that follows.

Among river transport operators, male presence was even more pronounced (94%), reflecting the male-dominated nature of commercial navigation employment. The median years of operational experience in the sector was 8 years, with a range of 2 to 22 years. This group reported extensive knowledge of vessel conditions, with 89% reporting that they regularly or frequently were aware of vessel maintenance deficiencies. Remarkably, when asked about safety equipment compliance, only 22% of operator respondents reported that vessels under their supervision carried the equipment legally required by DRC maritime law. This finding reveals widespread regulatory noncompliance and implicit acceptance by operators of substandard safety conditions. Government officials and humanitarian workers were younger (median age 34 years) than both survivors and operators. Notably, this subgroup included the only significant female composition in the sample (43%), reflecting different patterns of state employment and humanitarian sector participation across gender lines. These variations across stakeholder categories underscore the importance of examining disaster vulnerability through multiple institutional and social positions rather than treating affected populations as homogeneous.

### *Human Impact, Casualty Patterns, and Data Aggregation*

Reported fatality levels varied across incidents, with estimated deaths ranging from 4 to more than 300 when accounting for missing persons.<sup>24</sup> Survivors were recorded for all events, though survival rates were lowest in night-time capsizing cases. Most identified victims were adult travelers engaged in routine commercial or family mobility. A substantial proportion of children were reported among the casualties from the 8 April and 10 September shipwrecks.<sup>25</sup>

The casualty figures presented in this analysis represent a synthesis of multiple data sources with varying reliability due to geographic remoteness, limited communication infrastructure, and inconsistent provincial reporting systems in Équateur. This aggregation procedure aims to ensure methodological transparency and permit reproducibility. Data sources considered include provincial administrative statements and national broadcaster reports, civil society field monitoring teams operating in affected locations, humanitarian situation reports from UN OCHA and IOM-DTM, and survivor or witness testimony triangulated across interviews.

The estimation procedure employed a structured approach to source evaluation and convergence assessment. All available reports for each incident were compiled and classified by origin (state, civil society, humanitarian agency, direct testimony). When official and civil society casualty estimates differed by 20% or less, the figure was reported as a single validated estimate (for example, the 15 April 2025 event recorded 148 deaths reported across state and media sources). When divergence exceeded 50%, civil society estimates were weighted 2:1 relative to official sources, based on their earlier field presence and multi-site confirmation (see Supplementary Table 1). Provincial totals were calculated by summing the weighted incident-level estimates. The lower bound estimate of 620 deaths reflects official tallies only, while the upper bound of 850 deaths represents civil society estimates. The reported analytical estimate of 734 deaths represents the midpoint, reflecting the best available composite evidence.

A 95% confidence interval of 620-850 deaths accounts for incomplete body recovery in remote riverine zones, variable reliability and scope of provincial administrative reporting, absence of standardized national disaster reporting protocols, and expected testimonial variability related to trauma and geographic dispersion. Civil society sources were weighted more heavily because they maintain earlier and more direct access to affected riverine communities within 24-48 hours post-incident, systematic underestimation in official casualty reporting during prior DRC transport disasters is well-documented, and independent civil society reports frequently corroborated one another across distinct observation teams.<sup>26</sup>

### *Material and Infrastructural Losses*

In all recorded incidents, the vessels involved were fully destroyed or lost, resulting in total loss of transported commodities.<sup>27</sup> Most affected vessels were wooden multi-deck passenger boats operating without standardized structural certification. No cases reported the presence of functional life-saving equipment.<sup>28</sup>

### *Institutional and Emergency Response Patterns*

Local civil society organizations, riverine communities, and humanitarian actors conducted the majority of rescue and recovery operations. No formal state emergency intervention units were recorded as deployed during or immediately following the incidents.<sup>29</sup> Post-event responses primarily consisted of investigative announcements, declarations of mourning, and public statements of regulatory reinforcement.<sup>30</sup>

## **Discussion**

### *Recurrent River Disasters as Systemic Governance Failures*

The concentration of mass-casualty river transport disasters observed in Équateur province in 2025 reflects structural governance failures rather than isolated operational accidents. The repeated combination of vessel overloading, non-compliance with night navigation prohibitions, absence of life-saving equipment, and inconsistent administrative oversight indicates a systemic pattern of risk normalization rather than episodic error. These conditions reflect limited regulatory enforcement capacity, constrained resource allocation, and fragmented institutional coordination across provincial and national jurisdictions.

The recurrence of preventable disasters in settings where safety regulations formally exist but are not enforced is consistent with established indicators of governance fragility in civilian mobility infrastructure. As one river operator noted: “The boats are always overloaded; this has been standard practice for many years. No one has ever stopped us.”<sup>31</sup> This normalization of non-compliance suggests institutional tolerance rather than technical ignorance.

### *Multidimensional Vulnerability across Domains*

Applying the multidimensional vulnerability assessment framework, findings show that recurrent transport disasters generate or reinforce vulnerability in at least five domains. Governance vulnerability arises from declining public confidence in regulatory institutions following repeated safety failures. Economic vulnerability increases as losses of goods, rising transport costs, and disrupted mobility weaken regional market integration. Territorial vulnerability emerges in under-regulated river corridors where state presence is limited. Social vulnerability is reinforced through trauma, mourning, and perceived abandonment. Information vulnerability is visible in inconsistent casualty reporting, which enables rumor circulation and weakens crisis coordination. These vulnerabilities interact cumulatively across sectors.

As one survivor stated: “After the boats keep sinking and no one helps, we no longer believe the government is concerned about us.”<sup>32</sup> This sentiment appeared consistently across interview groups. A key analytical question concerns whether the vulnerabilities observed are antecedent conditions or direct consequences of the 2025 disaster sequence. Interview data from participants with pre-2025 experience (n = 23) indicate that vulnerabilities preceded the recorded incidents. One operator stated: “The boats are always overloaded—this has been normal for many years.”<sup>33</sup> Another noted: “No one has inspected our vessel in at least five years.”<sup>34</sup> A survivor recalled: “I have never seen life jackets on any boat on this river.”<sup>35</sup> This evidence suggests that governance, infrastructure, and safety

vulnerabilities were structurally embedded before the April-September 2025 shipwrecks. The disasters subsequently amplified vulnerability through social trauma, erosion of institutional legitimacy, and fragmentation of information flows.

A simplified feedback sequence can be proposed: Pre-2025 conditions involved weak governance capacity. The 2025 disasters then exposed recurrent infrastructural failures revealing systemic risk. Post-2025, a decline in trust and institutional legitimacy became apparent. Long term, governance fragility has been reinforced. This model is analytically suggestive, based on narrative sequencing rather than quantitative causality testing. Further longitudinal or network-based analysis would be required to empirically validate feedback strength.

### *When Vulnerabilities become Exploitable*

This study does not find evidence of deliberate or coordinated exploitation of the 2025 river disasters by state or non-state actors. However, the vulnerabilities identified create structural exposure conditions under which exploitation could become possible if incentives and capabilities were to align. The analysis therefore focuses on enabling conditions, rather than on realized threat actions. Interview testimony referencing irregular or absent port—corroborated by civil society observers—suggests limited state oversight capacity along key river routes. Such reduced regulatory presence constitutes an enabling condition for informal or unauthorized actors to operate with limited detection. Unprompted interview references to the perceived use of river corridors for unregulated commercial flows indicate awareness of potential openings for illicit transport. These statements represent perception of opportunity rather than evidence of confirmed trafficking activity.

Two interviewees referenced the presence of armed actors in or near riverine zones. These accounts are anecdotal and were not systematically verified. No evidence was collected indicating recruitment, coercion, or strategic activity linked to the 2025 disaster sequence. Divergence between official and civil society casualty estimates contributed to public uncertainty and rumor circulation. Such information gaps can create conditions in which competing narratives about state performance emerge.

No direct evidence of active exploitation by state or non-state actors was observed. References to armed or illicit actors are anecdotal and not generalizable. Information environments in riverine regions limit confirmability of covert activities. Conditions identified represent potential exposure, not documented exploitation. Équateur province in 2025 should be characterized as structurally vulnerable to potential exploitation, rather than as a context in which exploitation is occurring. The findings underscore the importance of strengthening regulatory enforcement, riverine monitoring capacity, and public information systems as resilience measures, independent of any confirmed external threat.

### *Implications for State Legitimacy and Territorial Integration*

The recurrence of preventable transport disasters undermines state legitimacy not only through direct loss of life but through the visible erosion of state responsibility for public safety and mobility infrastructure. In contexts where waterways function as primary vectors of territorial integration, such failures have implications beyond localized humanitarian impact. They affect the perceived credibility of state institutions, the reliability of logistical

networks, and the stability of inter-community linkages. The cumulative effect may contribute to incremental fragmentation of authority in peripheral provinces.

### *Repositioning River Transport Governance Within National Resilience Policy*

Addressing recurrent river transport disasters requires policy approaches that recognize these events as systemic indicators of vulnerability rather than episodic crises. Interventions should prioritize the reinforcement of inland water transport regulation, investment in vessel certification and safety infrastructure, development of emergency response capacity, and transparent communication mechanisms in casualty reporting. More broadly, the findings suggest that river governance must be integrated into national resilience and territorial cohesion strategies, rather than treated solely as a sectoral transport management issue.

### *Comparative Context: River Transport Vulnerabilities across the DRC*

While this study focuses on Équateur province, the vulnerabilities evident in river transport governance extend across the entire Democratic Republic of Congo. The 2025 Équateur shipwrecks were not isolated incidents but rather emblematic of pervasive state capacity deficits in civilian infrastructure management that characterize the broader DRC. In the Kasai region, data from the UN Office for the Coordination of Humanitarian Affairs document recurring river transport incidents and flood-related disruptions that regularly strand commercial and humanitarian supply chains.<sup>36</sup> The Kasai rivers—essential for trade circulation linking to diamond-producing regions—operate under similarly minimal regulatory oversight, with informal vessel operation predominant and safety standards essentially absent. IOM Displacement Tracking Matrix data from 2024-2025 identifies river-related displacement across Kasai as a persistent driver of humanitarian need, yet government capacity to address root causes of vulnerability remains negligible.<sup>37</sup>

Nord Kivu and Sud Kivu provinces present a parallel picture. In eastern Congo's volatile security context, river transport provides a critical alternative to roads dominated by armed group checkpoints and predatory taxation. Yet, as documented in recent IOM and OCHA reports, the Kivu waterways are characterized by vessel decay, minimal safety equipment availability, and complete absence of government regulatory presence.<sup>38</sup> A 2024 Kivu transport incident, resulting in approximately 400 deaths, mirrors the Équateur events in its causative factors: vessel overloading beyond safe capacity, aged and poorly maintained hull conditions, and governance collapse at both provincial and national levels.

Bandundu province, with its dense network of tributaries linking to the main Congo River, similarly demonstrates chronic transport system fragility. Government reports from the Ministry of Infrastructure acknowledge that road rehabilitation in Bandundu remains dependent on external donor funding, leaving river transport as the de facto essential connectivity mode for internal trade and mobility.<sup>39</sup> Yet provincial transport authority capacity is minimal, with most governance functions informally delegated to private operators with no safety accountability.

This geographic distribution of vulnerabilities demonstrates that river transport disasters in Équateur reflect not localized or exceptional governance failure but rather systemic weaknesses embedded in the DRC's broader institutional architecture. The recurrence of similar incidents across provinces, across multiple years, and under different

provincial administrations suggests that these are not idiosyncratic failures of particular officials but rather structural features of a fragile state where basic public goods provision—including infrastructure safety regulation and emergency response—exceeds institutional capacity. This systemic interpretation substantially strengthens the state fragility argument: river transport vulnerabilities constitute one visible and tragic manifestation of deeper state structural deficits that extend across sectors and geographies.

### *Study Limitations*

This study has several limitations that should be acknowledged. First, casualty figures remain estimates due to inconsistent official reporting and the challenges of documenting deaths in remote riverine areas. Second, the research focused exclusively on Équateur province, limiting generalizability to other DRC provinces with different governance structures and transport patterns. Third, the absence of quantitative risk assessment models prevents precise measurement of vulnerability levels. Finally, ethical constraints prevented direct observation of actual disaster events, relying instead on post-incident reconstruction through interviews and documentation.

Table 2 compares casualty estimates for the five major 2025 Équateur shipwreck events across multiple data sources and derives a pooled estimate with confidence intervals. The variation across sources reflects both genuine measurement uncertainty in fragile contexts and methodological differences in incident documentation and survivor identification. Radio Okapi and provincial government emergency services reports documented the most comprehensive initial incident counts, while IOM's Displacement Tracking Matrix, compiled through household surveys conducted weeks after incidents, showed somewhat lower figures, a pattern consistent with survivor underreporting in post-disaster contexts. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) situation reports, synthesizing multiple source streams, provide intermediate estimates. The pooled estimate of 734 deaths (95 % CI: 680 to 850) reflects the standard errors across data streams and represents the most conservative synthesis of available evidence while acknowledging measurement uncertainty. This conservative approach is appropriate given the high stakes of casualty figures in humanitarian assessments and policy discussions.

### **Conclusion**

This study examined recurrent river transport disasters in Équateur province as indicators of systemic governance vulnerabilities rather than as isolated humanitarian events. By analyzing five mass-casualty shipwrecks recorded in 2025, the research demonstrated that these incidents emerged within a broader configuration of infrastructural deterioration, regulatory non-enforcement, and limited institutional capacity for civilian mobility governance.<sup>40</sup> The recurrence of preventable disasters reflects structural patterns embedded within state service provision rather than exceptional breakdowns.

Using a multidimensional vulnerability assessment framework, the study identified five domains in which recurrent infrastructural failure generates cumulative exposure: governance capacity, economic resilience, territorial integration, social cohesion, and the information environment.<sup>41</sup> These vulnerabilities interact over time, shaping local perceptions of state reliability, restructuring trade and movement networks, and reconfiguring the distribution of authority in peripheral regions.<sup>42</sup> Although the study does

not provide evidence of deliberate strategic exploitation of these vulnerabilities by state or non-state actors, the underlying conditions identified may create opportunities for such exploitation should political or economic incentives converge.<sup>43</sup>

The findings underscore the importance of integrating river transport governance into national strategies aimed at reinforcing state resilience, rather than treating transport-related disasters as purely sectoral challenges.<sup>44</sup> Policy responses should include: (1) reinforcement of vessel regulation and safety standards; (2) development of emergency response capabilities in riverine corridors; (3) transparent casualty reporting mechanisms; and (4) long-term investment in inland waterway infrastructure.<sup>45</sup> Strengthening governance in this sector is not only a matter of reducing humanitarian losses; it is foundational to sustaining territorial cohesion, public trust, and institutional legitimacy in a context where waterborne mobility remains central to daily life and economic exchange.<sup>46</sup>

The policy implications of this analysis are complicated by the structural constraints facing the DRC. While calls for strengthened river transport regulation are analytically sound, such recommendations must account for the absence of viable alternative transportation options that would allow populations to reduce their exposure to risk. Unlike middle income or wealthy states where transport modal choice provides buffers against infrastructure failure, DRC citizens lack such options.

Improving road infrastructure would provide long term alternatives, but such capital intensive projects exceed current government and donor capacity. Strengthening air transport safety and affordability faces similar systemic constraints. In the absence of these systemic alternatives, the only realistic intermediate policy approach is a dramatic improvement in river transport governance itself, including mandatory vessel inspection regimes, enforcement of safety equipment requirements, operator certification and training, and the development of functional emergency response capacity. Yet this governance improvement is precisely what the state has failed to achieve across multiple decades and administrations, suggesting that river transport safety will remain a critical governance challenge and a key indicator of broader state fragility for the foreseeable future.

### **Declaration of Translation and Review**

This manuscript was originally written in French. The translation into English was completed using the DeepL AI application. The English translated text was subsequently reviewed and corrected by Professor Remond Sangabau, Chair of the Department of English at the University of Kinshasa (UNIKIN), to ensure terminological accuracy and linguistic quality. Final verification and additional adjustments were performed by the author prior to submission.

### **Works Cited**

Acemoglu, D. and J.A. Robinson. 2012. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. New York: Crown Publishers.

Bernard, H.R. 2006. *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. 4th edn. Lanham, MD: Rowman and Littlefield.

Conseil de Coordination de la Recherche Médicale de la RDC. 2019. *Directives éthiques pour la recherche impliquant des sujets humains en République Démocratique du Congo*. Kinshasa: Conseil de Coordination de la Recherche Médicale.

Creswell, J.W. and J.D. Creswell. 2018. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th ed. Thousand Oaks: SAGE Publications.

Cutter, S.L et al. 2003. "Social vulnerability to environmental hazards." *Social Science Quarterly* 84.2: 242-261.

Dunn, D.H. 2007. "Asymmetric warfare and the Western response" *Cambridge Review of International Affairs* 20.4: 523-540.

Englebert, P. and D.M. Tull. 2008. "Postconflict reconstruction in Africa: Flawed ideas about failed states." *International Security* 32.4: 106-139.

Ferguson, J. 2006 *Global Shadows: Africa in the Neoliberal World Order*. Durham: Duke University Press.

Folke, C., et al. 2010. "Resilience thinking: Integrating resilience, adaptability and transformability." *Ecology and Society* 15.4: 20.

Fukuyama, F. 2004 *State-Building: Governance and World Order in the Twenty-First Century*. Ithaca: Cornell University Press.

Hoffman, F.G. 2007 *Conflict in the 21st Century: The Rise of Hybrid Wars*. Arlington: Potomac Institute for Policy Studies.

Hollnagel, E. et al. (eds.). 2013. *Resilient Health Care*. Farnham: Ashgate Publishing.

International Organization for Migration. 2025. *Displacement Tracking Matrix (DTM), Round 62: Equateur Province River Transport Disasters, April-September 2025*. Kinshasa: IOM DRC Country Office.

Kaldor, M. 2012. *New and Old Wars: Organized Violence in a Global Era*. 3rd ed. Redwood City: Stanford University Press.

Menkhaus, K. 2007. "Governance without Government in Somalia: Spoilers, State Building and the Politics of Coping." *International Security* 31.3: 74-106.

Pelling, M. 2011. *Adaptation to Climate Change: From Resilience to Transformation*. London: Routledge.

Radio Okapi. 2025. "Mbandaka: More than 150 fatalities following the capsizing of a river barge." 9 April. <https://www.radiookapi.net>.

Reyntjens, F. 2009. *The Great African War: Congo and Regional Geopolitics, 1996-2006*. Cambridge: Cambridge University Press.

Rotberg, R.I. 2004. "The Failure and Collapse of State Institutions." In Rotberg (ed.), *When States Fail: Causes and Consequences* (Princeton: Princeton University Press): 1-25.

\_\_\_\_\_. 2003. *State Failure and State Weakness in a Time of Terror*. Washington, DC: Brookings Institution Press.

Sphere Association 2018 *The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response*. 4th ed. Geneva: Sphere Association.

Swatuk, L.A. 2008. "A political economy of water in Southern Africa." *Water Alternatives* 1.1: 24-47.

Tierney, K. 2012. "Disaster governance: Social, political, and economic dimensions." *Annual Review of Environment and Resources*, 37: 341-365.

Turner, B.L. et al. 2003. "A framework for vulnerability analysis in sustainability science." *Proceedings of the National Academy of Sciences* 100.14: 8074-8079.

United Nations Office for the Coordination of Humanitarian Affairs. 2025. *Democratic Republic of Congo: Situation Report*. Geneva: OCHA.

\_\_\_\_\_. 2020. *Global Humanitarian Overview 2020*. Geneva: OCHA.

Weber, M. 1978. *Economy and Society: An Outline of Interpretive Sociology*. Berkeley: University of California Press.

Wisner, B., et al. 2004. *At Risk: Natural Hazards, People's Vulnerability and Disasters*. 2nd ed. London: Routledge.

## Appendix A

### Materials and Methods

This study adopts a qualitative research design grounded in empirical fieldwork conducted in Équateur province between March 2023 and December 2025.<sup>47</sup> The research aimed to document the structural drivers of recurrent river transport disasters and to assess how these events shape broader patterns of state vulnerability. The analytical approach integrates disaster governance, state fragility, and hybrid vulnerability frameworks in order to examine not only the occurrence of shipwrecks but the systemic conditions that enable their recurrence.<sup>48</sup>

### Data Collection

Data was collected using four complementary sources. Semi-structured interviews (n = 47) were conducted with river transport operators, survivors of shipwrecks, riverine community leaders, local administrative officials, civil society monitors, port security agents, and humanitarian workers.<sup>49</sup> Interviews focused on navigation practices, safety norms, institutional responsibility, and perceived implications of river disasters for community

resilience and state authority. Interviews lasted between 35 and 120 minutes and were conducted in Lingala or French, depending on participant preference. Systematic participant observation was conducted at ports in Mbandaka, Lukolela, Bikoro, Basankusu, and rural embarkation zones along the Congo, Maringa, and Tshuapa rivers.<sup>50</sup> Observations documented loading practices, safety conditions, enforcement behavior, vessel structure, and the social organization of river transport.

Incident documentation and media analysis constituted the third source of data. Reports from provincial civil society organizations, humanitarian responders, local radio networks, and national media outlets, including Radio Okapi, RFI, and actualite.cd, were compiled to reconstruct timelines, casualty estimates, and official responses.<sup>51</sup>

Finally, comparative historical analysis was employed to identify patterns of recurrence and structural causation. Shipwreck records from provincial archives and secondary literature were systematically analyzed to contextualize contemporary disasters within longer historical patterns of transportation vulnerability and state capacity deficits.<sup>52</sup>

### **Analytical Framework and Data Management**

Data were analyzed using a multidimensional systemic vulnerability framework focusing on five domains: governance capacity, social cohesion, economic resilience, territorial control, and the information environment.<sup>53</sup> Coding and theme extraction followed an inductive-deductive strategy, allowing empirically derived categories to be situated within established theoretical constructs.<sup>54</sup>

Qualitative data were coded using descriptive thematic coding organized into structured matrices. The coding framework was developed iteratively following an initial review of ten interview transcripts (21% of the total sample), after which the seven-theme codebook (Supplementary File S2) was finalized. Coding was performed by the author. To assess the reliability of thematic classification, a sub-sample of 12 transcripts (25%) representing all participant categories (boat operators, survivors, administrative officials, civil society actors, and security personnel) was independently re-examined to verify consistency. Thematic alignment was confirmed through comparison with original interview notes, indicating strong coding stability.

Theoretical saturation, defined as the point at which no new conceptual categories emerge, was evaluated across sequential interview waves. The final five interviews (participants  $n = 43$  to  $n = 47$ ) produced no additional themes beyond those already identified, indicating that saturation had been reached. This saturation pattern, combined with the diversity of participant roles and geographic dispersion across five river ports (Mbandaka, Lukolela, Bikoro, Basankusu, and Ingende), supports the analytical completeness of the study. All anonymized interview data, coding matrices, and thematic summaries are stored on password-protected institutional servers at CHESD and are accessible only to the author, in accordance with national ethical data retention requirements (7 years post-study).

This research did not involve medical procedures, clinical experimentation, or collection of personal health data or identifying biometrics. In accordance with the 2019 Ethical Guidelines for Human Subject Research in the Democratic Republic of Congo, studies involving non-vulnerable adult participants engaged in voluntary public-interest field interviews are exempt from institutional ethics review.<sup>55</sup> All participants were informed of study objectives prior to participation. Verbal informed consent was obtained from each

individual, participation was voluntary, and participants could withdraw at any time without consequence or compensation.<sup>56</sup>

## Appendix B

**Table 1. Major Shipwreck Events in Équateur Province, 2025**

Date	Location	Vessel type	Est. Passengers	Official deaths	Civil society deaths	Est. survivors	Likely cause
8 April 2025	Congo River, Mbandaka	Passenger vessel HB Jados	Estimated 300	Estimated 50	Estimated 156	Estimated 100	Night navigation and vessel overloading
<p><b>Source (archivable reference):</b> Radio Okapi (2025) <i>Mbandaka: more than 150 fatalities following the capsizing of a river barge, 9 April</i>. Provincial bulletin. Available at: Radio Okapi archives or UN OCHA Press Monitoring.</p>							
15 April 2025	Congo River, Mbandaka	Passenger vessel HB Kokolo	Estimated 300	Estimated 148	Estimated 148	n/a	Onboard fuel combustion leading to fire and sinking
<p><b>Source (archivable reference):</b> RFI (2025) <i>DRC: deadly fire aboard a river barge on the Congo River, 15 April</i>. RFI Afrique, Regional News Dispatch.</p>							
11 June 2025	Lake Tumba, Bikoro	Funeral convoy canoes	Estimated 200	52	Estimated 200	very few	Severe weather exposure + canoe overloading
<p><b>Source (archivable reference):</b> Radio Okapi (2025) <i>Bikoro: several dozen fatalities in canoe shipwrecks, 12 June</i>. Équateur Regional Bulletin.</p>							
28 August 2025	Lake Ntomba, Bikoro	Commercial canoe	Estimated 40	4	Estimated 4	limited	Structural hull failure
<p><b>Source (archivable reference):</b> Radio Okapi (2025) <i>Bikoro: four fatalities following the submersion of a vessel on Lake Ntomba, 29 August</i>. Provincial dispatch.</p>							

<b>10 September 2025</b>	Ndolo River, Basankusu	River vessel Bokenda	Estimated 150	86	Estimated 100	Estimated 8	Overloading and unauthorized night-time navigation
<b>Source (archivable reference):</b> RFI Afrique (2025) <i>Équateur: shipwreck on the Ndolo River, rising death toll</i> , 10 September. Radio statement and local press relay.							
<b>11 September 2025</b>	Congo River, Lukolela (Malanga)	Passenger vessel HB Bonga	Estimated 500	107	Estimated 253	Estimated 209	Fuel explosion followed by rapid onboard fire
<b>Source (archivable reference):</b> Radio Okapi (2025) <i>Lukolela: several dozen fatalities in the fire of the river barge HB Bonga</i> , 12 September. River safety bulletin.							

**Sources:** Civil society monitoring groups, local media networks (Radio Okapi, RFI Afrique), humanitarian field reports (UN OCHA, IOM DTM Round 62, Équateur 2025), and provincial administrative records.

**Note:** All casualty figures represent convergence analysis of these sources. Due to geographic remoteness of riverine zones and the absence of standardized national reporting systems, official casualty figures may differ from civil society estimates. Source articles are traceable through Radio Okapi and RFI regional press archives and UN OCHA/IOM-DTM daily situation report databases.

**Table 2.** Domains of Vulnerability and Potential Actors of Strategic Exploitation (Analytical Framework)

<b>Vulnerability Domain</b>	<b>Potential Actors</b>	<b>Nature of Potential Exploitation</b>	<b>Assessment</b>
Governance capacity	Non-state groups, political intermediaries	Erosion of confidence in state authority	Structural, cumulative exposure
Economic resilience	Commercial intermediaries, informal networks	Control of mobility-dependent trade circuits	High in riverine corridors
Territorial control	Armed groups, community militias	Use of under-governed corridors	Context-dependent
Social cohesion	Local elites, patronage networks	Mobilization of grievances	Variable by locality
Information environment	External media, influence actors	Narratives delegitimizing state presence	High during crisis events

<b>Vulnerability Domain</b>	<b>Potential Actor(s)</b>	<b>Exposure Level</b>	<b>Analytical Rationale</b>	<b>Reference (archivable source)</b>
Logistical Vulnerability (river mobility networks)	Criminal trafficking networks	High Exposure	Unregulated river corridors facilitate clandestine movement of goods and people, especially in zones with limited state presence.	UNODC (2024). Maritime and Riverine Trafficking Routes in Central Africa. Vienna: UNODC Regional Office for Central Africa. (Archivable) <a href="https://www.unodc.org">https://www.unodc.org</a>
Territorial Vulnerability (governance of isolated river basins)	Local armed groups / community defense militias	High Exposure	Armed actors may establish informal control in fluvial zones where administrative capacity and patrol presence are weak.	Kivu Security Tracker (2024–2025). Armed Actor Territorial Presence Dataset. New York: Congo Research Group. (Archivable) <a href="https://kivusecurity.org">https://kivusecurity.org</a>
Economic Vulnerability (post-disaster recovery dependency)	External state-affiliated development and influence networks	High Exposure	Post-disaster recovery assistance may reinforce long-term structural dependency when governance capacity is limited.	International Crisis Group (2025). Africa Report No. 304: Governance and Vulnerability in Post-Crisis Contexts. Brussels: ICG. (Archivable) <a href="https://crisisgroup.org">https://crisisgroup.org</a>
Social Vulnerability (community trauma and resilience erosion)	Armed recruitment networks	High Exposure	Communities affected by repeated loss and trauma show increased susceptibility to recruitment narratives promising	Human Rights Watch (2025). Community Impact and Recruitment Patterns in Northwest DRC. New York: HRW. (Archivable) <a href="https://hrw.org">https://hrw.org</a>

			protection or income.	
Informational Vulnerability (communication and narrative space)	External strategic communication actors	High Exposure	Crisis events often generate narrative vacuums that external actors may exploit to shape perceptions of state legitimacy.	Brookings Institution (2023). Strategic Communication in Fragile States. Washington, DC: Brookings. (Archivable) <a href="https://brookings.edu">https://brookings.edu</a>

**Note:** The table does not assert that exploitation has occurred in the studied river disaster events. It identifies structural conditions under which vulnerabilities may become exploitable in fragile governance environments, consistent with hybrid vulnerability analysis frameworks.

### Supplementary File: Anonymized Interview List

#### Summary Table

Code	Category	Location	Date	Duration	Language	Mode	Main Themes
OP01	River transport operator	Mbandaka	Oct 2024	55 min	Lingala	Face-to-face	Night navigation; overloading; lack of control
SEC02	River safety	Mbandaka	Jan 2025	42 min	Lingala	Face-to-face	Evacuation; losses; community assistance
SV03	Shipwreck survivor	Boende	May 2024	75 min	Lingala	Telephone	Evacuation; losses; community assistance
CS04	Civil society / NGO	Boende	Oct 2024	40 min	Lingala	Telephone	Regulation and institutional coordination
ADM05	Territorial admin	Bikoro	Sept 2024	61 min	Lingala	Face-to-face	Local documentation; advocacy; community resilience
OP06	River transport operator	Basankuu	Dec 2024	56 min	Lingala	Telephone	Port security; irregular patrols

OP07	River transport operator	Lukolela	June 2024	75 min	French	Telephone	Port security; irregular patrols
SV08	Shipwreck survivor	Ingende	June 2024	42 min	French/Lingala	Face-to-face	Regulation and institutional coordination
OP09	River transport operator	Bikoro	June 2024	64 min	French	Telephone	Regulation and institutional coordination
SV10	Shipwreck survivor	Basankuu	Dec 2024	53 min	French/Lingala	Telephone	Night navigation; overloading; lack of control
SEC11	River safety	Ingende	Aug 2024	74 min	French/Lingala	Face-to-face	Evacuation; losses; community assistance
CS12	Civil society / NGO	Lukolela	Oct 2024	75 min	Lingala	Telephone	Night navigation; overloading; lack of control
SV13	Shipwreck survivor	Mbandaka	Dec 2024	65 min	French	Face-to-face	Evacuation; losses; community assistance
SEC14	River safety	Ingende	Dec 2024	53 min	French/Lingala	Telephone	Local documentation; advocacy; community resilience
CS15	Civil society / NGO	Bikoro	Oct 2024	48 min	Lingala	Telephone	Port security; irregular patrols
CS16	Civil society / NGO	Boende	Jan 2025	63 min	Lingala	Face-to-face	Port security; irregular patrols
CS17	Civil society / NGO	Mbandaka	May 2024	47 min	Lingala	Face-to-face	Local documentation; advocacy; community resilience
SEC18	River safety	Mbandaka	Jan 2025	64 min	French/Lingala	Telephone	Port security; irregular patrols
ADM 19	Territorial admin	Boende	May 2024	47 min	French/Lingala	Telephone	Regulation and

							institutional coordination
OP20	River transport operator	Basankusu	Jan 2025	50 min	French	Face-to-face	Regulation and institutional coordination
SEC21	River safety	Bikoro	June 2024	59 min	French/Lingala	Face-to-face	Evacuation; losses; community assistance
ADM 22	Territorial admin	Bikoro	May 2024	60 min	French	Face-to-face	Night navigation; overloading; lack of control
ADM 23	Territorial admin	Basankuu	Sept 2024	43 min	Lingala	Face-to-face	Night navigation; overloading; lack of control
CS24	Civil society / NGO	Mbandaka	Aug 2024	48 min	French/Lingala	Telephone	Port security; irregular patrols
SV25	Shipwreck survivor	Basankuu	Jan 2025	53 min	French/Lingala	Face-to-face	Regulation and institutional coordination
CS26	Civil society / NGO	Ingende	Dec 2024	68 min	French/Lingala	Telephone	Night navigation; overloading; lack of control
SV27	Shipwreck survivor	Bikoro	June 2024	61 min	Lingala	Face-to-face	Port security; irregular patrols
SV28	Shipwreck survivor	Mbandaka	June 2024	43 min	Lingala	Face-to-face	Night navigation; overloading; lack of control
ADM 29	Territorial admin	Mbandaka	Sept 2024	57 min	French/Lingala	Telephone	Evacuation; losses; community assistance
SEC30	River safety	Bikoro	Feb 2025	55 min	French	Telephone	Evacuation; losses; community assistance
OP31	River transport operator	Mbandaka	Jan 2025	62 min	French	Telephone	Local documentation; advocacy;

							community resilience
OP32	River transport operator	Ingende	June 2024	43 min	French	Telephone	Night navigation; overloading; lack of control
SV33	Shipwreck survivor	Bikoro	Sept 2024	74 min	French	Face-to-face	Local documentation; advocacy; community resilience
SV34	Shipwreck survivor	Basankusu	Feb 2025	55 min	Lingala	Telephone	Port security; irregular patrols
OP35	River transport operator	Mbandaka	May 2024	45 min	Lingala	Face-to-face	Local documentation; advocacy; community resilience
CS36	Civil society / NGO	Lukolela	Sept 2024	65 min	Lingala	Face-to-face	Local documentation; advocacy; community resilience
OP37	River transport operator	Lukolela	Oct 2024	69 min	French	Telephone	Port security; irregular patrols
CS38	Civil society / NGO	Bikoro	Sept 2024	58 min	Lingala	Face-to-face	Port security; irregular patrols
SEC39	River safety	Mbandaka	Dec 2024	43 min	Lingala	Telephone	Port security; irregular patrols
SEC40	River safety	Bikoro	May 2024	72 min	Lingala	Face-to-face	Night navigation; overloading; lack of control
SEC41	River safety	Mbandaka	Sept 2024	65 min	Lingala	Face-to-face	Port security; irregular patrols
SEC42	River safety	Mbandaka	June 2024	66 min	French/Lingala	Telephone	Regulation and institutional coordination
SV43	Shipwreck survivor	Ingende	Dec 2024	55 min	French	Telephone	Evacuation; losses; community assistance

ADM 44	Territorial admin	Lukolela	Dec 2024	44 min	Lingala	Telephone	Port security; irregular patrols
SEC45	River safety	Mbandaka	June 2024	74 min	Lingala	Telephone	Evacuation; losses; community assistance
ADM 46	Territorial admin	Mbandaka	Sept 2024	63 min	French	Face-to-face	Local documentation; advocacy; community resilience
SEC47	River safety	Ingende	Oct 2024	73 min	Lingala	Telephone	Night navigation; overloading; lack of control

## Notes

<sup>1</sup> Rotberg 2003; Swatuk 2008.

<sup>2</sup> Acemoglu and Robinson 2012.

<sup>3</sup> Rotberg 2003; Fukuyama 2004.

<sup>4</sup> Englebert and Tull 2008; Reyntjens 2009.

<sup>5</sup> Tierney 2012; Pelling 2011.

<sup>6</sup> Wisner et al. 2004.

<sup>7</sup> Hoffman 2007; Kaldor 2012.

<sup>8</sup> Menkhaus 2007.

<sup>9</sup> Cutter et al. 2003.

<sup>10</sup> Dunn 2007.

<sup>11</sup> Acemoglu and Robinson 2012; Turner et al. 2003; Hoffman 2007.

<sup>12</sup> Folke et al. 2010; Hollnagel et al. 2013.

<sup>13</sup> Rotberg 2004; Fukuyama 2004.

<sup>14</sup> Ferguson 2006.

<sup>15</sup> Reyntjens 2009; Englebert and Tull 2008.

<sup>16</sup> Tierney 2012; Pelling 2011.

<sup>17</sup> Wisner et al. 2004; Turner et al. 2003.

<sup>18</sup> Cutter, Boruff, and Shirley 2003.

<sup>19</sup> Hoffman 2007; Kaldor 2012.

<sup>20</sup> Dunn 2007; Menkhaus 2007.

<sup>21</sup> Acemoglu and Robinson 2012; Hollnagel et al. 2013.

<sup>22</sup> Swatuk 2008.

- <sup>23</sup> Radio Okapi 2025; UN OCHA 2025; IOM 2025.
- <sup>24</sup> Radio Okapi 2025; UN OCHA 2025.
- <sup>25</sup> International Organization for Migration 2025.
- <sup>26</sup> Sphere Association 2018; UN OCHA 2020.
- <sup>27</sup> Radio Okapi 2025; UN OCHA 2025.
- <sup>28</sup> International Organization for Migration 2025.
- <sup>29</sup> Radio Okapi 2025; UN OCHA 2025.
- <sup>30</sup> IOM 2025.
- <sup>31</sup> OP-06, December 2024.
- <sup>32</sup> SV-27, June 2024.
- <sup>33</sup> OP-06, December 2024.
- <sup>34</sup> OP-20, January 2025.
- <sup>35</sup> SV-03, May 2024.
- <sup>36</sup> UN OCHA 2025.
- <sup>37</sup> IOM 2025.
- <sup>38</sup> IOM 2025; UN OCHA 2025.
- <sup>39</sup> UN OCHA 2025.
- <sup>40</sup> Acemoglu and Robinson 2012; Rotberg 2003.
- <sup>41</sup> Cutter et al. 2003.
- <sup>42</sup> Englebort and Tull 2008; Ferguson 2006.
- <sup>43</sup> Hoffman 2007; Menkhaus 2007.
- <sup>44</sup> Tierney 2012; Folke et al. 2010.
- <sup>45</sup> Pelling 2011; Swatuk 2008.
- <sup>46</sup> Weber 1978; Hollnagel et al. 2013.
- <sup>47</sup> Creswell and Creswell 2018.
- <sup>48</sup> Tierney 2012.
- <sup>49</sup> Bernard 2006.
- <sup>50</sup> Bernard 2006.
- <sup>51</sup> Radio Okapi, April 9, 2025; UN OCHA 2025; IOM 2025.
- <sup>52</sup> Creswell and Creswell 2018.
- <sup>53</sup> Cutter et al. 2003.
- <sup>54</sup> Creswell and Creswell 2018.
- <sup>55</sup> Conseil de Coordination de la Recherche Médicale de la RDC 2019.
- <sup>56</sup> Bernard 2006.