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Ancient Maya economics: models, markets, and trade routes

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Research in the Maya area has now generated sufficient archeological data to better define past economic systems. Our traditional understanding of the ancient Maya was largely driven by archeological finds related to the elite stratum of society and by general anthropological theory that was not focused on complex societies. These past theoretical lenses have led to misconceptions about not only ancient Maya social complexity, but also economic and trade systems that can now be better interpreted and summarized over time through a combination of archeological data, epigraphic texts, and social science theory. These data show that the ancient Maya used market systems that moved goods throughout regional landscapes for consumption by elite and non-elite individuals and also incorporated extensive water-borne trade throughout their history.

KEYWORDS

Maya, archeology, economics, markets, trade, canoe, river

Introduction

Our understanding of ancient Maya economic systems has undergone vast changes in the last half century. We now recognize that the ancient Maya had markets and that both quotidian and prestige goods were distributed among the broader Maya populations through these markets (King, 2015; Masson et al., 2020). This is a far cry from earlier views of each family residential group as largely self-sustaining with little specialization or exchange taking place and in which many occurrences of elaborately painted ceramics were viewed as resulting predominantly from elite gifting. Rather than presenting a social dichotomy of elites and commoners or priests and peasants (e.g., Willey, 1956), to a large degree following models of class-based usage found in British and European societies (Bridbury, 1986), the existence of multiple social levels are now widely recognized as having existed in ancient Maya society (e.g., Chase and Chase, 1992a, 2017; Hutson, 2016; Sharer and Traxler, 2006). Yet, we are still working to reconstruct all the processes related to the physical distribution of goods throughout the Maya area and, more fundamentally, the locations of primary trade routes and how those routes shifted over time.

Maya economic models

Our understanding of the ancient Maya economy has been iterative and strongly influenced by archeological research designs, epigraphic interpretation, and changing technologies. Mid-20th century writings (e.g., Meggers, 1954; Sanders, 1963; Sanders and Price, 1968) speculated that civilization did not—and could not—develop internally within the subtropical Maya lowlands. The resources available in the environment were seen as redundant across the lowlands and thus could not support either the need for trade or the economic base for advanced settlement; agriculture was projected to be little different than historic and contemporary extensive slash-and-burn; and, populations were seen as relatively

low, reflecting modern settlement of the region. Through a focus on settlement investigation that included whole sites and not just site centers (starting with Willey et al., 1965), use of new technologies like lidar for broad spatial information (see overview in Chase et al., 2016 and review in McCoy, 2021), and the incorporation of other analyses and techniques (e.g., geochemical analyses to identify sourcing, stable isotope work to identify diet and population movements; see also Chase and Lobo, 2024), we now know that each of these assumptions was incorrect.

Initial research on the ancient Maya focused on elite centers with monumental architecture that were more easily identified in the heavily forested environment, and where there were also hieroglyphic texts on carved monuments to help guide interpretation. The data at hand suggested that centers were relatively small. Focusing only on hieroglyphic texts, monumental architecture, and elaborate tombs, pointed toward an elite-centric society. Because researchers were not clear as to how complex ancient Maya political societies were (Fox et al., 1996), a multitude of anthropological models were applied to the archaeological Maya. Most focused on the elite that were evident in the iconography on carved stone monuments and employed reciprocity or redistributive models for the economies. Some archaeologists speculated that markets could have existed (e.g., Ruppert, 1952 for Chichen Itza, Mexico; Ruppert and Dennison, 1943 for Calakmul, Mexico; Coe, 1967 for Tikal, Guatemala; see Dahlin et al., 2007), but without supporting evidence from excavations. Long-distance trade was seen as providing prestige goods to the Maya elite (Tourtellot and Sabloff, 1972). General reasoning dictated that larger monumental centers were in control of trade and that, therefore, these locations funneled trade routes through themselves. For example, the well-known site of Tikal in the Guatemalan Peten was believed to have been located where it was to control land-based trade (Jones, 1999), but we did not yet have detailed knowledge about ancient Maya economies. Trade routes were assumed to exist based upon the presence of non-local goods (see Lee and Navarette, 1978), but the mechanisms for production, transport, and exchange were not yet known.

From the inception of Maya archeology, artifactual distributions made clear that items were being moved across Mesoamerica. Jadeite, spondylus, and obsidian do not appear naturally in the Southern Lowlands, yet these goods are relatively common at most excavated Maya sites. Source areas for these items can be determined, but not always with great accuracy. The recognized jadeite source in the Guatemalan highlands, producing what is called “Motagua” jadeite (Bishop and Lange, 1993; Walters, 1982), for example, does not coincide with the apple green jade that is common in elite Maya tombs (e.g., Moholy-Nagy, 1983). Obsidian can be sourced for origin, but the mechanisms for its distribution largely remain conjecture. Similarly, spondylus shell is known from both the Pacific and the Atlantic coasts and is widely distributed, but the routes and mechanisms remain uncertain.

Sources and their use also changed over time. Obsidian is perhaps the best studied trade commodity. The three primary sources of Maya obsidian are San Martin Jilotepeque, El Chayal, and Ixtepeque, all located in the Guatemala Highlands. The relative frequency of each kind of obsidian changes over time in lowland Maya sites with San Martin Jilotepeque playing a larger role in the Preclassic era, El Chayal being dominant during the Classic, and with Ixtepeque appearing prominently at some sites in the Terminal Classic and Postclassic

Periods. Green Pachuca obsidian from Hildago, approximately 100 km northeast of Mexico City, is also relatively common in the Maya area in the Early Classic Period at sites that had strong ties with Teotihuacan (Moholy-Nagy, 1999). In the Terminal Classic era, multiple sources of Mexican gray obsidian occur at sites in the Maya lowlands (Braswell et al., 2004). Variations in relative percentages of these sources are believed to reflect changing political conditions and trading relationships throughout Mesoamerica (Gotliko and Feinman, 2015; Feinman et al., 2022b). Archeological data from both Ojo de Agua, Mexico, and Cancun, Guatemala, however, indicate that what often was traded were obsidian cores prepared for striking off blades rather than raw nodules (Clark and Bryan, 1997; Demarest et al., 2014). Other items, such as salt, were also moved across the Maya lowlands. Salt working areas have been well established on the coasts of Belize (McKillop, 2002, 2019) and the Northern lowlands (Andrews, 1980), likely tying both regions to the trade of salt cakes and salted fish inland (see McKillop and Sills, 2022). A major inland source of salt was also located at Salinas de los Nueve Cerros in Guatemala and was likely distributed by means of river transport (Woodfill et al., 2015).

Interpreting Maya economics

While researchers long knew about non-local items found in the Maya lowlands, a key question was what the Maya in the central lowlands themselves had to trade in return. Initially, the Maya landscape and environment was perceived as being redundant with little to offer in terms of trade (Sanders, 1963), which also meant that the Maya did not initially fit Service's (1962, 1975) model for the development of civilization. In attempts to overcome these issues, two economic foci came to the forefront—one centered on elite prestige goods and the other on the domestic economy (Chase and Chase, 2015). In an exceedingly impactful article, Rathje (1971) argued that the Maya elite were using their ideological and ritual complexes—and jungle-based items like bird feathers and jaguar pelts—as capital for obtaining salt, obsidian, and hard stone—all items necessary for their domestic economies. Because of a commitment to cultural ecology—and a mistaken belief that the Maya lowlands were lacking in most resources (Sanders, 1963)—trade in these three items was seen as being paramount in permitting lowland Maya societies to function. We now realize more than these three items were traded and that the domestic economies relied on other commerce.

One of the default assumptions held by many researchers was that Maya households were essentially self-sufficient, being able to grow their own food and make whatever items they needed (see Ardren, 2023; Willey, 1956). If households were self-sufficient, markets were not necessary for distribution in the domestic economy. However, we now know that household specialization and production took place in many ancient Maya residential groups (Chase and Chase, 2015; Masson et al., 2016). Elite items like spondylus and jadeite were viewed as being obtained outside of traditional trade networks, eventually leading to postulations about a Maya ritual economy (e.g., McNany, 2008, 2010; McNany and Wells, 2008) and Maya dual economies (e.g., Scarborough et al., 2003) where the hinterlands were not integrated with the trade networks, and in which transactions could take place outside of market contexts. The trading networks that led to a ritual economy were based on prestige items – like polychrome vessels with hieroglyphic texts and elaborate jadeite jewelry—with

their distributions mirroring political connections. These goods were seen as being controlled and gifted by the elite. They were believed to have been manufactured into elite craft items by what were termed “attached specialists” located adjacent to elite households (e.g., Demarest, 2013; Foias, 2013). Again, these models have shifted significantly as more archeological work has demonstrated the widespread nature of what are perceived as high-status goods.

In the traditional model, different Maya dynastic lines vied for power at the largest centers (e.g., Marcus, 1976; Martin and Grube, 2008; Schele and Freidel, 1989) and glorified themselves with portraits and texts on carved stone monuments that positioned them in terms of the larger cosmos. Life was centered largely around a royal court that supported the dynasty and ruled the outlying population (e.g., Inomata and Houston, 2001); elites interacted with other elites through feasting and gifting, which was viewed as driving the socio-political system (Reents-Budet et al., 2011, p. 834). The courtly elite lived completely separate lives from the farmers. Long-distance trade was an elite prerogative (Blanton, 2013). The outlying population was self-sustaining, both growing their own food and producing the items that their households required—with the exception of hard stone (igneous or metamorphic) metates to process corn, sharp obsidian for daily tasks, and salt for flavoring food. These three items were supplied by the elite and formed part of their power base (Rathje, 1971). As noted above, it was also thought that the elite maintained attached specialists to produce prestige items for their exclusive use (e.g., Costin, 2005). Thus, markets did not serve as key components of the economy.

The belief that markets did not exist in past pre-industrial societies became fairly ingrained in anthropological thinking at large. Polanyi (1947, 1957) argued that markets only came into existence with capitalism, which he tied to the onset of the industrial revolution (building on Marx, 1906). Anthropological scholars like Sahlins (1972) and Dalton (1961) adopted his views and also his mechanisms for alternative economic systems like ports-of-trade, barter, and gifting (see Chapman, 1957 for an early application of the port-of-trade model in ancient Mesoamerica). It is only relatively recently that archeology has recognized the widespread existence of preindustrial markets (Feinman and Garraty, 2010; Garraty and Stark, 2010), but the field at large remains burdened by Polanyi’s models (Blanton and Feinman, 2024).

The assumptions about the complexity of ancient economic systems were similarly mirrored in other beliefs about the complexity of ancient Maya societies. Because archeological data was rather limited, power relationships were identified from a combination of hieroglyphic occurrences and cross references in combination with the perceived architectural scale and sizes of specific sites. Thus, larger sites with numerous hieroglyphic texts were viewed as politically and economically significant (see Mallory, 1986). Particularly useful in this exercise were emblem glyphs that appeared to be correlated with specific sites (Berlin, 1958); based on hierarchical relationships garnered from the epigraphic texts, these were eventually utilized to argue for two large competing confederations during the Classic era that were centered on the sites of Calakmul, Mexico and Tikal, Guatemala (Martin and Grube, 1995; see Figure 1). Other sites were viewed as being of lesser importance (Martin and Grube, 2008). The elites at these two primary sites were projected to have controlled trade and interacted with each other in a system of patronage (reflected in the hieroglyphic texts) that to a large degree resembled

feudalism found in other parts of the world (Adams and Smith, 1981). This model created a dichotomy between the elites and the non-elites that is not reflected in the archeological record—at least not for all sites and time periods (Chase and Chase, 1992b; Chase and Chase, 2017; Sharer and Traxler, 2006).

Archeological and epigraphic models

As more archeological and hieroglyphic data have been collected, the originally perceived epigraphic relationships and competing Tikal and Calakmul confederation model have become more difficult to sustain—at least in its originally identified form. First, an earlier capital of Dzibanche was detected archeologically, using what was seen as being the Calakmul emblem (Nalda, 2004; Martin, 2024). Eventually, the texts were interpreted to suggest an inner dynastic rivalry and separation, leading to the shifting of a capital from Dzibanche to Calakmul in CE 636 (Helmke and Awe, 2016; Martin and Velasquez, 2016). Recently, archeological data has been incorporated into the epigraphic discourse (e.g., Estrada-Belli et al., 2024; Martin, 2020); much of the contextually collected archeological data complicate the traditional political model even further (e.g., Chase and Chase, 2020a; Chase et al., 2024c) in suggesting that multi-center Maya polities (e.g., regional states, and likely large ones) existed in the Late Classic Period with different mechanisms of political integration—including economic and trade relationships. While some epigraphers are now bringing the epigraphic and archeological bodies of data into better correspondence in terms of the politics (e.g., Vepretskii and Helmke, 2024), issues regarding trade have not yet been fully addressed.

Surviving Maya hieroglyphic texts on stone monuments and ceramic vessels did not contain overt economic passages, supporting the idea that economic systems were less developed and of minimal interest to the ancient Maya elite. Tribute and anything related to economics were hard to discern not only in Maya texts but also in Maya iconography (Stuart, 1993; Tokaviniine and Beliaev, 2013). What was noted, instead, was the elite desire to control strategic resources (derived from the ethnohistory; Roys, 1957). Even though archeologists argued that markets existed (e.g., Chase, 1998; Coe, 1967; King, 2015), the lack of explicit economic records and overt systems of physical currency and accounts (but see examples in Tokaviniine, 2020) led most researchers to believe that markets were either unimportant or did not exist [even though they were explicitly described in ethnohistoric documents (Farriss, 1984)]. Thus, until recently traditional epigraphically-derived models focused on the elite drove most conceptual thought regarding ancient Maya economics (e.g., McAnany, 2010).

Following the hieroglyphic arguments with regard to patronage in the texts and adopting what were essentially feudal models, researchers interested in economics focused on dynastic rulers and their courts (e.g., Inomata and Houston, 2001). Instead of a formal market system, most researchers believed that an extensive system of gifting was in place among the Maya elite (Foias, 2013; Tokaviniine and Beliaev, 2013, p. 172, 173). However, these models developed at a time when a limited sample of archeological materials existed. Polychrome ceramics being analyzed mainly derived from elite tombs and from out-of-context ceramic materials; many portrayed elaborate throne scenes (e.g., Kerr, 1997) and had hieroglyphic texts indicating personal

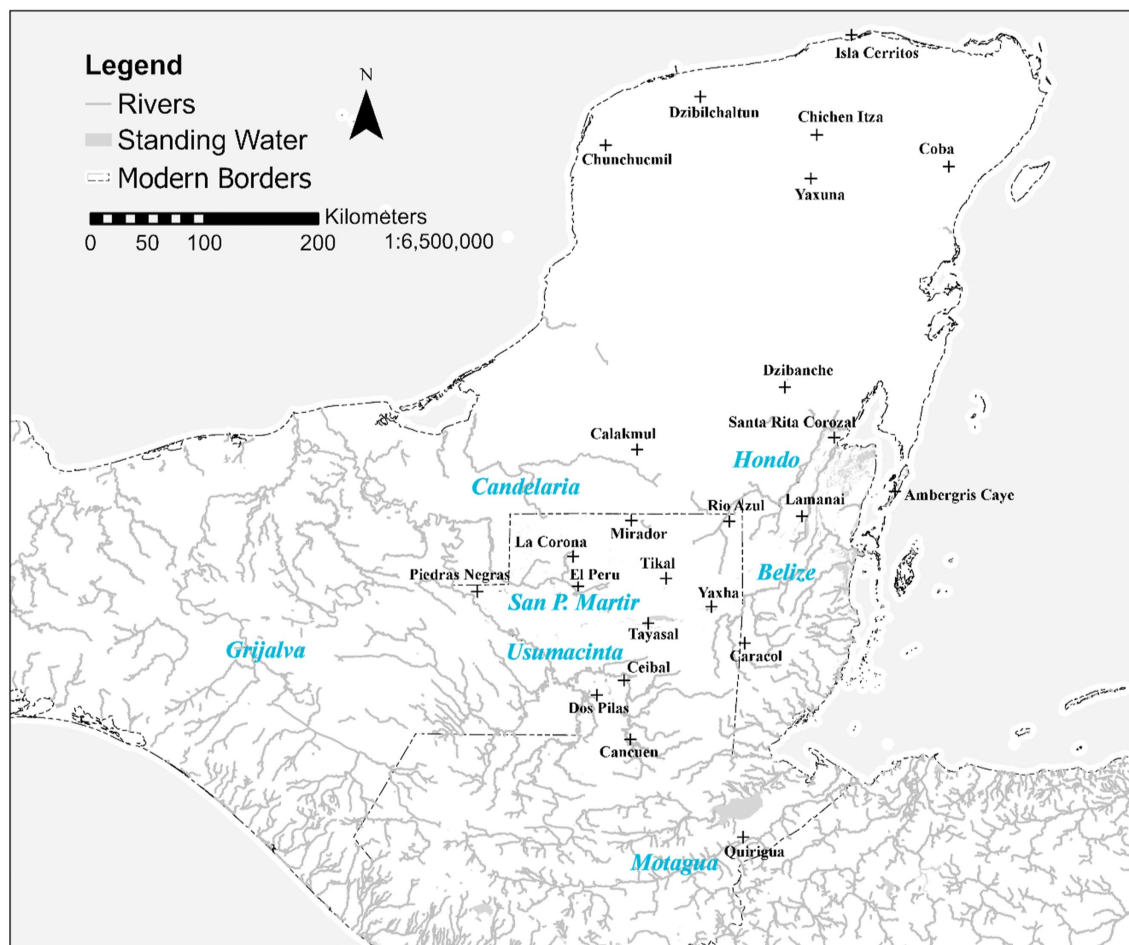


FIGURE 1

Map of the Maya area showing sites and all potential rivers and waterways in this region (using open source data from Open Street Map openstreetmap.org). Rivers that are important in terms of trade and communication to the Classic Period Maya of the Southern lowlands are labeled (e.g., the Candelaria, Grijalva, San Pedro Martir, Usumacinta, Motagua, Hondo, and Belize rivers; in blue) along with all sites (in black) mentioned in text.

ownership (Grube, 1991) and the drinking of cacao, an elite prerogative (Powis et al., 2011). Thus, such ceramic vessels, especially polychrome cylinders, were assumed to have been made for elites by attached specialists and then gifted by the elites to others of lesser status as part of a patronage system (see Hruby et al., 2022, p. 160; Taschek and Ball, 1992; Reents-Budet, 1994; Reents-Budet et al., 2011; Rosenswig, 2024, p. 245). While Culbert (2003, p. 67, 68) argued that polychrome figure vases were restricted to elite use at Tikal, he also noted their appearance “in the refuse from small sites in the Bajo La Justa.”

As more archeological data has accumulated, it has become clear that much of what was thought to have been gifted, such as elaborately painted scenes on cylindrical ceramic vases, appear in contexts in which gifting makes little sense in terms of the traditional patronage model (e.g., Chase, 1985a; Culbert, 2003). While gifting might be used to explain what is perceived to be a discordant context (e.g., Hruby et al., 2022, p. 160), other explanations premised on markets and wealth are also possible. Because so many of these objects occur in non-elite contexts, the distribution of such prestige items actually accords better with that of a market system, as predicted by Hirth (1998) and Chase and Chase (2014). The distribution of quotidian

items at Maya sites also appears to support Hirth’s (1998) model of a market system (Freidel and Masson, 2012). Painted iconographic scenes representing market transactions of more ordinary materials (atole, tamale, tobacco, maize grains, salt, serving vessels; Tokavine and Beliaev, 2013, p. 181–183) found at Calakmul, Mexico also provided hard data that the Classic Maya had markets that offered quotidian goods.

The market model

The primary impetus for the recognition of markets among the ancient Maya came from archeology and from a rejection of economic models developed for simpler societies. As noted above, Polanyi (1957) had argued that markets did not exist before modern capitalism and that capitalism did not exist prior to the industrial revolution. The Maya were not considered to be a capitalistic society and therefore Polanyi’s strictures were applied to them. One of the earliest work-arounds for the Maya was the suggestion of pilgrimage-fairs associated with other ritual activities as venues for economic transactions (Freidel, 1981). However, with the continued accumulation of

archeological data and research in the Maya region, it became clear that archeological distribution patterns could have been produced by a market system (Hirth, 1998), eventually leading to additional research and the widespread recognition of markets in ancient Mesoamerica (Freidel and Masson, 2012; Garraty and Stark, 2010; Feinman and Garraty, 2010). Follow-up work, using the frameworks provided by Hirth (1998) and Garraty and Stark (2010), when combined with testing of potential market plaza soils (Dahlin et al., 2007; Terry et al., 2015), led to greater recognition of their widespread existence (Hirth and Pillsbury, 2013; Horowitz and Cap, 2025; King, 2015; Masson et al., 2020).

The existence of markets in the Maya area was confirmed by configurational, distributional, and contextual patterns found at Maya sites (following the methodology established by Hirth, 1998). Not only could specific architectural features be associated with markets at various Maya sites (e.g., King, 2015), but the distributions of artifactual materials also strongly suggested their existence (Chase and Chase, 2014, 2020c; Freidel and Masson, 2012; Hutson et al., 2010). While some sites focused on the production of specific items—chert tools at Colha, Belize (Shafer and Hester, 1991), ceramic serving ware at Buenavista del Cayo, Belize (Reents-Budet, 2000), and salt at coastal sites in Belize (McKillop, 2019)—the archeology also demonstrated that most production took place in Maya households instead of workshops and was specifically geared for trade in local and regional markets (Chase and Chase, 2015). Maya households were to a large extent dependent on the local market systems for many of their goods by the Late Classic Period (e.g., Demarest et al., 2021).

Application of lidar as a tool to more fully understand the spatial extent and complexity of Maya sites provided further evidence that the ancient Maya populations were vast, urban, and likely economically organized in a way that was consistent with the existence of markets (Canuto et al., 2018; Chase et al., 2011; Chase A. S. Z. et al., 2023; Chase et al., 2024a; Hansen et al., 2023). Lidar has been particularly useful in highlighting the density of Maya population during the Late Classic Period (e.g., Chase et al., 2011; Chase et al., 2024b; Stanton et al., 2024) and in illustrating the need and availability of multiple market spaces within huge urban concentrations, as at Caracol, Belize (Chase, 2016; Chase and Chase, 2014, 2020c). More recent archeological analyses have also focused on traditional economic questions like identifying systems of financial accounting based on archeologically recovered tokens (e.g., Freidel et al., 2017; Tokovinine, 2020) and potential Maya currencies based on cacao, jadeite beads, spondylus beads, salt, and textiles (Baron, 2018; McKillop, 2021; Rosenswig, 2024).

Archeological data have also led to the postulation of at least two different kinds of markets and patterns of marketplace access among the Maya. The first is a central market, as is found at Chuchucmil, Mexico (Dahlin, 2009; Hutson, 2016, 2017), Calakmul (Dahlin et al., 2007), and at Tikal, Guatemala (Jones, 2015). The second is a dispersed market system with multiple commerce locations distributed throughout a single urban concentration, as is found at Caracol (Chase, 1998; Chase and Chase, 2014; Chase et al., 2015), Yaxnohcah (Anaya Hernandez et al., 2021), and possibly Coba based on its road system and large termini plazas (Stanton et al., 2024). Hutson et al. (2023, p. 6) have noted that “wealth inequality based on household size alone does not strictly parallel forms of governance.” Similarly, the type of market system that appeared in an ancient Maya city also does not appear to directly correlate with levels of wealth or governance as

indicated by GINI data, but governance, market systems, and other factors would have indirectly effected differential wealth in any given society (Chase D. et al., 2023; Feinman et al., 2022a).

Storage, moving goods, canoes, and seasonality

While there now may be widespread agreement among current Maya archeologists about the existence of markets in the Maya area (King, 2015; Masson et al., 2020), there is no firm consensus over how goods were moved over long-distances. Studies of Pre-European contact transport demonstrated that food staples could be carried overland for up to 275 km and still remain calorically profitable (Drennan, 1984, p. 28, 29, Drennan, 1985; Reyman and Dirks, 1985). However, for the Aztec capital in central Mexico, while local transportation of goods occurred across Lake Texcoco by canoe, long-distance transport was generally by foot. Hassig (2016, p. 151, 155) has noted that “staple foodstuffs were brought into Tenochtitlan as tribute from as far away as Oaxaca, nearly 200 linear miles and perhaps twice that by road.” Even if it was not especially efficient in modern terms, these transportation models and historic data indicate that long-distance overland Maya trade was readily available to the ancient Maya.

Involved in any discussion of long-distance trade in the Maya area are also questions over storage locations and capacity, as well as the impact of overland and water-based trade. Maya civilization agricultural basics included corn, beans, and squash. This diet was supplemented with some meat or fish protein and other plants. Because these crops are generally grown without access to irrigation, they are dependent on rainfall. However, agricultural terracing existed that could facilitate rainwater movement and minimize soil loss (Chase and Weishampel, 2016), and, at least at Caracol, there were agricultural areas with nearby reservoirs that would have facilitated access to water for pot irrigation. Raised field systems would also facilitate intensive agriculture (Beach et al., 2019). However, without rainfall, agricultural production was limited. Researchers have demonstrated that the Maya have faced droughts and shortages of food, but that these crises did not necessarily result in abandonment and depopulation (e.g., Hoggarth et al., 2017). In order to survive lean times, it would have been necessary for the Maya to have stored available surplus foodstuffs and to have had the ability to move these materials across or among populations in cases of localized droughts and famines (Chase et al., 2024d, p. 13; Dahlin and Chase, 2014). Famine risk has also been proposed as resulting in the development of Maya currency in the form of jadeite and spondylus beads (Freidel et al., 2002).

When dry, maize can be successfully stored for some 3 years; beans can actually be successfully maintained for longer. It is likely that each Maya household maintained a roofed structure with stored surplus foodstuffs (see Smyth, 2016)—and that there were also central repositories for stored foodstuffs in each Classic Period city (see Lemoureaux-St-Hilaire, 2022). Any central storage would have supplemented the ability of populations to survive lean times, especially with the availability of famine foods like ramon (Dine et al., 2019; Puleston, 1968) and root crops such as manioc (Sheets et al., 2012). While most sites grew crops to support their own populations, some areas in the Southern lowlands were capable of growing surpluses that could have been made available to others. The amount

of wetland fields recorded in northern Belize (Beach et al., 2019; Montgomery, 2016), for example, suggests that more crops were produced there than were consumed locally. This surplus likely ended up at interior cities whose populations had exceeded their own agricultural potential, such as Tikal (Dahlin and Chase, 2014). Given the quantities needed by the large populations in Late Classic times, these foodstuffs were likely being transported by canoe during the rainy season using the Hondo-Holmul River and Bajo de Santa Fe.

The northeastern Peten of Guatemala has large areas of bajo. These seasonal swamps become hard packed soil during the dry season but are inundated with water during the wet season. Rivers in the northeast Peten similarly shrink to trickles of water in the dry season and swell to sizeable channels in the wet season. The rivers and bajos are interconnected, making canoe passage possible from the Belizean border all the way to Tikal during the rainy season. Portage may also have been employed, as it was for the Belize to Usumacinta trade route (e.g., Laporte et al., 2008). In the northern Peten of Guatemala, the system of waterways efficiently facilitated the transport of bulk goods, like dried corn kernels, by canoe. Travel in other similar bajo-river systems located elsewhere in the Maya area also would have been possible during the rainy season. Objections were once offered to the transportation of bulk food by the Maya because of the assumption that the bearer would consume their carried load on any long journey, making such food transport inefficient (Sanders, 1962). However, transport by canoe permits several times the weight of human transport by fewer individuals (Hassig, 2016), and even over-land movement can still cover most of the Yucatan (Drennan, 1984, p. 28, 29, Drennan, 1985; Reyman and Dirks, 1985).

Besides interior waterways, canoes were also used for long-distance transport of a variety of items between the coast and inland locations (McKillop, 2005). These items included marine shell, fish, and salt. Fish, both dried and even alive, were traded into inland sites during the Preclassic and Classic eras (Cunningham-Smith et al., 2014; Teeter, 2001). Salt was also transported by means of canoes that plied the rivers of Belize (McKillop, 2002, 2019). One question that remains is whether the ancient Maya had use of a sail, which would have sped up maritime trade. Thompson (1949) argued that they did, but his interpretation was countered on linguistic grounds (Epstein, 1990), despite the fact that potential sails are found in Classic era graffiti at Tikal, Guatemala (Webster, 1963) and there is at least one unambiguous record of a Maya canoe with a sail – when Guerrero met with Cortes (Epstein, 1990).

Trade routes in the classic period Southern lowlands

As a result of the traditional model that was employed by both epigraphers and many archeologists, there initially was a sense that all economic trade must have either gone through or been controlled by key sites—Tikal or, alternatively, Calakmul—during the Classic Period (as noted above). Since the epigraphy reflected a hierarchy of centers beneath Tikal and Calakmul (Martin and Grube, 1995), the assumption was that these superordinate and subordinate relationships would be reflected in trading relationships. This was taken to mean that Tikal and Calakmul would have been the primary nodes for most economic transactions. Jones (1991, 1999) suggested that a trade portage route centered at Tikal linked the Belizean Atlantic Coast with

the Gulf of Mexico. A north–south trade route from the Guatemalan highlands to Calakmul was also projected (Freidel et al., 2007). More recent analyses suggest different and additional pathways for commerce that have archeological support from newer sources of data. For instance, archeological research at Cancun, Guatemala, has used trade materials to verify movements within and across Mesoamerica (Demarest et al., 2014; Woodfill and Andrieu, 2012), and remote sensing technologies like lidar have also been used to provide an analysis of least-cost routes (e.g., Carter et al., 2019) that can also be tested with archeological data.

Land-based trade routes used human porters to move goods during all time periods. The existence of different political units during the Classic Period, as indicated in their hieroglyphic texts (Martin, 2020), may have made it difficult for traders to be able to cross political boundaries. Yet, in spite of any boundaries, it is clear that goods were regionally distributed across the Southern lowlands in the Late and Terminal Classic Periods (Chase et al., 2025; Demarest et al., 2021). Given the lack of beasts-of-burden in the Maya area (other than humans), there was no equivalent to the Silk Road (Torr, 2018) for the transport of long-distance trade. That land-based routes did exist can be discerned from both archeology and ethnohistory. The widespread presence of Belize Red ceramics throughout southern Belize and the southeast Peten of Guatemala (Braswell, 2022; Hammond, 1975; McKillop and Sills, 2023) is particularly highlighted at sites along a combined land and water route connecting the Belize and Usumacinta Rivers (Chase and Chase, 2012). Other Classic era ceramic distributions reveal similar regional trading clusters (Chase and Chase, 2012, 2020b; Reents-Budet, 1994). Longer land-based routes may have existed during the Postclassic and Historic eras. The Itza, located in the central Peten of Guatemala around Late Peten Itza, made treks to Merida, Mexico to keep track of the Spanish, indicating that there was a north–south path or road through the central lowlands (Jones, 1998). Masson and Peraza Lope (2014) argue that this route was also used in the Postclassic era for regular contact between Mayapan and the Peten based on shared ceramics and architecture. However, given the hostilities between Maya groups, it was likely not a major avenue for trade in the Historic era, but rather one for carefully measured communication. While land-based routes were certainly important, it needs to be noted that bulk goods could more easily be transported for long distances by water-based routes.

The Royal Road

One postulated route that was thought to be key in moving goods between Maya centers has been called “The Royal Road” (Canuto and Barrientos, 2013; Freidel et al., 2007). Following the interpretation of Maya hieroglyphs based on patronage, titles, and the possession of a *kaan* (or “snake”) emblem glyph (e.g., Martin, 2020), the royal road was believed to have directly connected Calakmul with resources found in the Maya highlands (e.g., Demarest et al., 2014, Figure 5). Because the site of La Corona, Guatemala lay on the path of this royal road, Canuto and Barrientos (2013) designed an archeological project at La Corona to test how connected that site was with Calakmul and points south. A least-cost path analysis connected Calakmul to Uxul to La Corona to El Peru-Waka to Hix Witz to Polol to Dos Pilas and Ceibal to Cancun. This proposed route was “used by the Kaan kings to access people and resources along the western flank of their rival,

Tikal” (Canuto and Barrientos, 2013, p. 2). Yet, no causeways linking these sites—similar to the 99 km causeway linking Coba and Yaxuna in the northern lowlands (Stanton et al., 2020) or those built in the north-central Peten of Guatemala around El Mirador in the Preclassic era (Hansen et al., 2023)—have been found. Apart from the noted hieroglyphic relationships, there is little archeological data that supports the existence of such a route for significant trade.

The Great Western Route

Another postulated north–south route, referred to as “The Great Western Route,” joins the Cancuen to Seibal portion of the Usumacinta River with an overland portage to Tikal, but on an earlier horizon than the postulated Royal Road. Woodfill and Andrieu (2012) tested this route using the distribution of archeological remains dating to the Early Classic Period and argued that these data supported the route’s existence. Extensive Peten-related ceramic materials are found in the northern segment of the Guatemalan Highlands during this time period, also supporting this avenue of commerce. Based on the archeological data, this route was not functional after the CE 562 starwar against Tikal by Caracol (Woodfill and Andrieu, 2012, p. 189).

The Belize River to the Usumacinta River route

Another proposed Late Classic riverine route combines the Usumacinta and the Belize Rivers. Laporte et al. (2008) are responsible for identifying this route based on their archeological work in the southeastern Peten of Guatemala. Portage routes between water systems are also identified by these researchers, representing the most energetically efficient trade route. This route finds strong support for its Late Classic existence in the distribution of Belize Red ceramics (a Late Classic tradeware) at the Guatemalan centers along its path (Chase and Chase, 2012). It is likely that this route was controlled by Caracol, Belize after its CE 562 conflict with Tikal (Chase and Chase, 2017) and was functional until the onset of the Terminal Classic era.

Hondo River to Tikal trade route

A fourth proposed east–west route linked the Hondo River to the rivers (Holmul) and bajos in the northeastern Peten, connecting Tikal to the Caribbean Coast (and northern Belize) by using canoes and short portages during the wet season. This route was in existence during the Early Classic era as can be seen in the remains recovered at both Rio Azul (Adams, 1986) and Santa Rita Corozal that show close Peten ties (Chase and Chase, 1989, 2006). By the Late Classic Period, this route was being utilized to ship staple crops into Tikal as that city’s population had outstripped its resource base (Dahlin and Chase, 2014). Northern Belize’s wetland fields (e.g., Beach et al., 2019; Montgomery, 2016) were likely producing food not only for Tikal, but for other sites in northern Guatemala and the central part of the Yucatan Peninsula of Mexico. The rivers and bajos made the long-distance transshipment of these bulk goods by canoe possible during the rainy season.

Motagua River

A third eastern river (beyond the Hondo and the Belize Rivers) that was important to long-distance Maya trade was the Motagua River in Guatemala. This route linked the highland obsidian and jadeite sources to the Caribbean coast and it is likely that significant canoe trade plied its waters. In the Terminal Classic, the Motagua was tied into a circum-peninsular trade route centered at Chichen Itza (Cobos, 2023). Plumbate ceramics were produced on the Pacific coastal plain (Neff, 2023) and then transported overland on either a land-based western route to the Gulf Coast or by a route to the Motagua River, from where they would have gone by canoe to other destinations; plumbate is appropriately found at Chichen Itza (Brainerd, 1958), Isla Cerritos (Andrews et al., 1988), Quirigua (Chase, 1986), coastal sites in Belize (Sidrys, 1983; Mock, 1997) as well as Ambergris Cay (Guderjan, 2007; Guderjan and Garber, 1995), and at other Terminal Classic–Early Postclassic centers in the Peten lakes corridor (see Chase and Chase, 2008 for Tayasal, Guatemala). Quirigua, located on the Motagua River, also once exhibited a chacmool sculpture of the kind associated with Chichen Itza (Sharer, 1985), indicating that the trade went in both directions.

Candelaria and San Pedro Martir Rivers

On the western side of the Yucatan Peninsula, a triumvirate of rivers were also engaged in long-distance trade. The San Pedro Martir River flowed west out of the northern Peten, eventually joining the Usumacinta River in modern-day Mexico. The Usumacinta River forms the modern border between Guatemala and Mexico and joins with the Grijalva River in Mexico before reaching the Gulf. To the north, the Candelaria River that empties into the Laguna del Terminos also played a role in facilitating trade in the western Maya area. The rivers flowing into the Usumacinta (such as the San Pedro Martir) would have connected the central Peten of Guatemala to the Gulf of Mexico, while the Candelaria would have served as a route of communication for Calakmul, Mexico (Gunn et al., 2017). Portage routes for the Usumacinta River would have been located near Piedras Negras. The San Pedro Martir River was used as a transport route at least as far as Waka’ El Peru, Guatemala (Eppich et al., 2023). An overland route from Tikal going west may have eventually linked up to the San Pedro Martir River (Doyle et al., 2012). Because of limited archeological research, the western portions of these river routes are not well known, but riverine communication was clearly key in the rise of Maya civilization (Inomata et al., 2020, 2021).

Coastal trade routes

A final consideration is the water-borne canoe trade that would have circumvented the Yucatan Peninsula and connected with the various rivers. Water routes became most important during the Terminal Classic and Postclassic Periods (Sabloff and Rathje, 1975; Chase, 1985b; Cobos, 2023; Guderjan, 2007; Sidrys, 1976), although they were also of importance earlier (McKillop and Healy, 1989). Robles Castellanos et al. (2020) document an intracoastal trading network for the northwest Yucatan Peninsula that was actively used since at least the Early Classic Period based on data from Chunchucmil (Hutson et al., 2010). The

existence of waterborne trade along the east part of the Yucatan Peninsula has been correlated with the extensive coastal settlement in this region dating to the Postclassic Period (Sabloff and Rathje, 1975). The coastal route especially came to prominence in the Terminal Classic with the Hondo River and the Belize River becoming important passageways into the interior from the east and the Usumacinta connecting from the west. Belize's New River also served as a key route for Lamanai, a center that, unlike those in the interior Peten, successfully made the transition from Classic to Postclassic Periods (Graham and Howie, 2020; Pendergast, 1981). The distribution of fine orange pottery (Bishop, 2003; Smith, 1958) and molded-carved ceramic vessels suggest the importance of these routes in the Terminal Classic Period (Harrison and Pugh, 2020; LeMoine et al., 2022; Paris et al., 2021).

It would appear that these riverine routes helped both northern lowland Maya and non-Maya peoples from the Gulf Coast establish a presence in the southeast Peten of Guatemala (Chase and Chase, 2021; Chase and Chase, 1982; Chase et al., 2025; Halperin and Martin, 2020; Carter et al., 2024). These population movements were intricately tied to the Maya collapse and the depopulation of the Southern lowlands (Chase et al., 2021). The coastal sea route along the east coast also involved canoe trade with Honduras (McKillop, 2024) with those goods accessing minimally the Belize River based on the distribution of Ulua stone vessels in the upper Belize Valley (Chase, 2020) and ceramic imitations at Yaxha in Guatemala (Zralka et al., 2020). The coastal sea route continued in importance into the Postclassic Period after the depopulation of the interior area of the Yucatan Peninsula. The western routes evince limited evidence of having been used in the Postclassic, but the eastern sea route saw a build-up of settlement along the east coast of Yucatan (Andrews and Andrews, 1975; Lothrop, 1924) and renewed settlement in the central Peten around its east–west lake system that was likely tied to the Belize River by a portage route following the lakes (from west to east, Lakes: Salpeten, Peten, Macanche, Yaxha, Sacnab).

Conclusion

Over the course of the last half century, we have gained far more knowledge about ancient Maya trade and economic systems. The field of Maya studies has undergone drastic changes in the kinds of models that it now uses based both on the increase in excavated materials outside of site centers and on the advances made in understanding spatial distributions through artifact analyses, least-cost path modeling, and lidar (e.g., Chase et al., 2024a; Horowitz and Cap, 2025). These newer data have better grounded our interpretations. It was once unclear as to the kind of organizational model that should be applied to the ancient Maya; there were disagreements over the size of populations and how their ancient societies were structured. As a result, models derived from the epigraphic data were then used to fill the lacuna, but they largely focused on an elite system of trade without shedding much light on non-elite economic processes. As more archeological data accumulated, it became clear that the epigraphy did not reflect all of the socio-political processes. Archeological arguments were made for the presence of markets among the Maya and archeological data were slowly utilized to demonstrate their existence. In turn, the increased archeological data on artifact distributions have become important in identifying trade routes and their temporal shifts in the Maya area; in combination with topographic features, it is now possible to determine what major routes were important to the ancient populations.

By establishing spatial control over the ancient landscape, lidar made certain models obsolete. Lidar established the huge scale of some Maya cities and made it impossible to argue for small, limited Maya populations during the Classic Period. The density of settlement in some Maya cities also suggested the need for internal distribution mechanisms like markets. At the same time, the broader field of social science was rejecting some of the established orthodoxy in economics relative to the presence of markets in non-capitalist societies (e.g., Blanton and Feinman, 2024). With the archeological recognition of Maya markets and this shift in general theoretical perspective, new advances in our understanding of ancient Maya economic systems are possible. Not only were there different forms and kinds of marketplaces in various parts of the Maya lowlands, but they shifted over time dependent on political exigencies. The scale and importance of agricultural production (for surplus bulk foodstuffs) and maritime and riverine trade (first for salt and then for these foodstuffs) was also recognized. Archeological data has also now demonstrated the importance of such water-based systems of trade and communication both for the rise of Maya society and in terms of its collapse at the beginning of the 10th century. Future archeological research will no doubt further enhance our understanding of ancient Maya economic systems.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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