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Annotated bibliography

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This annotated bibliography, consisting of summaries from 10 peer-reviewed scholarly sources, focuses on the period during the gradual decline and eventual collapse of the Maya Civilization.

My final project will be what is described below:

As a documentary, imagined as a 45-minute film and rendered as a Powerpoint presentation with an accompanying annotated (and referenced) film script

Drought and the Maya:

(1) Aimers, J., & Hodell, D. (2011). Drought and the Maya: the collapse of the Maya civilization is often attributed to drought, but is the explanation as simple as that? Based on evidence from their respective fields, an archaeologist and a palaeoclimatologist call for a more nuanced assessment. *Nature*, *479*(7371), 44+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A272364688/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=c88698b6

During the period known as the Terminal Classic (roughly A.D. 750 to 1050), archeological research on the Mayan Civilization provided a wealth of information regarding the sharp decline and eventual collapse of the Maya civilization. Evidence to support this has ranged from political events and warfare to climate change and severe drought. The data itself was collected from monuments of conquest, human bone, fauna, and flora, dated via radiocarbon dating using trace amounts of carbon 14. Interestingly, collapse may not be the correct term to describe the long process of Maya decline, as many similar civilizations experienced similar periods of growth and decline. Nevertheless, arguments derived from this information are a matter of debate because of the complexity of discovered archeological data. This summary is relevant to my project because the summary gives a brief description of the natural or human-driven mechanisms which could have contributed to the collapse of the Maya Civilization. Because I am focusing on a period in the Maya Civilization history where their population declined sharply and eventually collapsed, the referenced article has many important details for my project.

(2) Dunning, N., & Beach, T., & Beach-Luzzadder, S. (2012). Kax and kol: Collapse and resilience in lowland Maya civilization. *PNAS*, 109(10) 3652-3657. https://doi.org/10.1073/pnas.1114838109

Particularly in the past 3 millennia, humans have been the dominant driver of ecological change; sometimes manipulating the fate of the Maya Civilization. Since the 19th century, images of Ancient Maya have been associated with images of beautiful buildings in various states of decay, crumbing palaces, and vegetation-covered temples. These vague images have created countless arguments for the fate of the Classic Period in the Maya Civilization. Modern society today, like Maya, has many similar elements which serve as a warning for modern civilization: its large size, sophisticated urban culture, abandonment of many large areas, dwindling resources, and drastic climate changes. In Mayan history, there are few examples of rapid depopulations similar to the one which ended the Maya Civilization, in contrast to the mass regional abandonment in the Terminal Classic, which played out at least 125 years. However, even those areas which did not experience abandonment eventually collapsed because of changes which brought on long-term population loss. At the heart of the Maya region centered around the Yucatán Peninsula and areas of Mexico and Central America, a region ranging from 40 to 300 metres in elevation is referred to as the elevated interior region (EIR). This region, in addition to being the centre of cultural development and great architecture, was the focus of mass collapse. Compared to the Maya communities centred in lowlands, those in elevated portions were more susceptible to collapse: lakes and water sources were few and far between and surface drainage was very slow and seasonally dependent. In an elevated region with such little rainwater and little-to-no groundwater, this would cause widespread droughts. Additionally, the Maya lowlands were subject to frequent hurricane strikes and forest fires over widespread areas, destroying large areas of resources such as crops and animals, or contaminating water sources. Much of the landscape of the EIR was tropical and dense forest cover, being well-suited to the agricultural system of the ancient Maya, but settlements still faced difficulties, especially as population density increased. Traditional Maya agriculture is highly adapted to the seasonal rhythms of regional precipitation. However, because the Maya lowlands experienced drying trends recurring on an apparent cycle, the shifts lead to increases in the frequency and severity of droughts. This

summary of the content is relevant to my project because the summary gives more of an in-depth explanation of the mechanisms which contributed to the collapse of the Mayan Civilization. Because I am focusing on a period in the Mayan Civilization history where their population declined sharply and eventually collapsed, the referenced article has many important details for my project.

(3) Zeitlin, R. N. (1984). Archeology and volcanism in Central America. *Science, 226*, 163+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A3472821/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=49347507

As a starting point for archeological research into ancient civilizations such as the Maya, studies were conducted in El Salvador starting in 1975; El Salvador was one of the main geographical regions where the Maya Civilization flourished. More specifically, one of the accomplishments of the project was to document the Holocene volcanic activity which, emitted by Mount Ilopango, wreaked havoc on a densely-populated area of Protoclassic Maya settlement. One of the most particularly catastrophic volcanic eruptions, occurring in A.D. 260, inspired much research into the change in human ecology as a result of the deep and widespread ash deposits following the volcanic eruption. To acquire the most accurate samples, the site of focus was an environmentally-diverse 546 square-kilometre area in the intermontane Zapotitan basin, 30 kilometres west of Ilopango, where geological sampling, settlement pattern surveys, and two archeological site excavations took place. Although modest in size and quality, the archeological material analyzed (soil, tephra deposits, ceramic remains, lithic artifacts, pollen, and fauna) is very informative about the past geological and cultural history of the Maya Civilization in that region. Additionally, excavations at a Late Classic period household add some neat evidence about highland Maya life and material culture. Many Mesoamerican prehistorians agree that the lowland Maya culture did not flourish as a choice, instead being forced due to mass movement away from the culturally important but volcano-ravaged lands of El Salvador, in the highland Maya. However, after 150- to 200- years post-eruption, rapid repopulation took place in El Salvador. In support of this, there is a seeming lack of human remains in the lowlands during the Protoclassic-Early Classic periods, followed by archaeological evidence of lowland-related pottery and stone tools at sites in the highlands, dating to the beginning of the Late Classic. The suggestion for this sudden repopulation is to re-establish trade and procurement networks, particularly for exotic trade goods such as polychrome pottery and obsidian. However, another theory suggested for the sudden repopulation of El Salvador following the volcanic eruption is part of a gradual, population-pressure-induced expansion of Maya agriculture. This summary is relevant to my project because the summary gives a brief description of several factors which may have contributed to the collapse of the Maya Civilization, most notably volcanic eruptions, and a boom in population increase. Because I am focusing on a period in the Maya Civilization history

where their population declined sharply and eventually collapsed, the referenced article has many important details for my project.

(4) Freidel, D. (2006). The Maya. *Journal of the Royal Anthropological Institute*, *12*(3), 676+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A152571890/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=d4be109d

Recent lake core analyses in the lowlands of Venezuela, combined with sediment analysis from various coasts, unearth important information regarding droughts which occurred in the first millennium A.D., particularly in the latter half. Drought or other extreme drying events impacted some significant events in Maya history, most notably the collapse of the great city of El Mirador, the cease of elite activity in the mid-Classic 'hiatus', and the collapse of the Central Area of modern-day Mesoamerica (Yucatan Peninsula) around 900 A.D. Because of the ongoing droughts in the latter half of the first millennium A.D., the Mayan culture was forced to undergo rapid cultural adaptations, crippling the Maya economy and culture. Particularly, Maize, being as much as 80% of the Mayans' diet, was unfortunately very sensitive to drought, and Maize crops died on large scale as a result, creating an agricultural crisis. The Maya lived in Mesoamerica geographically near other civilizations, in which they traded, allied, and warred with their neighbours from the time of the first settled farming communities in the Preclassic period. In lowlands adjacent to the Maya lowlands, a civilization known as the Olmec used religion to shape political institutions and others in the Preclassic Maya. In addition to climate change causing widespread drought and agricultural crisis' in Mesoamerica, geographical changes could have caused the breakdown of supply routes and alliances, further placing strain on the Mayans' resource base. Saying all this, the ninth-century collapse in central Mesoamerica has three major factors: dense populations stressing the weakening environment, severe episodes of drought, and constant warfare further straining the Maya resources. Interestingly, more so than any other factor, warfare on an increasingly destructive scale brought down the ruling elite: the Central Maya Area fought itself into demographic destruction. Like any other ruling elite who is corrupted and blinded to the reality of a situation, the arrogance and short-sightedness of the ruling elite played a central role. This source is relevant to my project because it contains information about how warfare, agriculture, and the breakdown of trading networks was a significant factor in the decline and collapse of the Maya Civilization in the Terminal Classic era (800 A.D. to 1000 A.D.).

(5) Andrews, E. W. (2012). Francisco Estrada-Belli. The first Maya civilization: ritual and power before the Classic period. *Antiquity*, *86*(331), 271+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A284753586/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=278b9ece

Epigraphers are professionals who specialize in the study of inscriptions as writing; they identify pieces of writing, clarify their meanings, categorize their uses according to dates and cultural contexts, and draw conclusions about specific details of both the piece of writing and the writer. Because of the Maya's significant advancements in the realm of artwork and linguistics, one of the most important advancements made in Maya archeology over the past 50 years has involved the deciphering of hieroglyphics - incomprehensible symbols, alphabetic elements, or syllabic elements - by epigraphers. This has allowed a great understanding of the early Maya elites, sites, and regions, whose settlements and artifacts are often buried under many centuries of sediment layers. The focus of this summary is on the excavations and survey by the Holmul Project at Holmul, Civil, La Sufricaya, and others in northeastern Guatemala. The earliest excavation at Holmul discovered a large pottery collection dating from 700 to 1000 BC, with similar material being found from sites in Belize, lowland Guatemala, the Puuc Hills and northwestern Yucatan. Radiocarbon dating of these discovered artifacts was part of the Middle Preclassic Maya lowland. A large Preclassic Period (1800 BC – 1000 BC) era site known as Cival was discovered to contain several large buildings made of stone, including a pyramid. The purpose of such a site was mainly for public rituals. Additionally, the architecture was linked to the development of ruling elites, the yearly agricultural cycle, maize (corn crop) cultivation, and aspects of Maya cosmology. These types of builds were amongst the first architectural features, which marks the origins of Maya public construction and architectural rituals in the southern Maya lowlands. A small early classic (1000 BC – 400 BC) ceremonial center was found about 1 kilometre from the centre of Holmul, augmented by traditional artwork, fragments, and status of famous warriors - 'Teotihuacan-style warriors'. It is suggested that this center was of strategic value in securing land routes to Caribbean ports and establishing trading centers with other groups. One of the most prominent sites found, however, was El Mirador, which contained ceramics, pottery, and one of the largest Mesoamerican pyramids, analyzed to be from the preclassic (1800BC – 1000BC) period. This source is relevant to my project because it contains

information about early Maya sites found and excavated contained valuable insights into early Maya Civilization and architecture.

(6) Hutson, S. R. (2017). History, politics and meaning among the Classic Period Maya of the southern lowlands. *Antiquity*, *91*(356), 533+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A494099403/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=9d4d42b8

This article explores three books related to Maya archaeology: Ritual, violence, and the fall of the Classic Maya kings, excavations in residential areas of Tikal, and mortuary lowlands of the Classic Maya: rituals of the body and soul of individuals. Ritual, violence, and the fall of the Classic Maya kings focuses on the 9th century A.D. when kingship was discredited and crumbled in many places and made a scapegoat model which is bound to always fail. The article referenced above investigates that an individual's capacity to determine and make meaning from their environment through conscious and creative actions is often the mediator between environmental downturns and socio-political disasters. Additionally, Politics in Maya societies were fluid, conflictive, and subject to constant negotiation due to internal considerations such as factional competition or warfare with other civilizations over resources or territory. Excavations in the residential areas of Peten Basin, Tikal (modern-day Guatemala), revealed artifacts and other archeological materials which were commonly given to royal members of the Maya Civilization, indicating a royal family lived in Tikal. Further, excavation data was used to provide a history of that family and suggests that people who occupied places such as Tikal after the eradication of kingship were people from the same communities carrying on generational practices, memories, and relationships. Mortuary lowlands of the Classic Maya housed rituals of the body and soul of the deceased to expedite the departure of the soul and facilitate its rebirth and renewal in later generations. The reconstruction of social bonds among the survivors of a group of deceased individuals was of utmost importance, to essentially preserve society. The basis of specific practices performed was based on widely held Maya beliefs about life, death, supernatural beings, and cosmology. The article concludes by describing that Maya archaeology has become more robust and is using empirical data to address meaning, motivation, and political action in the past. This source is relevant to my project because it contains additional information about three specific aspects of their society: mortuary rituals, termination deposits, and political organization which will be useful in explaining a little of how the Maya civilization functioned during the Classic Period (250 A.D. to 800 A.D.)

(7) Haug, G. H., Gunther, D., Peterson, L. C., Sigman, D. M., Hughen, K. A., & Aeschlimann, B. (2003). Climate and the collapse of Maya civilization. (Reports). *Science*, *299*(5613), 1731+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A99375824/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=c8d0b849

The collapse of the ancient Maya civilization around 1000 A.D. in the so-called 'Terminal Classic' period was due primarily to climate change, though other factors such as cultural and territorial wars between the Maya and other civilizations were contributing factors. Although other previous studies concluded that climate change was the main cause of the collapse, this study provides more reliable evidence of that, according to a study of sediment in the Cariaco Basin of the southern Caribbean. By measuring the titanium content of sediment and using it as a recorder of eroded sediment delivery to the basin, researchers developed a record of highly variable variations in river input and hydrological cycles in northern tropical South America. Ultimately, the sediment record showed a century-long decline in rainfall, intermixed with intense multiple-year droughts at around 810, 860, and 910 A.D. This is particularly deadly for the corn-like crop Maize, which was particularly susceptible to droughts, and which made up an average of 80% of the average Maya diet. Additionally, the gradually declining rainfall resulted in a general strain on resources in the region, which was made worse by drought events. This led to gradual social and cultural stress and the deaths of many Maya citizens. The study provides a starting point for integrating changes in climate into the history of the Maya civilization. Research suggests that the fast expansion of the Maya civilization during the Classic Period (250 A.D. to 800 A.D.) of Maya civilization from approximately 550 A.D. to 700 A.D., particularly during times of favourable climate, resulted in a population which overloaded the carrying capacity of the environment. This resulted in the Maya civilization essentially starving themselves of all categories of resources. Therefore, the sediment record constructed from the Cariaco Basin provides a template which archaeological data can be compared against to collect further data on the collapse of the Classic Maya civilization. This source is relevant to my project because it contains archeological information acquired from sediment deposits located in the Caribbean, where the Maya built many of their cities and structures. This information will be useful in elaborating on the fate of the Maya civilization.

(8) HAMMOND, N., BAUER, J., & HAY, S. (2000). Preclassic Maya architectural ritual at Cuello, Belize. *Antiquity*, *74*(284), 265. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A65537090/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=7df567e8

The community of Cuello, Belize is the earliest known village in the Maya lowlands, occupied from at least 1200 B.C. to approximately 400 A.D and used for ritual purposes, a shift from traditional domestic purposes like agriculture or religion. During the Preclassic Period (1000 B.C. to 250 A.D.), the Maya more formally organized their religious and cultural beliefs, resulting in Cuello becoming one of the earliest Maya ritual sites. Interestingly, however, in the Middle Preclassic period around 400 B.C., the entire site was ceremoniously demolished, and filled with large piles of stones and rubble. Deemed 'Platform 34' by archeologists, excavations in Cuello revealed buildings still standing which were from the Late Preclassic period (400 B.C. to 250 A.D.). The subsequent excavations of these buildings yielded abundant archeological material, such as a side-notched projectile point, at which radiocarbon dating confirmed it was from the Late Preclassic period. Another excavation revealed a structure referred to as 'Structure 334' which contained plaster flooring, which had been carefully defaced to reveal any hidden archeological information. An analysis of an excavation section in Structure 334 revealed the skeleton of a boy whose age was approximately 7.5 to 10 years old, accompanied by a unique bowl whose material is from the Consejo Ceramic Group of the Bladen Complex, dating from approximately 900 B.C. to 600 B.C. This source is relevant to my project because it contains archeological information about one of the first Maya ritual sites discovered, and because rituals were special in the eyes of the Maya, it provides important information.

(9) Lucero, L. J. (2015). Gyles Iannone (ed.). The great Maya droughts in cultural context: case studies in resilience and vulnerability. *Antiquity*, *89*(343), 250+. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A406991641/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=643aee1a

The focus of the above article is the discussion of a book which focuses on how climate change impacted the Classic Maya civilization in the southern lowlands of Mesoamerica in the Terminal Classic period of the Maya (800 A.D. to 1050 A.D.), where their population was on a sharp and permanent decline. The general argument is that the impacts of climate change on the collapse of the Maya civilization are multidimensional and complex, as opposed to relatively straightforward as many archeologists believed. Several case studies from areas in Mesoamerica and the Maya southern lowlands are presented to show that the impacts and responses invoked by climate change were localized and varied. New data presented by the article adds to our understanding of the Maya political collapse and urban migration which resulted from climate changes. This article challenges the main belief that kings and kingship, while an important part of Maya culture and politics, gradually lost power over time because of the Terminal Classic period megadroughts. In several instances, the kings and kingship lost power before the onslaught of the Terminal Classical period for reasons unrelated to environmental catastrophe. This story, although true for the southern Maya lowlands, is not true for the northern Maya lowlands. Contrastingly to the southern Maya lowlands, the northern Maya lowlands have generally thinner soils which absorb and retain water efficiently, with a water table much closer to the surface. Although the southern lowlands have deep pockets of fertile soil, that soil could not retain water for very long, and the water table was very low. These factors played a major role in the different political and settlement patterns of the two regions. This source is relevant to my project because it contains information about how specifically the southern and northern lowlands of the Maya were affected by drought, and what migrations took place because of that. Additionally, this source discussed briefly how the kings and, as a result, the political system of the Maya collapsed because of factors unrelated to the environment,

(10) Adams, R. E. W. (1991). Nucleation of population and water storage among the ancient Maya. *Science*, *251*(4994), 632. https://link-gale-com.ezproxy.lakeheadu.ca/apps/doc/A10425615/AONE?u=ocul_lakehead&sid=bookmark-AONE&xid=8f0f93b1

Urban city development in the northern and southern lowlands of the Maya lowlands is a controversial topic among archeologists and scholars because of arguments over the key factors which lead to urban city development. However, those arguments are fizzling out because of recent discoveries. Recently, studies have shown that specific Maya urban centers, such as Tikal, achieved urban status by having a population of 60,000 to 80,000 people at the tail-end of the Classic period around 750 A.D. One major discovery of urban development in the Maya lowlands was the capacity to sustain large populations through long, dry seasons of little rainfall. The Maya constructed various large water reservoirs as integral parts of society to have sufficient water for both agricultural and population sustainability. During the Preclassic Period (1000 B.C. to 250 A.D.), the Maya civilization developed the practice of shifting agriculture, preserving nutrients in the soil by rotating crops around each harvest. Because a significant source of water was needed for any settlement, the Maya had to create several storage zones to support populations. The main factor for the emergence of cities was large water reservoirs, which brought with it elite-class individuals who sought to use water for social control. The Classic period (250 A.D. to 800 A.D.) saw the abandonment of centers and cities, regardless of large-scale architecture and other structures, in favour of communities with sufficient water resources. Early lowland sites such as Mirador and Nakbe were abandoned almost certainly because of extremely low water levels. Some sites, however, such as Rio Azul and Seibal, were abandoned because of political and military disarray. Because the ancient Maya were so intensely dependent on water management, the largest cities in the Mayas' southern and northern lowlands were located near swamps, because of the abundance of water resources. Interestingly, however, the swamps and shallow lakes near cities were concluded to be modified or drained to make way for intensive food production. This source is relevant to my project because it contains information about how the Maya structured their societies and cities depending on how water was distributed. Seeing as how water was so important to Maya agriculture, any discussions on water usage in the Maya civilization are valuable.