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An imperium in imperio: A Geospatial Analysis of Defensibility and Accessibility of Maroon Settlements in Dominica

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(Received 15 February 2024; revised 10 May 2024; accepted 13 June 2024)

Abstract

This article explores the Maroon landscape of the Caribbean island of Dominica (Wai'tukubuli) by creating a geographic information system (GIS) model to determine the reasons behind settlement location choices. For more than 50 years, hundreds of self-emancipated Africans inhabited the mountainous interior of Dominica, where they formed various communities that actively resisted European colonialism and slavery not only to maintain their freedom but to assist in liberating enslaved Africans throughout the island. Contemporary Dominican communities maintain connections to these revolutionary ancestors through the landscape and continuing cultural practices. None of the Maroon encampments, however, have been studied archaeologically. This study uses geospatial methods to understand the visibility, defensibility, and spatial accessibility of nine Maroon camps. The results of the viewshed and least cost path analysis allows us to map Dominican Maroon social networks and reimagine the possible routes that the Maroons took to maintain their freedom.

Resumen

Este artículo explora el paisaje cimarrón de la isla caribeña de Dominica (Wai'tukubuli) mediante la creación de un modelo de sistema de información geográfica (SIG) para determinar las razones detrás de las elecciones de ubicación de los asentamientos. Durante más de 50 años, cientos de africanos autoemancipados habitaron el interior montañoso de Dominica, donde formaron varias comunidades que resistieron activamente el colonialismo y la esclavitud europeos no sólo para mantener su libertad, sino también para ayudar a liberar a los africanos esclavizados en toda la isla. Las comunidades dominicanas contemporáneas mantienen conexiones con estos ancestros revolucionarios a través del paisaje y las prácticas culturales continuas. Sin embargo, ninguno de los campamentos cimarrones ha sido estudiado arqueológicamente. Este estudio utiliza métodos geoespaciales para comprender la visibilidad, la defensa y la accesibilidad espacial de nueve campamentos cimarrones. Los resultados del análisis de la cuenca visual y de la ruta de menor costo nos permiten mapear las redes sociales de los cimarrones dominicanos y reimaginar las posibles rutas que tomaron los cimarrones para mantener su libertad.

Keywords: Marronage; Maroon settlements; GIS; visibility; accessibility

Palabras clave: Cimarronaje; asentamientos Cimarrones; GIS; visibilidad; accesibilidad

During the mid-eighteenth and early nineteenth centuries, the mountainous interior of the Caribbean island of Dominica (Wai'tukubuli) was known as Maroon Country (Esprit 2021; Honychurch 2017). Two centuries earlier, the Indigenous Kalinago resisted Spanish colonizers using their knowledge of the landscape to engage in guerrilla warfare to create the foundation for Dominica as a safe haven

for Taíno refugees fleeing enslavement from throughout the Caribbean. Similarly, with the transition to plantation agriculture supported by the African slave trade in the Caribbean, enslaved people escaped bondage to form their own independent communities beyond the control of European powers by fleeing to isolated areas in the mountains, caves, swamps, and forests. However, this freedom was under constant threat from military expeditions authorized by the colonial state governments and carried out by bounty hunters and local militias. Spanish colonizers were the first to refer to self-liberated Indigenous and African laborers as *cimarrónes*. “Marronage,” or freedom through flight from slavery, is a historical phenomenon that occurred throughout the slave societies of the Americas. For this reason, the Spanish word *cimarrón* became “maroon” in English and *marron* in French and Dutch (Price 1996:xii). Whether escaping individually, in small groups, or in a mass exodus, Indigenous and African persons fled and regained control of their daily lives despite overwhelming challenges and threats to their existence. During the sixteenth and seventeenth centuries, the Kalinago welcomed Africans who fled enslavement on other Caribbean islands or were liberated during Kalinago raids of nearby islands (Honychurch 2017:21). The Maroon population in Dominica, historically referred to as the Neg Mawon, increased significantly after English colonization in the late eighteenth century, when enslaved laborers from plantations on the island absconded to the interior mountains and joined forces with established settlements or created new camps. By 1813, British governor George Robert Ainslie described the Maroons in Dominica as a de facto nation, stating that they were an *imperium in imperio* (a state within a state), “established above 30 years” (Pattullo 2015:5). The people who settled in Maroon Country envisioned an alternative geography outside the territorial control of European states, “yet internal to the colony” (Hauser and Armstrong 2012:314). Our research confirms this sentiment, reflecting the interconnectedness of these camps, and how the rugged and mountainous interior of Dominica provided a unique landscape allowing for the strategic establishment of defensible places set within a broader network of Maroon communities.

Historical and sociocultural literature highlights the significance of the anti-slavery and anti-colonial resistance of the Dominican Maroons (Atwood 1791; Esprit 2021; Fontaine 2021; Grell 1976; Harris 2016, 2019; Honychurch 1995, 2014, 2017; Malm 2018; Marshall 1976; Pattullo 2015; Trouillot 1988; Vaz 2016, 2019), but none of the Maroon settlements in Dominica have been studied archaeologically. Following the approach used by Jones (2006), here we address this gap in scholarship by applying a settlement ecology framework to identify factors behind where Maroon communities chose to establish their settlements. Specifically, we seek to explain the decision-making process to create settlements in certain places on the landscape, including what criteria may have been prioritized by Maroon communities.

The historical contributions of Dominican Maroons to anti-slavery and anti-colonial resistance in the Americas more broadly has not received the same rigorous scholarly attention as Maroon societies in Jamaica, Brazil, Suriname, or Cuba, to name a few (Agorsah 1985, 1994, 1999, 2006; Craton 1982; La Rosa Corzo 2003, 2005; Ngwenyama 2007; Orser and Funari 2001; Sayers 2014; Weik 1997, 2012; White 2010, 2014). Comprehensive histories of marronage in the Americas written by Price (1996) and Thompson (2006) make minimal reference to Dominican Maroons. Although the Neg Mawon were much smaller than the Maroon communities in Jamaica, Suriname, and Brazil, their resistance to slavery and struggle for emancipation outlasted the Garifuna (Black Caribs) in St. Vincent and Jamaican Maroons by 20 years (Craton 1982; Vaz 2019:28). British colonial officials and the plantocracy viewed Dominica Maroons as a menace to plantation society second behind their counterparts in Jamaica (Honychurch 2017:78; Marshall 1976:27). Despite the different analytical orientations, the historical literature has mostly interrogated colonial sources written by the adversaries of the Neg Mawon. In doing so, the perspectives of Maroons have been mostly silent in scholarly works. One exception is Pattullo’s (2015) monograph, which prioritizes Maroon voices through the use of transcripts from trial records, but we also must be cognizant that testimonials could have been coerced by colonial authorities.

The archaeological interpretation of spatial data presented here builds off of this previous scholarship, allowing for additional evidence to reconstruct Maroon settlement patterns and the sociopolitical actions of Maroons to obtain freedom and independence. We argue that the location and organization

of Maroon settlements on the Dominican landscape was deliberate and strategic. Not only did the locations of settlements serve a defensive purpose, but there was intentionality in their decision-making to establish a network of connected communities to increase chances of survival and continued freedom. Due to the constant state of warfare between the British military and the *Neg Mawon*, we aim to show how defensibility and intercamp social networks were prioritized when deciding where to establish a Maroon settlement. Furthermore, this tradition of resistance, self-sufficiency, and struggle for emancipation persisted in the post-slavery period with the continuance of maritime Maroon networks to assist enslaved Africans from neighboring French islands in obtaining liberation (Vaz 2016), the Census Riots of 1844 and protests by small landholders against land taxes and plantation wages, and the 1970s back-to-the-land movement espoused by Rastafarians in Dominica (Honychurch 2017).

Theoretical Approaches in Maroon Archaeology

As a subfield, Maroon archaeology emerged in the late 1980s as part of a shift in African Diaspora archaeology away from plantation archaeology to consider the material culture of self-liberated Africans in the Caribbean and Americas (Ibarrola 2021:4–5). Orser and Funari (2001:62) state that this change was influenced by historians and anthropologists studying the historical and social elements of uprisings by enslaved peoples, as well as the connection between the Civil Rights movement and traditions of anti-slavery resistance. The archaeological study of Maroon settlements provides the opportunity to study overt resistance to slavery, the material expressions of *marronage* in the New World, and the formation of Maroon heritage and cultural traditions (Orser and Funari 2001:64). Traditional themes in African Diaspora archaeology such as cultural retention, forms of resistance, and rebellion remain fundamental to Maroon archaeological research (White 2014:230). Scholarship on Maroon archaeology has offered insights into concepts of power, freedom, and collective resistance. The earliest research goals of Maroon archaeology were to locate sites, expand new research areas, survey site boundaries and features, test settlement patterns, and supplement historical accounts (Weik 1997:83). In general, archaeologists of *marronage* have been successful at locating sites, recovering artifacts, establishing foundations for future excavations, and also revealing the struggles and successes of freedom seeking in extraordinarily precarious circumstances.

Our research of Maroon settlements in Dominica is positioned within the broad umbrella of landscape archaeology to reconstruct their settlement system by investigating spatial patterns and settlement location decisions (Hu 2011:80; Ingold 1993; Kellett and Jones 2017:7). We apply the concept of place, following Branton (2009:52) as “the human tendency to attach cultural meaning to discrete locations,” and space as the physical setting and context within which people moved and settled. More recent landscape perspectives have investigated settlement patterns “by treating the landscape as a formation of continuous culturally defined spaces in which humans actively create, use, manipulate, and experience landscapes” (Kellett and Jones 2017:7). According to Fish (1999:203), “A settlement pattern is a set of culturally significant locations, each of which occupies a specified position within an array that makes up a coherent distribution.”

Several Maroon studies throughout the Americas have utilized a landscape perspective in their study of settlement patterns. In Jamaica, E. Kofi Agorsah (1994) developed the Maroon Heritage Research Project (MHRP), which conducts historical, ethnographic, and archaeological research of Maroon communities at Nannytown and Accompong town. Regarding settlement patterns, Agorsah (1985, 1999:53) used a landscape approach combined with ethnoarchaeology to understand the retention of Africanisms in settlement behavior at Accompong town by drawing analogies from archaeological research in the Volta Basin of Ghana. Adding to the data collected by the MHRP in Jamaica, Ngwenyama (2007:40) conducted an ethnoarchaeological study of Suriname Maroons juxtaposing their settlement patterns with similar places in Africa to highlight familiar settlement behaviors. Agorsah (2006) also created a predictive model of *marronage* in Suriname based on geography, Maroon military strategies, and creation of settlements.

In Brazil, Orser and Funari (2001:68) observed how continuous warfare that the Maroon community at Palmares encountered strongly influenced the settlement pattern of all the sites investigated in the Serra da Barriga region. For example, all the sites were designed in a strategic position facing south,

given that this was the common approach used by colonial troops to attack Palmares (Orser and Funari 2001:68). In Cuba, La Rosa Corzo (2003:1–8) used a landscape approach combining historical and archaeological data to examine the relationship between environmental conditions and the actions of *cimarrónes* (Maroons) and the bounty hunters sent to capture and re-enslave them. Balanzátegui Moreno and Delgado Vernaza (2024) use a critical social archaeology approach to map Maroon resistance strategies to colonialism and racial violence in rural and urban areas and in *palenques* in Ecuador. Building off of this previous scholarship, we apply a landscape framework to examine the patterns of settlement among Maroon communities in Dominica, specifically through the lens of settlement ecology.

Settlement ecology developed out of previous approaches in settlement archaeology, landscape archaeology, and historical ecology (Kellett and Jones 2017:4–9). Anschuetz et alia (2001:177) explain how a settlement ecology approach is a useful archaeological application to landscapes, because it addresses issues of land use, occupation, and change over time. Settlement ecology, as advocated by Stone (1996), sought to correct the processual-era environmental deterministic models to explain and universally predict settlement patterns of ancient hunter-gatherer societies by shifting the focus to agrarian settlements (Kellett and Jones 2017; Stone 1996). Jones (2017:31) outlines two behavioral ecological assumptions that inform us about the relationship between settlement patterns and the underlying cultural preferences and values of past human actors. First, there is the assumption that human settlement behaviors are intentional rather than random. The second assumption is based on the proximity principle, which suggests that people will establish a settlement closest to critical resources (i.e., freshwater resources; Kellett and Jones 2017:6). Additionally, historical records allow us to incorporate additional social, cultural, and political factors when evaluating settlement location choice in a postcolumbian context. For instance, Davis (2022) observed a majority of African Seminole settlements in Central Peninsular Florida being located in well-drained sediments; however, the historical record mentions several African Seminole settlements engaging in wetland crop cultivation. Davis (2022:150, 178) maintains that most of the African Seminole communities sought to create settlements in higher-elevated and less-inundated areas but considers the spatial practices mentioned in the historical records as individual African Seminole communities prioritizing wetland environments for possibly defensive purposes. Like Davis, we have combined historical data with geospatial analysis to identify landscape features and resources that Maroons prioritized when deciding where to establish their camps.

Settlement ecology theory emphasizes human agency. Proponents argue that it is not the individual factors that determine the arrangement of a settlement; it is the “conscious decisions made by people in the face of these factors that ultimately create a pattern of settlement” (Kellett and Jones 2017:12). Archaeological research using a settlement ecology approach is based on three main premises. First, there is an emphasis on the interaction between settlement and environment. Second, the settlement decision-making process is time and space contingent—meaning that settlement location choices are influenced by geophysical and biogeographical properties of the landscape and by the sociocultural context in which those people lived in. Last, the defined settlement is a consideration of the relationships between sites and broader landscapes (Davis 2022:49; Jones and Ellis 2016:86), which provides a more in-depth understanding of a settlement system. As Kellett and Jones (2017:12) posit, “It is not just the influence of individual pressures upon settlement decisions, but how they intersect, connect, and impact one another.” Furthermore, settlement ecology is not limited to only agrarian societies, as Stone (1996) envisioned, but may include all types of societies and specific characteristics such as mobile communities engaged in continuous warfare (Davis 2022; Kellett and Jones 2017:11)—like the Neg Mawon. Davis (2022) used a geographic information system (GIS) mixed-method approach to understand ancestral African Seminole settlement location choices and explain settlement patterning processes through the lens of settlement ecology (Davis 2022:8). As is the case in Dominica, few of the African Seminole settlements have been documented or studied archaeologically. Furthermore, archaeologists studying marronage in St. Croix have used GIS to chart possible routes of freedom used by maritime Maroons (Dunnivant 2021) and for identifying potential Maroon sites (Ejstrud 2008). As demonstrated by Davis (2022), the phenomenon and broader geopolitical context of marronage create unique conditions for investigating settlement ecology. In Dominica, the extreme precarity of living as fugitives under constant threat of capture or death presented critical obstacles for constructing a settlement.

Previous historical archaeological research in Dominica has predominantly centered on investigating plantation and frontier landscapes, colonial-era trading outposts, colonial military forts, and enslaved diets and subsistence practices (Beier 2017; Harris 2016, 2019; Hauser 2011, 2014, 2015, 2017, 2021; Hauser and Wallman 2020; Hauser et al. 2019; Lenik 2010; Wallman 2020). Archaeologist Mark Hauser (2011, 2017, 2021) has noted how local trade and exchange between enslaved laborers, Maroons, and the Kalinago took place at legally sanctioned markets in Dominica. The archaeological investigation of Maroon settlements in Dominica may shed light on these socio-economic networks and the types of material culture exchanged between Maroons, enslaved Africans, and the Kalinago. Recent archaeological research in Dominica emphasizes how everyday practices—including food acquisition, production, and consumption, as well as leisure and household activities—allowed enslaved people to negotiate a contested colonial landscape (Hauser and Wallman 2020:2–3). The following section contextualizes the history of marronage in Dominica, in particular outlining specific Maroon settlement patterns that will be further explored in this study.

The Maroon Landscape of Dominica

Dominica (Wai'tukubuli) is a volcanic island located in the Lesser Antilles island chain in the Caribbean (Figure 1; Reilly and Stevens, 2024). The island is only 750 km², with a rugged coastline and a mountainous interior dominated by tropical rainforest. The highest peak is Morne Diablotins, which sits at 1,446 m asl. In 1493, the Spanish arrived on the island, but similar to the other Eastern Caribbean islands, no permanent Spanish settlement was ever established in Dominica (Honychurch 2017:16; Vaz 2016:3).

For over 200 years, the Indigenous Kalinago resisted Spanish colonization using their knowledge of the landscape to engage in guerilla warfare, creating the foundation for Dominica as a safe haven for Taíno refugees fleeing enslavement from the islands in the Greater Antilles. In the sixteenth and seventeenth centuries, the Kalinago in Dominica abducted Africans from wrecked slave ships and from raids on neighboring European plantations, and they captured self-emancipated Africans who had fled enslavement (Santos-Granero 2009:21–22). As Santos-Granero (2009:21) notes, at first, Kalinago in Dominica and St. Vincent would often trade African captives back to European enslavers, but on later occasions, they were incorporated into Kalinago society as captives, similar to Amerindian prisoners of war. The Indigenous Kalinago avoided intermarriage with captive Africans and engaged in armed conflict with self-emancipated Africans in Dominica (Santos-Granero 2009:21). Despite captivity and being relegated to field labor or domestic servitude, the different West African ethnic groups in Dominica and St. Vincent learned the Kalinago language and customs (Honychurch 2017; Santos-Granero 2009; Vaz 2016). We also must be cognizant that the ethnohistorical accounts (de Rochefort 1666:293, 324) from this period were written from a European perspective and fail to provide the point of view of Africans who were captured and integrated into Kalinago society. Nevertheless, the two centuries of interaction, cultural exchange, and resistance strategies shared between Amerindians and Africans prior to formal European colonization is evident in the strong presence of the Kalinago language and traces of African languages in the creolized culture of Dominica (Honychurch 2017).

Treaties between the English and French signed in 1660, 1668, and 1748 declared Dominica and St. Vincent as “Neutral Islands” that were designated to not be colonized by Europeans (Honychurch 2017:25). Europeans favored the neutrality treaties because of the resistance from the Kalinago, and although the island was neutral, Dominica was a colonial dependency of Martinique and Guadeloupe (Hauser 2014:149). However, processing sugarcane required an ample amount of wood for timber and fuel in the boiling houses. Subsequent deforestation of coastal areas in the neighboring French islands of Martinique and Guadeloupe led to incursions into Dominica by French timber merchants and lumberjacks seeking lumber and firewood (Honychurch 2017:30). In exchange for being allowed to harvest timber, the Kalinago would receive “tools, mirrors, scissors, cloth and casks of rum” (Honychurch 2017:30). As early as 1691, lumberjacks and timber merchants from Martinique and Guadeloupe were trafficking enslaved Africans to perform the manual labor of chopping and sawing the wood. Many of the enslaved Africans fled the timber camps temporarily,

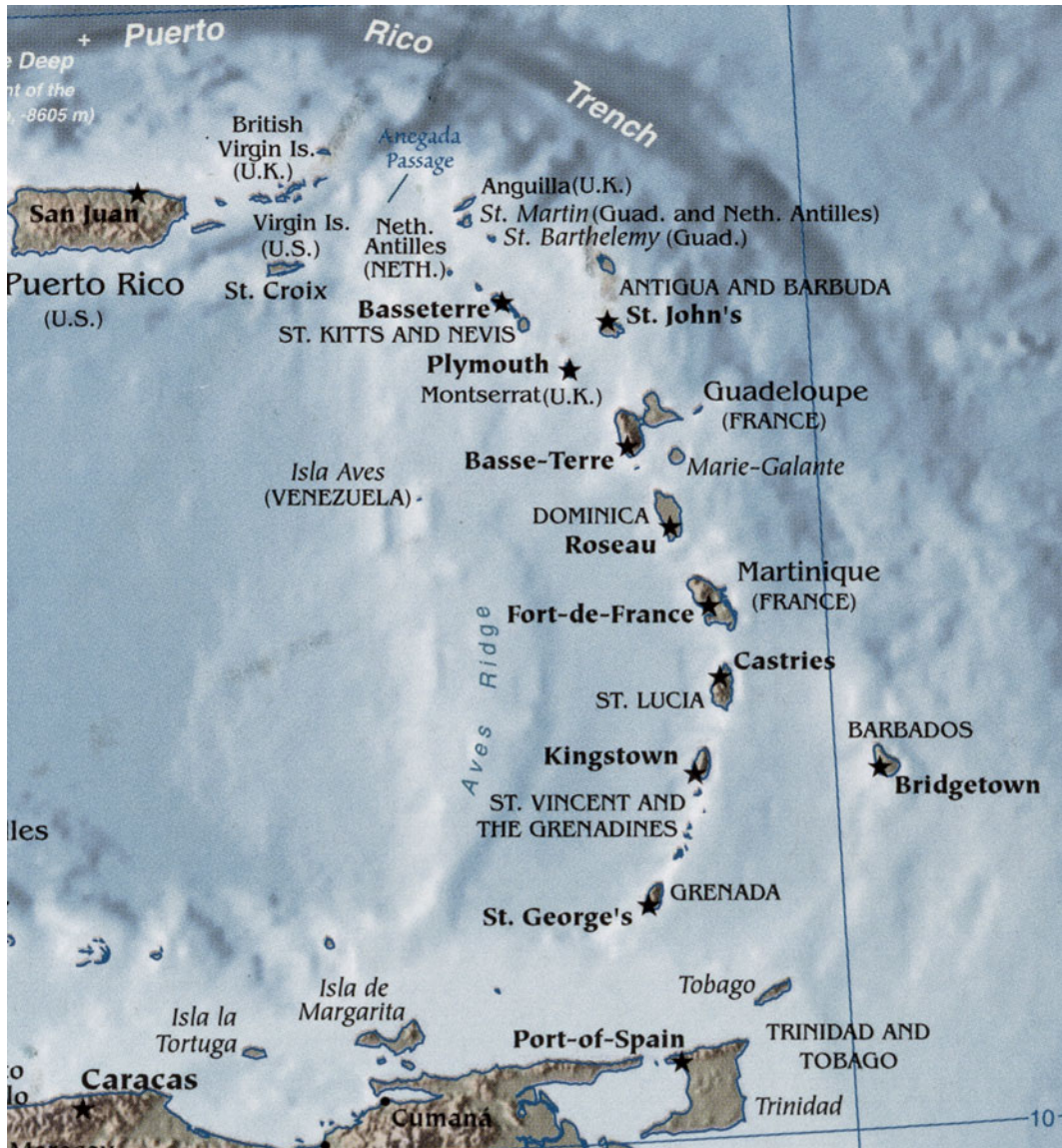


Figure 1. Modified map of the Lesser Antilles (<https://www.loc.gov/item/2008621835/>, courtesy of the Library of Congress).

eventually returning to the sawmills and plantations, or they escaped enslavement by fleeing into the hinterlands seeking freedom and liberation (Honychurch 2017). Like the Kalinago before them, enslaved African men, women, and children took advantage of the Dominican landscape to maintain their freedom. Honychurch (2017) states that by the seventeenth century, there was an unknown number of African Maroons on the island cultivating their own self-sufficient farms and trading their surplus production with neighboring French islands. This “informal” economy was so profound that the Council in Martinique made trading with Dominican Maroons a criminal offense (Honychurch 2017:31). Additionally, although the Kalinago and Maroons interacted and engaged in trade and cultural exchange, the Kalinago were also hired by European enslavers as guides or to track down and capture Maroons (Vaz 2016:62). The symbiotic relationship between the Neg Mawon and Kalinago from the neutrality period had dissipated because it became disadvantageous for the Kalinago to align with the Maroons following British colonization of their island. Historical

documents point to the fractured relationship between the Maroons and Kalinago. In one case, a Kalinago private in the 4th West Indies Regiment with orders to deliver a message from the British governor to a Maroon chief was killed and had his heart ripped out of his chest (Honychurch 2017:62). The result of the treaties of neutrality had drastic long-term effects for the European colonial powers given that the Maroons took advantage of the geopolitical situation by establishing a stronghold in the mountainous interior and an interisland Maroon network (Honychurch 2017:31).

At the end of the Seven Years' War (1756–1763), the British formally colonized Dominica. Colonial administrators along with the British and French planter class attempted a sugar revolution by shifting the agricultural economy from producing crops such as cocoa, coffee, and spices to monocrop sugar cultivation (Hauser 2021). The cultivation and processing of sugar required a large labor force. Vaz (2016:63), using records of trafficked enslaved Africans from the Transatlantic Slave Database, notes that the total number of white Europeans and enslaved Africans in Dominica nearly tripled in the first nine years under British colonization. Before the British colonized the island, there were 1,718 French settlers and 5,872 enslaved laborers, but by 1773, the island had transitioned to a slave society, with roughly 3,850 White inhabitants and 15,753 enslaved Africans (Marshall 1976:26). In the *Atlas of the Transatlantic Slave Trade*, Eltis and Richardson (2010:37–86), note that from 1764 to 1837, more than 110,000 captives were brought directly to Dominica (98.8%), and the other 1.2% of captives came from ports throughout the Americas (St. Kitts, Antigua, Barbados, Martha Brae, Charleston, and Rhode Island). Dominica also became a major reexport center for transporting captives to other colonies. Population estimates for the Indigenous Kalinago are not mentioned, but their exclusion may also be due to warfare with Europeans, diseases, and migration to other Caribbean islands and South America, which put their total population in 1730 at 400 (Honychurch 1995:47). As the enslaved African population on sugar estates continued to grow in the late eighteenth century, the number of Maroons in the interior of the colony increased. For more than the next five decades, the Neg Mawon were a threat to the social structure, which revolved around chattel slavery and the plantation economy.

Historical literature points to the interaction between Maroons and the landscape in Dominica. For instance, Dominican Maroons used wattle-and-daub construction techniques by using available environmental resources such as “palm, heleconia, ‘woseau’ and ‘zel mouche’ leaves” and “woven ‘gaullettes’” to build their homes (Honychurch 2014:80). The Maroon camps can be defined as military strongholds, where the Maroons took advantage of the steep topography (Honychurch 2014, 2017). These natural fortresses emphasize defensibility as a prominent factor in settlement location choice. Like other Maroon sites in the Caribbean and South America, several of the Dominican Maroon settlements were situated on the top of flat plateaus, which were surrounded on at least three sides by precipices and rivers covered in thick forests, making them difficult for enemy military personnel to detect (Honychurch 2014:81).

To access the camps, the Maroons carved stone steps into the cliff sides, and these also served a security purpose. For instance, the Maroons at Chief Jacko's camp manually constructed approximately 135 steps roughly 1 m (3 ft.) tall into the existing rock of the mountain (Figure 2). Historian Thomas Atwood provides the earliest description of steps carved into a mountainside by Maroons. Atwood (1791:246) states, “By noon the next day they came to the mountain whereon was the encampment of Balla. This they ascended with great difficulty, it being cut into steps of a great height above each other, which had been done by the runaways for their own convenience, as being the only possible way to ascend the mountain.” Today, the steps at the camp are commonly referred to as Jacko Steps, and they lead to the intersection of the Layou River and Zombie River. Jacko Steps provided an access route to the camp and were part of the camp's defenses, because it was difficult for the British military to traverse the steps. Due to the height and narrow design of the steps, military attachments sent to attack the camps were forced into a single file formation to ascend the steps, which caused the soldiers to be vulnerable to frontal attack (Atwood 1791:246–247; Honychurch 2014:81). Maroon sentries positioned at the top of the steps could observe possible intruders approaching the camp and engage the



Figure 2. Image of Jacko Steps taken during reconnaissance survey in August 2022. (Photo by Jonathan Rodriguez.)

enemy or alert the camp to retreat using an alternative route. Other defensive fortifications constructed by the Maroons include palisades and booby-trap pits with sharpened wooden stakes surrounding the perimeter of the camps (Honychurch 2017). Inside the enclosed camp were small gardens similar to the house gardens used by enslaved Africans on plantations. Larger agricultural fields or provision grounds were located at a greater distance from the camps (Honychurch 2017:60). Based on the historical data, the Maroons were likely creating their camps strategically in agriculturally productive areas with natural defenses and with accessibility to other Maroon communities. Consequently, viewshed and least cost path (LCP) analyses are useful to investigate the importance of defensibility and accessibility in deciding a settlement location.

Methods

Historical archaeological research on marronage has successfully used GIS approaches to create predictive models (Ejstrud 2008), to map marronage networks and routes of freedom (Dunnivant 2021), and to model processes of settlement location choice (Davis 2022). Additionally, GIS offers the best methodological approach for exploring the complexity of settlement patterns and various dynamics that inform human decision-making (Kellett and Jones 2017:13). For the purpose of this

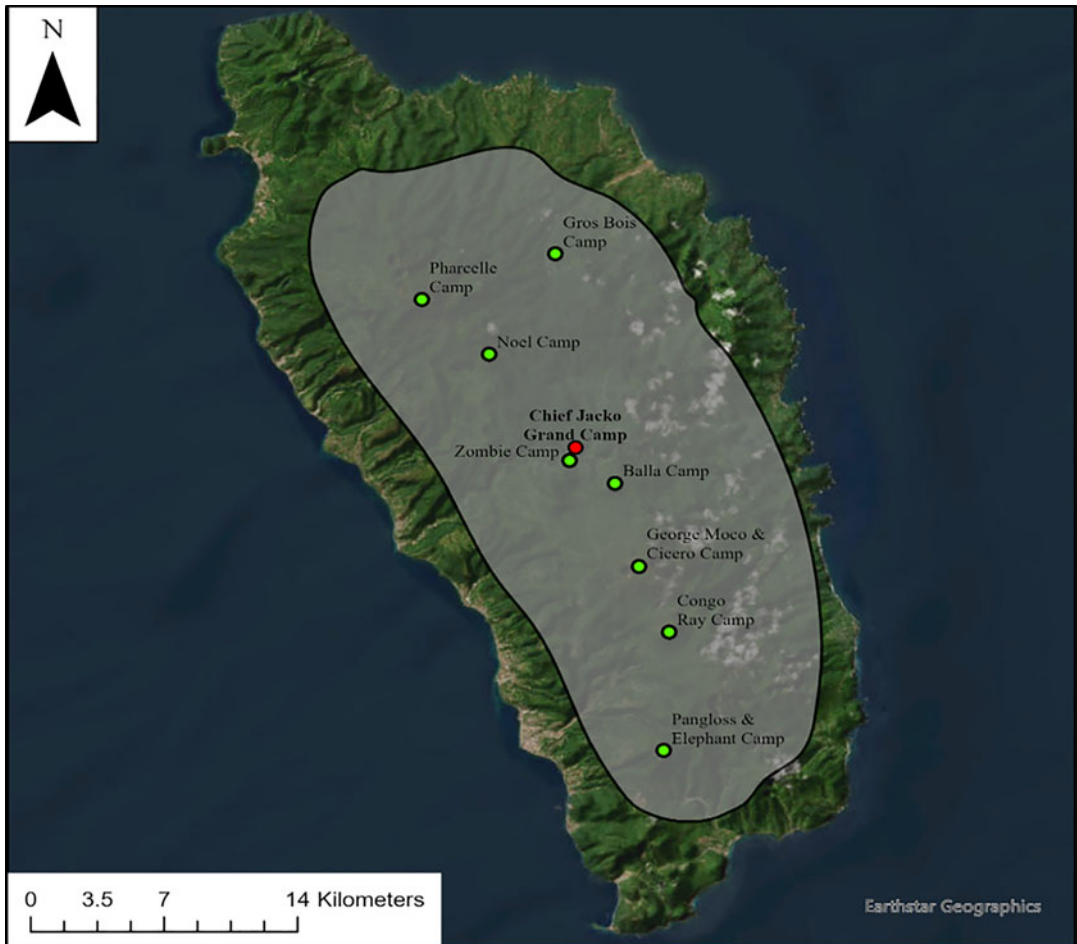


Figure 3. Map of Dominica Maroon settlements within the shaded area depicting Maroon Country. (Map created in ESRI ArcGIS Pro by Jonathan Rodriguez.)

study, the spatiotemporal parameters were limited to Maroon settlements located within the interior that were occupied after British colonization of Dominica in 1763 and the end of the Second Maroon War in 1815 (Figure 3).

The Maroon settlements were identified and mapped in ESRI ArcGIS Pro based on camp locations in historical records or mentioned in secondary historical monographs (Honychurch 2014, 2017; Pattullo 2015; Vaz 2016). Most of the historical data examined are British colonial office records, dispatches between colonial governors and the secretary of state, and reports from British military officers and local militiamen. In most cases, the records state that they are searching for runaways in the woods, or that a camp was discovered either abandoned or destroyed, without detailing where the settlement was located. However, some documents do provide glimpses into the general location of Maroon encampments in Dominica between 1763 and 1815. A document dated February 21, 1772, states that there were several encampments in the “Fonds of Maho, at Coulaboonne, Pointe Mulâtre, and Point Jacko” (Colonial Office [C.O.], 74/4, Minutes of Council, 21 February 1772, National Archives, London). A letter from P. Garret at Hatton Garden Estate to Governor Orde on March 22, 1786, details a military expedition against Maroon encampments in Layou and Kachibona, presumably the camps of Balla, Jacko, and Pharelle (C.O., 71/10, P. Garret to Governor Orde, letter, 22 March 1786, National Archives, London). Newspapers published in London during the First Maroon War (1785–1786) provide locations of camps and suspected Maroon leaders. On September 15, 1785,

the *Public Advertiser* in London published an article with camp locations for Pharelle, Congo Ray, Balla, and Pangloss (*Public Advertiser*, 6 February 1786:2). Coerced interrogations of captured Maroons such as Chief Cicero and trial records of both enslaved Africans and Maroons during the Second Maroon War (1791–1815) reveal camp locations for Noel, Gros Bois, George Moco, Jacko, and Cicero (Pattullo 2015). Although these documents were written by enemies of the Maroons and may have inaccuracies through our cross-examination of these records with contemporary place names associated with Maroon chiefs, we were able to create spatial data for eight specific encampments. For example, Noel, Zombie, Jacko Flats, and Morne Neg Mawon are place names memorializing the Maroon chiefs who once lived there.

The ninth settlement was created using Global Positioning System (GPS) data collected during a reconnaissance survey of the Chief Jacko camp. Currently, there is no GIS data on Dominican Maroon settlements available and no ground truthing has been completed for archaeological signatures at any of the settlements. However, all nine settlements are contemporaneous with the predominance of marronage in colonial Dominica. But the spatial accuracy is limited for the approximate Maroon settlement locations identified through historical accounts. These approximate locations are for settlements led by chiefs Balla, Pharelle, Noel, Zombie, Gros Bois, and Congo Ray, as well as camps that changed leadership between 1763 and 1814 but that resided in the same location, including Pangloss and Elephant, and Cicero and George Moco.

Viewshed and LCP analyses have been used in previous settlement ecology studies to explore relationships between landscape features and settlement patterns (Kellett and Jones 2017:7, 13). Viewshed analyses using GIS identify visible areas on the landscape from a specific location (for more detail about geographic information analysis in archaeology, see O’Sullivan and Unwin 2003). This type of spatial analysis uses a digital elevation model (DEM) to determine whether or not a specific point on the virtual landscape is visible from a particular location (Jones 2006). In a binary viewshed, grid cells are assigned a “1” if they are visible and a “0” if they are not visible (Jones 2006:524). However, there are several methodological limitations that should be considered when conducting viewshed analysis. For instance, the viewshed results are based on DEMs that may contain errors resulting in inaccuracies or misrepresenting visible areas from a point on the landscape (Jones 2006). To mitigate errors with digital elevation data, Fisher (1991, 1994) and Wheatley (1995) have developed concepts such as probable viewsheds, “fuzzy” viewsheds, and cumulative viewsheds that “attempt to achieve a more realistic and statistically powerful alternative to the all-or-nothing binary viewsheds” (Jones 2006:525). Similar to Jones’s (2006) study that used binary viewshed analysis to explore the factors that dictated Haudenosaunee settlement location, this geospatial investigation uses a binary viewshed analysis to assess defensibility of the Maroon encampments. Because of the mountainous topography, a binary viewshed is still a useful method because it highlights the visual affordances from the locations of Maroon settlements at higher elevations. During the period of slavery, Dominica was geographically divided into two regions: the plantation zone and Maroon Country. The plantation zone extended approximately 3.22 km from the coastline and was settled by Europeans, free people of color, and enslaved Africans who labored on estates, whereas the Indigenous Kalinago maintained control of territory in the northeastern portion of the island (Honychurch 2014:24). In contrast, Maroon Country was under control of the Neg Mawon and was the location of the majority of their encampments, although they did maintain alliances with enslaved people on estates and had access to anchorages along the coast such as the aforementioned Point Jacko. Maroon Country was roughly 440 km² and comprised of three of highest vegetation regions on the island—rain forest, montane thicket, and elfin woodland (Honychurch 2017:12). From these elevated areas, the vegetation provided additional security for the Maroons as well as a strategic view of the deforested areas of the coastal estates. The Maroons of Dominica were in a constant state of warfare, and they would have prioritized defensible positions for settlement. Defensibility as a qualitative category is defined as locations that “can be protected from entrance by outsiders” (Haas and Creamer 1993:26). Two concepts—field of view and line of sight—are crucial for using viewshed analysis to measure the defensibility of a site (Jones 2006). Field of view represents all the visible cells from a point in the landscape, whereas line of sight delineates point-to-point visibility (Jones 2006). Sites with a larger field of view have been

interpreted as being more defensible (Lock and Harris 1996); however, line of sight between sites (i.e., intervisibility) illustrates other defensive features such as communication networks and proximity of possible allied reinforcements in case of an enemy attack (Jones 2006).

The computation of LCP illustrates the different potential routes that Maroons would have taken based on cost surface (CS) analyses for elevation and river networks in Dominica. The use of multicriteria CS analysis to create the LCPs has been used by archaeologists to model past movement through physical landscapes (Howey 2007, 2011). LCP modeling is based on (1) the creation of barriers or costs between two points that can be topographic, natural, or cultural features and (2) the computation of an optimal route of travel calculated based on the least amount of costs (Howey 2011:2523). However, there are several limitations with LCP modeling, including the assumption that past travelers had “complete knowledge of the landscape they are traversing” and that travelers would choose to select the optimal path of travel (Howey 2011:2524). Another limitation is that there may have been other costs not included in the initial CS analysis that would have factored into traversing a path from one camp to another, such as distance to colonial settlements, roads, and vegetation. For instance, Supernant’s (2017) study on Métis mobility in western Canada illustrated how the GIS-generated LCP routes differed from Indigenous traditional knowledge of known travel routes passed down generationally. The multicriteria CS dataset for this study consisted of costs for traveling across elevation and river networks. Despite these limitations, this analysis at least provides an idea of possible movement and the geographic connection between the Maroon settlements on the island. Table 1 shows the datasets, variables, and measurements used to examine defensibility, proximity to critical resources, and mobility of each Maroon settlement.

The geospatial analysis incorporated three datasets, including the aforementioned GPS data from the Chief Jacko survey. The rest of the Maroon settlement vector data we mapped and edited in ESRI ArcGIS Pro based on historical accounts on Dominican Maroons and contemporary place names. Honychurch (2017:14) created a map of general positions of Maroon camps from 1763 to 1834 that provides the names of chiefs for each camp, but there is little to no spatial information. During our visit to the Jacko site, Honychurch noted that Chief Balla had a camp on Morne Neg Mawon. Using Google Maps, we then identified Morne Neg Mawon and placed the point data near the mountain. Pattullo (2015:153) mentions a camp near “present-day Giraudel, on the slopes of Morne Anglais” led by Chief Elephant. Likewise, Vaz (2016:87) shows a map of Maroon camps showing Chief Elephant inhabiting a camp that was formerly led by Chief Pangloss at Morne Anglais. To visualize this data, we created a point on Morne Anglais with the name “Pangloss and Elephant camp.” Vaz (2016) also provides a map of important locations of Maroon activities that was used as a reference. For example, Vaz (2016:86) mentions Chief Gros Bois’s camp being located in the heights of Castle Bruce in the eastern region of the island and Chief Pharcelle’s camp located at Morne Diablotins. Shuttle Radar Topography Mission (SRTM) 1 Arc-Second Global digital elevation data was downloaded from the United States Geological Survey Earth Resources Observation and Science Center (2018) archive. The SRTM data was used to create a digital elevation model (DEM)

Table 1. Variables Examined with the Landscape Activity They Measure.

Variable	Landscape Activity	Measurement
Distance to river networks	Freshwater, mobility across waterways	Straight-line distance between site and nearest river (as defined by Dominode 2022)
Viewshed size	Defensibility, intergroup relations	Used viewshed tool for each camp in ArcGIS using site location on STRM 30 m DEM
Number of camps visible	Defensibility, intergroup relations	Used viewshed tool for each camp in ArcGIS using site location on STRM 30 m DEM
Optimal path between camps	Mobility, intergroup relations	Used least cost path tool in ArcGIS using site locations and based on cost surfaces on STRM 30 m DEM and river networks (Dominode 2022)

with a 30 m spatial resolution. The river network dataset was obtained from Dominode (2022), Dominica's public GIS repository that grants users access to geospatial data of the island.

The final step before conducting the geospatial analysis was to create a cost surfaces layer based on costs for the DEM and river networks. Using the reclassify tool in ArcGIS Pro, we input the values of the SRTM 30 m raster data with the following values: 4 (−23–165 m), 2 (165–321 m), 3 (321–477 m), 5 (477–661 m), 6 (661–920 m), 7 (920–1,427 m) and No Data areas with no value. The reasoning behind the −23 to 165 m having a value of 4 is because historical accounts emphasize how Dominican Maroons used waterways to travel and maintain maritime marronage networks. Additionally, colonial settlements were generally located along the lowlands of the coast. Consequently, we wanted to account for the cost of using the waterways and maneuvering past possible dangerous areas along the coast. After converting the river network data to a raster, we then used the raster calculator to create the cost surfaces layer that accounts for both elevation and rivers as costs. Following the calculation of the cost surfaces layer, we used the cost distance tool to get the cost distance and cost direction to the Chief Jacko–camp point data. The distance and direction were calculated for the Chief Jacko camp given that it has the highest spatial accuracy. We then used the output distance raster and the output backlink (i.e., direction) raster for the LCP analysis.

Results and Discussion: Settlement Location Choice based on Visibility and Accessibility

Table 2 lists the approximate dates of occupation for each camp and the compiled results of the visibility, least cost path, and proximity to freshwater resources analyses.

Viewshed results of the Chief Jacko camp highlight the importance of defensibility in deciding to place a settlement on the high natural plateau in the upper Layou River valley. The results indicate that there were 12,408 visible cell areas within the field of view of the Chief Jacko camp. Within visible areas, four of the nine Maroon settlements were in line of sight from the Chief Jacko camp (Figure 4a). Two of the visible settlements, Zombie and Balla, are located in the Layou River valley and in the same territory as the Jacko camp. Furthermore, the Zombie camp is directly south of the bottom of Jacko Steps at the intersection of the Layou River, which highlights the interconnectedness of these two camps. The results suggest that intervisibility between settlements was prioritized for camps located within this central region of the island. Honychurch (2017:13) asserts that this space was the central stronghold for freedom seekers on the island, and where the largest Maroon settlements—including Balla, Fond Zombie, Jacko, and McFarlane—were located. The geospatial analysis confirms this premise. These Maroon leaders took advantage of the surrounding landscape of this region with its vast elevated plateaus and river gorges, which created natural defensive barriers, areas for agricultural production, and fresh water. Figures 4a–4f illustrate the field of view from each camp (shown as dark shaded areas), and intervisibility between camps are points within those areas.

For the Jacko and Zombie camps, close proximity to freshwater resources was a significant factor because they are located less than 350 m from the Layou River and several intersecting streams. The Zombie camp had the lowest field of view of the settlements in the Layou River valley, with a viewshed size of 4,739 visible areas (Figure 4b). This is most likely due to the site being located at a lower elevation than the camps of Jacko and Balla. For instance, although Zombie and Jacko have the closest proximity among all the settlements, with a straight line distance of approximately 805 m, the Jacko camp is not visible from Zombie. However, there are three settlements within line of sight, including Balla, George Moco and Cicero, and Noel. The Balla camp is the final settlement from the Layou River valley, and it is located on Morne Laurent, commonly referred to as Morne Neg Mawon (Figure 5). Balla's camp has the largest field of view, with a visibility count of 47,891 (Figure 4c).

This is also true for some of the other approximate Maroon settlement locations placed on mountaintops and ridges, which include Pangloss and Elephant, Pharelle, George Moco and Cicero, and Congo Ray. Chief Balla was the supreme leader of the Neg Mawon up until his death in 1786, when he was succeeded by Chief Jacko. As previously mentioned, Atwood (1791:245–249) provides an account of an expedition led by John Richardson accompanied by the colonial legions and a group of enslaved Africans who successfully attacked Chief Balla's camp. Atwood (1791:248) states

Table 2. Approximate Dates of Occupation for Each Camp and GIS Study Results.

Camp Name	Approximate Dates of Occupation	Straight Line Distance to Closest River	Viewshed Size	Number of Maroon Camps in Visible Areas	Name of Visible Maroon Camps	Least Cost Path Distance to the Chief Jacko Camp
Jacko Camp	1764–1814	225 m	12,408	4	Zombie; Balla; Noel; George Moco and Cicero	
Zombie Camp	1785–?	321 m	4,739	3	Balla; Noel; George Moco and Cicero	822.27 m
Balla Camp	1764–1786	933 m	47,891	4	Jacko; Zombie; Noel; George Moco and Cicero	3,077.69 m
Noel Camp	1802–1814	824 m	34,812	3	Jacko; Balla; George Moco and Cicero	7,354.46 m
Cicero and George Moco Camp	1783–1786; 1802–1814	867 m	9,946	1	Pangloss and Elephant	8,231.70 m
Gros Bois Camp	1785–1800	614 m	2,854	0		12.20 km
Congo Ray Camp	1785–?	579 m	503	0		16.93 km
Pharcelle Camp	1785–1800	163 m	43,626	3	George Moco and Cicero; Congo Ray; Pangloss and Elephant	12.83 km
Pangloss and Elephant Camp	1786–1791; 1802–1814	625 m	32,366	2	Congo Ray; Noel	24.36 km

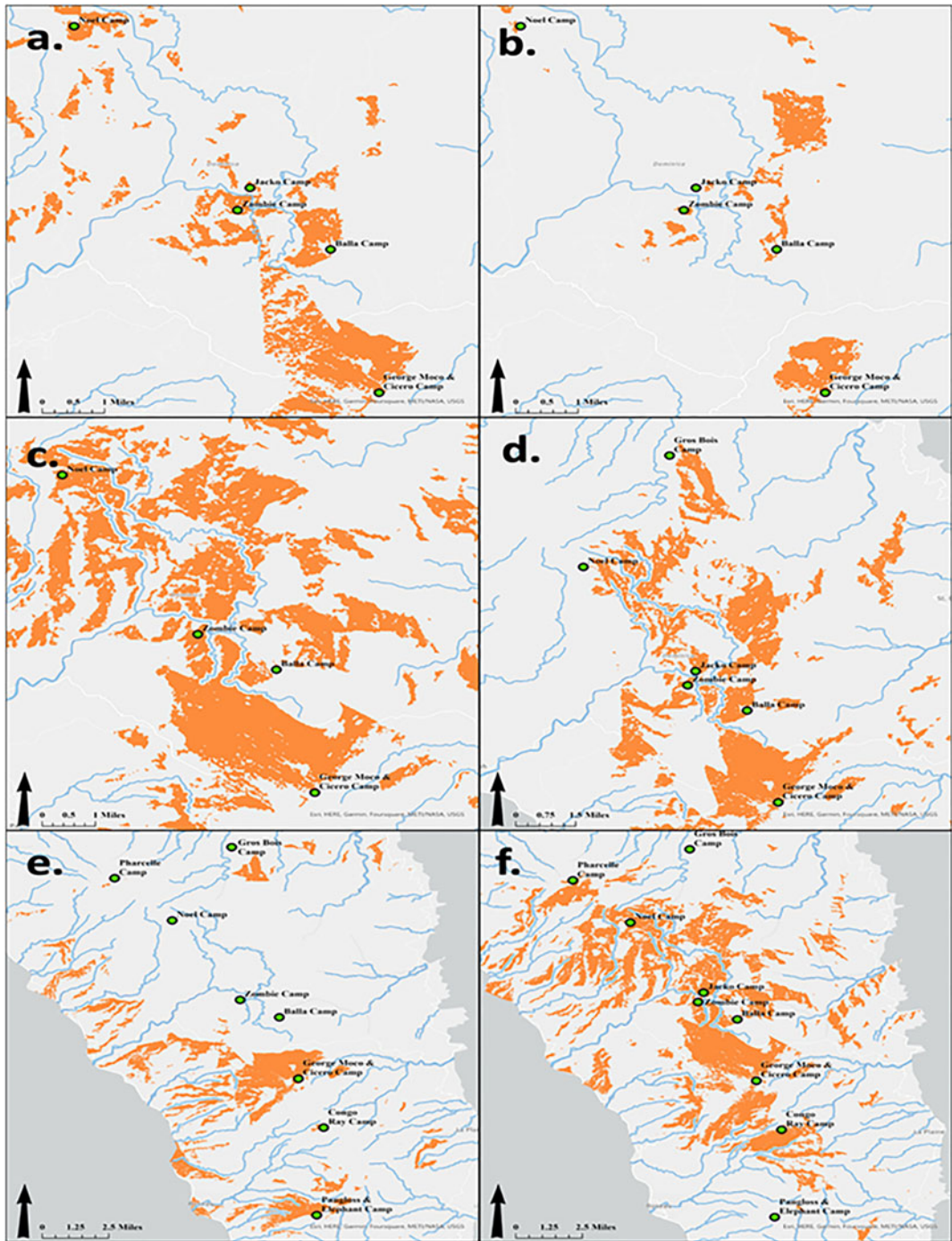


Figure 4. Viewsheds of camps with highest intervisibility. The visible area for each camp is represented by the dark gray, and river networks are gray lines: (a) Chief Jacko Camp; (b) Zombie Camp; (c) Balla Camp; (d) Noel Camp; (e) Pharelle Camp; (f) Elephant Camp. (Map created in ESRI ArcGIS Pro by Jonathan Rodriguez.)

that after seizing the camp, the party began searching the houses and started to receive gunfire from Maroons on the opposite mountain. Atwood declares this was the group that had initially fled the camp after being surprised by the ongoing raid. However, because there are four Maroon settlements within line of sight of the Balla camp, it is plausible that Maroons from either the Jacko or Zombie



Figure 5. Image of Morne Neg Mawon, where Chief Balla's camp was located. Photograph was taken from the trail leading to the Chief Jacko camp during the reconnaissance survey in August 2022. (Photo by Jonathan Rodriguez.)

camps located nearby may have reinforced the Maroons at Balla's camp. If Governor Ainslie's observations mentioned earlier are correct (Pattullo 2015), then the supreme leader of the Neg Mawon would have resided in the grand cantonment, with smaller outposts and camps set up throughout the surrounding region. The centralized location of settlements led by Balla and Jacko in the heart of Maroon Country allowed the Dominican Maroons to have a defensible base of operations to coordinate attacks on the plantations along the coastline of Dominica.

The camp of Chief Noel was based in the heights of Layou, approximately 7,050 m northwest of the Jacko camp (Pattullo 2015:154). The field of view is much higher than the camps of Jacko and Zombie, with a viewshed size of 34,812 visible areas (Figure 4d). The other camps in the Layou River valley, such as Balla and Jacko, have line-of-sight visibility from Noel. A third camp led by Cicero and, later, George Moco, which is located near Morne Trois Pitons, is also visible from Noel. Surprisingly, the field of view from the Cicero and George Moco camp is minimal for being based at such a high elevation. This is possibly due to the spatial resolution in the DEM and areas with no data. Despite the possible errors with the DEM, the historical data do state that Cicero maintained social connections to other Maroon chiefs across the island (Honychurch 2017:80). In total, there were 9,946 visible areas from the Cicero and George Moco camp, and the Pangloss and Elephant camp was the only mutually visible site. The Gros Bois camp was located in the northeastern region of the island behind Melville Hall, and this settlement was associated with the Maroon encampments, specifically Chief Pharelle, in the northern section of Maroon Country (Honychurch 2017:13). Although other defensive strategies may have been prioritized, the field of view from the Gros Bois camp is the second lowest of all the camps, with a total of 2,854 visible areas. Additionally, there were no other Maroon encampments within line of sight of the Gros Bois camp.

Likewise, the settlement led by Congo Ray and based in the south had the lowest field of view, with a visibility count of 503 and zero camps visible. Although this may seem that Congo Ray may have wanted to keep his settlement separated from the rest of the Maroon communities, historical data provide another interpretation. Honychurch (2017:80) points out that during the First Maroon War (1785–1786), Balla consulted with several Maroon chiefs about creating a grand camp. Two of those chiefs were Cicero and Congo Ray, who were based in the south, and the other was Chief Pharelle, whose encampment was located in the north. Following Cicero’s capture near his camp by Fond Boeri, he revealed in his interrogation that over the course of three years, he had spent time at the camps of Congo Ray and Balla (Honychurch 2017). Consequently, although the viewshed results from Cicero and Congo Ray are drastically smaller than the other settlements in this study, the historical record points to the social networks between these communities. Also, both encampments are moderately close to river networks, and the Cicero and later George Moco camp was placed strategically near Boeri Lake, the highest freshwater lake in Dominica.

The Pharelle camp was based near Morne Diablotins in the northern section of the island. Between Woodford Hill and the heights of Colihaut, there were encampments and hideouts surrounding the flanks on all sides (Honychurch 2017). Viewshed results illustrate the commanding view of the landscape available at Pharelle’s settlement. The field of view from Pharelle’s camp was the second highest out of all the camps analyzed, with a visibility count of 43,626 (Figure 4e). Three camps are within line of sight from Pharelle. These include George Moco and Cicero, Pangloss and Elephant, and Congo Ray. Also, the location of Pharelle’s encampment was approximately 163 m away from the nearest river and placed next to Lake Kachibona. Pangloss and Elephant constructed their camp near Morne Anglais. Viewshed results indicate that there are 32,366 visible areas within the field of view of the Pangloss and Elephant camp. Congo Ray and Noel are in line of sight from the Pangloss and Elephant camp (Figure 4f).

The results of the LCP analysis illustrate the different routes that Dominican Maroons may have taken to travel to the Chief Jacko grand cantonment based on elevation and river networks in Dominica (Figure 6). Note that the least cost routes are estimates of travel distance and may not have been the actual paths used. In fact, the least cost paths may not have been the optimal choice in many cases given that the Maroons had to be discrete and inconspicuous, hiding their movements from French and British colonists. In addition, there may have been other costs not included in the cost surfaces that would have factored into choosing a path from one camp to another, such as

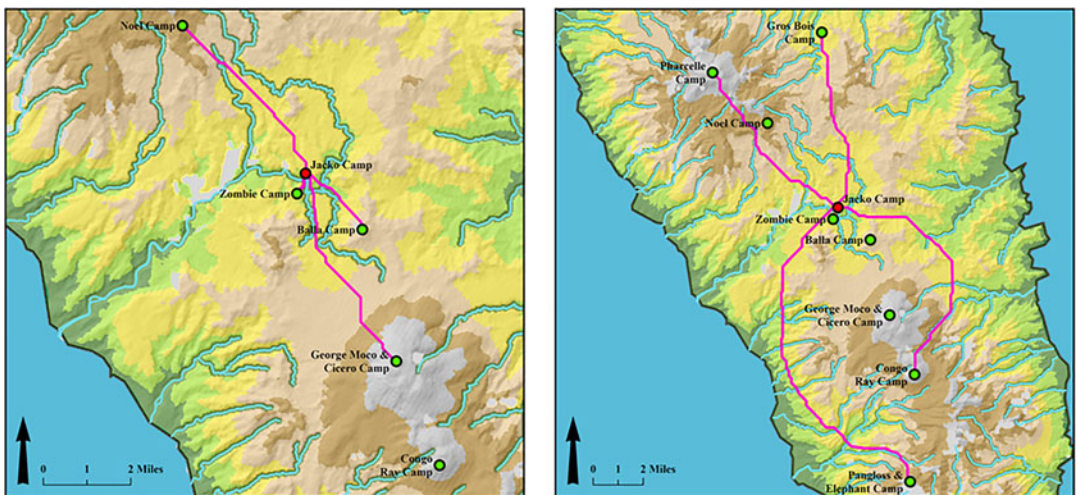


Figure 6. Least cost paths to Jacko Camp, based on costs for elevation and river networks, with total distances less than 10 km are shown on the left, and total distances greater than 10 km are shown on the right. (Map created in ESRI ArcGIS Pro by Jonathan Rodriguez.)

distance to colonial settlements, roads, and vegetation. Despite these limitations, this analysis at least provides an idea of the geographic connection between the Maroon settlements on the island. More importantly, we can measure the distance traveled by Maroons, with the farthest path being 24.36 km from Chief Jacko camp to the Pangloss and Elephant camp near Morne Anglais in the south of the island. Thomas Fontaine (2021) discusses Chief Jacko taking part in the attack on the Rosalie estate, located 35 km northeast of the capital, Roseau. Following the death of Chief Balla in 1786, Jacko formed alliances with Pharelle and Pangloss (Fontaine 2021:170). Based on the historical literature, we know there were established social networks between the Maroon chiefs and their camps. Furthermore, mapping the approximate locations of the Maroon settlements reveals that most of these camps are located in between or near a confluence of two or more major river networks. To us, this confirms that there is a noticeable settlement pattern regarding the geographic location of the Maroon camps in this study because they were all placed in settings similar to that of the Chief Jacko camp: with defensible ridges bounded by steep slopes or cliffs from rivers. Defensibility and security were evidently top priorities for the Maroon chiefs, and these may have been some of the terrain features they looked for in the landscape when deciding where to establish a camp.

Conclusion

Visibility and intergroup relationships between communities offer an opportunity to examine how the constant threat of warfare and re-enslavement affected Maroon settlement location choice in Dominica. Results of our geospatial analysis suggest that field of view was clearly an important factor, given that Maroon leaders desired to have a commanding view of the landscape to observe British military and militia movements, scout colonial estates to plan attacks, and maintain trade and intelligence networks with enslaved laborers on nearby plantations. Line of sight between Maroon camps seems to have been an equally significant factor in settlement location choice for defense, communication, and maintaining social ties. Seven of the nine Maroon settlements were strategically placed in locations that were within the line of sight of at least one other Maroon camp. Maroon settlements placed in the mountainous interior were within an intervisible network of camps while also constituting a blind spot for British military garrisons, outposts, and signal houses located along the Dominica coastline (Hauser 2014). However, British colonial administrators, military personnel, and planters circumvented this visual disadvantage by establishing three legion bases at strategic positions to protect estates from the Maroons in the mid-1780s (Honychurch 2017:80). Another tactic by the British was to grant manumission to enslaved Africans in the Black Ranger Corps for killing a Maroon chief. In fact, this was how John Le Villoux, the man who killed Chief Jacko in 1814, was freed from enslavement (Honychurch 2017:177–178). In 1810, commanding officers of the Black Ranger Corps and companies of the West Indies Regiment who had captured Maroon camps were granted Crown lands to establish estates where those camps were located (Honychurch 2017:161).

The largest Maroon camps were placed in the Layou River valley, suggesting a preference for vast natural plateaus that offered arable land that could be defended and fertile soils to produce crops. Whereas the camps led by Congo Ray and Pharelle were established at higher elevations with steeper slopes, potentially making it challenging for subsistence farming, they were located in close proximity to freshwater lakes such as Boeri Lake and Kachibona Lake. Proximity to freshwater resources was prioritized by the Maroons, given that *all* camps were less than 1,000 m from a major river network. Dominica waterways were crucial for self-emancipated Africans fleeing slavery by sea as well as maintaining maritime Maroon networks. Maroon chiefs Pharelle and Pangloss were often seen traveling by canoe to Martinique and Guadeloupe (Honychurch 2017; Vaz 2016). The steep gorges formed by these rivers provided an added layer of defensibility, notably exemplified by the steps at the Jacko camp, which created a strategic method of limiting and defending access to the settlement. Furthermore, the spatial practices and sociopolitical strategies of the Maroons were rooted in mutual aid and cooperation to build an alternative place outside the confines of racial violence and slavery. The anti-slavery and anti-colonial resistance movements in Dominica contributed to the eventual abolition of slavery in the colony. It is important to note that following

abolition of slavery in 1834, many former enslaved Africans fled to the interior where they created villages in the vicinity of Maroon settlements and engaged in subsistence farming and trading surplus at markets (Malm 2018; Winston 2021).

The results from the geospatial analysis have been a great initial step in the archaeological and digital heritage research of marronage in Dominica. Our future research aims to provide a more comprehensive examination of the Maroon landscape with the objective of identifying physical (environmental) and sociocultural factors that influenced settlement location and organization. This initial investigation into Maroon settlement choice based on visibility and accessibility has allowed us to digitally map out social networks, reimagine the possible routes Maroons could have taken, and estimate the distances traveled by the Neg Mawon to fight for their freedom and resist the slavery system.

Acknowledgments. The authors are incredibly grateful for the support and collaboration of the Esprit family and the 2022 field crew for the Archaeological Survey of Colonial Dominica (ACSD)—in particular, Michael Sanford and Micaiah Abraham. A special thanks to Mal and Eunice Esprit for supporting this research and sharing their knowledge of Dominican Maroon history. Thanks also to Schuyler Esprit for her collaboration and assistance with this project. Many thanks to Mark Hauser, Matt Reilly, Craig Stevens, and the other scholars who were supportive of the presentation of my (Rodriguez’s) paper at the Southern Historical Association’s 2023 meeting and provided suggested readings that improved this article. We would like to thank the reviewers for their helpful comments on earlier drafts of this manuscript.

Funding Statement. This work was supported by the Fulbright US Student Research Grant under PSID: PS00354949.

Data Availability Statement. The digital elevation data that support the findings of this study are openly available at the Earth Resources Observation and Science (EROS) Center at <https://doi.org/10.5066/F7PR7TFT>. Dominica River Network and Maroon settlement GIS vector data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing Interests. The authors declare none.

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