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We navel-string bury here: Landscape history, representation and identity in the Grenada islandscape

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Citation

Martin, J. A. (2023, October 4). *We navel-string bury here: Landscape history, representation and identity in the Grenada islandscape*. Retrieved from <https://hdl.handle.net/1887/3643183>

Version: Publisher's Version

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Note: To cite this publication please use the final published version (if applicable).

4

Analyzing Landscape Transformations in Grenada Via the Lens of HGIS: A Methodological Approach

*“A stranger could drive through Miguel Street and just say ‘Slum!’
because he could see no more. But we, who lived there, saw our street as a world,
where everybody was quite different from everybody else.”*

V.S. Naipaul, *Miguel Street* (2002:79)

There are many ways to see our world. There are many ways to see this island world... like a chicken-hawk (*Buteo latissimus*), soaring above its bird's-eye view and creating aerials of its predator landscape beneath. Or, like an agouti (*Dasyprocta antillensis*), scampering through the forest, breathlessly sniffing its way through the trees, bushes and undergrowth as a hunter follows on its heels; “fast like agouti,” but it cannot outrun its extinction!¹ Or take the miniscule Grenada frog (*Pristimantis euphronides*), enveloped within a water-filled bromeliad, seeing only a world reflected in its tiny, bounded surroundings. Or the endemic Grenada dove (*Leptotila wellsi*) surveying its shrinking habitat, hoping it has the perseverance to outfly the toxic Perseverance Landfill smoldering around it (Elgie et al. 2021; Rosenberg and Korsmo 2001). Or the Grand Étang (mona) monkey (*Cercopithecus mona*), dragged screeching across the Atlantic from equatorial Africa to masquerade for visitors for the treat of a ripe *fig* (banana). Or the fish-eating bat (*Nactilio leporinus mastivus*) that alights over the sea and swoops up a surprised catch in its claws, creating a ripple in the seascape that crashes against the coast, releasing centuries of entombed human skeletons that wash into the sea, without even an official sigh! And on the beach, within the gentle waves crashing at her feet, sits a child on the edge of an island landscape gazing out beyond the horizon. A ship sails by and disappears.

There are so many ways to see this island world, but this story of land use/landscape change is a multilayered, multi-perspective, transdisciplinary study that is best told through the

¹ The agouti, believed introduced from South America by Indigenous peoples centuries ago, is currently extinct from Grenada as a result of predation by man, and despite an attempt to reintroduce it in the 1970s. It was known for its speed and endurance, hence the saying “fas’ like agouti.”

encompassing methodological approach of Historical Geographical Information Systems (HGIS), which will allow for the multiple voices and stories of spatial representations across time and space in the Grenada islandscape (Jordi Martí-Henneberg 2011).

4.1 HGIS: A Spatial Approach to Analyzing Land Use/Landscape Change

One of the primary outcomes of this study is to produce a landscape biography of Grenada as a means to illustrate land use/landscape evolution in order to define landscape representation, and thus discuss the concept of landscape identity in an islandscape (Stobbelaar and Pedroli 2011). Though there are several possible ways to achieve this, the most appropriate and practical, for reasons that will be discussed later, is using historical Geographical Information Systems (HGIS) to analyze land use/landscape evolution. The fact that our present-day landscapes have been shaped by “historical settlement patterns and their varying cultural, socioeconomic and political causes,” the key to “understanding these ecological footprints and the processes that shaped them, therefore, requires a spatially and temporally explicit approach within a multidisciplinary framework,” thus HGIS (Etter and van Wyngaarden 2008).

HGIS is defined as a process that utilizes various tools and methods of GIS “to visualize historical information in its geographic context, examine it at different scales, interrogate its spatial patterns, and integrate material from many sources on the basis of shared location” (Knowles and Hiller 2008:xiii). It emphasizes “the role of spatial context and relationships in understanding the emergence, development and consequence of historical events” (Zang and Logan 2017; Lünen and Travis 2013). HGIS fuses history and geography where the result “is not about space on its own, but about interrelations between people set in space and time, which create places in the landscape” (Veldi and Bell 2019:1). Veldi (2020:64) stresses, “it enables the study of these human patterns in the context of place and time... [and] correlates with the concept of landscape biography” that compliments its use as a theoretical approach in this study.

GIS application dates to its emergence in the 1960s in the military and the fields of environmental science and cartography, but it was not until the 1990s that historical geographers and historians began to see it as a means to complement and enhance their study of the past (Gregory and Ell 2007; Veldi 2020). HGIS quickly became a sub-field within the

discipline of historical research, and its use was widespread among several others, including archaeology and geography. Gregory and Ell (2007), in looking at its impact in the field of historical research, write that “GIS allows geographical data to be used in ways that are far more powerful than any other approach permits. It provides a toolkit that enables the historian to structure, integrate, manipulate, analyze and display data in ways that are either completely new, or are made significantly easier.” Knowles (2008) adds that the application of GIS to historical research is changing the way history is practiced. There are a few detractors, however, who, according to Knowles (2008), question the supposed newness of the results and whether it warrants the laborious methodology. And though Gregory and Ell (2007) recognize that GIS affords a radical new approach at analyzing historical data, its reliance on overly scientific methodologies in a field that is not data-rich is problematic, which Knowles (2008:2) acknowledges, especially when “sources cannot easily be reduced to entries in a tabular database.”

Like geography, archaeology adopted HGIS as a methodological approach, particularly landscape archaeology where its practice is widespread today. As early as the 1980s, archaeologists were among the first in the humanities to adopt HGIS because of their field methods and fundamental “interest in the relationship between terrain and human settlement” as a way to provide more accurate site measurements and precise artifact location (Knowles 2008:7). HGIS, because of its accessibility and practicality presenting spatial history from multiple vantage points, has become quite popular across many disciplines in the humanities (Knowles and Hiller 2008). GIS was readily adopted because of its unique tools that organize and analyze spatial data, making it ideal and versatile for landscape studies (Hu 2012). It also allows for the integration of diverse quantitative and qualitative historical data sets across time and place to analyze landscape change and display the results spatially. Veldi (2020:62) concludes that “practicing landscape archaeology without GIS is unimaginable.” As popular as it has been, HGIS has been extensively used across the Caribbean by archaeologists, and as Reid (2008) notes, the region is fertile ground for geoinformatics in general due to the multiple ongoing archaeology projects there and the demand for state-of-the art technologies (see Armstrong et al. 2008; Farag et al. 2005, 2006; Finneran 2017; Hopkins et al. 2011; Norton 2020). It remains to be more widely adopted among historical researchers.

As identified above, this study will use the practical research tools of HGIS as a methodological approach to detect, map and analyze large-scale land use/landscape changes and create a map-based biography of the Grenadian landscape in the *longue durée* (Veldi and

Bell 2019; Veldi 2020). HGIS is a relatively accessible and user friendly approach, with results that are easy to understand by a general readership due to its visual results. This integrative tool allows the combining of historical spatial data like historical maps and location-specific data (like census of population and lands) that can then be compared across different time periods as well as to the contemporary landscape (Veldi 2020). HGIS scholarship adheres to specific characteristics as outlined by Knowles (2008:7):

- 1) Geographical questions drive a significant part of the historical inquiry;
- 2) Geographical information provides a good share of the historical evidence;
- 3) The bulk of evidence, or the evidence that provides the study's key analytical framework, is structured and analyzed within one or more databases that record both location and time;
- 4) Historical arguments are presented in maps as well as in text, graphs, tables and pictorial images; maps serve in particular to show patterns of change over time.

Most of the above characteristics of HGIS studies are pertinent to this particular study and as such reinforce the reasons why it is the most appropriate approach to analyze land use/landscape changes in Grenada in the last five centuries.

4.2 Data Sources

This study will analyze an array of qualitative and quantitative data collected primarily from French and English ethnohistorical documents from the 16th through the 21st centuries (Table 4.1). It will also utilize pertinent information from archaeological studies on Grenada and the Lesser Antilles (Bradford 2001; Bright 2011; Hanna 2017, 2018; Hofman et al 2012, 2016; Holdren 1998; Petitjean Roget 1981). The use of ethnohistorical documents have been shown by Bright (2007), Glazier (1983), and others to be an effective way to explore the settlement history of an area or region in the absence of other evidence, or as a way to lay the foundation for future archaeological analyses (see Holdren 1998). As such, this research will examine historical manuscripts, printed historical sources, illustrative documents such as historical maps, paintings and photographs, and administrative statistics such as censuses in national libraries and archives, and private collections to glean data on Indigenous, French, British, African and Grenadian settlement locations and landscape impacts (Table 4.1) (Armstrong, et al 2012; Boucher 1992; Glazier 1983; Holdren 1998; Honychurch 2002). These settlement patterns are used to analyze demographic (Kali'nago, French, British, enslaved Africans,

Creoles), political (conflict among Amerindian groups, attacks from Europeans, invasion by Europeans, immigration), economic (subsistence, export agriculture, types of crops, tourism), and social (representation) variables’ impact on the Grenadian landscape over the last five hundred years (Bradford 2001; Callaghan 2007; De Waal 2006; Meniketti 2004; Wilson 1989).

Types of Data	Sources
Archaeological	Bullen (1964); Hanna (2017); Hofman et al. (2016, 2017); Holdren (1998); Petitjean Roget (1981)
Cartographic	Archives Nationales (1984); Blondel (1667); Brierley (1992); DOS (1985); Jeffreys (1775); Romain (1749, 1749[1743]); Smith (1801, 1899)
Chronicles	Anonyme[Bresson] (1975[1659]); Bouton (1640); Breton (1999); de la Mousse (2006); Du Tertre (1667-71); Labat (2005[1722]); Rochefort (1665)
Historical Documents	Archives Nationales (1984); Dampierre (1904)
Statistics	Archives Nationales (1984); The National Archives, UK
Historical Images	Archives Nationales (1984)
Traditional Knowledge	Oral histories from multiple narratives; Hawthorne et al. (2004)

Table 4.1 List of types of data and sources used to generate HGIS models and discussions.

As the Kali’nago and Kali’na of Camáhogne have left no written records, no chronicles, no journals, no liturgies, no epic poems..., their habitation of Grenada in the era of European invasion has been defined by information gleaned from a few, if often biased European chronicles (Table 4.1). These narratives or ethnographies, primarily by French missionaries like Breton (1665, 1929), Du Tertre (1667), Labat (2005[1722]), and de la Mousse (2006) who accompanied French colonization of the region, provide the earliest details of Grenada’s Indigenous population following European settlement of the island. Earlier chroniclers and travelers like Laet (1988[1630]), La Borde (1674), Pelleprat (1965[1655]) and Rochefort (1658) provide information on the regional interactions of Indigenous peoples in the southern Caribbean and northern South America. All of these chronicles provide varying quantity and quality of information on the Indigenous populations of the Lesser Antilles. Rochefort (1658) and Du Tertre (1667) provide the most detailed ethnographies on the cultural landscape in the Lesser Antilles, with the latter having lived in the islands among the Indigenous peoples. According to Allaire (1997:180), on the writings of the 17th-century French missionaries, “essentially, what anthropologists and historians know today of Island Carib culture, language, and society is based almost entirely on these documents” (see also Honychurch 2000). Garraway’s (2005:51) critique of ethnohistorical research acceptance of these early chronicles is that it often “makes no attempt to situate these sources in their historical context,

much less to evaluate their reliability,” and thus unintentionally perpetuate “certain prejudicial assumptions.” So despite the heavy reliance on these early narratives for necessary data on Indigenous peoples of the Lesser Antilles, caution should be the guide, especially in regard to the objectives of the various writers.

Until the availability of archaeological practices across the region in the latter half of the 20th century there was no recourse to question the validity or accuracy of aspects of these historical narratives. Archaeological evidence, alongside these narratives and other historical documents, offers an approach to “construct a revised model of aboriginal societies and languages both before and during colonial contact” (Garraway 2005:62). Archaeological data can therefore provide a more balanced picture from the artifactual remains and other discarded objects embedded in the landscape, and this has enabled researchers to make new interpretations that render a more diverse view of the Indigenous landscape (Leech and Leech 2021). This study will use data from the relatively few archaeological studies that have been done to date in Grenada, especially to recreate the settlement patterns of the Kali’nago and Kali’na on the eve of European invasion of the island and immediately thereafter (Table 4.1). The most revealing of the archaeological studies to date were carried out at La Poterie, St. Andrew and provide interesting data on contact sites as well as confirming the presence of Cayoid pottery, thus establishing its presence on the island (Hofman et al. 2016, 2017, 2018; Holdren 1998). Much, however, remains to be done with regard to contact-era archaeology that can help rewrite the often biased narratives of the Kali’nago and Kali’na in Grenada rendered by the early chroniclers.

The historical cartography of the Caribbean islands, particularly because of the absence of extensive archival data on the landscape from the early years of European colonization, are a rich source of data in historical research (Hutchinson 2021; Pulsipher 1987). As Pulsipher (1987) acknowledges, “Historical maps are potentially rich sources of information about the past, providing visual representations of physical features, spatial relationships, and the effects of human activity that can rarely be acquired from other types of sources.” As such, historical maps are vital in the application of HGIS, and it would be impossible to fully utilize the methodology without them as they “record the geographical information that is fundamental to reconstructing past places, whether town, region, or nation” (Rumsey and Williams 2002). Historical maps have retained information like toponyms, physical features and boundaries that other written sources rarely capture, and thus become a permanent record of a specific time though that place would have been modified over time (Rumsey and

Williams 2002). Before the application of HGIS, historical maps were not fully utilized as many scholars generally “rated the usefulness of written documents above that of cartographic records” (Pulsipher 1987:408).

Historical maps were generally created to illustrate graphic representations of colonial possessions (thus announcing ownership and rights), as a measure of resources (i.e. land, timber, water sources), and the level of development attained under colonial management. And as Hutchinson (2021:10) qualifies, “Maps were not simply passive representations of landscapes but were instrumental in creating it,” and thus “conferred rights and possession” to its creators. Despite the popularity of cartographic data, however, it is clear that they should be treated as any other historical source and scrutiny required to ensure that they are authentic and accurate as possible, with emphasis on the technology used to create them, the political landscape when created, and thus the inherent biases they might contain (Hutchinson 2021).

Though the cartographic history of the Caribbean began at the dawn of the 16th century, representations vary across the region depending on the assumed importance of the islands by European colonial powers who rendered it. The early maps of the region and of specific islands were mere representations that sometimes bore little resemblance to the actual places they were supposed to capture. By the beginning of the 18th century, after decades of European settlement in the region, more accurate cartographic representations of the islands began to appear, capturing useful historical and geographic data. The cartographic history of any particular island is dependent on its importance and value to the colonial powers at the time as is reflected in many of the collections of maps of the islands, with more of the Greater Antilles, particularly Hispaniola (presently Haiti and the Dominican Republic).

This is also the case for the small island of Grenada that was not settled by Europeans until the middle of the 17th century and remained a frontier colony of the French until the middle of the 18th century. Though its cartographic history is rather limited there are a few historical maps, particularly two cadastral maps (Jefferys 1775; Smith 1801, 1900), and a modern, basic topographical map of Grenada (DOS 1986) that provide the data necessary to create the databases for the HGIS (Table 4.1). This study takes the entire island of Grenada as the study area, thus analyzing landscape change on an island-wide scale that is captured in these various cartographic representations at various times in its 500 years history since European sighting of the island in 1498. Data are also examined in smaller geographic units of parishes

or districts as the original data was thus created within these regional confines. The absence of consistent comparable cartographic representations of the later periods (between 1900 and 1983) necessitated the utilization of maps adopted from Brierley (1992) that capture “Estates by Size, 1940” and “Estates by Size, 1988.” To complete the analysis to the present, land cover and forest formation maps (Helmer et al. 2008; Sijmons 2016) were used to provide a complete picture of landscape change in the *longue durée*. All of these cartographic sources for the island thus provide comprehensive coverage of the entire time period under study.

The bulk of the data for this study will derive from the large array of historical documents (i.e. manuscripts, government communications, property ownership, population data, plantation records, newspaper articles, and historical images like paintings and photographs) that are readily available from French and British archives (Table 4.1). Much of this data was collected for tax purposes, particularly during the period of both French and British colonialism, especially slavery. In later periods, the land-use data derives from the production and export of agricultural produce. As most historical documents “are often related to geographic places (i.e. to locations that can be detected in maps), a GIS approach can be exploited as a useful tool for analyzing and mapping data for historical research” (Carrion et al. 2016). The data used in creating the GIS databases are statistical, including primarily census data of population, tax records, land acreage, types of crops, and property ownership (genealogy) (Table 4.1). The biggest issue with this historical data is its inconsistent nature that required additional modifications to make usable and will be addressed later.

Though other qualitative data like traditional knowledge are used in the discussion of this study, these, for obvious reasons, do not form part of the GIS databases as they lack scientific quality despite the fact that some of that data do possess geographical reference points. As this type of data are not consistent across the time frame of the study they can only be used as supporting data for the discussions on the HGIS models, landscape representation, and landscape identity.

4.3 Digital Mapping and Data Processing

As stated above, the availability of appropriate data is of the utmost importance for a scientific application of HGIS in historical research. As Knowles (2008:2) warns, “The precision that makes GIS so useful in many kinds of scientific research and statistical

analysis, however, can make it an awkward instrument for historical research when sources cannot easily be reduced to entries in a tabular database.” One of the most immediate problems is the inconsistency or unstructured nature of spatial and other data across these long time frames as examined in this study, resulting in the need for adjustments to historical data to render them uniform and comparable, or adjusting how the data are analyzed over time frames of centuries (Etter et al. 2008). Over the last 500 years of Grenada’s landscape evolution, the island witnessed multiple natural, political and social changes that altered the spatial units of measurements, particularly plantations, making land use comparisons difficult over the French and British colonial periods, and with the contemporary period where spatial dynamics have been totally altered, with the ubiquitous plantation replaced by settlements and diverse agricultural units. Other measurements like demographics are not consistent throughout, especially as the status of the majority of the population changed from enslaved to free, with race becoming less and less of a statistic of measurement. So too have the multiple other variables that are used to analyze landscape change in this study.

To manage or compensate for some of the disparity in the historical data over time this thesis will divide the study into historical periods “that adequately reflect the changes in the drivers and patterns of landscape change” (Table 4.2) (Etter et al. 2008:4). This division is based on identifiable socioeconomic and political characteristics, with “population dynamics and trends, land and resource use, patterns of economic activity, and the change in political and social institutions” the primary criteria defining the periods (Etter et al. 2008:4). The identification of the primary drivers or keystone processes that cause or influence landscape change is important as they will affect the creation of the datasets and outcome of the analyses, but also provide an understanding of why landscapes change, the rate (slow or fast) of that evolution, and the causal mechanisms of that shift (Plieninger et al. 2015). These forces driving landscape change—socioeconomic, political, natural, technological and cultural—are extensive and their components not always discernable because of their complex interactions (Burgi et al. 2004; Kizos et al. 2018; Marcucci 2000). Certain characteristics of forces like technology, nature, politics and the economy are readily identifiable due to their apparent disruptive nature in immediately affecting landscapes, but other forces, particularly cultural are more subtle, thus more difficult to identify and measure (Burgi et al. 2004). Many of these forces are often operating in tandem with each other in a feedback loop and oftentimes are difficult to isolate, conceptually represented as driving forces and actors operating in close and reciprocal interactions that lead to landscape changes (Figure 4.1)

(Kizos et al. 2018). Driving forces can also be intrinsic or extrinsic, and intentional or unintentional, thus adding further to their complexity.

Table 4.2 identifies the seven historical periods used in this study based on the detailed analysis of Grenada's historical and cultural landscape as gleaned from secondary sources, including Brizan (1998), Devas (1974), Martin (2013) and Steel (2003), statistical information from official documents, and expert knowledge. These provide the necessary data to not just identify the seven historical periods, but also recognize the primary drivers that influenced landscape evolution in Grenada between 1498 and the present. The creation of distinct historical periods enables a clustering of similar data sources that facilitate more consistent analyses and comparisons within and across historical periods (Etter et al. 2008). This methodological approach allows for the use of dissimilar data sets across the entirety of the study, and thus making it possible to produce a consistent spatial representation of the evolution of the Grenadian landscape.

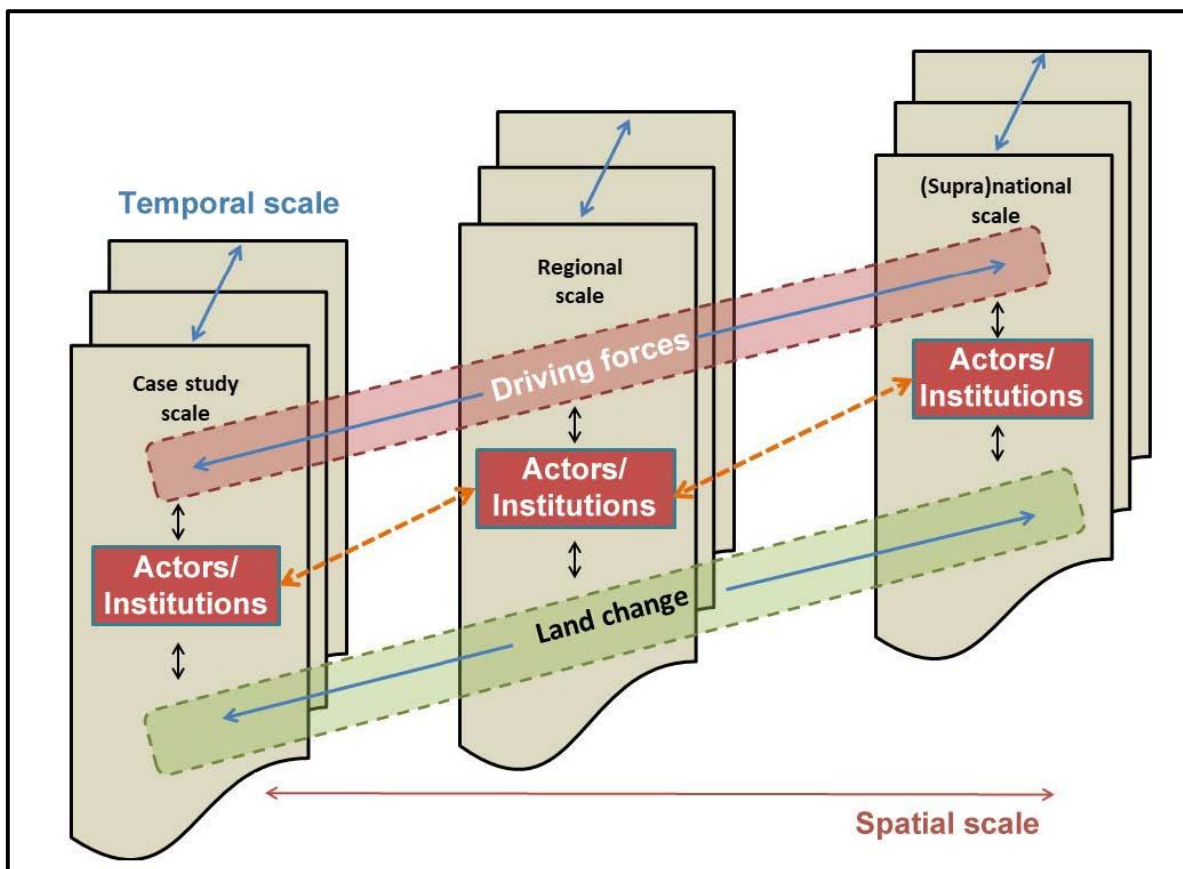


Figure 4.1 Different scales and actors involved in landscape change (Kizos et al. 2018)

Figure 4.2 presents a Schematic diagram of the methodology sequence of the overall process of taking historical cartographic and location-specific data (as part of databases) and applying

GIS methodology of digitization, georeferencing and analyses to generate land use/landscape change as spatial representations. As Veldi (2020) insists, HGIS can only be applied when the necessary spatial and historical data are available as the methodology is totally dependent upon them. The process of HGIS for historical cartography is quite specific, as outlined by Rumsey and Williams (2002):

- 1) High resolution scans of maps that afford easier access to them as historical documents;
- 2) Easily incorporated into a GIS as a graphic image that can be layered “to compare present and post configuration of a given place or landscape”;

Historical Periods	Definitions	Driving Forces (Keystone Processes)
1498-1649	Precolonial (Pre-European Invasion of Grenada)	Shifting agriculture, fishing, hunting, and possibly intensive cultivation of tobacco for trade; new technologies (European tools); introduced flora and fauna (pigs, chickens, banana, etc).
1649-1763	French Settlement/ Plantation Slavery	Fishing, hunting, subsistence (gardens) and intensive agriculture (cotton, indigo, coffee, cocoa, sugar cane); extensive forest clearing; grazing; introduced flora and fauna; slavery; international trade.
1763-1838	British Settlement/ Plantation Slavery	Subsistence and intensive agriculture (coffee, cocoa, sugar cane, nutmeg); increased forest clearing; grazing; slavery; international trade.
1838-1900	Post-Emancipation/ Freedom/Peasantry	Free labor (internal movement); shifting settlement patterns (village creation); extensive subsistence gardening; international trade; demographics (increasing population).
1900-1950	Remaking Grenadian Society	Modernization; economic expansion; demographics (increasing population); increasing settlements (villages).
1951-1983	Attempts at “Independence” from Below	Sociopolitical instability; natural disturbances; International trade/economics (low commodity prices); rural exodus; socioeconomic (low agricultural profitability).
1983 - Present	Small Island Developing State in the global economic and social landscape	Decrease in forest clearings; natural disturbances; International trade/economics (low commodity prices); rural exodus/urban growth; socioeconomic (low agricultural profitability; hard labor; youth opting out); expansion of tourism sector; degradation of coastal landscape’ emigration.

Table 4.2 List of historical periods and driving forces identified for Grenada

- 3) To analyze spatial information requires that maps be georeferenced where selected control points on a digital scan must be aligned with their geographical location, either by assigning geographical coordinates to each point, or by linking each point to its equivalent on a modern accurate digital map;
- 4) “Rubber sheeting” allows further adjustments to try to find the best fit for all part of the original map, stretching it, as it is almost impossible to perfectly align an old map

to modern coordinate systems because mapping methods before aerial photography often only very imprecisely represented scales, angles, distance and direction;

- 5) Create vector GIS layers by point features allowing the joining of attribute data like population and acreage. This process allows us to compare two sets of data over time, thus observing change.

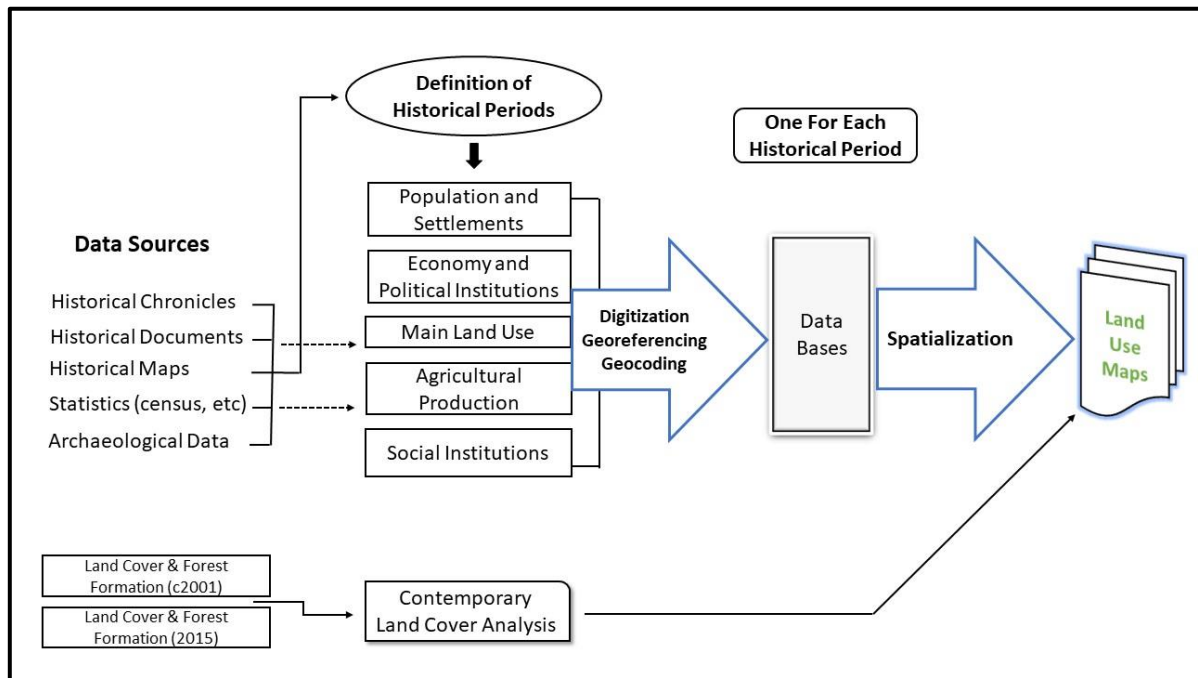


Figure 4.2 Schematic of the methodology sequence of input data and construction of HGIS maps (adopted after Etter et al. 2008)

Figure 4.2 also illustrates the method used to process multiple data sources into database entries, primarily from historical documents containing statistical data like population figures, size of plantations, ownership and production (Table 4.1). These datasets are then processed through the HGIS model to integrate with the cartographic sources to produce GIS models of land use in Grenada over time. The specific data and the resulting GIS models will be discussed in the next chapter.