Fragmented Landscapes: An Archaeology of Transformations in The Pra River Basin, Southern Ghana

Sean Hamilton Reid
Syracuse University

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Dissertation Abstract

This doctoral archaeological research examines the Pra River Basin in southern Ghana through lenses of landscape, temporality, and transformation. Drawing on the Annales school and the writings of Tim Ingold, this study moves away from binary constructions of natural and cultural landscape features toward a more integrated view of the landscape’s long human history. The primary temporal focus of this research is the past three millennia but evidence recovered of even more ancient eras is also examined. The artifacts and features documented while surveying this landscape allow us to glimpse pre-Atlantic (pre-1450 CE) settlement patterns, subsistence, and technology, as well as more recent and ongoing transformations of the landscape. Artifacts including ceramics, quartz flakes, stone beads, ground stone tools, and iron slag were found on hilltop sites throughout the surveyed areas. Most of these sites represent a pre-Atlantic pattern of settlement that continues, to a lesser extent, into the early Atlantic era (1450-1700 CE). Long grinding slicks, possibly related to Nyame Akuma production, are present on numerous rock outcrops in the region. Test excavation at an iron smelting site near Adiembra (AD31) yielded a temporally extensive range of dates. The bulk of the slag was deposited in the early second century CE, but deeper ceramic bearing contexts stretched back through the first millennium BCE. A single early seventh millennium BCE date associated with stone flakes underlay the site, representing the oldest date recovered from an archaeological context in the region. The archaeological evidence this study presents suggests the entire landscape has undergone continual alteration for numerous millennia, but much of the landscape’s current form represents Atlantic influences and more recent historical dynamics and transformations of the colonial and post-colonial periods. I examine this fragmented landscape using satellite remote sensing, archaeological pedestrian survey, diagnostic artifact analyses, and limited test excavations to identify and assess features and transformative processes.
Fragmented Landscapes: An Archaeology of Transformations in the Pra River Basin, Southern Ghana

by

Sean Hamilton Reid

B.A., St. Mary’s College of Maryland, 2007
M.A., The George Washington University, 2010

Dissertation
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Chapter 1: Introduction

1.1 Fragmented Landscape: Processes of History in the Southern Pra River Basin

Figure 1: The Pra River Basin, Southern Ghana.
The Pra River Basin landscape is a complex archive that reflects the many dynamics of its history: it has been shaped both by events\(^1\) and longer-term (*longue durée*) historical and environmental processes, in some cases echoing or reconjured in the present. Yet the reflection is uneven, partial, and often unintelligible. This study examines the landscape of the southern Pra River Basin (PRB),\(^2\) shown in Figure 1. This fragmented landscape has been continually reinscribed by a mélange of activities and processes, effacing earlier patterns. The landscape is a palimpsest of transformations in continual movement, containing artifactual scraps of earlier formations (Figure 2). Some of these transformations in the landscape signal or suggest transformations in the societies that inhabited this region over the past eight millennia. There is no “natural” landscape here; “natural” in the sense of having escaped the influence of humans. Yet it is not enough to call this a cultural landscape. To do so implies (or could imply) we see this landscape as once having been “natural,” but it was subsequently transformed by cultural forces into something else, something more human, but also in some sense degraded from an idealized “natural” state. The root of this trouble is a misleading binary opposition between nature/culture that is embedded in the western imaginary, including the language and practice of

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\(^1\) Historical ‘event’ in the sense of an identifiable moment or short span of time in which the landscape was markedly altered, such as the establishment of the Portuguese trade fort at Shama (see Chapter 3), or the construction of the Cape Coast-Takoradi highway and subsequent abandonment of Wawase (Amarrey 2021: 243). Events, and longer-term (*longue durée*) slices of spatiotemporal fabric are lenses through which to examine or reference historical processes (see Chapter 2). In this sense, an event or the *longue durée* does not refer to a specific length of time.

\(^2\) In larger context, this is only a small section of the Pra River’s full extent. The Pra River is the largest river draining the area south of the Kwahu Plateau in southern Ghana, and is fed by the tributary Ofin, Anum, and Birim rivers. The upper stretches of the Pra roughly follow the border between Eastern and Ashanti Regions, and then along the border between Ashanti Region and Central Region south to Twifo Praso. Continuing south it crosses into Western Region and then into the area shown in Figure 1 where it flows into Gulf of Guinea near Shama. In my usage throughout this dissertation, the Pra River Basin refers only to the stretch of the river and surrounding area shown in Figure 1.
Nor is this history of transformation simply a linear series of disconnected occurrences in time. I explore the human relationship with the landscape from a *dwelling* perspective (Ingold 1993, 2000) in concert with a spatiotemporal view of history drawn from the *Annalistes*, particularly Fernand Braudel (see Chapter 2). The significance of conceptualizing human relationships with landscapes over time outside of the nature/culture binary extends beyond archaeology into realms of ecology, environmentalism, and ecoterrorism. The writings and actions of ecoterrorists, for example, generally pivot around human-related degradation of perceived natural landscapes and seascapes (e.g. Kaczynski 1995).

![Figure 2: Human relationships with the landscape are discernable in multiple temporal rhythms in this multispectral satellite image of Apuntuado sacred grove (circled), adjacent to the Pra River. See Chapter 6 for discussion of this site and the variegated landscape surrounding it.](image)

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3 E.g., a hypothetical archaeological landscape characterized by *natural* features and patterns of *material culture*. My use of terms like ‘material culture’ throughout this dissertation should be read as material remains that are entangled with and a result of human/environmental historical processes, ultimately referencing the human relationship with the landscape (*dwelling*), which I explore in Chapter 2.

4 As Tomich (2011: 55) notes: “In Braudel’s conception, the longue durée provides the unifying element of human history. Humans make their history through space and time. Space creates time: time unifies space. In this way, Braudel discloses a densely textured, multi-layered spatial-temporal world that is unique because it is spatio-temporally singular.”
Although terms like ‘material culture’ and ‘artifact’ conflict with my overall theoretical framework in the way that they subtly reference nature/culture, I chose to use them in the interest of remaining intelligible and not burdening the reader with invented terms. Artifacts, (or the material traces of historical processes in an interwoven human/environment) are simply more legibly connected to and informative of the human past than many other material facets of the landscape. Similarly, my usage of ‘environment’ is not synonymous with ‘nature.’ In my usage it is referencing the ‘world’ component of ‘being-in-the-world,’ the fundamental characteristic of human existence (see Chapter 2).

Despite the piecemeal nature of the evidence, there is no way to understand the current iteration of the southern Pra Basin without a view towards the processes of human/environmental history, although we do not know how deeply that history extends into the past. Data from elsewhere in southern Ghana glimpse many millennia of human occupation and influence on the landscape. Stone tools found at Tema West II are suggested to have accumulated between 25,000-20,000 B.P. (Nygaard & Talbot 1984). Dates of 4180 ± 140 B.P. and 5850 ± 80 B.P. associated with pottery and flake tools were recovered from a shell midden at Kpone (Dombrowski 1977; Nygaard & Talbot 1984: 34). Recent dates from Bosumpra Cave provide an extended view of human activity, with dates as early as the mid-eleventh millennium BCE. Notably, patterns of material culture recovered from Bosumpra Cave in levels dating to first millennium BCE (Watson 2017) are comparable to material culture found scattered throughout the Pra River Basin. Kintampo sites in the forest’s northern margins demonstrate semi-sedentary villages and food production c. 2100-1400 BCE (Watson 2010). Collectively, these data

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5 Throughout this dissertation I use CE/BCE to refer to dates, but when referencing geological or radiocarbon dates the original “BP” format is preserved to avoid introducing ambiguity or errors through format translation.
strongly suggest that humans have also inhabited and transformed southwestern Ghanaian forest and coast for many thousands of years.

The current landscape of the Pra River Basin has been shaped by millennia of entangled human and environmental processes. Yet only some of these historical processes can be detected with clarity, and the most dramatic are quite recent, originating in the colonial period. Others, deeper in the past, can only be inferred, or speculatively interpreted in a very fragmented picture. My excavations at Site AD31 near Adiembra identified ceramic and stone tool contexts from the mid-first millennium BCE (see Chapter 5). Dates from this site, alongside dates recovered from Wawase on the east bank of the Pra (Amartey 2021), are roughly a thousand years earlier than previous dates recovered from the Central Region Project area. A single early seventh millennium BCE date, associated with stone flakes, was also recovered from my excavations at AD31, hinting at much earlier LSA activity.

The spread of agriculture in the PRB in whatever form would likely transform the landscape over decades, centuries, and millennia as it was repeatedly cleared, farmed, and fallowed. The swidden agriculture (with cycles of clearing, burning, farming, and fallowing) that is currently practiced in the PRB have obvious transformative effects on the land throughout the year. These stages, unfolding over years and decades are detectable, but it is insufficient to simply project these practices into the past to unpack the effect they might have had over millennia on the southern Pra Basin. One must also consider the long-term, transformative effects of intensive foraging and/or environmental management that pre-dated and overlapped with practices conventionally understood as “agriculture.”

6 My use of the term “historical processes” is inclusive of environmental factors that are interwoven with human history.
Similarly, metallurgy/iron production in the PRB would require charcoal production, resulting in some degree of forest clearing or the cutting of certain species of trees, and leaving mounds of slag in the wake of smelting on the landscape (see Chapter 5). Yet when compared with evidence from in northern Ghana, smelting seems to be occurring on a much smaller scale in the PRB. The specific reasons for this apparent difference in scale of production are uncertain, but it likely reflects distinct differences in the societal/environmental/geological milieux. The smelting site AD31 examined in Chapter 5 is the most well-studied array of slag mounds yet to be identified and excavated within the Pra River Basin and broader Central Region Project\textsuperscript{7} area.

The advent of the Atlantic trade and its associated economic, cultural, and biological entanglements also left substantial traces on the PRB landscape. The town of Shama at the mouth of the Pra assumed a particularly important role in early encounters and trade with the Portuguese in the fifteenth century, initiating the beginning of the Atlantic-era in what is now coastal Ghana (~1450-1900 CE, see Chapter 3). The interactions between the coastal inhabitants of this region and Europeans, particularly the gold trade and trade in enslaved captives, would have global consequences for the development of capitalism, modernity, and the African diaspora. But the pre-Atlantic history of this region, and what was happening in the hinterlands of Shama in the early Atlantic era when written records become available, remains cloudy, at best. Reverberations of this gold mining continue as present day *galamsey*, scarring the landscape of the Pra in ways that are new but still represent a form of historical continuity (see Chapter 6). The area shown in Figure 1 is therefore the object of this study, with the goal of illuminating the long-term history and archaeology of this region from a landscape perspective.

\footnote{7 The Central Region Project (CRP) is discussed in Chapter 4.}
Even where archaeological features are obviously present in the Pra landscape, interpretive difficulties arise. Long grinding slicks on granite outcrops are numerous throughout the Pra River Basin, but what are they? When were they produced? I suspect they are pre-Atlantic features likely resulting from the production/sharpening of Nyame Akuma ground stone tools used for agricultural or wood working purposes. Yet all this is uncertain. Such features are difficult to date and my test excavations at one yielded little but fragments of lithics and eroded pre-Atlantic pottery (see Chapter 5). The ubiquity of these grinding slick features throughout my survey areas is testament to a great deal of labor that unfolded over an extended period, perhaps millennia. These features represent direct transformation of the landscape as they quite literally transformed granite outcrops throughout the Pra River Basin. They also signal other forms of landscape transformation if it could be established that they are indeed sites of production/modification for tools related to agriculture or woodworking. Some grinding slicks also have smoothed areas, in contrast to the long ovoid slicks, which may represent an entirely different pattern of labor or resource processing. But knowing the details of the transformations attached to intensive foraging and/or agriculture, stone tool production, and metallurgy wrought over long periods of time is difficult, given our limited view and the complexity of the landscape as it has been deeply overwritten by more recent historical processes.

Colonial forestry policy framed the forest as a resource to be managed and exploited. The effects of these policies are evident in the land cover of the Pra Suhien Forest Reserve, located in the northern margin of the project area (Figure 1). Other colonial endeavors continue to resonate through the observable landscape, including logging, the introduction of cash cropping, and the plantation economy. Logging not only removed trees but left scars in the form of saw pits and old roads in the forest reserve. It echoes into the present as well, the sounds of chain saws could
often be heard in the distance during survey, and evidence of small-scale logging was noted throughout the survey zones in the form of rotting stumps and recently cut trees being processed into boards on site. The colonial introduction of cash cropping and plantation farming still frame large areas of the Pra River Basin landscape economy today. Cocoa tree farms are scattered throughout the region, and one is now situated over a large part of the Wawase site. Ordered rows of oil palm trees are ubiquitous throughout the PRB as well, which are readily visible from an aerial view. The Pra River Basin is a complex and overwritten landscape. It does not reveal itself fully. By this I mean only some of the historical systems that have shaped it for millennia are detectable, and the most dramatic are quite recent, originating in the colonial era, carrying into the present. Others, deeper in the past, can only be inferred, or interpreted in a very incomplete picture, at least within the framework of available resources at this time.

1.2 Questions and Perspectives

This research is motivated at a very broad level by the need to contextualize our understanding of the African Atlantic and the changes wrought by the opening of the Atlantic trade on African societies by using a long-term perspective. In other words, we must situate the impact of the Atlantic trade on African societies in a longer-term perspective by working toward a better understanding of those societies before the fifteenth century CE. This critical perspective frames the background of my research and the Central Region Project at large. At a more specific level, this work has been driven by and grapples with the following questions and considerations, organized along theoretical, methodological, and interpretive lines:

**Theoretical/Historical:** This research has sought to examine how the Pra River Basin reflects the past through the identification of historical processes and entanglements in the present iteration of the landscape. Survey and excavation have established that this landscape has
been inhabited for millennia and continually modified by humans. Therefore, a theoretical concern is to conceptualize an indivisibly natural and cultural landscape in motion with the rhythms of human history. In the past decade and a half, archaeological work in Central Region, adjacent to the Pra River Basin, demonstrated that Akan pre-Atlantic sociopolitical complexity had been substantially underestimated in previous historiography and some sacred grove forests are pre-Atlantic settlement sites (Chouin 2009, 2012; Chouin & DeCorse 2010). Most of the Pra River Basin has not been subject to archaeological survey until the present study and is therefore directly relevant to this dialogue concerning the contours of these pre-Atlantic societies, and how they might alter our understanding of later periods.

**Methodological:** The forests of West Africa are notoriously difficult to survey due to heavy tree cover, poor ground visibility, and numerous other complicating factors. This study has developed a multifaceted research methodology, incorporating pedestrian survey, archaeological excavation, GIS analysis, and multispectral satellite imagery to address these challenges and trace long term transformation in the landscape. High-resolution multispectral satellite imagery has become an increasingly available tool that has not yet received extensive attention or use by archaeologists in West Africa, but it has been productively employed for archaeological survey in tropical forests elsewhere in the world. When integrated with pedestrian survey, this powerful technology offers unique vantages on the landscape.

**Archaeological/Historical/Interpretive:** Through a conceptual vantage of an intertwined natural/cultural landscape and the multifaceted research methodology outlined above, this research seeks to interpret signals of extensive transformations writ large across the landscape. This includes remnants of ancient material culture, signatures of Atlantic entanglement, colonialism, and ongoing post-colonial processes effecting dramatic landscape alteration.
Interpreting some of these processes, particularly signals of ancient transformation, poses a significant challenge. For example, our understanding of the grinding slicks found throughout the landscape, presumably from *Nyame Akuma* production, is hampered by the inability to date these grinding slicks directly. But this methodology and conceptual vantage allows us to move forward, revealing the sheer prevalence of these sites throughout the Pra River Basin, and providing a window for examining temporally deep human-landscape entanglement, pre-Atlantic technology, and labor expenditure on an extensive scale. Signatures of colonial and post-colonial processes such as logging, cash cropping, and *galamsey* are far more legible, but artifactual signs of ancient processes remain dispersed within, which merits interpretive reflection. These recent, striking, and transformative historical dynamics are ongoing revisions of a landscape under revision for millennia.

### 1.3 Organization of Dissertation

In Chapter 2 I unpack Tim Ingold’s ideas of *dwelling* and Fernand Braudel’s *rhythms of history* to examine the spatiotemporality of the Pra River Basin landscape. Drawing on their ideas, I develop a working concept of landscape that avoids misleading binary oppositions of “natural” and “cultural” features. This is productive for interpreting a complex landscape characterized by ancient settlement sites, shifting cultivation, cash cropping, secondary forest, large colonial forest reserves, and dense patches of forest imbued with historical and cultural significance often referred to as sacred groves (*abosom*). Examples drawn from my fieldwork in the Pra River Basin are used to illustrate the complexity of long-term human entanglement with and transformation of the landscape, the history of which is more deeply examined in Chapter 3. The apparent marginality of West Africa within broader discussions and theorizations of “landscape archaeology” is also examined.
Chapter 3 offers an overview of the history and archaeology of the Pra River Basin. This landscape has been shaped by a confluence of entangled environmental, cultural, and historical processes that have unfolded over at least eight millennia. Evidence of the earliest eras of human occupation in the Pra River Basin is sparse and fragmentary, and in many cases has been overwritten by more recent transformative historical dynamics of the colonial and post-colonial eras. Shifts in subsistence, settlement patterns, and technology are evident, however, and the Pra River Basin landscape’s current iteration cannot be understood without an eye toward its deeper history.

Chapter 4 introduces and discusses the methodology being employed in this research. This methodology is multifaceted, incorporating archeological survey and excavation, satellite imagery analysis, and GIS analysis/geodatabase construction. As previously noted, this methodology was specifically developed to grapple with some of the challenges of surveying this densely forested landscape. Pedestrian survey aided by multispectral satellite imagery was the main means of finding and assessing sites in the field. Survey was also informed by previous survey data east of the Pra, collected by Central Region Project between 1985 and 2010. Limited test excavation was undertaken at three sites with pre-Atlantic components that were identified during survey: a hilltop atetefo ceramic scatter (SD610) and a grinding slick (SD520), both near Supomu-Dunkwa, and a hilltop iron smelting site (AD31) near Adiembra. Multiple forms of data including my survey and excavation data, previous CRP survey data, and satellite imagery were incorporated into a larger geodatabase for reference and analysis.

Chapter 5 examines the distribution of hundreds of sites, features, and artifacts throughout the Pra River Basin landscape. These sites provide a long-term perspective on the dynamics of human-landscape transformation in the PRB. I primarily draw on the results of my
surveys conducted in 2017 near the Pra River, supplemented by survey data previously collected throughout the Central Region Project area. I also draw on the field notes of Davies (1967) to contextualize and map similar patterns of material remains throughout the broader forest region of southern Ghana. Surface scatters of ceramics, hilltop sites, sacred groves, *Nyame Akuma* axes, grinding slicks, stone flakes, and iron smelting sites are fragments of vast and difficult to parse transformations that likely occurred during the pre/early Atlantic. This chapter also analyzes the results of the excavations at AD31, SD520, SD610.

In Chapter 6 I examine the contemporary Pra River Basin as a landscape in temporal motion with the rhythms of an entangled human/environmental history through ground photography and satellite images. The transformational historical dynamics illustrated by the sites in these images originated in different periods of the PRB’s history, and most continue to impact and alter the landscape in various ways. For example, grinding slicks are likely connected to forest clearing and farming over several millennia in the pre-Atlantic, but the current forested landscape is undergoing constant change in relation to shifting agriculture, palm oil and cocoa tree farming, and the growth and destruction of sacred groves, forest reserves, and secondary forest. I also examine the impact and distribution of *galamsey* gold mining sites, which is rapidly altering the Pra landscape, yet is still entangled with this region’s deeper history.

Chapter 7 offers concluding thoughts on key elements of this dissertation and future directions of research.

**1.4 Permissions and Associations**

This research was conducted under the auspices of the Central Region Project with a permit from the Ghana Museums and Monuments Board. Pedestrian survey was undertaken only after obtaining the permission of traditional leadership throughout the locales examined. All local
regulations related to cultural heritage management were followed and artifacts recovered during pedestrian survey and test excavations were deposited with the Ghana Museum and Monuments Board in Cape Coast after labeling, drawing, photography, and analysis.
Chapter 2: Time, Landscape, and the Pra River Basin

...most forms of social theory have failed to take seriously enough not only the temporality of social conduct but also its spatial attributes (Giddens 1979: 202).

Although there has been a general lack of consideration of the more philosophical issues of time throughout the discipline (Bailey 1983), this is especially true of spatial archaeology. There are at least two reasons which may help to account for this. The first concerns the tendency to consider space and time as separate and neutral dimensions which provide an environment for human behaviour. The second is the related tendency to equate time simply with change. As a result, most discussions of the temporal aspects of spatial patterning have been restricted to discussions of chronology, and especially the methodological difficulties of determining different phases of site use and occupation (Lane 1994: 196).

2.1 Introduction

This study examines the Pra River Basin as a ‘landscape’ in spatiotemporal motion. Viewing time solely as a linear variable is useful, but limiting, for the temporal rhythms of human life are diverse. Some rhythms are singular, while others are repetitive, seasonal, or otherwise cyclical. Some events dominate our perception of the living moment, while others move so slowly that they escape human attention. Escaping a linear view of time is useful for developing a more nuanced view of landscape in which the rhythms of human life are sometimes inscribed or reflected. However, defining landscape is also a complicated task. It is more than Euclidean space in which ‘sites’ are plotted, for these sites are the result of temporal processes as well. Neither are these temporal processes strictly linear, for they are only meaningful in that they correspond to the entangled rhythms of human life, social organization, and environment. Other interpretations have framed West African forest landscapes as a barrier to civilization—nature standing opposed to culture (see Chapter 7). These conclusions are false, for accumulating archaeological evidence shows that humans have lived in the forest zone for many thousands of
years. The landscape is as much ‘human’ as it is ‘natural,’ if they could ever be cleanly divided along this line, which they cannot. Therefore, the quest is to understand the contemporary landscape in terms of the temporal rhythms of human life in the past. To do this, I draw on Fernand Braudel (1958, 1972, 1973) for a structural model of temporality, and Tim Ingold (1993) for an alternative understanding of the human relationship with the landscape.

2.2 Time

To interpret time in the landscape of the Pra River Basin, this study draws on a theoretical model of structural history derived from a group of French historians referred to as the *Annales* School, and Fernand Braudel, in particular. The *Annales* school refers to several generations of twentieth-century French historians including Marc Bloch, Lucien Febvre, Jacques le Goff, and Emmanuel Le Roy Ladurie (Burke 1990). The founders of the movement reacted against nineteenth-century traditions of political history, in which history was primarily a narration of successive events. The work of the *Annales* School is very diverse, but emphasizes social and economic history, interdisciplinary scholarship, and ideological perceptions of the world in the past. A key conceptual aspect of Braudel’s work lies in his work on how time unfolds, and the relationship between structure and event. He identifies three scales, or temporal rhythms, of history: *événement*, *conjoncture*, and the *longue durée* (Braudel 1958, 1972: 1:13–22; Wallerstein 2009). *Histoire événementielle* is the short-term history of events, individuals, narratives, and political history. Medium-term *conjonctures* refer to social and economic cycles

8 Other models of temporality have been proposed by sociologists (Giddens 1979) and prehistoric archaeologists (Bailey 1981, 1983, 1987, 2007), but the *Annales* model is better suited to the temporal scale of this research. Giddens’ ‘planes of temporality’ are more focused on temporalities relevant to individual social actors, while Bailey’s time perspectivism is mostly constructed around the profound depths of time dealt with by prehistorians. Other geographic and historical factors of this research resonate with the *Annales* School as well, including the focus on the environment and landscape, the partially overlapping time frame, and the ‘Mediterranean World’ as inspiration for a great deal of relevant research into the ‘Atlantic World.’
occurring across time spans of several decades, as well as demographic and agrarian cycles, the history of eras, regions, societies, and mentalités, which refer to ideas, worldviews, and ideologies. The largest scale of historical analysis is the slowly unfolding longue durée and concerns geohistory, history of civilizations, stable technologies, and persistent mentalités or worldviews unfolding across centuries or millennia. All three “operate contemporaneously but at different wavelengths in time” yet are mutually influential and change as a result of their inner dialectic (Bintliff 1991: 6–7).

### 2.2.1 The Annales School in Archaeology


The Annales school was dominant in French historical interpretation by the 1940s but made little impression within anthropology and archaeology at the time as a decidedly anti-historical mode of thought framed European anthropology in the early twentieth century. A prominent example of this is Bronislaw Malinowski who, following a synchronic functionalist line of thought, argued the past had no explanatory value.9 This trend was later echoed by North

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9 However, E. E. Evans Pritchard rejected the ahistorical trend in anthropology and advocated for a closer relationship between the disciplines (Smith 1962).
American processualist archaeologists, who took a generally hostile attitude towards history.\textsuperscript{10} Lewis Binford, for example, saw an ideographic “history” and nomothetic “science” as irreconcilable, historical approaches being unable to explain cultural change (Binford 1962: 218, 1968). The root of this can be traced further back to Walter Taylor’s dissatisfaction with the state of the culture-historical approach, which prompted his arguments towards searching for rules of cultural behavior in the material record (Taylor 1983). An exception to this anti-historicism did however emerge with the field of North Americanist historical archaeology, which has maintained ongoing dialogue and theoretical exchange with the field of history (Schuyler 1978; Deetz 1988, 1996; Hall & Silliman 2006; Brooks \textit{et al.} 2008; Orser 2016).\textsuperscript{11} The influence of the Annales School on some archaeologists operating within or adjacent to the field of historical archaeology is evident (DeCorse 2008; Pietruszka 2011; Silliman 2012).

As for Braudel, he drew from and expressed affinity with anthropology through the interdisciplinary approach of Claude Lévi-Strauss (Braudel 1958: 725). Braudel was aware of the ambivalent status history maintained within the discipline of anthropology, at one point remarking while citing the aforementioned: “\textit{En fait, comment l'anthropologie se désintéresserait-elle de l'histoire ? Elle est la même aventure de l'esprit, comme aime à le dire Claude Lévi-Strauss}” (Braudel 1958: 736).\textsuperscript{12}

\textsuperscript{10} An exception to this would be the work of Stanley South (1978), who took a processualist approach to historical archeology.

\textsuperscript{11} Historical archaeology first cohered around the study of sites related to the more recent past (e.g., colonial settlements, forts, plantations, etc.) in conjunction with written and oral historical records (Orser 2016). The proper disciplinary affiliation of historical archaeology has been subject of debate (Schuyler 1978); it is generally institutionally situated within anthropology in North America, yet in some interpretations is more affiliated with history (Harrington 1978).

\textsuperscript{12} “How could anthropology lose interest in history? It is the same adventure of the mind, as Claude Lévi-Strauss likes to say.”
2.2.2 The Longue Durée

The concept of the longue durée is crucial to understanding both the Annales School and its influence on the discipline of archaeology. In a 1958 article titled “Histoire et Sciences sociales: La longue durée” Braudel discussed some of the advances made by the Annales School while arguing for a rapprochement of research between unnecessarily bounded social sciences.

Discussing the concept of structure and the longue durée, he writes:

Par structure, les observateurs du social entendent une organisation, une cohérence, des rapports assez fixes entre réalités et masses sociales. Pour nous, historiens, une structure est sans doute assemblage, architecture, mais plus encore une réalité que le temps use mal et véhicule très longuement. Certaines structures, à vivre longtemps, deviennent des éléments stables d'une infinité de générations : elles encombrent l'histoire, en gênent, donc en commandent l'écoulement. D'autres sont plus promptes à s'effriter. Mais toutes sont à la fois soutiens et obstacles. Obstacles, elles se marquent comme des limites (des enveloppes, au sens mathématique) dont l'homme et ses expériences ne peuvent guère s'affranchir. Songez à la difficulté de briser certains cadres géographiques, certaines réalités biologiques, certaines limites de la productivité, voire telles ou telles contraintes spirituelles : les cadres mentaux, aussi, sont prisons de longue durée13 (Braudel 1958: 731).

In the quote above, Braudel (1958) discusses how aspects of social “structures” persist through and shape the trajectory of historical development. Members of the Annales school, including Braudel, stressed the importance of longue durée structures as the central and formative processes of history. This meshes well with the strengths and limitations of archaeology, a discipline which has great potential to examine continuity and change through

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13 For social observers, structure means organization, coherence, and relatively stable relationships between social masses and other realities. For historians, it similarly signifies an assembly and an architecture, but it also defines a reality that time alters little and conveys well. Certain structures persist for so long that they become the stable elements of many generations. They encumber history. They hamper, therefore command, its outflow. Other structures molder more quickly. But all are simultaneously props and obstacles. As obstacles, they form boundaries (or enveloppes, in the mathematical sense) from whose authority people are hardly ever able to free their experiences. Just think how hard it is to shatter certain geographical frames, biological realities, barriers to increased productivity, and even spiritual constraints. For mind sets, too, are prisons of long duration (translated to English in Stoianovich 1976: 108–9).
time, but often struggles to see individuals and particular historical events. Structures capable of persistence through the longue durée can take many forms, but a frequently cited example is the geographic possibilities and constraints populations face. Braudel’s magnum opus, The Mediterranean and the Mediterranean World in the Age of Philip II, is geographically framed. His analyses of regional populations are frequently made in reference to settlement location, climate, disease, vegetation, economic subsistence, and geographic trade possibilities, such as access to rivers and seas. Archaeology can evaluate nearly all of these, and their development or change, through vast expanses of time. Thus, there is a potential for powerful synergy between archaeological investigation and temporalities, particularly the longue durée, derived from the Annales School.

2.2.3 An Annales-Inspired Approach to Temporality

An Annaliste longue durée perspective is valuable for Africanist archaeologists and historians because it provides an alternative to historical timelines that are the product of European and colonial encounters. It is a temporal framework in which colonialism is relegated to an episode in African history, and a relatively brief one in many areas. This is not to negate the important and transformative myriad of effects, encounters, and exchanges that occurred in the Atlantic world as a result of contact, trade, transatlantic slavery, and colonialism, but it does facilitate our escape from null perspectives such as that of Hugh Trevor-Roper, who echoing Hegel (Kuykendall 1993), viewed Africa as “unhistorical” and its past was nothing but “the unedifying gyrations of barbarous tribes in picturesque but irrelevant corners of the globe” (Oliver 1997: 284–92). In contrast, recovering and articulating the temporal depth and vitality of African and African diaspora history has been a central theme of pan-Africanist writings for over a century.
(Blyden 1890, 1905, 1967; Du Bois 1915; Woodson 1922; Holl 1995: 195); it is an endeavor towards which archaeology can make significant and otherwise inaccessible contributions.

It is important to recognize that Braudel’s temporal rhythms are neither arbitrary, nor are they fully discrete phenomena (Smith 1992b: 25–27). They are not arbitrary because for Braudel they are constructed empirically in his research, based on processes he observed operating at different levels (e.g. social and economic cycles at the level of conjuncture), and they are not fundamentally different for they represent “convenient sections along a continuum” (Smith 1992b: 27). There is no exact fixed length which defines the longue durée, it simply references the quality of a structure that is maintained for several hundred years, mostly outside the consciousness of individuals, yet guiding and constraining them. It is the longest temporal frame of study. Braudel and other Annaliste historians offer many potential examples of such structures that maintain coherence across the longue durée or in spans and cycles of conjunctures. These terms are ultimately a convenient starting point for the exploration of temporal rhythms. There is no absolute boundary between longue durée and conjuncture, rather, there are gradations of temporal perspective relative to the structure or question being asked (Tomich 2011). Braudel’s temporal rhythms were products of his investigation, and it is important to avoid their intentional or unintentional reification. One sometimes reads of “the longue durée” in publications that reference the Annalistes, contrasted against “conjunction” and “event” as if they held a discrete, objective reality. More typically, English-speaking academics refer to Braudel’s rhythms using the original French words due to nuances of translation and to signal a debt to the Annalistes, not to reference a rigid concept of time with an independent reality.

Although this research draws heavily on Braudel’s work and ideas of temporality, there are aspects of his approach that merit further discussion. He says little about his subject’s
mentalités, including their cultural attitudes, values, symbols, and other practices relating to astrology, magic, religion, and belief,\textsuperscript{14} even though many such practices had coherence over long periods of time. Admittedly, these are not often readily accessible through archaeological methods and are not the major focus of this research. Yet, these dynamic processes had and have important bearings on the material world, and cannot be dismissed so lightly (Clark 1985: 191–92). In discussing the relationship between Saussurian structuralism and that of the Annales, Stuart Clark makes the point that Braudel’s “preferred reality tends to lie outside signification altogether in the world of physical objects and relationships—geo-physical formations, patterns of climate, ecological systems, demographic mechanisms, and so on” (Clark 1985: 190). This strongly evokes an underlying assumption of a nature/culture divide, which surfaces in many of his discussions of the longue durée. As a side note, the nature/culture divide can be seen as an aspect of longue durée Western cosmology. However, it conflicts with the aspects of this research that seeks to examine the landscape as something more fundamentally integrated as it proceeds from previous research that has disrupted narratives of the “natural” (Fairhead & Leach 1996, 1998; Chouin 2009).

Can it not be said that there is a limit, a ceiling which restricts all human life, containing it within a frontier of varying outline, one which is hard to reach and harder to cross? This is the border which in every age, even our own, separates the possible from the impossible, what can be done with a little effort from what cannot be done at all. In the past, the borderline was imposed by inadequate food supplies, a population that was too big or too small for its resources, low productivity of labour, and the as yet slow progress in controlling nature. Between the fifteenth and the eighteenth century, these constraints hardly changed at all (Braudel 1981: 27).

\textsuperscript{14} Braudel largely ignored these aspects, but the Annalistes were a diverse group with diverse interests and others eagerly explored the realm of mentalités. Michel Vovelle (1973) wrote on religious practices in eighteenth century Provence, particularly changes in expressions of piety.
In much of Braudel’s work he heavily emphasized the dominance of the \textit{longue durée} structures over events, and generally discussed events as being overdetermined and ephemeral, despite dominating the attention of the living moment. His attitude was a continuance of the \textit{Annales} hostility to the \textit{ancien régime} of political history, but more deterministic than his predecessors such as Febvre, who saw \textit{longue durée} structures as both constraining and enabling (Burke 1990:40). Braudel cautioned that historians must not fall victim to the deception of the event, for “\textit{le temps court est la plus capricieuse, la plus trompeuse des durées}” (Braudel 1958: 728). In truth, however, Braudel was not always hostile to the event, “for every historical landscape – political, economic social, even geographical – is illumined by the intermittent flare of the event” (Braudel 1973: 2:901; see also Tomich 2011: 57; Braudel 1958: 726). Geographic entities are the centerpiece examples of Braudel’s \textit{longue durée}, for which he has been charged with environmental or geographic determinism by various critics (e.g., Sherratt 1992: 138). This is a common critique, and any model of temporality solely dominated by the \textit{longue durée} undermines our ability to analyze the complex dialectical or recursive relationship between structure and agency (Moreland 1992: 112–29).

Drawn from the \textit{Annales} school and the work of Fernand Braudel, I employ a loosely hierarchical temporal framework of \textit{longue durée}, \textit{moyenne durée} (\textit{temps conjoncturel}), and \textit{courte durée} (\textit{temps événementiel}) towards understanding temporality in the landscape. I depart from the somewhat overstated interpretations of Braudel’s scheme that posit the absolute dominance of the \textit{longue durée}, and the implied geographic or environmental determinism which results from a concept of immobile, long durée structures. In its place I recognize the recursive relationship between human action and social structures that are both the medium and outcome of those actions (Giddens 1986; Moreland 1992). Individual agency is most visible at the level of
the event, and is progressively subsumed within the longer temporal rhythms. While groups and individuals are endowed with agency, they must exercise that agency within the *longue durée* and *conjonctural* structural situations that surround them and have produced them. Echoing Marx’s well-known quotation, which even Braudel references\(^\text{15}\), people “make their own history, but not under conditions of their own choosing.” Thus, a *longue durée* perspective is important for situating and understanding temporal rhythms of shorter duration. Conversely, “every event, however brief, has to be sure, a contribution to make, lights up some dark corner or even some wide vista of history” (Braudel 1973: 2:901).

These temporal rhythms are more than just spans of time, they are dialectical scales for examining ‘continuity’ and ‘change’; for what might appear to be obvious ‘continuity’ in a shorter span of time, might be seen as slow ‘change’ across a longer span of time. Conversely, what might appear to be ‘change’ within *temps évènementiel*, might be better understood as ‘continuity’ when contextualized into the *longue durée*. As a hypothetical example, the sudden abandonment of a site related to resource exploitation can be seen as an eventful change, yet it could also be situated within a broader, *longue durée* pattern of exploitation and migration, which could be spatially and temporally described in a landscape.

The *Annales* School displays diversity of thought and approach to the degree that one can question whether it really is a coherent “school” at all. The generation after Braudel certainly fractured in many directions (Burke 1990: 65–93). Furthermore, concepts that are the hallmark of the *Annalistes*, such as *longue durée* and *conjoncture*, are loosely defined along temporal ranges and themes. This is a problem that some find difficult to overcome. Roland Fletcher,

\(^{15}\) (Braudel 1958: 739). However, he cites this as a somewhat problematic French translation via Claude Lévi-Strauss, as Immanuel Wallerstein (2009: 166–67) discusses.
writing on the applicability of the *Annales* approach in archaeology, states that “the central problem is that the various kinds of time scale proposed by the *Annalistes* have not been precisely defined, nor have their magnitudes been rigorously specified” (1992: 38). I disagree with this in that I do not see their loose definition as a problem. I see them as a starting point for constructing an empirically modified version of Braudel’s hierarchical rhythms as they apply to this research. West African societies of the pre-Atlantic cannot be expected to neatly conform to the temporal rhythms of the Mediterranean world of the sixteenth century. Braudel constructed his temporal rhythms empirically, and they provide a useful framework for his spatio-temporal research.

The critique of Braudel as an environmental or geographic determinist is overstated. He certainly emphasized *longue durée* geographic structures, but in his own words it is a history “of man in his relationship to environment, a history in which all change is slow, a history of constant repetition, ever-recurring cycles… [an]… almost timeless history (Braudel 1972: 1:20). Part of the problem stems from Braudel neglecting to illustrate the development and slow change of this relationship in his work. It is at this juncture where my research engages, for I seek to examine how humans have determined the landscape across multiple spatiotemporal frames but particularly the *longue durée*, or more precisely, to specify how the contemporary landscape is an entity shaped through and in motion with the rhythms of human/environment historical processes. My approach echoes that of *Annales* founder and Braudel’s predecessor, Lucien

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16 As Peter Burke succinctly puts it, “a more constructive criticism of Part One of *The Mediterranean* might be to suggest that although the author admits that his geo-history is not totally immobile, he fails to show it in motion (Burke 1990: 41).
Febvre, who wrote against crude geographic determinism, and instead argued for a “geographic possibilism” where there are “no necessities, but everywhere possibilities.”\(^{17}\)

Such possibilities are a crucial focal point of this research into the forested regions of Ghana, for some have assumed the geography of the forest to be a primary limiting factor in its assumed late inhabitation, particularly its denseness and the assumed difficulty of clearing land before the availability of iron tools. Yet as Chouin (2007, 2009) has shown in Ghana, and Fairhead and Leach (1996, 1998) have shown in Guinea, many parts of the presumed “natural” forest landscape are a result of human-related processes.

Archaeology is broadly compatible with the historiography of the *Annales* school because it encourages analysis on multiple scales of time through which the human activities across landscapes can be interpreted. For example, contemporary vegetation patterns can reflect human activities on different temporalities; e.g., *longue-durée* settlement patterns, or *temps conjoncturel* macroeconomic shifts in crop/tree exploitation, or intentional burning of fields in *temps événementiel*. It is productive to consider different temporal rhythms when considering how human activities affect, alter, destroy, and create the landscape.

### 2.3 Landscape

Landscape studies are simultaneously one of the most fashionable and avant-garde areas of scholarly enquiry, and also, paradoxically, one of the most theoretically dormant areas (Johnson 2007: 1).

The spatial focus of this research could broadly situate it within the field of “landscape archaeology.” Yet, “landscape archaeology” is a fractured term with numerous meanings and a

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\(^{17}\) Des nécessités, nulle part. Des possibilités, partout. Et l’homme, maître des possibilités, juge de leur emploi : c’est le placer dès lors au premier plan par un renversement nécessaire : l’homme et non plus la terre, ni les influences du climat ni les conditions déterminantes des lieux (Febvre 1922: 284).
complex history, many of which are incompatible with my approach. Parts of its origin and inspiration were inherited from English landscape history (e.g. Hoskins 1955; Hawkes 1959). Many aspects of contemporary landscape archaeology, such as settlement pattern analysis, were practiced before the term had come into wide use (e.g. Willey 1953; Clark 1954). Landscapes were also examined for evidence of the development of complex societies (e.g. Steward 1955). “Landscape archaeology” as a term did not come into common use until the 1980s, but spatial analysis of sites and artifact distributions was an important aspect of the New Archaeology during the 1970s (Hodder & Orton 1976). In 1978, “landscape archaeology” was used as an umbrella term for a group of articles discussing adaptive, environmental, distributional, and economic foci (such as interregional dynamics of economic strategies, economic explanations for settlement patterns, distributions of artifacts, environmental effects and constraints on agricultural production, and demography and sociopolitical complexity) (David & Thomas 2008: 28). These echo the general concerns of processualist archaeologists at the time, particularly with the focus on economic subsistence-settlement systems and adaptations to the environment (e.g. Binford 1980). By the early 1990s, trends in post-processual thought had a significant impact on mainstream landscape archaeology. Researchers attempted to move away from “economy,” “environment,” and “adaptation” to explore a variety of themes including the political, contested, subjective and embodied experience (phenomenological), and other social or symbolic aspects of landscape (Bender 1992, 1993; Shanks 1992; Tilley 1994; Ashmore & Knapp 1999).

2.3.1 Landscape Theory and West Africa

Sub-Saharan Africa is a strangely marginal realm of study within archaeology, despite the continent’s incredibly important archaeological record. This scholarly marginality echoes much of the continent’s economic location within the contemporary global capitalist system.
Internationally, the most well-known niche is the investigation of early hominids in East Africa, an investigation that is both externally funded and internally politically convenient (Schmidt 1995: 128–36). Unsurprisingly, Africa has been a peripheral geographic region in “high-level” theoretical discussion of archaeological landscapes over the course of the past twenty years. None of the papers in Barbara Bender’s edited volume *Landscape: Politics and Perspectives* (1993) attempt to examine or theorize African landscapes. Another important volume, *Archaeologies of Landscape: Contemporary Perspectives* (1999) edited by Wendy Ashmore and A. Bernard Knapp, is notable for its contribution to the development of social and symbolic approaches to landscape. The volume features contributions from archaeologists working in the Americas, North Africa (Egypt), Europe (Britain), Australia, East Asia, and the Mediterranean (Cyprus), yet no chapter focuses on landscapes of sub-Saharan Africa. Aside from a brief reference to Madagascar, sub-Saharan Africa is unmentioned throughout the volume. Continuing this trend, the continent is not mentioned in Anschuetz et al. (2001) article *An Archaeology of Landscapes: Perspectives and Directions*, in which they trace the development of landscape approaches and argue for its future direction.

The more recent edited volume *Handbook of Landscape Archaeology* volume by Bruno David and Julian Thomas (2008) breaks this trend of neglect and includes a chapter by an Africanist archaeologist Rod McIntosh discussing the unique trajectory of African landscape archaeology. He criticizes landscape approaches that are functional or seek environmental causation and chides the debates over scientific vs. humanistic approaches to landscape as “abstract theorizing that has little to do with historical circumstances, trends, or social understandings and more to do with contemporary power struggles within the discipline” (McIntosh 2008: 85). Rather, McIntosh argues Africanist approaches to landscape have “a
willingness to conceive of landscapes as layered social and symbolic—and physical—transformations, as holistic, deep—time fields of multiple perceptions, as well as reciprocal exploitations, arenas where peoples co-adapt and co-evolve” (McIntosh 2008: 85). The Power and Landscape in Atlantic West Africa volume edited by Monroe and Ogundiran (2012) focuses attention on transformation in economic and political landscapes in West Africa during the Atlantic period from an archaeological perspective. This volume offers analysis of historical developments in West Africa contextualized into multiple scales from local settlements, to larger political entities, to the world-economy. It is within the above Africanist frameworks that my conceptualization of the West African forest landscape is broadly situated. But first it is necessary to sweep away several insidious concepts that pervade the understanding of landscape—land, nature, and space.

2.3.2 Not Land, Not Nature, Not Space

Indeed, we have come to the realization that, in Africa like everywhere else, landscapes are anthropic formations; landscapes are artifacts and in this sense, the history of landscape belongs less to the realm of natural history than to archaeology (DeCorse & Chouin 2003: 11).

The Pra River Basin is neither land, nature, nor space. In this I follow Ingold (1993), in his negative exploration of what landscape is not. The forest landscape is not ‘land’, because ‘land’ is detached and lacks any inherent human aspect, for “where land is thus quantitative and homogeneous, the landscape is qualitative and heterogeneous” (Ingold 1993: 154). The existing forest landscape is not nature, because this is dependent on, and reproduces an unproductive nature/culture binary. It is necessary to reject this false subject-object duality to produce a nuanced understanding of humanity as being with and of the landscape. To proceed with a conception of the forest landscape as ‘nature’ unnecessarily separates humans and limits
discussion of an extremely tangled reality, particularly relating to how humans exist or have existed within multiple temporalities of the landscape. This dualism is reproduced in concepts of landscape that contrast ‘landscape’ with ‘nature’, which as Ingold (1993: 154) points out, creeps into the definition of landscape by theorists such as Daniels and Cosgrove (1988: 1) who define landscape as “a cultural image, a pictorial way of representing or symbolising surroundings.”

The assumption of divisible “nature” and “culture” is also built into many archaeological studies of formation processes, e.g. the “c-transforms” and “n-transforms” of Michael Schiffer (1975). 18

Consideration of formation processes is an essential aspect of understanding a landscape, but it is essential to recognize any such division is an abstraction, and there are many cases where such an abstraction obscures the incorporated reality of the landscape’s observed qualities. In any case, archaeological landscapes sometimes prove intractable, as Paul Lane (1994: 197) points out while quoting Seymour and Schiffer (1987: 554): “many of the insights provided by such studies, however, have tended to ‘underscore the difficulty of determining whether observed variability is caused by past behaviours or by formation processes.’”

The forest landscape is not ‘space’, either. ‘Space’ here referring to the ‘top down’ Cartesian representational constructs of cartographers and surveyors that are independent of any particular point of observation on the ground. Space merely implies two points of which there exists a measurable distance between. Heidegger writes that “when we speak of man and space, it sounds as though man stood on one side, and space on the other. Yet space is not something that faces man. It is neither an external object nor an inner experience.” (Heidegger 2001: 154).

Cosgrove (1984) critiqued the idea of an ‘objective’ space rooted in earlier traditions of

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18 As noted in Chapter 1, the nature/culture divide is embedded throughout the language of archeology, e.g., “material culture.”
geography, making the point that such projections are inextricably linked to the Renaissance and the development of the capitalist system of production, and are therefore neither neutral nor objective. “Space” is an abstract and commodified construction (Johnson 2012: 271). Ingold contrasts the “immobile and omnipresent” consciousness of space “in an imaginary position above the world” (1993: 155) with the “everyday project of dwelling in the world” (1993: 154) which is closer to his concept of landscape. Likewise, my representational creations within GIS are not the landscape, merely tools to assist thinking about and approach understandings of human life and the West African forest landscape—for thinking is a form of dwelling that can connect us intimately to the past, as the following will examine.

2.4 Dwelling in the Pra River Basin

...in dwelling in the world, we do not act upon it, or do things to it; rather we move along with it. Our actions do not transform the world, they are part and parcel of the world's transforming itself. And that is just another way of saying that they belong to time. For in the final analysis, everything is suspended in movement (Ingold 1993: 164).

To approach understandings of the Pra River Basin landscape, I draw on Tim Ingold’s (1993) temporal landscape in which humans are dwelling. In simple terms, dwelling refers to the idea that humans are inextricably part of the landscape in temporal motion, and “landscape is the world as it is known to those who dwell therein” (1993: 156). Human actions in various temporal rhythms create and transform the landscape as a fundamentally part of their being-in-the-world. The people who pass all or parts of their lives moving, working, living, thinking, building, gathering, farming, fighting, creating, destroying, worshipping, digging etc.—all aspects of dwelling in a landscape—continually modify the landscape within which they dwell. This includes the practice of archaeology—a form of dwelling that seeks to understand the traces of
past dwellers. The landscape therefore is an enduring story of the people who have passed their lives dwelling within it.

There are two fundamentally important philosophical aspects to understanding the “dwelling perspective.” The first is that the normal priority of form over process is reversed, thus emphasizing process over form. This is counter to a long tradition of Western thought that emphasizes form, stretching at least back to Aristotle’s ‘essences’ into the modern synthesis of Darwinian evolution. The second is that it takes human immersion in the world (Being-in-the-world in Martin Heidegger’s terminology) as the starting point for understanding, rather than starting with a divided subject/object understanding of human individuals confronting an external environment. This distinction is important, yet can be difficult to navigate because it is heavily ingrained into patterns of thought and language (see Ingold 2000). It is through this dwelling perspective that (1) binary concepts of nature/culture and (2) the idea that individuals represent something fundamentally separate from the ‘environment’ is avoided.19

While Ingold’s dwelling perspective draws on several lines of thought20, one major influence is the writings of Martin Heidegger from whom the term ‘dwelling’ is borrowed (Ingold 2000: 173). This term is meant to replace our understanding of our relationship with our surroundings by collapsing the subject/object division between us as individuals and the “world out there.” Particularly notable is a 1951 lecture “Bauen Wohnen Denken” (English: “Building Dwelling Thinking”). Heidegger explores the etymology of the word bauen (building) and its lost meaning of “dwelling” in the Old High German buan. Heidegger argues this etymological

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19 As noted, this presents linguistic difficulties. I use the term ‘human/environment’ throughout this dissertation to reference the fundamental embeddedness of human existence in the world, in contrast to ‘environment’ as something solely representing an external reality.

20 Ingold (2000:173) discusses the influences on his thinking, including other phenomenologists such as Maurice Merleau-Ponty and radical scholars within developmental biology and ecological psychology.
loss is metaphorical for a loss in understanding of the fundamental human existential condition of “Being” in the world—“the manner in which we humans are on the earth, is Buan, dwelling” (Heidegger 2001: 145). Heidegger dismantles the common understanding of the words ‘building’ and ‘dwelling’ as being separate and circumscribed, yet complementary activities—for example, to ‘build’ a house to ‘dwell’ in. Rather, he argues that building is already a form of dwelling, just as cultivation and construction are already aspects of dwelling. He writes “Building as dwelling, that is, as being on the earth, however, remains for man's everyday experience that which is from the outset “habitual”—we inhabit it, as our language says so beautifully: it is the Gewohnte” (Heidegger 2001: 145). In a later series of essays from which the following is extracted, Tim Ingold quotes Heidegger on the “dwelling perspective” as it is relevant to landscape archaeology:

We do not dwell because we have built, but we build and have built because we dwell, that is because we are dwellers . . . To build is in itself already to dwell . . . Only if we are capable of dwelling, only then can we build’ (Heidegger 1971: 148, 146, 160 original emphases). I take this to be the founding statement of the dwelling perspective. What it means is that the forms people build, whether in the imagination or on the ground, arise within the current of their involved activity, in the specific relational contexts of their practical engagement with their surroundings (Ingold 2000: 186).

Dwelling in a landscape runs counter to common sense notions of landscape as a pre-existing external object with particular qualities. Such notions separate humans from the landscape in which they dwell, framing it rather as something viewed, created, passed through, or pictorially represented by people. Rather, all these processes are part of the human condition of dwelling. Where Ingold (above) writes “specific relational contexts” I will clarify these contexts are temporally and culturally specific. Ingold’s “dwelling perspective” draws on the writings of philosophers broadly regarded as phenomenological such as Heidegger and Merleau-Ponty (Ingold 2000: 173), which then brings us to the relationship between a dwelling
perspective and other archaeological approaches to landscape that have drawn on phenomenological work.

### 2.4.1 Unpacking Phenomenology

The sensory experience of the phenomenologist seems all too often to be that of the solitary able-bodied male (Johnson 2012: 277).

When adopting Ingold’s “dwelling perspective,” the closeness to phenomenological approaches that privilege the subjective experience of moving through the landscape becomes apparent. If humans are an element of the landscape in motion, perhaps fore-facing how individuals experience the landscape is a potentially productive methodology. Some of these approaches have drawn on the idea of a unitary bodily experience in the landscape that would have been shared by past peoples (Tilley 2004: 221). Embodiment is then seen as a way forward to saying something about the experience of people in the past. As Michael Shanks writes in the Introduction to *Experiencing the Past*: “I see this as part of a project of embodiment, of locating the practices and pleasures of archaeology not just within the mind but within the body: embodied experience” (1992: 1). Indeed, in his more recent work, Ingold has explored aspects of embodied subjectivities including movement and the ways that weather is experienced (Ingold 2010). However, as Johnson (2012: 277) points out, the assumption of unitary bodily experience is problematic and tends towards psychic unity, rather than engaging with an anthropological focus on cultural differences. Furthermore, embodied differences are too easily displaced and ignored—gender, ability, race, class, age, and other variables that might affect how a landscape is experienced. Many phenomenological approaches that prioritize sensory experience are either alarmingly apolitical or reactionary in nature and signal a turning away from contemporary life. This represents a continuation of the Romantic tradition of landscape that Johnson (2007) traces
back through W.G Hoskins in *The Making of the English Landscape* (1955) to the poetry of William Wordsworth. These approaches are most successful when discourses of imagined prehistoric national ancestry or inheritance of the landscape are politically acceptable (such as in England), even if it is recognized that particular interpretations are contested (Bender 1992). If past people are imagined as some sort of prehistoric, featureless ancestor, one can engage in unrestrained subjectivities. The “right to speak” for—or project onto—such ancestors is not offensive, although it may be deluded. Yet, it would be difficult to imagine a white American archaeologist on a Native American or African landscape pretending such a project is entirely apolitical. It is certainly impossible to explore the subjective experiences of the enslaved in plantation landscapes with assumptions of unitary bodily experience. This comparison is more than a reference to a sensitive and painful history, for it reveals the incongruous and divergent relationship between prehistoric and historical landscape archaeology (Johnson 2007: 137–39).

For both the archaeologist and the native dweller, the landscape tells—a story. It enfolds the lives and times of predecessors who, over the generations, have moved around in it and played their part in its formation. To perceive the landscape is therefore to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past (Ingold 1993: 152–53).

Where Ingold writes about perceiving the landscape and engaging perceptually with the past, he is not talking about simply walking around and experiencing the landscape as a New Age way of communing with the dead. Rather, he is referencing many forms of knowing and understanding the landscape, including the practice of archaeology as a form of perception of the landscape, all of which are forms of dwelling. Therefore, while the approach taken here towards understanding the forest landscape draws on existential phenomenological thinking, it is not “phenomenological” as it is commonly understood in archaeological circles as simply
experimental discourses on embodiment, subjectivity, and how one experiences a landscape as one moves through it and views it (e.g. Shanks 1992; Tilley 1994, 2004). Ingold’s dwelling perspective is more holistic. In fact, some of the tensions between these approaches are revealed in a review written by Tim Ingold (with a response from Tilley) (2005) of Tilley’s book The Materiality of Stone: Explorations in Landscape Phenomenology (2004).

Ingold’s *dwelling* perspective is also useful for dissolving and enfolding the multiple concepts of landscape that appear within bounded subfields of anthropology. Because time and space are essential points of unity between archaeology and sociocultural anthropology, utilizing a concept of a landscape in temporal motion in which humans “dwell” dissolves the archaeologist’s idea of landscape as a spatialized backdrop of human activities as well as the idea of landscape as composed of cognitive and symbolic elements common in sociocultural anthropology (Ingold 1993: 152)—ultimately pushing beyond both. Yet, alluding back to Braudel and the Annales, the temporal motion of dwelling is more than linear. It occurs and can be understood across numerous, often concurrent, rhythms of human/environmental entanglement.
Chapter 3: History and Archaeology in the Fragmented Landscape of the Pra River Basin

3.1 Introduction

This chapter examines the landscape of the Pra River Basin (Figure 3) in Southern Ghana. More specifically, it ventures to grapple with the confluence of the environmental, cultural, and historical processes that have unfolded there from the Late Stone Age through the present, and producing the variegated landscape seen today. Much of the evidence is fragmentary and incomplete, and I can only speculate on some aspects of its transformation. The timeframe of early human occupation in this region, and West Africa as a whole, is not well understood. But the available archaeological evidence for shifts in subsistence, settlement patterns, and technology, as well as the effects of the regions’ eventual entanglement with the Atlantic world, suggests a complex landscape that does not defer to binary constructs of nature or culture. The remnants and echoes of these dynamics allow us to glimpse at how it has been transformed over millennia from early phases of human occupation through the Atlantic and colonial periods and into the present.21

3.2 Geology, Topography, and Soil

The geology, topography, and soil of southern Ghana share a general geographical relationship, influencing the types of vegetation cover observed across the landscape (Ahn 1970). Yet, as we will examine throughout this dissertation, these factors are deeply entangled with human history. The Pra Basin, and most of southwest Ghana, is underlain by pre-Cambrian Birimian-Tarkwian metavolcanic and metasedimentary rock with granitic intrusions. The Birimian rocks are notable in that they are the major source of gold in southern Ghana (Wright 1986: 38–49). The

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21 The contemporary postcolonial landscape is examined in Chapter 6.
availability of gold near the Pra became a significant factor of the African-European encounter during the Atlantic era (Section 3.8), a legacy which echoes into the present as *galamsey* gold mining (see Chapter 6). The granitic intrusions create a pattern of relief characterized by small
rolling hills divided by narrow valleys (Boateng 1967: 16–21). Archaeological survey has shown that many such hills near the Pra were concentrated areas of pre-Atlantic settlement and activity (see Section 3.7). The Pra itself likely served as a conduit of transportation and trade between these pre-Atlantic hilltop settlements along the river and the coast, as it did during the Atlantic era (Amartey 2021: 94).

The soil in the Pra River Basin bears significance as well, being a rich forest ochrosol (Obeng 1971), presumably enhanced further in areas of lower elevation by occasional flooding of the river. Ochrosol soils22 are the most productive agricultural soils in southern Ghana and support a wide variety of subsistence crops as well as export crops such as cocoa (Adjei–Gyapong & Asiamah 2002), which are farmed throughout the Pra River Basin (see Section 3.9 and 3.10, Chapter 6). These rich soils readily supported crops introduced during the Atlantic era, that were quickly incorporated into local diet and are still farmed throughout region (see Chapter 6).

Pre-fifteenth century settlement in the Pra River Basin shows a direct relationship with the topography of the landscape. Archaeological survey revealed many of the hilltops and hillocks (Figure 4) feature scatters of archaeological materials and are likely former settlement sites (See Section 3.7; Chapter 5). The hilltop deposits throughout the research area are seem to be deflated or eroded, a characteristic of most early sites investigated in the CRP (DeCorse

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22 The forested regions of southwest Ghana (primarily underlain by pre-Cambrian Birimian rocks) bear a rich and varied soil complex, divided into two general types of soil, oxysols and ochrosols. This relates to the underlying geology and regional pattern of rainfall. Ochrosols are widely found in the forested regions of southern Ghana with more moderate annual rainfall (65-45 in.). These soils are orange-brown, brown, or yellow-brown and are less acidic than the rainforest oxysols. Oxysols are prevalent in the rainforest regions (70-85 in.) and are orange-brown to yellow-brown color. They tend to be less rich in humus, more acidic, and leached from the high rainfall. Ochrosol-oxysol intergrade soils abound in the regions receiving 65-75 inches of annual rainfall (Boateng 1967:56-58).
A good example of this pattern in the PRB is the pre-Atlantic site SD620 near the town of Supomu Dunkwa. I initially identified the site during pedestrian survey by noting dense scatters of *atefefo* ceramics, stone flakes, and a stone bead\(^2\)\(^3\) washing down the side of the hill in a footpath. I later returned to perform test excavation at the top of the hill, but the archaeological deposits were shallow, extending less than half a meter. The most likely explanation seems to be that the hill and archaeological deposits have eroded and been washing down the side of the hill. I further speculate that this erosion could be a long-term human impact on the landscape related to cycles of clearing, farming, and fallowing which periodically expose the hilltop soil to heavy rains. If this is the case, the confluence of human and climatic dynamics has been gradually altering the topography of the landscape for millennia.

Granite/granodiorite outcrops and boulders are found scattered throughout the Pra River Basin, particularly in low-laying and eroded stream beds, but they were also occasionally noted on hillsides during surveys throughout the Central Region Project. Many of these outcrops feature several, sometimes dozens, of thin or ovoid grooves, likely from the production or sharpening of *Nyame Akuma* stone celts. The precise use of *Nyame Akuma* is unknown but given that many broken and damaged examples have been found, they may have been served as digging or wood working tools. If so, both the manufacturing process and their use was transformative of the landscape (see Chapter 5 and 6).

\(^2\)See chapter 5 and 6 for a discussion of artifact types.
Figure 4: Topography of the Pra River Basin near Supomu Dunkwa, in 10 meter elevation line increments. The topography is mostly characterized by rolling hills/hillocks. Around Supomu Dunkwa and south to the mouth of the river, the topography flattens out into marshy areas adjacent to the Pra River. North of Supomu Dunkwa, hills and ridges abut the river more closely. Supomu Island visible in the Pra River at bottom of image (Adapted from Survey of Ghana 1999 Sheet 0502C4).
3.3 Vegetation Zones and Climate

The Pra River Basin, along with much of Central and Western Regions, consists of moist, semi-deciduous forest that transitions into scrub and grasslands towards the sea, with mangrove swamp and lagoons in some areas immediately adjacent to the beach.\(^\text{24}\) The moist, semi-deciduous forest can be distinguished from the tropical rain forest of the far southwest portion of the Western Region on the basis of both climatic and vegetative characteristics, the latter receiving more rain (70 to 86 inches) in comparison with the former (50 to 70 inches)\(^\text{25}\) (Boateng 1967: 49). The trees and vegetation represented in these two southern forest zones have distinctive features: the semi-deciduous forest tends toward a flat canopy that loses some of its leaves in the dry season, while the largely evergreen tropical rainforest has very tall emergent trees above the high tree canopy (Varley & White 1958: 20–22; Boateng 1967: 46–53). In the moist, semi-deciduous forest, species such as *Celtis zenkeri, Triplochiton scleroxylon, Antiaris Africana, Chlorophora excelsa, and Cola gigantea* are common upper-story trees (Lane 1962:164-165), while the rain forest zone is prominently characterized by the trees *Cynometra Ananta, Lophira alata, and Tarrietia utilis*. Large emergents found in both forest zones include *Afromosia elata, Chlorophora excelsa, Entandrophragma spp., Khaya spp., Mimusops heckelii, Terminalia spp., and Triplochiton scleroxylon* (Lane 1962: 161).

The lower part of the Pra, from approximately Supomu Island south towards the sea (Figure 3), is generally mapped as coastal scrub/grassland zone by geographers (Boateng 1967: 48). The coastal scrub/grassland zone tends to receive less annual rainfall than the forest zones

\(^{24}\) Geographers have noted five broad classes of vegetation zones, correlated with climate and geology in modern Ghana: savannah woodland; moist, semi-deciduous forest; tropical rain forest; strand and mangrove; and coastal scrub/grassland (Boateng 1967; Varley & White 1958). On the ground, however, the landscape is far more variegated and complex (see Chapter 6).

\(^{25}\) There have, however, been troubling measurements and testimonials of declining precipitation in recent decades (Carr 2011:85). This may reflect macro-level human/environmental change.
and is characterized by patches of scrub vegetation with dispersed trees. According to Boateng (1967: 53) baobab, oil palm, *euphorbia drupifera*, and Guinea grass are common in this zone, but few baobab were noted during survey of the Pra River Basin. Lane (1962: 167) suggests that the coastal scrub was once forested but reduced by centuries of farming, citing the dispersed pattern of large forest zone trees on the landscape. This is significant as some of these trees are associated with ancient settlement sites. Other small shrubs and trees in this zone include *Baphia nitida*, *Dialium guineense*, *Diospyros mespiliformis*, *Hymenostegia afzelii*, *Lecaniodiscus cupanioides*, *Rinorea spp.*, *Trichilia prieuriana*, and *Vitex fosteri* with isolated specimens of larger trees common to high forest such as *Antiaris Africana*, *Bombax buonopezense*, *Ceiba pentandra*, and *Sterculia tragacantha* (Lane 1962: 167). Despite the classification of this part of the Pra River Basin as coastal scrub, on the ground the landscape is quite diverse, consisting of farms, small cocoa and oil palm plantations, swamps, and patches of secondary forest (see Chapter 6).

The mouth of the Pra is part of the strand and mangrove zone which features intermittent lagoons. One such lagoon is behind Anlo beach on the east bank, with a second, recently (re?)formed lagoon on the west bank near Shama. Analysis of satellite imagery taken at different points over the past decade reveals the dynamic nature of the lagoons at the mouth of the Pra (Figures 5-6). Although I am uncertain if this is the case at Shama, the opening of some coastal lagoons regularly cut for access to the sea in towns such as Cape Coast (DeCorse, personal communication). Lagoonal resources, including fish and shellfish, have been an important aspect of the coastal subsistence base in both the pre- and post-European contact periods (Chouin 2009; DeCorse 2001: 104–15, 2005).
Figure 5: The mouth of the Pra in a Google Earth image dated October 2014. A long spit of sand, with vegetation growing on it, extends from Anlo beach in the NW quarter of the image down towards Shama in the SW corner of the image, where the Pra drains into the sea.

Figure 6: This second Google Earth image, captured in July 2020, shows the Pra has broken through the spit and currently drains more directly into the sea. The spit has become attached to the Shama side and now encloses a newly formed lagoon.
Although geology, soil, and climate bear a significant influence on the vegetation of the PRB and CRP landscape, the long-term presence and activities of humans has also been a significant force in shaping the landscape. A striking example of the relationship between vegetation and human occupation are the sacred groves, the presence and significance of which has been noted by European observers since at least the mid-eighteenth century (e.g., Rømer 2000: 84, 95). In recent decades, the long term human influence on the West African landscape has received increased attention (Fairhead & Leach 1996, 1998; Sheridan & Nyamweru 2008; see also Clark et al. 1998). Once thought to represent relic stands of natural primeval forest that had escaped the destructive influence of humans, investigations of sacred groves in Central Region have been demonstrated by archaeologists to be former settlement sites or cemeteries that have been imbued with historical, symbolic, and socio-political significance (Chouin 2002, 2007, 2009; Spiers 2007). My investigations of three sacred groves in the PRB led to the identification of several new sites, characterized by dramatically different vegetation patterns that can be seen in in multispectral satellite imagery (see Chapter 6). These groves are not simply preserved but are actively subjected to varied forms of use, including hunting and in some cases logging.Elsewhere in Ghana, distinctive vegetation has been noted at archaeological sites at sites like Boyase Hill, Ladoku (Anquandah 1982: 7), and Ngyeduam earthwork (Boachie-Ansah 2008: 2). This highlights the complex interwoven dynamic between human history and the vegetated landscape, a relationship that has developed through hundreds and thousands of years.

26 I documented extensive evidence for logging, both in sacred groves and the Pra Suhien Forest Reserve (see Chapter 6). Ethnobotanical survey of sacred groves in Sierra Leone (Lebbie & Guries 2008) have revealed a similar situation in which groves are not simply preserved as natural relics but are subject to restricted exploitation. The researchers documented how 57 species of plants (not including timber) found in the sacred groves are used for medicine, poles, poison, dye, soap, food, etc., yet remain zones of major biodiversity (2008: 48–49).
3.4 Early Sites and Occupation

Our understanding of how humans have transformed the Pra River Basin landscape in the deepest realms of prehistory is limited. In the broader context of southern Ghana, the earliest human presence has not been definitively established, and many questions remain about the early stone industries and the lifeways of their producers. Davies (1967: 89–146) reported sites with Early and Middle Stone Age tools including Oldowan-like pebble choppers, as well as Acheulean and Sangoan industries throughout the region, although these assessments have been critiqued as being poorly defined and dated, or generally disputed (Wai-Ogusu 1973; Davies 1976a; Nygaard & Talbot 1984; Stahl 1994; Hawkins et al. 1996; Basell 2010). The earliest well documented sites on the coast are at Asokrochona and Tema West I and II (near Accra), where thousands of quartz and chert tools including choppers, scrapers, and flakes were identified. Dates for Asokrochona and Tema West I are unclear but the tools at Tema West II are suggested to have accumulated between 25,000-20,000 B.P. (Dombrowski 1977; Nygaard & Talbot 1984).

In the Pra River Basin, I identified a possible aceramic stone tool context at the hilltop site of AD31, dated to 8164 - 8000 cal BP, but only a few quartz flakes and a core were recovered (see Chapter 5).

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27 Currently, the earliest well-dated archaeological context in Ghana is published in Casey et al. (1997: 36) who report a preliminary date range of 30,000 - 35,000 B.P. obtained from stimulated luminescence of sediments from an in-situ Middle Stone Age component of the Birimi site in northern Ghana. However, this is distant from the research area.

28 “Ages and Stages”, e.g. Stone Age, Iron Age, etc. are not well defined nor a particularly compelling way of parsing out the past in southern Ghana. For example, stone tools like Nyame Akuma and quartz flakes continued to be used long after the introduction of iron. That said they do provide temporal orientation, so where I indicate various “Ages” in this chapter, I am following the cited authors’ designations, but this should only be interpreted in a general way.
3.5 Intensive Exploitation and Agriculture

Intensified exploitation and/or cultivation of plants and animals, sometimes associated with evidence for sedentary village life, marked major transformations in landscape, lifeways, subsistence, and settlement throughout the southern forest. Many of these processes of exploitation/cultivation may have inhabited the transitional “vast middle ground” between foraging and agriculture (Neumann 2005: 265). Cycles of cultivation repeatedly transformed the forest landscape as land was cleared, farmed, and fallowed or abandoned and the presence of various domestic animals including goats and sheep would have affected vegetation through trampling, selective grazing, pollination, and seed dispersal over the course of millennia. For comparison, there is far more evidence in central and northern Ghana from sites associated with a suite of artifacts collectively referred to as the ‘Kintampo complex,’ named after the Kintampo rock shelters where they were first identified (Davies 1962, 1967: 216–23; Flight 1970, 1972, 1980; Casey 1993; Stahl 1994, 1995; Watson 2005, 2010). Well-studied Kintampo complex sites are distant from the Pra River Basin but they provide a precursory context for comparative purposes, as they were practicing intensive cultivation/agriculture in a variety of environments, including the forest, by the fourth millennium B.P. (see Alexander & Coursey 1969; D’Andrea et al. 2001, 2007; Casey 2005; Gautier & Van Neer 2005; Chouin 2009: 48; Logan & D’Andrea 2012; Winchell et al. 2018).

29 Remains of these species have not yet been identified in pre-Atlantic contexts in southern Ghana, but presumably at least some of them were present. Remains of ovicaprids (sheep or goat) and possibly cattle have been identified at Kintampo complex sites, although the overall amount of evidence is limited (Casey 2005: 236–40; Gautier & Van Neer 2005). Emergent evidence of caprines and cattle has also been documented in northern Nigeria, dating to the fourth millennium BCE (Linseele 2013), possibly signaling an expansion of pastoral/agrarian societies into the forest zone during this period. Sheep, cattle, and goats are non-native species are likely the products of diffusion from the North Africa or Eurasia, and it must have taken trypanosomiasis-resistant ovicaprids and cattle an extended period to evolve disease resistance and survive in the forested zones of Ghana (Connah 2016: 168; Mitchell 2018).

30 One of the closer Kintampo sites is Boyasi Hill near Kumasi, approximately 180km north of the Pra River Basin. The Kintampo rockshelter “K6” and “B-sites” are roughly 300km north.
Evidence of oil palm provides another avenue for understanding intensified exploitation/agriculture. By around 3000 BCE, oil palm pollen evidences a rapid spread and increase of oil palm throughout the broader rain forest and woodland savanna regions of west and west central Africa, broadly linked to material culture of the Stone to Metal Age (Sowunmi 1999; D’Andrea et al. 2006; Logan & D’Andrea 2012; Casey 2013). Cores taken from Lake Bosumtwi, 150 km north of the PRB, indicate broadly regional forest recession and drastic rise in pollen from oil palm trees around 3500 BP (Talbot et al. 1984: 188). While the recession of the forest and expansion of oil palm could have been caused by changes in climate, contemporary archaeological evidence from Kintampo sites show that people were exploiting oil palm trees and creating tools, such as ground stone axes/adzes, that could be used to clear forest. The spread of oil palm implies that some degree of recession, removal, or thinning of the forest canopy occurred, as oil palm readily grows in the moisture of the forest zone but requires direct sunlight to thrive (Andah 1995: 246).

As of now, it is unclear precisely when domestication of plants and animals or sedentary life initially began in the Pra River Basin and along the coast and coastal hinterland regions of Ghana more generally. Previous research in Central Region has shown that it was well settled by agricultural communities in the first millennium CE (DeCorse 2005; Chouin & DeCorse 2010), and recently acquired dates from Wawase (Amartey 2021) and AD31 (see Chapter 5) indicate an even earlier first millennium BCE occupation. With the limited available archaeological evidence, I suggest that the Pra River Basin vegetative landscape was transformed between first millennium BCE and mid-first millennium CE, as ground stone tools were used to thin out the tall forest canopy, enabling more intensive palm oil exploitation. Burnt palm nuts found in the
lower levels of excavations at several sites in the Pra River Basin are material evidence of this process (see Chapter 5).

3.6 Iron Smelting

Evidence for the manufacture and use of iron signals a significant achievement in technological capability and additional dynamics of landscape transformation, not only in the Pra River Basin but throughout Ghana. The earliest evidence for iron is in northern Ghana at Daboya, west of Tamale, dating from the first century BCE (Shinnie & Kense 1989). In Central Ghana, iron has been found at sites such as Atwetwebooso (Hani), Abam (Bono Manso), Amuowi Rockshelter, Bonoso, and New Buipe, with dates ranging between 200-1100 CE (Stahl 1994: 63–64).

On the southern coast, previous excavations at Coconut Grove (DeCorse 2005), 4 km west of Elmina, have revealed iron slag in association with ceramics, stone beads, and quartzdebitage dated between the sixth and ninth centuries CE (DeCorse 2005: 46). Other evidence for iron smelting has been found throughout the CRP/PRB region during surveys conducted over the past decade and half.31 My excavation of a slag mound near Adiembra (AD31) recorded slag in contexts dated between the early first and second millennium CE (although see Chapter 5 for discussion of the earlier portion of this range). While site AD31 is the largest known smelting site in the Pra River Basin, the scale of production seems to have been significantly larger in northern and central Ghana (e.g., Goucher 1981: 182). Yet it is still worth considering that even small-scale smelting would have required significant tree cutting and charcoal production to fuel iron smelting furnaces. Processes related to iron production (tree felling, charcoal production,

31 A map of regional evidence for iron smelting is presented in Chapter 5. The locations of these sites are listed in Appendix B.
slag waste accumulation) and the employment of iron tools in agriculture likely increased the pace and intensity of landscape alteration as well.

It is significant to note that the production of iron did not displace the use of stone tools on the coast; a quartz tool industry was maintained at least until the end of the first millennium CE (DeCorse 2005: 47) and polished stone Nyame Akuma tools are also found in similar contexts. Hence “Iron Age” is a problematic term because what is known of archaeological assemblages in the PRB/CRP does not fit neatly into technological “Ages.” Cases like this contribute to the general idea that terms such as “Iron Age”, with their origin in unilineal cultural evolution and European prehistory, are baggage-laden terms that are not appropriate for West African archeological contexts (MacEachern 2005; see also Casey 2013).

3.7. Pre-Atlantic Settlement and Complexity

As alluded to earlier, a new pattern of settlement appeared among the iron and stone using agriculturalists of the southern forest and coast characterized by hilltop, hillock, and entrenchment sites (Chouin 2002, 2007, 2009: 598–644; DeCorse 2005; Spiers 2007, 2012; Chouin & DeCorse 2010). Radiocarbon dates from the Akrokowa earthwork [5km northeast of Eguafo, 19km east of the Pra], indicate that it was constructed in the 8th or 9th century CE and abandoned in the mid-fourteenth century CE (Chouin & DeCorse 2010: 142). The hilltop and earthwork sites in the PRB/CRP seem to be at least partially contemporary with and feature similar material culture to other pre-Atlantic sites in southern Ghana, including the earthworks of the Birim Valley [roughly 130km northeast of the PRB] (Boachie-Ansah 2008, 2010, 2014; Braunholtz 1936a; Davies 1967: 283–89; Jenner 1931, 1932; Kiyaga-Mulindwa 1978, 1982).

The large earthworks constructed during this period would have required a well-organized society able to mobilize and coordinate large number of laborers for the creation of
such projects. The data may suggest a denser pattern of settlement during the pre-Atlantic than recorded in the Atlantic period (Chouin & DeCorse 2010: 129). Archaeological evidence from Akrokowa and other data from the CRP research prompted a reevaluation of previous models of Iron-Age and pre-Atlantic settlement and sociopolitical complexity during the first millennium CE (Chouin 2009; Chouin & DeCorse 2010; see also Boachie-Ansah 2014). These societies also seem to have experienced a rupture in settlement patterns in the mid-fourteenth century CE. The reasons for this are unknown, but Chouin and DeCorse (2010: 142–44) have advanced the hypothesis that this apparently drastic change in population size and pattern of settlement could be a result of the second plague pandemic\textsuperscript{32} documented in written sources for Europe, North Africa, and other world areas.

While no earthworks were identified during survey in 2017 along the Pra, numerous hilltop sites were identified featuring scatters of artifacts including archaic \textit{atetefo} ceramics, celts, grindstones, quartz microliths, ground stone beads, and iron slag. Emergent radiocarbon dates from AD31 (Chapter 5) and Wawase (Amartey 2021) situate the beginning of this hilltop pattern of settlement between the first millennium BCE\textsuperscript{33} and the mid-first millennium CE, earlier than the earthwork sites previously investigated in the Central Region or Birim Valley. This suggests that hilltops likely formed the primary basis of early agricultural settlement before the advent of earthworks in other parts of the southern forest during the later centuries of the first millennium CE.

\textsuperscript{32} Initially framed in reference to the “Black Death,” Chouin (2018) updates this thesis to refer instead to the Second Plague Pandemic beginning in the 1360s.

\textsuperscript{33} First millennium BCE radiocarbon dates associated with ceramics, palm nuts, and flakes were recovered from the lower levels of excavations at the hilltop sites of AD31 (Chapter 5) and Wawase (Amartey 2021).
3.8 The Atlantic Era

3.8.1 Shama and The Early Atlantic Gold Trade

In the third quarter of the fifteenth century CE, various settlements/polities such as Shama, and Jarbiw were present in the vicinity of the Pra River Basin. The immediate coastline featured dispersed villages, that seem to have been subsidiaries of these hinterland polities, which likely characterized the relationship between coastal Shama and Jarbiw (DeCorse 2001: 18–20, 2005; Henige 1975a). At the regional level, trade was linked to North Africa and other parts of West Africa through long-distance trade networks by the first millennium CE and possibly earlier (Garrard 1972, 1973; Posnansky 1973, 2015; see also Casey 2010). While there is evidence of interconnection between North Africa and the West African forests, there is no direct evidence for trade connections between the coast and the deep hinterland. The coast was a marginal periphery of the trans-Saharan network until the arrival of the Portuguese created a second major direction of trade, initiating a new era of Atlantic economic and cultural interaction.

O primeiro resgate do ouro, que se fez nesta terra, foi em húa aldeia chamada Sámá, que naquelle tempo seria de quinhentos vizinhos (Barros 1552: Decada 1 Liv. 2, Cap II Folio 22v)

In 1471, following decades of exploration, trade, and raids down the coast of West Africa and in rivers (Fage 1966; Marques 1972: 145–63; Vogt 1979: 1–21; Newitt 2010), Portuguese ships reached the coastal village of Shama, situated about a mile from the right bank of the Pra River where it meets the sea. Astonished at the amount of gold available for trade, this

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34 “The first recovery of gold, which took place on this land, was in a village called Sámá, which at that time would have been five hundred households.” Translation by author.

35 Most historians have accepted the date of 1471 provided by João de Barros (Barros 1552: Decada 1, Liv. 2, Cap. II, Fol. 22v), but Massing (2009: 339–40) argues Portuguese arrival may have occurred a year or two before this. Many other voyages were not well recorded or their records were subsequently lost (DeCorse 2001: 21; Marques 1972: 135; Massing 2009)
village and the proximate coastline was described as *A mino do douro*, on a surviving c. 1471 CE map (Costa 1940), or *Mina*.  

Searching for the source of trans-Saharan gold was a primary motivation of Portuguese exploration along the coast of West Africa. Shama would become a focal point of the Portuguese trade on the Mina coast for over a decade. When the Portuguese eventually endeavored to build a fortress on the Mina coast to store goods and to defend their interests from other Europeans that were beginning to find their way to the region, Shama was an obvious choice as it had been the center of trade. Logistical considerations, however, seem to have driven the decision to construct the fortress about 20 miles east at another village referred to by the Portuguese as *aldea de duas partes* (DeCorse 2001: 21; Costa 1940; Hair 1994: 24; Vogt 1979: 21; Newitt 2010: 90–99). The fortress was built in 1482 and named *São Jorge da Mina*.

The Portuguese retained an active interest in Shama, though, and constructed a trading post there sometime in the first half of the sixteenth century, eventually known as *São Sebastião*. Details are hazy but this post was reportedly first fortified in 1526, and further fortified with earthen banks, palisades, and cannons in 1555, whereafter they were used to repel English traders that same year (Blake 1941: 56; Vogt 1979: 103,112). Yet the trading fort was only intermittently manned by the Portuguese, and the repelled English traders were able to return to Shama a few weeks later and successfully trade for gold (Vogt 1979: 103–4). Shama became a locus of conflict through the 1550s, as the English made repeated voyages recounted in Hakluyt. These conflicts were not only between Portuguese and other Europeans, but between the

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36 An anonymous Portuguese map c. 1471 indicates Shama/the Pra as *A mino do douro*, with *aldea de duas partes*, the eventual location of *São Jorge da Mina*, further east along the coast (Costa 1940:62, Table 3). *Mina* was also used to refer to the coastline between both settlements (de la Fosse 1992: 27).

37 E.g. de la Fosse, a native of the Netherlands, was captured by the Portuguese while attempting to trade in 1489 (de la Fosse 1992). Castilians also made numerous voyages along the coast of West Africa in the fifteenth century, which was a source of friction with the Portuguese who sought to exclude them (Blake 1941: 185–246; Hair 1994: 2–5).
Portuguese and the people of Shama, largely centered around the general willingness of Shama’s residents to trade with Europeans the Portuguese regarded as interloper. A brief skirmish at Shama in 1557 even culminated in a sea battle between the Portuguese and combined fleet of English and French ships (Hakluyt 1903: 6:218–23; Vogt 1979: 108–10). Shama was burned repeatedly in these years, not only by the Portuguese [1544], but by the English [1558] after they were excluded from town’s gold trade (Hakluyt 1903: 6:246–47; Vogt 1979: 103). The Portuguese lost control of São Sebastião in the immediate aftermath of the Dutch capture of São Jorge in 1637, and the Dutch would later [~1665] substantially renovate and fortify the fort toward its present manifestation (Lawrence 1963: 274–80; Daaku 1970: 57; Vogt 1979: 192–93; DeCorse 2010: 219–30).

The importance of Shama in the early phases of the coastal gold trade was driven by geography and geology. Its geographic location at the mouth of the Pra River made it well situated to link the seafaring Portuguese with merchants from interior polities such as Adom and Jarbiw, who would travel to the coast at the news of a trading ship having arrived (e.g. de la Fosse 1992: 27; Hair 1994: 115; Reynolds 1974: 26). The significance of the Pra was also recognized by the Dutch after the Portuguese had been expelled. The Pra was not only a convenient avenue of transportation for interior merchants to conduct themselves to the coast, but it was also a source of gold in a more direct sense. The gold, originating in the Birimian

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38 Bosman "(1705: 21–22) remarked the Pra “takes its Course from our Fort, passing by the Jabishian [Yarbiw] and Adomese [Adom] Country, as well as that of Juffer[?]....It is a small matter less than the River of Ancober, but wide enough, and hath the advantage of being so laid, that loaden Boats may conveniently come into it from the Sea, if the Pilot be but so careful as to avoid a Rock near its Mouth, which the Sailors call the Sugar for else they are liable to Split, as it hath several times happen'd during my Residence there and some have been lost, especially if the Sea happen'd to turn or was Rough. This river is very advantageous to us: for besides the fresh Water with which our Ships Store themselves, it furnishes the Castle with Fuel for the Kitchens and Overs, as also with Wood necessary for small Shipping; so that indeed the River is really more useful to us than the Fort it self; and without the former I do not believe we should long keep the latter.”
rocks that underly the region, has been dispersed through geological action (e.g. erosion and redeposition) throughout the rich alluvial soils of the Pra, and usually extracted by placer mining techniques (*apoae*)

(Kea 1982: 85–94) estimated that half of the gold traded at both the various coastal ports and inland commercial centers like Begho in the sixteenth and seventeenth centuries originated from the Pra-Ofin Basin region, broadly considered.

Alluvial gold was also acquired by collecting from fields and runoff courses after heavy rains (e.g. de Marees 1987: 83, 188–91; Hair 1994: 2; Meredith 1967: 119–20). The availability of gold in the alluvial soils of the Pra fuels the contemporary local *galamsey* industry which continues to actively transform the landscape along the banks of the river (see Chapter 6).

To protect their interest in trade, Europeans constructed numerous other forts in addition to *São Sebastião* along the entire coast of what is now Ghana and attempted to exclude competing nations by force. By accessing the gold trade much closer to the sources, the Portuguese and other Europeans were able to circumvent the middlemen of the traditional trans-Saharan trade, and local traders and rulers gained direct access to a variety of trade goods, including textiles, copper, iron, beads, weapons, cowries, and other valued items (Blake 1977; Boxer 1969; Daaku 1970: 21–47; DeCorse 2001: 145–74; Kea 1982: 206–47; Ogundiran & Falola 2007; Thornton 2006: 43–71). Polities of the coast and forest grew in power and wealth by controlling the circumstances of trade with Europeans and the trade routes that accessed the coast.

39 Shaft and pit mining techniques were also practiced but seem to have been more common further inland and in areas further from the more accessible alluvial gold of the Pra, Ofin, Ankobra, and Birim Rivers (see Dumett 2013: 129–44).
3.8.2 The People of The Pra River Basin

The populations that traded with the newly arrived Europeans were mostly speakers of a broad category of related Akan languages (Murdock 1959: 252–59; Greenburg 1966: 6–41; DeCorse 2001: 18–20). Parsing out finer linguistic associations of the inhabitants of the Pra River Basin from the early phases of the Atlantic era is difficult, but the historical record provides a few hints that the river was, at times, a linguistic and political boundary region between Ahanta speakers, to the west, and other Akan-subdialect\(^{40}\) (Fante/Twi) speaking people to the east.\(^{41}\) Studies of linguistic data from historical sources by Hair (Hair 1967, 1969) suggest ethnolinguistic continuity, and likely continual occupation, of Akan language-group speakers\(^{42}\) in southern Ghana from the fifteenth century CE when such records become available. Pushing deeper into the past, the limited archaeological data indicate considerable continuity in ceramics and settlement patterns in this region from the early first millennium CE until the seventeenth century CE, which suggests that total depopulation or replacement\(^{43}\) had probably not occurred during this span of time (See Chapter 5; Amartey 2021; DeCorse 2001: 118, 176; Chouin & DeCorse 2010).

\(^{40}\) Linguistic analyses have varied over time in the classification of Ahanta as an Akan language. Murdock (1959) Greenburg (1966) and Hair (1969) discuss Ahanta as an Akan language, while Dolphyne and Kropp Dakubu (1988) divide the major Volta-Comoé linguistic tree into two major groupings, Bia (under which it situates Ahanta) and Akan. For simplicity, I discuss Ahanta as an Akan-related language here.

\(^{41}\) A 1629 Dutch source indicates the Pra River being both a linguistic and political boundary between Ahanta to the west, and Eguao to the east, and Dapper (1668) indicates that Shama as the western extent of Twi/Fante speaking people, with Ahanta the presumably spoken west of the Pra (Hair 1969:229-230).

\(^{42}\) Without consideration to subdialects and other aspects of ethnolinguistic diversity.

\(^{43}\) Despite the apparent linguistic and archaeological evidence for a long history of Akan people in southern Ghana, the seemingly abrupt changes in ceramic traditions in the stratigraphy of the region’s earthwork sites have been interpreted by Kiyaga-Mulindwa (1982) as an Atlantic-era total replacement of an earlier, unknown population by Akan speaking migrants from the north. Kiyaga-Mulindwa’s chronology has been challenged on the basis of stratigraphic reevaluation and radiocarbon date recalibration (Chouin & DeCorse 2010). The revised chronology reflects a pre-Atlantic abandonment of the Monsa earthwork and reoccupation a century or two later, rather than an abrupt Atlantic-era population replacement event.
Aside from linguistic similarities, speakers of Akan languages also share a high degree of cultural similarity and institutions including exogamous matrilineal clans (abusua) which structure rules for kinship, succession, and marriage (Manoukian 1964: 22–34; DeCorse 2001: 175–93). However, in the current Shama paramountcy, succession follows direct male descent, which is rare within Fante/Akan patterns of political organization and is also found at Elmina (DeCorse 2001: 39–40; Henige 1975b: 287; Welman 1969: 12–13). Other similarities among Akan language-group speakers are patrilineal spirit groups (ntoro), a calendrical system, and other aspects of worldview, ideology, and ritual (Manoukian 1964). That said, a strict definition of Akan culture is not possible or particularly useful, as populations described as “Akan” have changed over time and the term has been mobilized politically at least since the nineteenth century (Kiyaga-Mulindwa 1980; Shumway 2011: 17–21).

Today, the Pra River Basin is primarily inhabited by Fante speaking people, which is one of several related Akan languages spoken in Ghana. Fante speakers populate much of the coast and hinterlands between Winneba/Senya Beraku in the East and Sekondi in the West. It seems that the geographic extent of the Fante language (and identity) may have expanded westward over time, beyond the Pra, at the expense of Ahanta and several other languages, and many native Ahanta speakers also speak Fante (Abakah 1998). Politically, the settlements of Pra River Basin primarily fall under the Shama paramountcy, with Divisional Chiefs at Yarbiw, Inchaban, and Supomu Dunkwa. The colonial-era administration considered the Shama paramountcy part of Ahanta as it is on the 1629 Dutch map, but ambivalently so, noting the Fante speaking population and close cultural ties with other Fante people to the east (Welman

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44 The Shama paramountcy was established by the colonial state in 1912. See 3.8.5 for a brief discussion of the Pra River as a locus of shifting political power and boundaries through the Atlantic era.
1969: 12–13). In any case, Shama and its subsidiaries are not part of the core Borbor Fante political structure (Amartey 2021: 75). The pre-colonial political history of the Yarbiw is not well documented, but it seems more likely that Shama was a subsidiary of Yarbiw during the Atlantic era (DeCorse 2001: 18–20, 2005).

While linguistic and archaeological data indicate a long continuity of Akan languages and peoples in the vicinity of the Pra, aspects of what constitute identity are very much products of historical process and change. Indeed, important aspects of what constitute contemporary Fante culture, political organization, and identity developed in the context of the gold trade in the sixteenth and seventeenth centuries, the expanding slave trade in the eighteenth century, and the Fante position between Imperial Britain on the coast and the inland Asante state in the nineteenth century (Kea 1982, 2012; McCaskie 1995; Shumway 2011, 2015; Law 2013b). A politically influential asafo company is also present in Shama (Henige 1975a: 29). Asafo companies are a men’s military institution primarily associated with coastal Fanteland settlements, and various hypotheses about its origins and development during the Atlantic era have been proposed (see Spiers 2007:75). Aside from trade, fishing and farming were historically important and today remain the primary occupation of many Fante people in the region.

### 3.8.4 Atlantic Transformations in Settlement and The Fort Trade

At the time of European contact, the pattern of settlement on this part of Ghana’s coastline was primarily characterized by dispersed small-scale fishing and farming villages (DeCorse 2001: 18–20, 2005) with more important settlements like Yarbiw and Eguafo inland from the coast.

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45 See also the location of ‘Fantijn’ in the 1629 Dutch map in Figure 7.
46 The asafo institution has spread beyond Fanteland and present in traditionally Ga (Akrong 1998) and Ewe (Baku 1998) regions.
Archaeological investigation has demonstrated this dispersed pattern of coastal settlement was likely the general trend from at least the mid-first millennium (see Section 3.7). European knowledge of the hinterlands was nebulous in the fifteenth and sixteenth centuries, but it is likely that these coastal settlements were politically and commercially subordinate to various inland polity capitals, some of which predate the arrival of Europeans, such as Eguafo. This pattern of coastal villages subordinate to inland capitals was certainly the dominant pattern by the seventeenth century (Kea 1982: 11–94).

Yet throughout the period coastal settlements like Shama were growing in population and significance. Regionally along the coast, there appears to have been a general trend in population growth and number of settlements from the contact period in the mid-fifteenth century through the seventeenth century; there were only two coastal ports on the Gold Coast where significant gold could be obtained at market in the 1470s, at least eleven by the mid-sixteenth century, and 25-30 coastal markets by the 1680s. The density of these settlements along the coast increased through the seventeenth century, from an average distance apart of ~19-26 kilometers (12-16 miles) to around 13 kilometers (8 miles) by the end of the century (Kea 1982: 57–58).\(^47\) In the context of maritime trade with Europeans from the late fifteenth century onward, the dispersed pattern of fishing and farming villages that characterized the general pattern of settlement in the first half of the second millennium CE. gave way to denser, more highly populated settlements associated with or adjacent to European outposts and trade forts (DeCorse 2001, 2005, 2008). By the end of the nineteenth century when census data becomes available, Shama and Supomu held the highest populations in the vicinity of the Pra (Amartey 2021: 107).

\(^{47}\) Kea’s (Kea 1982) sources are archival, and these conclusions could be reassessed with archaeological data. Archival sources probably do not include all settlements.
3.8.5 The Pra River: A Shifting Borderland

Politically, the Pra River Basin was a shifting borderland during the Atlantic era between various polities including Adom, Ahanta, Jarbiw, Shama, and Eguaso, but the details of these transformations are not entirely understood. In the sixteenth century, Eguaso expanded its territorial control westward as far as the east bank of the Pra (Chouin 2009: 95). In a 1629 Dutch map (Figure 7) the Pra river is shown as a border of Anta (Ahanta) at the coast near Shama, Sabeu (Jarbiw) inland on the west bank, and Commenda/Guaffu (Eguaso) commanding the east bank from the coast inland, with the river extending further north into Adom territory (Kea 1982:27). In the late seventeenth century, Supomu Island was the capital of Jumoo, a province of the Adom state (Kea 1982:64-65), and the island was besieged during the Komenda wars of 1694-1700 (Law 2007:150). The growing power and expansion of Ahanta, Wassa, and Fante during the eighteenth century seems to have been at the expense of Adom and Jarbiw, and the former would eventually fall into obscurity (Henige 1975a). A 1729 map shows Eguaso (increasingly associated with the Fante alliance by this time) territory expanded west of the Pra, and now in control of Yarbiw on the western bank (Spiers 2007:66). Although Eguaso had expanded, Ahanta is described as the most powerful polity west of the Pra in the eighteenth century (Henige 1973:233). By 1760, the Adom polity was largely defunct, but the name lingered on in reference to its former province, Supomu Island (Henige 1975:32-35).

48 The most extensive analyses are found in Henige (Henige 1973, 1975a), Spiers (2007), Chouin (2009) and Amartey (2021). Place names and oral traditions collected by Chouin (2009: 320–28, 751–53) have revealed a complex historical entanglement between the polities of Eguaso and Jarbiw, with contradictory oral historical claims to political superiority.
Figure 7: Reproduction of an annotated 1629 Dutch map of the Gold Coast, based on Kea 1982:27, redrawn by Gérard Chouin. The approximate Pra River Basin and Central Region Project research area is outlined including areas once under the control of the ‘Comendo of Gwaffo’ (Komenda/Eguafo), ‘Abramboe’ (Abrem), ‘Jabeu’ (Yarbiw), ‘Adom’, and ‘Anta’ (Ahanta) polities in the early 17th century. The Pra River is between ‘Jabeu’ and ‘Comendo of Gwaffo.’ (figure by Chouin 2009: 61; annotations published in Daaku & van Dantzig 1966).

In the early nineteenth century, Daboasi [5km NW of Supomu Dunkwa on the west bank of the Pra] was one of several centers of political powers for Wassa, with an economy centered around gold extraction (Dumett 2013: 132). Eguafo was subsumed by Wassa around this time (Spiers 2007:73) and took control of Supomu Island; the governor of the English fort at Winnebah noting that “[Supomu Island] has been an object of jealousy for many years between
the Chamahs and Warsaws: the latter are now in possession of it” (Meredith 1812: 78-79). In 1838, the ruler of Ahanta, Badu Bonsu II, was killed during the Dutch-Ahanta war and the polity reduced to “insignificance” (Henige 1973:233). In the colonial-era, Jarbiw and Supomu Dunkwa (the eventual successor settlement of Supomu Island after the island was abandoned in the later nineteenth century (Henige 1975a: 34; Amartey 2021: 119) were organized as divisions of the independent Shama paramountcy in 1912 after a colonial inquiry was unable find evidence of Shama being bound to Ahanta nor Fante political structures (Welman 1969: 56). This marks a reversal for Shama and Jarbiw, as Shama was generally described as either part of or a subsidiary to Jarbiw before the late eighteenth century (Henige 1975a).

Aside from Supomu Island (Amartey 2021), possibly a settlement of the Adom polity, most of the important hinterland polities and settlements of the Atlantic era in the immediate area of the Pra River Basin, e.g. Ahanta, Shama, and Yarbiw have not been subjected to extended archaeologically inquiry. Some inland capitals of this period to the east in Central Region have received archaeological attention to varying degrees, including Eguafu (Spiers 2007, 2012; Chouin 2009), Efutu (Agorsah 1975), and Asebu (Nunoo 1957).

**3.8.6 The Expansion of The Slave Trade**

Internal and external historical processes resulted in the expansion of enslaved people being exported from the Gold Coast from the later seventeenth century through the eighteenth century. Internally, conflicts and wars between various Akan states in the interior (e.g. Denkyira, Akyem, Akwamu, Asante) struggling for political and economic dominance devastated inland regions and resulted in a large increase in the availability of captive people (Lovejoy 2011: 57–58, 80–84), many of whom were trafficked south through the forest (and PRB) to the coastal forts. Polities closer to the coast in the vicinity of the Pra River Basin such as Adom and
Eguafo/Komenda were also engaged in an escalating pattern of warfare and conflict over control of trade during this time, sometimes directly involving Europeans as was the case during the Komenda wars of 1694-1700 (Law 2007; Feinberg 1989: 14–15; Shumway 2011: 42–47). Externally, the growth of the plantation system in the West Indies provided an insatiable market for enslaved captives. Enslaved people eventually overshadowed gold as the most important export of the Gold Coast towards the end of seventeenth century until the era of abolition (Daaku 1970: 21–47; DeCorse 2001: 26). The expansion of the slave trade probably contributed to the continued growth of urban coastal settlements like Shama, with a corresponding depopulation in the vulnerable Pra hinterlands because of warfare and political instability.

3.8.7 Warfare and Landscape

Outbreaks of warfare between various polities on the coast and inland left their mark in the landscape in the form of devastated towns and farms. As noted in Section 3.8.1, Shama was raided and at least partially burned several times during the first century of the Atlantic gold trade. English traders off the shoreline of Shama in 1555 noted that “…the Portugals had spoiled their boates, because we saw halfe of their towne destroyed (Hakluyt 1903: 6:196). The English would soon after also attack Shama for making peace with the Portuguese:

The 24 we took our boat and pinnesse and manned them well, and went to the town of Shamma, and because the Captaine thereof was become subject to the Portugals we burned the towne, and our men seeking the spoile of such trifles as were there found a Portugals chest, wherein was some of his apparel, and his weights, and one letter sent to him from the castle, whereby we gathered that the Portugall had bene there of a long time (Hakluyt 1903: 6:247).

De Maree’s also recounts a sixteenth century conflict involving Shama, Ahanta, and Eguafo/Komenda that occurred in the second half of the sixteenth century, although he incorrectly seems to assert that Shama had relocated from the east side of the river to the west.
More likely people inhabiting subsidiary settlements or hamlets of Shama had relocated across the river:

They also burn one another’s Houses and Towns and chase away People. This happened recently during our time, when the people of Agitaka or Alde de Torto has a quarrel with those of Iabbe [Jarbiw] and Cama [Shama], who had their Towns on the eastern side of the Rio St. George [Pra River]. One night, the people of Agitaki came and drove away the people and set fire to their Towns. The Inhabitants of Iabbe and Cama took flight in their Canoes across the River, where the people of Anta [Ahanta] came to their help, so that the others dared not follow them any more. These fugitives made their Houses and Towns on the west side of the River and placed themselves under the King of Anta, who gave them protection and liberated them. They have their Towns there to this very day. Now they form one Nation; they have made peace with those of Agitaki and they no longer make war on each other (de Marees 1602:90-91).

In the seventeenth century, Europeans again were witness to or directly involved in some of the wars involving coastal polities. Writing in the 1670s, Dutch traders noted that “The whole Coast has come into a kind of state of war. This started in the year 1658, and gradually this has gone so far, that none of the passages could anymore be used, and none of the traders could come through” (Shumway 2011: 43). A series of conflicts referred to as the Komenda wars broke out in the vicinity of the Pra River primarily between the Dutch and Eguaf/Komenda between 1694-1700, but also involving other polities including Adom, Akani, Borbor Fante, as well as the French and English (Law 2007). At one point in the war the village on Supomu Island in the Pra River was besieged (Law 2007: 150). In the 1720s, fierce conflict between Wassa and Asante progressively involved other polities including Eguaf and Abrem, with the latter being sacked and burned in 1726 (Feinberg 1989: 14–15). This of course was only the beginning of numerous devastating conflicts over the next century between the expansionist Asante state and the coastal polities that “invariably had a negative impact upon the peoples between the Pra River and the Atlantic Ocean” (Feinberg 1989: 14).
The Pra River basin was a crossroads of conflict in the first half of 1824. The previous December news of an Asante advance toward the coast had reached Cape Coast (Yarak 1990: 59). To stop the Asante army’s advance through Wassa, Sir Charles MacCarthy crossed the Pra at Daboasi on January 13th with a contingent of allied troops and halted at Assamacow (Ricketts 1831: 49). MacCarthy’s troops, alongside allies from Denkyira and Wassa, were completely overrun a week later by the Asante army near a small Pra tributary stream. One of the survivors described a scattered retreat through abandoned villages along the Pra (Ricketts 1831: 65, 70). The Asante army halted at Assamacow to resupply and regroup, stationing troops along the right bank of the Pra between Heman, Daboase, and Shama (Ricketts 1831: 74; Yarak 1990: 59). The Pra became a battleground and numerous skirmishes across the river ensued over the following two months, particularly in the vicinity of Shama and Daboase. After burning Assamacow, the Asante pushed across the Pra in early April, with further engagements and Dompin [Mampon?], Efutu, and eventually Cape Coast, laying waste to the countryside along the way (Ricketts 1831: 46–47, 75–99; Reindorf 1895: 191–95).

The effects of warfare manifested in the landscape itself, particularly when farms and settlements were not immediately reoccupied. Although distant from the Pra, further perspective is gained by later accounts written by Europeans traveling inland toward Kumasi for the first time following the Asante-Fante wars between 1806 and 1816. What they saw was a landscape transformed by war and being overtaken by vegetation. For example, in 1817 Thomas Bowdich described the landscape from the coast inland through Mansue (Assin Manso, the last of the

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49 Sometimes referenced as the battle of “Nsamankow; Assamacow; Insamankow; Asamankaw but the actual battle occurred near a small tributary variously referred to as Adoomansu (Ricketts 1831: 52), “Ankwaw” (Reindorf 1895: 191), Adumansu (Claridge 1915: 1:346) and Bonsa/Bonsasu (Ward 1963: 172–74). Ward’s identification of the Bonsa River (which is a tributary of the Ankobra) seems to be based on Captain Rickett’s overestimation of distances throughout his account. Reindorf explicitly states the river was a tributary of the Pra.
Fante territory towns, 70km from the PRB) in bleak terms: “The country thitherto presenting all the gloom of depopulation, and the forest fast recovering the sites of the large towns destroyed in the Ashantee invasions” (Bowdich 1873: 25). Joseph Dupuis, traveling toward Kumasi in 1820, related a similar sentiment describing how “...all Fantee[land], excepting the few towns on the coast, and the far greater portion of Assin should be found in the state I have described; the population extinct, the plantations more or less destroyed, and the forest relapsing to its original growth” (Dupuis 1824: 45).

### 3.9 Abolition and Colonialism

#### 3.9.1 A Landscape of ‘Legitimate’ Commerce

The suppression of the slave trade by the British in the first half of the nineteenth century and eventual consolidation of colonial rule in the last quarter of the nineteenth century saw the expansion of “legitimate commerce” in oil palm, rubber, cocoa, gold, coffee, and logging in the southern Gold Coast (Austin 2013; Dumett 2013; Grier 1981; Law 1995; Law et al. 2013; Reynolds 1974). Palm oil exports became significant by the 1820s, but trade was periodically disrupted by conflict with Asante (Reynolds 1974: 69, 94, 133, 145). Cocoa, introduced from Fernando Po in 1879 and propagated over the course of the following decade, became a particularly dominant colonial export crop (Fage 1966: 67–71). From 1890 to 1919, Ghana’s cocoa exports rose from 95 pounds to over 100,000 tons (Grier 1981: 32). The rubber trade, exploiting wild *Funtumia elastica* and *Landolphia owriensis*, boomed from the early 1880s to 1905 (Dumett 1971).

In a sad irony, the efforts of abolitionists had largely been successful in suppressing overt European involvement in the slave trade, but the lack of market for enslaved people and the push toward ‘legitimate’ commerce resulted in a major expansion of the internal economy of slavery.
“Immense numbers” of enslaved people were being imported into the Fante region through Asante in the mid-nineteenth century (cited in Austin 1995: 96). Enslaved people who would have formerly been sold to Europeans were now used as an agricultural labor force for the production and transportation of cash crops for the Atlantic/colonial market (Lovejoy 2011: 140–41, 165–70).

Details of exactly how these transitions manifested in the nineteenth century Pra River Basin are somewhat lacking, except for rubber. Ekutuase, just east of the Pra Suhien Forest Reserve, is recorded as a major regional hub of wild Funtumia rubber exploitation in the early 1880s, and the traditional road from Wassa to Shama was a major conduit of rubber being transported to the coast (Dumett 1971: 83–84). Significant numbers of wild Funtumia trees were present throughout the forests of the region, which came under rapid exploitation. Notably, the method of extraction for much of the rubber boom destroyed the tree by felling, and the British partially attributed the decline of the trade in the very early twentieth century to “reckless overtapping” (Dumett 1971: 86, 88). The Pra River Basin was therefore a significant juncture in the Funtumia rubber industry, associated with significant destruction of Funtumia throughout the vicinity of what is now the Pra Suhien Forest Reserve.

It should be noted that the Dutch had previously experimented with plantations in the vicinity of Shama and the Pra, possibly as early as 1689 (Amartey 2021: 112–16; Law 2013a: 120–22; van Dantzig 1978: 84; Reynolds 1974: 63). A cotton plantation was operated near Shama from 1765-1783 (Lawrence 1969: 32), and two plantations were maintained in the middle

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50 Condensed data on nineteenth century imports and exports from the Gold Coast generally do not discern the source or of goods beyond coastal entrepôts or larger regions. Hence, how much of the palm oil exported from Cape Coast (e.g. Reynolds 1974) was produced in the immediate vicinity of the Pra?
of the nineteenth century on the east bank of the Pra, one of which was near Supomu Island (Gramberg 1861). These plantations grew groundnuts, cotton, flax, hemp, coffee, and tobacco (Markham 1874: 285). These Dutch plantations along the Pra have yet not been archaeologically identified or investigated, or even thoroughly studied historically, and their size and impact on the landscape is difficult to judge. However, they would provide a productive comparison with the better-known nineteenth century Danish plantations in the Akuapem Hills north of the Accra plains (Bredwa-Mensah & Crossland 1997; Bredwa-Mensah 1999, 2004, 2008; DeCorse 1993; Kea 1995; Osei-Tutu 2002).

3.9.2 Logging

“With regard to timber, the valuable woods of the Central Province have practically not been touched with the exception of a very small area near the river Prah” Dispatch from the Governor to the Secretary of State, no. 747, 2 November 1922 (Kay 1972: 158).

Logging along the Pra was not strictly isolated to colonial times, as Shama and Supomu Island were important centers of an Atlantic era canoe building industry that served the broader region (Henige 1975a: 34; Kea 1982: 65; de Marees 1987: 204; Amartey 2021: 95–98). This industry continued through the nineteenth century; fine canoes fetched about 3 pounds 10 shillings at the mouth of the Pra in 1881 (Dumett 2013: 67). As Amartey (2021: 96–97) has observed, the toponymy of Supomu (forested island), Dunkwa (tree stump), and Wawase (under the Wawa tree) are potentially suggestive of logging. This industry focused on large bombax or silk cotton trees from which canoes were, and still are, used to construct dugout sea canoes (Dumett 2013: 67).

In the late nineteenth century, the logging industry expanded greatly, and export timber became a major extractive forest industry in the colonial Gold Coast (Varley & White 1958:
The first export of timber was in 1888 and from that time until 1945 over 90% was mahogany (*Khaya spp.*) (Foggie & Piasecki 1962: 239). Other important trees for the logging export industry include Wawa (*Triplochiton scleroxylon*), Sapele, or ‘penkwa’ in Twi (*Entandrophragma cylindricum*), Utile (*Entandrophragma utile*), Makoré (*Mimusops heckelii*) (Foggie & Piasecki 1962). By 1920, around 37.5 million logs had been exported from the Gold Coast and the colonial government’s anxiety over deforestation was growing rapidly (Kay 1972: 211, 243). The colonial governments concern was not only due to the timber industry; vast tracts of land of forest were also being cleared for the expansion of cocoa farming. Their primary concern seems to have been that the destruction of the forest would ultimately have a deleterious effect on rainfall and the moisture the forest retained, which cocoa trees were ultimately dependent on (Kay 1972: 243). In 1923, the colonial government began to establish forest reserves and by 1926, twelve reserves covering 450 square miles had been established (Kay 1972: 211). The Pra Suhien Forest Reserve, adjacent to the Pra River (Figure 3), was established in 1928 (Hawthorne & Abu-Juam 1995: 181).

The Pra River, as well as the Ankobra, Ofin, and Tano, are historically important for the timber industry for their role in linking logging areas to ports (Wills 1962: 213). Shama, served by the Pra River, was a leading center of this trade in the 1890s (Dumett 2013: 61). Before railways and road systems were developed in the early decades of the twentieth century, the logging industry was almost completely dependent on rivers like the Pra to float logs to the coast for export (Dumett 2013: 56–58, 240–43). Shama was gradually surpassed in importance by Sekondi in the twentieth century after the latter was connected to the rail system and a loading pier was constructed (Dumett 2013: 61). Despite the eclipse of Shama, the expansion of the road

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51 By the 1960s, the supply of mahogany was rapidly dwindling (Foggie & Piasecki 1962: 239).
system facilitated logging in the PRB that was further away from the immediate vicinity of the riverside (Carr 2011: 74). One such logging operation was based at Berase (19km east of the Pra) through the 1940-1960s, until falling global timber prices resulted in its closure (Carr 2001: 17–29). While the scale of the earlier canoe building industry is difficult to ascertain, the expansion of the timber industry from the late nineteenth century, and the colonial governments attempts to limit deforestation starting in the 1920s, had a major impact on the landscape of the Pra River Basin. Logging continues in the area, but colonial policies are quite clearly carved into the current manifestation of the forested landscape (see Chapter 6).

3.10 Conclusion: Fragmented Knowledge

This chapter has offered a brief landscape-centered review of human/environmental processes that have shaped the Pra River Basin through the colonial era. Despite the many unknowns, there is ample evidence for long-term human entanglement with this landscape, to the extent that the Pra River Basin landscape is a historical entity, woven together by various threads of human history. Contemporary activities continue to have dramatic impacts on the PRB landscape, some of which are gradually altering or erasing earlier culturally shaped landscapes. Many of the historical dynamics outlined in this chapter continue to reverberate; the post-colonial landscape is characterized by forms of continuity in the farming of oil palm and crops introduced by Atlantic trade, as well as extractive industries surrounding logging, cocoa, rubber, and gold mining. The historicity of the contemporary postcolonial Pra River Basin is examined more closely in Chapter 6.
Chapter 4: Methods for Examining Transformation in The Pra River Basin

4.1 Introduction

The previous chapter provided an overview of the historical context of the Pra River Basin. This chapter introduces the field and spatial analysis methods I use to examine “natural” and “cultural” features toward a more integrated view of the landscape’s long human/environment history. This research employs a multifaceted methodology incorporating pedestrian survey, satellite imagery and GIS analysis, and limited test excavation at select sites to assess settlement stratigraphy and chronology. These techniques are complementary and mutually informative. A GIS database was created to integrate various categories of data (my data, previously collected survey data, satellite imagery, and topographic information), perform analysis, and map artifact distributions. I selected sixteen survey zones in the vicinity of the Pra River for pedestrian survey. Satellite imagery analysis assisted the planning process of prioritizing survey zones for pedestrian foot survey and provided fantastic vantages on transformational processes that have altered the landscape. Limited test excavation was undertaken at three sites of particular interest (1) a hilltop site featuring five slag heaps (AD31), (2) a hilltop site featuring surface scatters of atetefo ceramics, quartz flakes, and a stone bead (SD610), and (3) a grinding slick site (SD520). These excavations are discussed in detail in Chapter 5.

4.2 Background- The Central Region Project

This research is an extension of the Central Region Project (CRP), directed by Dr. Christopher DeCorse (Figure 8). The origins of the project are in DeCorse’s (2001) work at Elmina, examining transformations in the lifeways of people inhabiting the town adjacent to the fortification São Jorge da Mina in the context of intense African–European interaction and trade. Since then, the CRP has systematically surveyed portions of the Central Region and eastern
fringe of the Western Region between the Pra River basin in the west and the Kakum River in the east. The coastal state of Edina (Elmina) and powerful Atlantic polity of Eguafo have been the focus of sustained archaeological survey and excavation (see Chouin 2002, 2007, 2009; Spiers 2007, 2012). Chouin’s work has revealed that sacred groves, patches of forest where spiritual beings (abosom) or ancestral spirits (asaman) reside, are in many cases ancient settlement sites, a fact often not recognized by local people. Underwater archaeological survey and excavation focusing on maritime trade have also been the subject of several CRP dissertations (Horlings 2011; Pietruszka 2011; Cook 2012). A regional chronology of over two millennia has been established through the accumulation of tightly dated archaeological sites with pre-Atlantic components, including Elmina, Eguafo, Brenu Akyinim, Komenda, Abrem Berase, Coconut Grove, and, most recently, Abanzi and Wawase (DeCorse et al. 2000, 2009; Carr 2001; Chouin 2002, 2007, 2009; Cook & Spiers 2004; DeCorse 2005, 2013; Spiers 2007, 2012; Chouin & DeCorse 2010; Amartey 2017, 2021; Reid & Amartey 2019). These expansions in geographic and temporal range serve to contextualize the archaeology and history of this region, though these data have yet to be fully published.

Before the 2016–2017 field season, most of the sustained archaeological work conducted by CRP researchers was on the coast and eastern portion of the project area (see Figure 8). The most recent work conducted near the Pra River at Supomu, Wawase, and Adiembra has been part of a determined effort to better understand the western, lesser-known project area (DeCorse et al. 2009; Amartey 2017, 2021; Reid & Amartey 2019). The work discussed here addresses a gap in archaeological knowledge of the forest belt by identifying settlement sites in the western orbit of Eguafo, although the specific relationship between them is unclear.
4.3 Methodology Overview

The methodology for this project was designed with a series of observations about the survey area in mind: (1) the landscape is hilly and heavily vegetated, consisting of tall and secondary forest, sacred groves, bushy fallow land, swampy lowlands, and farms; (2) some sacred groves and earthwork sites in the region feature scatters of pre-Atlantic material culture or are, in fact, pre-Atlantic settlement sites (e.g. Chouin 2002, 2007, 2009; Spiers 2007); (3) published and unpublished CRP survey data demonstrate that many hilltops feature similar surface scatters of
pre-Atlantic or early Atlantic material culture (DeCorse 2005); and (4) overall, the area surveyed is sparsely known archaeologically, and our understanding of the ceramic sequences in the immediate area is heavily dependent on data recovered from excavations in the central coast, particularly Eguafo and Coconut Grove. Yet it is unclear if these data reflect broader settlement patterns and ceramic chronologies within the region. With the preceding observations in mind, I prioritized a pedestrian survey strategy across hilltops, ridges, and patches of forest, testing for indications of pre-Atlantic or early Atlantic material culture. Permission of local leadership and landowners/tenure holders was obtained before survey and test excavations were performed.

Drawing on the knowledge of the landscape gained from past CRP surveys, the 2016–2017 survey employed complementary methods of GIS analysis, satellite imagery processing and analysis, and pedestrian survey, supplemented by test excavations to assess stratigraphy and chronology. Topographic maps were scanned and imported into ArcGIS and ERDAS IMAGINE as raster files, which were then georeferenced (Figure 9). In addition to elevation, the scanned topographic maps contained other useful information about the landscape, such as forest cover, swamps, creeks, roads, footpaths, and hamlets, although they were far from comprehensive in detail. In ERDAS IMAGINE, topographic maps were overlaid with Worldview-2 (0.5 m panchromatic, 2 m multispectral resolution) and Worldview-3 (0.31 m panchromatic, 1.24 m multispectral) satellite imagery. Thanks to the immense improvement in spatial and spectral resolution of satellite imagery in recent decades, very high-resolution multispectral imagery provides a great deal of detailed insight into landscape and vegetation. Using ArcGIS, a geodatabase was created to integrate various geospatial data, including previous survey points. This streamlined the process of GIS analysis, regional mapping of site locations, and comparison of topography and land cover. An Excel file served as a master list of sites found during the CRP
survey and pulled from other publications, including the field notes of Oliver Davies (1976b). This master list contains site names, locations, artifact types, artifact densities, photograph logs, topographic features, and current land-use practices. Also recorded were varieties of crops being grown at various sites, evidence for logging or gold mining, and species of culturally important vegetation and trees like palm oil, kapok trees (*Ceiba pentandra*), and bamboo.

![Figure 9: Screenshots from ERDAS IMAGINE showing survey zones along the Pra River. Georeferenced topographic maps (left) and very high-resolution multispectral satellite imagery (right) were used to prioritize areas for pedestrian survey, resulting in the identification of 300+ sites shown as blue dots (Worldview-2 and Worldview-3 imagery courtesy of the DigitalGlobe Foundation).]

Pedestrian survey zones were chosen based on topography and vegetation cover, as well as the availability of satellite imagery. Satellite imagery analysis was very useful in identifying potential sacred groves, as it provides refined details about the landscape and vegetation, and it can be manipulated in numerous ways to highlight the qualities of an image that are outside the
range of visible light. Most of the survey zones were chosen based on their hilly attributes and a variety of vegetation patterns. However, swampy and low-lying areas were also surveyed to ensure that we were not missing archaeological sites. The results of initial pedestrian surveys provided guidance for understanding the landscape and its variety of sites and provided the basis for selecting survey zones. In total, 15 survey zones were outlined and examined (Figure 8, Figure 9). The total size of the survey zones was 30.02 km². Stratigraphic test excavation at three sites provided a deeper temporal context than afforded by the surface survey, offering additional insights into the region’s chronology.

4.3.1 Satellite Remote Sensing and Survey
Satellite imagery is employed and referenced throughout this dissertation. The following sections discuss the experimental use of several satellite imagery sources (Google Earth, Worldview-2, and Worldview-3, see Figure 10) and imagery analysis techniques that aided archaeological survey and examining transformational dynamics in the landscape. These techniques include visual interpretation, infrared contrast manipulation and stretching, and overlaying multispectral satellite imagery on scanned, georeferenced topographic maps in ERDAS Imagine.

My initial intent was to use satellite imagery to identify and predictively model archaeological sites in the landscape through vegetation patterns, as I had done in Sierra Leone (Reid 2016). However, I found the Pra River Basin landscape far too variegated and transformed to readily associate most of the archaeological sites I found with spectral characteristics in the available satellite imagery. Despite this, I found satellite imagery, in conjunction with topographic maps, of great utility in planning pedestrian surveys as it provides vistas
Figure 10: These three overlapping multispectral satellite images, captured by Worldview- and Worldview-3 satellites, cover most of the western portion of the CRP survey area. The survey zones I examined are outlined in red. Images courtesy of the DigitalGlobe Foundation.
on the region that capture local topography and features not clearly discernible on topographic maps. Dense vegetation, swamps, and creeks hindered access and approaches to some areas. It also enabled me to identify footpaths, most of which were not marked on the available maps of the area.

The greatest utility, however, is in the way of multispectral imagery aided in assessing transformations in the landscape when integrated with archaeological survey. While most of the sites discussed in this dissertation were identified through pedestrian survey, incorporating satellite imagery analysis extends the insights of pedestrian survey much further. Shifting agriculture, oil palm and cocoa tree farming, akpateshi production, and galamsey are transforming the contemporary landscape at different paces (rhythms of history), some quite rapid and drastic. Correlating the location of these sites as identified through pedestrian survey with patterns in satellite imagery enables the large-scale visualization of these transformative historical processes. Moreover, the pace and effects of these transformations can sometimes be gauged through comparing satellite imagery of the same location captured at different time periods. In this way pedestrian survey and satellite imagery analysis are mutually reinforcing components of a multifaceted methodology; pedestrian survey anchors what is often uncertain in satellite imagery, and satellite imagery extends our vision of the landscape in ways that are impractical or impossible in pedestrian survey.

The use of multispectral satellite imagery in sub-Saharan African archaeology is relatively recent (Darling 1998; Davis & Douglass 2020; Davis et al. 2020; Klehm & Gokee 2020; Nyerges & Green 2000; Reid 2016). It grows out of advances in the larger, global discipline of remote sensing and aerial photography (e.g. Lasaponara & Masini 2011; Leisz 2013; Parcak 2009; Wiseman & El-Baz 2007). Among the most significant contributions of
aerial imagery are the potentials to reveal patterns in the landscape and vegetation that reflect past human activities. Crawford and Keiller (Crawford & Keiller 1928) were among the first to observe how vegetation and crop marks can reveal archaeological sites from an aerial perspective. In Central America, aerial imagery has aided efforts to survey the swamps and dense tropical forest of the ancient Maya landscape since the late 1920s and early 1930s (Kidder 1929, 1930; Ricketson & Kidder 1930). Contemporary Mayanists have also creatively employed very high-resolution satellite imagery (Garrison et al. 2008; Garrison 2010; Saturno et al. 2007).

There are some parallels between the Maya lowlands and southern Ghana in that they are both densely forested landscapes that are difficult to survey but can now be accessed using remotely sensed images (Figure 10). The near-infrared capabilities of satellite imagery are ideal for examining vegetation patterns in the landscape because healthy vegetation strongly reflects near-infrared energy. Worldview-2 and Worldview-3 satellites are particularly useful for vegetation analysis because three of their eight bands record near-infrared energy levels: bands 6 (red edge), 7 (NIR 1), and 8 (NIR 2) (see Table 1). Most multispectral satellites only feature one band measuring near-infrared energy. Patterns of electromagnetic reflectance and absorption recorded in near-infrared bands can indicate certain species of vegetation (Wang et al. 2004), and vegetation patterns frequently reflect land-use and management practices by societies in both the present and the past. Multispectral satellite imagery is, therefore, a powerful tool for landscape archaeologists attempting to understand human influence on the landscape.

4.3.1.1 Multispectral Visual Interpretation

Multispectral visual interpretation, aided by contrast manipulation, is the primary way satellite imagery was utilized in this survey. Visual interpretation, in its most basic form, involves manually trawling through areas of interest on an image with the naked eye (Lillesand...
et al. 2008: 189–324; Parcak 2009: 81–110). Successful visual interpretation is heavily dependent on a researcher’s familiarity with the landscape at the ground level, including the knowledge of past and contemporary land-use practices, an understanding of the varieties of land cover and vegetation present, and what characterizes archaeological sites on the ground. This can be done inside the software environment of an image processing program like ERDAS IMAGINE or ENVI. To a lesser degree, ArcGIS also has the capability to open and manipulate multispectral imagery. When working with multispectral satellite images, it is important to have a clear understanding of the different bands that compose an image.

<table>
<thead>
<tr>
<th>Band</th>
<th>Band name</th>
<th>Spectral resolution (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coastal</td>
<td>400–450</td>
</tr>
<tr>
<td>2</td>
<td>Blue</td>
<td>450–510</td>
</tr>
<tr>
<td>3</td>
<td>Green</td>
<td>510–580</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>585–625</td>
</tr>
<tr>
<td>5</td>
<td>Red</td>
<td>630–690</td>
</tr>
<tr>
<td>6</td>
<td>Red edge</td>
<td>705–745</td>
</tr>
<tr>
<td>7</td>
<td>Near-infrared 1 (NIR1)</td>
<td>770–895</td>
</tr>
<tr>
<td>8</td>
<td>Near-infrared 2 (NIR2)</td>
<td>860–1,040</td>
</tr>
</tbody>
</table>

Table 1: Multispectral Worldview-3 imagery bands.

For example, Worldview-3 imagery is composed of eight spectral bands corresponding to different areas of the electromagnetic spectrum (Table 1). When viewing multispectral imagery in image processing programs, the user typically views the image as a combination of three bands. For reference, visible light for humans is approximately 400–700 nm. Shifting between different band combinations will reveal different aspects of the image; if it includes red-edge and
near infrared bands, it can reveal and enhance features in the landscape invisible to the human eye. Throughout this dissertation, multispectral images will reference which bands are represented in the following format (1-2-3).

4.3.1.2 Infrared Contrast Manipulation and Stretching

Image processing programs like ERDAS IMAGINE and ENVI allow the user to manipulate multispectral imagery in numerous ways: by stacking the image bands in different ways to highlight reflectance patterns in the landscape along the electromagnetic spectrum, by running techniques of classification, or by using techniques of contrast enhancement. Inside the software environment of ERDAS IMAGINE, it was extremely helpful to enhance the images through contrast stretching, particularly Gaussian and histogram equalization (Lillesand et al. 2008: 499–508). When satellites capture an image, they record a brightness value for each pixel of each band of the image. Worldview satellites have an 11-bit dynamic range (~1000 possible brightness values), but the actual recorded values are sometimes clustered. Contrast stretching techniques algorithmically expand a narrower range of values, displaying them as a much wider range of pixel values. The resulting image displays tonal variations with much greater clarity. These operations can be done quickly in ERDAS IMAGINE with the Adjust Radiometry tools and are particularly effective when incorporating bands in the near-infrared range. This research found other forms of data preprocessing to be unnecessary due to the speed, utility, and reversibility the Adjust Radiometry tools provide. Contrast stretching the images of Supomu Island and Wawase (Figure 11), for example, makes some human-related features in the landscape, such as the Apuntuado sacred grove, stand out more clearly (Henige 1975a; Amartey 2017, 2021; Reid & Amartey 2019). This sacred grove, almost impossible to identify in Google Earth (see Section 4.3.1.3), is clearly visible in the contrast-enhanced Worldview-3 image
The vegetation pattern in the high-resolution multispectral satellite imagery and the nature of the topography (Figure 12) led to the identification of this area as a high priority for archaeological survey, although previous surveys by CRP researchers had identified no artifacts or features in the grove. When this area was surveyed in 2017, pre-Atlantic ceramics were documented in spoil heaps adjacent to animal burrows and soils pulled up by the roots of fallen trees. In other words, the combination of topography, vegetation patterns, and field survey led to the identification of this pre-Atlantic settlement site. Stretching and contrast manipulation of multispectral imagery can reveal features in the forest landscape that do not directly correlate with archaeological sites but are reflective of past human activity. For example, human influence on the landscape and vegetation can be seen on a much larger scale in a Worldview-3 image of the Pra Suhien Forest Reserve (see Chapter 6).

Figure 11: Worldview-3 image of Supomu Island and Apuntuado Sacred Grove: a natural color (5–3–2) image before contrast stretching (left), a natural color (5–3–2) image after contrast stretching (center), and an enhanced false color infrared (8–3–2) image after contrast stretching (right). Note the increasing visibility of the sacred grove (circled) as one moves from left to right. Image width is approximately 2000m.
Visual interpretation of Google Earth Imagery was occasionally useful for this research, especially in planning logistics for survey work, but not particularly productive for site detection. There are two primary constraints to the usefulness of Google Earth for site detection in this region, the lack of multispectral data and the poor spatial resolution of forested areas. Google Earth is a collage of pictures generated by various multispectral satellites, but the images are no longer multispectral. The visible light bands have been condensed into one natural color image, while the red-edge, near-infrared, and thermal bands have been stripped out. The poor spatial resolution displayed in densely forested areas is due to Google Earth displaying images from older, lower spatial resolution satellites like Landsat and SPOT in these areas. For example, during 2016-2017 the available Google Earth imagery of the Apuntuado sacred grove site near Supomu and Wawase (Figure 13) was almost entirely indistinguishable from the surrounding landscape. Recently, however, the imagery quality and resolution of the Pra River region has
notably improved, and the clearing of several nearby sacred groves has become apparent in
images Google Earth imagery captured in 2020 (See Chapter 6).

![Figure 13: Screenshot of a Google Earth Image, stitched together from two satellite images captured at different times, showing Supomu, Wawase, and Apuntuado Grove. The sacred grove of Apuntuado (circled) is nearly indistinguishable from the surrounding landscape. This was the best available image of the area in 2016-17 while I was in the field. As of 2020, however, higher quality imagery of this area is now available in Google Earth.](image)

4.3.1.4 Imagery and other Geospatial Data

Combining scanned, georeferenced topographic map data with contrast-enhanced and stretched multispectral imagery in ERDAS IMAGINE proved to be an effective way of planning survey and locating sites in the region. The topographic maps allowed for the quick identification of hills and ridges, and multispectral imagery provided an accurate impression of the land cover prior to survey—whether the land was a dense forest, secondary forest, fallow land, or actively
being farmed. It also revealed sacred groves, bamboo stands, and areas that had been logged or cleared for farming. As expected, areas prepared for cultivation had the best ground visibility (Figure 14).

Figure 14: Views from two hilltops surveyed in Western Region, Ghana; the hilltop on the right had recently been cleared, providing good ground visibility.

As shown in Figure 12 and Figure 13, some sites were identified by a combination of vegetation patterns in multispectral satellite imagery and by having a relatively high elevation as shown on topographic maps. Another example of this is the sacred grove near Asemasa shown in Figure 15—visible as a relatively high area in the local topography and as a densely forested patch in the Worldview-3 imagery. When surveyed, local ceramics were observed in areas of disturbed soil, and the soil of an uprooted tree, probably at 10–15 cm depth before the tree fell. Evidence of logging *Ceiba pentandra* (kapok) trees was also noted in this sacred grove. Many had been cut recently, but some rotten stumps indicated the practice had been occurring for some time.
4.3.2 Pedestrian Survey Zones

The insight that hilltops, low rises, and sacred groves are likely to contain pre-Atlantic archaeological materials, drawn from previous work in the eastern and central part of the Central Region Project, was examined via pedestrian survey in the lesser known, western part of the project area along the Pra River during my 2016-2017 fieldwork. This was done by establishing 15 high-priority survey zones. These zones were selected on vegetative characteristics visible in high-resolution Worldview-2 and Worldview-3 satellite imagery, combined with topographical information, particularly areas of higher elevation\(^{52}\) (Ghana topographical map Sheet 0502C4 Edition 1999). These zones were in the vicinity of the villages of Supomu-Dunkwa, Atwereboannda, Beposo, Asamasa, Adiembra, Nyame Bekyere, and Sekyere Heman (see Figure 17-Figure 21). It was not possible to completely survey these zones for archaeological materials due to several constraints, including variable ground visibility,\(^{53}\) dense vegetation, overall size of

\(^{52}\) E.g., hilltops and ridges.

\(^{53}\) Ground visibility of artifacts is intimately connected to processes transforming the landscape. Hence, even if an area was completely surveyed by pedestrian means in a short span of time, a later survey would produce different
the survey areas, and time limitations. Survey was both opportunistic and guided by specific objectives relevant to each survey zone. In practice, this meant I marked specific waypoints or areas to reach in the survey zone (e.g. particular hilltops identified through topographic maps, or forest patches and other, sometimes unknown features observed in satellite imagery), and opportunistically surveyed the paths, farms, forests, creeks, and swamps I traversed along the way. Many of the waypoints were not directly reachable by established paths, which required navigating through dense forest, brush, and swamps. Permission to survey was granted by the chiefs of the respective towns. The political reality of surveying areas that spanned the territory of multiple villages required a flexible, in some cases shifting approach. For example, the head of Yabiw, Nana Kwamina Weinu II was willing to grant me permission to survey but I was unable to finalize a second meeting with him and the other elders due to scheduling conflicts related to his duties as the acting paramount chief within the Shama paramountcy. Thus, I was unable to survey Yabiw, but I expanded my survey efforts around Supomu-Dunkwa. In other cases, chiefs or elders were traveling and I was unable to obtain official permission and thus redirected my survey elsewhere until it could be obtained.

The hilltop sites that were not sacred groves did not have a single recognizable vegetation pattern in multispectral satellite imagery. Rather, the pedestrian survey shows that the current vegetation of these hilltop sites represents multiple patterns of land use and reuse, including actively or recently farmed and fallow plots. Hilltops that had been recently cleared, burned, and planted had the best ground visibility, and ceramics were often located in areas disturbed by hoe results due to cycles of swidden agriculture. Artifacts and features would become visible in areas that had been cleared and planted and ground visibility would be reduced in areas left to fallow as vegetation density increased. I noted this dynamic repeatedly when revisiting areas I had previously surveyed. Similarly, galamsey reveals, alters, and destroys archaeological contexts as it sweeps through the Pra River Basin.

While this slowed pedestrian survey efforts, it ultimately provided greater variability in the types of land cover surveyed than if survey had been strictly opportunistic along paths and in more open terrain.
cultivation. For example, in survey zone 6 (Figure 16) near the village of Adiembra, an area was investigated (marked AD30 and AD31) that had no notable vegetation signature in the multispectral satellite imagery other than being a patchwork of farms and fallowed land. It was, however, clearly identifiable as a hilltop using topographic data and, therefore, selected for survey as a potential settlement site. At AD30, the hilltop had been recently burned, cleared, and planted with cassava, and a very dense scatter of pre-Atlantic to early Atlantic ceramics were found throughout the field. At AD31, an adjacent hill approximately 130 m to the southeast, a complex of four iron slag mounds was recorded which I later excavated (See Chapter 5).

Figure 16: The pre-Atlantic to early Atlantic hilltop sites of AD30 and AD31 near the contemporary village of Adiembra (to the west, not pictured): Ghana sheet 0502C4 (left) and a Worldview-3 image with a vegetation (8–7–6) band combination (right). These adjacent sites were initially identified because of the hilly topography and excellent ground visibility due to the field at AD30 having been recently cleared, burned, and planted with cassava. The area shown is approximately 94 hectares.
Figure 17: Detail of Survey Zones near Adiembra, showing sites identified.
Waypoints targeted hilltops and patches of secondary forest. Survey of the
westernmost zone (west of Yereyebiahwe on the map, although no one in the
area that I encountered was familiar with this placename) was interrupted,
and I was not able to complete it.

Figure 18: Survey zones and sites identified near Nyame Bekyere. Waypoints
targeted hilltops, the riverside, and vegetation patterns seen in satellite
imagery that were identified as secondary forest and bamboo groves during
survey (see Chapter 6).
Due to thick tree cover, obtaining GPS points within the Pra Suhien Forest Reserve was extremely difficult and ground visibility was poor. Waypoints targeted hilltops, galamsey sites along the riverside, and the Pra Suhien Forest Reserve.
Figure 20: Survey zones near Supomu Dunkwa and Atwereboanda. Most waypoints targeted hilltops, ridges, and oil palm farms, but the two central survey zones west of Supomu Island and Wawase were specifically selected to include low-lying areas with variable vegetation patterns. Swamps and small creeks that feed into the Pra limited my ability to access some areas.
Figure 21: Survey zones near Asemasa. Waypoints targeted hilltops and what appeared to be two sacred groves in satellite imagery. One of these groves is further discussed in Chapter 6 (Site AS6).

4.3.2.1 Diagnostic artifacts

Diagnostic surface artifacts recorded during pedestrian survey were the primary means of rapidly assessing and temporally categorizing sites in the field. All surface finds were counted and photographed but only potentially diagnostic artifacts were collected, including ceramics with rims or surface decoration, stone flakes, *Nyame Akuma*, and stone beads. Collected artifacts were drawn and rephotographed during analysis. Maps indicating the locations of diagnostic artifacts throughout the landscape are presented in Chapter 5.

Previous Central Region Project research (see Section 4.2) provided a template for interpreting the temporal contexts of a variety of diagnostic artifacts I documented during this survey. For example, quartz flakes, ground stone artifacts, fragments of slag and iron, gritty
orange *atetefo* ceramics, and stone beads were recovered from well-dated stratified deposits at Coconut Grove, and these materials are known to be characteristic of sites in the region dating from the mid-first millennium CE or earlier into the beginning of the seventeenth century (DeCorse 2005; DeCorse *et al.* 2009). Similarly, robust ceramics first seem to appear in seventeenth century and later contexts at Eguafo (Spiers 2007: 143). In my initial survey design, I expected to find large amounts of Atlantic trade materials in the hinterlands as was the case with previous investigated sites like Eguafo, Elmina, and Komenda. However, this was not the case, and very few Atlantic trade materials were found in surface contexts in the areas I examined. Most of the hilltop artifact scatters I documented were primarily pre-Atlantic or possibly early Atlantic contexts, with a lesser number of robust ceramic sites. Radiocarbon dates recovered from the excavations at AD31 along with the work completed by Amartey (2021) at Wawase have extended the chronological template provided by earlier work further back in time (see Chapter 5).

Despite this, the chronology of some artifacts (flake tools, ground stone tools, ground stone beads) and features (grinding slicks) are loosely bracketed by a broad timeframe of use and production and, ultimately, rather ambiguous. Grinding slicks on rock outcrops are not directly dateable but are presumably associated with the production of Nyame Akuma. The earliest appearance of quartz pebble flakes in the area is also unclear, although quartz flakes and a core were found in a level that produced an early seventh millennium BCE radiocarbon date at AD31. I expect that further excavations at pre-Atlantic sites will bring these chronologies into better focus.
4.3.3 Test Excavation and Site Mapping

Acquiring GPS points and filling out site recording forms was sufficient for most sites discovered in the process of this survey due to the chronological association provided by surface artifacts (see above). Limited test excavation was undertaken at three suspected pre-Atlantic sites of interest identified during pedestrian survey to examine stratigraphy and recover datable materials and diagnostic artifacts: a hilltop atetefo ceramic scatter near Supomu Dunkwa (SD610), a grinding slick, also near Supomu Dunkwa (SD520), and a hilltop iron smelting site near Adiembra (AD31). All three of these site-types potentially signal large-scale pre-Atlantic landscape transformation, but excavation was required\(^5\) to gain insight into these ancient transformative processes. The survey work I conducted had revealed numerous hilltop atetefo scatters and grinding slick sites which I suspected to be pre-Atlantic: Thus, SD610 and SD520 were specifically chosen because they seemed to be relatively representative of the other hilltop and grinding slick sites I had identified during survey. The iron slag site (AD31) on the other hand, seemed to be large in comparison to known smelting sites in the area. In the case of all three sites, however, the purpose of excavation was to temporally anchor these site types and any associated material culture in a more concrete manner than examination of surface artifacts can alone provide. Test excavation units (1x1m) were mostly dug in arbitrary 10cm levels unless disturbances or obvious soil changes were noted. The intent of using 10cm arbitrary levels was to capture refined gradients within larger natural strata if they were present, which was largely the case at AD31. One 1x1m unit was opened on the hilltop at SD610, three contiguous 1x1m units were dug as a trench through one of the iron slag mounds at AD31, and one 1x1m unit was dug near the grinding slick at SD520 along with six 50cm circular shovel tests pits (See Chapter 5).

\(^5\) In contrast, evidence for colonial and post-colonial transformative effects on the landscape was far more obvious.
All site maps, test unit locations, and diagnostic artifacts were recorded and integrated into the geodatabase. Artifacts recovered in the process of test excavations were isolated by unit and stratigraphic level, washed, labeled, photographed, and placed in labeled bags with artifact tags. All excavated artifacts were deposited with the Museum of Ghana at Cape Coast.

4.3.4 GIS Geodatabase

This project integrated multiple forms of vector and raster spatial data, including site survey data, topographical information, and high-resolution satellite imagery. These data were built into a geodatabase for ease of analysis. The following data sets were compiled to map the locations of sites throughout the CRP project area and the broader region of southern Ghana.

1) Site survey points I took in 2016-2017 throughout the fifteen survey zones I delineated near the Pra River.
2) Western survey points collected by Central Region Project researchers in the 2007-2009 field seasons
3) Eastern survey points collected by Central Region Project researchers near Eguapo and Abrem in the 2010 field season
4) Sites hand-recorded by Oliver Davies and published in part four of his field notes: Southern Ghana (1976b).
5) Locations of sacred groves recorded by Chouin (2009).
6) Worldview Satellite Images acquired from the DigitalGlobe Foundation
7) Topographic maps of the region. These were scanned from physical copies of the 1999 Survey of Ghana map, sheets 0502D3 and 0502C4.

Site location data from sources 1-5 was compiled into a series of Microsoft Excel sheets (Figure 22) that recorded the type of site, the data source, artifact categories present, and other relevant information. Data points were first inputted in a degree (°), minute (‘), second (″) format. For ease of integration into ArcGIS, the spreadsheets were coded to automatically convert degrees (°), minutes (‘), seconds (″) format into decimal degrees using the formula: -
(Degrees + Minutes/60 + Seconds/3600) = Decimal degrees. Hence, the GPS recorded the location of the slag mounds site AD31 as 5°9’37.9” N 1°36’9.7” W and when inputted into the spreadsheet, Excel converted the site location into the decimal degree equivalent of 5.160527778 -1.602694444. A few sites from Oliver Davies’ (1976b) fieldnotes were east of the Prime Meridian, in which case the formula was manually adjusted to reflect a positive longitude, rather than a default negative longitude. To create maps of site locations, I exported the lists of sites into a series of *.CSV files, imported them into ArcGIS, and converted them to shapefiles *.SHP. Decimal degree format is significantly easier to import and work with than degree, minute, second format in ArcGIS, and therefore used to indicate the specific locations of sites throughout this dissertation. Maps of site locations created through this process are presented in Chapter 5.

**Figure 22:** Screenshot from Excel showing iron smelting related sites have been found in the CRP project area. The list of sites reflects the data source, site...
The primary categories of site codings are (1) *atetefo* ceramics (2) robust / *Atwea* ceramics (3) flaked lithics, almost entirely consisting of small quartz flakes (4) *Nyame Akuma* (5) grinding slicks (6) iron smelting, consisting of slag, tuyeres, and furnaces and (7) hilltop sites. These categories are not mutually exclusive. As I previously noted, I expected Atlantic trade materials (e.g. imported ceramics, pipes, or imported metalwares) to be a major category of material throughout the landscape but as only a few sporadic examples found, I dropped them as a major category of site coding. Known locations of earthworks in Central Region and other parts of southern Ghana such as the Birim Valley were also recorded into the database, but as no new earthworks were found this did not become a significant site category in the project analysis. However, the *atetefo* ceramics documented on hilltops throughout the 2016-2017 survey zones are very similar to ceramics of earthworks found elsewhere in southern Ghana. This is discussed in Chapter 5.

4.4 Conclusion

The methods employed in this dissertation project consist of satellite imagery analysis, pedestrian survey, and test excavation at select sites, and GIS geodatabase integration. Diverse sets of spatial data were built into the geodatabase as they were acquired, including topographic maps, satellite images, and site location data. These methods enabled me to locate and preliminarily assess new sites in a difficult to navigate forested environment. The locations of diagnostic artifacts found during my surveys were integrated with previous survey data in the geodatabase and mapped across the CRP project region, and in the case of grinding slick sites, the entire region of southern Ghana (see Chapter 5). The resulting geodatabase is a valuable tool not only for recording archaeological sites, but also for evaluating the implications of long-term
changes in settlement, subsistence, and technology and associated effects on the Pra River Basin landscape.

It is important to note that my focus on hilltops and ridges is due to the preliminary nature of survey work in the hinterlands and forests of this region. Several of the survey zones included low-lying and swampy areas with the express purpose of seeking a wider range of site patterning, but these areas are extremely difficult for pedestrian survey and ground visibility is very poor. Ceramic sherds were sporadically found in these areas, but with nowhere near the regularity and scatter density of hilltop areas that were actively being farmed. Thus, it is entirely possible that other types of sites exist that have not yet been identified.
Chapter 5: Artifacts, Site Distribution and Test Excavation

5.1 Introduction

The methods of archaeological data collection for this research were introduced in the previous chapter. This chapter examines material remnants of historical processes\(^{56}\) that offer fragmentary insights into at least three and possibly up to eight millennia of human-related landscape transformations in the Pra River Basin. I draw on the results of my surveys and test excavations conducted in 2016-2017 near the Pra River, supplemented by survey data previously collected by the Central Region Project and the field notes of Oliver Davies (1976b). Archaeological deposits recorded during test excavation at AD31 were radiocarbon dated, providing critical temporal contextualization for some of the finds I discuss. Many of the sites and materials discussed in this chapter, including surface scatters of ceramics, hilltop sites, *Nyame Akuma* celts, grinding slicks, stone flakes, and iron smelting sites date to the pre-Atlantic-era. They reflect historical dynamics including settlement patterning, technological developments/production, and subsistence, all of which would have had transformative effects on the landscape over several millennia. Unfortunately, the many details of these transformations are difficult to parse as the landscape has been continually overwritten, much of it now reflecting colonial and post-colonial historical processes. Thus archaeology, via pedestrian survey and excavation is the most productive way of accessing information about the pre-Atlantic Pra River Basin.

\(^{56}\) As discussed in Chapter 1, my use of the term ‘artifacts’ and different ‘artifact types’ is best understood as material remains that reflect human/environment historical processes (dwelling), albeit incompletely. ‘Artifacts’ and ‘features’ in this sense are not ‘cultural’—in opposition to ‘natural’—nor are they bound by concepts derived from culture-historical approaches to archaeology.
5.2 Ceramics of the Pra River Basin: *Atetefo*, Robust, and European Wares

Surface scatters of low-fired earthenwares were the most common type of site I found during pedestrian survey. Two broad categories of local low-fired earthenwares were recorded: *atetefo* (Figure 23, Figure 24) and robust (Figure 25, Figure 26). Much remains to be clarified about ceramic inventories in southern Ghana but these categories, based on nearby excavations in the Central Region Project area at both coastal and inland sites (e.g. DeCorse 2001; Chouin 2009; Spiers 2007), provide a working typology for ceramic identification. These generally correspond to Type 1 and Type 2 wares documented at Eguaf. Excavation at the Eyim locus of Eguaf demonstrated the transition from *atetefo* to robust around the seventeenth century CE (Spiers 2007: 142).

Most surface scatters in the 2017 survey zones, particularly on hilltops (see Section 5.3), bear affinity to the eroded, sand or quartz-tempered (or less commonly micacious), yellowish-brown to orange ceramics documented at sites like Asebu (Nunoo 1957), the Birim Valley (Kiyaga-Mulindwa 1978, 1982), Komenda (Calvocoressi 1975), Brenu Akyinum, Coconut grove, Eguaf, and Elmina (DeCorse 2001: 116–23; Spiers 2007: 141–70, 2012: 125–31). These ceramics have been referred to by various names over the years in different publications, including “earthworks wares,” “proto-Akan wares,” and “Nyama akuma wares,” Type 1 wares (at Eguaf), but I follow Chouin’s (Chouin 2009: 530–36) usage and refer to them as “*atetefo* wares.”57 The forms are primarily cups, bowls, and pots with flared rims (Spiers 2007: 145) but

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57 The term derives from the work of Wild (1937). He noted that “the patterns on the ancient pottery are not recognized by modern potters: they invariably refer them to the *Atetefu*, the ‘old, old people’” (Wild 1937). Watson (2017: 497) is skeptical of the term, arguing that “the definition of virtually all pre-Atlantic Late Iron Age pottery from the coast to the forest basin and the Kwahu Plateau as Atetefo ware (pace Chouin 2009: 44, 672–673) based on ceramic assemblages from a few detailed excavations is premature since it implies a degree of regional and chronological homogeneity in technology and culture that still requires demonstration by detailed comparative analysis of existing assemblages and available oral histories.” My response would be that I think it should be
many of the sherds I identified during pedestrian survey were too small and eroded to discern the vessel form. The \textit{atetefo} sherds range in color from yellowish-red, yellowish-orange, brown, reddish-brown to greyish/black, the latter probably representing fire clouding or uneven firing (see Figure 35 for variety of \textit{atetefo} paste colors excavated from SD610). The surfaces of the sherds are usually heavily eroded. The paste is typically sandy and friable, sometimes with small quartz inclusions/temper (<1 to 3mm). \textit{Atetefo} rims often have a distinctive “flange”, “ledge”, or “collar” (Figure 24). The functional purpose of the collar is unclear, although Braunholtz (1936a: 35) opined it was to fix a string carrier to the vessel. In my view, it may have been both stylistic and functional, as a ledge rim would have likely cooled faster than the immediate exterior surface of a heated pot of liquid or food, making moving a hot vessel somewhat easier. \textit{Atetefo} earthenwares have been excavated from earthwork sites and pre-Atlantic sites throughout southern Ghana (Boachie-Ansah 2008, 2014; Braunholtz 1936b; Chouin 2009; Chouin & DeCorse 2010; DeCorse 2005; Kiyaga-Mulindwa 1978; Spiers 2007). They are very distinct in form and paste from the later Akan pottery associated with Atlantic trade materials (see Bellis 1987; DeCorse 2001). Radiocarbon and thermoluminescent dates acquired from tightly controlled excavations at Coconut Grove temporally place the production of these ceramics in the first and early second millennium CE (DeCorse 2005; DeCorse \textit{et al.} 2009). More recent work at AD31 (see Section 5.7.1) and Wawase (Amartey 2021) extends the regional production and use of \textit{atetefo} ceramics into the first millennium BCE. Spiers (2007: 255, 2012: 129) argues assumed that regional and temporal variation existed within \textit{atetefo} wares (or facies), and taking similarity in ceramics to mean cultural homogeneity would be a mistake anywhere. My usage of the term \textit{atetefo} wares term suggests some degree of connection (whether it be historical, economic, technological, etc.) but the nature of that connection cannot be determined by ceramics alone, and this was certainly not a region of homogenous culture (e.g. \textit{kulturkreis}). The utility in the term is that it draws a linkage between contemporaneous sites with some distinctly similar features in ceramics.
that there is a degree of stylistic continuity with the robust and “Akan” ceramics of the Atlantic period in the seventeenth and eighteenth centuries.

Figure 23: Thin-walled and eroded Atetefo rim sherds from the hilltop site of SD618, near Supomu Dunkwa. A dense scatter of atetefo sherds was found washing out of a road across this hill, but most were too fragmentary and eroded to determine decoration, vessel size, or shape. The rim sherds shown here were among the few that had discernable decoration. The two lower images are from the same vessel, featuring incised and beaded line decoration (D=14cm). Five grinding slicks were also present in exposed bedrock at the site.
Robust ceramics form the second broad category of ceramic scatters recorded during survey (Figure 25, Figure 26). These ceramics bear similarity to wares sometimes referred to as Atwea or Akan wares. The distinction between atetefo and robust ceramics in form, paste, and manufacture is detailed by Bellis (1987) and DeCorse (2001:118-123). Thousands of sherds of robust ceramics were recovered from excavations at Eguaso during excavations led by Sam Spiers, which he refers to as Ware Type 2 (2007:142-168). Robust ceramics are usually orange.
pasted and better fired than *atetefo* ceramics, although some are grey in paste or micaceous tempered. Exterior color is variable tones of grey, red, and black and many are fire clouded. Some feature incised line decoration or burnished surfaces. Based on excavations at Eguafo, robust ceramics are typical from the seventeenth century onward (Spiers 2007:143). There is a great deal of variety in form, including hearth pots, handled vessels, bowls, and for the first time, carinated vessels (DeCorse 2001: 116-123; Spiers 2007:146). For the purposes of this survey, an inclusive category of robust wares was functionally useful. That said, there is a possibility that transitional or regional variation of robust wares could be parsed out and clarified through future excavation of sites identified in this survey.
Figure 25: Robust sherds identified at AD12 on the farm of Mr. K.E. Ankomah of Domiabra village. This thick-walled sherd being held features an everted rim and carination along the side of the vessel. The partially complete thick-walled footed vessel on the top right features braided and stamped decorations. Most scatters of robust ceramics were significantly more fragmentary than the examples in these images.
Figure 26: Examples of rim profiles of robust ceramics collected from sites identified near the Pra River. 1) Site SD574. Everted Rim with incised band decoration, D=34cm. 2) Site AS4. Everted rim, D=34cm. 3) Site AS4. Everted rim, D=22cm. 4) Site SD508. Everted rim, D=24cm. 5) Site SD540. Everted rim, D=24cm. 6) AS4 Inverted rim with carination and incised band decoration, D=33cm. 7) S610 Flared rim (restricted aperture), D=25 cm.

Immense amounts of Atlantic trade materials, including European ceramics, pipes, metal wares, and beads were recovered from excavations at Eguasu (Spiers 2007) and Elmina (DeCorse 2001). In contrast, Atlantic trade materials are almost entirely absent from sites identified in 2017 and extremely rare throughout the CRP hinterland survey areas. One sherd of
nineteenth century yellow paste rockinghamware was found amidst a small scatter of *atetefo*, robust and/or *Atwea* ceramics on a hilltop cassava field at SD566, and an isolated eighteenth or nineteenth century European pipe bowl was found at SD569. At the hilltop site AD12, dense scatters of robust ceramics were recorded. The farmer of the land, Mr. K. E. Ankomah of Domiabra Village (Figure 27), reported finding white pipe stems, presumably of European origin, but I did not directly observe any Atlantic trade materials at the time of survey. The presence of European pipe stems amongst dense scatters of robust ceramics would not be surprising though, as it fits with Spiers’ (2007) data from Eguafo that suggests robust ceramics first appear after the mid-seventeenth century CE.

Figure 27: Site AD12, near Adiembra. Numerous large fragments of robust ceramics were found on the farm of Mr. K. E. Ankomah (pictured, holding vessel fragment). The field was recently cleared and burned in preparation for planting.
5.3 Hilltops and Ridge Sites in the Pra River Basin

Scatters of ceramics are common throughout the Pra River Basin. The results of previous surveys in the Central Region Project area (east of my survey areas along the Pra) showed that hilltops frequently featured *atetefo* ceramics, possibly representing a pre-Atlantic pattern of settlement (in addition to earthworks and sacred groves). Working from this existing knowledge, I targeted hilltops and ridges using Ghana topographic map sheet 0502C4, and assessed them through pedestrian survey, aided by satellite imagery. I expected to potentially find scatters of pre-Atlantic material culture, including stone flakes, *atetefo* and robust ceramics, stone beads, and iron slag. I also expected to identify European trade materials, but almost none were found (see Section 5.2). I was unable to directly identify reliable signatures of archaeological sites solely with satellite imagery, which directly relates to the degree the landscape has been transformed, and continues to be transformed, by more recent historical processes. I found the imagery very valuable, however, in identifying farms and fields where ground visibility was good. In total, I identified ninety-eight hilltop sites in the 2017 survey areas. Seventy featured *atetefo* earthenwares (Figure 28) twelve of which were very dense scatters featuring 25+ sherds and two with sherds coded as 100+. There were thirty-four hilltops and ridges with scatters of robust ceramics (Figure 29). Five of these were very dense scatters featuring countless sherds, which I coded as 100+. *Atetefo* and robust ceramics were both present on twenty-two hilltop sites, although often in very different proportions Figure 30. The individual sites and number of ceramic sherds identified are listed in Appendix B.

Based on scatters of *atetefo* ceramics, the results of my 2017 survey suggest that hilltops and ridges bear traces of pre-Atlantic, and to a lesser degree, Atlantic settlement broadly throughout the region (Figure 28). Notably, these sites lacked Atlantic trade materials,
suggesting that they were either abandoned before the Atlantic period or were outside networks of dispersal and use of Atlantic trade materials. Most of these hilltop/ridge sites, particularly the high-density atetefo and robust sherd scatters (26-100+ sherds) were actively being farmed and the soil had been disturbed, bringing sherds to the surface. The process of burning vegetation to prepare for planting removes covering vegetation and exposes the soil to erosion from rain. Hoes and cutlasses are used to loosen and prepare the soil, which also reveals buried sherds. I noted many sherds throughout these sites with hoe scars from being struck while preparing the ground for planting.

**Hilltop Sites with Atetefo Ceramics**

Figure 28: Hilltops and ridges with surface scatters of *atetefo* earthenwares identified during pedestrian survey in 2016-2017.
Figure 29: Robust ceramic scatters on hilltops and ridges identified during pedestrian survey in 2016-2017.

Drawing generalizations when comparing the data in Figure 28 and Figure 29 is difficult because it based on pedestrian survey of surface artifact scatters which is highly dependent on ground visibility at the time of survey. Large gaps in the intended survey zones are also present due to issues with accessibility. That said, the data suggests that hilltop surface scatters of *atetefo* ceramics are both more common (and the sherds generally more numerous) than the hilltop robust scatters. Sites with the highest density of *atetefo* ceramics were also somewhat further inland than most of the high-density robust scatters. If this does represent a pattern emerging, it could be showing a shift in hinterland settlement toward the coast in the seventeenth to
nineteenth centuries, which directly relates to the observation that coastal settlements grew markedly during the Atlantic era (see Chapter 3).

The twenty-two hilltops on which both *atetefo* and robust ceramics were identified as surface scatters are proportionately shown in Figure 30 (max sherd count 100 per variety). Again, making generalizations is difficult from this data but the proportions of each type are notably distinct at several of these sites (e.g. SD603, AS19, AS9, AS4), which may be chronologically suggestive. Whether the co-presence of these ceramic types indicates actual temporal overlap of use and disposal or of subsequent occupations would require controlled excavation.

![Hilltop Sites With Robust and Atetefo Ceramics](image)

*Figure 30: Hilltops with Robust and *Atetefo* sherds.*

**5.3.1 Sacred Groves on Hilltops**

The work of Chouin (2002, 2007, 2009) and Spiers (2007, 2012) at sacred groves in Central Region has demonstrated that many such sites either bear material traces of human activity in the
past or were in fact pre-Atlantic settlement sites, as is the case with the dompow of Eguafo. I selected three sacred groves on hilltops near the Pra River for pedestrian survey in the vicinity of Supomu Dunkwa (Apontuado, Site XX7) and Asemasa (Sites AS6 and AS14). At XX7 very fragmentary atetefo ceramics were found in dirt displaced by treefalls and animal burrows. In the AS6 grove, a piece of atetefo ceramic with incised decoration and a robust sherd were exposed by a treefall. No materials were noted in the grove at AS14 but atetefo ceramics, stone flakes, and a few small slag fragments were recorded immediately adjacent to the grove in a recently planted cassava field with excellent ground visibility. The groves at XX7 and AS6 have undergone rapid landscape transformation in the past several years due to logging. Satellite imagery captured in 2020 shows that the grove at AS6 has now been entirely effaced from the landscape (see Chapter 6).

5.3.2 Hilltops and Earthworks

No earthworks were identified in the areas I surveyed along the Pra River in 2017, but the hilltops I surveyed bore similar patterns of material culture to two earthworks inside the Central Region Project research area near Abrem: Akrokrowa and South Berase (Chouin 2009). These sites are situated roughly 18km due east of the Pra River near Sekyere Heman. This raises the question of the relationship between hilltop and earthwork sites which seem to be, at least partially, contemporaneously used or inhabited. The most exhaustive current overview of the chronology and function of the earthworks of southern Ghana is available in Chouin’s (Chouin 2009: 521–97) doctoral dissertation. Chouin’s investigations of Akrokrowa conclusively date the earthworks construction to the 8th or 9th century AD and its abandonment sometime before the first quarter of the fifteenth century CE, which he notes is approximately one generation before the arrival of Europeans on the coast (Chouin 2009: 547–48). Most of the earthworks that have
been archaeologically investigated elsewhere in southern Ghana have revealed material culture that includes \textit{atetefo}-like pottery, \textit{Nyame Akuma}, grinding stones, palm kernels, and slag (Boachie-Ansah 2008, 2010, 2014; Braunholtz 1936a; b; Davies 1962; Jenner 1931, 1932, 1934; Kiyaga-Mulindwa 1978, 1982). The similarity in artifacts at hilltop sites and earthworks suggests these were related or (at least partially) contemporaneous sites used by agricultural communities of southern Ghana in the first and early second millennium CE.

The reason for this apparent pattern of hilltop settlement is unclear. It is possible it was driven by defensive considerations, which is one of several hypotheses regarding the earthworks of southern Ghana (Chouin 2009: 585–93). When cleared, these hilltop sites also provide good surveillance of the surrounding areas. But most hilltops and ridge sites, particularly in the southern survey areas south of Supomu Dunkwa and Beposo are not exceedingly high or difficult to ascend (20-30m over sea level). Hilltop and ridge sites are higher in the northern surveys near Adiembra (30-60m, with a few outliers around 90m). Wind and drainage may have been important considerations as well. Greater exposure to wind in areas of higher elevation would have reduced the prevalence of mosquitoes and areas of low elevation, particularly in the southern survey areas, are periodically marshy during heavy rains.

\textbf{5.3.3 Hilltop Test Excavation (SD610)}

SD610 is situated on a hill south of Supomu Dunkwa. The site was identified during pedestrian survey when hundreds of \textit{atetefo} sherds were observed washing down out of a footpath that traverses the hill (Figure 32, Figure 32). A stone bead (Figure 33), several quartz flakes, and a small number of robust sherds were also noted on the surface. Although present in small numbers as surface scatter, no robust sherds were found during test excavation. At the time of
survey this hill was covered by felled oil palm trees which had been tapped for palm wine extraction.

Figure 31: *Atetefo* sherds in a footpath that traverses the hill at SD610.
Figure 32: Surface collection of *atetefo* rims (top) and decorated body sherds (bottom) from SD610. Some of the latter probably represent rims with eroded/broken edges. Precise orientation of body sherds is uncertain.
I excavated a 1x1m test excavation unit at the top of the hill approximately 6m west of the footpath with the goal of ascertaining a sense of the site’s depth and stratigraphy and to recover artifacts from an in-situ hilltop context. As the site’s stratigraphy was unknown, the unit was dug in 10cm arbitrary levels to a depth of 50cm, which appeared to be sterile. Aside from charcoal and palm nuts, the only artifacts recovered were atetefo ceramics, present in Levels 2-4 but almost entirely concentrated in Level 3 (Table 2). Several sherds had discernible surface decorations (Figure 34). Most of the ceramics were highly fragmented and eroded to the extent that vessel form and size was indeterminate, but a variety of pastes were present, some with small quartz inclusions/temper (Figure 35). The concentration of atetefo ceramics in Level 3 and the ceramics washing down the hill in the footpath may indicate the site is deflated. The soil transitions from a dark brown/black loam at the surface to a strong brown clay loam around 30cm, which corresponded with the arbitrary excavation level. No other archaeological stratigraphy or features were observed.

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58 No artifacts were found in Level 5 and the soil seemed to be sterile. Incoming rain precluded further excavation.
<table>
<thead>
<tr>
<th>SD610</th>
<th>Depth</th>
<th>Atetefo</th>
<th>Robust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>0cm</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Level 1</td>
<td>0-10cm</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Level 2</td>
<td>10-20cm</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Level 3</td>
<td>20-30cm</td>
<td>99</td>
<td>0</td>
</tr>
<tr>
<td>Level 4</td>
<td>30-40cm</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Level 5</td>
<td>40-50cm</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2: Sherds recovered from a 1x1m test unit on the SD610 hilltop site.

Figure 34: *Atetefo* sherd from Level 3 of SD610 with raised band and incised or possibly fingernail impressed decoration, orientation uncertain. Three other sherds with similar paste and decoration were recovered from this unit, possibly representing sherds from a single vessel.
Figure 35: Typical fragmented and eroded *atetefo* sherds recovered from Level 3 of SD610, showing a range of colors and pastes. Some feature quartz inclusions/temper.

5.4 Nyame Akuma

Ground stone axes or celts are referred to as *Nyame Akuma* (God’s axe) in southern Ghana, referencing the belief in their divine origin by most Akan speaking peoples. They are regularly found by farmers and sometimes placed in altars to *Nyame* or *Nyankopon*, the supreme being in Akan cosmology. These altars can be found in some compounds and shrines (Meyerowitz 1960: 75). They form a major class of artifacts indicating pre-Atlantic human activity, but the temporal range of their production is unclear. They have been found during excavations of pre-Atlantic earthworks (e.g. Davies 1961: 23–24) and other clear pre-Atlantic contexts (e.g. DeCorse et al. 2009). Most commonly made of greenstone, some appear to have been flaked and then ground
down into a desired shape. They vary in size, some possibly having been hafted, others being quite small. The precise use of *Nyame Akuma* is unknown, but they were probably utilized for a variety of purposes. The labor involved in their production and maintenance, and their commonality throughout the region, must reflect their importance to their makers in terms of use, trade, or belief. I strongly suspect the grinding slicks throughout the Pra River Basin (see Section 5.5) were sites of manufacture or maintenance of *Nyame Akuma* tools. If so, both can be read as material remnants of historical processes that were radically transformative the PRB/CRP landscape, most likely between the first millennium BCE and early second millennium CE if the dates from excavations at AD31 (Section 5.7.1.3), Wawase (Amartey 2021: 210), Nsadwer Abaka, Coconut Grove (DeCorse 2005), and Akrokrowa, (Chouin 2009: 545–46) are provisionally applied as a chronological framework (see also Chapter 6).

Only two *Nyame Akuma* were found during pedestrian survey in 2016-2017, both in the vicinity of Supomu Dunkwa, sites SD583 and XX5. The *Nyame Akuma* collected at XX5 (Figure 36) was found amidst a very high-density scatter of *atetefo* sherds on a hilltop. Stone flakes were also observed. At SD583, a *Nyame Akuma*, an *atetefo* sherd, and a grinding stone were eroding out of a footpath (Figure 37). Although only two were identified during survey in the Pra River Basin, many more have been found during previous surveys throughout the Central Region Project area (Figure 38).
Figure 36: *Nyame Akuma* found at the hilltop site XX5, south of Supomu Dunkwa amidst a dense scatter of *atetefo* sherds. Quartz flakes were also observed.

Figure 37: *Nyame akuma* found eroding out of a footpath northwest of Supomu Dunkwa (Site SD583). An *atetefo* sherd and grinding stone was also noted in the vicinity.
Grinding slicks on granite outcrops are one of the most intriguing and understudied archaeological features found throughout the Pra River Basin and the broader Central Region Project area. These long, thin, or ovoid-shaped grooves on rock outcrops were presumably created by people manufacturing or sharpening stone Nyame Akuma tools\(^{59}\) (Figure 39). The ground surfaces in the rock typically show significant weathering. In many cases grinding slicks are partially buried. Twenty-seven sites grinding slick sites were found by the CRP during survey in 2007-2010, and I recorded another eighteen\(^{60}\) during survey in 2017 (Figure 40).

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\(^{59}\) They have also been interpreted as being related subsistence stops along overland slave trade routes (e.g., Perbi 2004), but this identification is contentious. Overland slave trading routes may have indeed stopped in places where grinding slicks were present, but the association is almost certainly happenstance.

\(^{60}\) Two of the eighteen are outside of the PRB/CRP survey areas, see Figure 40 for a broader view. I recorded the location of these sites while traveling.
Grinding slicks are also present near the Dumpow of Eguafo (Spiers 2012:129). Slicks were found throughout the Pra River Basin landscape on rock outcrops and boulders on hills, hillsides, flat land, in swamps, and creeks (See Chapter 6 for images of grinding slicks in different environments). Davies (1976b) opportunistically documented similar features throughout southern Ghana (Figure 41). The clustering of grinding slick site locations shown in Figure 40 and Figure 41 is almost certainly a product of survey methodology and pedestrian coverage, and I suspect they may exist throughout the region in comparable densities to what has been found in the immediate vicinity of the Pra.

I interpret the prevalence of grinding slicks as a relic of transformational processes related to the expansion of agricultural communities in the Pra River Basin beginning at least by the first millennium BCE. Grinding slicks most likely represent areas of specialized Nyame Akuma tool manufacture, modification, or use. The extensive production and/or sharpening of Nyame Akuma at these sites might reflect agricultural, forest clearing, woodworking, or other activities. Cutting down a large mature tree with a small Nyame Akuma would be extremely difficult, but the tree's bark could easily be ringed to kill it and open the tree canopy to expand areas available for farming and oil palm cultivation. These processes would radically change the landscape through patchwork deforestation, expansion of agriculture, and exposure of the soil to erosion during farming and clearing. Unfortunately grinding slicks cannot be directly dated and the precise use of Nyame Akuma is unknown. That said, the prevalence of grinding slicks and Nyame Akuma throughout southern Ghana indicates a widespread commonality of function in these tools across a wide area. This implies these were important, or at least common tools for these early agriculturalists who perhaps used them for digging, cutting, and processing food or other resources.
Figure 39: One of two rock outcrops found in a low laying bamboo grove near Nyame Bekyere covered in grinding slicks (site designation NB37). The pictured rock features at least 21 long slicks, probably created by people manufacturing or sharpening Nyame Akuma stone tools. The measuring tape is 1 meter.

Figure 40: Grinding slicks located in the Pra River Basin/Central Region Project area. My targeted survey areas (2017) are shaded, and red triangles indicate newly identified grinding slicks along the Pra.
Figure 41: Grinding slicks in Southern Ghana identified by Central Region Project/ Pra River Basin surveys (red crosses) and Oliver Davies (1976) (black triangles).

Table 3 shows an approximate count of individual grinding features at sites I identified, divided into two basic types: (1) long slicks, roughly 5-15 cm in width, and (2) areas smoothed, sometimes slightly depressed, from grinding. The first category could potentially be further subdivided between long, thin slicks (~5cm), and long, slightly wider or ovoid slicks (~10-15cm), but I suspect they represent the same pattern of activity. A precise count was not possible as many blend, overlap, or are partially buried. There are two substantial observations to be made from this table: the overwhelming prevalence of long slicks and the complete absence of bowl-like mortar/basin grinding hollow features (e.g., David 1998: 28–30). Thus, in my view, these
grinding slick sites primarily represent remnants of *Nyame Akuma* manufacture or modification. The absence of bowl-like features suggests that food processing is somewhat less likely or only secondary pattern of activity at these sites, possibly represented by the smoothed areas which are in some cases slightly depressed and of varying size. See Appendix B.3 for the location of these sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>Long slicks (~6-15cm width)</th>
<th>Smoothed areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD15</td>
<td>12+</td>
<td></td>
</tr>
<tr>
<td>AD24</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>AD26</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>AD27</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Asemkow (XX2)</td>
<td>80+</td>
<td></td>
</tr>
<tr>
<td>NB30</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>NB36</td>
<td>10+</td>
<td></td>
</tr>
<tr>
<td>NB37</td>
<td>25+</td>
<td>1</td>
</tr>
<tr>
<td>SD520</td>
<td>28+</td>
<td>8+</td>
</tr>
<tr>
<td>SD522</td>
<td>19+</td>
<td></td>
</tr>
<tr>
<td>SD528</td>
<td>6+</td>
<td></td>
</tr>
<tr>
<td>SD535</td>
<td>8+</td>
<td></td>
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<tr>
<td>SD538</td>
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<td></td>
</tr>
<tr>
<td>SD543</td>
<td>8+</td>
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<tr>
<td>SD595</td>
<td>8+</td>
<td></td>
</tr>
<tr>
<td>SH14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>SH21</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3. Grinding slick site feature typology.

**5.5.1 Grinding Slick Test Excavation (SD520)**

As grinding slicks cannot be directly dated, test excavation was undertaken at a grinding slick site near Supomu Dunkwa (Site SD520, Figure 42, Figure 43) with the objective of correlating material culture associated with the grinding groove features. This grinding slick is also situated in a low-laying swamppy area, which I wanted to examine more closely as I had focused on hilltops throughout most of the survey areas. I opened one 1x1m test unit and six shovel test pits

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61 Site is not in the Pra River Basin. It is on a beachfront near Asemkow, about 40km SW of the PRB. A geologist I met in Butre led me to this site.
to the west of the grinding slick at SD520. Unfortunately, no deposits were encountered with significant quantities of Atlantic or pre-Atlantic materials. The test unit began to hit a buried face of the rock outcrop at 30cm, which sloped down to 74cm until the unit was entirely blocked. The excavated soil of the 1x1 test unit was entirely modern fill. The upper levels of the STPs (0-40cm) were interspersed with modern materials. In the lower levels (40-90cm) a few sherds of atetefo pottery, a quartz flake, and an unidentified bone with a cut mark were recovered (See Appendix C). The depth of modern trash deposits is due to the proximity of an inhabited household to the east of the outcrop. Overall, these test excavations yielded little material culture aside from modern trash. The artifacts recovered from deeper contexts (atetefo sherds (N=7), stone flake, and bone), however, may indeed be related to the grinding slick, and provide some basic temporal contextualization. As numerous grinding slick sites have now been identified in the CRP area, future excavations could chronologically situate these features more precisely and test their tentative identification with Nyame Akuma manufacturing/modification. Despite the minimal materials recovered from this excavation, it did expand my thinking about the degree to which some of these sites may extend below the modern surface. Judging by the exposed slope of the outcrop, I did not expect to hit the outcrop surface so quickly in the 1x1 unit I excavated. As seen in Figure 42, some of the individual slicks extend below the modern surface of the ground, an aspect I later noted at many of the other grinding slick sites I identified throughout the PRB (see Chapter 6). It raises question about how many and how much of these sites have been buried by ongoing human/environmental processes, obscuring important facets that would aid in their interpretation.
Figure 42: Site map of a grinding slick on a rock outcrop near Supomu Dunkwa (Site SD520).
5.6 Stone Flakes

Quartz flakes produced from small pebbles are a common artifact type found throughout the CRP survey region on the coast and in the hinterlands (Figure 44). They are perhaps the artifact most representative of *longue durée* continuity of material culture, being found in the earliest archaeological contexts throughout the region into the early second millennium CE. Most of the flakes are produced from milky white or smoky, partially translucent quartz. The use of quartz flake tools persists after the introduction of iron smelting technology in the region, until at least the end of the first millennium CE (DeCorse 2005: 47). Chouin (2009: 650) suggests the use and production of quartz microlith tools may have continued until the opening of the Atlantic trade,
declining with the increased availability of iron cutting tools. Yet the relationship between flake and iron tools during the pre-Atlantic remains unclarified. Why did these small flake tools persist? What special purposes did they serve? Or were iron tools, appearing at least by the mid-first millennium CE, simply rare or restricted in their distribution so that flake tools retained their utility?

The locations mapped in Figure 44 do not tell us much of anything other than that quartz flakes were widely distributed across the PRB/CRP landscape. The clusters represent survey intensity and not actual artifact distribution in this region. Yet there is still value in recognizing flakes as a commonplace tool (or detritus of tool-making), probably used in daily life for various cutting needs and processing of materials that made subsistence in the region possible.

Quartz flakes were found in the lowest levels of excavations at AD31 (iron smelting hilltop site near Adiembra), SD610 (pre-Atlantic hilltop site near Supomu Dunkwa), and SD520 (grinding slick site near Supomu Dunkwa). They are sometimes found in association with atetefo ceramics and stone beads, but the deepest levels of excavation at AD31 (90-110cm) only featured stone flakes and charcoal. Three radiocarbon dates from these levels were obtained: 1552 - 1411 cal BP, 2434 - 2308 cal BP, and 8164 - 8000 cal BP (see Section 5.7.1.3).
5.7 Slag and Iron Smelting Sites

Evidence of iron smelting in the form of iron slag, furnace fragments, and tuyeres have been documented throughout the Central Region Project area (Figure 45). Chouin (2009: 721–25) found slag, sometimes with pieces of furnace walls, during his investigations at Bosomtwi, Abirpow, Akrokrowa, and Asaba, all of which seem to represent sites of pre-Atlantic settlement or activity. He excavated an early-mid seventeenth century slag mound underlain by pre-Atlantic contexts at Nana Abaka (Chouin 2009: 491–95). Slag was also found at the coastal site of Coconut Grove, in stratigraphic contexts dated as early as the seventh and eighth centuries CE.
(DeCorse 2005), representing the earliest\(^{62}\) certain evidence for iron production in the project area. I located several surface scatters of iron slag while surveying in 2017. At the largest of these, situated on a hilltop near Adiembra (Site AD31) I opened a test excavation trench which at the time, largely confirmed my initial thought that the site was pre-Atlantic. Yet when charcoal samples I collected were subjected to radiocarbon dating, they produced a temporally deep range of dates far beyond what I had initially imagined (see Section 5.7.1).

The remnants of iron smelting throughout the landscape represent a technological development that seems to have begun in this region around the mid-first millennium CE and continued into the Atlantic period. Therefore, the sites shown in Figure 45 represent a long-term process of material accumulation. There are at least two more significant impacts on the observed landscape related to the spread of iron: (1) cutting of trees for charcoal and (2) increased availability of iron tools, which would have presumably resulted in easier clearing of land, cutting of trees, and breaking up soil for planting. This may have intensified the pace and scale of human-related land cover changes. Yet this did not necessarily involve extensive deforestation as is evidenced in some cases (e.g. Goucher 1981). Rather, it may have been cyclical, moving through fallowed farmlands that had reverted to forest, entangled with the cycles of swidden agriculture over the course of decades and centuries.

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\(^{62}\) Slag was found in older contexts at AD31 (mid-first millennium BCE to mid-first millennium CE) than at Coconut Grove, but given that levels above this context are almost completely composed of slag it is difficult to be completely certain the slag is not intrusive in some fashion without performing further excavation (see Section 5.7.1.4).
Evidence of iron smelting, including slag, tuyeres, and furnace fragments documented from surveys conducted in the Central Region and Pra River Basin. This only represents hinterlands survey data from 2007-2010 and 2016-2017 and is not inclusive of slag identified during survey of the immediate coast and identified during excavations at sites like Elmina, Eguafo, Coconut Grove.

5.7.1 AD31 Iron Smelting Test Excavation

I located several iron smelting sites with surface scatters of iron slag on hilltops during survey in 2017. The largest of these, AD31, featured four mounds of slag on a large hill east of Adiembra (Figure 46). An adjacent hilltop featured dense scatters atetefo ceramics. Due to the dense concentration of slag mounds and nearby associated ceramics, I chose this site for test excavation and opened three contiguous 1x1 m units (N105, N106, and N107) as a trench inside the largest slag mound (Figure 47). These units were exploratory, with the aim of recovering dateable
charcoal samples and diagnostic ceramics from the slag feature, finding out the depth of the slag deposit, seeing if a furnace could be identified, and finding out if any materials could be identified below the slag levels.

Figure 46: Site map of AD31 Slag Mound Excavations. The brown line is a small footpath.
Figure 47: Trench in iron slag mound at AD31. See Figure 45 for site map.

5.7.1.1 AD31 Stratigraphy

These units were excavated in ten-centimeter arbitrary levels, down to a maximum of 110cm in N105, 100cm in N106, and 95cm in N107 (Figure 48, Figure 49, Figure 50). All depths were measured with a line level on a string fixed to the southwest corner of unit N105 (the corner closest to the point from which the photograph in Figure 47 was taken). The surface of the ground gently sloped down from this high point towards the north and east. Arbitrary levels were initially chosen because this excavation was exploratory. As the larger natural strata became apparent, I maintained the smaller artificial levels for stratigraphic control. Three major stratigraphic levels were identified: (A)The surface and upper levels of the trench (0-25) consisted of a dark brown loam (7.5YR3/4) and densely full of slag. (B)Around 25cm, the soil
transitioned to a strong brown clay loam (7.5YR5/6) also densely full of slag that extended down to 70cm depth in units N105, and N106. In N107, this level ended between 50cm on the west side of the unit and 65cm on the east. (C) From 70-100cm in N105 and N106, the soil was yellowish-red, clay loam (5YR 5/6) with much less slag, and no slag was found below about 90cm depth. In N107, this yellowish-red, clay loam (5YR 5/6) level extended from 50-65cm to 95cm. Only quartz flakes, burnt palm nuts, and charcoal were found at the depth of 90-100cm, and nothing was found below 100cm in N105.

Stratigraphy was intact except for a decayed tap root extending the entire length of the west wall of Unit 107 (see Figure 50, Figure 51). This disturbance was confined to the center of the western edge of the unit and did not seem to penetrate any more than 15-20cm towards the center of the unit. Soil from the disturbance was screened separately and contained nothing but dark loam, fragments of bark, and palm nuts. The presence of this disturbance was unfortunate because my objective for Unit 107 was to collect carbon samples for radiocarbon dating from precisely recorded depths in every level. Out of general caution, I only submitted two of the N107 charcoal samples for radiocarbon dating (see Section 5.7.1.3). These two samples were collected from the lower levels of the east and south portions of N107 in intact contexts distant from the disturbance along the west wall.
AD31 Slag Mound
Profile of East Trench Wall

A. Dark brown loam, 7.5 YR 3/4
full of slag
B. Strong brown clay loam, 7.5 YR 5/6
full of slag
C. Yellowish-red clay, 5 YR 5/6
small amounts of slag
D. Yellowish-red clay, 5 YR 5/6 no artifacts noted
(no discernable change in color)

All measurements in centimeters
S. H. Reid

Figure 48: Profile of east trench wall at AD31.
Figure 49: Profile of south wall (N105) at AD31.
AD31 Slag Mound
Profile of West Trench Wall

Figure 50: Profile of west trench wall at AD31.

A. Dark brown loam, 7.5 YR 4/4
   full of slag
B. Strong brown clay loam, 7.5 YR 5/6
   full of slag
C. Yellowish-red clay 5 YR 5/6
   small amounts of slag
D. Yellowish-red clay 5 YR 5/6 no artifacts noted
   (no discernable change in color)
E. Intrusion: 7.5 YR 3/2 dark brown loam
   likely a rotted tree

All measurements in centimeters
S. H. Reid
The vast majority of artifacts recovered were slag, followed by furnace fragments, and atetefo sherds (Figure 52-Figure 54). A deposit of dense slag fragments interspersed with furnace fragments and sherds extended from the surface to around 60 or 70cm depth. Some fragments of slag were quite large in this stratum (Figure 53). Small fragments of slag were found in the two levels below this (70-90cm), and none were found below 90cm. The atetefo sherds spanned a variety of pastes and decorations, but no robust or imported European wares were found. From the lowest levels of the excavations (Levels 8-11), stone flakes, burnt nut fragments, and a
ground stone bead were recovered (Figure 55-Figure 57). Table 4, Table 5, and Table 6 show the distribution of *atetefo* sherds, furnace fragments, and stone flakes by unit and level.

![Figure 52: Atetefo sherds with wavy channeling decoration, a chunk of slag, and a fragment of furnace with bits of slag attached. All were recovered from N106 Level 6 (50-60cm). Similar ceramics were recovered from mid-second millennium CE contexts at Bosumpra Cave (Watson 2017, 481).](image)
Figure 53: Large fragments of slag in-situ in Unit N107, Level 6 (50-60cm).
Figure 54: Variety of *Atetefo* rims and decorated body sherds from AD31. Orientation and profile extensions are uncertain for heavily eroded rims. (A) Unit N107 Level 3 (20-30cm). The three rims on the left appear to be from the same vessel. The body sherd in top right features a similar pattern to the body sherds shown in Figure 52 from Unit N106 Level 6 (50-60cm) (B) Unit N106 Level 2 (10-20cm). (C) Unit N105 Level 3 (20-30cm). (D) Unit N106 Level 8 (70-80cm). (E) Unit N106 Level 8 (70-80cm).
Figure 55: Ground stone bead recovered from N107 Level 8 70-80cm. A similar bead was found during surface collection at SD610 (see Figure 33).

Figure 56: Burnt oil palm nut fragments from N107 Level 9 80-95cm.
Figure 57: Quartz core with evidence of unifacial flaking. Cortex shown in right image. Recovered from N106 Level 10 90-100cm.

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Level</th>
<th>Atetefo Sherds</th>
<th>Furnace Fragments</th>
<th>Flakes</th>
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<tr>
<td>10</td>
<td>LVL1</td>
<td>0</td>
<td>16</td>
<td>-</td>
</tr>
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<td>LVL2</td>
<td>8</td>
<td>19</td>
<td>-</td>
</tr>
<tr>
<td>30</td>
<td>LVL3</td>
<td>15</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>40</td>
<td>LVL4</td>
<td>3</td>
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<td>90</td>
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<td>-</td>
<td>9</td>
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</tr>
<tr>
<td>110</td>
<td>LVL11</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>60</td>
<td>10</td>
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Table 4: Sherd, furnace, and flake counts from N105.
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<th>Atetefo Sherds</th>
<th>Furnace Fragments</th>
<th>Flakes</th>
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<tr>
<td>N106</td>
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<td>10</td>
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<td>63</td>
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<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>83</td>
<td>184</td>
<td>6</td>
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Table 5: Sherd, furnace fragment, and flake count from N106.

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Level</th>
<th>Atetefo Sherds</th>
<th>Furnace Fragments</th>
<th>Flakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N107</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10</td>
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<td>LVL2</td>
<td>36</td>
<td>5</td>
<td>-</td>
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<td>30</td>
<td>LVL3</td>
<td>135</td>
<td>56</td>
<td>-</td>
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<td>40</td>
<td>LVL4</td>
<td>4</td>
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<td>-</td>
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<tr>
<td>80</td>
<td>LVL8</td>
<td>58</td>
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<td>-</td>
</tr>
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<td>95*</td>
<td>LVL9</td>
<td>17</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
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<td>110</td>
<td>LVL11</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>263</td>
<td>155</td>
<td>1</td>
</tr>
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</table>

Table 6: Sherd, furnace fragment, and flake count from N107. *Note: Level 9 was accidentally dug from 80-95cm instead of 80-90cm, after which the unit was closed. The radiocarbon date taken from this level was collected from a burnt palm nut at 95cm depth.
## 5.7.1.3 AD31 Radiocarbon Dates

<table>
<thead>
<tr>
<th>Depth</th>
<th>Level</th>
<th>N107</th>
<th>N106</th>
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<td></td>
</tr>
<tr>
<td>30-40</td>
<td>LVL4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td>LVL5</td>
<td>673 - 628 cal BP&lt;sup&gt;63&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td>LVL6</td>
<td>674 - 629 cal BP&lt;sup&gt;64&lt;/sup&gt;</td>
<td>315 - 266 cal BP&lt;sup&gt;65&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td>LVL7</td>
<td>610 - 554 cal BP&lt;sup&gt;66&lt;/sup&gt;</td>
<td>740 - 669 cal BP&lt;sup&gt;67&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>70-80</td>
<td>LVL8</td>
<td>1928 - 1780 cal BP&lt;sup&gt;68&lt;/sup&gt;</td>
<td>1374 - 1296 cal BP&lt;sup&gt;69&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>80-90</td>
<td>LVL9</td>
<td>2434 - 2308 cal BP&lt;sup&gt;70&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-100</td>
<td>LVL10</td>
<td>1552 - 1411 cal BP&lt;sup&gt;71&lt;/sup&gt;</td>
<td>8164 - 8000 cal BP&lt;sup&gt;72&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>100-110</td>
<td>LVL11</td>
<td>Not excavated</td>
<td>Not excavated</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Calibrated radiocarbon dates from AD31. Dates in table reflect highest probability date range. See footnotes or Appendix E for full range of possible dates.

<sup>63</sup> Beta No. 608548. Charcoal collected at 46cm in unit.
(53.1%) 1277 - 1322 cal AD (673 - 628 cal BP)
(42.3%) 1356 - 1392 cal AD (594 - 558 cal BP)

<sup>64</sup> Beta No. 597657. Charcoal collected at 60cm in unit
(58.8%) 1276 - 1321 cal AD (674 - 629 cal BP)
(36.6%) 1358 - 1390 cal AD (592 - 560 cal BP)

<sup>65</sup> Beta No. 500945. Charcoal collected in soil matrix from screen.
(45.8%) 1635 - 1684 cal AD (315 - 266 cal BP)
(40.1%) 1736 - 1805 cal AD (214 - 145 cal BP)
(8.6%) 1935 - Post AD 1950 (15 - Post BP 0)
(0.9%) 1530 - 1538 cal AD (420 - 412 cal BP)

<sup>66</sup> Beta No. 569976. Charcoal collected at 66cm in unit.
(54.5%) 1340 - 1396 cal AD (610 - 554 cal BP)
(40.9%) 1282 - 1329 cal AD (668 - 621 cal BP)

<sup>67</sup> Beta No. 557631. Charcoal collected in soil matrix from screen.
(95.4%) 1210 - 1281 cal AD (740 - 669 cal BP)

<sup>68</sup> Beta No. 571496. Charcoal collected at 80cm in unit. This sample was right at the artificial level divide between LVL8 and LVL9 and could be equally displayed as part of LVL 9 in Table 7.
(93.6%) 22 - 170 cal AD (1928 - 1780 cal BP).
(1.8%) 194 - 209 cal AD (1756 - 1741 cal BP)

<sup>69</sup> Beta No. 608549. Charcoal collected in soil matrix from screen.
(95.4%) 576 - 654 cal AD (1374 - 1296 cal BP)

<sup>70</sup> Beta No. 571495. Charcoal collected in soil matrix from screen.
(94.5%) 485 - 359 cal BC (2434 - 2308 cal BP)
(0.9%) 271 - 262 cal BC (2220 - 2211 cal BP)

<sup>71</sup> Beta No. 500944. Burnt palm nut collected at 95cm from unit. Level 9 of N107 was accidentally dug from 80-95cm instead of 80-90cm, after which the unit was closed. The date is shown in this table in Level 10.
(95.4%) 398 - 539 cal AD (1552 - 1411 cal BP)

<sup>72</sup> Beta No. 569975 Charcoal collected in soil matrix from screen.
(95.4%) 6215 - 6051 cal BC (8164 - 8000 cal BP)
5.7.1.4 Interpretation

Excavation at AD31 has revealed approximately four stratigraphic-temporal contexts of human activity:

1.) The earliest, an early seventh millennium BCE context associated solely with quartz microliths and a core, is tentative as only a single date is represented. This is the earliest date recovered from the Central Region Project area; the closest similar date is a sixth millennium BCE date below the earthwork ditch at Akrokrowa (Chouin 2009: 540; Chouin & DeCorse 2010: 136–37). Older (tenth millennium BCE) contexts have been recovered from southern forest fringe at Bosumpra Cave (Watson 2017), which is less than 200km from AD31. This early date is further discussed in Section 7.3.

2.) The second context at AD31 stretches from the mid-first millennium BCE through the first millennium CE (see layer “C” in Figure 48). Material culture found in this context includes burnt palm nuts, atetefo ceramics, quartz flakes and a core, small amounts of slag, and a stone bead. The burnt palm nuts are significant in that they signal exploitation/domestication of oil palm and are directly dateable. Two of the dates from this context were acquired from burnt palm nuts: 1552-1411 cal BP (N107 Level 10) and 1374 - 1296 cal BP (N106 Level 8). Given the large deposition of slag above this level, I am hesitant to concretely attribute the small amounts of slag found in this context to the earlier portion of this date range until more work is done at the site and it is certain these fragments did not somehow disperse down from the extremely dense layer of slag above it. Slag in mid-first millennium BCE contexts would be about a millennium earlier than
other known contexts in southern Ghana, but it is certainly possible, and it would be of great significance if comparable contexts could be identified.

3.) The third context has similar material culture to that found in the second context, but reflects an intensification of iron smelting at this specific site in the first half of the second millennium CE (layer “B” in Figure 48). These levels are almost fully composed of slag with intermixed fragments of furnace and *atetefo* ceramics. The bulk of this iron slag dates from the thirteenth to fourteenth century CE.

4.) One seventeenth- or eighteenth-century radiocarbon date was recovered from N105 Level 6, which may suggest the deposition of slag may have continued into the early Atlantic-era. The production and use of *atetefo* ceramics has been documented in a few other contexts as late as the seventeenth century (see Section 5.2). However, the thirteenth to fourteenth century CE dates in the adjacent Unit 106 (Levels 5-7) strongly suggest the N105 Level 6 date is an outlier. Moreover, no materials definitively reflective of the Atlantic-era (e.g. European trade goods, robust or Akan ceramics, etc.) were recovered from the site whatsoever, even from surface collection. In my view, this date is most likely either anomalous/intrusive or reflects the time period in which the mound of slag was slowly buried as the landscape continued to be farmed and utilized throughout the Atlantic-era.
5.8 Discussion

Figure 58: Young cocoa trees surround the excavated trench at AD31.

The test excavation at the hilltop slag mound AD31 revealed a long chronology of material culture, providing indications of how the broader Pra River landscape has been transformed by its human history. Some of these dates and finds are open to interpretation, but we can tentatively glimpse human presence in the early seventh millennium BCE associated with quartz flakes, and much later, the spread of agriculture and hilltop settlements from the mid-first millennium BCE through the first millennium CE (burnt oil palm nuts, *atetefo* ceramics, and continued use of flakes). We also see the appearance of iron metallurgy, possibly in the first millennium BCE if not certainly by the first millennium CE, with an intensification of smelting on this immediate hilltop in the early to mid-second millennium CE (dense slag and furnace fragments). The exposed portions of the other slag mounds at AD31 shown in Figure 46 likely date from this period of intensification (early- to mid-second millennium CE) and are probably similarly underlain by much more ancient contexts. The intensified iron smelting at A31 would have
greatly altered the landscape as trees were cut for charcoal production, but the contemporary vegetation cover at this site reflects more recent dynamics of landscape history. The young cocoa trees covering much of the site (Figure 58) are a result of colonial economic policies that have had lasting economic relevance to local communities. These cocoa trees will be nurtured for several years before they begin to produce cocoa pods full of seeds which will be sold as a cash crop.

The general absence of European trade materials at the sites I identified in the Pra River Basin can be interpreted in two ways: either they represent pre-Atlantic sites, or they represent settlements peripheral to the immense European-African trade post 1450 CE, which was dominated by traders and elites in larger coastal towns and inland polities. For the sites where atetefo ceramics predominate, the former is the most likely reason, although atetefo ceramics have been found in a few contexts as late as the seventeenth century such as Eyim locus in Eguafo (Spiers 2007: 142) and at Abandze (DeCorse, personal communication). If the sites featuring primarily robust ceramics are representing Atlantic-era settlement sites, this would indicate these settlements were largely peripheral to the trade networks through which Atlantic goods were dispersed and consumed.

The material culture (or more precisely, the material remnants of human/environment historical processes) found scattered throughout the Pra River Basin and discussed in this chapter, reflects ancient dynamics of how this landscape has been inhabited and altered over several millennia. The following chapter examines visual evidence, both photographs and satellite imagery of transformative historical processes that have shaped the contemporary Pra River Basin.
Chapter 6: Visualizing Landscape History and Transformation in The Contemporary Pra River Basin

6.1 Introduction

Through survey photographs and satellite images, this chapter examines the Pra River Basin as a landscape in temporal motion with the rhythms of human/environment historical processes (an *Annales*-influenced dwelling perspective, discussed in Chapters 1 and 2). I took several thousand photographs during pedestrian survey of sites and features to capture representative aspects of landscape transformation. When possible, satellite images captured at different points in time over the past decade are included, with the specific year the image was captured indicated in the caption. All ground photographs were taken between October 2016 and June 2017 during pedestrian survey. The transformations illustrated in these images originated at different times and are representative of various time scales. Some sites represent ancient dynamics of human-landscape transformation and others represent modern and rapid change. Grinding slick sites are representative remnants of more ancient transformational processes, while crop farming and *galamsey* gold mining sites represent activities that rapidly change the land cover along the Pra River. Although contemporary *galamsey* is often undertaken with modern methods and machinery, there remains a connection to the deeper history of the gold trade that transformed southern Ghana into an important hub of the Atlantic world trade in past centuries. Similarly, palm oil tree farming unfolds over the course of decades, but the history of palm oil in this region stretches back for several millennia. The densely treed sacred groves, forest reserves, secondary forest, and orchards of tree crops are all entwined with human activity on a slower timescale, originating in past decades and centuries, yet still undergoing drastic and rapid change due to logging throughout the vicinity of the Pra River (Figure 59). The various categories of
“forest” that compose the landscape of the Pra River Basin reflect inseparable forms of entanglement with human history and the environment (e.g. *dwelling*, see chapter 2).

![Figure 59: The remains of a recently cut large tree (possibly *Ceiba Pentandra*) tree on the bank of the Pra, near Nyame Bekyere. Oil palm tree in background.](image)

**6.2 Supomu Island: Bamboo and *Galamsey* on an Atlantic Era Settlement Site**

Supomu Island (Figure 60) exemplifies this entanglement of the “natural” and “cultural,” as well as the effacement of past landscapes by more recent dynamics. As discussed in Chapter 3, the Pra River was a shifting borderland throughout the Atlantic era, with the Supomu Island settlement being a center of contestation at times. Yet today, the landscape seen from an aerial view gives little indication of the settlement that once existed here. Most of the island and adjacent shoreline to the west and northwest is covered by dense patches of bamboo. In the mid-
nineteenth century, inhabitants of Supomu Island lived in houses built of “split bamboo covered in clay” roofed with palm leaves (cited Henige 1975:35-36) but the settlement was seemingly in decline and was ultimately abandoned by 1872 (Henige 1975:36). The preponderance of bamboo on the island may reflect Atlantic era cultivation/propagation that eventually spread across the island in the wake of abandonment. Bamboo is still used locally as a building material for wattle and daub structures in the immediate vicinity of the island (Figure 61).

Figure 60: Multispectral Worldview-3 image of Supomu Island, captured in February 2016 in false color IR (8-7-6). Radiometry adjusted via histogram equalization. Total area shown 1.63 sq. km. Width 1.56km. Center of Supomu Island approximately 5.09828408, -1.61708965. (Worldview-3 imagery courtesy of the DigitalGlobe Foundation).
Another notable feature visible in satellite imagery is a large cut through the vegetation, roughly 20 meters wide on the north side of the island created for the modern high voltage power lines that extend east to west across the river, supported by massive steel towers. Extending toward and beyond Takoradi in the west and Cape Coast in the east, this vegetation cut follows an inland path along much of southern Ghana with offshoot lines providing power to inland and coastal settlements. In the cut on Supomu, cassava, plantains, and pepper were being farmed despite the island being uninhabited (Figure 62).
Figure 62: Peppers, cassava, and plantain being grown under the large powerlines that run across the north side of Supomu Island.

The ground in between bamboo groves is so heavily pockmarked from galamsey activities in recent years (Figure 63), that Amartey (2021: 149) performed targeted excavations near the dense root bases of bamboo where intact archaeological stratigraphy could be found. Galamsey operators seem to have avoided these areas due to the difficulty of digging out the dense rhizomes. Galamsey has had a major impact on the Pra River in recent years, and many large galamsey sites along the river are readily identifiable in high resolution satellite imagery.
(see Section 6.9). A notable feature of the extensive *galamsey* on Supomu is that it is not visible in satellite imagery, as the water-filled pits are covered by a canopy of bamboo.

![Supomu Island](image)

**Figure 63: Supomu Island is heavily pockmarked by *galamsey* pits. *Galamsey* operations sometimes target archaeological sites including graves.**

Supomu Island is at once distinct in terms of its history as an island settlement in an Atlantic era shifting borderland but also illustrative of the complex interweaving of human/environment historical processes found throughout the survey area. The island has been shaped by the geological and riparian environment but is deeply entangled with human history. For example, the action of the river on the island interfaces with an embankment along the shoreline built by people at some point in the past, presumably to prevent erosion and flooding (Amartey 2021: 151). One can suppose the island would look significantly different today from the action of the river over time if it did not have this protective berm constructed around it.
Moreover, the *galamsey* which continues to reshape the island landscape, is extracting gold that is both “natural” (alluvially deposited gold) and “cultural” (gold dust and artifacts from archaeological contexts relating to the island’s long history, see Section 3.8.5). And despite being abandoned for over a century, the island’s vegetation has clearly been shaped and continues to be shaped by historical processes.

### 6.3 Grinding Slicks: Variations of Features Representing Ancient Regional Landscape Transformation

Grinding slicks are perhaps one of the most striking material traces of ancient human settlement in the Pra. These features are more thoroughly discussed in Chapter 5, where I examine them as likely remnants of past landscape transformational processes. Grinding slicks are a direct form of landscape micro alteration by people in the past (speculatively) linked to macro historical processes through which portions of the Pra landscape were transformed by human effort into agricultural communities and landscapes. At very least, the fact that these grinding slicks are so common suggests they represent a human-landscape historical process that unfolded at the regional scale (see Chapter 5 for map). The intent in this section to is to demonstrate through photographs how they manifest on the landscape and illustrate some the range of variation they have in the vicinity of the Pra. Grinding slicks are usually quite noticeable on the ground but I have been unable to discern any of these sites in multispectral satellite imagery, despite attempts with various band combinations and image contrasting techniques. The sites are either too small to be reliably visible at the available image resolutions, partially buried, or covered by a vegetation canopy.
Figure 64: Site AD26 features four granite boulders in a swamp west of Adiembra (5.15455556, -1.64191667) featuring numerous grinding slicks. Rock 1 (top left) features five long, thin slicks and two wide areas smoothed by grinding. Rock 2 (not pictured) features several wide areas smoothed out by grinding. Rock 3 (top right) featured three long parallel slicks. Boulder 4 (bottom) features at least ten long grinding slicks.

Within the Pra River Basin landscape, grinding slicks were found in a variety of locations including swamps (e.g., AD26, Figure 64), creek beds (e.g., SH14), and high on hillsides (e.g., SD595). Most were found in areas currently in some stage of shifting cultivation, but slicks were
also found inside the Pra Suhien Forest Reserve at SH14 (Figure 66) and SH21 (Figure 67). Most grinding slicks show a relatively high degree of weathering, which may testify to their age, for example, SD520 (Figure 68). Many are partially buried, including NB37 (Figure 65), SD520, and SD595 (Figure 69), making determining their overall size and counting the number of slicks impossible without excavation. Given that many of the slicks in the PRB are partially buried, it seems likely that there are grinding slick sites that have been completely buried by erosion and redeposition of soil over an extended period. Figure 64 through Figure 69 review a sample of these sites in different contexts throughout the Pra River Basin.

![Figure 65: Site NB37 is southeast of Nyame Bekyere in a bamboo grove (5.171444444, -1.591083333). Two portions of the outcrop are visible, both featuring grinding slicks. Rock 1 (left) has four long slicks and a wide flat area smoothed by grinding. Rock 2 (right) is partially buried but features at least 21 long slicks, and more are likely in the buried portion of the rock. Tape represents one meter.](image)
Figure 66: Site SH14 is north of Sekyere Heman in a tributary creek of the Pra that forms part of the southern border the Pra Suhien Forest reserve (5.214388889, -1.554583333). I counted 14 long thin slicks, found in five discrete clusters. Only one cluster is visible in this image. All slicks were in exposed bedrock in the creek and were relatively eroded. Several mature tall canopy trees, including *Ceiba Pentandra*, were adjacent to the site. Davies (1976b: 114) also reported “grinding-hollows” in the rocks near where this creek joins the Pra, which would be approximately 900m downstream from SH14.
Figure 67: Site SH21 is in a small creek inside the Pra Suhien Forest Reserve, 983m north of the forest reserve’s boundary. This creek joins the Pra approximately 806m downstream. Two wide, long grinding slicks and two shallow, smoothed grinding areas were noted in the exposed bedrock. Tape represents 1m. A network of creeks winds its way around the hilltops throughout the Pra-Suhien and I strongly suspect many more could be found but are difficult to access due to the density of the forest. This site was identified only because it was adjacent to a small footpath used by loggers and hunters.
Figure 68: Site SD520 (5.09888889, -1.62416667) was subjected to test excavation and is further discussed in Chapter 5. This site is one of the most extensive grinding slick sites I found in the immediate vicinity of the Pra. SD520 is located a low-lying area adjacent to a swamp and an occupied hamlet, 1.75km south of Supomu Dunkwa and 712m west of Supomu Island. I counted approximately 28 long, thin slicks and 8 or 9 larger grinding areas. The slicks are heavily weathered, and some areas have flaked off, presumably due to sub-florescence of the stone surface over time. Four of the slicks extend into the ground.
Figure 69: Site SD595 (5.119861111, -1.630472222) is high on a hillside cultivated with cassava, 333m north of the footpath path between Supomu Dunkwa and Kakokrom. A total of eight grinding slicks were present on two exposed portions of rock, with more probably buried. Both exposed portions featured four thin slicks. Seven atetefo sherds were noted on the surface in the immediate vicinity of the site.
6.4 Sacred Groves

As discussed in Chapter 3, sacred groves are generally patches of forest inhabited by natural (abosom) or ancestral (asaman) spirits. Many of the sacred groves in the region are also ancient settlement sites or cemeteries (Chouin 2002, 2007, 2009). The transformation from settlement to sacred grove represents a remarkable example of human-related landscape alteration playing out over centuries. Yet the following examples from the Pra River Basin illustrate they can also be sites of dramatic and sudden change.

6.4.1 Apontuado Grove (XX7): Logging at an Ancient Site

Figure 70: The Apontuado sacred grove (Site XX7), adjacent to the Pra River 500m north of the abandoned settlement site of Wawase (see Figure 3). Picture taken from the ridge just south of the grove. Intercropped maize and sweet potato are visible in the foreground (right). Nearly every aspect of vegetation in this picture reflects a degree of human influence.

The Apontuado Sacred Grove (Site XX7) is situated on a hilltop on the east bank of the Pra, 500m north of the abandoned settlement site of Wawase (see Amartey 2021). Situated at the peak of a hill, the tall trees of the grove tower over the surrounding landscape, including the Pra River (Figure 70). After permission to survey was granted and libations were poured, numerous
fragments of highly eroded *atetefo* ceramic sherds were noted near animal burrows and in soil turned up by tree falls (Figure 71). In 2017, the site was almost unidentifiable in Google Earth (see Reid 2020). However, the site stands out dramatically from the surrounding landscape in multispectral imagery, (Figure 72, Figure 73).

![Highly eroded *atetefo* sherds being unearthed by burrowing rodents inside Apontuado sacred grove (XX7).](image)

The variegated landscape shown in Figure 72 and Figure 73 is dramatically marked and shaped by historical processes unfolding in multiple temporal rhythms. All around the grove at the center of the image are farms in various stages of the clearing, farming, and fallowing process occurring over days, seasons, years, and decades. The semi-ordered rows of oil palms are reflective of the quotidian use of palm oil in local cuisine, the expansion of oil palm farming in colonial and post-colonial extractive economies (*temps conjoncturel*), and in the long-term (*longue-durée*) history of oil palm being domesticated and exploited for thousands of years in the forests of West Africa, with major implications toward the development of populous, agricultural societies. The sacred grove at the center of the image reflects long term human interface with the
landscape. The *atetefo* ceramics coming out of tree falls and animal burrows I documented during pedestrian survey in 2017 suggest the site was once inhabited in the deeper past and is now considered a place where spirits reside.

As of 2020 this grove has been cut down for the extraction of timber and cultivation of rubber (Amartey, personal communication), both of which represent enduring traces of the colonial extractive economy. While surveying I noted evidence of small-scale logging in recent years inside the grove during survey in 2016 (Figure 74) but I did not see any evidence of active logging operations. Google Earth imagery from January 2020, however, shows the site to have been greatly impacted by logging since my fieldwork, particularly on the eastern side of the grove (Figure 75). When Amartey (2021: 135) revisited the site later in 2020, the site had been completely logged in the time since the image in Figure 75 was captured. Amartey also noted a dense scatter of *atetefo* ceramics exposed throughout the hilltop. The removal of forested sacred groves from the landscape is discussed by Chouin (2009: 202–6), and a further instance of grove removal will be discussed in Section 6.4.2.
Figure 72: Apontuado sacred grove (circled) and surrounding landscape. Multispectral Worldview-3 image shown in Enhance False Color IR (8-6-3). Total area shown 5.04 square km. Width 2.17km. Center of grove is approximately 5.10784195, -1.61370043. Image captured in February 2016. (Worldview-3 imagery courtesy of the DigitalGlobe Foundation).
Figure 73: Detail image of Apontuado sacred grove (Site XX7). Multispectral Worldview-3 image shown in false color IR (7-5-3). Total area shown 42.8 hectares. Width 750m. Grove encompasses 4.07 hectares. Center of grove is approximately 5.10784195, -1.61370043. Image captured in February 2016. (Worldview-3 imagery courtesy of the DigitalGlobe Foundation).
Figure 74: Author and stump of a logged buttressed tree inside the Apontuado sacred grove. The cut tree opened the canopy, allowing direct sunlight to penetrate to the ground. Numerous stumps were noted throughout the grove. Some of these were very weathered and rotten, indicating tree harvesting had been occurring for an extended period.
Figure 75: Detail image of Apontuado sacred grove (Site XX7) in February 2020. In comparison with Figure 73 (captured in February 2016) the grove has been significantly impacted by logging, particularly on the east side. Large tree crowns are missing, and the ground is visible in some spots within the grove. Grove encompasses 4.07 hectares. Center of grove is approximately 5.10784195, -1.61370043. (Image courtesy of the Google Earth).

6.4.2 Destruction of Asemasa Grove (AS6)

Site AS6, a grove southwest of Asamasa (Figure 78), also represents a fascinating case of dramatic landscape transformation in a relatively short period of time. I noticed this grove while working with Samuel Amartey at Wawase in late 2016, as it was visible in the distance as a patch of dense forest on a hilltop. I met with the chief of Asamasa Nana Kow Tawiah II the following April to request permission to survey the area around Asamasa and enter the grove,
which was granted. The only artifacts noted in the grove were two sherds, one *atetefo* body sherd with a rouletted decoration, and a robust local earthenware, both embedded in soil pulled out from the ground by the roots of a fallen tree. I also noted evidence of active small-scale logging and rotting stumps from tree cutting in past decades (Figure 77). At the time of survey, the logging seemed to be relatively selective, so I was astonished to see more recent imagery of the site. High resolution satellite imagery from January 2020 now shows this grove to have been
almost completely effaced from the landscape (Figure 78). This dramatic change of landcover at this hilltop grove site is of course not the first time this site has been transformed by human activity. As with the Apontuado grove (Section 6.4.1), the fragmentary atetefo sherds observed in soil disturbed by treefalls suggests it was once a settlement site, signaling a much longer timeline of human-landscape transformational dynamics.

Figure 77: Evidence of small scale logging in a grove southwest of Asamasa (Site AS6). The ground is covered in fine ash where brush was burned.
6.5 Agriculture and Tree Crops: Ancient Roots, Later Introductions, and Contemporary practices

The contemporary Pra River Basin is predominantly a landscape of dynamic agriculture and tree crops. The predominant pattern of farming, as it is elsewhere throughout southern Ghana, is land rotation near a permanent settlement. In this system, land is cleared, burned, planted, harvested, and then left fallow for a number of years so that the soil can recover (Carr 2008, 2011; Boateng 1967: 63–88; Varley & White 1958: 117–80; Wills 1962: 201; Wilks 1993: 41–90). During the process of clearing, underbrush and smaller scrub vegetation are slashed and burned, the larger
brush and branches being used for the production of charcoal\textsuperscript{73} which is then sold in the market (Carr 2011: 37–38). Larger trees are, however, typically left standing. These include \textit{Ceiba pentrada}, \textit{Chlorophora excelsa}, \textit{Cyclicodiscus gabunensis}, \textit{Piptadeniastrum africanum}, \textit{Triplochiton scleroxylon} (Lane 1962: 162). This is partially due to the difficulty of felling large, hardwood trees, but some crops such as cocoa benefit from partial shade (Section 6.5.3). Ed Carr’s work at Domenase in Central Region has shown that farmers are typically aware of the deleterious effect of deforestation on local precipitation and soil health (Carr 2011: 121).

### 6.5.1 Atlantic Introductions and Intercropped Landscapes

Atlantic trade introduced or facilitated the spread of dozens of foreign domesticated plants and animals which were readily incorporated into local diet and agriculture, supporting a growth in urban populations (DeCorse 2001: 32–33). The circulation of cultivars and domestic animals from the Americas, Asia, and other parts of Africa had profound reverberations on societies of southern Ghana, not only supporting population growth at growing urban settlements but transforming the visible landscape they were selectively integrated into foodways, medicines, and overall patterns of agricultural production. It is difficult to imagine the contemporary Pra River Basin landscape without the fields and gardens of intercropped varieties of crops originally introduced\textsuperscript{74} by Atlantic trade (Figure 79, Figure 80), including pawpaw, maize, cassava, sweet potato, sugar cane, pineapple, cocoa, plantain, banana, coconut, cocoyam, citrus trees, eggplants, cucumber, capsicum peppers, etc., as well as introduced varieties of domestic animals such as chickens, geese, cats, and sheep (see Alpern 1992; Chastanet 1998; de Marees 1987: 11–12, 73)

\textsuperscript{73} Several charcoal production sites were observed during my survey in 2017. In Central Region, Carr (2011: 125–26) noted fast growing Acacia (\textit{Acacia polyacantha}) trees being grown specifically for the purpose of charcoal production, but at the expense of the future soil productivity.

\textsuperscript{74} It is certainly possible that some or even many of the crops found throughout the contemporary PRB are varieties introduced in the twentieth century. However, the historical linkage to their original Atlantic era introduction and incorporation into societal patterns of production and consumption remains relevant.
110–14, 126–30, 148–49, 158–66; La Fleur 2012; Gallagher 2016; Logan 2020; Juhé-Beaulaton 1990; Mauny 1953; McCann 2005; Miracle 1965). In some cases, introduced plants like tobacco, wildly popular as a trade good and locally grown during the Atlantic era seem to have fallen out of present local favor in the Pra River Basin, yet it is still grown and sold elsewhere in Ghana.\footnote{Public tobacco smoking is somewhat taboo in parts of southern Ghana today, but I did see occasional evidence of cigarette smoking in the privacy of small rain/cooking shelters on farms in the Pra River Basin in the form of cigarette butts and crumpled cigarette packaging. In northern Ghana near Yikpabongo, I noted tobacco plants and locally grown loose tobacco for sale in small plastic bags.}

Figure 79: A farm in the Pra River Basin. Cultivars introduced during the Atlantic period, are a major component of the farmed landscape in the Pra River Basin. This image of a farm field in the PRB shows a pineapple plant among numerous cassava plants and plantain/banana trees. Oil palms are visible on the far edge of the field.
Agricultural fields are not “archeological sites” in the traditional sense, but the process of clearing and planting the land often reveals surface scatters of archaeological materials. Most surface scatters of ceramics I documented throughout the survey areas were in fields that had been cleared or partially cleared for planting, which had exposed the soil. The process of clearing, burning, planting, harvesting, and fallowing regularly transforms the vegetated landscape, and as I argue, has been a significant historical process (or processes) linked to long term landscape transformation in the Pra River Basin. Among the most prevalent crops I observed while surveying throughout the Pra River Basin were cassava, plantain, sweet potato, cocoyam, capsicum pepper, maize, pineapple, and papaya. These crops are frequently grown in an intercropped fashion which helps manage environmental and market uncertainty (Carr 2011: 43–63), and some can produce multiple crops per year. Because of this, the intercropped agricultural landscape is continually changing. Correlating ground photographs of these crops with satellite imagery is difficult because these farming cycles change and transform at a more rapid pace than the satellite imagery available to me can capture. In other words, with the exception of more obvious tree crops like oil palm (Section 6.5.2) and cocoa (Section 6.5.3), it is difficult to know exactly what a satellite image is showing in an intercropped field without having ground level photographs from when the satellite image was taken.

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76 Rarer or absent were millet, groundnut, yams, and coffee which are important in other regions of Ghana.
77 Imaging satellites are in fact capable of capturing images in relatively rapid succession. The Worldview-3 satellite, for example, has a revisit time (temporal resolution) of around one day. But chartering a satellite for specific tasks like this are far beyond my means and are primarily used for military purposes and natural disaster monitoring.
6.5.2 Oil Palm (*Elaeis guineensis*)

Ordered patches of palm oil trees are abundant throughout the Pra River Basin (Figure 81), being grown for both consumption and sale. This abundance is clearly connected to the transition to “legitimate commerce” and colonialism. Yet it also represents a longue durée strand of continuity in oil palm as a food source. The burnt palm nuts recovered from AD31 suggests at least two thousand years of oil palm exploitation in the area. On a shorter timescale, contemporary oil palm groves reflect a cadence of agricultural human-landscape transformation that plays out over several decades, in which they are planted, mature for several years, produce palm nuts, and are eventually cut down for palm wine/akpateshi production. Atetefo ceramics
were observed as surface scatter in the vicinity of numerous oil palm parcels throughout the Pra River Basin. I do not suspect there is any direct association between the two, rather farming activity and active footpaths tends to expose the soil and reveal scatters of artifacts.

Parcels of palm oil trees are highly visible in multispectral satellite imagery (Figure 82). These oil palms are not fully mature, judging by their general height (see Figure 81 for a photograph taken from the ground at this site). Oil palm trees are frequently cut down to extract palm wine, as they have been at least since the early Atlantic era (de Marees 1987: 78–79, 164–66). The oil palms pictured in Figure 81 and Figure 82 have all been cut down as of January 2020 (Figure 83) for palm wine/akpateshi production. Numerous palm wine production sites were encountered during survey where trees were being cut and tapped (Figure 84-Figure 86).

Figure 81: Oil palm trees south of Supomu Dunkwa (5.10883, -1.61647). These trees are visible in the circled area in Figure 82.
Figure 82: Partially harvested patch of oil palm trees south of Supomu Dunkwa (circled). Ordered rows of oil palm are highly visible in multispectral satellite imagery. The photograph in Figure 81 was taken inside the circled area. The bald patch inside the circle was previously full of oil palm trees but they had been cut the previous year (Figure 83). This patch of trees was located at 5.10883, -1.61647. Pra River at center of image. Apontuado sacred grove in southeast section of image. Worldview-3 image in false color IR band combination (8–7–6). Image captured February 2016. (Worldview-3 imagery courtesy of the DigitalGlobe Foundation).
Figure 83: (Top) The same parcel of oil palm trees in 2015, a year before the image in Figure 82 was captured, showing an intact lot of trees. (Bottom) Image captured in 2020 shows the parcel to be entirely harvested and other forms of vegetation are growing. Also note the changes to Apuntuado sacred grove; many of the large tree crowns in the 2015 image are no longer present in the 2020 image. See Section 6.4.1. (Images courtesy of Google Earth).
Figure 84: Palm wine harvesting in a second area south of Supomu Dunkwa (approximately 5.108119, -1.626569). The blue barrels are full of fermenting palm wine that has been harvested from recently cut and tapped oil palm trees in the vicinity.
Figure 85: Palm wine harvesting in a second area south of Supomu Dunkwa (approximately 5.108119, -1.626569). Cut and tapped oil palm tree visible to right.
6.5.3 Cocoa (*Theobroma cacao*)

As discussed in Chapter 3, cocoa (*Theobroma cacao*) was introduced in the late eighteenth century to Ghana. A tree native to South America, these trees are an artifact of early colonial economic initiatives and their legacy in the contemporary global capitalist system. While some
cocoa beans are manufactured into chocolate in Ghana, most end up exported to chocolate producers abroad. The scale of cocoa production in the Pra River Basin over the twentieth century is hazy, but the adjacent Eguafo-Abrem area was characterized as center of cocoa (and palm oil) production in the mid 1950’s (Carr 2001:17). Presently, cocoa is locally grown as a cash crop, and small orchards of cocoa trees are dispersed throughout the Pra landscape. The mature cocoa grove which partially covers the abandoned settlement of Wawase (Figure 87) clearly post-dates the site’s abandonment in the 1960s (Amartey 2021: 127). The AD31 iron smelting site (see Chapter 5) is also situated in a young cocoa tree grove (Figure 88).

Figure 87: Part of the abandoned settlement site of Wawase is now covered by a cocoa tree orchard, which post-date the site’s abandonment in the 1960s. Samuel Amartey directed excavation and test units inside the orchard during his fieldwork in late 2016 (see Amartey 2021).
Figure 88: Young cocoa trees interspersed with mature shade trees covers much of the AD31 iron slag mound site. This cocoa grove is still in the process of being established.

In multispectral imagery, cocoa orchards can be distinguished by their extremely high reflectivity of NIR energy. In Figure 89, a hilltop cocoa orchard (site BE501) appears almost white (top image), and when the radiometric values are inverted, the grove appears almost black (bottom image) in contrast to the surrounding landscape of intercropped fields, palm oil groves, and fallowed land. No artifacts were noted but ground visibility in this orchard was extremely poor due to the density of dead cocoa leaves. *Atetefo* sherds were found throughout the adjacent fields, however, which had been recently cleared for planting (Sites BE502, BE503, BE504).
Figure 89: (Top) Multispectral image of Site BE501 (5.152389, -1.612111), a cocoa orchard north of Beposo (circled). A second orchard is visible just north of this site. Cocoa orchard covers 1.2 hectares. Pictured area 57.6 hectares. Worldview-3 image, captured February 2016 in false color IR (8–7–6). (Bottom) The same image with inverted radiometric values (courtesy of the DigitalGlobe Foundation).
6.5.4 Rubber (*Funtumia* spp. & *Hevea brasiliensis*)

The late nineteenth to early twentieth century rubber boom exploited wild *Funtumia* trees (Chapter 3), but the contemporary rubber industry is centered around cultivation of *Hevea brasiliensis* (Addae-Mensah & Eastin 1991). The transition to plantation cultivation of rubber can be traced to experiments by the colonial government and private entities around 1900-1914 (Dumett 2013: 39). Today, Western Region is a major area of production (Tangonyire 2019: 1–2), including in the vicinity of the Pra. In one of the larger fields I surveyed, flakes and *atetefo* sherds were recorded amidst young rubber trees 1.2km southwest of Atwereboanda (Sites AT21 and AT20, Figure 90). The field in Figure 90 was formerly covered in oil palm trees which have been felled for palm wine/*akpateshi* production. A satellite image of the field, captured in January 2020 (Figure 91) shows the rubber trees to have made significant growth in the three years since the photograph in Figure 90 was taken. The rows of immature rubber trees form a pattern distinct of vegetation in contrast with the standing patches of oil palm trees in the northeast, west, and southwest portions of Figure 91. In a span of roughly five years, the vegetation transformed from mature oil palms to young rubber trees. The artifacts in the field, flaked quartz and *atetefo* ceramics, indicate a much deeper history, perhaps cycles of transformation through human labor for millennia.
Figure 90: Sites AT21 (5.075028, -1.628472) and AT20 (5.074444, -1.626556) Young rubber trees being cultivated. This field was previously covered in palm oil trees which were cut down for palm wine/akpateshi production. Trunks of the felled oil palms are visible throughout the field. Flaked quartz and atetefo ceramics were observed on the surface of the field.
Figure 91: Sites AT21 and AT20, 1.3km southwest of Atwereboanda. This satellite image, captured in January 2020, three years after the photograph in Figure 90 was taken. The rubber trees have grown significantly in this time. Oil palm trees are visible in the northeast, west, and southwest portions of the image.

6.6 The Pra Suhien Forest Reserve: a Forest of History

The Pra Suhien Forest Reserve Block One was established by the colonial government in 1928 (Block 1, 82 square km). Five years later, another 104 square km was added to the reserve (Block Two). The reserve was continuously logged between 1975-1991 with around 2894 trees being harvested during this period (Hawthorne & Abu-Juam 1995: 181). Despite the logging, the legacy colonial forestry policy and its continuance in contemporary forest reserve management can be seen on a very large scale in a Worldview-3 image of the Pra River that has been subjected to stretching and contrast manipulation (Figure 92). Here, the image on the left is an
unaltered natural color band combination (5–3–2). Cloud haze and Harmattan dust partially obscure the landscape, and the contrast is poor. However, the image on the right displays a contrast-adjusted vegetation band combination (7–6–5) that highlights minor variations in infrared energy, thus revealing the outline of the Pra Suhien forest reserve (Figure 92, right). The same techniques were used to enhance the visibility of the forest reserve in a Worldview-2 Image (Figure 93). Despite the stark contrast with the farms and fallow lands near the forest edges, my survey documented a significant amount of small-scale logging, particularly targeting high-value mahogany trees (Figure 94). Trees are felled and cut into boards with chainsaws and carried out by hand.

In the Pra Suhien Forest Reserve Block 1 north of Sekyere Heman, I identified *atetefo* ceramics and grinding slicks that may have been associated with early agriculturalists of the Pra River Basin (Figure 66, Figure 67). Oil palms were also occasionally found throughout the forest. These indicators are suggestive that this tall forest is not a relict ancient forest, and perhaps has been more impacted by human influence over the past several millennia than generally recognized.

Venturing into speculation, Pra Suhien landscape and larger area of the Pra River Basin may have been partially deforested or thinned out by early intensive foraging or agricultural societies beginning between the first millennium BCE and mid-first millennium CE and subsequently undergone a later process of reforestation, possibly connected to the event(s) that led to the abandonment of earthwork sites like Akrokowa in the fourteenth century CE (Chouin & DeCorse 2010: 142). Burnt palm nuts, signaling the presence and probable exploitation of oil palm trees, have been found in several excavated contexts in the Pra River Basin and immediately adjacent areas dated to this period, for example AD31 (Section 5.7.1), Wawase
As discussed in Section 3.5, oil palms require direct sunlight and do not thrive in tall canopy forest. These sites are outside the official bounds of Pra Suhien Forest Reserve but the prevalence of burnt palm nuts at contemporary sites indicates this was a broadly regional pattern of exploitation, possibly connected to the grinding slicks found within the Forest Reserve (see Section 7.3). In present day Nigeria, we can glimpse a parallel dynamic in areas once inhabited by agriculturalists associated with “Nok Culture” materials (roughly contemporary with early mid-first millennium BCE- mid first millennium CE agricultural societies of the Pra River Basin) that have also transformed into forest in the present (Rupp 2010). Early nineteenth century European commenters noted a process of reforestation occurring in the vicinity of destroyed towns and abandoned farms at the Fante/Asante frontier near Assin and we can imagine similar processes of revegetation in the wake of Atlantic era warfare in the vicinity of the Pra (see Chapter 3). Reforestation in the aftermath of Atlantic era political strife has also been proposed in the vicinity of Benin Kingdom in Nigeria (von Hellerman 2010). The area around the Pra Suhien was significant in the early phases of the wild Funtumia rubber room in the early 1880s through the turn of the century (see Chapter 3; Dumett 1971), likely destroying most of these tall canopy trees in the environs. Later, colonial era forestry policy in the Gold Coast both facilitated logging and outlined protected areas that remained or returned to tall forest. The shape of the contemporary Pra Suhien forest landscape is quite clearly a manifestation of colonial-era forestry policy that outlined its polygonal boundaries, which are dramatically revealed in multispectral satellite imagery (Figure 92, Figure 93).
Figure 92: Worldview-3 image of the Pra River and the Pra Suhien Forest Reserve: a natural color (5–3–2) image (left) and a vegetation (7–6–5) image with infrared band combination highlighting vegetation patterns (right). The pictured area is approximately 13 km and encompasses 496 square km (Worldview-3 imagery courtesy of the DigitalGlobe Foundation).
Figure 93: Worldview-2 multispectral satellite image of the Pra Suhien Forest reserve, adjacent to the Pra River. Image shown in false color IR (8-4-2) with contrast enhanced via Gaussian stretch. The polygonal boundaries separating tall canopy forest from adjacent farmed/fallowed land are a manifestation of colonial/post-colonial forestry policy. Pictured area approximately 200 square km. Center of image approximately 5.25436804, -1.54142071. Worldview-2 image courtesy of DigitalGlobe Foundation.
Evidence of small-scale logging was found throughout the Pra Suhien Forest Reserve during survey. Left—Tree is roughly milled into boards by chainsaw, which are carried out of the forest on footpaths. No site designation, but approximately at the coordinates of 5.235833, -1.545000. Right—A felled tree, not yet processed into boards (Site SH24).

6.7 Other Logging

Logging is not limited to sacred groves and forest reserves; felled trees, rotting stumps, and depressions in the ground that were described to me as old saw pits were relatively common features throughout the Pra River Basin landscape (Figure 95). Contemporary logging recalls both the Atlantic era canoe building industry and colonial era high-value tree extraction (Chapter 3). The hull of many large fishing canoes used throughout coastal settlements are constructed in a dugout manner from the trunks of massive trees to which planking is added to increase the freeboard of the vessel. The sound of chainsaws echoing in the distance could heard on most days in more northern survey zones near Sekyere Heman and Nyame Bekyere. As with galamsey (Section 6.9) much of this industry appears to be operating illegally in the view of the state,
particularly logging occurring in the forest reserve. Yet economic and political realities in the region make these industries unlikely to abate in the foreseeable future without some sort of broader economic intervention.

Figure 95: The remains of large silk cotton trees that had been logged near the Pra River. Note the large galamsey spoil mound in the far background of the top image on the far bank of the river, behind my assistant Yaw.
6.8 Secondary Forest: Fallowing and a Middle Stage of Forest Transformation

The predominant pattern of farming in the Pra River Basin, and elsewhere throughout southern Ghana is land rotation near a permanent settlement. In this system, land is cleared, burned, planted, harvested, and then left fallow for a period of several years so that the soil can recover (Wills 1962: 201; Boateng 1967: 64, 76–77; Wilks 1993: 41–90; Carr 2008). When fallowed, fields are often quickly occupied by *Musanga cecropioides* (umbrella tree), or other species such as *Terminalia, Alchornea cordifolia, Baphia nitida, bridelia spp. Macaranga spp., myrianthus spp., Phyallanthus spp. and Trema guineensis*. If the field is left alone, it will revert to secondary forest. Umbrella tree is among the most common and distinctly noticeable species on fallowed land and secondary forest in the Pra River Basin. This is fairly typical for the region, as *Musanga* (umbrella tree) tends to be very common on fallowed land in southern Ghana for the first 20 years or so (Lane 1962: 162).

During survey I encountered numerous patches of forest that were almost certainly secondary forest based on the preponderance of umbrella trees (*Musanga cecropioides*) and the general middling height and thickness of other varieties of trees (e.g., Site NB27, shown in Figure 96). However, these were not sacred groves as far as I was able to ascertain by inquiring with farmers in the vicinity. These patches sometimes have oil palm or coconut palm trees interspersed within them (Figure 97). The canopy can be relatively tall, but the trees usually lack the thickness of mature trees (Figure 96). These patches of forest may be later-stage fallow land that was left long enough to gain significant traction toward reforestation. Such patches of secondary forest might represent a mid-stage of forest landscape transformation. In multispectral satellite imagery these areas are characterized by a dense pattern of vegetation that lacks large tree crowns (Figure 98). The cleared areas to the immediate south, northwest, and northeast of
the secondary forest patch at NB27 were under cultivation, primarily with cassava but cocoa, plantain and oil palm were also noted (Figure 98).

Figure 96: Umbrella tree in a patch of secondary forest (Site NB27)

Figure 97: Site NB27 north of Nyame Bekyere. Oil and coconut palms were often noted in areas of secondary forest/fallow land, interspersed among other trees and vegetation.
Figure 98: Patch of secondary forest or very late stage fallowed land north of Nyame Bekyere (Site NB27), circled. The photographs in Figure 96 and Figure 97 were all taken within this patch of forest. Center of forest patch is located at 5.18416415, -1.59106129. Pictured area 1.53 square km. Width 1.3km.

6.9 *Galamsey*: Change and Continuity in Gold Extraction Along The Pra River

Abundant evidence of *galamsey* gold mining was documented along the Pra River during survey. As discussed in Chapter 3, the availability of gold was a significant factor in the Atlantic history of the Pra, but significant mining activities in recent years has marked the landscape with accumulated spoil mounds and large pits dug out near and along the riverside. Dredge rafts in the water, sluices on land, and heavy machinery were noted at active mining sites (Figure 99 through Figure 104). These operations pose a significant hazard to water quality, and locals at Supomu
Dunkwa reported the river being muddy brown since the mid-2000s due to a significant expansion of *galamsey*. These operations sometimes target archaeological deposits because gold dust and artifacts are often found. At Supomu Island, *galamsey* operations have heavily disturbed and destroyed archaeological contexts including graves (Figure 63). During a visit to Eguafo in late 2016, *galamsey* operations were actively digging out archaeological deposits and sluicing the soil (Figure 105). Seventeenth and eighteenth century imported European trade materials, *Nyame Akuma*, *atetefo* and robust ceramics were strewn around in disturbed areas. A notable aspect of *galamsey* along the Pra is the involvement of foreign nationals. A Chinese crew of “sand miners” was staying in Supomu Dunkwa during my fieldwork and was conducting some of the operations along the river. The legality/illegality of *galamsey* is a complex topic, deeply enmired in politics, overlapping networks of state and traditional authority, and the involvement of foreigners and foreign capital (Aidoo 2016). Hence, while small scale mining operations might be operating without official permits from the state, they would not be able to operate without navigating local structures of authority. The entanglements of *galamsey* are not only political, but spiritual; gold has significant meaning within traditional Akan cosmology and contemporary *galamsey* is enmeshed with religious/spiritual practices (Meyerowitz 1960: 197–207; Rosen 2020). Eighteen years ago, Kankpeyeng and DeCorse (2004) sounded the alarm at the unmitigated destruction of Ghana’s archaeological past due to development and *galamsey* operations. Unfortunately, in parts of the Central and Western regions, it continues unabated.
Figure 99: Active *galamsey* rafts on the Pra River near Nyame Bekyere (Site NB13).

Figure 100: *Galamsey* operation (Site SD617) south of Supomu Dunkwa, on the west bank of the Pra River. Dredge rafts are being used to pump sand and soil onto the shore into sluices to extract gold. Heavy machinery was also present, which was used to clear vegetation and move sand from the spoil mound.
Figure 101: *Galamsey* site SD617. Sluices (top) and large spoil mound (bottom).
Figure 102: Site SH25. *Galamsey* dredge rafts and large spoil mounds in the Pra River near Sekyere Heman.

Figure 103: Site SH7. Large *galamsey* pond (foreground) adjacent to the Pra River (visible in top left of image) near Sekyere Heman. The soil has been dug out and washed for gold. Picture taken standing on an earthen bank of spoil left behind by past *galamsey* operations at marked point in Figure 104. Numerous large ponds like this are present along the river from *galamsey*.
Figure 104: *Galamsey* ponds near Sekyere Heman along the Pra River. Four ponds are present on the east side of the river (Site SH7), and a connected complex of ponds is present on the west side of the river. The picture in Figure 103 was taken from the location marked SH7, facing northwest.
Figure 105: Galamsey at Eguafo. Gold dust was being recovered from archaeological contexts. Seventeenth- and eighteenth-century artifacts including imported ceramics, imported pipes, brass manillas, beads, and gun flints were strewn around in the disturbed soil. Numerous fragments of local ceramics, including partially complete vessels were also being uncovered by the digging.

Areas along the Pra highly impacted by galamsey are visible in high resolution satellite imagery. While viewing a multispectral image adjusted to highlight water and sand, I used the Feature Counting tool in Erdas Imagine to mark galamsey ponds and sand reefs along a stretch of the Pra 33km long north of Nyame Bekyere. I used sites identified during pedestrian survey near Nyame Bekyere and Sekyere Heman (e.g. Sites SH7 and SH25, see Figure 102, Figure 104) as a guide for identifying similar sites in satellite imagery. I counted a total of 153 areas highly impacted by galamsey (Figure 106, Figure 107) along this 33km stretch of the Pra. Given the age of this image (2016), it cannot be considered current. However, the extensive significant impact
of *galamsey* along this part of the Pra is evident. Discussions I had with townspeople and farmers throughout the PRB suggested a significant increase in *galamsey* in the past decade.

Figure 106: This stretch of the Pra is 500m west of the Pra Suhien Forest Reserve. Areas highly impacted by *Galamsey* (ponds and sand reefs) are marked with red circles. Multispectral Worldview-3 image shown in false color IR (7-5-3). Total area shown 84.7 hectares. Width 1km. Center of image approximately 5.28167476, -1.59056196. (Worldview-3 imagery courtesy of the DigitalGlobe Foundation). Image captured in February 2016.
Figure 107: 153 areas highly impacted by galamsey (circles) along the Pra north of Nyame Bekyere near the Pra Suhien Forest Reserve. The arrow indicates the area shown in Figure 106. Worldview-3 image, captured in February 2016 in false color IR (7-5-3). Total area shown approximately 300 square km. Width 13km. The stretch of the Pra shown in this image runs about 33km. (Worldview-3 imagery courtesy of the DigitalGlobe Foundation).
6.10 Conclusion

Adopting an *Annales*-influenced *dwelling* perspective provides an impetus to examine the landscape as something integral and inseparable from the human history that has unfolded here. The imagery of sacred groves, forest reserves, tree crops and agriculture, grinding slicks, and *galamsey* in this chapter represents only a fraction of entangled history of the Pra, but they offer fragmentary insight into a landscape in motion with the rhythms of history and human life. The material remnants of historical processes dispersed throughout the landscape testify to millennia of change, even if our understanding of ancient de/re-forestation, and agricultural practices remain incomplete and speculative. Agriculture and exploitation of palm oil trees extends at least two millennia into the past in the vicinity of the Pra. Yet the centrality of crops introduced in the Atlantic and colonial eras in contemporary agricultural practices underscore radical forms of difference from the deeper past. The agriculture-related transformational dynamics I observed throughout the Pra likely bear little semblance to the processes that altered this landscape from the first millennium BCE through the mid-second millennium CE. Similarly, gold was being extracted from the alluvial soils of the Pra for use and long-distance trade long before the arrival of the Europeans. The immense amount of gold available for trade to the newly arrived Portuguese in the fifteenth century testify to this fact, and gold was a critical influence on early African-European encounters (see Chapter 3). The availability of gold still attracts foreigners, although most are no longer European.\(^\text{78}\) Contemporary *galamsey* retains a historical linkage to

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\(^{78}\) I was often initially regarded as an *“Oborɔnyi China”* by people that did not know me, due to the perception that I was involved in *galamsey*. This perception cut across ages and professions and occasionally prompted friendly arguments over whether I was an *Oborɔnyi* China or not. Chinese miners are by far the most commonly seen foreigners in the area, despite the relative proximity of the coastal highway and tourism industry in coastal settlements like Elmina and Cape Coast. Excluding Chinese miners, I saw no other *Oborɔnyi* in my research area except two white missionaries on the main road and the occasional chauffeured vehicle waiting to pay the bridge toll at Beposo on the coastal highway.
these more ancient practices of extraction, but the actual processes of extraction are very different, involving gasoline-powered dredges/water pumps and heavy machinery which quicken the pace of extraction, leaving large ditches, tailing ponds and sand reefs in their wake. Thus, a modicum of historical continuity can be identified in the examples of oil palm and gold mining, but their present reiterations are profoundly different from the deeper past.
Chapter 7: Reflections

This dissertation has examined the Pra River Basin through lenses of landscape, time, and transformation (an Annales-influenced dwelling perspective). What has been revealed is a fragmented landscape profoundly shaped by at least three and possibly eight millennia of entanglement with its human history. As I have shown, nothing can easily be considered solely “natural” or “cultural” in this landscape, and this binary is ultimately an impediment for understanding these transformations. Rather, the Pra River Basin has been synergistically formed, reformed, altered, effaced, and inscribed by the entangled rhythms of human/environmental historical processes for millennia.

This chapter offers reflections and future directions on several key elements of this dissertation. The first (7.1) revisits the “denaturalization” of the Pra. The second (7.2) offers commentary on the present and future possibilities of incorporating satellite imagery within multifaceted archaeological research methodologies. The third (7.3) considers prospects and uncertainties surrounding pre-Atlantic material culture. The fourth (7.4) reviews and reflects on transformations of the forested landscape of the Pra River Basin.

7.1 On Nature and Culture

After penetrating through a thicket of five or six hundred paces, we suddenly found ourselves in a forest as magnificent as it was dense and intricate. Numerous plants and creepers of all dimensions chained tree to tree, and branch to branch, clustering the whole in entanglement, so that it sometimes became necessary to cut an opening as we proceeded. In this operation we were considerably retarded, and our clothing suffered much from the rude assaults we sustained from the trunks of trees and impending boughs. Nor was this the only inconvenience; for notwithstanding we were continually on the alert in watching these formidable obstructions, we could not avoid receiving some slight contusions, and scratches. The opacity of this forest communicated to the atmosphere and the surrounding scenery a semblance of twilight; no ray of sunshine penetrated the cheerless gloom, and we were in idea entombed in foliage of a character novel and fanciful (Dupuis 1824: 15–16).
There is a long history of the forests of Southern Ghana, and West Africa more broadly, being depicted as a “natural” barrier, penetrated only with difficulty, and an obstacle to notions of “cultural” or “civilizational” progress (Dupuis 1824: 15–16; e.g. Boyle 1874: 206–7; Maquet 1972: 85–86; Wilks 1993: 41–42, 77–78; McCaskie 1995: 9; Shumway 2011: 26–27). It has persisted into recent decades for a number of reasons, among them the lasting influence of cultural evolutionary theories and agendas (Tylor 1871; Morgan 1878; Stahl 2001: 13–15), and the influence of Ivor Wilks’ “big bang” theory of Akan sociopolitical development (Wilks 1978, 1993, 2005), and the dearth of forest zone archaeological research. It is unnecessary to further probe Wilks’ model as it has been thoroughly critiqued (Klein 1994; Chouin 2007, 2009, 2012; Chouin & DeCorse 2010; Pavanello 2011). The work of Chouin is particularly important, not only in dismantling the “big bang” theory, but in that it archaeologically challenged the notion that sacred groves were simply remnants of “natural” primeval forest, and in some cases, were quite clearly ancient settlement sites. This challenge to the “naturalness” of these forest patches, and the exploration of their complex, long-term history, was a starting point for the research in this dissertation.

It has been my intent to investigate and reimagine the entire Pra River Basin landscape, and the human relationships with it, beyond the constraints of a nature/culture binary, as it has contributed to the reproduction of restricted visions of the past. I examine the PRB landscape as a reflection and product of human actions in various temporal rhythms, creating and transforming the landscape as a fundamental part of its inhabitants (past and present) being-in-the-world (Ingold 1993, 2000, 2002; Heidegger 2009). The philosophical emphasis here is on process, over that of form or essence, and the landscape is more than a backdrop of human activity: it is something recursively shaped through historical processes, which reciprocally
shape human life. Yet this *dwelling* perspective presents challenges as it collides with western orderings of the world, which are embedded deeply in the English language, e.g., the separation of subject (human / human activity) and object (influence on the landscape), which echo the very nature/culture binary I have sought to challenge. I have found no easy solution for this without a loss of clarity in meaning. It should simply be understood that I am referencing something more integrated and organic when I refer to human *influence* on the Pra River Basin landscape. Considering the broader field of landscape archaeology, dismantling a reified nature/culture binary could open many productive lines of deep time inquiry. This is particularly true in West Africa, where so little is known about the earliest eras of human habitation.

### 7.2 On Aerial Visions

Distinct insights on the complex and transformative human relationships with the PRB landscape have been gained through the incorporation of satellite imagery into a multifaceted, field-based methodology. As I have shown, the Pra River Basin has been shaped by processes of human history, and when grounded with fieldwork, many can be traced in satellite imagery. Whether longer-term influences or rapid transformational dynamics, the entire PRB landscape has some human aspect; the farms, fallow land, forest reserves, sacred groves, logging operations, and *galamsey* gold mining that characterize the Pra River Basin can be witnessed in aerial imagery. The potential of satellite imagery has only just begun to be explored in West African contexts (Davis & Douglass 2020).

When I began this research, imagery of the Pra River Basin available on Google Earth was primarily Landsat imagery, the resolution (30m) of which is far too low for most archaeological purposes. In the past several years, however, the coverage of areas captured by very high-resolution imagery in Google Earth has expanded dramatically. Most of the PRB is
now overlapped by images captured at different times, enabling the comparison of imagery. Through such comparisons, the pace and scale of historical processes acting to transform the landscape can be witnessed. There is every indication that Google Earth imagery will become increasingly useful in tracking and assessing landscape change in the PRB and broader region as newly captured images continue to be added. Conversely, the availability of very-high resolution multispectral for researchers has diminished. From 2007-2019, DigitalGlobe provided free VHR multispectral imagery to researchers through the DigitalGlobe Foundation imagery grant program. It was through one of these imagery grants I obtained the Worldview-2 and Worldview-3 imagery employed in this dissertation. After being acquired by another company in 2017, DigitalGlobe was renamed Maxar (Maxar 2017), and the DigitalGlobe Foundation was quietly shuttered a year and half later. VHR multispectral imagery is available for purchase, but the cost is extremely prohibitive. As noted by Casana (2021: 177), Maxar’s primary customer is the U.S. government yet imagery paid for with public funds is not made available to researchers without purchase. Until this situation changes, the unfortunate reality is that multispectral imagery will play a narrow role in future West African archaeological endeavors.

7.3 On Stone, Iron, and Ceramics

The archaeology presented in this dissertation, alongside recent work in the area (Amar tey 2017, 2021; Reid & Amartey 2019), has begun to peel previously unknown temporal vistas of human habitation of the Pra River Basin. This temporal expansion has major implications for our understanding of longue durée human entanglements with this landscape. The earliest glimpse comes from the bottom of the trench at AD31, in which stone flakes were found in a context dated to the early seventh millennium BCE. A single radiocarbon date and a few flakes are not enough to revise the occupational history of Southern Ghana, and it is possible the date is not
directly associated with the flakes which may very well be more properly associated with the later first millennium BCE activity at the site. But it is enough to imagine that it could be. Or, even if we disregard the flakes, to imagine that the burnt organic matter from which the date is derived is not just “natural,” but is instead communicative of something about human occupation in the seventh millennium BCE. This date is not entirely an outlier—an early sixth millennium BCE date was recovered from the context below the earthwork ditch at Akrokrowa (Chouin 2009: 540–46; Chouin & DeCorse 2010: 136–37). Moreover, paleoclimatic reconstructions in Southern Ghana situate these dates well within the African Humid Period, an extremely rainy and humid climatic event extending from around the middle of the eighth millennium BCE through the second millennium BCE (Hassan 1997: 223; de Menocal 2015). In the spirit of my ongoing interrogation of the “natural,” I do not believe these dates can be easily dismissed as some sort of “natural” phenomenon like a brush fire, particularly considering the available paleoclimatic data. Even today in a significantly drier climate than that of the African Humid Period, almost all brush and forest fires are a result of human activity (Agyemang et al. 2015).

Moving several thousand years forward in time, a vision of the Pra’s human history begins to come into better focus. Radiocarbon dates from AD31 suggest occupation or use of the site in the mid-first millennium BCE through the early- to mid-second millennium BCE, associated with atetefo ceramics, flakes, burnt palm nuts, stone beads, and slag, roughly comparable in date and material culture to that excavated by Amartey (2021) at Wawase. More significant than considering AD31 and Wawase as distinct sites however, is the fact that the Pra River Basin is full of remarkably similar hilltop sites with surface scatters atetefo ceramics. It is entirely possible, and in my view likely, that AD31 and the hilltop at Wawase are just two of many such sites that were either inhabited contemporaneously or in shifting succession from the
mid-first millennium BCE through the early-to-mid second millennium CE. A targeted program of test excavation at the hilltop sites I identified could provide comparative data to better situate how these hilltop sites relate to each other. There is also variability in paste color, temper, and frangibility within what I inclusively categorize as atetefo ceramics, which has been noted by others working in the area (Amartey 2021: 164–65; Chouin 2007: 673–74; Spiers 2007: 141–43). The significance of this, if any, remains uncertain. In the test excavation at SD610, these variations were present in the same context (Section 5.3.3). Atetefo sherds from the lowest ceramic bearing levels of AD31 (mid-first millennium BCE to first millennium CE) were somewhat more eroded, frangible, and fragmented (see Appendix D) than the sherds found in the primary iron slag context (thirteenth or fourteenth century CE). Thus, there may have been at least three stages of local paste or firing technique improvements from early atetefo, to later atetefo, to robust ceramics. In any case, the material culture of this period, and the fact that it is widely distributed throughout the Pra River Basin, suggest tremendous changes in the landscape through the expansion of agriculture, settled communities, and smelting of iron; which may have been associated with some degree of deforestation (Goucher 1981).

The excavations at AD31 have offered both insight and produced further questions about the production of iron in the Pra River Basin. The primary layer of slag dated to the thirteenth or fourteenth century CE, and is probably contemporaneous with the slag found in the upper levels of the pre-Atlantic horizon at Wawase (Amartey 2021: 178). But I also noted very small amounts of slag and furnace in levels 8 and 9, which dated to the mid-first millennium BCE through the mid-first millennium CE. My interpretation of this in Chapter 5 (Section 5.7.1.4) is conservative given that the overlaying context is almost completely slag, and it may simply represent ancient disturbance through rodent or tree root action, although there was no direct indication of this.
Yet, it does raise questions worth pursuing through future excavations at this site. The latter portion of this date range would be a couple hundred years before the seventh to eighth century CE contexts at Coconut Grove (DeCorse 2005), and the earlier portion of this date range would be concurrent with the earliest known iron smelting sites in Ghana, north of the forest zone (Stahl 1994: 79–82). Thinking forward in time, the early-mid seventeenth century slag mound at Abaka (Chouin 2009: 491–95, 723–25), represents regional continuity of iron production several hundred years after the bulk of the smelting occurred at AD31. Notably, atetefo ceramics underlay the slag mound at Abaka but were not found in the primary slag context as they were at AD31.

Despite the ambiguity surrounding grinding slicks, it is my view that they signal something extremely important for understanding ancient transformational processes that occurred in the Pra River Basin (and elsewhere in southern Ghana). I have argued they are likely related to the expansion of communities practicing intensified exploitation or agriculture throughout the PRB, and perhaps associated with patchwork deforestation or shifting agriculture over time. This would roughly situate these features between the mid-first millennium BCE and the early second millennium CE. It is important to emphasize these slicks are throughout the landscape, on hills, hillsides, swamps, creeks, and in the tall canopy forest, directing our attention to the ebb and flow of a forested landscape entangled with human history for at least several millennia. A productive area of future research could be directed at further excavation of areas around these grinding slicks to concretely associate other forms of material culture that would shed light on their production, including dateable organic materials. The significance of this would better anchor our temporal understanding of what these features represent and how
they might illuminate transformational processes that I strongly suspect dramatically altered this ancient landscape.

### 7.4 On Forests of Transformation, Past and Present

Unpacking the fragmentary history of the Pra River’s forested landscape is difficult, as all we have are glimpses of events and processes originating at different time periods. Early agricultural societies inhabiting hilltops may have cleared or thinned out trees for oil palm, which requires direct sunlight to thrive. When iron metallurgy began, hardwood trees were probably cut and burned for charcoal, but the scale of this is difficult to determine. Tall forest likely rebounded in the wake of abandonment and depopulation, possibly related to a fourteenth century intercontinental pandemic (Chouin & DeCorse 2010). The forest reclaimed abandoned settlement sites, some of which would be later recognized as sacred groves. The Atlantic trade brought numerous new cultivars like cassava, maize, and pineapple which were readily incorporating into the existing system of swidden agriculture. By this time, it is likely that clearing/burning/farming/fallowing cycles of shifting cultivation had cyclically transformed the landscape for well over a millennium or more, not only turning forests into farms but farms into forest when fallow land is abandoned. Atlantic era warfare and political instability, concurrent with the growth of coastal settlements, may have depopulated portions of the Pra River Basin which subsequently reafforested. Yet trees were being cut near the Pra for the canoe industry, and then by the late nineteenth century, for export timber. The colonial export economy of timber, palm oil, and cocoa has also left its mark, clearly echoing well into the present post-colonial era. It is notable that much of the material culture distributed throughout the Pra River Basin reflects pre-Atlantic or very early Atlantic settlements, but the contemporary forest and vegetation reflects more recent historical processes; not only Atlantic crop introductions but
particularly nineteenth and twentieth century colonial economic and forestry policies. This speaks to the impact of these colonial era historical dynamics and how they continue to resonate: the productivity and profitability of these crops, the extraction and export of timber, and the ongoing utility of forestry control policies to the current governing structure. These are all excellent examples of long-term historical dynamics that have overwritten previous iterations of this landscape.

This sketch of the forest’s history illustrates some of the complexities of untangling the landscape of the Pra River Basin in connection to processes occurring at intercontinental, regional, and local spatial scales or, imagined historically, processes resonating at various temporal rhythms and echoing through the pre-Atlantic, the Atlantic, the colonial, and the post-colonial. The human/environment historical processes that have transformed the Pra River Basin could be recognized from the vantage of many other spatiotemporal categories and frames of reference, yet through this research we have begun to glimpse how processes unfolding in the past and present were/are entangled with the global, just as quiet echoes of the pre-Atlantic and Atlantic are alive in the present palimpsestic landscape that concedes little to strict reifications of the “natural” and “cultural.”
Appendix A: Survey and Excavation Forms

FIELD RECORD

Site Name: ___________________________  Date: ___________________________
Locus/Unit: ___________________________  Recorder: ___________________________
GPS Reading: ________________________ (LAT) ________________________ (LON)
Level: ______________________________  Excavator(s): ________________________
  Description: ________________________  Photos: ____________________________
  Depth/Size: _________________________

Description of soil (color, Texture, Charcoal content)

Summary of artifacts

Additional Field Observations (note features, disturbances)

Indicate North:  

Key

Scale
### SHOVEL & AUGER TEST PIT RECORD FORM

**SITE:**

**DATE:**

**LOCUS:**

**RECORDE:**

<table>
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<th>Depth</th>
<th>SOIL COLOR &amp; TEXTURE</th>
<th>ARTIFACTS</th>
</tr>
</thead>
<tbody>
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<td>Level 1: SURFACE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Level 2: Depth 0 to ______ cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 3: Depth ______ to ______ cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 4: Depth ______ to ______ cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5: Depth ______ to ______ cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 6: Depth ______ to ______ cm</td>
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<td></td>
</tr>
<tr>
<td>Level 7: Depth ______ to ______ cm</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Level 8: Depth ______ to ______ cm</td>
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</tr>
<tr>
<td>Level 9: Depth ______ to ______ cm</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Level 10: Depth ______ to ______ cm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey Point Number</td>
<td>Date</td>
<td>GPS Reference: (LAT) (LON) (error)</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
<td>------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SITE SURVEY RECORD FORM

Site Name: ______________________________ Date: ________________
Recorder: ______________________________ Photographs: ________________

GPS Reference: ____________ (LAT) ____________ (LON) ________ (error)
Name of Chief and/or Guide: ______________________________

Site Location (Note nearest settlement, associated ruins, water sources etc.): ______
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

Attach Sketch Map (Y/N) # _________________ Last Survey Point: ______

Description (Include soil color, charcoal, any surface features etc.): __________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

Method of Collection: ______________________________

Summary of artifacts (Count/draw significant finds):

Number of diagnostic artifact bags collected: ______

Additional field observations (Note disturbances etc.): ______________________________

_______________________________________________________________________
<table>
<thead>
<tr>
<th>UNIT</th>
<th>LEVEL</th>
<th>DESCRIPTION</th>
<th>COUNT</th>
<th>WEIGHT (grams)</th>
<th>COMMENT / DESCRIPTION</th>
</tr>
</thead>
</table>

**SMALL- FINDS ANALYSIS:______________________**

**SITE:_________________________**

**DATE:_________________**

**RECORDER:___________________**

**INPUT:________________**
Appendix B: Site Location Lists

Appendix B presents a condensed selection of sites and artifacts identified, collected, or reported in the vicinity of the Pra River Basin and Central Region Project area. This data is mapped in Chapter 5. Data source is indicated by section but includes my fieldwork in 2016-2017, previous Central Region Project surveys 2007-2010, Chouin (2009), and Oliver Davies’ field notes (1976). Data points were extracted from the geodatabase I constructed and are presented in decimal degree format. The data presented is not exhaustive or mutually exclusive of other materials noted at each site but abridged notes and descriptions of the sites, derived from the original source, is included for most tables.

B.1 Hilltop Sites

This table lists hilltop ceramic scatter sites throughout the Pra River Basin identified during my survey in 2016-2017. Black burnished robust sherds were recorded as “Akan,” although very few were found, the majority of which were at sites dominated by “Robust” ceramics.

Table 8. Hilltop Site Locations in the PRB

<table>
<thead>
<tr>
<th>Site</th>
<th>Lat DD</th>
<th>Long DD</th>
<th>Atetefo</th>
<th>Robust</th>
<th>“Akan”</th>
<th>Flakes</th>
<th>nondiag</th>
<th>Total Sherds</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD1</td>
<td>5.161917</td>
<td>-1.61242</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD3</td>
<td>5.162556</td>
<td>-1.61372</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-1.61597</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD6</td>
<td>5.162306</td>
<td>-1.61642</td>
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<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>AD7</td>
<td>5.162083</td>
<td>-1.61686</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD8</td>
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<td>-1.61767</td>
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<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD9</td>
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<td></td>
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<tr>
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<td>-1.63119</td>
<td>19</td>
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<td>-1.63119</td>
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<td>SD603</td>
<td>5.103639</td>
<td>-1.62364</td>
<td>80</td>
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<td>SD605</td>
<td>5.104806</td>
<td>-1.62411</td>
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<td>SD608</td>
<td>5.106833</td>
<td>-1.62308</td>
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<tr>
<td>SD609</td>
<td>5.106833</td>
<td>-1.62272</td>
<td>26</td>
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<td>SD610</td>
<td>5.107722</td>
<td>-1.62253</td>
<td>100+</td>
<td>1</td>
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<td>100+</td>
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<tr>
<td>SD611</td>
<td>5.106333</td>
<td>-1.62097</td>
<td>7</td>
<td>10</td>
<td>2</td>
<td>15</td>
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<tr>
<td>SD618</td>
<td>5.108611</td>
<td>-1.62589</td>
<td>100+</td>
<td>2</td>
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<td>100+</td>
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</tr>
</tbody>
</table>
## B.2 Nyame Akuma

Table 9. Survey data of *Nyame Akuma* locations in the PRB/CRP

<table>
<thead>
<tr>
<th>Site</th>
<th>Data Source</th>
<th>Lat DD</th>
<th>Long DD</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-EG-100</td>
<td>CRP2010</td>
<td>5.162861</td>
<td>-1.39075</td>
<td><em>Nyame Akuma</em> was collected from middle of road.</td>
</tr>
<tr>
<td>1-EG-144</td>
<td>CRP2010</td>
<td>5.194972</td>
<td>-1.38175</td>
<td><em>Nyame Akuma</em> was collected.</td>
</tr>
<tr>
<td>1-EG-65</td>
<td>CRP2010</td>
<td>5.160889</td>
<td>-1.42525</td>
<td><em>Nyame Akuma</em></td>
</tr>
<tr>
<td>2-EG-03</td>
<td>CRP2010</td>
<td>5.154639</td>
<td>-1.39097</td>
<td><em>Nyame Akuma</em></td>
</tr>
<tr>
<td>2-EG-114</td>
<td>CRP2010</td>
<td>5.158917</td>
<td>-1.46467</td>
<td><em>Nyame Akuma</em></td>
</tr>
<tr>
<td>3-EG-152</td>
<td>CRP2010</td>
<td>5.195194</td>
<td>-1.37208</td>
<td><em>Nyame Akuma</em> collected.</td>
</tr>
<tr>
<td>3-EG-157</td>
<td>CRP2010</td>
<td>5.19825</td>
<td>-1.36544</td>
<td><em>Nyame Akuma</em></td>
</tr>
<tr>
<td>3-EG-22</td>
<td>CRP2010</td>
<td>5.16275</td>
<td>-1.43539</td>
<td><em>Nyame Akuma</em> was collected.</td>
</tr>
<tr>
<td>3-EG-26</td>
<td>CRP2010</td>
<td>5.164222</td>
<td>-1.43875</td>
<td><em>Nyame Akuma</em> was collected.</td>
</tr>
<tr>
<td>3-EG-27</td>
<td>CRP2010</td>
<td>5.162639</td>
<td>-1.44028</td>
<td><em>Nyame Akuma</em></td>
</tr>
<tr>
<td>3-EG-84</td>
<td>CRP2010</td>
<td>5.173</td>
<td>-1.42661</td>
<td><em>Nyame Akuma</em> collected. Boulders present but no grinding marks.</td>
</tr>
<tr>
<td>AA16</td>
<td>CRP2007</td>
<td>5.06025</td>
<td>-1.44961</td>
<td><em>Nyame Akuma</em> found by rocky outcrop on edge of Bosom Ampeni, 100m from beach</td>
</tr>
<tr>
<td>AA22</td>
<td>CRP2007</td>
<td>5.068722</td>
<td>-1.44283</td>
<td><em>Nyame Akuma</em> found on top of hill behind Bosom Ayefe, local ceramics also found</td>
</tr>
<tr>
<td>AA6</td>
<td>CRP2007</td>
<td>5.072778</td>
<td>-1.43822</td>
<td>Hilltop site extending along ridge, local ceramic, flake, and <em>Nyame Akuma</em> found</td>
</tr>
<tr>
<td>AB27</td>
<td>CRP2007</td>
<td>5.04</td>
<td>-1.53458</td>
<td><em>Nyame Akuma</em>, dense scatter of gritty orange, 19th c imported European ceramic, imported bead and pipestem, possible flake</td>
</tr>
<tr>
<td>AB4</td>
<td>CRP2007</td>
<td>5.048333</td>
<td>-1.53417</td>
<td>Two <em>Nyame Akuma</em>, not mentioned on site survey form but are drawn on an additional form. Local ceramics, and possible flakes</td>
</tr>
<tr>
<td>BK21</td>
<td>CRP2007</td>
<td>5.220917</td>
<td>-1.51339</td>
<td><em>Nyame Akuma</em> found on low hill, north of Komenda College</td>
</tr>
<tr>
<td>BK3</td>
<td>CRP2007</td>
<td>5.043917</td>
<td>-1.50689</td>
<td><em>Nyame Akuma</em> found on farm near school</td>
</tr>
<tr>
<td>Efutu</td>
<td>Davies 1976</td>
<td>5.2</td>
<td>-1.31667</td>
<td>&quot;Celt&quot;</td>
</tr>
<tr>
<td>Eguapo (XX-1)</td>
<td>CRP2017 REID</td>
<td>5.161111</td>
<td>-1.40972</td>
<td><em>Nyame Akuma</em> found in spoil nearby this galimsey area. Not mentioned on sheet but visible in photos.</td>
</tr>
<tr>
<td>F18</td>
<td>CRP2007</td>
<td>5.064056</td>
<td>-1.59539</td>
<td><em>Nyame Akuma</em>, partially buried found in-situ</td>
</tr>
<tr>
<td>Code</td>
<td>Site</td>
<td>Code</td>
<td>Site</td>
<td>Latitude</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>F5</td>
<td>CRP2007</td>
<td>5.072083</td>
<td>-1.58172</td>
<td>Nyame Akuma reportedly found here by local farmer</td>
</tr>
<tr>
<td>Huni</td>
<td>DAVIES 1976</td>
<td>5.101389</td>
<td>-1.3375</td>
<td>&quot;Celt&quot;</td>
</tr>
<tr>
<td>KO-148</td>
<td>CRP2009</td>
<td>5.118667</td>
<td>-1.57474</td>
<td>Nyame Akuma and isolated robust paste sherd</td>
</tr>
<tr>
<td>KO-165</td>
<td>CRP2009</td>
<td>5.119556</td>
<td>-1.56844</td>
<td>Nyame Akuma and two robust paste sherds eroded</td>
</tr>
<tr>
<td>KO-218</td>
<td>CRP2009</td>
<td>5.138778</td>
<td>-1.57203</td>
<td>Nyame Akuma and medium density scatter of eroded sherds. Nyame Akuma not mentioned on survey sheet, but it is mentioned in the lithics analysis there are photographs of it.</td>
</tr>
<tr>
<td>KO-235</td>
<td>CRP2009</td>
<td>5.138306</td>
<td>-1.58158</td>
<td>Nyame Akuma in road, three eroded robust paste sherds</td>
</tr>
<tr>
<td>KO-236</td>
<td>CRP2009</td>
<td>5.137</td>
<td>-1.56872</td>
<td>Nyame Akuma in path</td>
</tr>
<tr>
<td>KO-306</td>
<td>CRP2009</td>
<td>5.1325</td>
<td>-1.54789</td>
<td>Nyame Akuma</td>
</tr>
<tr>
<td>KO-32</td>
<td>CRP2009</td>
<td>5.147583</td>
<td>-1.57094</td>
<td>Nyame Akuma, low density scatter of eroded local ceramics</td>
</tr>
<tr>
<td>KO-353</td>
<td>CRP2009</td>
<td>5.126361</td>
<td>-1.52556</td>
<td>Nyame Akuma</td>
</tr>
<tr>
<td>KO-354</td>
<td>CRP2009</td>
<td>5.125194</td>
<td>-1.52917</td>
<td>Nyame Akuma</td>
</tr>
<tr>
<td>KO-498</td>
<td>CRP2009</td>
<td>5.089972</td>
<td>-1.50989</td>
<td>Nyame Akuma</td>
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<tr>
<td>KO-61</td>
<td>CRP2009</td>
<td>5.147889</td>
<td>-1.60807</td>
<td>Nyame Akuma and high-density scatter of ceramics on hilltop</td>
</tr>
<tr>
<td>KOE-20</td>
<td>CRP2009</td>
<td>5.163306</td>
<td>-1.52256</td>
<td>Nyame Akuma in road</td>
</tr>
<tr>
<td>KOE-23</td>
<td>CRP2009</td>
<td>5.155639</td>
<td>-1.53456</td>
<td>Caretaker noted Nyame Akuma on hilltop, 18 other sherds of which 7-9 were gritty orange</td>
</tr>
<tr>
<td>KOE-24</td>
<td>CRP2009</td>
<td>5.156556</td>
<td>-1.53544</td>
<td>Hilltop, probably part of KOE-23 site. 5 Nyame Akuma found by caretaker on site. ~15 gritty orange sherds found</td>
</tr>
<tr>
<td>KOE-37</td>
<td>CRP2009</td>
<td>5.166917</td>
<td>-1.52597</td>
<td>Isolated Nyame Akuma</td>
</tr>
<tr>
<td>Komenda</td>
<td>DAVIES 1976</td>
<td>5.041667</td>
<td>-1.5</td>
<td>&quot;Celts&quot;</td>
</tr>
<tr>
<td>SB17</td>
<td>CRP2007</td>
<td>5.031528</td>
<td>-1.59997</td>
<td>Nyame Akuma, not collected but photographed</td>
</tr>
<tr>
<td>SD-108</td>
<td>CRP2009</td>
<td>5.109472</td>
<td>-1.58769</td>
<td>Piece of greenstone, type used to make Nyame Akuma</td>
</tr>
<tr>
<td>SD583</td>
<td>CRP2017 REID</td>
<td>5.122083</td>
<td>-1.63628</td>
<td>Broken Nyame Akuma, stone quern, and atetefo sherd.</td>
</tr>
<tr>
<td>SD-98</td>
<td>CRP2009</td>
<td>5.124556</td>
<td>-1.59297</td>
<td>Nyame Akuma, two local sherds, bead</td>
</tr>
<tr>
<td>Wawase</td>
<td>Amartey 2017, 2021</td>
<td>5.102944</td>
<td>-1.61417</td>
<td>S. Amartey reported recovering a Nyame Akuma during his recent work at Wawase.</td>
</tr>
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</table>
B.3 Grinding Slicks

Descriptions of sites sourced as CRP2017REID are my own (see Figure 40). All other descriptions are derived from the indicated source. Two of the grinding slick data points in Table 10 (Miemia and Asemcow) are outside of the PRB/CRP area near Busua. The site at Asemkow was shown to me by D. Devon West who is the owner of Alaska Beach Club at Busua and formerly worked as a geologist. He reported the site at Miemia to me, but I did not see it directly.

Table 10. Survey data of grinding slick locations in the PRB/CRP

<table>
<thead>
<tr>
<th>SITE</th>
<th>SOURCE</th>
<th>LAT DD</th>
<th>Long DD</th>
<th>Description</th>
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<tr>
<td>1-EG-71</td>
<td>CRP2010</td>
<td>5.16931</td>
<td>-1.41511</td>
<td>Site Sketch Map in Survey Record Form Binder</td>
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<tr>
<td>1-EG-86</td>
<td>CRP2010</td>
<td>5.14142</td>
<td>-1.37517</td>
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<td>3-EG-111</td>
<td>CRP2010</td>
<td>5.17844</td>
<td>-1.39869</td>
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</tr>
<tr>
<td>3-EG-128</td>
<td>CRP2010</td>
<td>5.21619</td>
<td>-1.39300</td>
<td>Five boulders, multiple grinding marks.</td>
</tr>
<tr>
<td>3-EG-36</td>
<td>CRP2010</td>
<td>5.17042</td>
<td>-1.45953</td>
<td>Rock boulders near a river scattered with grinding marks. Site sketch map in Survey Record Form Binder</td>
</tr>
<tr>
<td>AD15</td>
<td>CRP2017 REID</td>
<td>5.16025</td>
<td>-1.61194</td>
<td>Grinding slicks on granite outcrop. ~7-8 slicks observed, some wider ones have narrower ones inside. On path west of Adiembra.</td>
</tr>
<tr>
<td>AD24</td>
<td>CRP2017 REID</td>
<td>5.15647</td>
<td>-1.64039</td>
<td>Two boulders with grinding slicks in low laying creed bed near Prah. Two slicks on one boulder, ~5 on the other.</td>
</tr>
<tr>
<td>AD26</td>
<td>CRP2017 REID</td>
<td>5.15456</td>
<td>-1.64192</td>
<td>Numerous grinding slicks on four boulders in swampy area west of Adiembra and Otodum.</td>
</tr>
<tr>
<td>AD27</td>
<td>CRP2017 REID</td>
<td>5.16397</td>
<td>-1.60939</td>
<td>4-5 long grinding slicks on a granite outcrop. Two larger ones and 2-3 small, thin ones. Just outside Adiembra to northwest in cocoa farm on hillslope.</td>
</tr>
<tr>
<td>Asemkow</td>
<td>CRP2017 REID</td>
<td>4.83639</td>
<td>-1.88306</td>
<td>Beachfront property owned by D. Deven West, owner of Alaska Beach club in Busua. Many grinding slicks on jumbled rocks along beach. Rocks have been broken and jumbled since the grinding slicks were made.</td>
</tr>
<tr>
<td>Hemang</td>
<td>DAVIES 1976</td>
<td>5.20000</td>
<td>-1.56667</td>
<td>This is Sekyere Heman, but Davies calls it &quot;Hemang.&quot; He writes: Grinding-hollows at the Pra rapids near the F.R. boundary; this would be 1 1/2-2 upstream from Hemang.</td>
</tr>
<tr>
<td>Location</td>
<td>CRP Year</td>
<td>Latitude</td>
<td>Longitude</td>
<td>Description</td>
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<td>-----------</td>
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<tr>
<td>KO-06</td>
<td>CRP2009</td>
<td>5.15781</td>
<td>-1.59242</td>
<td>5 grinding slicks. No map.</td>
</tr>
<tr>
<td>KO-155-A</td>
<td>CRP2009</td>
<td>5.11264</td>
<td>-1.57519</td>
<td>Along river, very eroded, some underwater. Site map drawn.</td>
</tr>
<tr>
<td>KO-155-C</td>
<td>CRP2009</td>
<td>5.11361</td>
<td>-1.57408</td>
<td>2 slicks, No site map.</td>
</tr>
<tr>
<td>KO-158</td>
<td>CRP2009</td>
<td>5.11306</td>
<td>-1.57278</td>
<td>Many slicks. Site map.</td>
</tr>
<tr>
<td>KO-161</td>
<td>CRP2009</td>
<td>5.11469</td>
<td>-1.57228</td>
<td>9 slicks. No site map.</td>
</tr>
<tr>
<td>KO-163</td>
<td>CRP2009</td>
<td>5.11925</td>
<td>-1.56986</td>
<td>27 slicks counted. Surface is eroded, may have more originally. Site plan drawn.</td>
</tr>
<tr>
<td>KO-170</td>
<td>CRP2009</td>
<td>5.12244</td>
<td>-1.56325</td>
<td>Two separate grinding mark areas.</td>
</tr>
<tr>
<td>KO-22</td>
<td>CRP2009</td>
<td>5.16086</td>
<td>-1.59956</td>
<td>Sketch map. 12 slicks.</td>
</tr>
<tr>
<td>KO-251</td>
<td>CRP2009</td>
<td>5.14458</td>
<td>-1.56586</td>
<td>At least 7 marks on two separate rocks. No site map drawn.</td>
</tr>
<tr>
<td>KO-35</td>
<td>CRP2009</td>
<td>5.15328</td>
<td>-1.58294</td>
<td>2 slicks. No sketch.</td>
</tr>
<tr>
<td>KO-408</td>
<td>CRP2009</td>
<td>5.12328</td>
<td>-1.56278</td>
<td>5-6 slicks? Heavily eroded.</td>
</tr>
<tr>
<td>KO-57</td>
<td>CRP2009</td>
<td>5.14631</td>
<td>-1.60389</td>
<td></td>
</tr>
<tr>
<td>Miemia</td>
<td>CRP2017</td>
<td>4.80775</td>
<td>-2.16942</td>
<td>Reported to me by D. Deven West, owner of Alaska Beach Club at Busua.</td>
</tr>
<tr>
<td>NB30</td>
<td>CRP2017</td>
<td>5.18589</td>
<td>-1.59117</td>
<td>Group of boulders, two of which have long grinding slicks. Boulder 1 - two long slicks. Boulder 2 - two long slicks.</td>
</tr>
<tr>
<td>NB36</td>
<td>CRP2017</td>
<td>5.17806</td>
<td>-1.58664</td>
<td>Outcrop with possible grinding slicks, rock is weathered and in poor condition. West of Nyame Bekyere.</td>
</tr>
<tr>
<td>NB37</td>
<td>CRP2017</td>
<td>5.17144</td>
<td>-1.59108</td>
<td>Two granite boulders with grinding slicks. Boulder 1 - four long slicks and one wider flattened area from grinding. Boulder 2 - at least ~21 long slicks but some blend together or are inside larger slicks. Probably more on rocks that are too buried to examine.</td>
</tr>
<tr>
<td>OBK-19b</td>
<td>CRP2007</td>
<td>5.09364</td>
<td>-1.60228</td>
<td>9 leaf shaped grinding slicks. Highly eroded, part of rock possibly broken off.</td>
</tr>
<tr>
<td>OBK-19c</td>
<td>CRP2007</td>
<td>5.09144</td>
<td>-1.60542</td>
<td>21 grinding slicks. See map.</td>
</tr>
<tr>
<td>OBK-21</td>
<td>CRP2007</td>
<td>5.09756</td>
<td>-1.60072</td>
<td>Grinding slicks at abandoned settlement site, possibly pre-European. Ceramics appear to be pre-European.</td>
</tr>
<tr>
<td>SD520</td>
<td>CRP2017</td>
<td>5.09889</td>
<td>-1.62417</td>
<td>Granite outcrop with at least 17 long slicks .3m long and 3 wider grinding depressions.</td>
</tr>
<tr>
<td>SD522</td>
<td>CRP2017</td>
<td>5.11889</td>
<td>-1.62511</td>
<td>Five grinding slicks on granite outcrops. Slicks partially buried. 1 sherd atetefo also present and 2 UNID sherds.</td>
</tr>
<tr>
<td>SD528</td>
<td>CRP2017</td>
<td>5.11719</td>
<td>-1.62769</td>
<td>At least six long grinding slicks, more probably present but buried.</td>
</tr>
</tbody>
</table>
At least eight long grinding slicks in boulders.

Three long grinding slicks, one large wide one.

At least eight long grinding slicks in bedrock, probably more buried.

About eight grinding slicks, probably more buried. 7 eroded *atefe*o sherds.

Granite bedrock in creek near small waterfall. North of Sekyere Heman. ~14 slicks total in five different areas.

Granite bedrock in creek in Pra Suhien Forest Reserve. Two deep, wide, and long grinding depressions and two shallower grinding areas, smoothed.

### B.4 Flakes

Table 11. Survey data of quartz flake locations in the PRB/CRP

<table>
<thead>
<tr>
<th>Site</th>
<th>Data Source</th>
<th>Lat (DD)</th>
<th>Long (DD)</th>
<th>Description (quartz, unless otherwise indicated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-EG-129</td>
<td>CRP2010</td>
<td>5.188306</td>
<td>-1.377250</td>
<td>1 flake</td>
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<td>1-EG-14</td>
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<td>-1.398278</td>
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</tr>
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<td>1-EG-38</td>
<td>CRP2010</td>
<td>5.137000</td>
<td>-1.380944</td>
<td>1 flake</td>
</tr>
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<td>1-EG-42</td>
<td>CRP2010</td>
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<td>2 flakes</td>
</tr>
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<td>1-EG-49</td>
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<td>5.125167</td>
<td>-1.370639</td>
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</tr>
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</tr>
<tr>
<td>1-EG-65</td>
<td>CRP2010</td>
<td>5.160889</td>
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<td>1 retouched flake</td>
</tr>
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</tr>
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<td>1-EG-87</td>
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<td>2 flakes, 1 retouched flake/scaper</td>
</tr>
<tr>
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<td>-1.389694</td>
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<tr>
<td>2-EG-101</td>
<td>CRP2010</td>
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<td>-1.457583</td>
<td>6 flakes/shatter</td>
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<td>5.202111</td>
<td>-1.373778</td>
<td>2 flakes</td>
</tr>
<tr>
<td>2-EG-164</td>
<td>CRP2010</td>
<td>5.213139</td>
<td>-1.345917</td>
<td>3 flakes (one is large)</td>
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<td>CRP2010</td>
<td>5.199833</td>
<td>-1.327861</td>
<td>2 large flakes (scraper)</td>
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<tr>
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<td>Loc.</td>
<td>Coll.</td>
<td>CRP</td>
<td>GCO</td>
<td>WHD</td>
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<td>CRP2007</td>
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<td>CRP2007</td>
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<td>CRP2009</td>
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<td>-1.558361</td>
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<td>KOE-94</td>
<td>CRP2009</td>
<td>5.149167</td>
<td>-1.557583</td>
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<td>CRP2017</td>
<td>REID</td>
<td>5.183528</td>
<td>-1.591500</td>
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<td>5.128472</td>
<td>-1.612778</td>
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<td>SD500</td>
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<td>-1.618139</td>
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<td>-1.625417</td>
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<td>-1.641306</td>
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<td>Lat DD</td>
<td>Long DD</td>
<td>Description</td>
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<td>--------------------------------------------------</td>
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<td>-1.631194</td>
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<td>SD613</td>
<td>CRP2017 REID</td>
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<td>-1.619222</td>
<td>2 flakes</td>
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<td>SD618</td>
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<td>5.108611</td>
<td>-1.625889</td>
<td>flakes</td>
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<tr>
<td>SH19</td>
<td>CRP2017 REID</td>
<td>5.217139</td>
<td>-1.556972</td>
<td>3 flakes</td>
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<td>SH20</td>
<td>CRP2017 REID</td>
<td>5.217361</td>
<td>-1.556944</td>
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**B.5 Slag**

Table 12. Survey data of slag locations in the PRB/CRP

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<th>Site</th>
<th>Data Source</th>
<th>Lat DD</th>
<th>Long DD</th>
<th>Description</th>
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<tr>
<td>1-EG-05</td>
<td>CRP2010</td>
<td>5.156472</td>
<td>-1.405416</td>
<td>Slag on road</td>
</tr>
<tr>
<td>1-EG-13</td>
<td>CRP2010</td>
<td>5.158861</td>
<td>-1.406750</td>
<td>Slag, lots of other artifacts</td>
</tr>
<tr>
<td>1-EG-14</td>
<td>CRP2010</td>
<td>5.150722</td>
<td>-1.398277</td>
<td>Slag, lots of other artifacts</td>
</tr>
<tr>
<td>1-EG-22</td>
<td>CRP2010</td>
<td>5.146416</td>
<td>-1.391666</td>
<td>Slag, robust ceramics</td>
</tr>
<tr>
<td>2-EG-102</td>
<td>CRP2010</td>
<td>5.213556</td>
<td>-1.415139</td>
<td>Low density slag, other artifacts</td>
</tr>
<tr>
<td>2-EG-141</td>
<td>CRP2010</td>
<td>5.203889</td>
<td>-1.407500</td>
<td>Low density slag</td>
</tr>
<tr>
<td>2-EG-152</td>
<td>CRP2010</td>
<td>5.203861</td>
<td>-1.379416</td>
<td>Low density slag</td>
</tr>
<tr>
<td>2-EG-16</td>
<td>CRP2010</td>
<td>5.179777</td>
<td>-1.391111</td>
<td>Slag, other ceramics</td>
</tr>
<tr>
<td>2-EG-76</td>
<td>CRP2010</td>
<td>5.157389</td>
<td>-1.457000</td>
<td>medium density slag</td>
</tr>
<tr>
<td>2-EG-92</td>
<td>CRP2010</td>
<td>5.143583</td>
<td>-1.453027</td>
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<td>2-EG-94</td>
<td>CRP2010</td>
<td>5.144083</td>
<td>-1.454250</td>
<td>Low density slag</td>
</tr>
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<td>CRP2010</td>
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<td>-1.484277</td>
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<tr>
<td>3-EG-66</td>
<td>CRP2010</td>
<td>5.148194</td>
<td>-1.448056</td>
<td>Slag, high density ceramics</td>
</tr>
<tr>
<td>AB-21</td>
<td>CRP2007</td>
<td>5.067416</td>
<td>-1.531833</td>
<td>Large piece of slag, local sherds</td>
</tr>
<tr>
<td>Abakapow</td>
<td>Chouin 2009</td>
<td>5.070333</td>
<td>-1.468056</td>
<td>Surface scatters of various sherds, small mounds of slag and fragments of furnace walls. Oven-like features (Chouin 2009:217, 491, 721-725)</td>
</tr>
<tr>
<td>Abirpow</td>
<td>Chouin 2009</td>
<td>5.180527</td>
<td>-1.401389</td>
<td>Gritty orange and slag (Chouin 2009:366, 722-725)</td>
</tr>
<tr>
<td>Abrawdiwurem</td>
<td>Davies 1976</td>
<td>5.170833</td>
<td>-1.529166</td>
<td>Pieces of slag</td>
</tr>
<tr>
<td>AD31</td>
<td>CRP2017 REID</td>
<td>5.160527</td>
<td>-1.602694</td>
<td>Complex of iron slag mounds. Four here, another at AD32. Excavated a</td>
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<tr>
<td>Location</td>
<td>Reference</td>
<td>Coordinates</td>
<td>Description</td>
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<td></td>
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<tr>
<td>Akrokrowa</td>
<td>Chouin 2009</td>
<td>5.1996000 -1.3912667</td>
<td>Slag at earthwork, lots of <em>Atetefo</em> ceramics (Chouin 2009:461, 721-725)</td>
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</tr>
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<td>AS14</td>
<td>CRP2017 REID</td>
<td>5.1042500 -1.5853056</td>
<td>Slag</td>
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<tr>
<td>Bosomtwipow</td>
<td>Chouin 2009</td>
<td>5.0714722 -1.4735000</td>
<td>&quot;Lots of archaeological material visible on surface in and around the grove, including local and imported ceramics, imported ceramics, local and imported tobacco pipes, lots of slag and human remains&quot; (Chouin 2009:217, 721-725).</td>
<td></td>
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<tr>
<td>Capecoast U.C.</td>
<td>DAVIES 1976</td>
<td>5.1083333 -1.2833333</td>
<td>Slag, smelting pot</td>
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</tr>
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<td>Daboasi</td>
<td>DAVIES 1976</td>
<td>5.1333333 -1.6500000</td>
<td>Many heaps of slag between Daboasi and the main road, more on road toward Ebissa</td>
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<tr>
<td>Efutu</td>
<td>DAVIES 1976</td>
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<td>Slag, european pipes, strike a light, gin bottles, brass</td>
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<tr>
<td>Efutu 2</td>
<td>DAVIES 1976</td>
<td>5.1944444 -1.3208333</td>
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<td>KO-262</td>
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<td>5.1404167 -1.5600556</td>
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<td>5.2171389 -1.5569722</td>
<td>Slag piece, very dense scatter of <em>Atetefo.</em></td>
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Appendix C: SD520 Additional Materials

C.1 SD520 STP Site map

Figure 108: Map of test excavations at SD520.
C.2 SD520 STP Artifact Data

See Figure 108 for map of STP locations. All sherds represent *atefo* ceramics.

Table 13. SD520 Shovel Test Pits

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<th>Depth (cm)</th>
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</table>
Appendix D: AD31 Additional Materials

D.1 AD31 Sherd Counts

Table 14. AD31 excavated *atetefo* sherd counts and weight by level.

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<td>Atetefo Sherds</td>
<td>Total weight (g)</td>
<td>Avg. weight (g)</td>
<td>Notes</td>
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<td>Atetefo Sherds</td>
<td>Total weight (g)</td>
<td>Avg. weight (g)</td>
<td>Notes</td>
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The level extends 80-95cm.

Weight missing for three sherds.

---

### D.2 AD31 Furnace Counts

Table 15. AD31 furnace fragments by weight and level.

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(Table 15 continued)

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</table>
D.3 AD31 Wall Photographs

This section provides wall photographs of the trench excavated at AD31. Meter scale is included for visual reference. The 10cm marks on the meter scale do not correspond to the excavated levels. Excavation depth was measured from a single high point at the southwest corner of the trench (Unit N105), down from which the ground surface slopes slightly to the east and north through Units N106 and 107.

Figure 109: Unit N105 east wall (left) and south wall (right).
Figure 110: Unit N105 west Wall

Figure 111: Unit N106 west wall (left) and east wall (right).
Figure 112: N107 north wall (top left), east wall (top right), and west wall (bottom) showing disturbance from rotted taproot.
Appendix E: Radiocarbon Reports

August 16, 2018

Mr. Sean Reid
Syracuse University
1122 Forest Hills Avenue
Charlottesville, VA 22903
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

Our invoice will be emailed separately. Please forward it to the appropriate officer or send a credit card authorization. Thank you. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

[Signature]

ISO/IEC 17025:2005 Accredited Test Results: Testing results recognized by all Signatories to the ILAC Mutual Recognition Arrangement
# REPORT OF RADIOCARBON DATING ANALYSES

<table>
<thead>
<tr>
<th>Laboratory Number</th>
<th>Sample Code Number</th>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta - 500944</td>
<td>AD31-FS90-N107-LVL9</td>
<td>Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)</td>
</tr>
</tbody>
</table>

**BetaCal3.21; HPD method: INTCAL13**

<table>
<thead>
<tr>
<th>Age (95.4%)</th>
<th>398 - 539 cal AD</th>
<th>1600 +/- 30 BP</th>
<th>IRMS 613C: -25.8 o/oo</th>
</tr>
</thead>
</table>

- **Submitter Material:** Charcoal
- **Pretreatment:** (charred material) acid/alkali/acid
- **Analyzed Material:** Charred material
- **Analysis Service:** AMS-Standard delivery
- **Percent Modern Carbon:** 81.94 +/- 0.31 pMC
- **Fraction Modern Carbon:** 0.8194 +/- 0.0031

- **D14C:** -180.60 +/- 3.06 o/oo
- **δ14C:** -187.31 +/- 3.06 o/oo (1950: 218.00)

**Measured Radiocarbon Age:** (without d13C correction): 1610 +/- 30 BP

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP). "Present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (cratonic). Quoted errors are 1 sigma counting statistics. Calculated ages less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and δ18N values are relative to VPDB-1. Referenced for calendar calibrations are cited at the bottom of calibration graph pages.
REPORT OF RADIOCARBON DATING ANALYSES

Sean Reid  
Syracuse University  
Report Date: August 16, 2018  
Material Received: August 03, 2018

<table>
<thead>
<tr>
<th>Laboratory Number</th>
<th>Sample Code Number</th>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
<th>Calendar Calibrated Results: 95.4 % Probability</th>
<th>High Probability Density Range Method (HPD)</th>
</tr>
</thead>
</table>
| Beta - 500945    | AD31-FS67-N105-LVL6 | 230 +/- 30 BP  
(45.9%)  
(40.1%)  
(8.6%)  
(0.9%)  
1635 - 1684 cal AD  
1736 - 1805 cal AD  
1935 - Post AD 1950  
1530 - 1538 cal AD | (315 - 266 cal BP)  
(214 - 145 cal BP)  
(15 - Post BP 0)  
(420 - 412 cal BP) | IRMS δ13C: -29.4 o/oo |

Submitter Material: Charcoal  
Pretreatment: (charred material) acid/alkali/acid  
Analyzed Material: Charred material  
Analysis Service: AMS-Standard delivery  
Percent Modern Carbon: 97.18 +/- 0.36 pMC  
Fraction Modern Carbon: 0.9718 +/- 0.0036  
Δ14C: -28.23 +/- 3.63 o/oo  
δ14C: -36.19 +/- 3.63 o/oo(1950:2,016.00)  
Measured Radiocarbon Age: (without δ13C correction): 300 +/- 30 BP  
Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NIEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxic acid). Quoted errors are 1-sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. δ13C values are on the material itself (not the AMS δ13C). δ13C and δ15N values are relative to VPDB-11. References for calendar calibrations are cited at the bottom of calibration graph pages.
BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years

(Variables: d13C = -25.8 o/oo)

Laboratory number Beta-500944

Conventional radiocarbon age 1600 ± 30 BP

95.4% probability

(95.4%) 398 - 539 cal AD (1552 - 1411 cal BP)

68.2% probability

(38.2%) 487 - 534 cal AD (1463 - 1416 cal BP)
(18.4%) 410 - 434 cal AD (1540 - 1516 cal BP)
(11.6%) 452 - 470 cal AD (1498 - 1480 cal BP)

AD31-FS90-N107-LVL9

Database used
INTCAL13

References
References to Probability Method

References to Database INTCAL13
Reimer, et.al., 2013, Radiocarbon55(4).
BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years

(HPD): INTCAL13

(Variables: d13C = -29.4 o/oo)

Laboratory number  Beta-500945

Conventional radiocarbon age  230 ± 30 BP

95.4% probability

(45.8%) 1635 - 1684 cal AD  (315 - 266 cal BP)
(40.1%) 1736 - 1805 cal AD  (214 - 145 cal BP)
(8.6%)  1935 - Post cal AD 1950 (15 - Post cal BP 0)
(0.9%)  1530 - 1538 cal AD  (420 - 412 cal BP)

68.2% probability

(36.7%) 1645 - 1669 cal AD  (305 - 281 cal BP)
(26.4%) 1780 - 1798 cal AD  (170 - 152 cal BP)
(5.1%)  1944 - Post cal AD 1950 (6 - Post cal BP 0)

AD31-FS67-N105-LVL6

Database used
INTCAL13

References

References to Probability Method

References to Database INTCAL13
Reimer, et.al., 2013, Radiocarbon55(4).
Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: August 16, 2018
Submitter: Mr. Sean Reid

QA MEASUREMENTS

Reference 1
Expected Value: 0.49 +/- 0.10 pMC
Measured Value: 0.50 +/- 0.03 pMC
Agreement: Accepted

Reference 2
Expected Value: 96.69 +/- 0.50 pMC
Measured Value: 96.92 +/- 0.28 pMC
Agreement: Accepted

Reference 3
Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.31 +/- 0.37 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: [Signature]
Date: August 16, 2018
May 04, 2020

Mr. Sean Reid  
Syracuse University  
1122 Forest Hills Avenue  
Charlottesville, VA 22903  
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported d13C was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

Chris Patrick  
Vice President of Laboratory Operations
# REPORT OF RADIOCARBON DATING ANALYSES

**Sean Reid**

**Syracuse University**

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**Laboratory Number**: Beta - 557631  
**Sample Code Number**: AD31-FS68-N105-LVL7

**Report Date**: May 04, 2020  
**Material Received**: April 23, 2020

<table>
<thead>
<tr>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendar Calibrated Results: 93.4 % Probability</td>
</tr>
<tr>
<td>High Probability Density Range Method (HPD)</td>
</tr>
</tbody>
</table>

| **Beta - 557631** | **AD31-FS68-N105-LVL7** | **780 +/- 30 BP** | **IRMS 513C**: -28.4 o/oo |

| **(95.4%)** | **1210 - 1281 cal AD** | **(740 - 669 cal BP)** |

**Submitter Material**: Charcoal  
**Pretreatment**: charcoal material acid/alkali/acid  
**Analyzed Material**: Charred material  
**Analysis Service**: AMS-Standard delivery  
**Percent Modern Carbon**: 90.75 +/- 0.34 pMC  
**Fraction Modern Carbon**: 0.9075 +/- 0.0034  
**D14C**: -92.54 +/- 3.39 o/oo  
**Δ14C**: -100.19 +/- 3.39 o/oo (1950-2020)  
**Measured Radiocarbon Age**: (without Δ13C correction): 840 +/- 30 BP

**Calibration**: BetaCal3.21: HPD method: INTCAL13

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Results are ISO/IEC 17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (marine alkali). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. Δ13C values are on the material itself (not the AMS Δ13C). Δ13C and δ15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.
Calibration of Radiocarbon Age to Calendar Years

(Variables: d13C = -28.4 o/oo)

Laboratory number Beta-557631

Conventional radiocarbon age 780 ± 30 BP

95.4% probability

(95.4%) 1210 - 1281 cal AD  (740 - 669 cal BP)

68.2% probability

(68.2%) 1224 - 1270 cal AD  (726 - 680 cal BP)

Database used
INTCAL13

References
References to Probability Method

References to Database INTCAL13
Reimer, et.al., 2013, Radiocarbon55(4).
Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: May 04, 2020
Submitter: Mr. Sean Reid

QA MEASUREMENTS

Reference 1
Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.26 +/- 0.37 pMC
Agreement: Accepted

Reference 2
Expected Value: 96.69 +/- 0.50 pMC
Measured Value: 97.54 +/- 0.29 pMC
Agreement: Accepted

Reference 3
Expected Value: 0.45 +/- 0.04 pMC
Measured Value: 0.45 +/- 0.04 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: [Signature]
Date: May 04, 2020
October 13, 2020

Mr. Sean Reid
Syracuse University
1122 Forest Hills Avenue
Charlottesville, VA 22903
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

Ronald E. Hatfield President
# REPORT OF RADIOCARBON DATING ANALYSES

<table>
<thead>
<tr>
<th>Laboratory Number</th>
<th>Sample Code Number</th>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta - 569975</td>
<td>AD31-FS81-N106-LVL10</td>
<td>7250 +/- 30 BP</td>
</tr>
</tbody>
</table>

(95.4%)

<table>
<thead>
<tr>
<th></th>
<th>6215 - 6051 cal BC</th>
<th>8164 - 8000 cal BP</th>
</tr>
</thead>
</table>

Submitter Material: Charcoal
Pretreatment: (charred material) acid/alkali/acid
Analyzed Material: Charred material
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 40.55 +/- 0.15 pMC
Fraction Modern Carbon: 0.4055 +/- 0.0015

D14C: -594.46 +/- 1.51 o/oo
Δ14C: -597.88 +/- 1.51 o/oo (1950-2020)

Measured Radiocarbon Age: (without d13C correction): 7290 +/- 30 BP
Calibration: BetaCal3.21; HPD method: INTCAL13

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Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5560 years), is corrected for total isotopic fractionation and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (marine oxic). Quoted errors are 1-sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.
REPORT OF RADIOCARBON DATING ANALYSES

Sean Reid
Syracuse University

Report Date: October 13, 2020
Material Received: October 01, 2020

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<tr>
<th>Laboratory Number</th>
<th>Sample Code Number</th>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta - 569976</td>
<td>AD31-FS78-N106-LVL7</td>
<td>640 +/- 30 BP, IRMS 513C: -29.8 o/oo</td>
</tr>
</tbody>
</table>

(54.5%) 1340 - 1396 cal AD (610 - 554 cal BP)
(40.9%) 1282 - 1329 cal AD (668 - 621 cal BP)

Submitter Material: Charcoal
Pretreatment: charred material
Acid/alkali/acid

Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 92.34 +/- 0.34 pMC
Fraction Modern Carbon: 0.9234 +/- 0.0034

D14C: -76.58 +/- 3.45 o/oo
D18C: -64.37 +/- 3.45 o/oo (1950, 2020)

Measured Radiocarbon Age: 
(without d13C correction): 720 +/- 30 BP
Calibration: BetaCal3.21; HPD method: INTCAL13

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and a Thermo IRMS. The “Conventional Radiocarbon Age” was calculated using the Libby half-life (5560 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), “present” = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (marine sediments). Quoted errors are 1-sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d18N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.
BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years
(High Probability Density Range Method (HPD): INTCAL13)

(Variables: d13C = -27.2 o/oo)

Laboratory number Beta-569975

Conventional radiocarbon age 7250 ± 30 BP

95.4% probability

(95.4%) 6215 - 6051 cal BC (8164 - 8000 cal BP)

68.2% probability

(34.7%) 6108 - 6062 cal BC (8057 - 8011 cal BP)
(21%) 6206 - 6168 cal BC (8155 - 8117 cal BP)
(12.5%) 6162 - 6141 cal BC (8111 - 8090 cal BP)

Database used
INTCAL13

References
References to Probability Method
References to Database INTCAL13
Reimer, et.al., 2013, Radiocarbon55(4).
BetaCal 3.21
Calibration of Radiocarbon Age to Calendar Years
(High Probability Density Range Method (HPD): INTCAL13)

(Variables: d13C = -29.8 o/oo)

Laboratory number Beta-569976

Conventional radiocarbon age 640 ± 30 BP

95.4% probability

(54.5%) 1340 - 1396 cal AD (610 - 554 cal BP)
(40.9%) 1282 - 1329 cal AD (668 - 621 cal BP)

68.2% probability

(40.7%) 1355 - 1388 cal AD (595 - 562 cal BP)
(27.5%) 1292 - 1316 cal AD (658 - 634 cal BP)

Database used
INTCAL13

References
References to Probability Method

References to Database INTCAL13
Reimer, et.al., 2013, Radiocarbon55(4).
Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: October 13, 2020
Submitter: Mr. Sean Reid

**QA MEASUREMENTS**

**Reference 1**
- Expected Value: 0.49 +/- 0.10 pMC
- Measured Value: 0.49 +/- 0.03 pMC
- Agreement: Accepted

**Reference 2**
- Expected Value: 129.41 +/- 0.06 pMC
- Measured Value: 129.45 +/- 0.37 pMC
- Agreement: Accepted

**Reference 3**
- Expected Value: 96.69 +/- 0.50 pMC
- Measured Value: 97.56 +/- 0.30 pMC
- Agreement: Accepted

**COMMENT:** All measurements passed acceptance tests.

**Validation:**

Date: October 13, 2020
November 03, 2020

Mr. Sean Reid
Syracuse University
1122 Forest Hills Avenue
Charlottesville, VA 22903
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than ±1-30 years, a conservative ± 30 BP is cited for the result unless otherwise requested. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

[Signature]

Ronald E. Hatfield
President
## REPORT OF RADIOCARBON DATING ANALYSES

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Beta - 571495</td>
<td>AD31-FS80-N106-LVL9</td>
<td>2330 +/- 30 BP IRMS 513C: -26.3 o/oo</td>
</tr>
</tbody>
</table>

| (94.5%) | 485 - 359 cal BC | (2434 - 2308 cal BP) |
| (0.9%)  | 271 - 262 cal BC | (2220 - 2211 cal BP) |

- **Submitter Material:** Charcoal
- **Pretreatment:** (charred material) acid/alkali/acid
- **Analyzed Material:** Charred material
- **Analysis Service:** AMS-Standard delivery

**Percent Modern Carbon:** 74.82 +/- 0.28 pMC

**Fraction Modern Carbon:** 0.7482 +/- 0.0028

**D14C:** -251.78 +/- 2.79 o/oo

**Δ14C:** -256.09 +/- 2.79 o/oo (1950:2020)

**Measured Radiocarbon Age:** (without d13C correction): 2350 +/- 30 BP

**Calibration:** BetaCal3.21; HPD method: INTCAL13

---

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5560 years), is corrected for total isotopic fractionation and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP). "Present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oak wood). Quoted errors are 1-sigma counting statistics. Calculated sigmas less than 30BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.
### REPORT OF RADIOCARBON DATING ANALYSES

<table>
<thead>
<tr>
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<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta - 571496</td>
<td>AD31-FS89-N107-LVL8</td>
<td>1910 +/- 30 BP IRMS S13C: -29.1 o/oo</td>
</tr>
</tbody>
</table>

(93.6%) 22 - 170 cal AD (1928 - 1780 cal BP)
( 1.8%) 194 - 209 cal AD (1756 - 1741 cal BP)

- **Submitter Material:** Charcoal
- **Pretreatment:** Charred material
- **Analysis Service:** AMS-Standard delivery
- **Percent Modern Carbon:** 78.84 +/- 0.29 pMC
- **Fraction Modern Carbon:** 0.7884 +/- 0.0029
- **D14C:** -211.62 +/- 2.94 o/oo
- **Δ14C:** -216.26 +/- 2.94 o/oo (1950-2020)
- **Measured Radiocarbon Age:** (without d13C correction): 1980 +/- 30 BP
- **Calibration:** BetaCal3.21; HPD method: INTCAL13

Results are ISO/IEC 17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and a Thermo TRAMS. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5560 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP). "Present" is AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (marine oyster). Quoted errors are 1-sigma counting statistics. Calculated values less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.
BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years

(Variables: δ13C = -26.3 o/oo)

Laboratory number  Beta-571495

Conventional radiocarbon age  2330 ± 30 BP

95.4% probability

(94.5%)  485 - 359 cal BC  (2434 - 2308 cal BP)
(0.9%)   271 - 262 cal BC  (2220 - 2211 cal BP)

68.2% probability

(68.2%)  408 - 383 cal BC  (2357 - 2332 cal BP)

Database used
INTCAL13

References

References to Probability Method

References to Database INTCAL13
Reimer, et. al., 2013, Radiocarbon,55(4).
BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years

(Variables: δ13C = -29.1 o/oo)

Laboratory number Beta-571496

Conventional radiocarbon age 1910 ± 30 BP

95.4% probability

(93.6%) 22 - 170 cal AD (1928 - 1780 cal BP)
(1.8%) 194 - 209 cal AD (1756 - 1741 cal BP)

68.2% probability

(68.2%) 68 - 126 cal AD (1882 - 1824 cal BP)

AD31-FS89-N107-LVL8

Database used
INTCAL13

References

References to Probability Method

References to Database INTCAL13
Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: November 03, 2020
Submitter: Mr. Sean Reid

**QA MEASUREMENTS**

Reference 1
- **Expected Value:** 0.49 +/- 0.10 pMC
- **Measured Value:** 0.49 +/- 0.03 pMC
- **Agreement:** Accepted

Reference 2
- **Expected Value:** 129.41 +/- 0.06 pMC
- **Measured Value:** 129.46 +/- 0.37 pMC
- **Agreement:** Accepted

Reference 3
- **Expected Value:** 96.69 +/- 0.50 pMC
- **Measured Value:** 96.57 +/- 0.26 pMC
- **Agreement:** Accepted

**COMMENT:** All measurements passed acceptance tests.

Validation: [Signature]
Date: November 03, 2020
July 26, 2021

Mr. Sean Reid
Syracuse University
1122 Forest Hills Avenue
Charlottesville, VA 22903
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

Chris Patrick
Vice President of Laboratory Operations

[Signature]
# REPORT OF RADIOCARBON DATING ANALYSES

<table>
<thead>
<tr>
<th>Laboratory Number</th>
<th>Sample Code Number</th>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta - 597657</td>
<td>AD31-FS77-N106-LVL6</td>
<td>680 +/- 30 BP  IRMS 513C: -28.7 o/oo</td>
</tr>
</tbody>
</table>

(58.6%) 1276 - 1321 cal AD  (674 - 629 cal BP)
(36.6%) 1358 - 1390 cal AD  (592 - 560 cal BP)

- **Submitter Material:** Charcoal
- **Pretreatment:** charred material/acid/alkali/acid
- **Analyzed Material:** Charred material
- **Analysis Service:** AMS-Standard delivery
- **Percent Modern Carbon:** 91.88 +/- 0.34 pMC
- **Fraction Modern Carbon:** 0.9186 +/- 0.0034
- **D14C:** -81.17 +/- 3.43 o/oo
- **D18C:** -69.03 +/- 3.43 o/oo (1950:2021)
- **Measured Radiocarbon Age:** (without d13C correction): 740 +/- 30 BP
- **Calibration:** BetaCal4.20; HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and a Thermo IRMs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5560 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP). "Before Present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (ollitic acid). Quoted errors are 1-sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d18N and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.
BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(HPD): INTCAL20

(Variables: δ13C = -28.7 o/oo)

Laboratory number Beta-597657

Conventional radiocarbon age 680 ± 30 BP

95.4% probability

(58.8%) 1276 - 1321 cal AD  (674 - 629 cal BP)
(36.6%) 1358 - 1390 cal AD  (592 - 560 cal BP)

68.2% probability

(44%) 1280 - 1304 cal AD  (670 - 646 cal BP)
(24.2%) 1366 - 1382 cal AD  (584 - 568 cal BP)

Database used
INTCAL20

References
References to Probability Method
References to Database INTCAL20
Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NISTSRM-1990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: July 26, 2021
Submitter: Mr. Sean Reid

**QA MEASUREMENTS**

Reference 1
Expected Value: 0.44 +/- 0.10 pMC
Measured Value: 0.44 +/- 0.03 pMC
Agreement: Accepted

Reference 2
Expected Value: 96.69 +/- 0.50 pMC
Measured Value: 96.89 +/- 0.31 pMC
Agreement: Accepted

Reference 3
Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.58 +/- 0.39 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: [Signature]
Date: July 26, 2021
November 29, 2021

Mr. Sean Reid
University of Virginia
1122 Forest Hills Avenue
Charlottesville, VA 22903
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

Chris Patrick
Vice President of Laboratory Operations
# REPORT OF RADIOCARBON DATING ANALYSES

Sean Reid  
University of Virginia

<table>
<thead>
<tr>
<th>Laboratory Number</th>
<th>Sample Code Number</th>
<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
</tr>
</thead>
</table>
| Beta - 608548     | AD31-FS76-N106-E100 LVL5 | 670 +/- 30 BP, IRMS 513C: -25.6 o/oo  

(53.1%) 1277 - 1322 cal AD (673 - 628 cal BP)  
(42.3%) 1356 - 1392 cal AD (594 - 558 cal BP)

Submitter Material: Charcoal  
Pretreatment: (charred material) acid/alkali/acid  
Analysis Service: AMS-Standard delivery  
Percent Modern Carbon: 92.00 +/- 0.34 pMC  
Fraction Modern Carbon: 0.9200 +/- 0.0034  
D14C: -80.02 +/- 3.44 o/oo  
\( \Delta^{14}C \): -87.89 +/- 3.44 o/oo (1950:2021)  
Measured Radiocarbon Age: (without \( \delta^{13}C \) correction): 680 +/- 30 BP  
Calibration: BetaCal4.20; HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and a Thermo IRMs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5560 years), is corrected for total isotopic fractionation and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (coconut oil). Quoted errors are 1-sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded to 30. \( \delta^{13}C \) values are on the material itself (not the AMS \( \delta^{13}C \)). \( \delta^{13}C \) and \( \delta^{15}N \) values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.
BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years
(HPD: INTCAL20)

(Variables: \( \delta^{13}C = -25.6 \) o/oo)

Laboratory number Beta-608548

Conventional radiocarbon age \( 670 \pm 30 \) BP

95.4% probability

(53.1%) 1277 - 1322 cal AD (673 - 628 cal BP)
(42.3%) 1356 - 1392 cal AD (594 - 558 cal BP)

68.2% probability

(37.1%) 1283 - 1305 cal AD (667 - 645 cal BP)
(31.1%) 1364 - 1384 cal AD (586 - 566 cal BP)

Database used
INTCAL20

References to Probability Method

References to Database INTCAL20
Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NISTSRM-1990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: November 29, 2021
Submitter: Mr. Sean Reid

QA MEASUREMENTS

Reference 1
Expected Value: 0.42 +/- 0.04 pMC
Measured Value: 0.42 +/- 0.03 pMC
Agreement: Accepted

Reference 2
Expected Value: 96.69 +/- 0.50 pMC
Measured Value: 96.13 +/- 0.29 pMC
Agreement: Accepted

Reference 3
Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.70 +/- 0.35 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: [Signature]
Date: November 29, 2021
December 02, 2021

Mr. Sean Reid
University of Virginia
1122 Forest Hills Avenue
Charlottesville, VA 22903
United States

RE: Radiocarbon Dating Results

Dear Mr. Reid,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact us.

Sincerely,

[Signature]

Ronald E. Hatfield President
REPORT OF RADIOCARBON DATING ANALYSES

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<th>Laboratory Number</th>
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<th>Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) &amp; Stable Isotopes</th>
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<tbody>
<tr>
<td>Beta - 608549</td>
<td>AD31-FS79-N106-E100 LVL8 (palm nut)</td>
<td>1440 +/- 30 BP IRMS δ13C: -25.5 o/oo</td>
</tr>
</tbody>
</table>

(95.4%) 576 - 654 cal AD (1374 - 1296 cal BP)

Submitter Material: Charcoal
Pretreatment: (charred material) acid/alkali/acid
Analyzed Material: Charred material
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 83.59 +/- 0.31 pMC
Fraction Modern Carbon: 0.8359 +/- 0.0031

\[ \Delta^{14}C = -164.11 +/- 3.12 \text{ o/oo} \]
\[ \Delta^{13}C = -171.26 +/- 3.12 \text{ o/oo (1950-2021)} \]

Measured Radiocarbon Age: (without δ13C correction): 1450 +/- 30 BP
Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP). "Present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (ecolic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. δ13C values are on the material itself (not the AMS δ13C). δ13C and δ18N values are relative to VPDB. References for calendar calibrations are cited at the bottom of the calibration graph pages.
BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(Variables: $\delta^{13}C = -25.5$ o/oo)

Laboratory number Beta-608549

Conventional radiocarbon age 1440 ± 30 BP

95.4% probability

(95.4%) 576 - 654 cal AD  (1374 - 1296 cal BP)

68.2% probability

(68.2%) 603 - 644 cal AD  (1347 - 1306 cal BP)

Database used
INTCAL20

References
References to Probability Method

References to Database INTCAL20

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: beta@radiocarbon.com

Page 3 of 3
**Bibliography**


**AMARTEY, S.** 2017. The Archaeology of Supomu Island (Ghana) and the Atlantic Trade. *Nyame Akuma* 88: 6.


—. 2010. Who were the builders of the earthworks of southern Ghana? Studies in the African Past 8.


BOWDICHI,T.E. 1873. Mission from Cape Coast Castle to Ashantee: With a Descriptive Account of that Kingdom. Griffith & Farran.


—. 1930. Five days over the Maya country. The Scientific Monthly 30.


REINDORF, C.C. 1895. *History of the Gold Coast and Asante* (Based on Traditions and Historical Facts, Comprising a Period of More Than Three Centuries From About 1500 to 1860). Basel.


Sean Hamilton Reid

Department of Anthropology | Maxwell School | Syracuse University
209 Maxwell Hall | Syracuse, NY | shreid@syr.edu

EDUCATION

Ph.D. Anthropology
Syracuse University, Syracuse, NY 2022

M.A. Anthropology
The George Washington University, Washington, DC 2010

B.A. Sociology and Anthropology
St. Mary’s College of Maryland, St. Mary’s City, MD 2007

A.A. Honors
Montgomery College, Rockville, MD 2005

PUBLICATIONS


**Selection of HONORS & AWARDS**

**Don Stabile Alumni Doctoral Scholarship**
St. Mary’s College of Maryland, Office of Alumni Relations

**Woodson Pre-Doctoral Fellow**
The Carter G. Woodson Institute for African-American and African Studies at the University of Virginia

**U.S. Student Fulbright Fellow, Ghana**
Institute of International Education

**Maxwell African Scholar’s Union Summer Research Grant**

**DigitalGlobe Foundation**
Satellite Imagery Grants

**Roscoe Martin Fund for Research**

**SU Graduate Student Organization Research Grant**

**Maxwell African Scholar’s Union ASA Award**

**Scottish Rite Endowment Graduate Fellowship**
The George Washington University

**Critical Language Scholarship**
in Arabic, Cairo, Egypt
American University in Cairo and The U.S. Department of State

**TEACHING EXPERIENCE**

**Teaching Assistant**, University of Virginia
“Introduction to African & African Diaspora Studies” AAS 1010/1020

**Maxwell Teaching Associate** Syracuse University
“Global Community” MAX 132

**Adjunct Professor** Le Moyne College
“Introduction to Anthropology” (Four Field)

**Teaching Assistant**, Syracuse University
“Prehistoric Archaeology”- ANT 141
“Historical Archaeology”- ANT 145
“Global Encounters” – ANT 185
“Historical Archaeology” – ANT 145
“Biological Anthropology” – ANT 131
“Peoples and Cultures of the World” – ANT 121

Teaching Assistant, The George Washington University 2008–2010
“Biological Anthropology” – ANTH 1001

ARCHAEOLOGICAL FIELD EXPERIENCE

Principal Investigator 2016–2017

Field Crew Supervisor Trent’s Plantation, Barbados Summers 2014–2016, 2018
Research directed by Dr. Douglas Armstrong

Field Crew Supervisor Bunce Island, Sierra Leone Summer 2013
Research directed by Dr. Christopher R. DeCorse


Dive survey, site mapping, site stabilization.
Research directed by the National Park Service Submerged Resource Center

Field School Student James Island, Juffüre, Albreda, The Gambia Summer 2006
Research directed by Dr. Liza Gijanto

Field School Student Celtic Outpost, Marseille, France Winter 2005

CONFERENCE PRESENTATIONS


Satellite Remote Sensing and Archaeological Survey in Central and Western Regions, Ghana XVth Colloquium, West African Archaeological Association (W.A.A.A/A.O.A.A)
July 10-14, 2017 Department of Archaeology and Heritage Studies, University of Ghana, Legon.

**Satellite Remote Sensing of Archaeological Vegetation Signatures in Coastal West Africa (Sierra Leone).** Environmental Archaeology and Historical Ecology: Present and Future Directions. 49th Annual Conference on Historical and Underwater Archaeology January 6-9, 2016 Washington, D.C.

**Atlantic Horizons: Maritime Landscapes and the Atlantic Trade in the Sierra Leone Estuary.** With Samuel Amartey. Connecting Continents: Archaeological Perspectives on Slavery, Trade and Colonialism Society for American Archaeology & European Association of Archaeologists Joint Thematic Meeting, November 5-7, 2015 Curaçao

**Why BISC-2’s Brick Ballast May Have the Most Interesting (Archaeological) Things to Say about Imperial Marginality**
46th Annual Conference on Historical and Underwater Archaeology January 11, 2013. Leicester, England

**INVITED TALKS**

**Spotlight On Africa: Archaeological Survey and Satellite Remote Sensing in Central and Western Regions, Ghana** Hosted by the Maxwell African Scholars Union, Moynihan Institute of Global Affairs, Syracuse University October 13, 2017

**Archaeological Discoveries In Ghana** Hosted by the U.S. Embassy in Accra, Public Affairs Section. May 11, 2017

**Archaeology, Remote Sensing, and Two Millennia of History in Central and Western Regions, Ghana** Hosted by Department of History, University of Education, Winneba, Ghana April 12, 2017

**OTHER GUEST LECTURES and PRESENTATIONS**

**Globalization, Culture, and Identities: Cultural Change and Conflict.** With Dr. Miriam Elman. Lecture in Maxwell 132 “Global Community.” October 18, 2017

**Complexities of Globalization: “Development” and the Millennium Development Goals.** With Lindsay Burt. Lecture in Maxwell 132 “Global Community” September 13, 2017

**One Million Years B.C.? Context and Chronology in Archaeology: How We Know Humans and Dinosaurs Did Not Co-exist.** Guest lecture in “Archaeology at the Movies” Dr. Christopher R. DeCorse February 3, 2016

**Gender, Sexuality, Masculinity, and Femininity.** Guest Lecture in “Peoples and Cultures of the World” Dr. Azra Hromadzic October 7, 2015

The Underwater Archaeological Record: Generally When Things Went Wrong. Guest lecture in “Introduction to Maritime Archaeology” Dr. Rachel Horlings September 12, 2012

Tools of the Lower Paleolithic. Guest lecture in “Introduction to Prehistory and Archaeology” Dr. Christopher R. DeCorse September 19, 2012

SERVICE AND OTHER PROFESSIONAL EXPERIENCE

Anthropology Graduate Student Organization Syracuse University

“Secretary” 2017-2018
“Speaker Series Coordinator” 2013-2014

Crisis Counselor Safe Journey House Residential Mental Health Crisis Center. Prince George’s County, MD 2011
Assessing resident needs and supporting their individual treatment plans

AmeriCorps*VISTA National Park Service, Alaska 2007-2008
Grant writer and public outreach for Alaskan Native Youth Archaeological Mentorship Program.

SPECIAL SKILLS

Technical: ESRI ArcGIS; ERDAS Imagine, Microsoft Office Suite;
Certifications: CPR and First Aid; SSI Advanced Diver, Navigation, Rescue, Dry Suit

PROFESSIONAL MEMBERSHIPS

Society for Africanist Archaeologists (SAFA), African Studies Association (ASA),
Society for Historical Archaeology (SHA), Society for American Archaeology (SAA)