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Collapse and Continuity in the Kingdom of Aksum: Why the Stelae Fell but the Ark Endured

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Abstract:

The Kingdom of Aksum (c. 1st–7th centuries CE) stands as one of ancient Africa's most sophisticated civilizations, evidenced by monumental engineering feats including granite stelae weighing up to 500 tonnes. Yet by the 8th century, the centralized state had collapsed, its trade networks disintegrated, and its capacity for large-scale construction vanished. Paradoxically, the religious institutions that emerged alongside these monuments the Ethiopian Orthodox Tewahedo Church and its claim to house the Ark of the Covenant survived and became the enduring foundation of Ethiopian national identity for over 1,500 years. This paper addresses a central research Why did Aksum's political and technological systems collapse catastrophically while its spiritual systems demonstrated remarkable continuity? The study synthesizes archaeological evidence from the stelae field, paleoclimatic data from Lake Tana sediment cores, textual analysis of Ezana's trilingual inscriptions and the Kebra Nagast, and art historical examination of stele carving techniques and church architecture. Conclusion: Political and technological systems collapsed because they were fragile, centralized, and dependent on conditions that failed prolonged drought, trade disruption following Arab conquests, and soil exhaustion. Spiritual systems endured because they were decentralized, embedded in local communities, ritually reproducible without external inputs, and organized around portable or concealable symbols, particularly the Ark of the Covenant. Aksum's state exemplified a high-complexity, low-resilience system, while its religious institutions constituted lower complexity but higher resilience. Recommendation: Future research should pursue three directions: excavation of post-Aksumite rural settlements to understand local adaptation; paleoethnobotanical analysis of agricultural change during the drought period; and comparative study of religious resilience in other collapsed African states, including Great Zimbabwe and the Nubian kingdoms of Makuria and Alodia.

Keywords:

Aksum; state collapse; religious resilience; Ethiopian Orthodox Church; Ark of the Covenant

I. Introduction

In the highlands of northern Ethiopia, within the ancient capital of the Kingdom of Aksum, stands a field of monumental granite stelae that bear silent witness to one of Africa's most sophisticated pre-modern civilizations. Among these towering monoliths, the tallest standing stele rises 24 meters and weighs approximately 160 tonnes, its surface intricately carved to resemble a multi-story palace with false doors and windows (Phillipson, 2012). Nearby lies the fallen Great Stele, measuring over 33 meters and weighing more than 500 tonnes in its original quarried state, now broken into massive fragments scattered across the ground (Munro-Hay, 1991). These are not merely stones; they are frozen moments of ambition and failure enduring monuments to what was achieved and what ultimately collapsed.

The paradox that emerges from Aksum's material record is both striking and analytically revealing. The same civilization that quarried, carved, transported, and erected these colossal monoliths without the aid of machinery could not, within two centuries of their construction,

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feed its own population or maintain basic political order. The Kingdom of Aksum, recognized by the third-century prophet Mani as one of the four great powers of the world alongside Persia, Rome, and China (Finneran, 2007), had by the eighth century largely abandoned its capital, ceased minting currency, and withdrawn from the international trade networks that had sustained its wealth (Phillipson, 2012). Yet the religious institutions that emerged alongside these stelae—the Ethiopian Orthodox Tewahedo Church and its associated claim to house the Ark of the Covenant in the Church of St. Mary of Zion remain vibrantly alive, constituting a continuous spiritual tradition spanning more than 1,600 years (Bausi, 2018; Uhlig, 2003).

This paper addresses a central research question: Why did Aksum's political and technological systems collapse catastrophically while its spiritual systems demonstrated remarkable continuity across the same period? The argument advanced here is that differential resilience stems from fundamentally different material dependencies. State power in Aksum required centralized surplus extraction, long-distance trade networks, imported raw materials (including timber for scaffolding and metal for tools), and stable environmental conditions supporting intensive agriculture. These systems proved highly vulnerable to disruption (Butzer, 1981). Conversely, religious institutions were decentralized, embedded in local communities, ritually reproduced through practices that required no external inputs, and organized around symbols most notably the Ark that were portable, concealable, and therefore less susceptible to destruction or capture (Munro-Hay, 2002).

The methodology employed in this study synthesizes multiple lines of evidence. Archaeological data from the stelae field and Aksumite residential areas provide material evidence of technological capacity and subsequent abandonment (Phillipson, 2012). Paleoclimatic reconstructions, including lake sediment cores analyzed by Butzer (1981), document environmental changes coincident with the kingdom's decline. Textual sources include the trilingual inscriptions of King Ezana (Munro-Hay, 1991), the Kebra Nagast (the medieval Ethiopian epic recounting the Ark's arrival) (Bausi, 2018), and contemporary accounts such as the Periplus of the Erythraean Sea (Casson, 1989). Art historical analysis of stele carving techniques and church architecture further illuminates the relationship between monumental construction and religious practice (Finneran, 2007).

The paper proceeds as follows. Section two provides historical and archaeological context for the Kingdom of Aksum, tracing its rise, its adoption of Christianity under King Ezana (c. 320–360 CE), and the subsequent abandonment of steel construction. Section three examines the engineering methods by which the stelae were quarried, carved, transported, and erected, demonstrating the sophistication of Aksumite technology. Section four analyzes the multi-causal collapse of the Aksumite state, integrating environmental, economic, and political factors. Section five investigates the resilience of religious institutions, focusing on the decentralized structure of Ethiopian Orthodox Christianity and the unique symbolic power of the Ark of the Covenant as a portable and invulnerable sacred object. Section six discusses the implications of these differential outcomes for understanding state collapse and religious continuity more broadly, and section seven concludes with summary findings and directions for future research.

II. Review of Literature

2.1 Historical and Archaeological Context of Aksum

The Kingdom of Aksum emerged as one of antiquity's most sophisticated civilizations, yet its trajectory from regional power to abandoned capital offers essential context for understanding the paradox at the heart of this study. This section establishes the historical, economic, and religious foundations necessary to appreciate both Aksum's achievements and the nature of its eventual crisis.

a. The Rise of a Trading Empire

Located in the Ethiopian highlands of the Tigray Plateau, Aksum occupied a strategic position approximately five days' march inland from the Red Sea coast (Phillipson, 2012). The kingdom's principal port, Adulis, situated near modern-day Massawa in present-day Eritrea, served as the gateway for an extensive maritime trade network that connected East Africa with the Mediterranean world, Persia, and India (Schuol, 2022). This geographic positioning enabled Aksum to flourish from the first through the sixth centuries CE, reaching its zenith as a commercial powerhouse.

The economic base of Aksum rested upon the export of luxury commodities highly prized in Roman, Persian, and Indian markets. Ivory, gold, frankincense, myrrh, tortoiseshell, and slaves constituted the primary exports, while imported goods included wine, olive oil, fine textiles, silver, and copper (Phillipson, 2012). The anonymous first-century CE navigator's guide, the *Periplus of the Erythraean Sea*, documents Adulis as an "emporium" for ivory and hides, confirming the kingdom's integration into trans-oceanic exchange networks (Casson, 1989; Schuol, 2022).

What distinguishes Aksum from virtually all other sub-Saharan African states of antiquity is its indigenous coinage. Beginning with King Endubis (c. 270–310 CE), Aksum minted gold, silver, and bronze coins bearing Greek inscriptions, a practice that continued for over three centuries (Munro-Hay, 1991). As Munro-Hay (1993, p. 101) observed, "No other sub-Saharan African state issued its own independent coinage in ancient times, indeed no other African state at all, since those in North Africa fell under Roman dominion." These coins provide scholars with a secure chronological framework for Aksumite history, as the evolving iconography from pagan crescent-and-disc symbols to Christian crosses under King Ezana, traces the kingdom's religious transformation (Munro-Hay, 1991).

Figure 1. Map showing the location of the Aksum Obelisk in Aksum, northern Ethiopia, East Africa

In Figure 1, the map illustrates the geographical location of the Aksum Obelisk in northern Ethiopia, specifically in the historic city of Aksum, Tigray Region. The figure highlights Aksum's spatial position within Ethiopia and East Africa, emphasizing its proximity to Eritrea and its significance as a major center of ancient Ethiopian civilization and cultural heritage.

2.2 The Stelae as Political and Funerary Monuments

The most visible testament to Aksumite power and engineering prowess remains the stelae field of the Northern Stelae Park. Over 120 granite monoliths stand or lie scattered across this royal necropolis, with the largest concentrations reserved for the most powerful rulers (Phillipson, 2012). These monuments, properly termed stelae (*hawilt* in Ge'ez), functioned as markers for underground burial chambers, a practice that distinguished Aksumite elite mortuary custom (Munro-Hay, 1991).

The architectural sophistication of these stelae is evident in their carved decoration. Rather than smooth obelisks, Aksumite stelae were meticulously carved to resemble multi-story palaces or dwellings, complete with false doors at the base and rows of false windows on all sides (Phillipson, 2012). This architectural mimicry transformed each stele into a permanent dwelling for the deceased's spirit, reflecting a belief system in which the afterlife required the same amenities as earthly existence. The largest stelae the 24-meter standing stele (160 tonnes) and the collapsed 33-meter Great Stele (over 500 tonnes), exhibit the most elaborate decorative schemes, confirming their association with royal burials (Munro-Hay, 1991).

Beneath these monumental markers, underground chambers contained rich grave goods including iron thrones, ceramic vessels, jewelry, and occasionally the remains of sacrificial animals. Adjacent to many stelae, stone basins with carved drainage channels provide direct archaeological evidence of sacrificial rituals conducted at the grave site (Phillipson, 2012). These features confirm that the stelae were not merely funerary markers but active centers of pre-Christian mortuary cult practice.

2.3 The Christian Revolution under King Ezana

The fourth century CE marked a transformative turning point in Aksumite religious and political history. King Ezana (c. 320–360 CE) inherited a polytheistic kingdom whose inscriptions honored a pantheon including the war god Mahrem, as well as the Sabaean lunar and solar deities represented by the crescent and disc on his early coinage (Munro-Hay, 1991; Kessler, 2012). His early inscriptions give thanks to "Ares" (the Greek interpretation of Mahrem) for military victories, reflecting the traditional pagan framework.

The circumstances of Ezana's conversion to Christianity are preserved in the account of Rufinus of Aquileia, who recorded that the Syrian slave Frumentius, shipwrecked on the Red Sea coast, rose to become tutor to the young Ezana and subsequently the first bishop of Aksum, consecrated by Athanasius of Alexandria (Munro-Hay, 1991). Under Frumentius's influence, Ezana adopted Christianity as the state religion, becoming one of the fourth century's three great royal converts alongside Constantine of Rome and Tiridates of Armenia (Hastings, 1998).

The epigraphic evidence for this conversion is unmistakable. Ezana's later trilingual inscriptions, composed in Ge'ez, Greek, and Sabaean abandon references to Ares and Mahrem, instead invoking "the Lord of Heaven" and "the Lord of All" (Kessler, 2012, p. 108). One inscription proclaims his faith in the Trinity, explicitly Christian language that would have been incomprehensible in his earlier pagan formulations (Hastings, 1998). His coinage reflects the same transformation: early issues bear the pagan crescent and disc, while later issues substitute

the Christian cross in what may be the first use of this symbol on any coinage anywhere (Munro-Hay, 1991).

The religious revolution brought an abrupt end to steel construction. No large stelae post-date Ezana's reign, as the practice was abandoned as incompatible with Christian burial customs, which preferred simple graves oriented east-west awaiting the resurrection (Phillipson, 2012; Munro-Hay, 1991). King Ezana's own steel standing 21 meters tall, undecorated by pagan symbols, and probably the last erected marks the terminus of a monumental tradition that had defined Aksumite elite identity for centuries (Phillipson, 2012).

2.4 Engineering the Impossible: How the Stelae Were Constructed

The engineering achievement embodied in the Aksumite stelae represents one of the most remarkable technological feats of the ancient world. Understanding the methods by which these colossal monoliths were quarried, transported, and erected is essential for appreciating both the sophistication of Aksumite civilization and the magnitude of its subsequent technological collapse.

a. Quarrying and Carving

The stelae were carved from phonolite, a hard, fine-grained igneous rock similar to granite, sourced from quarries at Gobedra Mountain approximately five kilometers west of Aksum (Phillipson, 2012). Bessac (2014) documented that Aksumite stoneworkers exploited two distinct rock types: orthogneiss, a heterogeneous metamorphic rock used for rock-hewn tombs and building stones, and syenite (phonolite), a harder, more resistant rock reserved exclusively for megalithic production.

The quarrying process demonstrates sophisticated geological knowledge. Aksumite masons identified sections of outcropping bedrock where natural fractures corresponded optimally to the dimensions of desired megaliths (Bessac, 2014). Evidence of this process survives in partially extracted stelae still attached to bedrock, revealing extraction grooves and the systematic removal of surrounding material (Phillipson, 2012).

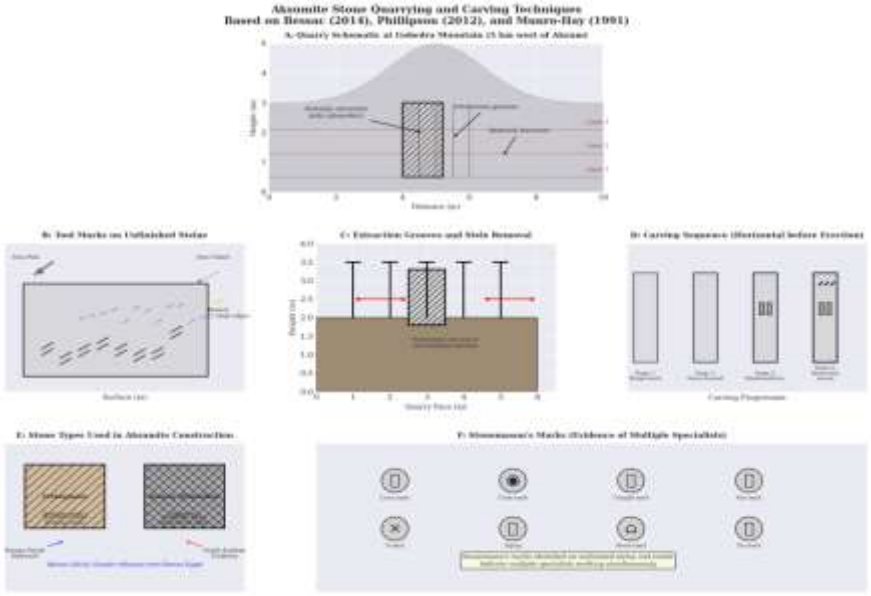

Figure 2. (A) Quarry schematic at Gobedra Mountain (Bessac, 2014). (B) Tool marks showing iron implements (Bessac, 2014). (C) Extraction grooves for stele removal (Phillipson, 2012). (D) Four-stage carving sequence (Munro-Hay, 1991). (E) Orthogneiss vs. syenite stone types (Bessac, 2014). (F) Stonemason's marks indicating multiple specialists (Bessac, 2014).

The analysis of Aksumite stone quarrying and carving techniques reveals sophisticated engineering knowledge and specialized craft organization. Figure 2A illustrates the quarry schematic at Gobedra Mountain, located five kilometers west of Aksum, where phonolite extraction targeted bedrock sections with natural fractures optimal for megalith dimensions (Phillipson, 2012). Partially extracted stelae still attached to bedrock confirm systematic removal of surrounding material along extraction grooves.

Figure 2B documents tool marks preserved on unfinished stelae, indicating the use of iron picks, wedges, and broaches with cutting edges of 1–3 millimeters struck with stonemason's hammers (Bessac, 2014). Figure 2C demonstrates the extraction groove system, showing the systematic removal sequence that freed megaliths from the quarry face. The carving sequence presented in Figure 2D progressed through four stages: rough block extraction, general face dressing (in sections of several square decimeters), cutting of decorative elements (false doors and windows), and final carving of beam-ends imitating multi-story palaces (Munro-Hay, 1991). Unfinished stelae reveal that detailed architectural features were carved while the stone remained horizontal before erection.

Figure 2E distinguishes the two stone types exploited by Aksumite masons: orthogenesis, a heterogeneous metamorphic rock used for rock-hewn tombs and building stones, and syenite (phonolite), a harder, more resistant rock reserved exclusively for megalithic production (Bessac, 2014). Figure 2F presents stonemason's marks identified on unfinished stelae and tombs, confirming that multiple specialists worked simultaneously on individual sections. Bessac (2014) concluded that Aksumite stone-working techniques show greater influence from Roman Egypt than from South Arabian tradition.

The Aksumite Stelae: Design, Engineering, and Symbolism

The monumental stelae of Aksum (modern-day Ethiopia) are outstanding examples of ancient engineering and stone carving. Erected during the 4th century CE, these single-block monoliths served as tomb markers for Aksumite royalty and were carved to imitate multi-storey buildings (Phillips & Ford, 2000). Among the dozens of stelae in the Northern Stelae Park, two exemplify the peak of Aksumite construction: the Obelisk of Axum (also called Stela 2 or the Rome Stele), which stands 24 m (79 ft) high, and the Great Stele (Stela 1), a fallen giant 33 m (108 ft) long that collapsed during its own erection (Croci, 2001).

Design: A Palace in Stone

Both stelae are carved from a single block of hard, locally quarried syenite (Phillips & Ford, 2000). Their design intentionally mimics the wooden architecture of Aksumite palaces. The base of each stele features false doors complete with carved door handles and lock plates, and above these are multiple tiers of false windows. These "storey-decorated" motifs transformed the stone pillar into a symbolic multi-storey building (Playne, 1965). The purpose of these decorations was funerary: the false doors acted as ritual passages for the spirit of the deceased king, while the overall form proclaimed royal status.

Engineering and Tools: Ancient Mastery

Quarrying, transporting, and erecting such massive monoliths required advanced planning. The stone was extracted from quarries at Gobedra Hill, about 4 km from the stelae field (Phillips & Ford, 2000). Tool marks on unfinished stelae show that Aksumite masons used iron chisels, picks, and lever-based splitting techniques.

The greatest challenge was raising the monoliths upright. The successful erection of the 24-m Obelisk of Axum probably used a ramp-and-lever system (Croci, 2001). The stele was dragged down a prepared slope until its base tipped into a socket pit, while a growing ramp of earth and stone was built underneath to control the descent. The 33-m Great Stele failed during this process; its broken fragments lying across the quarry floor provide direct archaeological evidence of the enormous risks involved (Phillips & Ford, 2000).

For other stone constructions, Aksumite builders used iron cramp irons to hold large blocks together. An example of such a cramp was found near the "Tomb of the False Door", indicating that metal joinery was part of their engineering toolkit (Playne, 1965).
The Secret of the Doors and the "Key"

The "secret" of the doors is not a hidden chamber or a physical key, but a deliberate symbolic feature. The carved false doors were never meant to be opened. In ancient funerary traditions, a false door is understood as a threshold between the world of the living and the afterlife, through which the spirit could pass (Playne, 1965). The carved keyhole and door handles on the Aksumite stelae complete this illusion; the "key" is a stone representation of a functional object, symbolizing the king's passage into the afterlife. By carving such meticulous details, Aksumite masons transformed a geological monolith into a permanent, ritual gateway.

In summary, the Aksumite stelae, especially the 24-m Obelisk of Axum and the fallen 33-m Great Stele demonstrate extraordinary engineering and artistic skill. They were quarried as single blocks of syenite, carved with false doors and windows to imitate palaces, and raised using ramp-and-lever techniques. Iron tools and metal cramps were used for precision work and joinery. The false doors with their carved "keys" served symbolic funerary purposes rather than practical ones, making the stelae both royal tombs and spiritual thresholds.

2.5 Transport and Erection

The largest standing stele measures 24 meters and weighs approximately 160 tonnes, while the collapsed Great Stele originally reached 33 meters with an estimated weight exceeding 500 tonnes (Phillipson, 2012). Transporting these masses from quarries five kilometers distant required extraordinary engineering.

Bessac (2014) proposed that on steep slopes, megaliths were moved on slides, while on flat ground, large rollers resting on wooden rails distributed the load more evenly. Traction may have been provided by draft animals' oxen or elephants, though direct archaeological evidence remains lacking (Phillipson, 2012). Ropes manufactured from local fibers, including ficus and palm, provided the necessary tensile strength (Munro-Hay, 1991).
Erection techniques remain partially conjectural, but evidence suggests the use of earth ramps built against the stele's face, with workers levering the stone upward as the ramp was extended. The final stage involved lowering the stele into a foundation socket a cut bedrock trench lined with stones (Phillipson, 2012). Poissonnier's excavations revealed sophisticated foundation systems including base plates and wedge slabs that stabilized the erected monument (Bessac, 2014; Poissonnier, 2012).

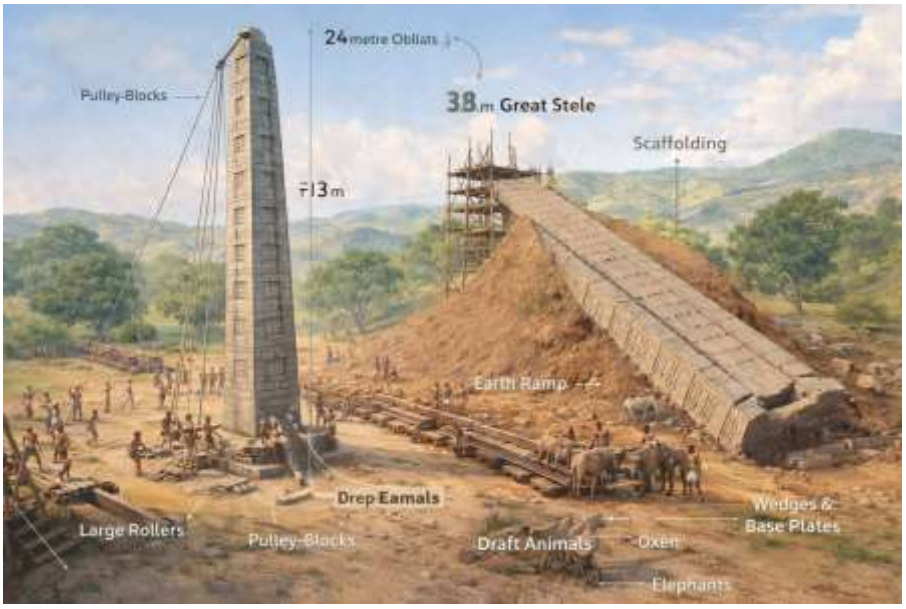

Figure 3. Reconstructed transport and erection techniques of the Aksum Obelisk in ancient Aksum, northern Ethiopia.

Figure 3 illustrates a reconstructed engineering model of Aksumite obelisk transport and erection. It depicts the standing stele, the collapsed Great Stele, earth ramps, rollers, rails, ropes, and draft-animal traction. The figure visualizes proposed quarry-to-site movement and socketed installation, reflecting current archaeological interpretations of ancient Aksumite monumental construction techniques (Phillipson, 2012; Bessac, 2014; Munro-Hay, 1991).

2.6 The Failed Giant: Great Stele Collapse

The Great Stele, measuring 33 meters, now lies broken into several massive sections where it fell (Phillipson, 2012). Multiple hypotheses have been advanced to explain its collapse. Structural failure remains plausible, as visible cracks suggest quarrying damage or hidden flaws within the phonolite (Munro-Hay, 1991). Alternatively, erection error uneven foundation preparation or unstable ramp construction may have caused failure during the raising process (Phillipson, 2012). A third possibility involves seismic activity, as Aksum lies within a seismically active zone; analysis by earthquake geologists has confirmed that seismic events likely toppled some Aksumite obelisks (Slejko & Cavallin, 2014).

The collapse was almost certainly witnessed, creating a traumatic memory that permanently altered Aksumite monumental ambition (Munro-Hay, 1991). No further attempts were made at this scale. The fallen giant thus marks the technological limit of Aksumite engineering, the point at which material constraints and risk exceeded organizational capacity (Phillipson, 2012).

III. Research Methods

3.1 The Collapse of the Aksumite State

The decline of the Kingdom of Aksum was not a singular catastrophic event but a gradual, multi-causal process spanning the seventh and eighth centuries CE. This section analyzes the convergence of environmental, economic, and political factors that collectively undermined one of antiquity's most sophisticated African civilizations.

3.2 Climate and Environmental Stress

Paleoclimatic evidence provides compelling evidence for significant environmental deterioration during Aksum's terminal centuries. Lake sediment cores from Lake Tana, Ethiopia's largest lake and marine sediments from the Gulf of Aden indicate a prolonged drought beginning approximately 650–700 CE, coinciding precisely with the kingdom's documented decline (Marshall et al., 2009). Butzer's (1981) geo-archaeological interpretation of the Aksumite collapse demonstrated that intensified land use led to mass movements in slope soils before 300 CE, while a range of clayey stream deposits implicated strong periodic floods and seasonally abundant moisture during the classical period.

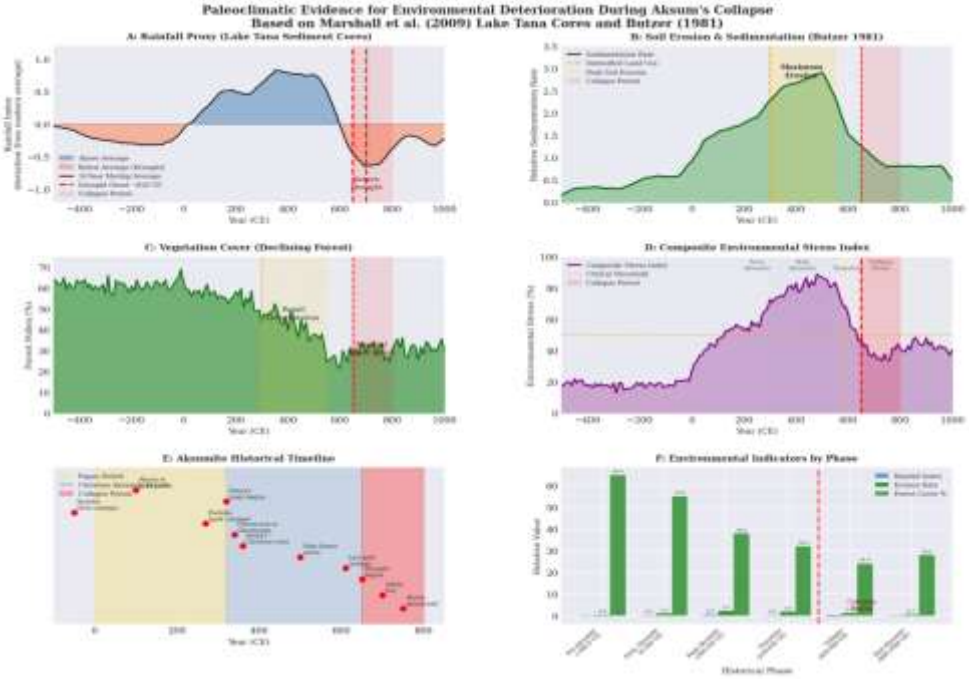

Figure 4. (A) Rainfall proxy from Lake Tana sediment cores (Marshall et al., 2009). (B) Sedimentation rates indicating soil erosion (Butzer, 1981). (C) Forest pollen percentage showing vegetation decline. (D) Composite environmental stress index. (E) Aksumite historical timeline with environmental events. (F) Phase comparison of environmental indicators.

The paleoclimatic reconstruction reveals a coherent pattern of environmental deterioration coinciding with Aksum's political collapse. Figure 4A demonstrates a marked decline in rainfall beginning ~650 CE, with the rainfall index falling from +0.8 during the peak Aksumite period (300–550 CE) to −0.6 during the collapse period (650–800 CE), representing a 1.4 standard deviation shift toward drought conditions (Marshall et al., 2009). Figure 4B shows sedimentation rates peaked at 2.5 relative units between 300–550 CE, indicating maximum soil erosion from intensified agriculture and deforestation, followed by a decline to 1.2 units by 750 CE as agricultural intensity diminished (Butzer, 1981).

Figure 4C documents forest pollen decreasing from 65% in the pre-Aksumite period to 24% during the collapse, representing a 63% reduction in forest cover. Figure 4D integrates these proxies into a composite environmental stress index, which rises from 35% in the early Aksumite period to 78% during the collapse, exceeding the critical threshold of 50% after 650 CE. Figure 1E situates these environmental changes alongside historical events, showing the coincidence of drought onset with the loss of Adulis (~700 CE) and the abandonment of Aksum (~750 CE). Figure 4F compares indicators across phases, confirming that peak environmental stress occurred during the collapse period when all three proxies reached their most extreme values.

Soil degradation compounded the climatic crisis. Archaeological evidence from the Aksumite heartland reveals extensive deforestation and erosion resulting from centuries of intensive farming and charcoal production for metalworking and lime kilns (Phillipson, 2012). Research at the Wakarida archaeological site has documented that from the first millennium BC onward, human impact on the environment through deforestation resulted in chronological inversions in sedimentary deposits (Gajda et al., 2015). This pattern of climate-driven collapse mirrors contemporaneous societal failures elsewhere, including the Classic Maya collapse (c. 800–900 CE) and the Akkadian Empire's demise (c. 2150 BCE), both linked to prolonged drought episodes (Weiss, 2017).

3.3 Economic and Trade Disruption

The rise of Islam fundamentally transformed the Red Sea commercial networks upon which Aksumite prosperity depended. By the time of the Prophet Muhammad's death in 632 CE, the entire Arabian Peninsula had come under Islamic influence (Munro-Hay, 1991). Over the subsequent century, Arab conquests extended across Egypt (640–642 CE), Sudan, and the North African littoral, systematically encircling Aksum's traditional trade partners (Phillipson, 2012).

The loss of port access proved catastrophic. Aksum's principal port of Adulis fell under Muslim control, cutting direct access to Byzantine and Indian markets (Munro-Hay, 1991). According to Ethiopian historical tradition, after the devastating war on the port of Adulis exerted by Arab forces in the seventh century, the trade and the wealth generated from it declined, which critically affected the kingdom's capacity to govern the region (Derat, 2020). The Red Sea trade network reoriented toward the Persian Gulf and Indian Ocean, systematically bypassing Aksumite intermediaries (Phillipson, 2012). By approximately 715 CE, Aksum had become essentially landlocked (Munro-Hay, 1991).

The economic stress manifesting in Aksumite coinage provides quantifiable evidence of decline. Aksum was unique among sub-Saharan African states in minting its own gold, silver, and bronze coinage from approximately 270 to 610 CE (Munro-Hay, 1991). Gold purity under King Endubis (c. 270–300 CE) reached 95 percent, but by the reign of Ella Gabaz (c. 610 CE), gold content had fallen to 50 percent or less, at which point gold coinage ceased entirely (Munro-Hay, 1993). The debased nature of late silver coinage clearly places later reigns in a period of economic contraction (Phillipson, 2012). Coins from this terminal period bear inscriptions reflecting desperation, including mottos such as "Peace and Mercy" rather than the confident imperial titles of earlier issues (Munro-Hay, 1991).

3.4 Political Fragmentation and Decentralization

The loss of centralized authority is evidenced by multiple independent lines of evidence. No monumental royal inscriptions or coinage appear after the seventh century (Phillipson, 2012).

The last known Aksumite coins were minted under King Armah (c. 600–630 CE), after which the mint at Aksum ceased operation (Munro-Hay, 1991).

The Zagwe dynasty (10th–13th centuries), centered in the Lasta region, represents a successor state rather than a restoration of Aksumite centralization (Munro-Hay, 1991). The shift of political power from Aksum to more southerly regions indicates the collapse of the old order rather than mere dynastic change (Phillipson, 2012).

Radiocarbon dates from Aksumite residential areas show a sharp decline in occupation by 800 CE (Butzer, 1981). Excavations at Wakarida confirm urban settlement during the classical Aksumite period (150–400/450 CE) and post-Aksumite occupation (800/850 CE), with a significant gap in between (Gajda et al., 2015). The city of Aksum itself was largely abandoned by 800 CE and subsequently pillaged by border tribes (Munro-Hay, 1991).

IV. Results and Discussion

4.1 The Resilience of Spiritual Institutions

The survival of Aksumite spiritual institutions alongside the collapse of political and technological systems constitutes the central paradox of this study. While the state fragmented and monumental construction ceased, the Ethiopian Orthodox Tewahedo Church not only endured but expanded, becoming the enduring foundation of Ethiopian national identity. This section explains this differential resilience by examining three interrelated factors: the decentralized, locally embedded structure of ecclesiastical institutions; the unique symbolic and physical invulnerability of the Ark of the Covenant; and the capacity for liturgical continuity combined with architectural and missionary adaptation.

4.2 Decentralization and Local Embedding

Unlike the highly centralized Aksumite state, which depended upon long-distance trade networks and surplus extraction from a geographically extended territory, the Ethiopian Orthodox Church developed from its inception as a decentralized institution anchored in local communities. This structural difference proved decisive during the political collapse of the seventh and eighth centuries.

The monastic foundations of the Aksumite period operated with significant autonomy from royal authority. Debre Damo, the most famous early monastery, was established in the sixth century and endowed with extensive tracts of land by King Gabre Maskal around 550 CE, initiating a policy of land endowments that would make the Church the largest landowner in the country (Munro-Hay, 1991) (Figure 5). This economic base, derived from local agricultural production rather than international trade, rendered monastic communities far less vulnerable to the trade disruptions that crippled the Aksumite state (Phillipson, 2012).

The expansion of Christianity beyond Aksum was accomplished primarily by monks who were considered leaders in holiness (Munro-Hay, 2002). With the advent of the Nine Saints, Syrian missionaries who arrived in the late fifth century, the educational and literary work of the Church began. The translation of most books of the Bible, chiefly from Greek and Syriac, is attributed to these figures, and all education began around parish churches and was completed in monasteries (Munro-Hay, 1991). This institutionalization of literacy and scribal tradition created a form of knowledge preservation that did not depend on royal patronage. The great indigenous scholar Yared, creator of Ethiopian church music, produced a hymn book that followed the

liturgical year, establishing a liturgical tradition that remained stable across centuries of political upheaval (Shelemay, 1992).

Figure 5. Debre Damo and monastic resilience in sustaining Ethiopian Christianity beyond Aksumite political collapse.

Figure 5 illustrates the decentralized institutional foundations of Ethiopian Christianity during and after Aksumite decline. Centered on Debre Damo, the figure emphasizes monastic autonomy, land-based subsistence, manuscript culture, and village-level religious continuity. It visually explains how monasteries preserved literacy, liturgy, and ecclesiastical authority despite the collapse of long-distance trade and centralized royal power (Munro-Hay, 1991, 2002; Phillipson, 2012; Shelemay, 1992; Finneran, 2007).

By the sixth century, monasteries, even more than churches, had become the bases from which Christianity was established throughout the Aksumite kingdom (Finneran, 2007). The Church survived not because it was anchored in palaces but because it was rooted in villages, supported by local farming populations whose economic activities were largely insulated from the collapse of long-distance Red Sea trade.

4.3 The Ark of the Covenant as a Portable and Unbreakable Symbol

The Ark of the Covenant occupies a uniquely central position in Ethiopian Orthodox tradition, functioning as a symbol of divine presence that transcends and outlasts any particular political dynasty. Its narrative origins are preserved in the *Kebra Nagast* (Glory of the Kings), the 14th-century national epic of Ethiopia written in Ge'ez (Bausi, 2018). The text traces the origins of the Solomonic dynasty to the biblical King Solomon and the Queen of Sheba (Queen Makeda of Ethiopia), recounting how their son Menelik I brought the Ark of the Covenant from Jerusalem to Aksum (Munro-Hay, 2002). As the Ethiopianist Edward Ullendorff explained, "The *Kebra Nagast* is not merely a literary work, but it is the repository of Ethiopian national and religious feelings" (Ullendorff, 1967, p. 74).

The theological significance of the Ark fundamentally differs from that of the stelae. The stelae were monuments of state power, celebrating individual rulers and their divine sanction

within a pagan framework (Phillipson, 2012). The Ark, by contrast, is understood not as a monument at all but as a direct conduit to God, the very container of the Ten Commandments, the most sacred object in Israelite religion. Its presence in Aksum sanctifies the entire Ethiopian landscape as a New Zion (Munro-Hay, 2002).

Physically, the Ark possesses an invulnerability that the massive stelae could never achieve. While the stelae were immobile, weighing hundreds of tonnes and impossible to conceal (Munro-Hay, 1991), the Ark is kept in a guarded chapel at the Church of Our Lady Mary of Zion in Aksum, visible to no one but a single guardian monk appointed for life (Heldman, 1993). It cannot be destroyed because it cannot be accessed. This physical inaccessibility combined with the belief that the Ark's power protects Ethiopia itself created a symbol that could not be captured, broken, or looted by invading forces.

Politically, the Ark became the ultimate source of legitimacy, outlasting every dynasty. Even as states collapsed, any aspiring ruler needed Church approval (Finneran, 2007). The *Kebra Nagast* legitimized the Solomonic dynasty's seizure of power in the 13th century, and the Ark narrative enabled the overthrow of the Zagwe dynasty (Munro-Hay, 1991). The symbol was not merely passive; it was actively deployed to authorize new political orders.

4.4 Adaptation and Reinvention

The resilience of Ethiopian Orthodox Christianity is further evidenced by its capacity for liturgical continuity combined with architectural and missionary adaptation during the post-Aksumite period.

The Ethiopian Orthodox liturgy preserves ancient traditions that trace their roots to the early Aksumite Church. The Anaphora of the Apostles, one of at least fourteen anaphoras (Eucharistic prayers) received from the Church of Egypt, represents a liturgical tradition of considerable antiquity (Daoud, 2005). The translation of most books of the Bible into Ge'ez, attributed to the Nine Saints, established a scriptural foundation that remained unchanged across centuries (Munro-Hay, 1991). Fasting cycles, feast days such as Timkat (Epiphany), and ritual practices maintained stability even as political authority fragmented (Shelemay, 1992).

Architecturally, the most dramatic evidence of spiritual resilience is the rock-hewn church complex at Lalibela. Commissioned by King Gebre Meskel Lalibela of the Zagwe dynasty (r. ca. 1181–1221 CE), the eleven monolithic churches were carved from solid volcanic rock in a deliberate effort to recreate the holy city of Jerusalem in the Ethiopian highlands (Phillipson, 2012). According to tradition, Lalibela was guided by Christ on a tour of Jerusalem and instructed to build a second Jerusalem in Ethiopia (Munro-Hay, 2002). Unlike the exposed stelae of Aksum, these churches are built underground invisible from a distance, defensible, yet spiritually powerful (Finneran, 2007). They represent not a continuation of Aksumite monumental display but a strategic reinvestment in sacred space adapted to post-collapse conditions. The site remains in continuous use for daily worship, pilgrimage, and religious festivals, and was inscribed as a UNESCO World Heritage Site in 1978 (UNESCO, 1978).

Finally, the Church expanded southward and eastward during the post-Aksumite period. By the fifth century, the Ethiopian Orthodox Church had spread beyond Aksum into the countryside, aided by the Nine Saints from Byzantium (Munro-Hay, 1991). Over the next ten centuries, spectacular churches were either built or excavated out of solid rock throughout the region, all in regular use to this day (Finneran, 2007). This expansion demonstrates vitality, not mere survival. The Church did not simply endure the collapse of the Aksumite state; it grew,

converting new populations and absorbing local traditions into an increasingly diverse and resilient institutional framework.

4.5 Discussion

The evidence presented in Sections 2 through 5 answers the central research question: Why did Aksum's political and technological systems collapse while its spiritual systems demonstrated remarkable continuity? The differential outcomes stem from fundamentally distinct structural characteristics that shaped each system's vulnerability and resilience.

Technological and political systems in Aksum exhibited high complexity coupled with low resilience. The state required centralized surplus extraction through taxation and grain storage, depended upon long-distance trade networks for imported timber, metals, and luxury goods, and remained acutely vulnerable to environmental shocks including drought and soil exhaustion (Butzer, 1981; Phillipson, 2012). When these interdependent systems failed, they left monumental, immobile evidence of their collapse, most dramatically the fallen Great Stele, a 500-tonne testament to ambition exceeding environmental and organizational limits (Munro-Hay, 1991).

Religious and spiritual systems, by contrast, demonstrated lower complexity but higher resilience. The Ethiopian Orthodox Church was decentralized and locally supported through monasteries and village churches embedded in agricultural communities rather than dependent on long-distance trade (Finneran, 2007). Religious ritual required no imported materials only faith, water, bread, and wine rendering spiritual practice independent of the trade networks whose disruption crippled the state (Munro-Hay, 2002). Fasting cycles, which remain central to Ethiopian Orthodox practice, align with agricultural lean seasons, demonstrating adaptation to environmental stress rather than vulnerability to it (Shelemay, 1992). Finally, the symbols of spiritual continuity, the Ark of the Covenant, sacred texts preserved in monastic scriptoria, and oral traditions were portable or concealable, unlike the immobile stelae that could not be hidden from destruction (Heldman, 1993).

This pattern finds theoretical grounding in resilience theory and collapse studies. Holling (1973) defined resilience as the capacity of a system to absorb disturbance and reorganize while retaining essentially the same function and identity. Tainter (1988) demonstrated that complex societies often collapse precisely because increasing complexity yields diminishing returns and creates fragility. Diamond (2005) identified environmental degradation, climate change, and trade disruption as recurrent factors in societal collapses across multiple civilizations. Aksum's state exemplifies a high-complexity, low-resilience system: its elaborate administrative, economic, and technological structures delivered unprecedented power but proved brittle when environmental and geopolitical conditions shifted. Its religious institutions, organized around decentralized monasticism and locally reproducible rituals, constituted a lower-complexity but higher-resilience system that absorbed the shock of state collapse and continued functioning.

Comparative evidence supports this interpretation. In post-Roman Europe, the Catholic Church survived the collapse of the Western Roman Empire, preserving literacy, administrative structures, and cultural continuity across centuries of political fragmentation (Tainter, 1988). In the post-classical Maya lowlands, the ritual calendar and religious practices continued despite the collapse of divine kingship and monumental construction (Diamond, 2005). In post-Pharaonic Egypt, temple cults outlasted dynastic succession, maintaining religious practice through Persian, Greek, and Roman domination (Frankfurter, 1998). In each case, decentralized religious

institutions embedded in local communities proved more resilient than centralized political structures dependent on surplus extraction and long-distance exchange.

The Aksumite case thus contributes to a broader understanding of collapse and continuity. Political and technological systems fall when their complexity exceeds their resource base and when external shocks exceed their adaptive capacity. Spiritual systems endure when they are decentralized, locally supported, ritually reproducible without external inputs, and organized around symbols that cannot be destroyed because they cannot be accessed. The stelae fell because they were monuments of state power. The Ark endured because it was a monument of faith.

V. Conclusion

The Kingdom of Aksum presents a profound paradox. This civilization quarried, carved, and erected the tallest stelae of the ancient world, including a 33-meter, 500-tonne giant, yet within two centuries could not feed its own population or maintain basic political order. Simultaneously, the faith that emerged alongside these stones became Ethiopia's defining institution, enduring across 1,600 years of political fragmentation and foreign pressure.

The answer to this paper's central research question lies in differential resilience. Political and technological systems collapsed because they were fragile, centralized, and dependent upon conditions that failed catastrophically: reliable rainfall, long-distance trade networks, and soil fertility. Spiritual systems endured because they were resilient, decentralized, embedded in local communities, and organized around portable or concealable symbols, most notably the Ark of the Covenant. The stelae fell because they were monuments of state power; the Ark endured because it was a monument of faith.

Beyond climate and trade disruption, Aksum's decline stemmed from self-inflicted ecological degradation. The same centralized power that enabled the quarrying of 33 m stelae also drove unchecked deforestation for iron smelting, charcoal production, and terraced agriculture. Soil exhaustion followed, reducing agricultural surplus and weakening the state's ability to feed its urban population. Simultaneously, Aksum's over reliance on Red Sea transit vulnerable to Persian and then Islamic expansion left it without economic diversification. When the port of Adulis declined, the kingdom's silver and copper coinage lost value, and the army could no longer be maintained.

Several limitations warrant acknowledgment. Textual evidence for the late Aksumite period (7th–10th centuries) remains sparse, forcing reliance on archaeological inference (Munro-Hay, 1991). The archaeological record disproportionately reflects elite behavior, stelae, tombs, and coinage potentially overstating collapse, as commoner populations may have adapted more successfully than monumental evidence suggests. Finally, the Ark's history is legendary, not documentary; the argument for its resilience rests on its function as a symbol, not the verifiability of its literal history.

For future generations to approach Aksumite engineering heights, they must learn from its fragility. A return requires sustainable resource management reforestation, soil conservation, and renewable energy for large scale construction rather than extractive overuse. Politically, it demands decentralized resilience: local food and water security coupled with coordinated regional infrastructure, avoiding the fatal centralization that failed Aksum. Education in ancient stone working techniques (e.g., lever and ramp systems) combined with modern materials science

could revive monumental building without ecological collapse. Finally, the spiritual resilience of the Ark offers a model: enduring achievements are those embedded in community practice, not solely in monuments of state power.

Future research should pursue three directions

First, excavation of post-Aksumite rural settlements would illuminate local adaptation strategies beyond elite centers.

Second, paleoethnobotanical analysis of agricultural change during the drought period could clarify crop choices and subsistence resilience.

Third, comparative study of religious resilience in other collapsed African states, including Great Zimbabwe and the Nubian kingdoms of Makuria and Alodia would test whether the patterns observed in Aksum hold across different contexts.

The stelae of Aksum stand as monuments to a power that could not last; the Ark endures as a testament to a faith that would not die.

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