

# 11

## Urban Planning at Caracol, Belize

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*Governance, Residential Autonomy, and Heterarchical Management through Time*

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### INTRODUCTION

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Archaeological investigations at Caracol, Belize, have been carried out within this ancient Maya city for almost four decades. This research trajectory has resulted in an initial, but still incomplete, understanding of the urban administration and city planning that occurred at Caracol during its thousand-plus years of occupation (see table 11.1). Here I examine two aspects of ancient urban life at Caracol. The first focus is at the level of households that resided in groupings of mounds located around a common *plazuela* (e.g., a patio group as per Ashmore 1981:48–49). Multiple groupings of these plazuelas can be aggregated into neighborhoods (*sensu* Huston 2016; Smith 2010) consisting not only of the multiple plazuela housemound groups but also of residential reservoirs and agricultural terraces. In fact, the management of agricultural terraces, where dozens of fields drain downslope one into the other, means that neighborhood-level planning would have been required to mediate the construction of new fields with owners of existing fields. Moving upwards from the scale of the residential plazuela and associated neighborhoods, I also examine the integration

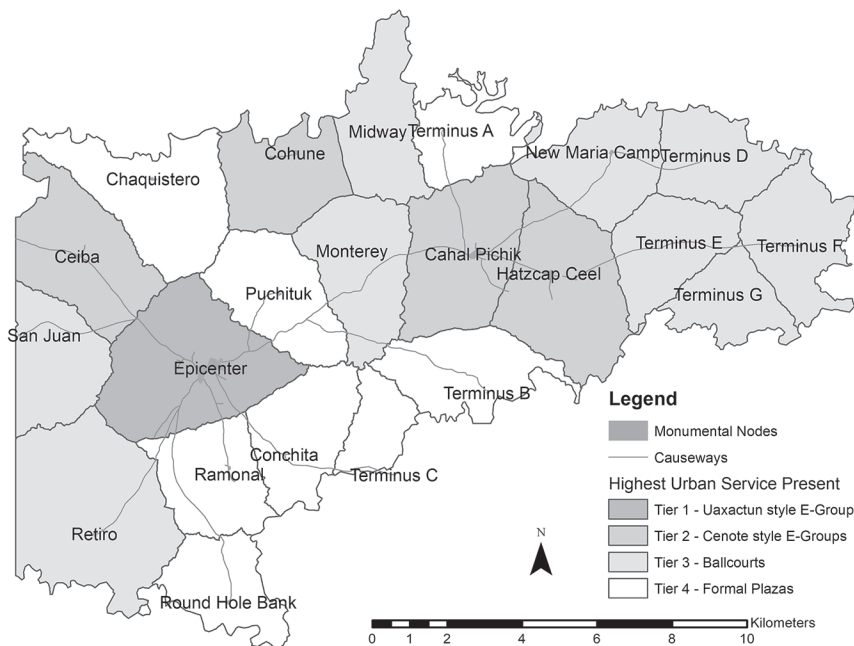
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**TABLE 11.1.** The major chronological periods and known dates for Caracol, Belize

<i>Period</i>	<i>Start</i>	<i>End</i>	<i>Feature</i>	<i>Notes</i>
Preclassic	-600	250	Monumental Reservoirs	[-300 start for epicenter, older date near Monterey, and preconurbated]
Early Classic 1	250	400	End of E Group construction	[End date could be 380 instead; date indicates appearance of cylinder tripods]
Early Classic 2	400	550	Expanding the E-W causeway system	[May potentially relate to ballcourt construction pattern]
Late Classic 1	550	680	Population boom	[End date indicates defeat of Caracol by Naranjo]
Late Classic 2	680	800	Expansion into peripheral areas (i.e., suburbs)	[Final construction of new monumental nodes]
Terminal Classic	800	900	Slow Abandonment and Emptying of the City	[End date is the end of occupation at Caracol]

of these areas into a broader spatial framework. This second focus is at the level of city administration and can be demarcated by public and integrative architecture within the city; the downtown and its outlying districts are defined by nodes of monumental architecture and plazas that provided urban services. A built road or causeway system linked these nodes to the city’s epicenter and also provided an overland route between the Macal and the Mopan Rivers. The organizational aspects of both the public architecture and the causeways can be temporally sequenced so as to understand how the city developed. Urban form shifted from multiple centers in the Late Preclassic, each individually controlling its own E Group, and constructed monumental reservoirs to an Early Classic (ca. 250 CE) of unified settlement with the construction of the primary east-west causeways that connected downtown Caracol to both Cahal Pichik and Hatzcap Ceel (figure 11.1). The causeway system and settlement expanded further in both the Early and Late Classic Periods before the start of the Terminal Classic (800 CE). However, urban planning at Caracol involved not simply bottom- up or top- down processes but also lateral and heterarchical aspects of these processes along various spatial scales over time.

Within a single metropolitan area, Caracol the city unified and occupied a large nearly 240 km<sup>2</sup> territorial extent (cf. about 200 km<sup>2</sup> in modern Belize and about 40 km<sup>2</sup> in modern Guatemala) at its height. This was accomplished by situating nodes of monumental architecture throughout the landscape, nearly all of which were connected by a dendritic causeway system to the downtown area (see figure 11.1). That Caracol functioned as a single city, and not as several, can be seen in the primacy and centrality of the epicenter, the dendritic nature of the causeway system, and the continuity and density of residential



**FIGURE 11.1.** Map of Districts at Caracol, Belize focusing on the highest order urban service present. These service tiers are cumulative (i.e., every monumental node with a ballcourt also has a formal plaza). This map also demonstrates the dendritic nature of Caracol's causeway system.

settlement and agricultural terraces (A. F. Chase and Chase 2001, 2017a). A Guttman-like scale of urban service facility features exists at monumental nodes (A. S. Z. Chase 2016b:25–26), and no boundaries exist in agricultural terracing or settlement between these monumental nodes. In addition, the hieroglyphic and archaeological records also support treating Caracol as a single city, not several (D. Z. Chase and Chase 2017c).

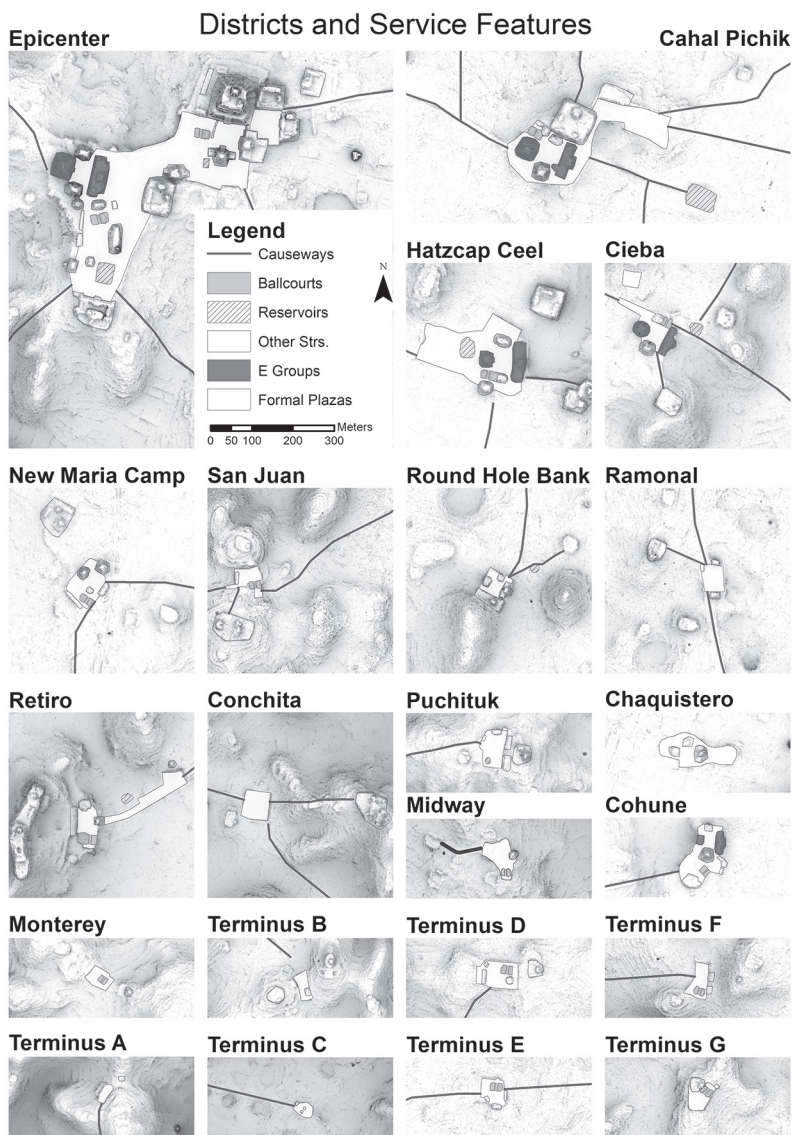
Caracol exhibits a landscape covered with residences, built reservoirs, and especially agricultural terraces, making it a true garden city. As a polity, Caracol spanned a far larger spatial extent that incorporated specific locations of interest. The historical aspects of this spatial unit (above the city level)—how the polity came to its extent, and how its area and connections varied over time—would have played a part in the planning evident in the archaeological record. These factors also likely influenced the degree to which Caracol the city exhibited a strong sense of categorical identity of group similarity (see Tilly 1978:62–69 and Nexon 2009:48 for general theory; Peeples 2018:8–9, 27–28 for archaeological operationalization) that is visible in the archaeological record of the city's living groups through: similar residential ritual practices of both caching and

burial; material accessibility beyond simple market interaction; and relative (for the time) wealth equality. These shared practices helped build intracity cohesion while creating and reinforcing the nature of the “Caracol” categorical identity (above person-to-person relational identity) across the large spatial expanse covered by this ancient city (D. Z. Chase and Chase 2004).

Archaeological research at Caracol has also documented diachronic changes in urban planning and settlement. Construction, maintenance, and modification of specific types of monumental architecture occurred over the course of the site’s existence, leading to both older and newer expressions of E Groups and monumental reservoirs within the urban matrix. The monumental nodes that are connected by causeways dendritically to downtown Caracol exhibit both diverse histories and variability in design (see figure 11.2, table 11.2). Three architectural concentrations—downtown Caracol, Hatzcap Ceel, and Cahal Pichik—were initially independent centers that conurbated into the singular city of Caracol during the transition from the Late Preclassic to the Early Classic (i.e., by 250 CE). Some earlier nodes (e.g., Chaquistero and Cohune) were never formally incorporated into the causeway network, but some preexisting centers (e.g., Ceiba, San Juan, Retiro, and New Maria Camp) were connected by causeway to downtown Caracol. Other nodes (e.g., Conchita, Ramonal, and Puchituk) were purposefully constructed in areas of higher settlement, ostensibly to provide needed services. And some other late outlying monumental nodes (e.g., Terminus A and Terminus C) appear to have been built to facilitate urban sprawl with a formal causeway connection, but little supporting proximal residential settlement and agricultural terracing. In general, the average resident of ancient Caracol could have constructed the garden city aspects of the landscape without requiring top-down coordination except at the neighborhood level, even though adjudication of some disputes may have required district level intervention (see Murtha 2009). However, the monumental construction efforts required to facilitate the distributed nature of Caracol settlement and agriculture have implications both for its urban planning and governance. Additionally, archaeologically observed changes over time highlight the relative equality of residents at the city and the loss of this equality at the end of the city’s history—just before its depopulation in the Terminal Classic (see A. F. Chase and Chase 2021).

## TOP-DOWN AND BOTTOM-UP PROCESSES

Caracol exhibits a mixture of top-down and bottom-up processes at multiple scales that include: the *plazuela* level, the neighborhood level, the district level, the citywide level, and the polity level (see A. S. Z. Chase, n.d.); and these same intraurban and political scales appear in multiple Mesoamerica and Andean cities despite differences in size and complexity (see Walden and Quequezana, n.d.; Thompson and Prufer, n.d.). Each of these scales exerted both bottom-up and

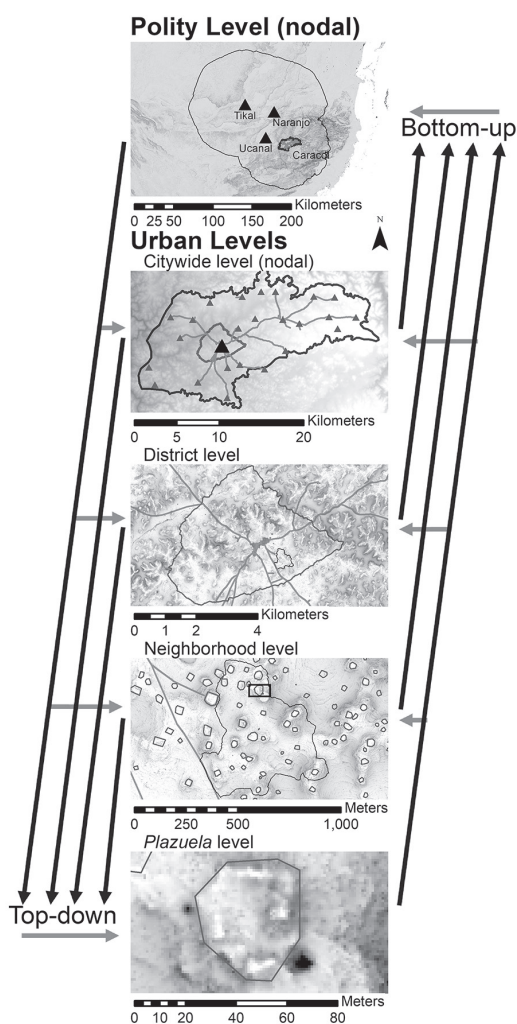


**FIGURE 11.2.** The 22 monumental nodes within modern Belize shown over a sky-view factor to highlight the urban services present at each. Three other nodes exist (for a total of 25) in modern Guatemala but not included in the lidar data (after A. S. Z. Chase 2016b:19, figure3).

**TABLE 11.2.** Presence/Absence data of urban service facility features present within monumental nodes. Less information is known about the three potential nodes in Guatemala, which are not covered by the Caracol or Western Belize lidar datasets.

<i>District Name</i>	<i>Formal Plaza</i>	<i>Ballcourt</i>	<i>Monumental Reservoir</i>	<i>Large Reservoir</i>	<i>E-Group</i>	<i>Causeway</i>
Service Feature Tier 1: Uaxactun E Group, Cenote E Group, Ballcourts, Formal Plaza						
Epicenter	Present	Present	Present	Present	Present	Present
Service Feature Tier 2: Cenote E Groups, Ballcourts, Formal Plazas						
Cahal Pichik	Present	Present	Present	–	Present	Present
Hatzcap Ceel	Present	Present	Present	–	Present	Present
Ceiba	Present	Present	–	Present	Present	Present
Cohune	Present	Present	–	–	Present	Present
Service Feature Tier 3: Ballcourts, Formal Plazas						
Retiro	Present	Present	–	Present	–	Present
Terminus D	Present	Present	–	Present	–	Present
Terminus E	Present	Present	–	–	–	Present
San Juan	Present	Present	–	–	–	Present
New Maria Camp	Present	Present	–	–	–	Present
Terminus F	Present	Present	–	–	–	Present
Midway	Present	Present	–	–	–	Present
Monterey	Present	Present	–	–	–	–
Terminus G	Present	Present	–	–	–	Present
Service Feature Tier 4: Formal Plazas						
Chaquistero	Present	–	–	–	–	Present
Conchita	Present	–	–	–	–	Present
Puchituk	Present	–	–	Present	–	Present
Ramonal	Present	–	–	–	–	Present
Round Hole Bank	Present	–	–	Present	–	Present
Terminus B	Present	–	–	–	–	Present
Terminus A	Present	–	–	–	–	Present
Terminus C	Present	–	–	–	–	Present
Potential Districts in Guatemala						
La Rejolla	Present	?	?	?	?	Present
San José	Present	?	?	?	?	Present
Las Flores	Present	?	?	?	?	?
Chiquibul						





**FIGURE 11.3.** *Urban levels framework for investigating top-down and bottom-up process.*

top-down pressure through interactions with the other scales in what may be viewed through a system of urban levels (figure 11.3). The existence of these varied levels, as a device for the interpretation of urban planning, means that the simplified conflation of bottom-up with households and of top-down with elite does not provide the most nuanced social insights for all of the mid-level interactions.

In general, discussing both top-down and bottom-up processes and using heuristic frameworks such as urban levels help Mayanists move away from the prevailing models concerning the existence of either omnipotent rulers or the independence of autonomous residents. Within the first hundred years of the Late Classic

Period (specifically between 562 and 658 CE), the city of Caracol grew to be far too large for any single individual to have micromanaged everything that occurred within its boundaries, meaning that the ancient rulers of Caracol could not have administered the city without the use of bureaucrats and other people in the middle (e.g., D. Z. Chase and Chase 2017c; Murakami 2016; M. L. Smith 2018). Although the iconographic and epigraphic records are interpreted as presenting accounts of all-powerful rulers (Martin and Grube 2000), the hieroglyphic texts and portraiture on the Maya stone monuments also show the official constraints placed on leadership positions—the rituals, performances,

and other requirements that need to be carried out in practice. Both the images and texts on Caracol's Late Classic monuments indicate that rulers carried out standardized rituals and actions, showing that there were restrictions on their autocratic power. This interpretation is in line with understandings of governance more broadly (Blanton and Fargher 2008; Feinman 2018), and it also indicates a direct limit on their ability to do only as they pleased.

Collective action theory posits situations in which autocratic rulers in multiple societies tend to seek outside revenue and use fewer internal taxes; it also shows that increasing internal taxation generally leads to increased requirements to gain the consent of the governed within ancient states (Blanton and Fargher 2008; Levi 1988). Increasing internal taxation thus creates a positive feedback loop whereby internal taxation leads to agitation for or provision of additional social services to justify the increased revenue—over time, this can then loop back on itself. Because of an ever-increasing need for revenue, governing systems tended to gravitate toward more collective societies over time (at least as outlined by Blanton and Fargher 2008). This system of collective action leads to processes that can affect urban planning in ways that are visible archaeologically, especially through the built environmental remains of any structure erected or created to provision urban services.

As a comparative aside, in the grand scheme of collective, as opposed to autocratic cities in Mesoamerica, Caracol likely existed as an intermediate point along the autocratic to collective continuum (see also Feinman and Carballo 2018). If we assume that more collective societies experience less wealth inequality (*sensu* Boix 2015:table 2.1; Carballo 2020:78), then we can use Gini indices as a quick but incomplete comparative metric (see table 11.3). However, other relationships also exist between Gini values, settlement size, and agricultural forms (see Kohler et al. 2018:figure 11.2).

Gini indices are used in the field of economics as a statistical measure of the distribution of wealth and inequality in a given society (Gini 1912), but fundamentally they represent a measure of a distribution's unevenness (Peterson and Drennan 2018:39). At first glance, this appears to be a separate issue from that of social inequality; however, inequality in society represents unequal access to and ownership of resources—whether those resources are material, social, or embodied (see both Bowles et al. 2010; Munson and Scholnick 2021). Historic and archaeological investigation of inequality and its change provide narratives that shape modern understandings of social inequality and suggest, in equal measure, overarching preferences for fairness (e.g., Jennings 2021) amid ever-present inequality, even in “egalitarian” societies (e.g., Flanagan 1989). In this case, the academic discussion of Gini data, society, and governance by archaeologists and other social scientists has direct implications about how we view inequality today.



At first glance, the Gini Index for Caracol is 0.34. It neither exhibits the relative equality of Teotihuacan at 0.12 (M. E. Smith et al. 2014:319–20) nor the extreme inequality present at Tikal at 0.62 (Kohler et al. 2017). However, these base indices are not necessarily comparable or completely accurate (see A. F. Chase 2019); I derived Caracol's index from the area contained in extended family plazuela groups. Tikal's method simply states household area without specifying the method used in the supplemental table (i.e., based on structure or plazuela; see Kohler et al. 2017). The Teotihuacan Gini uses apartment compounds evenly divided by the number of residential units within each apartment by status class, which thus artificially flattens the resulting curve with these average values (M. E. Smith et al. 2014:319–20). This means that these Gini indices are not directly comparable because the underlying data types used for analyses differ. Instead, if Teotihuacan is divided by the actual residential subunits within apartment compounds, instead of average areas, or Tikal is expanded to include similar residences of plazuela or patio groups, then these numbers may become more similar to those from Caracol. To return to urban planning, these Gini indices may have implications for interpreting government systems (Boix 2015:table 2.1; Carballo 2020:78), which in the context of an autocratic to collective continuum influence the urban planning present in a given society. Still, other factors including settlement size and agricultural system also need to be considered (Kohler et al. 2018:figure 11.2).

In terms of the practical application of collective action on the urban services available to the inhabitants of Caracol, these actions are likely mirrored in the construction and maintenance of formal plazas distributed throughout the urban area; these plazas functioned as marketplaces and loci for civic administration at monumental nodes (A. F. Chase et al. 2015; King 2015). Revenue may have been primarily collected from taxation on market transactions (see D. Z. Chase and Chase 2020d). If so, then this would partially explain (along with other social factors) the dispersed nature of Caracol's nodes of monumental architecture as practical locations to ensure market access (see figure 11.1). The creation of such market nodes near the city periphery likely encouraged future settlement (see D. Z. Chase and Chase 2014c). Assuming that taxation occurred in the markets at Caracol's dispersed nodes, the causeway linkages ensured direct connection with the city center of downtown Caracol, which meant that citywide top-down planning was possible. While we think that the dispersed monumental plazas definitely served as spaces for local administration and market transactions, these formal plazas also provided space for ceremonies and other activities that could encourage social cohesion (Inomata 2006; Tsukamoto and Inomata 2014).

In addition to these plazas, other urban service facility features identified at Caracol include ballcourts, monumental/large reservoirs, and E Groups (A. S. Z. Chase 2016b). The ballcourts at some of Caracol's outlying architectural nodes

**TABLE 11.3.** Gini inequalities for roughly contemporary Mesoamerican cities of similar population sizes along with potential governmental interpretations of those inequalities (from Boix 2015 and Carballo 2020, but see also settlement size and subsistence trends in Gini data from Kohler et al. 2018:figure 11.2). In addition, sample sizes differ widely for these data.

Site	Gini	Data Type	Boix 2015 (cited in Carballo 2020) Gov't Type	Source
Caracol	0.34	plazuela group	unknown	A. S. Z. Chase 2017, 2021
Teotihuacan	0.12	apartment compound*	Republic	Smith et al. 2014
Tikal	0.62	household area†	Monarchy	Kohler et al. 2017

\* Unexcavated apartment compounds were divided into residential units based on the existing sample of 39 residential units to generate this Gini; artificially flattens the overall inequality curve.

† Household area methodology remains undefined in both the article itself and supplemental data on the 762 households analyzed. Reanalysis of residences at Tikal may produce different results.

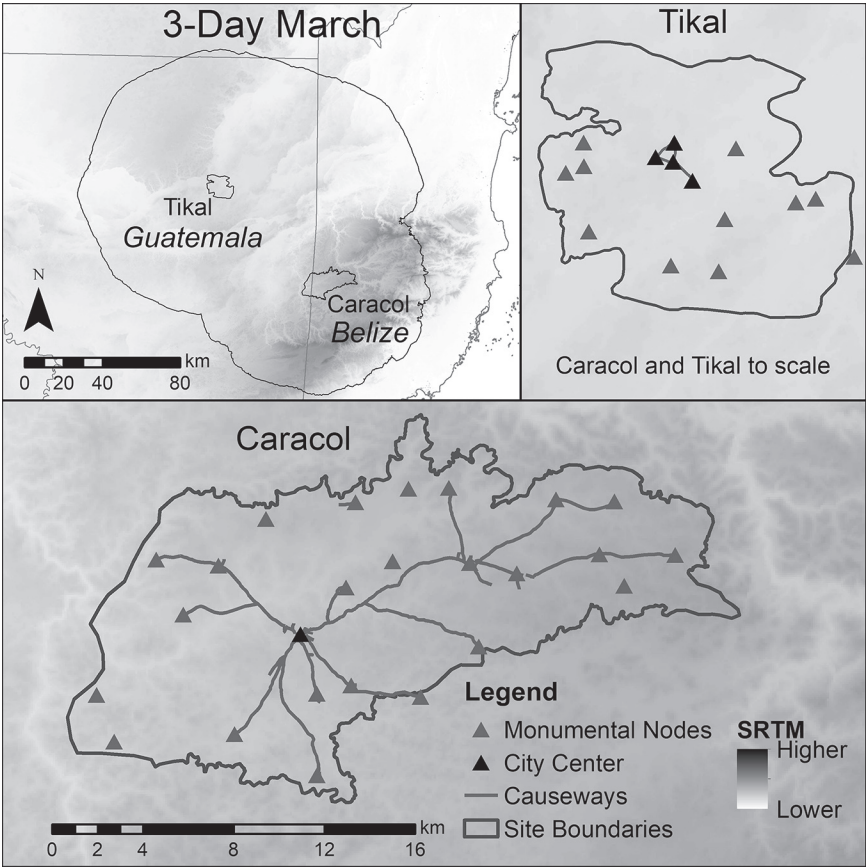
permitted individuals either to watch or to participate in the Maya ballgame (Scarborough and Wilcox 1991; Stark and Stoner 2017), again promoting positive social cohesion. E Groups also occur at many of Caracol’s monumental nodes; this architectural complex would have served to tie the local inhabitants to a deep past and also have facilitated a separate type of ritual and social cohesion through its formal structure (Freidel et al. 2017). Gallery and range structures that may be found scattered throughout the city (but usually associated with outlying formal plazas) may have served a separate purpose, similar to the meeting rooms on Caana (A. F. Chase and Chase 2017a). However, top-down processes may be seen in the ultimate focus on the downtown Caracol E Group over other E Groups after the Early Classic Period (A. F. Chase and Chase 2017b). However, we do not necessarily know the exact ways in which ancient peoples used these spaces, and the archaeological record shows that these relationships changed over time.

Both the landscape and the governance structure likely contributed to Caracol’s immense size. The landscape contained karstic hills and valleys, as well as rich soils, and the governance structure sought to integrate the overlying settlement. Caracol’s populations dispersed over this landscape and enabled a system of sustainable agriculture. The importance of widely placing the architectural nodes to facilitate their use by a dispersed population, and yet maintain central control through a causeway system, is what likely led to Caracol’s eventual size and spatial extent (see A. F. Chase and Chase 2016a). This settlement form of intensive urban agriculture, employing terraces and dendritically connected monumental nodes, ensured that Caracol the city was and still is an anomaly among many urban systems (see Barthel and Isendahl 2013; A. F. Chase and Chase 1998b; Fletcher 2009; Graham 1999).

Caracol also existed as a polity beyond the scale of a single city. Based on marching distance and warfare theory (A. F. Chase and Chase 1998a; Hassig 1991) and least cost-area allocation (see method in A. S. Z. Chase 2016b:24), at its maximal extent, Caracol the polity would have been able to control points of interest militarily within a broad area (figure 11.4) previously estimated at encompassing between 7,000–12,000 km<sup>2</sup> at CE 650 (A. F. Chase and Chase 1996:808). No evidence exists to treat this as a firm territorial boundary (e.g., A. F. Chase et al. 2009:181), and the actual nodes of control (e.g., M. L. Smith 2005) could differ from those of a three-day march—especially if researchers consider riverine canoe travel. Significantly, Caracol the polity influenced the urban planning at multiple cities, including both Naranjo and Tikal in Guatemala. At Tikal, Caracol buried two of its Late Classic rulers in pyramids on the north side of Tikal’s main plaza, appropriating that sacred space as a result of successful warfare in the early part of the Late Classic Period (A. F. Chase and Chase 2020a, 2020c, 2021). But Caracol did not modify the nature of Tikal’s settlement; instead, it likely used Tikal for extractive tribute (A. F. Chase et al. 2022). Tikal, in fact, exhibits a separate concentrated urban form that is unique and distinctive from that seen at Caracol (A. S. Z. Chase and Cesaretti 2019; A. F. Chase et al. 2020a; Murtha 2015). Together, this seems to indicate that urban planning over time occurred at the citywide scale within Maya societies, while at the polity level governing elites focused specifically on erecting monuments and monumental architecture in specific nodes (see also Liendo and Campiani, chap. 12), thus having less of an impact on overall city plans. These inferences also suggest that the degree or form of internal revenue collected at various cities could differ within a single polity.

## RESIDENTIAL AUTONOMY

Three specific archaeological features exist at this garden-city scale, and each would have required distinct levels of planning to construct and maintain: extended family plazuela groups (A. F. Chase and Chase 2014a; D. Z. Chase et al. 2020b:116–18), built residential reservoirs (A. S. Z. Chase 2016a), and constructed agricultural terraces (A. F. Chase and Chase 1998b). Although monumental construction efforts appear to facilitate a higher degree of top-down urban planning, the basic fabric of the garden city of Caracol, which consisted of extended family plazuela groups and neighborhoods, would not have required top-down planning to manage. In truth, many combinations of processes could operate at multiple scales and exhibit equifinality in their formation; however, it is likely that this more basic residential scale utilized bottom-up processes by residents within neighborhoods or adjacent plazuela groups to engage in collective action—but only as necessary. This inference supports ideas about the relative independence of ancient Maya residents within their respective cities (Murtha 2009, 2015).



**FIGURE 11.4.** Warfare theory based three-day marching distance of direct control potential for extent of known Caracol territorial control after its conquests (see A. F. Chase and Chase 1998a, 2020c, 2021). This is not a direct territorial boundary but the effective zone where military force could easily have been employed and active administrative control would have focused on important resource nodes within this region.

Plazuela groups existed as extended family units with a central plaza often surrounded by three or more cardinaly located structures; even though as many as a dozen structures can crowd the edges of a single residential plaza, in general, the majority of Caracol’s plazuela groups averaged four structures (A. F. Chase et al. 2023, forthcoming). Of equal importance to this discussion is the fact that the overall household plan centered on the plazuela existed along the entire spectrum of residences from the ruler’s residence atop Caana down to the smallest plazuela group at Caracol. However, the number and types of these structures could vary widely, as could the kinds of buildings incorporated within

a given residential group; outbuildings included sweat baths, storage areas, shrines, and kitchens (A. F. Chase and Chase 2014a). In addition, these residences grew through accretion and expansion across generations. Archaeological excavations in Caracol's residential groups exhibit intricate stratigraphic sequences that suggest these structures and plazas underwent complex accretional growth and urban renewal over time. Outside help in their construction would not have been required, but it would have expedited the process at each step.

The city of Caracol exhibits three types of built reservoirs (by size): residential, large, and monumental (A. S. Z. Chase 2016b:table 2), and the focus on constructing each type shifts over time (A. S. Z. Chase 2019). Residential reservoirs were sometimes built into residential plazuelas themselves, but were more often built into the landscape near residential groups. They were usually formally constructed and stone-lined, often rectilinear in shape and sealed with clay or limestone to store rainfall runoff for use during the dry season. I distinguish "reservoirs" from *aguadas*, which form natural concavities for the storage of rainwater on the landscape. While *aguadas* are not common at Caracol, some reservoirs appear to be modified *aguadas* (e.g., Crandall 2009), making this distinction tenuous. The location of Caracol on a karstic plateau away from standing bodies of potable water (e.g., rivers and lakes) highlights the use of all reservoirs for their potential to store water during the dry season. At the same time, as standing bodies of water, reservoirs could have had diverse uses that possibly included aquaculture. Excavated deposits at Caracol contain the remains of whole and partial saltwater fish, which would have required substantial effort to bring from the coast (Cunningham-Smith et al. 2014). While specific cultural practices and the use of water lilies and fish would have been required to mitigate mosquito populations, parasites, and disease (Lucero et al. 2011:483–84), freshwater fish would also provide an additional protein source (as they did at other Maya sites; see Coyston 2002; Powis et al. 1999; Scherer et al. 2007). In addition, since watery imagery has long been associated with the underworld and ritual power by the ancient Maya (Lucero and Fash 2006; Stross 1994), it suggests that local aquaculture practices would have deeper meanings than simple food provisioning for a plazuela's residents. Either way, no clear evidence currently exists to support this type of aquaculture at Caracol—especially given the poor preservation of materials within the reservoirs themselves—but the data do not preclude the possibility either.

Within the city of Caracol, the ratio of residential reservoirs to plazuelas could be as low as 1:1, with no plazuela more than 120 feet from a reservoir (A. S. Z. Chase 2016a:892). This value varies over the city as a whole, and the current lidar data provide an overall ratio of about 1:3.5 within the city of Caracol; future resampling would likely lower this ratio. From a planning perspective, these smaller built reservoirs remained instrumental as a provisioning source of

water during the dry season. Large reservoirs exist as a size class between smaller residential and larger monumental reservoirs, possessing a surface area of over 120 m<sup>2</sup> but well under the 1000 m<sup>2</sup> at monumental nodes. Their construction does appear to have occurred in the Late Classic 2 monumental nodes or in the three Preclassic nodes (aside from the B Group reservoir in the epicenter). Their construction likely fades in conjunction with the proliferation of residential reservoirs. Monumental reservoirs only occur at the three Late Preclassic monumental nodes that conurbated into the metropolitan framework of Caracol by 250 CE. By the start of the Late Classic Period, planning for monumental nodes distributed within the urban matrix no longer required the construction of even large reservoirs; they are not in evidence at either the Conchita or Pajaro-Ramonal Termini. This indicates not only a system of formal planning based on the temporal pattern of reservoirs but also diachronic change in the use of these features. In addition, labor would have been required to maintain and remodel reservoirs in the interstitial time between the dry and wet seasons, concentrating labor requirements into a smaller window of time. But even as residential reservoirs do not appear to exhibit top-down planning, those associated with monumental architecture would likely have had top-down purposes.

In contrast to plazuela groups and reservoirs, constructed agricultural terraces would have utilized planning at least at the neighborhood level due to the large labor investment in construction, the physical extant of some of these terraces, and the flow of water from one field into another (see also discussion on agricultural terraces by Nondédéo et al., chap. 13; and Walker, chap. 14). Terrace soil was manipulated down to bedrock within ancient Caracol due both to the lack of small stones and a missing soil horizon (Healy et al. 1983:406). This matches other examples of the ancient Maya spending large amounts of effort on soil management (Turner 1978:170). On top of the physical labor required for terraces, their construction was also undertaken to encourage the flow of water across fields instead of directly downslope (A. S. Z. Chase and Weishampel 2016). The requirement for neighborhood-level planning is primarily due to the need for some kind of management of these systems of terraces, especially as dozens of these fields drain into each other downslope, meaning that any construction of a new field had to be mediated with the owner of any existing fields. While the issue of ancient land tenure remains difficult to ascertain through archaeology alone, some researchers have attempted to determine parameters for land ownership in the Belize Valley (LeCount et al. 2019) and Southern Belize (Thompson and Prufer 2021). The long timespan of Caracol's field system and the lack of evidence for system subdivision indicates that some form of land tenure existed but does not explicitly argue for any particular system.

For Caracol, communication and interaction through the planning and construction process would have been required for these features, even if they were



managed by individual households or held as community land. While prior arguments have been made for some top-down management of agricultural terraces (A. F. Chase and Chase 1998b:72–73), it seems more reasonable to advocate for a lower-level system of organization at the plazuela or neighborhood levels and to acknowledge that the system of land tenure present could adjust the level of administration required (see also Netting 1993).

For all three of the above feature classes listed, planning would also have been required at some level of community interaction. Individual plazuelas or residential reservoirs may not have required any support from additional households; however, given the density of the terracing on the landscape by the Late Classic Period, if not earlier, the agricultural terraces would have likely required neighborhood or community-level organization. In addition, the interconnected nature of terraced fields could have created a potential for disputes over agriculture or land tenure within Caracol that required an outside force to help adjudicate. While the actual construction of these features would not have required labor from beyond that community and, while it is likely that the neighborhood could have handled internal disputes, it is possible that the range or gallery structure meeting rooms (see example on Caana in A. F. Chase and Chase 2017a:18–19, figure 2) found in the monumental nodes at the level of districts could have hosted administrators who facilitated the adjudication of arguments that could not be resolved at the local level—with one caveat. The argument for semi-autonomous residential groups managing most of their daily life, local construction, and planning seems likely—but these groups were still interconnected to a larger economic system through the market plazas for many of their needed goods (e.g., A. F. Chase and Chase 2015; D. Z. Chase and Chase 2020d).

## MONUMENTAL ARCHITECTURE AND COHESION

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In contrast to the plazuelas, reservoirs, and terracing, the organization of the more monumental architecture at Caracol leaves little room for formal community management below the district level. Causeways facilitated formal movement and connectivity among monumental nodes, and all transit and transport within the city was done on foot. These causeways existed at the citywide scale and connected public architecture back to the primary node of downtown Caracol (figure 11.1). This dendritic system enhanced movement from, to, and through the downtown instead of between other monumental nodes (A. F. Chase and Chase 2001). This indicates formal top-down, city-scale planning of road construction and intentional avoidance of most district-to-district connections, but there are occasional neighborhoods, plazuelas, or acropoleis that are directly connected to these linear roads by means of a formally constructed causeway spur. These connections appear only infrequently, seemingly more

often near older monumental nodes, and may reflect the vagaries of time in terms of wealth, community needs, and political connections. What is important is that the longer causeways facilitated movement to the monumental buildings and plazas found throughout Caracol amid the garden cityscape. Both the administrative and the garden aspects of Caracol the city required the other to function, but their management allowed plenty of room for heterarchical governance in the planning for and administration of specific features, including: E Groups, monumental or large reservoirs, and formal monumental plazas.

E Groups provided for community-oriented spaces with cosmological and astronomical purposes that would have required formal planning to construct (Freidel et al. 2017). Although the exact nature of their use(s) can be debated, these features appear to have a limited distribution in the Maya region and a clear temporal origin in the Middle to Late Preclassic Period (BCE 900—CE 250) in the southern lowlands (A. F. Chase et al. 2017:figure 1.4) with broader ties to deeper Mesoamerican traditions (Inomata et al. 2021). Caracol contains multiple E Groups, but only downtown Caracol sees a “modernization” to a Uaxactun-style E Group from a Cenote-style E Group (A. F. Chase and Chase 1995, 2017b). In addition, evidence points to the use of E Groups until the end of occupation at Caracol (A. F. Chase and Chase 2020b), probably as part of top-down processes of community integration.

Monumental and large reservoirs provided for bulk rainwater storage; however, the question of use between an autocratic (Lucero 2006a, 2006b) and a more collective (A. S. Z. Chase 2016a; Johnston 2004) water management system remains open to debate (see also Murtha, chap. 10; Liendo and Campiani, chap. 12). It is likely that this debate has temporal aspects that can be difficult to disentangle from the final urban form present on the landscape, especially as these systems of water management remain on the landscape leading to path dependence even if the system of management appears to change over time. For example, there is a focus on monumental reservoirs early in Caracol’s Preclassic history that shifts by the Late Classic toward smaller reservoirs attached to residential compounds. The function of monumental reservoirs may have also changed over time from part of a water management system necessary to provision water to a less necessary and more ornamental feature over time (see A. S. Z. Chase 2019; Klassen and Evans 2020). Regardless of how the Maya used these rainwater storage features, a clear aspect of time superintends their construction. And once built, they remained embedded within the urban framework. Monumental reservoirs occur only at the three formerly independent centers that conurbated to form Caracol’s urban core of the largest monumental nodes—downtown Caracol, Hatzcap Ceel, and Cahal Pichik—all connected by the first causeways built by the end of the Preclassic Period (e.g., D. Z. Chase and Chase 2017c:figure 6). Large reservoirs occur at a smaller subset of monumental nodes, and the latest nodes contained

no associated reservoirs (A. S. Z. Chase 2016b:table 2; 2019).

Large monumental plazas provided formalized space for rituals, political events, administration, market exchange, or anything else that needed a formal plaza floor to host. Evidence points to exchange and market use within these spaces of quotidian, ritual, and prestige items, as well as intrasite trade in materials that derived from household production (A. F. Chase et al. 2015; D. Z. Chase and Chase 2014b; Johnson 2016). The distribution of these monumental nodes across the landscape seems to be linked to a desire for the nearly equidistant spacing of these features amid Caracol's settlement. In addition, materials such as obsidian, polychrome ceramics, jadeite, marine shell, and other exotic goods appear not only to have been exchanged at these markets but also to have been kept at costs low enough to allow nonelite residents to acquire them (D. Z. Chase and Chase 2017c:188–89, 213–16; see also Masson and Freidel 2012). This pattern fits into the market-exchange model in terms of the distribution of goods (Hirth 1998). However, the distribution of goods may also indicate that some level of price control and market management was in place to facilitate a more equitable distribution of goods (A. F. Chase and Chase 2009). In addition, these spaces likely served as centers for other activities (Inomata 2006; Tsukamoto and Inomata 2014). Still, expanding these locales to accommodate future growth and more people would have proved challenging given the spatial constraints that obtained in ancient urban planning (see Ossa et al. 2017). At Caracol, the monumental plazas expanded laterally beyond the basic plaza and four structure unit of urban planning, leading to some monumental nodes having large associated plazas or multiple sets of plazas linked together, as in downtown Caracol. This provides some evidence that the initial plaza planners had not expected such significant growth and could only carry out limited remodeling because of the initial positioning of the monumental architecture within these plazas.

The formal plazas, E Groups, and causeways served as integrative features tying the city together both physically and socially. In addition, the basic unit-plan of four structures around a plaza seen at the residential level in plazuela architecture reflects monumental forms around large plazas and even the arrangement on the top of Caana. Ritual activity related to caching and burial maintained a high degree of similarity across social scales. Roughly 70 percent of residences utilized the eastern structure as a ritual building and placed caches and burials within these structures (A. F. Chase et al. 2020a:355). Lower-status residences frequently had tombs and burials that have yielded face caches, jadeite, polychrome ceramics, and marine shell. Elite burials at Caracol are not as elaborate as those in some other Maya cities—in fact, they appear “poorer” than their counterparts. The two burials at Tikal that can be identified as Caracol rulers were in fact cited repeatedly by the Tikal researchers for the relative paucity of grave goods in the chambers (A. F. Chase and Chase 2020c:39; Coggins 1975:372–80; Coe

1990:539–40). This suppression of elite wealth, combined with a relatively strong signs of wealth among the rest of society, which included dental modifications involving jadeite and hematite inlays, would have helped to build a cohesive and strong categorical identity of shared features among residents of Caracol (A. F. Chase and Chase 2009:figure 2; D. Z. Chase and Chase 2004:figure 1). This categorical identity and focus on more wealth-sharing encouraged a form of collective action that likely led to the dispersed nature of the urban planning that is present on the Caracol landscape.

## TIME AND URBAN PLANNING

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From these different scalar data above, it becomes evident that diachronic change in planning principles repeatedly emerged. Some monumental features such as E Groups and monumental reservoirs occur only at the earliest (i.e., Preclassic and Early Classic 1) monumental nodes, while the latest (i.e., Late Classic 2) nodes tend to have neither large nor monumental reservoirs present in association with their formal plazas. These formal plazas themselves exhibit the constraints of population growth. That much is clear, for instance, when the expansion of plaza space kept earlier monumental structures in place and simply extended beyond the basic plaza unit of four structures around a central plaza. In addition, this fundamental plaza unit occurs at multiple spatial scales—from the residential to the monumental—and occasionally exhibits a nested scale (i.e., B Group plaza and the summit of Caana).

Other evidence points to indications of potentially purposeful design that facilitated urban sprawl (see also D. Z. Chase and Chase 2014c). Three of the latest (Late Classic 2) monumental nodes constructed (Terminus A, Terminus B, and Terminus C) all exist toward the urban periphery (see figure 11.1). The causeway system ties them into the formal structure of Caracol, but the lack of population and their smaller sizes indicates something odd about these nodes (see figure 11.2). They appear to be constructed tactically in order to place a formal plaza and associated structures—and the connecting road—near peripheral areas in a way that would have encouraged population to follow a well-used strategy in many urban landscapes (A. F. Chase and Chase 2016b:364). These three termini potentially show urban planning with an eye toward population growth and the management of urban sprawl at Caracol. The administrative structures had been built in Late Classic 2 to encourage settlement that would never peak due to the eventual depopulation of the entire city during the Terminal Classic.

Excavations at Caracol have also yielded information about extensive urban renewal in some residential groups of various sizes throughout the Caracol metropolitan area. In the area of public architecture known as “Monterey,” indications are that ancient Maya removed earlier architectural layers from several groups and rebuilt new structures in the Late Classic period (see also Eppich,

Menéndez, and Marken, this volume). In a residential group east of the Machete Terminus, evidence exists for the complete removal of earlier remains to bedrock and then the construction of elaborate residential architecture during the Late Classic Period. Another residential group to the south of Machete appears to have had its structures demolished to expand the plaza. In yet another residential group, the remains of at least eight individuals, forty ceramic vessels (dating from 480 through 850 CE), and smaller artifacts had been jumbled together in a small tomb in an eastern building, which bears all the hallmarks of a Terminal Classic ritual deposit that likely resulted from the intentional redeposition of burials disturbed during the urban renewal process (A. F. Chase and Chase 2014a:8; A. F. Chase et al. n.d.). Most excavations at Caracol show evidence for building atop prior structures leading to a slow accretion of architectural volume and structure-size over time; however, as seen from the above examples, the potential for completely removing existing structures also existed (see part II, this volume). In this context, the importance of excavation to test the surface-level palimpsest visible in survey becomes even more important to investigations of settlement dynamics. This also means that at times and for places within this city, we cannot always know what urban form was previously present because it has been stripped away.

## CONCLUSION

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Both extensive survey and excavated archaeological data are necessary to be able to discuss the various aspects of urban planning of Maya cities. At Caracol, planning exists in the urban palimpsest; the intermixing of processes at multiple levels affected both the built environment and the resulting urban form in multiple ways that we are only now beginning to sort through. The framework developed here showcases an overlapping heterarchical system of urban planning that is influenced by the feature in question, the time period of construction and use, and the urban scale considered. Based on current information, residential plazuelas, it appears, managed to maintain a great deal of autonomy at a local level. In addition, urban planners seem to have both constructed and spatially placed specific features within the city of Caracol so as to provide services to residents. The interpretation for such construction practices derives from collective action theory and indicates sufficient internal taxation to warrant service provisioning. The archaeology of Caracol also exhibits built remains, artifactual distributions, and ritual practices that helped to facilitate the adoption of a categorical identity by the city's residents; this adoption can be seen in the presence of eastern household shrines, caching and burial practices, accessibility of otherwise prestige goods such as jadeite and polychrome ceramics, and widespread dental modification patterns. Together, these features and practices would have acted to reduce the

barrier to collective action and increased social cohesion (see also Baldassarri 2011; Bethany and LeCount 2017; A. F. Chase and Chase 2009; Normark 2004; Peeples 2017; Tilly 1978).

The large spatial scale of Caracol the city—with its multiple administrative nodes built around formal plazas and its causeways dendritically connected to the downtown/city center—meant that the integration of the garden cityscape aspects of plazuelas, residential reservoirs, and agricultural terraces required civic administration and an active means of increasing social cohesion. Based on collective action theory (combining the distinct uses in Peeples 2017 and Blanton and Farger 2008), the city would have provided urban services—seen in its formal plazas, monumental reservoirs, ballcourts, and E Groups—as well as arbitration in exchange for taxation. The last of these was likely carried out within the monumental nodes that hosted those services and likely managed by bureaucrats and other people in the middle (e.g., Murakami 2016; M. L. Smith 2018). In the case of formal plazas and planning, evidence points toward their potential use to facilitate urban sprawl, which encouraged both population growth and agricultural terrace construction. While the focus on specific features may have changed through time—as for E Groups and monumental reservoirs—the importance of these features to the overall urban structure is attested to by the fact that they were still maintained through several hundred years of occupation and urban renewal projects, despite the fact that their original purposes had faded. Finally, urban residents could have constructed their daily landscape of plazuelas, residential reservoirs, and agricultural terraces without citywide top-down administration, but neighborhood or district level administration was required for their agricultural terraces and produced their garden cityscape. The urban form of the ancient city of Caracol resulted from a variety of heterarchical and hierarchical processes at multiple social levels that, when taken together, reveal a long-term, complex pattern of urban planning.

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