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Caracol's Impact on the Landscape of the Classic Period Maya

Urbanism and Complex Interaction in a Tropical Environment

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The ancient Maya operated within a variety of interrelated landscapes. The physical locations that they occupied were often completely transformed—water was captured and channeled; soils were excavated, manipulated, and transported; and the enveloping natural canopies were removed and replaced with useful plants, trees, and crops. Modifications to the physical landscape also resulted in changes to ground temperature and in some cases may have affected climate. Like the physical landscape, ancient Maya sociopolitical landscapes were also dynamic, with differential impacts on economic linkages and physical well-being in different parts of the Maya area at any one point in time. Late Classic period (ca. 550–800 CE) ancient Maya sociopolitical landscapes were engaged in what may be termed "global" relationships; this interplay left Caracol, Belize, in a position to incorporate, at least for a period of time, several distinct polities and their diverse environments into its broader political and ritual sway.

Adaptations by the ancient Maya were complex but to a large extent were conditioned by and responsive to local environmental and topographic factors. While not all adaptations were necessarily sustainable, one in particular—low-density urbanism—appears to have allowed the Maya greater resilience and, at least in some circumstances, the challenge and opportunity to develop their settlements at scale. The largest low-density settlements of the Classic period Maya were often located away from readily accessible water sources and in landscapes that today are considered largely inaccessible; the locations of these sprawling metropolises raise the question of what benefit they derived from their scale. Comparative research on ancient and modern cities suggests that, among other things, "energized crowding" drew people to people to live and congregate in cities (Kostof 1991:37). While Western cities both excluded agriculture and bounded this crowding in smaller spaces, Maya cities essentially crowded their expansive landscapes with both settlement and agriculture, using both intensive and extensive agricultural strategies within urban confines (Chase and Chase 2016a). We would argue that one benefit of Maya low-density cities—at least at full scale when focused on in-city agricultural production—was the ability to mitigate environmental and climatic fluctuations because of the presence of different microenvironments and microclimates within the city's perimeters. In fact, we suggest that Maya urbanism in the Southern Maya Lowlands was expansive and formed broad integrated regional systems that were an effective adaptation to tropical environments in that they distributed the risk of "bad year economics" (Halstead and O'Shea 1989) through the use of a "managed mosaic" of crops (Fedick 1996)—in conjunction with a similar mosaic of the household production of a wide variety of other goods.

By the Late Classic period, if not earlier, at least a dozen Maya cities were characterized by a preindustrial low-density urbanism that covered upward of 200 km^2 into metropolitan areas (e.g., Chase and Chase 2016a, 2016b). We have been working for over three decades at one of these large cities—Caracol, Belize—and the archaeological work associated with this site helps shed some light on how the Maya successfully thrived in an environment largely devoid of natural water resources for more than 1,500 years. These same data also suggest that this city's demise may ultimately be linked to human choices within an exteriorly interconnected economic and political framework that was potentially compounded by environmental or climatic change.

Caracol, Belize: The Components of a Monumental Landscape

Our archaeological work at Caracol, Belize, is a long-term attempt to understand the development of the site within the Vaca Plateau in broader Maya social and environmental contexts (e.g., Chase and Scarborough 2014). Situated within the Southern Maya Lowlands, Caracol is somewhat unusual for a Lowland Maya site in that it is situated at an altitude of over 550 m. The site is located in the foothills of the Maya Mountains where wind patterns generally ensure monthly rainfall, even if only minimal amounts. As the site lies within the rain shadow of the higher elevations of the Maya Mountains, it is viewed as probably receiving upward of 2,500 mm of rainfall per year (Johnson and Chaffey 1973:11; incomplete records for the drier parts of the Chiquibul Forest indicate minimal rainfall amounts of 1480–1560 mm, which forms a minimum baseline for rainfall at Caracol). Often this rain is exceedingly concentrated and heavy. It is this rainfall that provided all of the water (potable and agricultural) for the site, and the population modified the landscape extensively to both create built reservoirs and manage the flow of water (Chase 2016a; Chase and Cesaretti 2018; Chase and Weishampel 2016).

The site was located within a critical topographic passageway that permitted the channeling of needed resources (particularly hard stone used in grinding maize) from the Maya Mountains in current-day Belize into the Petén of Guatemala (Chase and Chase 2012). This siting on a trade route likely bolstered its success. Warfare with the site of Tikal (see below for additional discussion) was also likely due to competition for trade routes.

In the course of this research, we ground-mapped some 23 km^2 of settlement and then subsequently used lidar to gain a better understanding of the full extent of the site (Figure 6.1 and Plate 6.1). These data show that an extensive causeway system integrated a metropolitan area of approximately 200 km^2 (Figure 6.2; see also Chase and Chase 2003, 2007a; A. Chase et al. 2011; Chase, Chase, et al. 2014). Besides excavating the site's epicentral monumental architecture, we have also investigated the site's nodes of monumental architecture along its causeways (Figure 6.3) and archaeologically tested over 126 residential groups (Chase and Chase 2002, 2004a, 2017). The landscape in which Caracol is located has been extensively modified to construct agricultural terraces over approximately 170 km^2 of the city (see Chase 2016b); some 4 km^2 of these terraces have been completely ground-mapped (Chase and Chase 1998a; Healy et al. 1983), and the total extent of these terrace systems is visible in the lidar data collected for the site in 2009 and 2013 (A. Chase et al. 2011; Chase, Chase, et al. 2014; Chase and Chase 2017). While sizeable human-made reservoirs are located both in the site epicenter and at 7 of the 20 major causeway nodes (see Chase 2016b:Table 1), at least 1,500 smaller human-made reservoirs are liberally distributed throughout the site's settlement area (Chase 2016a).

The final integrated layout of Caracol, as expressed through its causeways and termini as well as in the regularized distribution of its residential groups and extensive terraces, supports the notion that "city planning" was

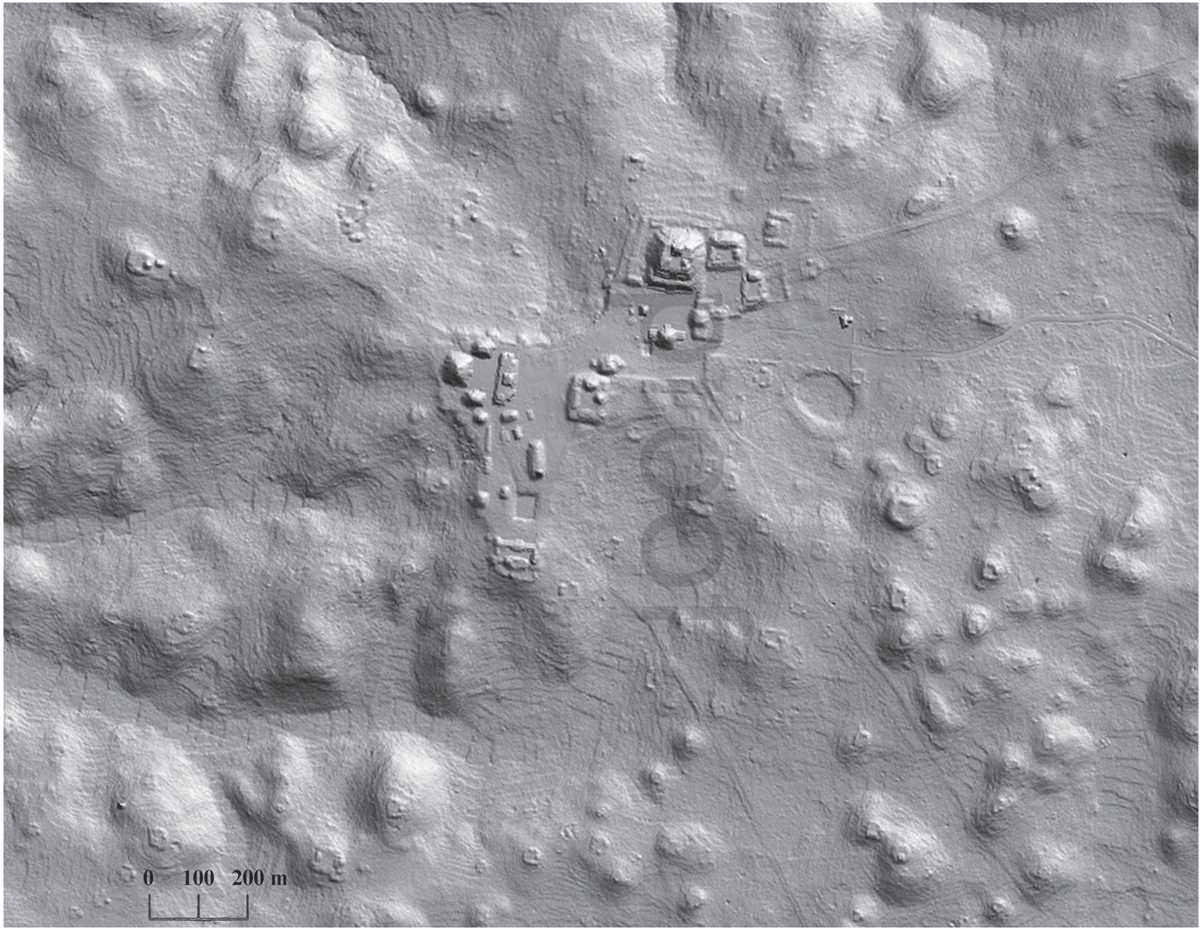

Figure 6.1. Lidar (2D) hillshade of central part of Caracol, Belize. North is at the top of the map.

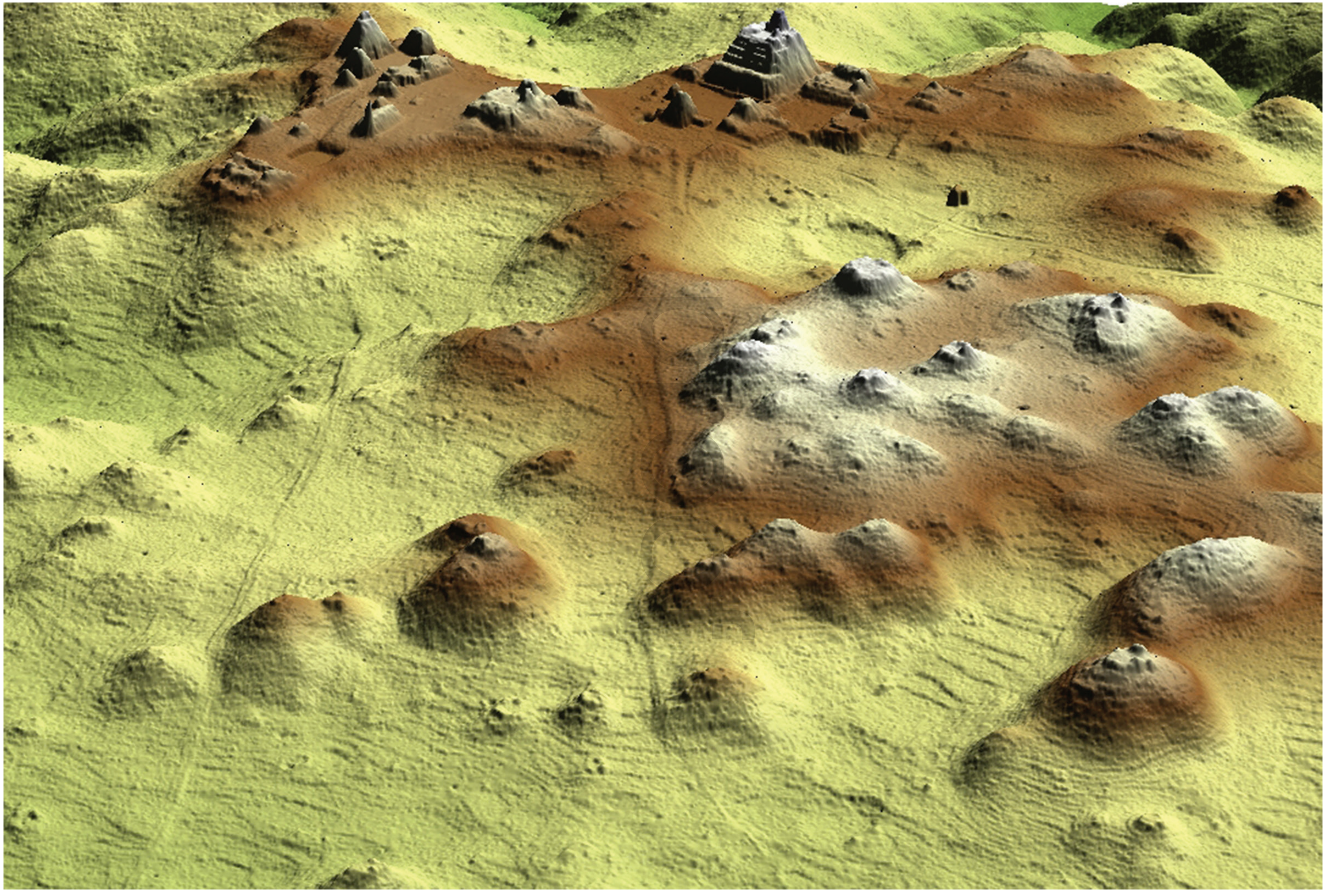

Plate 6.1. Lidar image (2.5D) of central Caracol showing topography, roads, residential groups, agricultural terraces, and monumental architecture.

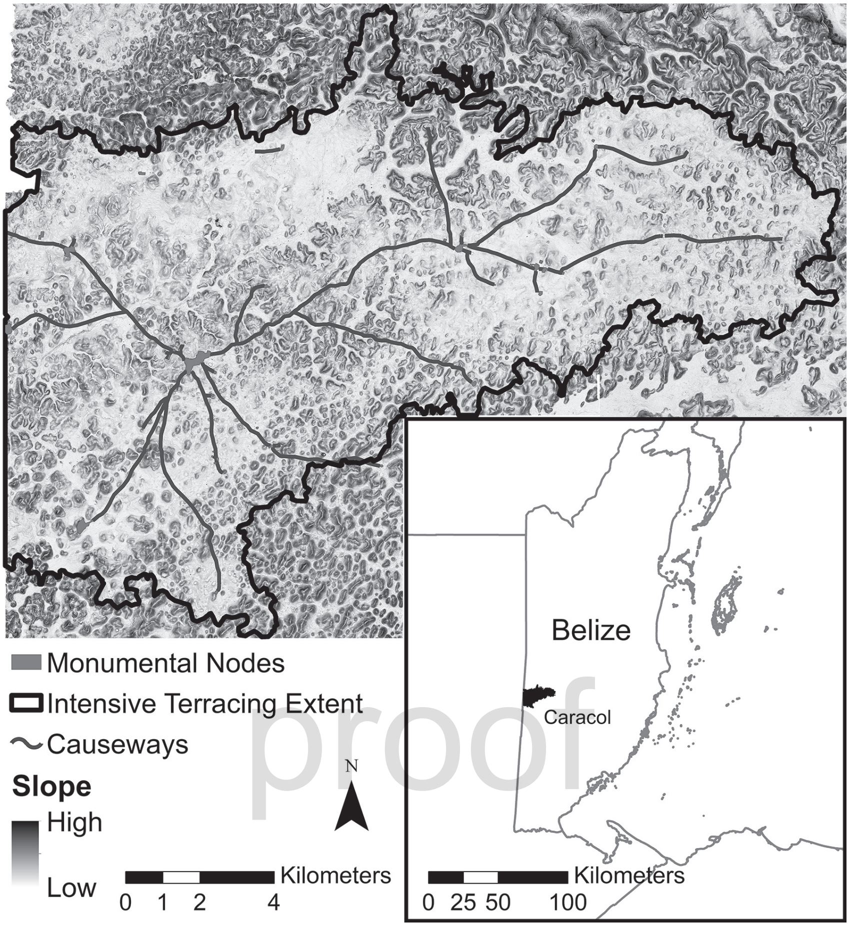

Figure 6.2. The city of Caracol, Belize, as revealed through on-the-ground mapping and lidar. A dendritic causeway system integrates the urban environment.

a key element in the site's development. What may have initially started out as an unplanned cacophony of plazuela groups and terracing was subsumed into a coordinated whole during the Late Classic period (550–800 CE). Caracol's settlement also can be related to the development of urban settlements elsewhere. The growth of Caracol is very similar to what has been described in modern literature as "edge cities" (Garreau 1979), in which centers of commerce and administration are embedded in the settlement landscape at some distance from the urban epicenter in order to serve outlying populations (Chase et al. 2001). However, in the case of Caracol, many of these edge cities or termini began as independent centers that

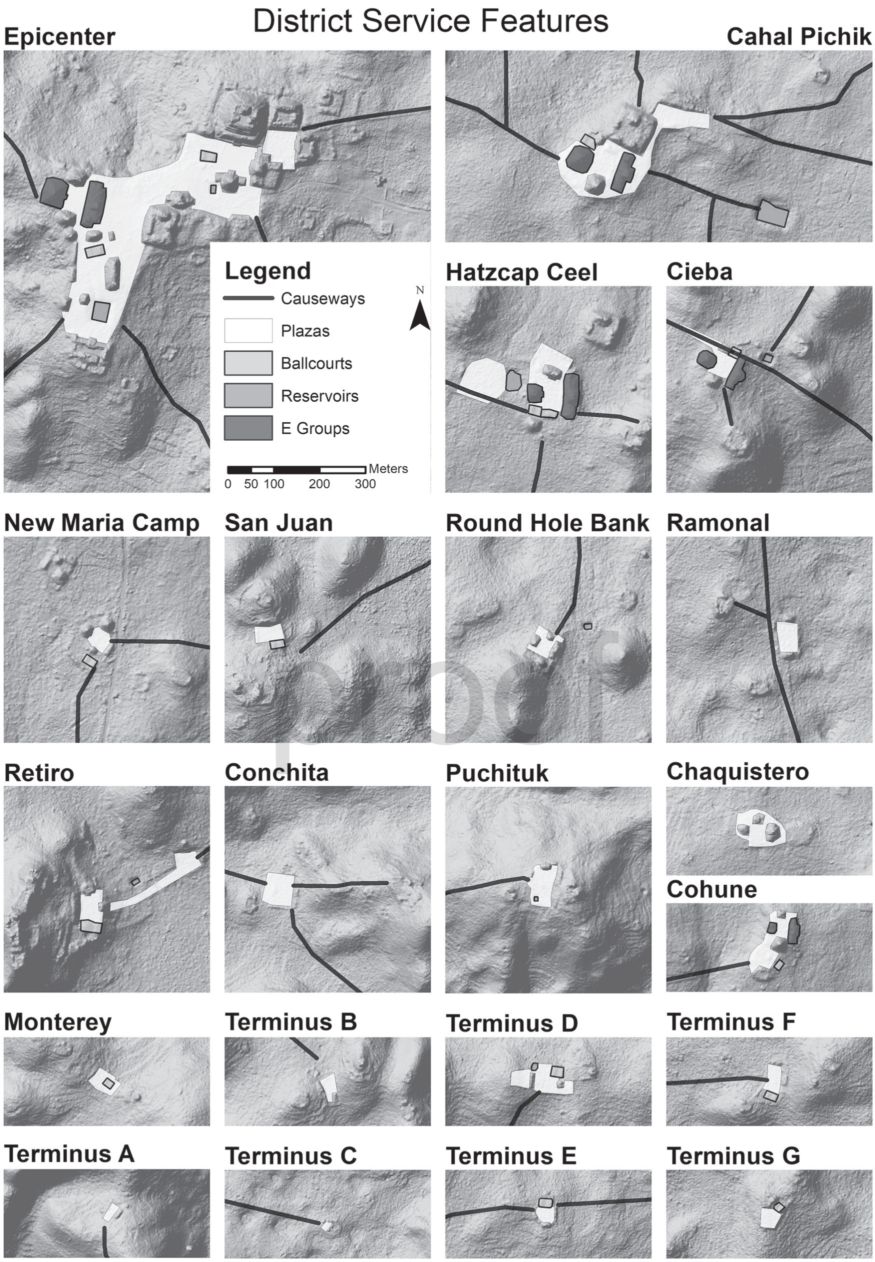

Figure 6.3. The known areas of monumental architecture within Caracol with certain districting features outlined (after Chase 2016b).

were subsequently joined to and incorporated within the Caracol urban landscape.

Minimally, four key components compose the Caracol settlement system and are presumably at least partially responsible for the successful adaptation of Caracol's population to the local environment. These four components are (1) the site's residential plazuela groups, (2) the site's causeway system, (3) the site's reservoir system, and (4) the site's agricultural terraces. In addition, a specific Late Classic period management strategy—symbolic egalitarianism—that led to shared wealth and identity was also a key human development adaptation.

Plazuela Groups

For the most part, Caracol's settlement is composed of formally constructed plazuela groups (Figure 6.4) that contain a variety of structure types (Chase and Chase 2014). Generally, these groups are independently sited on raised rectilinear platforms that are placed over the entire landscape, being situated on the tops of hills, on the sides of hills, and in the bottoms of valleys. In the original 200 km^2 of lidar obtained in 2009 (A. Chase et al. 2011:395), 4,732 raised plazuela groups were evident, and the 2013 lidar sample has added at least another 500 raised groups to this sample; the nonraised plazuela groups that are more difficult to identify substantially increase the overall total of these residential features. Anywhere from 1 to more than 12 elevated substructures (that once supported buildings of various functions) are located along the edges of the raised platforms. Most common, however, are 4 to 5 constructions located on the cardinal sides of each plazuela group.

Caracol's plazuela groups were more than dwellings for the site's inhabitants. They formed the backbone of the site's economy. Archaeological remains show that each of the households contributed to the market economy, separately producing both perishable items and worked shell and stone tools that were used throughout the site (Chase and Chase 2014a; Cobos 1994; Johnson 2014; Johnson et al. 2015; Pope 1994). Neighboring households not only generally produced distinctive items but also had varied diets reflective of mixed-status neighborhoods (Chase et al. 2001; Chase and Chase 2017:190, 231). These heterogeneous neighborhoods are characteristic of walking cities (Chase and Chase 2016b:365; G. Storey 2006:9–10).

Unlike settlement at some other Maya sites, Caracol's plazuela groups do not generally occur in nested concentrations (as would normally happen

Figure 6.4. A typical residential plazuela group at Caracol showing multiple excavations in progress.

with the hiving off of generational kin groups wishing to maintain proximity to parents; see Webster [1989] for an example of a nested residential concentration at Copan, Honduras). Spatial integrity was maintained between distinct plazuela units—and the land between groups was generally occupied by agricultural terracing. Closer to the epicenter, the distance between plazuela groups is approximately 50 to 100 m, but the average spacing between groups is from 100 to 150 m for much of the site. While this regularized spacing between plazuela groups may have provided an upper limit on the number of individuals and extended family members that could live in concentrated areas located in proximity to each other, it had other benefits. It provided areas between plazuela units that could be used for kitchen gardening and terraced agriculture and that could easily be tended by households and fertilized through the use of domestic night soil. This regularized (and less compact) plazuela group spacing also offered some protection against the ready transferal of disease and provided for a more controlled and sanitary urban setting (e.g., Drennan 1988; see also R. Storey [2006] for a contrary pattern at Teotihuacan). As the site grew, it expanded to encompass the local region through retaining the spacing of its plazuela units, thus supporting settlement and population growth (Chase and Chase 2014b).

Using the standard methodology employed at the other Maya sites, which focuses on structure counts and likelihood of occupation (e.g., Culbert and Rice 1990), the 200 km^2 area that is estimated to compose the city of Caracol would have supported a population of over 100,000 people during the Late Classic period (Chase and Chase 1994:5; A. Chase et al. 2011; Chase and Chase 2017). Each residential group at Caracol was occupied by an extended family that grew its own food, practiced its own rituals, produced specialized goods for trade, and, by the Late Classic period (550–800 CE), was completely dependent on the site's market system for both quotidian and prestige goods (Chase and Chase 2015; Chase and Chase 2014a).

Causeway System

Part of Caracol's long-term success may also be attributed to the communication and transportation access provided by its extensive causeway system. This dendritic system connects all large Late Classic period architectural concentrations in the broader region directly to the site epicenter (Chase and Chase 2001) and specifically with the central architectural complex of Caana (Plate 6.2; see also A. Chase and D. Chase 2017a). These causeways also provided easy walking access throughout the city, even in areas of rough terrain. The radiating causeways focused traffic into and out of the epicenter, providing central control points for the broader city that fostered the integration of the site's large population, providing an excellent ancient Maya example of a "walking city" (G. Storey 2006:9–10). All of the causeway termini had large open plazas that provided the sitewide population access to commerce, helped distribute goods throughout the urban area, and also likely served as the focal points for sitewide governance and administration (Chase 1998; Chase and Chase 2001). That these plazas were used as markets has been demonstrated through several overlapping datasets, including soil chemical analyses (Chase et al. 2015; Chase and Chase 2014a). These causeway nodes also included once independent centers that were engulfed in Caracol's metropolitan area by the onset of the Late Classic period as well as nodes purposefully constructed to serve commercial and administrative functions for the city. Through these causeways, the entire metropolitan area of Caracol was brought into walking radius of urban service facilities (Chase 2016b) and integrated into a single community. These same causeways also facilitated the flow of goods and resources from outside the metropolitan area into the core of the city. In particular, goods made of metamorphic stone from the Maya Mountains (to the east of Caracol) flowed over its road system through the Vaca Plateau and were made

Plate 6.2. Photograph of Caracol's central architectural complex, Caana ("sky place").

available to the broader Maya world. The site occupies a geographic choke point that would have permitted control over the trade of these resources.

Reservoir System

The site of Caracol was located in an area that was devoid of larger natural bodies of water. Like other major Maya centers, such as Tikal, Guatemala, and Calakmul, Mexico, Caracol's siting in such a waterless environment (at least in terms of standing or running water) may have been predicated on ideological or economic factors, or both (D. Chase and A. Chase 1989). Nevertheless, water management was key to the development of Caracol. While riverine water can be found approximately 19 km to the site's north, south, and west, it is clear that the site's earliest inhabitants would have had to construct a water management system in order to occupy the area. And the successful maintenance of a water management system was key for the site's growth and development.

Large constructed reservoirs, capable of storing water for a substantial segment of Caracol's population, were located wherever sizeable early monumental architecture occurred, particularly being associated with the site epicenter and the ends of each of the site's early causeway nodes. The three earliest reservoirs at Hatzcap Ceel, Cahal Pichik, and Caracol itself were all over 1,000 m^2 in surface area; other termini reservoirs at Ceiba, Puchituk, Ramonal, Retiro, Round Hole Bank, and Terminus D were smaller, ranging from 70 to 260 m^2 in surface area (Chase 2016b). It may be that the construction of these smaller termini reservoirs was possible because of the Late Classic proliferation of constructed reservoirs in residential groups. All these reservoirs were positioned to catch rainfall runoff from broad plastered surfaces and, given their broad distribution throughout the urban landscape, certainly came into play during times of lessened rainfall. However, the larger reservoirs did not provide Caracol's elite with a monopoly on water, as has been suggested to be the case for other Maya centers (e.g., Lucero 2006); the plethora of smaller formally constructed reservoirs that were distributed throughout the site's settlement suggests that extended family units controlled their own access to water. Analysis of the lidar data for Caracol reveals that the site had a minimum of 1,600 smaller constructed reservoirs associated with residential groups (Chase 2016a).

It is the more localized reservoir system—broadly distributed among the various plazuela groups—that provided potable water for most of the site's population. Smaller, formally constructed reservoirs were located throughout Caracol's settlement area and can be found in association with residential units of different status levels, although they are often attached to hilltop residential units. The placement and construction of these reservoirs was also often next to broad plastered surfaces to catch rainfall. The locations of these reservoirs in non-elite contexts suggest that they were independent of elite control. At least five reservoirs were located within any square kilometer of Caracol's settlement (Chase and Chase 1996). Most formally constructed reservoirs occupied high ground, presumably meaning that the Maya were cognizant of health issues that could occur had such units been located at lower topographic levels.

Some purposefully constructed reservoirs do occur in the fields, both as raised embankment catchment units and as check dams within valley terrace systems. Given their locations, it is likely that these reservoirs were employed for agricultural purposes. Also found within the terrace systems are constructed embankment walls set at an angle at the base of ravines that would have served to control and divert heavy runoff rainfall, thus preventing extensive erosion of valley terrace systems (Chase and Chase 1998a) and facilitating infiltration of water into the soil reservoir (Chase and Weishampel 2016).

Agricultural Terraces

With the exception of the basic topography of hills and valleys, the entire Caracol landscape is a product of intense human modification. Not only were causeways, plazuela groups, and other architecture situated on the terrain, but most of the landscape was excavated, manipulated, and then reconstituted as terraced fields (Chase and Chase 1998a; 2016b). While it has been suggested that some alluvial soils were imported into the region (e.g., Turner 1978:170), it is presumably more likely that soils used in the agricultural terraces were moved about within the site area itself (Coultas et al. 1994; Healy et al. 1983) and enhanced through occasional volcanic ashfall (see, e.g., Tankersley et al. 2011). Deforestation was probably extensive, with only the sides of steep hills being left intact; whether this resulted in a temperature increase (e.g., Oglesby et al. 2010) in the Caracol region is unknown. Quarries, which are quite common at most Maya sites, are rarely in evidence at Caracol; most quarries were presumably engulfed by the extensively constructed terrace systems that are distributed throughout the site. While these terrace systems may have begun through the efforts of individual smallholders toward the end of the Late Preclassic period, by the early Late Classic period most of the region about Caracol had been infilled by settlement, and many terrace systems became exceedingly regularized in their distribution on the landscape and throughout valleys. The density of terraces and settlement suggests a centralized control or regulation of spacing as well as mechanisms for handling land disputes by the Late Classic period.

The terraces provided sustainable agricultural fields, even with minimal rainfall. They tend to retain water, a fact that can be seen today in the high proportion of palms that grow on these features (D. Rice, personal communication 1991), and were built to control the flow of water over the landscape (Chase and Weishampel 2016). Thus, the terraced fields would have provided a buffer against any sudden climatic change. Maize is more sensitive to drought than Old World crops like wheat (Daryanto et al. 2016), but the water retention of Caracol's agricultural terraces would have mitigated some of the effects of drought. And the very plants that the Maya used and continue to use—maize, beans, and squash—provided additional nutrients and pest protection as compared to Old World monocropping of wheat and rice. Not only does multicropping (see Ford and Nigh 2015:126; Nigh 2008) enhance nutrients within the terrace soils, the placement of some plants such as palms would have provided food and fuel sources and at least some shaded areas (Balick and Beck 1990; Johannessen 1957). In modeling agricultural production on the terrace systems in the northern part of Caracol based on soil and topographic slope, the continued long-term productivity of these features can be clearly established; very little decline in productivity occurs even after continuous use for 100 years; only with double cropping on these features would there have been a severe decline in productivity over time (Murtha 2002).

Symbolic Egalitarianism

During the Late Classic period, the residents of Caracol collectively enjoyed substantial prosperity, as indicated by shared access to identity markers and evidence of material well-being. Residents of household plazuela units and palaces alike had access to obsidian, marine shell, polychrome pottery, and jadeite. Ritual symbolism was also shared; all households participated in the same caching practices and buried their dead within their plazuela units in eastern mortuary shrines. Nearly every domestic unit—whether small or large—contained at least one tomb (Figure 6.5), and these chambers housed one or more revered ancestors who had been interred during auspicious times (e.g., Chase and Chase 2003a, 2011). We have elsewhere

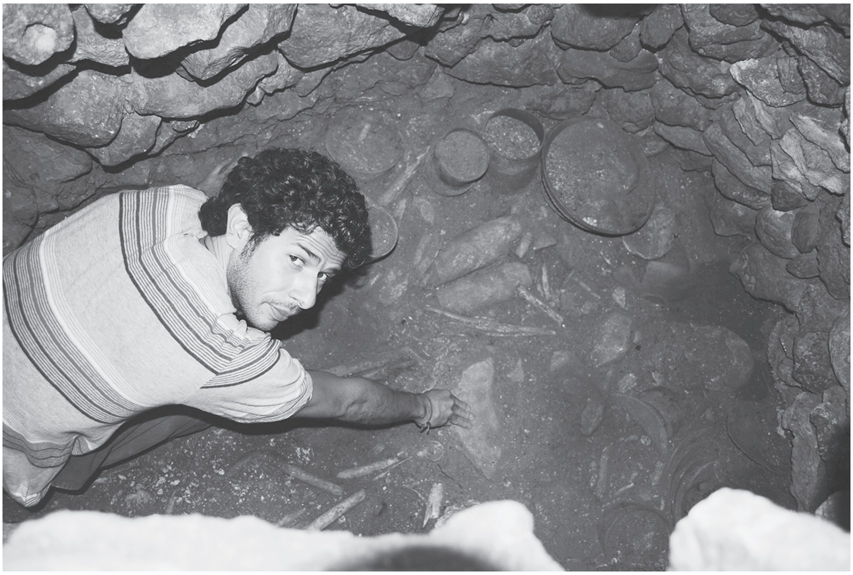

Figure 6.5. A typical residential tomb at Caracol in the process of excavation; the ceramics that are visible in the tomb partially reflect the wealth of the site's inhabitants.

defined the widespread prosperity and shared identity as symbolic egalitarianism and suggested that these phenomena resulted from a management strategy intentionally and successfully employed at Caracol following successful warfare against the Guatemalan sites of Tikal and Naranjo (Chase and Chase 2005a; A. Chase and D. Chase 2009; Chase and Chase 2006, 2017). Corresponding with this period of prosperity, shared identity, and symbolic egalitarianism was a decrease and, ultimately, a cessation in the erection of dynastic monuments, ostensibly the result of a star war waged by Naranjo at Caracol in 680 CE (see Chase and Chase 1998b:19; Chase and Chase 2000, 2003a:178). While there were real differences between the elite and other members of society, outward symbolism of these differences was minimized. Attempts to reestablish dynasty and to short-circuit symbolic egalitarianism at Caracol occurred late in the eighth century. We believe that these changes, which led to overt status differences and dichotomous distributions of goods between the palace elite and contemporary core populations (Chase and Chase 2004, 2007b), are symptomatic of the ultimate failure of the Caracol infrastructure system just before 900 CE.

Caracol, Belize: Its Position in the Late Classic Political Landscape

The sociopolitical landscape in which Caracol participated during the Late Classic period was one fraught with constant change—one where allies were fluid and polities rose and fell. When conjoined, archaeology and epigraphy provide some sense of the political complexities during the Late Classic period.

As presently construed by epigraphers (e.g., Martin and Velasquez Garcia 2016), there was a long-term competition between two primate states in the Southern Maya Lowlands: Tikal and the Snake Kingdom. The Snake Kingdom, located in the Northern Maya Lowlands, had a shifting capital that moved from Dzibanche to Calakmul in 635 CE (Helmke and Awe 2016a; Martin and Velasquez Garcia 2016). This kingdom is seen as dramatically impacting sites throughout the Maya Lowlands, including assisting or directing Caracol in its sixth-century defeat of Tikal (Martin and Grube 2008). Following these epigraphic reconstructions, the Tikal kingdom, which remained constant in its location at the Southern Maya Lowland site of Tikal, subsequently defeated the Snake Kingdom in war in 695 CE, leading to the eventual permanent downfall of this long-standing power by 751 CE. While epigraphy focuses primarily on the competing relationship between Tikal and the Snake Kingdom, archaeology makes it clear that the situation was more complex and nuanced. Regardless of who the texts might suggest as being the primary antagonists, Caracol's inhabitants prospered and the site grew following the initial sixth-century war with Tikal and the early seventh-century war with Naranjo (A. Chase and D. Chase 1989, 2001). And the site continued to thrive even following an eighth-century monument hiatus (Chase and Chase 2007b; Chase and Chase 2017:216–217). The polity was very much in the political mix and likely exploited the tortured politics between these two broader political systems.

Based on epigraphy, it appears that Caracol was an early client state of Tikal and that the ruling dynasty of the site may have been founded by a branch of the Tikal royal family. Yet Caracol independently appears to have developed a distinct and prominent political role; it has been interpreted as having provided the initial ruler for Copan, Honduras, in 436 CE (Helmke et al. 2019; Price et al. 2010). While early Caracol rulers appeared to be beholden to Tikal (Grube 1994), this changed in 562 CE when a star war resulted in Caracol's independence and the rise of the site's two most important rulers, Yajaw Te' and K'an II. Based on archaeological data, it also appears that the 562 CE star war resulted in tangible benefits for Caracol in terms of population growth and prosperity. Subsequent to this event, the dynastic ritual architecture associated with the North Acropolis at Tikal also was appropriated by "usurpers" who occasioned a "dynastic overthrow" (Haviland 1992:73–74), presumably from Caracol, based on the recorded warfare events. It is probable that Caracol's two best-known rulers were interred in the North Acropolis of Tikal (Chase and Chase 2017): Yajaw Te' was placed in Tikal Burial 195 by 598 CE and K'an II was located in Tikal Burial 23 after his death in 658 CE; these interpretations are supported by a variety of archaeological data, including stable isotope analysis, and are consistent with our epigraphic understanding of this era (A. Chase and D. Chase 2020).

While there was a relationship between Caracol and the Snake Kingdom, it appears that, given the distance and political upheavals of the time, Caracol took advantage of this relationship as a trusted ally to consolidate its hold over both Tikal and Naranjo through a 631 CE star war (Chase and Chase 1998b; Chase and Chase 2000, 2003a), leaving the Snake Kingdom to pursue other alliances like the one it had with Dos Pilas. Furthermore, Caracol Stela 3 names K'an II as the elder brother of the coeval Snake ruler and shows an ongoing relationship that minimally involved three rulers from this dynasty, suggesting that the relationship was not a simple subordinate one. Yet the archaeology also makes it evident that Caracol, under K'an II, consolidated its hold over both Naranjo and Tikal. A large number of Caracol-related stone monuments occur at Naranjo; these include at least one hieroglyphic stairway (A. Chase and D. Chase 2020; Graham 1978; Martin 2017b), a carved panel (Graham 1978), and other monument fragments from within the fill of buildings (Tokovinine 2007:17). The carved panels found at Xunantunich, Belize, also likely came from Naranjo (Chase and Chase 2017:206; Helmke and Awe 2016b), more likely deriving from a building façade than from the reconstructed hieroglyphic stairway (A. Chase and D. Chase 2020). While Simon Martin and Nikolai Grube (2008:73) believed that it originated at Caracol based on a small carved block fragment recovered in front of Structure B5 (see Grube 1994:113–114, Fig. 19.14a; identified as MF10, "a stela edge"), no hieroglyphic stairway exists at Caracol; neither carved stairway blocks nor panels (as occur at Naranjo) are known from the site. Instead, the distribution of hieroglyphic stairways (Helmke et al. 2015) and the political events of the seventh century make it more likely that the hieroglyphic stairway was part of K'an II's display of control over Naranjo at Naranjo as a result of his successful star war. The later destruction and scattering of these monuments with their textual references to K'an II resulted from the successful Naranjo star war at Caracol in CE 680—during the reign of Smoke Skull, who had been in power at Caracol for some 22 years after the death of K'an II (Chase and Chase 2017).

The number of Caracol-related monuments that occur at Naranjo support the inference that this site was made into a second capital by Caracol and used as a "stepping-stone" to control Tikal and other sites in the Petén (Chase and Chase 1998b; Chase and Chase 2003a). The additional presence of Caracol rulers in "prime real estate" burials in the North Acropolis at Tikal further indicates that Naranjo was also under the direct sway of Caracol (A. Chase and D. Chase 2020; Chase and Chase 2017:219) for a period of time. Thus, we suspect that Caracol was a very strong ally of the Snake Kingdom but that, because of distance and personal relationships, Caracol was able to remain independent, consolidating control over much of the southeast Petén. Subsequently, Caracol lost its hegemonic control over much of the territory in the southeast Petén as a result of the 680 CE star war by Naranjo against the site (A. Chase and D. Chase 1998b, 2020).

Caracol's hieroglyphic history is relatively silent during the eighth century. While the lack of historic texts for might be interpreted to suggest that Caracol retired from the sociopolitical field, its population enjoyed great prosperity through the end of the Late Classic period (A. Chase and D. Chase 2009), confirming that texts alone are unlikely to provide all the answers in the reconstruction of Maya history. Archaeology provides complementary and supplementary data that can be used (to some degree) to recontextualize the more politically charged textual data.

The Abandonment of Caracol, Belize: Considering the Role of Climate Change

The idea that the Classic period Maya came to a disastrous end as a result of severe drought has gained serious traction in popular literature (Diamond 2005) and has additionally been adopted by a number of Mayanists (see Douglas, Demarest, et al. 2016; Gunn and Adams 1981; Hoggarth, Restall, et al. 2017; Iannone 2014; Luzzadder-Beach et al. 2012). The modern-day focus and political arguments over the effects of climate change have also served to drive drought-based interpretations of the Maya collapse. But it may also be argued that much of the support for drought-based explanation is tautological.

There is a tendency for academic interpretations concerning the Maya to mirror popular events and issues (Wilk 1985). The Russian Revolution is seen as having led to interpretations of the Classic Maya collapse as being caused by a peasant revolt (Becker 1979; but see Marcus 1982). Modern earthquakes, volcanic eruptions, and hurricanes also often lead to similar causal arguments for the earlier Maya collapse. Thus, to some degree, we would see the modern political focus on climate change as driving the current drought-based explanation for the Maya collapse.

Multiple lines of evidence have been brought to bear in terms of demonstrating that droughts appeared in past Maya climate records—these avenues include the use of soil cores drilled from lakes, speleothems collected from caves, and water-level rise observations for both the sea and for cenotes (Douglas, Demarest, et al. 2016). Generally, these data have been combined to suggest that severe drought impacted the Maya world at the time of the Maya collapse. But several assumptions that are problematic underlay this conclusion. First, there is a belief that the Maya trajectory is reflective of climatic records that have been collected from both outside and within the Maya area; thus, the more general record from the Cariaco Basin is often referenced (Kennett et al. 2012; Douglas, Brenner, and Curtis 2016) and differences in topography, wind, and shadow rainfall are not fully considered, nor is the potential impact of microclimates within various regions, even when the data appear to indicate that there was variability. Many of the known lake-cores across the Maya area provide different assessments of when droughts occurred (see Wahl et al. 2013; Wahl et al. 2014), and the records from the lakes in the central Petén (Lake Petén Itzá and Lake Salpeten) show either no variability or minor variability in rainfall records in the ninth and tenth centuries (Curtis et al. 1998; see also Rosenmeier et al. 2016). Second, there is often an uncritical use of climatic records, even when it is known that the data are suspect (e.g., Douglas, Demarest, et al. 2016). For instance, the original speleothem collected for the Macal Chasm (J. Webster et al. 2007) was too near the entranceway to accurately mirror climate, and the more recently collected Yok I speleothem (Kennett et al. 2012) is not mineralogically suitable for the kind of dating and analysis that has been done on it (Lachniet 2015). Yet, because of a lack of better data, these flawed records continue to be used (e.g., Douglas, Brenner, and Curtis 2016).

While Caracol clearly would have suffered from any long-term drought, the epigraphic and archaeological data from the site indicate that there is no downfall associated with the drought cycle (Haldon et al. 2018), as suggested by Richard Gill and his colleagues (2007). The archaeological data instead suggest that the site moved to expansionistic modes at the height of each drought cycle (Iannone et al. 2014); in fact, the site was quite prosperous during the Terminal Classic period, a conclusion also derived for the outlying site of Minanha, north of Caracol (Iannone 2007). Furthermore, if the existing speleothem data (Kennett et al. 2012) are used, they show that the site was abandoned during a wet period (Lachniet [2015], however, has suggested that this speleothem is problematic). While any regionwide instability (which surely existed) would have been a problem for Caracol's sustainable adaptation and its economic interdependence on other sites, drought was likely only an ancillary cause to the overall Maya collapse (see also Douglas, Demarest, et al. 2016; Turner 2018; Turner and Sabloff 2012).

In terms of its population history, the site was maximally occupied in the waning years of the Late Classic period around 800 CE (Chase and Chase 2005b). Epigraphic data suggest the site's epicentral dynasty made a resurgence in the Terminal Classic (Chase and Chase 2007b), attempting to reinstitute a divine kingship that had been largely undone in 680 CE as a result of the Naranjo star war against Caracol (Chase and Chase 2003b). Iconographic portrayals and hieroglyphic texts from the Terminal Classic period indicate that Caracol's elite had entered into a series of alliances with nonlocal individuals (Chase and Chase 2015; Chase et al. 1991; Grube 1994). Faunal remains indicate that deer and small game were plentiful and that marine fish were being imported by the site's latest inhabitants (Teeter 2004). Artifactual items abandoned in the site's epicentral building show that long-distance trade was maintained until the end of occupation at the site. Archaeologically, there is a growth in disparities among the population in terms of access to resources. The site's elite adopted its own ceramic subcomplex and isolated itself from the general population (Chase and Chase 2004), which makes dating Terminal Classic remains problematic for the majority of the population (Chase and Chase 2008). At least five unfinished building efforts were ongoing at the time of the site's abandonment, and unburied dead on the summit of Caana and in the plaza fronting this complex appear to demonstrate that the epicentral collapse was sudden and quite final, implicitly suggesting that sociopolitical or ideological factors (that reversed previous symbolic egalitarian human development tendencies), or both, were responsible for the site's epicentral abandonment. Given the terracing within the agricultural field system, it is likely that some occupation continued in the broader Caracol metropolitan area after the epicentral collapse, but this occupation is difficult to isolate archaeologically.

Conclusion

Caracol successfully modified its physical environment and managed the Late Classic sociopolitical landscape to its own advantage. The four key components of Caracol's settlement system (plazuela groups, causeways, constructed reservoirs, agricultural terraces), combined with a human development-oriented management strategy (symbolic egalitarianism), worked together to make a sustainable adaptation to an otherwise hostile environment. The settlement system and the spatial distribution of the plazuela groups served to keep the site's inhabitants relatively healthy. Garbage and night soil were recycled into building projects and the heavily modified landscape. The multicropped terraced agricultural system fed Caracol's population. The reservoir system ensured that water was available as long as there was rainfall—and the variation in topography of the broader Caracol region meant that rainfall was likely to occur somewhere within the metropolitan area with relative frequency. The causeway system promoted effective communication and the redistribution of resources from one part of the site to another; it is not too far-fetched to suggest that, if necessary, water itself could have been transported from rivers at the edges of the metropolitan area into the site core. Symbolic egalitarianism assured that Caracol's population at large shared in material well-being and a common identity. Thus, the site's overall settlement system was configured in concert with its environment for continued sustainability.

The archaeological data indicate that Caracol had a direct sociopolitical impact on both Tikal and Naranjo in the Late Classic period, incorporating both of these Guatemalan sites into its ritual and political sphere (for almost a century in the case of Tikal and for half a century in the case of Naranjo). While stripped of its broader political and ritual impact after 680 CE, Caracol still prospered until the attempted reassertion of dynastic rule in the Terminal Classic. We believe that human fallibility was responsible for Caracol's final abandonment.

It was the human intervention of a reassertive ruling dynasty at Caracol that altered the playing field, transforming a sustainable city into a shrinking one—and, by doing this, no longer buffering society from environmental and climatic change. These data suggest, first, the value in using multiple kinds of data; second, the importance of new techniques, such as lidar, in the interpretation of the past; and, finally, the possibility that the past can provide us with powerful historic analogs to the present and future.

Acknowledgments

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