

# Modeling Colonial Paternalism: GIS and Multispectral Satellite Imagery at Kingstown, British Virgin Islands

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*GIS modeling and analysis of multispectral satellite imagery are applied to a former plantation in the British Virgin Islands (BVI), which, in 1831, became a settlement of free Africans who lived within slavery-based British colonialism. A map of the settlement represents the paternalist British government ideal for this community—an “experiment” for controlling a postemancipation peasantry—and the techniques discussed here allow clearer understanding of the way these ideals would have interacted with the physical and social landscape of the BVI had they been implemented. The residents were certainly aware of their situation, and this study does not mean to imply that they simply adopted the plan they were handed. Instead, our goal is to interrogate the implications of the plan itself. We combine least cost path (LCP), Normalized Difference Vegetation Indexes (NDVI), and other technical analyses to show the interaction of the British plan and the BVI landscape in order to describe the context in which the Kingstown community was built and maintained. Although schematic, this study quantifies at least some of the barriers the community overcame and contributes in a limited way to broader considerations of the place of land and landscape in structures of colonialism.*

**Keywords:** British Virgin Islands, NDVI, GIS, postemancipation, paternalism, colonialism, Caribbean, least cost path

*Análisis y modelos de imágenes satelitales multiespectrales de SIG, fueron aplicadas a una antigua plantación en las Islas Vírgenes Británicas (IVB), las cuales en 1831, llegaron a asentarse de africanos libres quienes vivían dentro del colonialismo británico basado en la esclavitud. El mapa del asentamiento simboliza el ideal paternalista del gobierno Británico para esta comunidad—como una “experimentación” para controlar la posterior liberación del campesinado—y las técnicas examinadas permiten un claro entendimiento de la manera en las cuales estos ideales hubieran interactuado con el entorno físico y social de las IVB si hubiesen sido establecidos. Los residentes estaban ciertamente conscientes de su situación y esta investigación no tiene la intención de insinuar que los residentes simplemente adoptaron el ideal que les fue proporcionado; al contrario, nuestro objetivo es cuestionar las implicaciones del ideal en sí mismo. Hemos combinado la técnica de Least Cost Path (LCP por sus siglas en inglés), el Índice de Vegetación de la Diferencia Normalizada (NVDI), junto a otros análisis técnicos a fin de exhibir la interacción entre el ideal Británico y el panorama de las IVB con el propósito de caracterizar el contexto en el que la comunidad de Kingstown fue construida y mantenida. Aunque sea esquemático, este estudio cuantifica al menos algunos de los obstáculos superados por la comunidad y contribuye en una manera limitada consideraciones más amplias sobre el ambiente del panorama cultural y el territorio dentro de las estructuras del colonialismo.*

**Palabras clave:** Las Islas Vírgenes Británicas (IVB), NVDI (Índice de Vegetación de la Diferencia Normalizada), SIG (Sistema de Información Geográfica), posterior a la emancipación, paternalismo, colonialismo, El Caribe, ruta de menor coste (LCP)

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**T**his study examines the landscape of a site in the British Virgin Islands (BVI) known as Kingstown, originally a slavery-based plantation but repurposed before emancipation and occupied by free Africans who were never themselves enslaved. Despite the special status

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of these residents, this land was controlled—or at least planned—by British colonial authorities. An 1831 map provides part of what James Scott (1990) might have called the “public transcript” of the settlement, an episode of colonial domination’s rehearsal for a post-slavery Caribbean that preserved Britain’s hegemony. The map does not describe reality—indeed it is clear that BVI islanders, including the Kingstown people, combined many sources of production with paid work and trade in order to survive both before (Chenoweth 2018) and after (O’Neal 2012) slavery—but its interrogation provides meaningful context to how residents lived, worked, and resisted.

Archaeology has proven to be a powerful window into how simple acts of daily life can, in important ways, resist colonial power structures—for instance, through the creation of a “homespace” (Battle-Baptiste 2011), “acts of residence” (Silliman 2001a:194–195), or just “maintaining your self-respect” (Given 2004:164). Perhaps especially in the postemancipation period, “hidden” transcripts accessible archaeologically have shown colonialism’s continued role by examining sites where those who were formerly enslaved began to build their own communities (Barnes 2011; Bates et al. 2016; Singleton 1988). As these works recognize, however, neither colonial attempts at domination nor resisting acts of community-building take place in a vacuum. Instead, they interact with each other and with a particular place and time. This project, then, combines technological analyses (GIS modeling and the analysis of multispectral satellite images) and historical sources to show the interaction of the British plan and the BVI landscape, recognizing the kinds of barriers these would have erected and adding to the context in which the Kingstown community was built and maintained.

### Resistance and Caribbean Colonialism

In framing the discussion to follow, it is important to state that anthropologists and archaeologists have repeatedly shown that colonialism was (and is) not a one-way process of acculturation in which dominant ideals are adopted

by the dominated. For instance, the “hidden transcripts” of the weak both subtly and sometimes openly challenge domination (Scott 1990). Controlling “strategies” of production can also come to be recast as “tactics” of resistance through peoples’ “ways of using the products imposed by a dominant economic order” (de Certeau 1984: xiii; emphasis original). Thus, the *everyday*—the purview of archaeology—is a central arena for negotiation of power relations.

Archaeologists have described situations of domination in which Native agency is nonetheless a powerful force shaping colonial interactions (Silliman 2001a, 2001b, 2004), and colonized agents can be shown to have incorporated new material culture into their lives through systems that made sense to them (Dietler 1998). In the Caribbean, Armstrong (1990) recognized aspects of low-fired ceramic forms used by enslaved Africans that are similar to African ones, and Goucher (1999) saw Caribbean continuities with traditional African metalworking, which is highly symbolic and meaningful in West Africa—both suggesting the continuing influences of African sensibilities long into the colonial process. Even when aspects of colonial culture are adopted by the colonized, this cannot be seen as blind following or acculturation. As Singleton points out, “Once African Americans appropriated the material culture of European Americans it became an aspect of *black culture*” (Singleton 1998:183, emphasis original), a point echoed by Wilkie (1999, 2000) and applied by Flewellen (2019) in the nearby USVI to recognize “self-making” in choices of clothing by both enslaved and free people.

In keeping with these points, we do not suggest that the British plan for Kingstown was a monolithic force that created acculturative acceptance on the part of residents. Just the opposite. Our analysis of the specific landscape over which British ideology was cast seeks to break down “a generic” archaeology of colonialism that risks “over determining the power of the colonizers’ ideologies of landscape” (Hicks 2007:2). Given the results presented below, it seems clear that the Kingstown people negotiated a different path given that they successfully flourished as a community for a generation or more—

something we suggest would be extremely difficult under the British plan.

Instead, we suggest that the analysis of the British plan for Kingstown allows us to understand a particular episode of colonial negotiation of the end-period of slavery in its context on the landscape. It is important in its own right to recognize the diversity of experiences of colonialism and of resistance (Odewale 2019), but Kingstown also reveals an inflection point that aimed to maintain British structures in the long term. Although the daily individual-scale negotiations of this system by the Kingstown people will require further archaeological work to recover, what can be analyzed from the sources at hand are (1) the limitations of the British ideals when put into practice in the BVI and (2) their tendency to introduce inequality among the Kingstown residents if they had they been implemented as designed.

### Peasantry and Paternalism for Captured Africans

In 1807, the British ended the slave trade but not slavery. People were still to be treated as commodities, although those already bound could only be moved within—not brought into—British colonies. This of course led to smuggling, which, when detected, led to the confiscation of the ships involved. But what to do with the people on those ships, brought to the New World enslaved but now legally free? Over the six decades following 1807, 500 ships were taken and 40,000 Africans came to British colonial territories as nominally free people surrounded by a racist, slavery-based economy and society (Adderley 2006:2). Many were “sent” to service in the British Navy or Army, while other large groups were settled in the Bahamas and on Trinidad. Between 1807 and 1823, more than 1,000 individuals ended up under the control of the Collector of Customs at Tortola, BVI. These people were given a variety of names in records and recent scholarship, and the term “captured” will be used here, but contemporary British authorities called these people “liberated Africans.” This term is somewhat ironic given the various kinds of bondage to which they were subjected outside the framework of legal slavery, and it

also reveals the perspectives of colonial officials, who saw them as having received a “gift” from the British state and falling under its paternal “protection.”

Historian Stephanie Camp traces the rise of such paternalism in the U.S. South: “In the decades after the [American] Revolution, proslavery ideology shifted subtly from the patriarchalism of the colonial period to paternalism, a form of social control more consistent with the humanitarian ideals of the age” (Camp 2004:17). This attitude is well charted in the archaeology of British colonialism in the nineteenth century—for instance, being traced (along with successful resistance to it) in the Bahamas (Wilkie 2001; Wilkie and Farnsworth 2005) and described as far afield as South Africa (Lucas 2004:127–129). In this system, as Higman (1998:65–66) explains, for the colonial British, the “peasantry” represented a stable supply of labor—workers too poor to provide substantial opposition but having long-term residency, as opposed to tenants, who were less rooted in an area (and perhaps, therefore, more prone to remove their labor) and rarely supplied wage labor to plantations. Anthropologist and BVI islander Michael O’Neal provides an extensive critique of this concept and its application to the BVI in particular (O’Neal 2012:65–71) and argues for the more neutral term “smallholder,” which avoids some of the pitfalls of Eurocentrism and generalization. Our use of the term “peasantry” here does not take issue with his analysis showing that such a group did not develop in the BVI, but it reflects the goals of the British colonial state under analysis. More than simply paternalism, the British looked at the arrival of these nominally free Africans in the Caribbean as an opportunity for a social experiment: “a population with which Britain might rehearse for the realities of Caribbean colonial life after slavery” (Adderley 2006:126–127). Quite explicitly, the goal of this experimentation included both “how to exploit the labor of Africans” after slavery and “efforts to ‘civilize’ the liberated Africans” (Adderley 2006:126–127). They were intended to compose a new “peasant” class maintaining British hegemony.

Clearly, however, as with those held in legal bondage, the captured Africans brought their

own ideologies, goals, and plans to this interaction. For instance, running through the story of the Jamaican plantation of Montpelier, Barry Higman (1998) sees “a set of competing models of the appropriate relationship of people and land, people and place. Essentially, these models may be reduced to a long-term struggle between communalism and individualism” in which the planters, “a class of land-takers,” hung on to individualism through the force of the state, while the enslaved and later emancipated people of African descent “shared a communal, collective concept that was sharply opposed to the English-based legal formulation of free-hold tenure” (Higman 1998:290–291, 303). Although Higman did not necessarily mean for this pattern to be generalized throughout Caribbean history, elements of these differing perspectives on land and land use can be traced in the present example. Historian Isaac Dookhan (1975:98) suggests that, on the whole, the British government appears to have honestly worked toward the “general welfare” of the captured Africans. Although this may be so, the cultural distinctions just described are central here, and the steps taken by colonial authorities must be recognized as culturally placed: each side had a different definition of “welfare.”

In short, then, the captured Africans of Tortola were seen by British authorities as a potential peasantry, who should be made to embrace individualist, capitalist modes of production as a way of proving the ability of African people in general to take their proper (subservient) place in a postemancipation British Empire. Aside from the different models of land-human interaction and social relations outlined above, the land itself has a role to play. The landscape of Kingstown and colonial maps laying out what this paternal, peasant ideal should look like allow us to examine this “experiment” and uncover at least some aspects of how it could have played out that are unrecorded in the written record. Mapping is itself a means of establishing and projecting colonial control, but this analysis also engages with the mapped landscape itself. In doing so, we aim to expose flaws in the British plan as a way of uncovering the potential paths of resistance in daily life open to the Kingstown People as well as barriers to their maintaining a stable community.

### Kingstown, Tortola

Between 1807 and 1823, several shiploads of captured Africans arrived at Tortola, which was then a marginal and poor colony undergoing the slow collapse of the sugar economy. The history and archaeology of the BVI, of which Tortola is the main island, are better covered elsewhere (Chenoweth 2017; Dookhan 1975; Harrigan and Varlack 1975; O’Neal 2012; Smith 2009), but it is relevant to note here that a sugar-based slavery economy developed later here and was always more fragile than elsewhere in the British Caribbean. By the end of the nineteenth century, plantation agriculture was entirely dead in the BVI, and it was replaced with a nearly universal pattern of small, more-or-less subsistence farms owned by the descendants of those previously enslaved.

The precise number of captured Africans who landed on Tortola differs between various contemporary accounts, but it was upward of 1,300. Parliamentary Commissioner John Dougan reports that approximately 28 ships illegally carrying enslaved people were seized at or near Tortola and brought to the Vice-Admiralty court there between 1807 and 1823 (House of Commons 1825:5). About 1,070 of these captured Africans came from four ships flying the Spanish flag—*Venus*, *Candelaria*, *Manuela*, and *Atrivedo*, all captured in 1814 and 1815—although about a quarter died shortly after arriving on Tortola, a rather shocking figure blamed on an intestinal infection passed around on the ships. Another near-third of the group was “sent” for military service, after which their trail seems to end.

Much of the remainder of the group was “apprenticed.” As with the period immediately following emancipation, also called “apprenticeship,” the idea of this innocuous term was that, like youths training in trades, the Africans would work for planters to earn their keep and, in doing so, learn skills that would allow them to function as free people. This plan, however, was fatally flawed in several ways. Aside from the obvious disadvantages of life as a person of African descent in the slavery-based Caribbean, Dookhan (1975:98) points out that these indentures were decided without any consultation of

the people themselves, and their unusually long 14-year term resulted in individuals being treated more like enslaved people than free. Moreover, their status as free people paradoxically threatened them—because “their deaths constituted no financial loss to those responsible for their welfare” (Dookhan 1975:100), they were often treated worse than enslaved people. This trend was perhaps worsened by the fact that many Tortola planters were themselves in dire financial straits, and it was those planters most unable to support apprentices who often accepted them, being in need of the extra labor.

The prospects of these captured Africans were worsened by tensions that existed between them and both the free Black and enslaved communities. The former considered the new arrivals lower class because they were unable to gain any employment other than manual labor, which was usually associated with enslaved status, whereas the latter were reportedly jealous of their nominal freedom (Dookhan 1975:102). Dookhan’s gloss may represent, to some extent, the view of whites more than the Africans themselves, as he also reported that a scheme to transfer the group to Trinidad failed because almost all refused to leave Tortola, having formed relationships with—and many having had children with—others who were still enslaved there (Dookhan 1975:103). Regardless, by the time the indentures of the surviving captured Africans of 1814 and 1815 began to expire in the late 1820s, colonial authorities thought that they would stand little chance of survival on their own due to their social position, the poor state of the economy in the BVI in general, and the competition of unfree labor undercutting any efforts to find employment. Some alternate plan was needed.

Under the 1807 Slave Trade Abolition law, the Collector of Customs was responsible for dealing with the human “cargo” of seized ships. An 1830 letter to London from Tortola Collector Robert Claxton speaks positively about the group, noting that since release from their indentures, none had been arrested for a crime, and he laments that their position as farmers was precarious because of “the very doubtful tenure of the lessor of [their] lands” and their lack of recourse when their crops were damaged by

“the trespassing of stock on their grounds” (House of Commons 1831:25). Claxton suggests the purchase of land to be “parceled out” to the captured Africans.

The goal of at least some members of the British colonial machinery was the “most economical mode of disposing of those persons” (House of Commons 1831:26), but the depressed state of the economy in Tortola made the purchase of land more economical there than on other islands. By March 1831, the Treasury had approved the sum of £1,025 to be spent on the purchase of 110 acres of former plantation lands in two parcels, and £5 worth of building materials for each of the 100 people to be settled (House of Commons 1831:26–27). It was made explicit that the Crown would continue to own the land and that the residents would be forbidden from transferring or selling it.

As the project commenced, the number of people to be settled on the land now known as “Kingstown” grew to nearly 300. Further grants totaling £1,300 were made in order to purchase additional land and materials (Dookhan 1975:108). Several maps of the settlement were made, including the one analyzed below (Figure 1), showing the total area of the site to be about 180 acres. Twenty of these acres were used for a village, which had about 90 structures depicted on the map, including a school (apparently the old plantation house) and an Anglican chapel—St. Philip’s—begun in 1834, the ruins of which still stand and were partially restored in the mid-2010s. The village clusters on the more-or-less level ground by the sea around a small brackish pond (now filled in) and the main road to Road Town, the colony’s main settlement. Sixteen acres of the site were reported to be “high woods and fruit trees,” and 40 were reported to be “Guinea grass and unoccupied” (UK National Archives CO 700/VIRGIN ISLANDS/6; see Figure 1). The remaining 106 acres were divided into what were thought to be equal one-acre lots, each assigned to a particular family by lottery.

The community appears to have survived for some time, although the archival records are limited, a reflection of both the overall colonial disinterest in the BVI (Chenoweth 2017:26–32) and



school and church both had repairs to their roofs in 1862, at the expense of the government (House of Commons 1864:94). The end of the community is unclear, but it appears that it was largely unoccupied by the turn of the twentieth century.

### GIS Modeling

The map of Kingstown in [Figure 1](#) is deceptive, presenting a more or less uniform space available for appropriation and cultivation. [Figure 2](#), though, makes clear a defining feature of the BVI landscape: it is extremely steep. Tortola is rarely more than 3 km wide but rises to over 500 m (1,700 ft.) at Mt. Sage. In about 1 km (3,300 ft.), the land near Kingstown rises from the sea to a peak of nearly 300 m (985 ft.). The land is also uneven in terms of farming potential: although prime farming areas such as Cane Garden Bay exist, much of the island has shallow, sandy soils, and some areas are bare rock.

The remainder of this article, then, seeks to understand how the spatial layout of the site and its landscape interacted with the colonial plan and how it may have impacted the daily lives of the captured Africans who made it home. In the next section, we explore the question of the differing agricultural potential across the site, but first we consider limitations imposed by the question of access to these fields—a central feature and limiting factor of daily life. This can be productively explored indirectly through artifact analysis but also by examining the landscape itself (Bates 2016). At Kingstown, due to the ideal of individualism inherent in the plan and the distribution of separate one-acre lots, those members of the community who were assigned fields just above the village would have been able to travel to their field quickly and easily, but those whose fields were farther away would have had more difficulties. Although it is schematic, we suggest that it is possible to quantify those differences and explore their potential implications.

In order to address these questions, the 1831 map was georeferenced and laid over the USGS Global Data Explorer 30 m Digital Elevation Model (DEM) of the area so that human movement could be studied. Although it is etic, such

an analysis can speak to the physical limitations on time, productivity, and energy imposed by the landscape if used as represented in the British plan. This model and the available data have limitations connected to the resolution of the elevation model, potential modifications of the landscape, and certain assumptions used in the model, which are discussed in detail in the supplemental material available with this article (see Supplemental Text 1). We feel that these limitations do not detract from the general conclusions we draw.

### *Least Cost Paths and the Kingstown Fields*

The generation of cost surfaces has been receiving increasing attention and application in archaeology (Hare 2004; Herzog 2014; White and Surface-Evans 2012). Distances between two points can be measured easily, but of course such measurements “as the crow flies” cannot account for barriers, hills, or other impediments to travel. As described most completely in *Historical Archaeology* by Edward González-Tennant (2016:30), the production of a cost surface (a raster or grid of values representing the “energy required to move through an environment”) allows for the calculation of least cost paths (LCP)—the most efficient and therefore “most likely routes from one point to another across a landscape.”

As noted, the 1831 Kingstown map is deceptive in precisely this way: travel along the beach, into the hills where the fields were located, and back downhill to the village are all quite different propositions and are not differentiated by a simple measure of linear distance. ArcGIS was used to calculate the LCP from the Kingstown village (the centrally located St. Philip’s Church was used as a common starting point) to each of the 106 fields represented on the 1831 map ([Figure 3](#)), producing a different path to reach each field, including the path length and elevation gain. [Table 1](#) charts the actual distances traveled over the surface as it rises and falls, showing not only a substantial difference between the extremes, but also a wide distribution of journey lengths, which average 815 m but range between just 124 m to over 1.5 km. The difference between these trips was not only in length but also elevation: whereas some fields were just



**Figure 2.** Kingstown, Tortola, from the air in 2013 (photo by John M. Chenoweth). (Color online)

15 m above the level of the village, others required an elevation gain of up to 220 m (Table 1).

#### *Time, Energy Costs, and Implications*

When considering how people in the past would have actually related to this landscape, however, time might be a more meaningful unit than distance and elevation. Each person had only a limited number of daylight hours. A time-based cost raster for the area was calculated based on Tobler's Hiking Function (Tobler 1993), which models speed of movement as a function of slope. A map was produced with anisotropic contours—sometimes called “isochrones”—representing hiking distance at speeds of about 5 km per hour over level ground, adjusted accordingly over slopes (Figure 4). In effect, starting from the center of Kingstown village, it should take approximately the same amount of time to reach any point along any given contour shown in this image. Some of the farthest fields would take more than a half hour of steady, uphill hiking to reach, whereas those just uphill of the village could be reached in less than five minutes.

Return travel downhill would have been easier, but the journey from the farthest fields would still have taken 20–25 minutes (Figure 5).

The figures given above for travel distance, elevation, and time have deeper meanings than simply the annoyance of long commutes. They directly impacted the ability of farmers to make ends meet—already a difficult task for a subsistence farmer in the marginal Caribbean—and these difficulties can be specified using the data just discussed. Roundtrip travel to the farthest eight fields at Kingstown totaled about 52.5 minutes, while the nearest five had a roundtrip commute of only about eight minutes. The BVI has an average of just over 12 hours per day of daylight, although the shortest days of the year are about 11 hours. Anyone who has navigated its steep, rocky slopes as night quickly descends will understand that even in familiar settings, it can be treacherous in the dark, and it is assumed that travel during the daylight would have been preferred. Those traveling to the farthest fields consumed nearly an hour in their daily commute, giving them an average of about 92.7% of the daylight available to those with the closest fields,



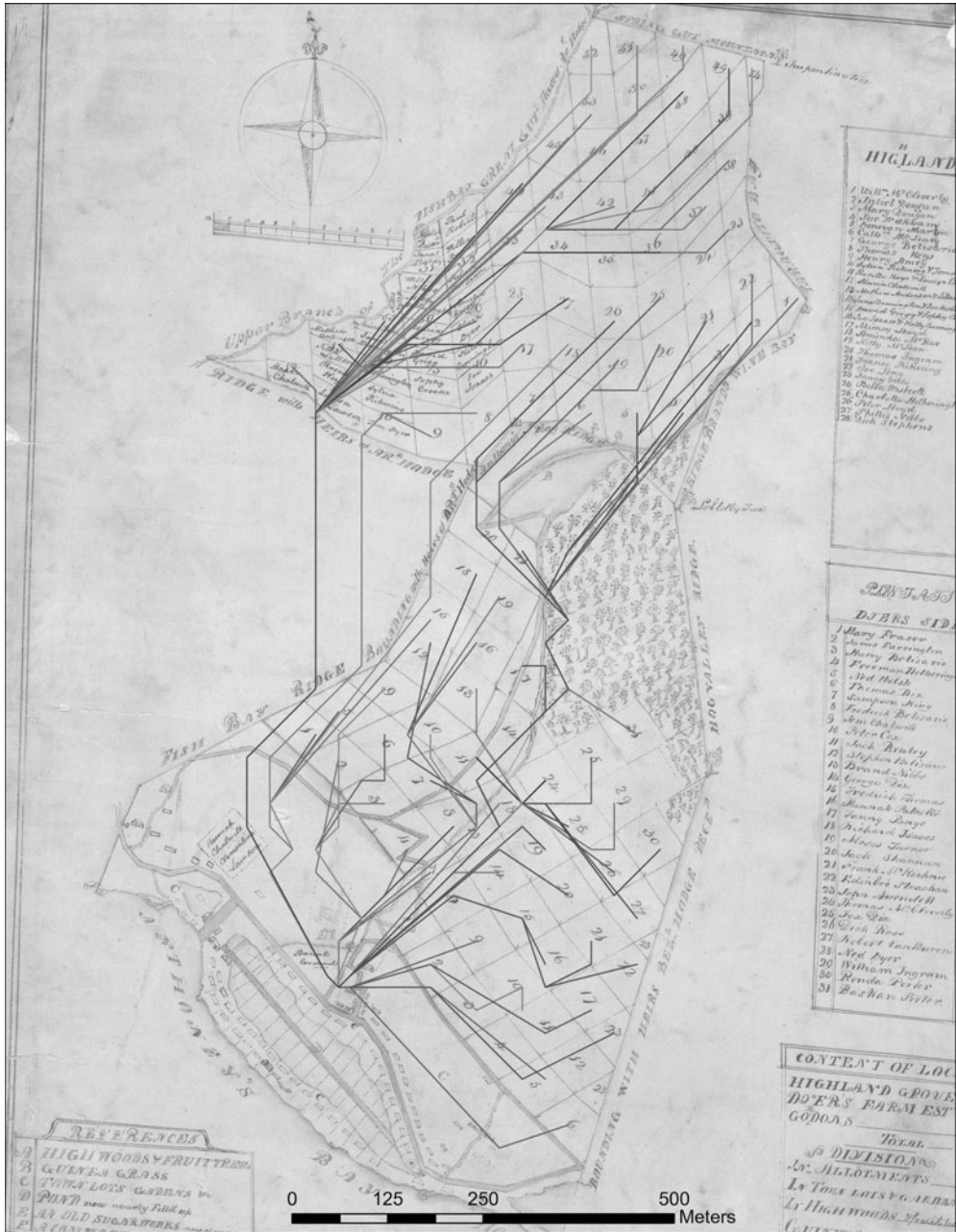


Figure 3. Least cost paths from the center of the Kingstown village to each of the fields depicted on the 1831 map (map by John M. Chenoweth).

even if they had left their homes at dawn and returned at dark.

Distance and elevation traveled can also be brought together in a single measure of energy expenditure in kilocalories. See section 2 of Supplemental Text 1 for the details of how this

calculation was conducted. As with distance, elevation, and time, energy consumption for roundtrip travel to the fields varies widely (Table 1)—from 356 kcal per trip to only 27 kcal. A person traveling to the farthest, highest field assigned to the Kingstown people

Table 1. Least Cost Distance, Elevation Gain, and Energy Usage for the Journey from Kingstown Village to Each Field Depicted on the 1831 Map (along with Measured Field Area and Mean Normalized Difference Vegetation Indexes [NDVI] Values for Each Field).

Field	One-Way Travel (m)	Elevation Gain (m)	Roundtrip Kcal Use	Measured Area (m <sup>2</sup> )	Mean NDVI
D01	127	31	262.03	3,476	0.7502
D02	124	15	331.08	4,520	0.7893
D03	209	25	335.41	4,760	0.7674
D04	248	45	308.92	4,200	0.6903
D05	313	44	297.32	3,920	0.6972
D06	397	27	270.44	4,380	0.7574
D07	210	58	273.64	1,340	0.8265
D08	192	40	268.61	5,048	0.8212
D09	191	36	268.07	4,684	0.8160
D10	307	50	271.53	4,632	0.7489
D11	300	73	275.87	4,548	0.7096
D12	357	51	296.14	4,316	0.7506
D13	295	72	238.39	2,168	0.8345
D14	272	61	355.82	4,844	0.8165
D15	287	65	327.58	4,720	0.8264
D16	354	81	348.89	4,760	0.7788
D17	367	88	342.31	4,540	0.7408
D18	319	84	322.14	3,148	0.8090
D19	362	75	297.94	4,536	0.8259
D20	385	98	310.31	4,556	0.8010
D21	479	120	300.15	4,580	0.7486
D22	506	107	308.11	3,524	0.7443
D23	424	75	311.22	4,420	0.7419
D24	382	99	287.44	4,600	0.8273
D25	407	108	278.48	4,968	0.8230
D26	490	129	286.89	4,972	0.7585
D27	562	150	300.15	4,280	0.6743
D28	490	117	314.23	4,592	0.7964
D29	538	158	295.25	7,716	0.6879
D30	605	155	339.06	4,836	0.7151
D31	643	148	325.33	4,180	0.7202
G01	394	59	248.14	4,304	0.7545
G02	334	79	305.58	4,096	0.7212
G03	331	83	283.38	3,916	0.7350
G04	212	77	270.26	4,172	0.7886
G05	436	78	248.97	4,592	0.7656
G06	403	111	230.96	4,332	0.7833
G07	392	111	228.49	4,368	0.7805
G08	272	168	232.59	4,588	0.8262
G09	452	113	202.34	4,176	0.7817
G10	433	135	310.74	4,068	0.8226
G11	425	119	244.06	4,032	0.8504
G12	586	127	258.04	5,104	0.7793
G13	508	144	287.44	4,824	0.8166
G14	449	115	298.72	4,832	0.8479
G15	605	140	313.27	5,004	0.8070
G16	595	154	323.48	4,628	0.8471
G17	582	133	339.88	3,904	0.8387
G18	674	157	319.22	5,488	0.8349
G19	662	176	298.72	4,956	0.8442
G20	794	176	312.45	4,672	0.8215

Table 1. Continued.

Field	One-Way Travel (m)	Elevation Gain (m)	Roundtrip Kcal Use	Measured Area (m <sup>2</sup> )	Mean NDVI
G21	752	187	293.84	3,112	0.8226
HG01	1,200	220	213.75	2,664	0.8162
HG02	1,138	212	243.82	3,420	0.8534
HG03	1,109	210	169.34	4,004	0.7550
HG04	987	213	200.87	4,864	0.8126
HG05	969	216	106.42	4,900	0.8330
HG06	1,004	214	85.00	4,228	0.8304
HG07	948	191	97.62	4,568	0.8402
HG08	984	186	78.37	5,364	0.8238
HG09	931	175	41.70	5,068	0.8423
HG10	864	165	244.14	5,264	0.8442
HG11	863	129	328.63	4,768	0.7905
HG12	893	115	150.03	2,232	0.7914
HG13	948	140	265.18	3,440	0.8061
HG14	929	135	142.56	4,716	0.8485
HG15	996	138	143.34	4,876	0.8510
HG16	1,056	148	117.28	4,760	0.8504
HG17	1,129	162	94.12	4,664	0.8365
HG18	1,033	189	110.10	4,444	0.7829
HG19	1,067	201	248.57	4,360	0.7911
HG20	1,151	204	107.33	4,372	0.7662
HG21	1,114	196	229.41	4,680	0.7377
HG22	1,203	209	213.75	4,216	0.7896
HG23	1,446	199	181.80	2,844	0.7953
HG24	1,404	191	202.55	4,580	0.8026
HG25	1,214	202	190.68	4,464	0.7598
HG26	1,159	196	151.87	4,440	0.7928
HG27	1,200	171	184.50	4,572	0.8298
HG28	1,144	147	177.33	4,660	0.8519
HG29	1,068	142	153.19	4,600	0.8517
HG30	1,013	147	96.50	4,604	0.8546
HG31	1,055	171	53.26	3,492	0.8767
HG32	1,118	160	56.74	4,684	0.8801
HG33	1,183	154	74.80	4,528	0.8550
HG34	1,223	150	71.69	4,368	0.8569
HG35	1,284	171	74.38	4,348	0.8005
HG36	1,344	173	67.50	4,576	0.7756
HG37	1,431	181	202.21	4,648	0.7814
HG38	1,486	198	204.30	3,228	0.8230
HG39	1,511	181	46.08	4,276	0.8017
HG40	1,426	167	157.92	4,676	0.8193
HG41	1,384	162	195.61	4,492	0.8073
HG42	1,303	158	168.87	4,372	0.8032
HG43	1,225	160	141.33	4,712	0.8179
HG44	1,225	171	129.76	3,624	0.8620
HG45	1,310	188	113.78	5,160	0.8628
HG46	1,336	172	150.72	4,456	0.8177
HG47	1,378	162	159.78	4,636	0.8262
HG48	1,463	162	129.65	4,616	0.8422
HG49	1,540	176	27.04	4,428	0.8160
HG50	1,425	177	110.19	4,768	0.8044
HG51	1,485	202	118.87	2,392	0.8519
HG52	1,451	210	110.83	3,328	0.8551

Table 1. Continued.

Field	One-Way Travel (m)	Elevation Gain (m)	Roundtrip Kcal Use	Measured Area (m <sup>2</sup> )	Mean NDVI
HG53	1,352	196	89.57	4,312	0.8429
HG54	1,592	194	84.23	1,120	0.8369
HG55	971	147	96.71	2,724	0.8696
AVERAGE	814	138	215.00	4,313	0.8026
MIN	124	15	27.04	1,120	0.6743
MAX	1,592	220	355.82	7,716	0.8801

Note: The fields are named according to the map, with the letters representing the respective names of the original plantations combined into Kingstown: Dyer's Side Plantation (D), Gordon's Plantation (G), and Highland Grove Plantation (HG).

would—just by getting to her or his allotted ground and not including any energy used to farm it—have needed an additional 329 kcal per roundtrip journey compared to the person farming the nearest field. On a per-year basis, assuming an average of four trips to the field per week all year round (the other days being used for fishing, craft activities, or rest; this figure is supported by discussion in section 3 of Supplemental Text 1), this could be a difference of more than 68,400 kcal in energy expenditure—about 5% of the total calories needed in a year by an adult performing heavy labor, such as farming.

To put this into more meaningful terms, we can translate these raw energy figures into food: sweet potatoes, a common and nutritionally dense provision crop, were grown in the area prehistorically and are documented in the BVI in the twentieth century, so they were probably available to the Kingstown people. The difference in energetic travel cost between the farthest and nearest fields at Kingstown converts to approximately 76 kg (167 lbs) of sweet potatoes per year (see section 3 of Supplemental Text 1 for more on this calculation). In terms of time and energy usage, then, a farmer with the farthest fields has to produce substantially more food to counter energy expenditure and yet has only about nine-tenths the time to accomplish this. This information should be further contextualized by the fact that any person who has, in the course of a day, hiked for an hour with over 200 m in elevation gain will consequently have substantially less energy available to work.

Work reconstructing prehistoric sweet potato yields, also discussed in Supplemental Text 1, shows that some of the one-acre lots at

Kingstown likely could not have produced enough food for a family of three. It should be noted that in most ways, these calculations assume the best case scenario for the captured Africans if they were attempting to conform to the British colonial plan. Various social and practical factors—discussed further in section 4 of Supplemental Text 1—would likely have prevented these “best cases” from being achieved in daily life at Kingstown, suggesting that these results probably *underestimate* the disadvantages of the upper fields and their productive limitations relative to the lower ones. Results therefore suggest that the average resident of Kingstown would have had a difficult time making ends meet and that there was a wide deviation from average. Limitations of time and energy, imposed by the differences in field placement, would have introduced substantial differences. The Normalized Difference Vegetation Indexes (NDVI) section of this article further explores these divisions through a consideration of the fields themselves and the productivity of each parcel.

### NDVI and Analysis of Satellite Images

We can further consider the plan as represented in the colonial authorities' map by examining the nature of the fields themselves. One distinction between the one-acre lots is that, when measured in GIS, they were rarely one acre (4,047 m<sup>2</sup>), with some lots as little as half an acre or less, and wide variation: the standard deviation of the measured lots is 833 m<sup>2</sup>, or about one-fifth of an acre. Some of this may be due to inaccuracies in both nineteenth-century mapping and modern georeferencing

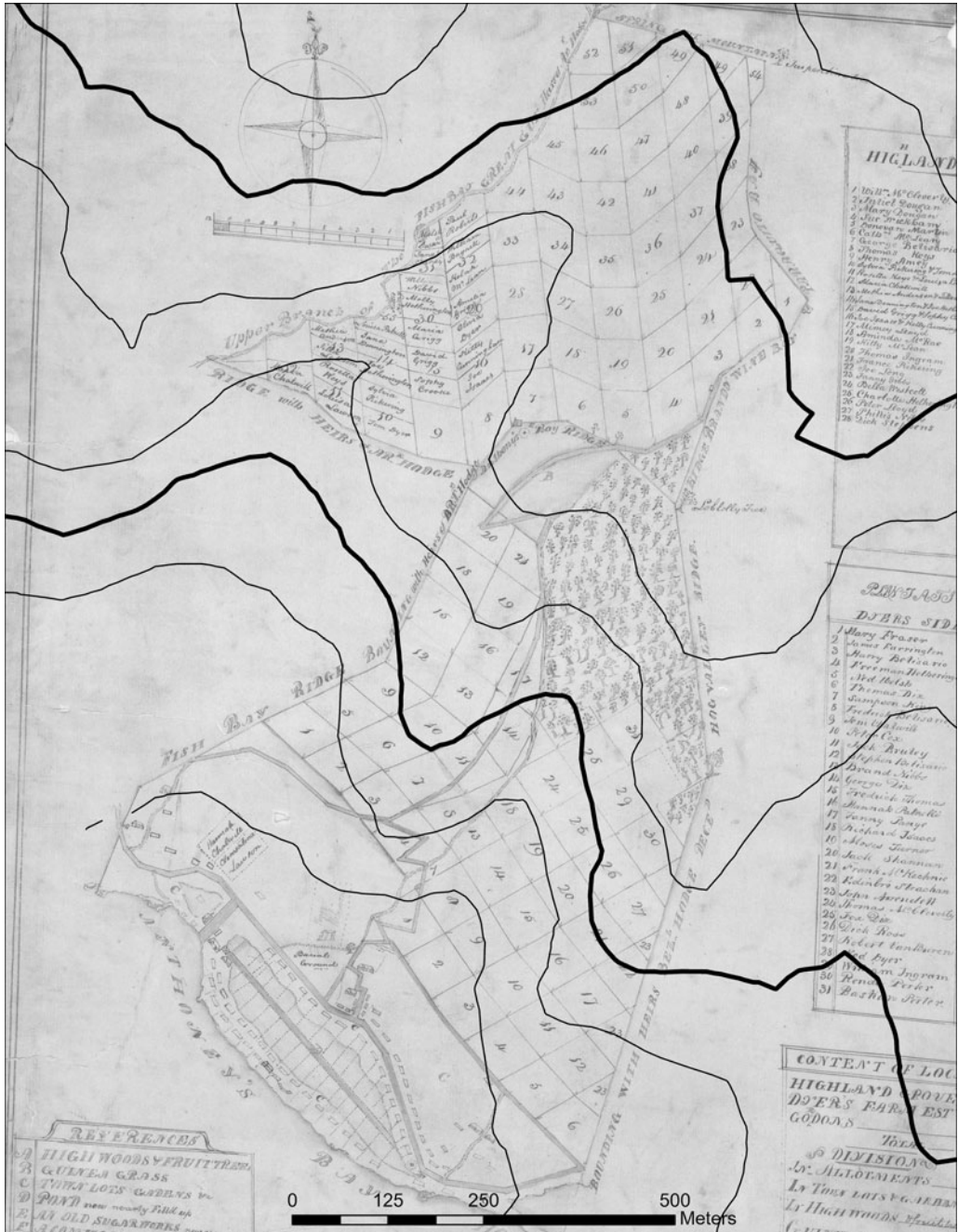


Figure 4. Map showing walking time from the center of the Kingstown village in 5-minute isochrones (map by John M. Chenoweth).

and measuring, but it is still clear that these lots were far from equal in size. Moreover, it is obvious that some land is more fertile than other, and this is particularly true in the British Virgin

Islands, where some areas can be excellent for agriculture, whereas others are bare rock. In order to analyze the fertility of the fields in Kingstown, high-resolution, multispectral

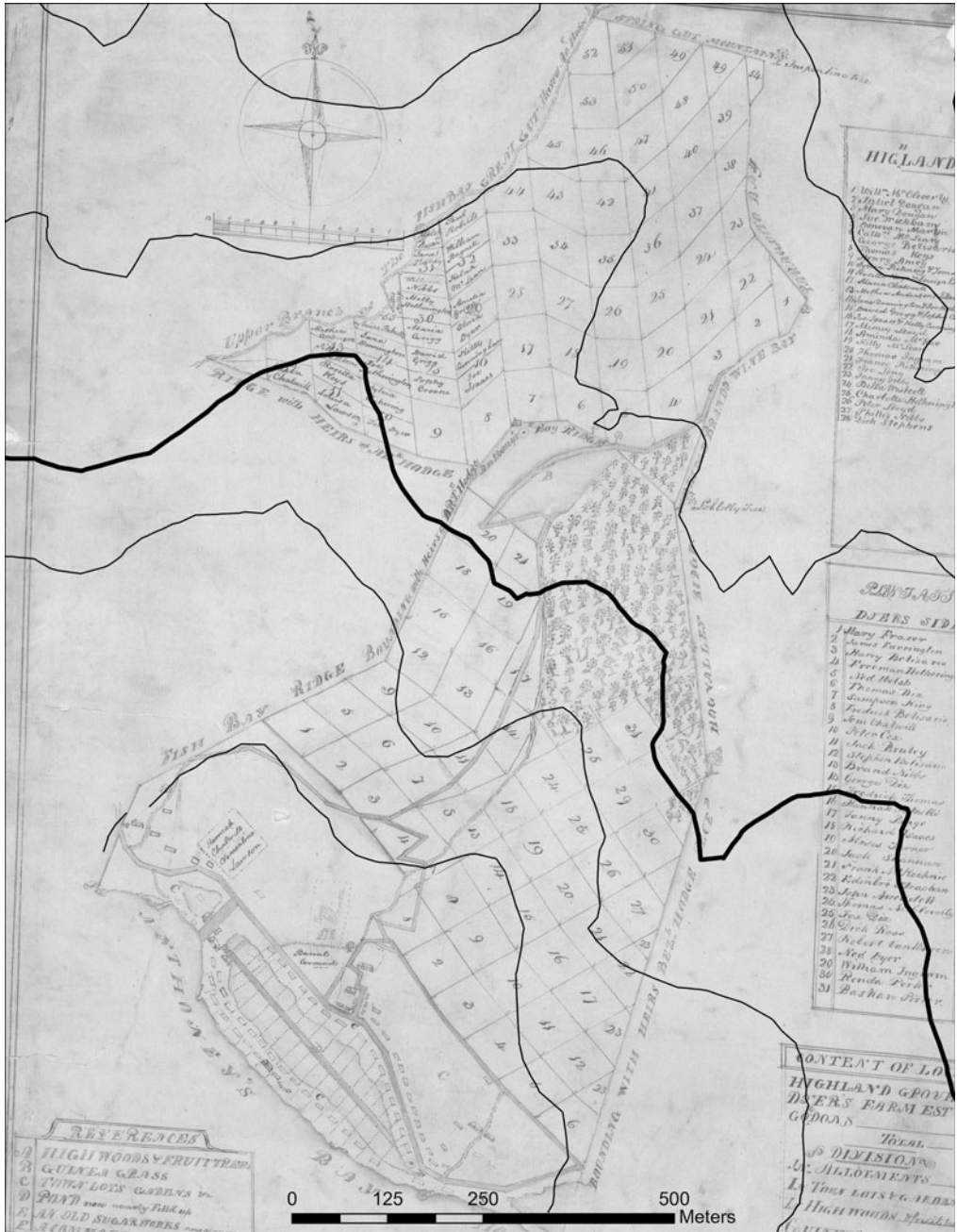


Figure 5. Map showing walking time on the return journey back toward the center of the Kingstown village in five-minute isochrones (map by John M. Chenoweth).

WorldView-2 satellite imagery (obtained through a grant from the Digital Globe Foundation) was used to calculate NDVI—a measure of plant health and, consequently, soil conditions—with higher numbers suggesting good

growing potential. This process is described in section 5 of Supplemental Text 1.

Table 1 shows the average NDVI value in each of the Kingstown fields. Again, there is wide variation between the fields, both in terms

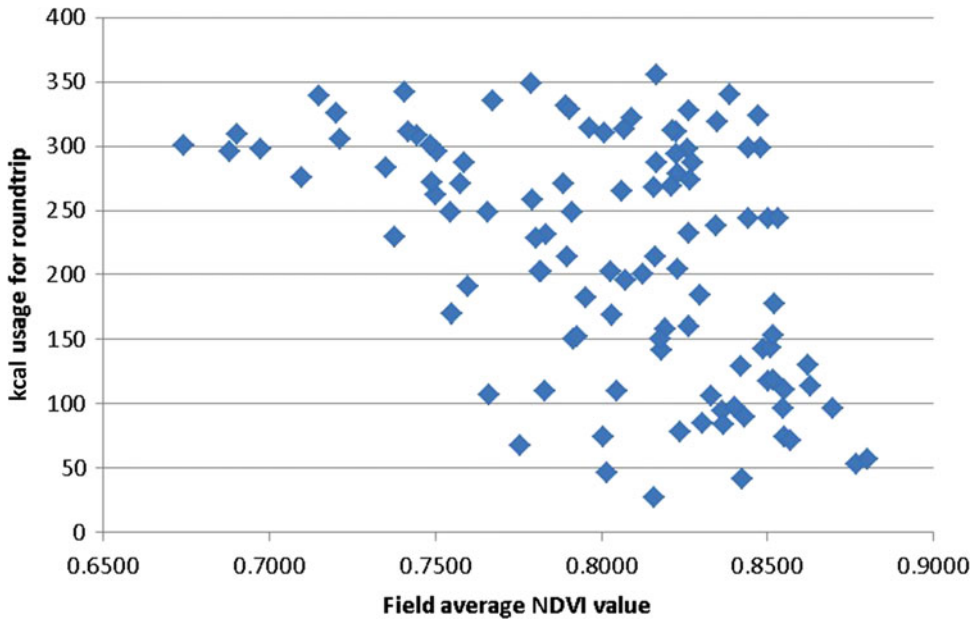


Figure 6. Scatterplot of NDVI values and kilocalorie usage values for roundtrip access to each of the Kingstown fields.

of size and average NDVI values. It is difficult to convert NDVI values directly into more meaningful figures, as was done above in the case of kilocalorie usage and food productivity to account for both elevation gain and distance in accessing fields. To put these numbers into context, therefore, we also ran NDVI figures for several effectively unfarmable areas on BVI out islands pictured in the same dataset, and this produced NDVI numbers ranging from just under 0.5 to about 0.6. Several of the Kingstown fields are little better than these figures (Table 1). By contrast, NDVI values for an area of Cane Garden Bay on Tortola—which, as the name suggests, has long been known as excellent farming land—are just under 0.9. Some of the Kingstown fields show strong potential for farming, with 16 having an average NDVI pixel value of 0.85 or higher.

Perhaps the best way to assess the data is to combine NDVI values with the calorie-cost figures derived above, incorporating both access and productivity into a scatterplot (Figure 6). Some fields at Kingstown would have been relatively easy to access and reasonably productive, shown in the lower-right quadrant. Yet others

(upper left) would have been much more costly to access and at the same time less productive. It is interesting that there are few fields that are both unproductive and easy to access (the lower left). This may be because fields closer to the village would have also been lower on the slopes of the mountain, where soils would have been deeper and the moisture retention greater. Together, these datasets reinforce the suggestion above that the individualism of the British colonial model, in the separate working of apparently equal plots, would have necessarily produced inequality rather than provided equal opportunities.

### Conclusion

Multiple lines of rather dispassionate analysis have been braided together here, but the goal has been to provide insight into the daily lives of the Kingstown people. LCP, NDVI, and other analyses have shown how these people would have been limited by both the British plan for them and the landscape in which they found themselves. LCP analysis has allowed us to quantify the baseline effort required to reach each of these fields, and it has also provided

unexpected insights, such as that these paths sometimes crossed into neighboring properties, potentially off-limits to the Kingstown population. NDVI has shown the limits to and, in particular, variability of the natural fertility of the soil, revealing further inequities in a system that seems to represent equality. In each case, the result is a number, but that number speaks to a lived experience: an afternoon of work under the hot sun, a fear that enough food will not be found, and probable anger at an administration that seemed to expect gratitude for its meager offerings.

Of course, the very precise numbers presented above are schematic, only hinting at what actual individuals in the past did. As discussed at the outset, the data presented here are not intended to suggest automatons blindly following the course laid out by the British authorities. There are many ways this idealized model of individual farmers working their separate plots may have been subverted. Those farming the upper fields may have chosen lower-maintenance crops and traveled to them more rarely, or they may have erected temporary houses in the fields as was sometimes done even under slavery (Delle 2016). They may have entered into cooperative agreements with each other or, in de facto defiance of the colonial ban on transferring their lands, bartered the use of their assigned plot away to others without official recognition, concentrating their time instead on fishing or working for wages—both important parts of the small-scale economy of the BVI (Chenoweth 2018; O’Neal 2012).

It is notable, however, that many of these negotiations would have also thwarted the British paternalist peasant model that was being imposed on the Kingstown people: it would have made the fields more communal—as at Higman’s (1998) Montpelier—directed people away from subsistence farming, or kept them further from the intended oversight of the village. In this way, survival and resistance may have been tied up with each other as “acts of residence” (Silliman 2001a) in farming (or not) that worked around the unworkable British model.

The public transcript of British colonialism at Kingstown was orderly, stable, and straightforward—geometric, equal plots equally distributed.

The lived reality at Kingstown was far more complex. If the Kingstown “experiment” was typical, the British picture of the postemancipation BVI was deeply flawed. And yet we know that a community survived here for many years, rebuilding its church and school into the 1860s and beyond. This speaks not to the success of the paternalistic model we have explored here, but to the resourcefulness of the residents of Kingstown in subverting it.

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*Data Availability Statement.* Satellite imagery is available through Digital Globe and the Digital Globe Foundation. The digital elevation models providing topographic data for this study were downloaded from the USGS’s Global Data Explorer, which has since been retired, but the same data are accessible via the USGS AppEEARS site (<https://lpdaacsvc.cr.usgs.gov/appeears/>).

*Supplemental Material.* For supplemental material accompanying this article, visit <https://doi.org/10.1017/aaq.2021.55>.

Supplemental Text 1. The supplemental text provides additional details about the potential limitations of the least cost path modeling, the assumptions and procedures used in the kilocalorie and sweet potato calculations, social considerations particular to the BVI, and the creation of Normalized Difference Vegetation Indexes (NDVI).

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