Demise of Classic Maya civilization
a theoretical approach

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Abstract


Keywords: Classic collapse, Maya civilization, Maya archaeology, Theories of Maya, Classic Maya collapse, David Webster, Billie L. Turner, James L. Brewbaker, William J. Folan, Lisa J. Lucero, Climate and collapse

Nyckelord: Klassisk kollaps, Maya civilization, Maya arkeologi, Teorier av Maya, Klassiska Maya kollaps, Klimat och kollaps
1. Introduction

Archaeologist David Webster (Webster, 2002: 7) describes the obscurity of the Classic Maya collapse as “one of the world’s great archaeological mysteries”. Geologists Larry C. Peterson (Peterson, 2005: 322) calls it “one of the great anthropological mysteries”. Numerous archaeologists, anthropologists, historians, laboratory specialists, epigraphers, among many, have conducted research on the Mayan civilization and all have their own view central to their research and experience on how the empire came to an end. There are a number of suggestions to select from such as drought, spread diseases, invasion, climate change, revolts, earthquakes, volcanic eruptions and eruption of soil. All individually equally frustrating to try to explain and even if you succeed it never gives the whole answer because other factors overlap. The whole vision of the Mayan end has disintegrated into smaller pieces of opinions and interpretations much due to our own personal image of the civilization. Much is known about their knowledge of astronomy, mathematics and literature and of course architecture which has made professionals and amateurs, as well as private persons, amazed about their culture. Only their Long Count calendar, counting days of the year with exact preciseness as our Gregorian calendar, gives that away. This has on one hand created strong illusions, a sort of a romantic picture, to all interested about whom the Mayans were and a form of a cultural evolution has formed about the perception of the Mayans – one telling a story who then tells another but lacks elements of the original story. This might have contributed to generate the inflexible or less flexible opinions of the issue as perception of new or past theories are harder to initiate to the public because they disrupt the already determined minds of what the Mayan civilization represented.

In order to understand the problem one must first focus the issue in understanding the research that has been done on the subject before stating any premises. In other words – build a foundation on which your arguments can rest upon. The Mayan empire goes as far back as 4000 years (Brunius, 1992: 8) known as the Pre-Classic period. The core point of this research is focused on the late Classic era from 8th to 10th century AD when the empire came to an unexplainable sudden end after previously blooming with intellectual progresses in astronomy, mathematics, arts and architecture. Now exactly what caused this downfall of culture are primarily the objective and a number of scientist’s opinions and research need to be studied to either clarify and/or dismiss any theory.

1.1 Aim and question formulation

The initiative of this paper is to shed light on the different theories of the Classic Maya collapse and face those theories against each other in an attempt to clarify one or more theories as more plausible as others concerning the extensiveness of the collapse.

Question Formulation
- What are the most relevant theories of the Classic Maya collapse?
- How extensive has the archaeological work been in the Maya areas?
How has the perception of the Mayans shifted among scientists throughout the 19th and 20th century?

1.2 Material and scope

This paper is a literature study approaching the issue of the Classic Maya collapse. Numerous scientists’ theories on the collapse are being presented as well as work that has been done on Maya archaeology during the 19th and 20th century. Literature concerning the whole Classic Maya, its social and political structures as well as shorter illustrative explanations of other complex society’s collapses is put in context with the issue here. Out of dozens of different theories explaining the collapse I have narrowed it down to the six most plausible scenarios due to the reason that most research have befallen upon these theories. Theories that are discussed is Billie Turner’s Population density from 1976, James Brewbaker’s maize diseases from 1979, William Folan’s and Tom Abate’s climatological approaches from 1983 and 1994, Lisa Lucero’s theory of water control from 2002 and David Webster’s Elite and Total system collapse from 2002.

This paper will not enlighten my own personal views of the Mayan civilization nor will it focus on the vagueness that the whole subject is surrounded of, i.e. the hazy theories given by various alleged experts. The core point of this paper is to explain the theories which clarify the Classic collapse and the research conducted which has justified those statements to later face those theories against each other. A brief overview of the Mayan civilization, both Pre- and Classic, will be presented as well as a review of late 20th and beginning of 21st century archaeology concerning Mesoamerica.

1.3 Method

This paper is characterized by a quantitative collection of different archaeologists and anthropologists, as well as other allegeable professions, theories of the subject in order to prepare a qualitative comparison. The method used is literature regarding Classic Maya and numerous publications relating to and concerning the collapse in order to put the various theories into discussion.

1.4 Short background of the Mayan civilization

The early Mayans goes as far back as about 4000-3500 BP and consisted mostly of smaller societies with roots in early foraging and farming cultures. These cultures inherited together common traditions and language and gave birth to a Mesoamerican tradition that gradually formed something that can be identified as a civilization. It is today still arguable what Mesoamerican society can be called the oldest civilization since several Early and Middle Pre-Classic cultures existed in the Mexican highlands and on the Pacific coast of Mexico and Guatemala. Although many archaeologists believe the Gulf Coast Olmec which roughly thrived between 3200 and 2400 BP with great centers of San Lorenzo and La Venta with monumental temple-pyramids and stone sculpture are to be the earliest Mesoamerican civilization. The Mayans, as many other societies in Mesoamerica, had connections to the Olmecs and successively developed what later are known as the most colorful and well-preserved archaeological records in the world. Up until about 1800 BP, known as the Pre-
Classic period, the Mayan civilization grew in both the high- and lowlands. As the society grew larger also did the social differences as political and religious elite was formed and chiefly systems and larger urban centers established. The Pre-Classic Mayans shared in varying degrees distinctive patterns of art, architecture, writings, calendar systems, technologies and world views with other societies of Mesoamerica covering about 900,000 sq. km known as the Mesoamerican Great Tradition. Subsequent 1800 BP are known as the Classic Maya. This is the period when the civilization thrived greatly with achievements in astronomy, mathematics, monuments and buildings amongst other. The Classic Maya suffered a massive downfall of culture between 1300 and 1100 BP which the society never fully recovered from. However the Mayans survived up until the Spanish conquest in 1697. A century earlier Cortés observation of the Aztecs and Mayans in 1519 was only the latest manifestation of a much older and deeper Mesoamerican pattern (Adams, 1969: 3f, Webster, 2002: 76ff)
2. Previous research

Systematic focus on the Classic collapse by scientists didn’t begin until in the late 1950’s under advancement of art historian Proskouriakoff whereas she suggested Maya archaeology, and Mesoamerican archaeology for that matter, would open itself up to a wider circle of specialists. Prior to 1958 the history of Mesoamerica was primarily studied by archaeologists and anthropologists whom have had their entire professional career dedicated on the subject. It was thought by many the archaeology conducted had become too rigid and needed to advance in the field of explanatory theories. Similar thoughts were reflected in the 1940’s by anthropologists C. Kluckhohn suggesting anthropologists were neglecting their duties for disregarding advanced theories. In the latter half of the 20th century studies of the Classic era of Maya civilization was intensified. It resulted in number of published articles and publications concerning not only the collapse but also topical and survey studies that were put in context of the civilization (Adams, 1969: 4ff). During the 1960’s and 1970’s the field of the collapse gained more attention as more scientists approached with new or renewed class conflict hypothesis of what could explain the downfall of culture. One attractive approach was that of a climatic change which has been used by a number of scientists for carrying their theories, for instance by Folan in 1983 and more recent Peterson in 2006. Lisa J. Lucero published in 2002 an article, with close relations to climate changes, regarding to the role of water control and thus the debate of climatological factors towards the demise of Classic Maya have been heated.
3. Maya archaeology of the 19th and 20th century

Following part is a summary of institutions conducting archaeology in the early periods of Maya studies. Overviews of disciplines and influential archaeologists as well as anthropologists whom have contributed to the modern understanding of Maya civilization are given as are developmental schemes from the late first half of the 19th to mid 20th century. The whole third chapter is aimed to explain the extensiveness of the archaeological work conducted in the Maya areas and give a better understanding how it has developed towards present day. Chapter 3.1 is a summary of the first period of the archaeology conducted in the 19th and early 20th century. Chapter 3.1.1. is a summary of the second period when the Carnegie institution of Washington took over the research, which is also the reason the second period is named ‘Carnegie’. The chapter concludes, 3.2, with an overview of the second half of 20th century archaeology that has been conducted in the Maya regions.

3.1 Great Explorer, 1839-1924

The Mesoamerican archaeology is known to be a vast diffusion sphere – a New World archaeology where concept is more applied to the data than discipline. Over time Maya archaeology has become a fundamental part of Mesoamerican prehistory. Due to New World archaeologists early on specialized themselves in Maya studies the discipline itself has followed the general trends and stages of development in archaeological culture. In the 19th century most of the study done on the Mayan civilization consisted of extensive surveys of architectural remains, sculptures and intensive studies of hieroglyphic systems. At that time the oldest history of the Maya, today known as the Pre-Classical period, was the central key in the archaeology conducted. Maya archaeology can thus prior to 1958 be divided into two periods: the first one from 1839 to 1924 known as the “Great Explorer” period. The archaeological work done during this period was largely financed by museums and private individuals with the Peabody museum of Harvard and the British Museum as the most active contributors. In difference from today universities are the main body of finance. During this period Maya archaeologists were mostly trained in North America with an anthropological view to the field and were intellectually influenced by the dominant anthropologists Franz Boas. The methods of Boas consisted mostly of fieldwork and processes of data which emphasized the descriptive aspect thus excluding explanatory theories. He saw theorizing as a premature attempt about still not yet known cultures. This approach made the archaeological work in the 1800’s known as much oriented towards rigorous techniques and descriptions and when theories were advanced it was in the particularistic and historical nature. This method gained critique in the early 20th century when archaeologists began to reflect upon the rigid work done in the previous century which intensified and distinguished itself as the predominant professional characteristics in the period following the “Great Explorer” in 1924 (Adams, 1969: 4).

3.1.1 Carnegie, 1924-1958

In 1924 Maya archaeology experienced a change of dominance when the Division of Historical Research of the Carnegie Institution of Washington took
over most of the activities of Maya archaeology together with the Peabody Museum of Harvard as they entered in a symbiotic relationship. Most of the influential scientists were therefore trained at Harvard University under A.M. Tozzer, who previously were active in fieldwork but withdrawn and become focused on research. During this period A.V. Kidder (Adams, 1969: 5), chairman of the Division of Historical Research during 1930-1950, dominated the field of American archaeology and by a large scale followed anthropologists Franz Boas’s methods of systematic gathering of data. Although Kidder reflected the before mentioned attitude of extreme skepticism towards theorizing he combined those analysis with innovating new techniques, such as stratigraphic excavation. He also together with anthropologists S.G. Morley integrated the Maya field with other collateral and supportive fields which could provide further data to archaeology as well as anthropology. This lead to an embracement of linguistic studies of Andrade, ethnology studies of Redfield, Chamberlin’s historical investigations, Scholes’ ethno-historical studies as well as an emphatization of medical and environmental studies. The aim was to gain greater and more diverse samples of Maya prehistoric culture through intensive excavations in selective areas and sites. This resulted in a vast amount of work done with quality reports published in high quantity considering fewer resources available than during previous period and the complexity and size of the problems that occurred as more data became accessible. In 1938 as Vannevar Bush was elected President of the Carnegie Institution (Adams, 1969: 6) the whole agenda became strongly reoriented towards the “hard” sciences and a systematic reduction and excluding of humanistic science programs took place which was though as a needless approach by many.

The Carnegie period also gained criticism in the field of archaeology of being too occupied with techniques and descriptions by anthropologist A. Tozzer (Adams, 1969: 5) in 1937 and gained support by Kluckhohn (ibid), of the same field, in 1940, as mentioned in chapter two. The criticism had similarities to the critique Great Explorer period gained in the beginning of the 20th century as archaeologists and anthropologists were reflecting against the nonexistence of advancement of explanatory theories and were told the risk of it developing into a sterile exercise in systematics. The criticism continued throughout the 1940’s towards 1958 and thus as in so many endeavors the development of Maya archaeology was intervened by World War II, as the quandary of the Great War caused to the earlier period. In 1950, after the retirement of Kidder archaeologists H.E.D. Pollock was left to close up the operations of the department which took place in 1958 marking the end of the Carnegie period. During the same year in 1958 through the work art historian Proskouriakoff (Adams, 1969: 7) Maya studies shifted from an object-oriented research institutionally funded by museums into the hands of academic institutions. The motivation was to bring archaeological problems more open to other occupations thus reversing the trend of specialization and providing greater opportunities to younger investigators to gain acquaintance with Mesoamerican archaeology. The second half of 20th century Maya archaeology thus changed in a way many other science programs did during the 1960’s – it became more university oriented (Adams, 1969: 5ff).
3.2 Maya archaeology of the 1960's towards 1980

The archaeological work done during the 1960's fell into three major categories (Adams, 1969: 8) when conducting research in the three Maya regions, the lowlands, highlands and the Pacific coast: A. Intensive site excavations, B. Limited excavation and testing, C. Exploration and survey. A description of the whereabouts of the three Maya regions is shown in figure two. Between 1958 and 1968 the main emphasis befell on the lowlands which noted for more work than in the two others regions together. Through intensive site excavations (Category A) the Maya lowland regions provided the most data of the three regions but were not only known for its quantitative outcome but also for its qualitative conclusions it gave to the discipline. It was through the large projects at Tikal and Dzibilchaltun which has in a sense dominated the thinking of Maya archaeology. Other lowland region excavations in Palenque, Altar de Sacrificios and Seibal have all contributed what later was described as a massive amount of data collected for Maya prehistorians. The research done on the Maya lowlands compared to the highlands and Pacific coast regions can in pure numbers put to 22 out of 36 excavated/surveyed sites, during the timeline mentioned above, making the lowland region a dominant investigational area. Although smaller amounts of work have been conducted in the other regions it was by the effort of Proskouriakoff's by introducing Maya archaeology to a wider circle of specialists that such a work could be enabled. Topical studies during the first ten years after the Carnegie operations became increasingly leading in the study of the Mayan past. G.R. Willey's (Adams, 1969: 12) reintroduction of settlement pattern studies to the Maya discipline became one of the most effective instruments available for expressing archaeological data after successfully having used this method in the Virú Valley project in Peru. This made it available to imply social structures of settlement patterns in an ecological setting and matters previously thought to be beyond detection in archaeology such as class structuring, economic systems, social integration now became accessible.

The 1970's archaeology consisted primarily of deepening of topical studies such as agriculture, ceramics, trade, settlement patterns and social organization and of course the collapse. During the period of 1976-1980 an amount of 200 papers concerning Maya archaeology were published where 120 of them lied on topical studies mentioned above. Social organization studies of the Maya have been a sizzling topic to conduct research upon since it wasn’t until in the 1960’s when a new model of Maya society began to emerge. It was through the epigraphic advancements of Proskouriakoff and Berlin (Adams, 1969: 32) demonstrating a dynastic and a more secular historical content to the monumental inscriptions. In the 1970’s recognition of occupational specialization within the middle classes of Maya culture came apparent through papers by Adams and Becker which highlighted the importance of taking in account of specialized and most probably fulltime occupations. This allowed further, but not yet conclusive, hypothesis of extensive trading systems within the civilization. Hammond’s 1972 (Adams, Hammond, 1982: 507) obsidian trade model detected different sources of obsidian within the society which analyses demonstrates even long-distance trade might have occurred during the earlier periods. However trade patterns have been documented there has been little advancement of theorizing amongst other sources of material. It is due to the
difficulty of defining sources of such but on one hand recognition of marine routes around the Yucatan during the Pre-Classic and Classic periods has emphasized the importance of maritime adaptations and the role of seaborne commerce in the society. A publication by Gifford (Adams, Hammond, 1982: 506) concerning the site Barton Ramie report of ceramic studies in 1976 paved way for the Belize Valley chronology as older types of ceramic were found dated about 3000 BP, in northern Belize. Studies of Maya pottery have thus been an attractive chart to work with since it gives a deeper view of Pre-Classic civilization and assists in the research of the origins of Maya civilization.

Concerning research of the Classic collapse in the 1970’s a number of scientists have come forth with either new or renewed theories. Culbert (Adams, Hammond, 1982: 501) spoke of a culture bound to a growth system as Sharer (ibid) emphasized increasing population awareness coupled with a stress-response model. Other scientists like Hosler, Sabloff and Runge (ibid) used population densities as a model but adds trade, external pressures and elite activities as decisive factors as well. The search for the reasons of the Classic collapse became one of the intriguing topics to work with since there haven’t yet been conclusive theories of the cause of the event. Although the Classic collapse is still a topic under discussion today, since the late 1970’s fewer works have been conducted to determine the causes. One reason might be as Webster (Webster, 2002: 7) puts it is that as we know so much of them already more details would only haze the environment concerning the whole of Mayan civilization because too many opinions and interpretations already flow around the subject.
4. Concept of a collapse

When speaking of a collapse one often associates to synonyms like ‘end’, ‘vanish’, ‘extinct’, an often misguided term when using the word because it at some occasions doesn’t give a fair picture of how the event affected the future. Anthropologists and historian Joseph A. Tainter (Tainter, 1990: 4) describes collapse as a ‘broad term’ covering many kinds of processes. In 1929, when the stock market fell, it was called a collapse but our monetary system, the one factor that allowed this to happen, survived. One can draw parallels to the Soviet collapse in 1989, but the country still lives. The Mayan empire collapsed during the 9th century but wasn’t extinct until 1697 by the Spaniards after 170 years of war waging against each other. Tainter (ibid) focuses the term of civilization collapse on institutional dimensions, which he primarily saw as a political process. When a society experiences less stratification differences as well as less political centralization the civilization is invoked into a loss of consciousness of its surroundings. When the economy production suffers a downfall and political units become more territorial centralized into smaller areas or a decreased exchange of information and resources occur among individuals/groups as well as between centers and its peripheries they were considered as signs of downfall of civilization. It is therefore ideal in my opinion to consider the concept of a collapse to be analyzed through the elements that gave the justified expression collapse, as with the Mayans for their abrupt end of their Classic period. I prefer not to spotlight the term as a self explainable reason to civilizations downfall. Of course even if lacking knowledge of a specific society general presumptions can be made to mark reasons of a collapse. However it doesn’t give a picture of why such event took place or how the society was consent to let such thing happen. It only gives a premature hypothesis for a, if possible, future theory.

On this subject it wasn’t only one or two aspects that fell but many and determining when the Mayan, or any other complex civilization, reached the climax point of this development will have to be studied through the complexity of the causes that lead to the conclusion of a collapse.

4.1 Patterns of the Classic collapse

The Mayan empire stretched from the Highlands of Yucatan in modern east Mexico to the Lowlands through Belize, Guatemala, El Salvador and Honduras. It was by all means a Central American civilization with connections with the Aztecs in Mexico. Although including the northern hemisphere most activities of the Classic Maya occurred in the lowlands and exactly what happened during the event of the collapse the archaeological data gathered over the years reveal several mini-collapses as well as social and political frictions. Exactly what those disturbances were one has to gain knowledge of before conducting any form of hypotheses over the event. Patterns of the collapse, as summarized by Webster (Webster, 2002: 214), follow general steps which are results of
decades of research conducted of the Mayans and works as a foundation of our common understanding of the collapse.

- In the late 8th century AD rapid disappearance of royal dynasties occurred over a vast region of the southern lowlands lasting for about a century. This disappearance began earlier in the peripheries in northwest and progressed inwards towards the core regions around Tikal.
- Elements of the Classic Maya Great Tradition such as elaborate burials declined. Monuments were no longer carved as weren’t royal buildings constructed or maintained. Production and exchange of goods faded away resulting in rapid disappearance of kingship and ceased functions of royal courts as centers of dynastic power and cultural influence.
- In numerous places monuments were destroyed or defaced, Classic buildings and tombs ravaged and offerings ceased from both Post-Classic and other people from surrounding areas. Some major centers were in contrast abandoned without signs of widespread and severe violence or destruction.
- Few remnants of the old Classic royal tradition survived as did the rural farmers of those areas but most or all supporting population disappeared at the same time as the kings lost power or very shortly thereafter.
- A political disruption was triggered when the overall population density reached its maximum supportive size and the whole of ruling dynasties were more abundant than before.
- The Mayan lowlands that had supported millions of people eventually lost most of its population leaving behind a vast deserted landscape. So vast that when Cortes and his men in AD 1524 and 1525 marched across nearly starved to death. The same area that previously had supported millions of people.

Two parts of the collapse stand out as the most vivid with the first the abrupt decline of Classic Maya institutions of kingship. Where elsewhere nobles or other leaders had survived the kings had disappeared. Second is the population decline as its long-term effects produced the landscape of abandoned centers and ranks as one of the greatest demographic transformations in history, whether it took decades or centuries for the inhabitants to disappear (Webster, 2002: 213ff).
5. Theories of the Classic Maya collapse

Two pioneering Mayanists, Thomas Gann and J.E.S. Thompson (Webster, 2002: 217) gave in 1931 a number of explanations for the Classic collapse. They talked about climatic changes, exhaustion of soil, epidemic diseases, earthquakes, war (internecine, foreign or both), ‘national decadence’ and ‘religious and superstitious causes’. Considering from present day, with a little rephrasing, they are strikingly similar to the explanations still argued today. Through that point of view one would imagine scientists would already have been able to rule many of the theories out and determine one more plausible than another. In reality the knowledge of the Mayans has increased in a way it almost becomes impractical to put one theory over another, a matter which will be discussed later on.

In the below parts the most relevant theories of the demise of the Classic collapse will be presented by authors whom have dedicated most of their scientific career in Maya or Mesoamerican archaeology. The first theory from 1976 by Turner is a subject of population density and how it might cause distress to the high populated Maya areas. Second theory is not suggested by an archaeologists but a botanist with diseases as the most concern. In the following the climatological approach towards the collapse will be presented by archaeologists Folan and science writer Abate. Folan who have dedicated much of his research on climatological affects on ancient societies have in his work in detail presented data supporting climate changes. David Webster, a known professor of archaeological anthropology argues for the most rapidly affected areas which were involved during the collapse: the kings, lords and their associated Great Tradition. He also gives a broader cause to the collapse based on non ecological and ecological causes. Climate debates will be continued by Lucero in 2002 and Peterson in 2006 as both have drought for reasons to the collapse. Lucero on another hand also suggest an elite decline due to water reservoirs drying up and don’t have a climate change as a single event theory.

5.1 Billie L. Turner, II – Population density (1976)

One of the most important and controversial issues of lowland Classic Maya has been the concern of population density and whether it contributed to the demise of civilization. American geographer Billie L. Turner has in an attempt through both house site and agricultural approaches to estimate an approximate figure of the population density per square kilometer in lowland Maya civic-centers of the Río Bec area. Through a house site approach an attempt of establishing the maximum density of population for specific surroundings is made. Studies like these have previously been conducted by Haviland and Puleston (Turner, 1976: 73) where Haviland in his research concludes the rural area of Tikal’s peak population densities have reach as much as to 600 to 700 people per sqKm. Puleston’s calculations of the surroundings between Tikal and Uaxactún have been around 300. As for Turner’s calculations in the Río Bec area a total of 142 house sites have been identified in a 106 hectares area, making it 1,34 houses per hectare. Turner’s method of calculation derives from two variables: average number of occupants per house and number of houses simultaneously inhabited. Common estimates of occupants in one
house have been five in Río Bec area. For Barton Ramier the number is 7.5 through Willey and through Puleston calculations and 5.4 between the surroundings of Tikal and Uaxactún (Turner, 1976: 77). Calculating the Río Bec area through five persons per house estimated number of population density per sqKm is concluded to be as much as 670 inhabitants in the rural areas after scraping off margin errors. The pattern of Río Bec occupation confirms to the one of Tikal and Barton Ramier that all three areas were inhabited approximately at the same time around AD 730 and 830 as can be suggested from evidence of ceramics.

The second approach the agricultural view of estimating population density one uses it to approximate maximum population density for a whole area. In this case the entire Maya lowland. Estimations through this approach are generally based on contemporary slash-and-burn productions in the lowland which then are applied to the Classic Maya. According to Cowgill’s (Turner, 1976: 74) calculations this kind of carrying capacity ranges from 38 to 77 inhabitants per sqKm. In northern Petén for the Río Bec area calculated by Vogeler (ibid) the number is about 28 to 85. Turner emphasizes though that agricultural estimates must be viewed with caution as they are subjects to assumptions and interpretations.

Variables deviated from such to calculate an estimate includes intensity and productivity of the agricultural system in progress and of the amount of cultivable land, variables that are easily manipulated. However the agricultural approach has been one of few methods that allows possible estimates of population densities for the entire Classic Maya and has been used to support various theories concerning actual and potential densities. In Turner’s study of the Río Bec area through an agricultural approach the foundation of the variables have been cultivation of maize under various levels of agricultural intensity and corresponding cropping techniques. As intensity have increased parallel increase in population sizes and densities occurs as well where total density figure varies from about 75 to 640 inhabitants per sqKm in all of the region total (Turner, 1976:73ff).

The population issue has gained devotion of scholars from number of fields to increase insight into Maya sociopolitical organization and ecological issues to expand knowledge of the demise of the Classic Maya. It is today arguable whether or not the Mayan high population density contributed to a breakdown of the total carrying capacity and if this resulted in emigration or disease spread epidemics due to failure of health, as will be given details of in the next theory presented.
5.2 James L. Brewbaker – Diseases of maize (1979)

The question of disease spread epidemics contributing or working as a sole factor for the demise of Classic Maya civilization have been discussed by botanist James L. Brewbaker as he argues for maize spread diseases in the wet lowland tropics. Major diseases of maize have been summarized besides from Brewbaker but also by Renfro and Ullstrup in 1976 and through Ortega in 1974 in both wet and dry lowland areas and smaller areas of the highlands. Brewbaker’s study is mostly focused on the maize mosaic virus (MMV) as it destroys yields of corn where it acts as most severe where conditions allow a year-round corn production. As the maize mosaic virus has a unique worldwide distribution it has still up to this day been presented in southern United States, Mexico, Nicaragua, Venezuela, Nigeria, Tanzania, Mauritius, Australia and several Pacific islands. The complexity of the virus is caused by a bullet-shaped rhabdovirus and transmitted only from maize and teosinte. A sustained maize crop failure due to disease is proposed by Turner to have contributed to the Classic collapse as maize was a supplement food source in the Maya diet. As high severity of MMV can only be detected in tropic wetlands a year-round production of maize can realistically be argued only for the lowland Maya as the region supports high activity of *Peregrinus maidis*, i.e. planthoppers from which MMV is transmitted of. The symptoms of MMV are shortening of internodes and leaves and long chlorotic stripes over leaf veins. Struck by the virus husks are often shortened, and sheath and rind might show chlorotic mosaicism. It is suggested since corn first was brought to Puerto Rico before the time of Christ the virus have been travelling by wind to the Mayan lowlands to create an epidemic since trade paths between the Yucatán peninsula and the West Indies did not occur at that time. The general pattern of site abandonment of Classic Maya lowlands is from the peripheries from east to west. The last eastern inscribed dated monuments are AD 799 at Palenque, AD 795 at Piedras Negras and AD 800 at Bonampak. The western centers last inscriptions follow the pattern such as in Tikal and Barton Ramier in AD 830 and AD 840 for Yaxchilán. According to Brewbaker’s interpretation of this data the spread of the virus has been slow and hazardous as sites like Edzna were never resettled (Brewbaker, 1979).


Science writer for the San Francisco Examiner in 1994 Tom Abate uses a climatological approach towards the Classic Maya collapse and uses it to compare climate change effects with other complex civilizations throughout history. His main question institutes from climate changes and whether they have caused or contributed to the collapse of ancient civilizations and if the archaeological and paleoclimatological records yield evidence for such a statement. Among scientists Yale University archaeologists Harvey Weiss has a definite answer to the first as he strongly believes climate changes have abruptly contributed to different civilizations collapse and refers to northern Mesopotamian valley around 4200 BP when a rapid dry spell literally had catastrophic effects against the Akkadian Empire. A famous account from Mesopotamian clay dated around 4000 BP constitutes: “[…] agricultural tracts produced no grain. The inundated tracts produced no fish. The irrigated orchards produced neither syrup nor wine.” (Abate, 1994: 516). Weiss uses it as
an argument for being as close to an eyewitness account as we’re likely to get of a climatic shift that disrupted civilizations but other archaeologists argue it to be exaggerated or have been too interpreted. As for the Classic Maya research conducted by four archaeologists with William J. Folan as the leading author show that paleoclimatological and archaeological data strongly indicate a correlation between atmospheric moisture and the political and socioeconomic history of the lowland Maya (Folan, 1983: 453). The Folan study, conducted with major climatological studies for support, shows in broad perspective the Mesoamerican archaeological record to match the data compiled by geologists George Denton and Wibjorn Karlén in 1973 (Folan, 1983: 456) relating to the advance and retreat of both tree lines in the Alaskan and Swedish mountains and advance and retreat of glacial. This indicated global periods of cold and warm weather and is used to determine what effects these climatic changes brought to southern Mexico. Exploring their glacial chronology Folan suggests a wet period had occurred in the Mayan lowlands between 3400 and 2500 BP followed by a drier interval up to 1400 BP. From 1400 to 1100 BP, during the late Classic, a cycle of cooler weather and heavier rainfall occurred which continued with warmer and drier intervals from 1100 to 700 BP. Records like these are easily applicable to important dates of the Classic Maya such as AD 292 (Webster, 2002: 209) which marks the beginning of the Classic period and correlates with the world-wide date of 1680 BP established by Wendland and Bryson for a major botanic change which supposedly had aided in the advancement of Pre-Classic to Classic era. Another date influenced by cold and wet weather cycles during AD 534-593 marks the transition from early to late Classic and matches the end of that period with Tikal’s maximum development at AD 600. The most interesting date that coherent with climatic cycles is Wendland’s and Bryson’s cultural discontinuity date of 1260 BP which equates reasonable well with AD 790 when a rapid drop of Maya texts occurred and can be explained by climate turning into warmer and drier periods (Folan, 1983: 458).

Although climate change hypothesis have been relatively attractive suggestions to civilizations collapse nowadays there are scientists who avoid such propositions. It is still arguable whether the margins of error in archaeological or climatological data are too great to prove that a natural event has occurred. Howard University anthropologists Bruce Dahlin (Abate, 1994:517) argues that climate interacts with social and political variables in determining whether civilizations fall. He underlines societies such as the late Maya might have diminished under a climatic shift but reminds that under proper leadership, as great civilizations usually had, people were more bound to organize themselves to such changes and avoid a total collapse. Abate concludes his article by the words of anthropologists Alan Kolata that even if evidence links climate change to a collapse natural events are most probably accompanied by other social conflicts unrecorded in the archaeological record, indicating the climate-collapse hypotheses should not be taken for granted as a single cause event (Abate, 1994: 519).
5.4 Lisa J. Lucero – Role of Water Control (2002)

Following section is a comparable theory to the climatic change debate but more centered towards human activity as anthropologists Lisa J. Lucero discusses the roles of water control that might have contributed to the Classic Maya collapse. She focuses her article on an issue long underestimated among scholars: the demise of political power of the Maya due to lack of water control. Since the rise of the Mayan civilization deviates from other complex civilizations in relation to natural water reservoirs the scale of water control in the Maya correlates with the degree of political power. In areas such as Mesopotamia, Egypt, China, the Indus Valley, Andean South America and central Mexican civilizations they emerged in areas with natural water sources and agricultural land that could support a dense population. The Mayans emerged in southern lowlands jungles and ruled in areas without any natural water sources. Lucero argues that scientists have failed to take notice of the importance of the control of artificial reservoirs by Maya rulers which she suggests has played a critical role both in the emergence and its later collapse. In the event of the collapse of the Classic Maya one has to note that mostly the largest centers failed to survive whereas minor centers avoided such and is according to Lucero because of less dependence on water control. She also underlines the loss of water control emerged due to climatic changes with decreased rainfall and therefore collapse of elite rules. Evidence supporting Lucero’s theory are the abandonment of major centers of Tikal and Calakmul in the 900’s, both dealing with drought but second also with threat of foreign power due to weakened leadership. In both centers as in Caracol, Copán and Palenque all suffered a disruption in royal interactions during the 800’s where leaders were not only facing with depleting resources but also internal among elite lineages. Decreased rainfall and its possible effects such as disease and decreasing health are possibly the main factors that put in motion the erosion of political power and might have resulted farmers emigrating from elite ruled areas and population dying due to decreased health and fertility (Lucero, 2002).

5.5 David Webster – (I) Elite Collapse (2002)

The Elite Collapse theory explained by Webster is classified into four different categories:

- A. Peasant revolts
- B. Internal warfare
- C. Foreign invasion
- D. Disruption of trade networks

A – Peasant revolts

The most well-known explanation of a peasant uprising was advanced by J.E.S. Thompson in 1954 (Webster, 2002, 219) where he suggests the idea of Maya elites being overthrown by their subjects – the peasant rebellion hypothesis. The reason for this approach by Thompson lies in the single most prominent class of archaeological remains on the Maya landscape – buildings. Prior to 1960 the Classic Maya were thought to be strongly theocratic and ruled by priests instead of kings which resulted in a logic that ordinary people worked under selfless directions of the theocrats to create immense buildings. Since
great buildings are among the principal cornerstones of civilization anywhere
the buildings Maya raised became monumental of the descriptive aspects of the
culture. Thompson believed that monumental Maya buildings required
enormous investments of human labor reminiscent of the great pyramids of
Egypt and argued that the elite demands for support and labor of building such
became increasingly oppressive undermining the religious devotion and
ordinary people of Maya. This would supposedly have lead to a rebellion
against the priests in serious spontaneous uprisings that broke out at slightly
different times from place to place.

Webster reflected a serious problem with Thompson’s hypothesis as he points
out peasant revolts could only account for only part of what happened to the
Maya and not be related to as a single-event theory. The peasant revolt
hypothesis didn’t solve the massive depopulation issue which occurred across
the Classic Maya between AD 850 and 900 and points out “if relieved of their
demanding elites, farmers should have thrived mightily, not declined in
numbers” (Webster, 2002: 222). He secondly gives critique to the underlying
assumption that oppressive burdens were placed on the Maya population.
Since there only have been a few systematic research conducted to determine
what kind of labor techniques were used to build the buildings Webster’s
colleague Elliot Abrams conducted in 1981 a series of time-motion studies and
experiments on construction and sculpture techniques during Webster’s work at
Copan. The conclusion became that the buildings of Copan did not require as
much labor and time as previously believed by Thompson. Webster later used
Abram’s methods to model a construction potential of Copan’s population. His
conclusion was that if each Copan peasant family provided a single laborer
once in ten years and that this laborer worked only 100 days during that year a
labor force of this size could have generated the equivalent of 30 such
structures during the period of AD 750 and 800 alone. Webster concluded that
such work burden cannot be considered a hard and oppressive level of
demand. He on the other hand doesn’t reject the peasant revolt hypothesis
entirely but underlines its effect not to have been the major factor of the
collapse but as one possible reason along others of the decline (Webster, 2002:
217ff).

B – Internal warfare
Archaeological research and inscriptions show that internal warfare among the
Maya took place already during Middle Pre-Classic times and increased in
intensity towards the 7th and 8th centuries and became an almost pathological
condition of Maya society. Noted is that there are more fortifications known in
the Maya Lowlands than in the more warlike Central Mexico and by Late
Classic times war have seemed to been a both ideological and practical
component of kingship. Due to the existing evidence of wars being initiated by
kings and nobles Webster places the internal warfare hypothesis into the Elite
Collapse category. Although warfare is not necessarily just a destructive
process Webster argues it was one way Maya rulers’ centralized power and
authority in Pre-Classic and Early Classic periods. He also reminds that there
never was any overall unity among the many Classic polities and even with
shared folkways and elite traditions it no more prevented conflict than they did
among the city-states of ancient Greece. Warfare among the Maya have long
been seen as a futile point of view since a common understanding have brewed among the scientist during the first half of the 20th century that the Mayans were one of the most peaceful civilizations of the Americas. However as more evidence of war-related terms have been revealed by arts and texts and fortifications the old approach has more or less been muted today (Webster, 2002: 223ff).

Enthusiastic as Webster is about the implications of warfare on ancient civilizations he believes internal warfare among the Maya is one reason why the culture collapsed but doesn’t emphasize it as a whole reason. An outcome of a war is usually divided amongst winners and losers and suggests if anyone want to use warfare as a general explanation of the Maya collapse one has to prove the wars of the 8th and 9th century only generated losers. As it is for the peasant rebellion hypothesis there are no links between the depopulation issue and internal warfare. Historically speaking local population of other societies has quickly rebounded after a conflict and the fact that millions of people during the length of the collapse had died due to preindustrial warfare seemed unlikely (Webster, 2002: 223ff).

C – Foreign invasion
The foreign invasion hypothesis, if such has ever occurred, generally affected the local areas of the Classic Maya. According to a stela (a stone monument) from Seibal in the Maya lowlands dated to about AD 800 is proposed to show iconographic elements not recognizable with the Classic Maya. Along with other evidence of new forms of fine-paste pottery detected during the 1960’s suggests to have been ascribed to invaders from the coastal areas of Campeche and Tabasco in the Maya highlands. The whole explanation of a foreign invasion envisions that the Mayan civilization experienced an external military pressure by outside forces thus generating a negative pattern of destructive consequences leading to the collapse. Scientists are most obligated to propose, if such event ever took place, an invasion would occur from other large and dynamic political systems of the west in the highland Mexicans and/or Mexicanized Maya from the Gulf coast, visioning the Mayan geography in Middle America. Although the discussion of a foreign invasion have been debated among scientists in earlier days it has in present day in general become contradicted due to more research conducted especially on the Seibal iconography which has drawn away the dramatic appeal it once had. It is today in knowledge that the monuments at the end of the Classic era portrays a much wider range of personage of social and political status than they have earlier done. Scientists have also been able to read the Seibal texts representing distinctively the Classic Maya tradition of calendar systems, rituals, names and titles which contradict any foreign threat. It is sought by Webster to recall the foreign invasion hypothesis more as a symptom rather than a cause of the collapse, as with the internal warfare explanations which apply here as well (Webster, 2002: 228ff).

D. (A1) – Disruption of trade networks
The decline of trade networks hypothesis applies to both aspects of Webster’s theories since the basic logic of the argument is that Maya kings and elites were heavily depended on functioning trade networks to uphold their authority by
possessing, displaying and redistributing prestige objects to attract and bind commoners to their political duties. Due to a decline of such networks kings and nobles lost the essentialness of their authority which weakened their influence over their subjects resulting in migration to other regions. The origin of declining trade networks hypothesis comes from the understanding that Maya kings end elites were a part of a large network of trade routes operating across the borders of Maya kingdom linking to a much larger commercial system of Teotihuacan in modern Mexico. As it has long been assumed that Teotihuacan abruptly declined around AD 700-750 it triggered a destructive pattern of economic relations throughout Mesoamerica which contributed to the Classic Maya collapse.

The trade disruption has been an attractive idea to implicate with the collapse but recent studies have shown that Teotihuacan seem to have lost its political and economic vastness around hundred years earlier than before thought around AD 600-650 and its influence on the Mayans was strongest around the 4th and 5th centuries. This meaning, if the demise of Teotihuacan had any influence on the Classic Maya it is more likely to be related to the 6th century than during the actual timeline of the collapse. Another problem with a long-distance trade hypothesis being the cause of the collapse is that it originated before scientists had any detailed grasp of the inscriptions which after having been decoded show little indication of exchange of any kind. Webster’s means it’s not the failure of managing well-established networks of economic exchange that contributed to the collapse but instead the insufficiency of Maya kings and nobles to adapt to the crises of the 8th and 9th centuries by not instituting such exchanges (Webster, 2002: 231ff).

5.5.1 David Webster – (II) Total System Collapse (2002)

The second aspect of the Maya collapse explained by Webster the Total System Collapse is divided into two categories with various subheadings.

A. Non-ecological causes
   1. Collapse of trade networks
   2. Ideological pathology

B. Ecological causes
   1. Catastrophic ecological causes
      a. Earthquakes, hurricanes, and volcanic eruptions
      b. Climatic change (drought)
      c. Epidemic diseases of humans
   2. Long-term ecological causes
      a. Degradation of agricultural landscape through human activity


A2 – Non-ecological causes: Ideological pathology

The ideological pathology hypothesis explained by Webster is a speculation asserted by Gann and Thompson when talking about religious and superstitious causes. Although Webster believes the idea of the collapse being caused by ideological basis is unworkable he agrees they might have slightly contributed
to the process. An example of an ideological pathology completely braking down a society comes from southeast Africa, the Xhosa, from 1856. The Xhosa listened to a prophecy from a young girl claiming to have received messages from dead ancestors saying all livestock and food should be destroyed in return for a rebirth of the earth and an endless supply of immortal cattle. It resulted in thousands of people starving to death and for the survivors a life of an already broken culture. Anthropologists Grant D. Jones explained it to be the greatest self-inflicted immolation of a people in all history. The same idea is asserted to the Mayans as they used cyclical calendars predicting certain events coherent to astronomy and social life. It is suggested by archaeologists Dennis Puleston (Webster, 2002: 236) that they fell into predictable patterns in beginning of Classic times around AD 250 and that their belief stimulated the collapse as Maya scholars and priests were aware of their fate. Webster denies this idea due to our current understanding of the Mayans but agrees at the same time a scenario like this might be plausible as a contributor to certain parts of Maya land but not to the overall society (Webster, 2002: 234ff).

B1 – Ecological causes
Following sequel is a follow-up to the second of Webster’s theories the ‘Total System Collapse’. Above mentioned parts A1 and A2 were of non-ecological aspects and following is turned to the ecological causes both catastrophic and long-term.

B1a – Ecological causes: Earthquakes, hurricanes, and volcanic eruptions
Because of the geographical location of the Mayan society earthquakes, hurricanes and volcanic eruptions are not an unusual pattern of phenomenon and often even co-occur. Webster sees these occurrences as plausible aspects of the collapse but not as a whole reason. Pointing out why earthquakes and volcanism are even out of the local phenomena in the collapse is because either has much affected on the great limestone platform underlying most of the Maya Lowlands. Although it is not unexpected one has to take in notice unpredictable natural catastrophes like these since archaeologists have unearthed whole landscapes, including houses and agricultural fields, buried by Pre-Classic eruptions where it was clear ancient populace were forced to abandon their crops and homes (Webster, 2002: 236ff).

B1b – Ecological causes: Climatic change (drought)
One attractive theory which recently has coped scientists minds are climatic changes due to developed sophisticated methods for reconstruction and interpretation of climatic history. One Webster points out to have contributed to the collapse are droughts, more exactly megadroughts when periods of reduced rainfall have lasted for decades or centuries. He refers to work of Richardson Gill in 2000, The Great Maya Droughts, which summarizes and interprets a vast amount of data concerning world’s atmospheric systems as historical droughts and famines. The Mayan society has experienced droughts before but it is proposed during AD 800 and 1000 the most extended and destructive drought period occurred where not only crops failed but also rivers and lakes dried up. As the whole Mayan vital construction cultures had a fatal vulnerability – its total dependence on consistent rainfall – it is not a farfetched idea of reservoirs drying up resulting in no drinking water. This hypothesis is one that Webster is
taking affection on because it speaks of a total system collapse as it postulates a catastrophe hitting all levels of the Maya society at the same time. However he underlines, in difference from Gill, that this cannot be explained as a single cause event since most of the data presented by Gill comes from the Maya highlands and is linked with the newly understood hemispheric trends to argue the existence of a megadrought. As there are insufficient data from the southern lowlands extreme droughts cannot be confirmed to have struck the Pacific side of Mesoamerica (Webster, 2002: 239ff).

**B1c – Ecological causes: Epidemic diseases of humans**
Prior to 1492 it is understood that the Americas were a much healthier place than Europe. Not saying it was free of disease. The Mayans were afflicted by bacillary, amoebic dysentery, pneumonia, tuberculosis, fevers, bacterial infections, and salmonella among others. As the Black Death struck Europe in the 14th century hypothesis about an epidemic or pandemic hitting Central America in the late 8th century have been discussed. The possibility of such cannot be ruled out due to the vast population density in the Mayan urban areas which some scientists argue of are easier to have a lethal effect on the population than on low density areas. But questions rise up as that if such would have taken place it would also affect the northern parts of Maya society, where no proofs of a vast epidemic have so far been discovered and why the population didn’t eventually recover as the Europeans did? Identifying diseases in ancient archaeological population have been and still is problematic particularly if the case is swiftly lethal diseases since they leave no traces on bones or teeth. Although with factors such as poor diet might contribute to general debilitation and disease further samples of disease infected remains need to be studied to confirm such theory as an imminent cause (Webster, 2002: 247ff).

**B2a – Long-term ecological causes: Degradation of agricultural landscape through human activity**
Ever since systematic studies of the Mayans began destruction of the agricultural landscape has been identified as one of the prime causes of the Classic collapse. This hypothesis origin in the sense that the Mayans did it to themselves which is drawing resembles to the ideological pathology hypothesis however on a more ecological basis. Already in the 1930’s botanist C.W. Cooke (Webster, 2002: 251) proposed that deep lakes near Tikal had silted up with clay due to deforestation and cultivation and turned into swamps which became breeding grounds for disease-bearing insects. Another conclusion following Cooke came from the Ricketsons who meant the Mayans used more intensive cultivation methods than just slash-and-burn after finding evidence for unusually dense populations which ultimately damaged the environment. Although such propositions lacked sufficient direct evidence and were seen plausible only to the tropical forest ecosystems compared to those of other parts of the world. It is after all well-known when human population density grows the balanced system between man and nature is usually undermined from which a cycle of destructive patterns are triggered such as too frequent cultivation of fields and deforestation. It is suggested by a number of archaeologists the Mayans put themselves in an ecological trap as population grew out of control and their productive landscapes degraded as human capacity were reached or
exceeded. Plenty of evidence for such hypotheses are confirmed by both paleoecologists and archaeologists and suggesting the Classic collapse was due to the changes in the agricultural ecosystem has been an attractive alternative since it focuses on all the important energetic foundations of Maya civilization (Webster, 2002: 251ff).
6. Analysis

Given the theories presented by the authors and reviewed here one has to wonder how an archaeological area of investigation explored since the 1840’s can still be a quandary in present day for scientist to solve. Known the Classic collapse weren’t systematically analyzed since the 1960’s the research behind it should have supplied a steady background and a firmer grasp on the subject but hence has not befallen. It is true the first period of Maya archaeology resented theorizing and moved towards a systematized structure of the subject matter. The second period mostly followed the previous though introducing it to a wider perspective of scientific areas but foremost to add data to the already scrutinized system. In the 1960’s a serious attempt in theorizing on the Classic collapse was initiated. It was not only the collapse that was theorized upon but other areas too and as for such one can say after the Carnegie period theorizing on the whole subject of Maya archaeology emerged.

The perception of the Mayans among scientists has shifted over the years. During the 19th century (Fash, 1994: 182) the interests of the Mayans were sparked by a series of publications of ancient Maya culture. It was due to a series of superb photographs and drawings of inscriptions on stone monuments that drew most scientists to decipher the Maya scripts. The interest in Maya scripts followed to the early 20th century and resulted in an outbreak of readings of Maya calendrics and hieroglyphs. During the 19th and early 20th century scientists speculated of the nature of the Maya society. Due to the information available at that time acquired through Maya writings, preliminary surveys and knowledge of peasant lifestyle characterizing Maya villages at the end of 19th century the view of the ancient Mayan society was established as a theocracy run by priests. One of the greatest view changing contributors to Maya society was Proskouriakoff’s (Fash, 1994: 183) discovery in the 1970’s that the stone monuments did not tell any historical information, as was previously thought. Instead they recorded important events in the lives of Maya rulers such as birth, inauguration, conquests and death. This discovery enabled to decipher dynastic histories and royal genealogies from most major cities of the Classic period and break through a whole new concept of the Mayan elite life that previously was unreachable. Although this breakthrough was one of the noteworthy ones minor discoveries earlier changed the outlook of Maya civilization significantly. Up until 1946 (ibid) a common understanding had evolved by scientists. They were thought as wise, perceptive and receptive as a society. The ‘peaceful Maya’ was a frequent point of view and reflected their understanding of the civilization. However in 1946 in the ruins of Bonampak, see figure 2, the view of the ‘Classic Maya not engaging in warfare’ had been shattered forever as photographs of painted murals showed explicit battle scenes occurring during Classic times. Subsequent discoveries of defensive systems in major areas like Tikal, Becan and Yucatan only confirmed the former view to be lost. Although the view of the ‘peaceful Maya’ didn’t disappear swiftly and a good example comes from an amateur student (Webster, 2002: 29) of the ancient Maya who in 1970 visited the Maya center of Becan in the middle of the Yucatan Peninsula in Mexico. This was during a point when anthropologists David Webster was excavating the area and asked him of the surroundings. When the tour came to the defensive systems, which today are known as the largest and earliest
fortifications in Mesoamerica, the student became disgruntled and spoke: “Goddammit, somewhere there has to have been a peaceful civilization!” (Webster, 2002: 30). Today the perception of the Maya society has turned into a more of a general understanding that politically and socially however complex it might have been the Mayans were no more peaceful than the Incas, ancient Mediterranean or Mid-Eastern civilizations. Although military conquest outside the Maya borders commenced by the Mayans is still yet to be proved. It is also understood by most scientists (Fash, 1994: 189) that human population and social pressures did grow to unmanageable sizes by the end of the Classic period. However many scientists have different opinions to what extent and whether or not they were crucial factors in the event of the collapse.

Analyzing the reasons of why definite theories are so hard to implement one has to understand the variety of the problem has shifted itself through time as increased reconstructions of the Classic Maya has emerged. There have been few times when scientists have had common sympathetic thesis of the Mayans, both Classic and Pre-Classic. During the Great Explorer era the science generally followed one man and was built upon it but during the Carnegie period as more major influents was involved the understanding slowly changed from one to another and has followed the same pattern to this day. Studies of the Classic Maya, especially the collapse, has on one note decreased since the 1980’s thus the reason being as I mentioned on an earlier note Webster’s point that more research upon it would only overwhelm the field. As of right now one has to swim through a sea of possible hypothesis in order to create a theory or examine an already existing theory and analyze it through new not yet used methods. Theories given in this paper are so far the most influential ones and of course there are dozens of more that could be analyzed and discussed and put through mathematical or climatological models to give more descriptive results but as the most research have been put upon these theories it befalls apparent they are also the ones that should be discussed. One reason I chose the population density theory explained by Turner to follow with Brewbaker’s disease theory is because diseases are usually related to high population densities which makes it logical to implement Brewbaker’s theory to that. The climate change approaches by Folan is a major study done in 1983 and puts in plain words of how climatological changes have affected Maya activity which makes it a noteworthy theory to present. As for Abate he merely follows other scientist’s arguments but explains them in a good fashion way of how climate changes disrupt civilizations as he is not only talking about the Classic Maya. I follow this paper with more recent work done towards the Collapse with Webster’s and Lucero’s studies from 2002. Webster’s (Webster, 2002) theory is a compound system of minor hypotheses put together to form a theory. He only not touches natural causes to the collapse but also human activities which make it one of the most multifaceted theories of the subject and an obvious one to present here. As for Lucero’s (Lucero, 2002) theory suggesting drought to cause internal tensions amongst the society is also a multilevel approach as she only doesn’t talks about natural events but adds it together with human factors.
7. Discussion

After having carefully considerate the theories that explain the Classic Maya collapse it befalls to an almost impossible task to try to exclude one or more theories of the equation. They all give a plausible scenario to what might have happened and they all have a respectable amount of research behind it. However it is not in my intension to exclude any of the theories I’ve chosen to present, merely to discuss them and from that point of view conceivably allow further interpretations of one more than another.

Turner’s theory of population density that I selected is more comparable to a general estimation of how many people lived in the area during the Classic Maya. However it is discussable with Brewbaker’s theory of disease striking the region. Both theories are from the late 1970’s but are still reasonable conjectures. If taken into account Turner’s estimation of 670 people per sqKm in the Río Bec area it is a quite large number for an ancient civilization to carry. These numbers relates to the rural areas of Río Bec and for the agricultural areas the number varies from 75 to 640. Considering modern measurements of 670 inhabitants per sqKm in the rural areas of Classic Maya civilization in Río Bec we are looking at cities the size of Atlanta in the U.S. and Abu Dhabi of the United Arab Emirates with both a population density of 700 people per sqKm (City Mayors Statistics, 2007). If a disease had struck the region or any other region of the Classic Maya such density would rank as a main factor why a disease could be consent to spread with a mortal outcome for the population. Although the Mayans were no strangers to minor diseases as they were afflicted by pneumonia, tuberculosis, fevers, bacterial infections and food poisonings but so far evidence for big epidemics such as small pox, influenzas, measles, plague or cholera are yet to be proved to have existed among the Maya before Columbus (Webster, 2002: 248). A maize spread disease as proposed by Brewbaker would class as a major epidemic disease but goes hand in hand with food poisoning as maize was a part of the Maya diet and could only be caught by eating poisoned maize. As Brewbaker suggests the virus had been carried out from South America and settled in the lowlands where a year-round maize production was ideal. This meaning if struck the site abandonments should also follow a pattern from east to west, which they do. But a question rises how an entire civilization could have allowed one disease to take a firm grasp of the well-being of a whole population? Even if accepting Brewbaker’s theory of wind carrying the virus to the Mayan lowlands and also being on the same line of its severity a more reasonable outcome would be that the Mayans might have quickly learned of the poisonous maize. They more likely would simply stop eating it until the virus was under control and not let it spread to other parts of the society. This kind of an adaption to agricultural changes wouldn’t be new as ancient Egyptians already about 7,000 years ago were able to detect and adapt themselves to changes of Nile floods and crop diseases (Keita, 2003: 212). Given the maize spread to several places at the same time a wide-ranging tear down of the maize crop would be a more plausible scenario than a wide-ranging annihilation of population. Although the theory cannot be dismissed entirely since maize spread disease might have contributed to the downfall of culture if looking at the aspects of it entirely destroying the maize crop. That on one hand could have caused poorer diet for
a shorter period making it easier for diseases closely related to high population density to manifest such as infant diarrhea and various worm diseases.

A topic under heavy discussion nowadays concerning not only ancient civilizations but ours as well is the impacts of climate change. Whether or not climatological changes have disrupted or completely caused a collapse on societies is a matter difficult to verify but due to advanced instruments detailed information can be achieved to gain a better understanding. Modern improved studies of the greenhouse effect are probably one reason scientists have increased focus on climatological effects on ancient civilizations.

Paleoclimatological data concerning ancient Maya presented by Folan (Folan, 1983: 458) shows rather strikingly comparable data to Maya activity which gives a convincing hypothesis of climate changes being able to affect outcomes on ancient civilizations. Same study reasons with Luceros’ (Lucero, 2002: 814) in 2002 of a dry period occurring during the late Classic. She suggests such drought would have inflicted lesser control of water resources resulting in failure of elite rules and given she already has support of such hypothesis previously it gives support to the whole theme of the climate debate. However as this angle is a rather attractive subject to work with it is still questionable the margins of error the data gives and how much civilizations are affected by climatological changes. On one hand matching data towards activity can impress and also convince a person but one has to question whether or not climate changes affect more on smaller societies than on the complex ones such as the Mayans. As Dahlin (Abate, 1994:517) underlines complex civilizations are usually governed under proper leadership and are more able to adapt themselves for changes. If abrupt natural causes would occur, what Webster is referring to in his Total System Collapse, volcanic eruptions, earthquakes and hurricanes might slightly disrupt activities in a society for a short period. Although for the Mayans such events were re-occurring and not seen as new phenomena which would make them more adaptable for such. Concerning climatological changes they are not in any meaning sudden changes in fact quite the opposite. They occur over a longer period which gives time for a society to become accustomed and evidently find solutions to survive.

Given one cannot entirely dismiss the climatological hypotheses over the subject matter. They indeed, as shown by Folan and Lucero (Folan, 1983: 456. Lucero, 2002: 814), can affect the social balances in a society which for the Mayans they most probably have in one point and cause distress between the population and their rulers. However I will not go as far as pointing out climate changes have disrupted entirely the Classic Maya but instead might have contributed to the already existing problems. If Folan’s premise of a drier period occurring during the late Classic is correct then one can take that in notion for Brewbaker’s theory of disease being even harsher against the population as dry spells usually leads to starvation and therefore weaker immune system. I would suggest instead of pointing out population densities, diseases and climatological changes being single causes it is better to consider these parallel during the whole event of the collapse and not focus on one single factor alone. Complex societies seldom diminish due to single reasons. A good example of that is of the Western Roman Empire which literally collapsed in the 5th century but the
trail towards the collapse cannot in no way be explained through a single cause (Tainter, 1990: 12).

Webster’s in an attempt tries to analyze the demise of the Classic Maya civilization with multiple hypotheses and build it towards one large theory of the most plausible scenario. By using two aspects of the collapse he includes both the human factors as well as natural causes that might have contributed. It is known the elite rules declined dramatically during the length of the collapse and some disappeared even entirely and is also suggested to have been the reason for the collapse but Webster is more concerned of the reasons of why they declined. He draws up previously discussed hypothesis of peasant revolts, internal warfare, foreign invasion and disruption of trade networks that might have contributed to such and also talks about a total system collapse which would include the whole system of which the civilization is built upon caused merely by natural causes. Personally I enjoy reading his theories because they give a good and well described picture of the whole event. The Elite Collapse description is a thoroughly convincing aspect of theorizing as it covers one of the debated hypotheses and puts them in a more logical sentence of explanation. There is however some ambiguities concerning the first three hypotheses as all are focused on violence of some sort, whether it’s internal or foreign. Webster likes to point out none of these can be concluded as single causes but more as contributors to the collapse since more research has roughly denied their position as leading theories. A persuasively approach would be if a conclusively conclusion would conclude the Elite Collapse theory instead of ending it the way it started – square one, puzzling the reader. Webster is also known for his interest in prehistoric warfare which on one hand doesn’t surprise his selection of hypothesis for the demise of elite rules. Therefore one has to look through it under critical view before jumping on the same train. However Webster jumps to his own defense (Webster, 2002: 7) as he reminds that nowadays it is almost impossible to give conclusive answers to the collapse due to all the knowledge and interpretations there are.

The second aspect of his theory concerning the total system collapse Webster tries to paint a picture of how natural events might have contributed to the demise of Maya civilization. He as other scientists is fond of the climatological aspects and is drawn to the drought approach. Although Webster is not focused on a general drought that might have caused minor damages for the agricultural prospects instead he puts more weight on a so called megadrought lasting eventually up for centuries. He refers to the work of Gill in 2000, *The Great Maya Droughts*, where he consistently sticks to megadroughts being the single cause of the collapse of Classic Maya. Drought hypotheses like these resembles many scientists works for example Lucero’s and is given more space in the theorizing sector towards the collapse. In difference from Gill, Webster doesn’t like to use the megadrought as a single cause and perhaps not even a major contributor since there is any linking evidence for it striking the lowlands. Instead he corresponds with the swiftly destructive natural causes such as earthquakes, hurricanes and/or volcanic eruption that if occurring at the same time with a major drought it might trigger a destructive pattern in the society. The total system collapse to my liking gives a more convincing aspect towards the collapse given there are several explanations in difference from each other
that corresponds. There is however one hypothesis which I would like to reject immediately of the equation: the ideological pathology. It is based on the collapse caused by superstitious causes, a self-inflicting reaction which the Mayans brought upon themselves. Such explanations can only be founded upon speculations of the Mayan mythological beliefs and suggesting the Mayans obliterated their own civilization through religious causes is an approach which in no sentence can be verified with scientific data. It is well known the Mayans were strong when it came to religion. They were also known for their knowledge in astronomy and mathematics which created their advanced calendar system anticipating full moons, solar eclipses etc. which tells us about their complexity of their civilization. Nevertheless in my opinion suggesting an ideological pathology towards the collapse belongs in the same context of nonsense such as the Mayan calendar (Webster, 2002: 8) supposedly going to predict the end of the world the 21st of December 2012, which also is not proved the Mayans themselves believed that.
8. Conclusion

In the introduction I mentioned Webster’s quote of the Maya collapse being one of the greatest archaeological mysteries and this paper has been an attempt to clarify the reasons of such and present the most relevant propositions that explain the collapse. I chose to present six theories reflected by five authors with all a respectable amount of work behind. The result was as expected not an inconceivable breakthrough in Maya archaeology but a persistent investigation of the depths of the information the discipline has brought us. It is not unthinkable to say the research has gone so far any definite theories can be implied but due to new and yet advancing techniques and instruments more detailed information brings us closer to the answer as time goes. I personally prefer more exploration on the climatological approach as there are various linking indications of major droughts appearing during the event of the collapse. From that point of view if any drastic climate changes have taken place the possibilities of it bringing more destructive patterns elevates such as diseases or internal tensions. Based on the research I’ve done to write this paper I will not move towards a single event theory and find it also hard to imagine a change of course in future endeavors. Not because it feels unlikely but because so far evidence supporting any complex civilization collapsing due to single reasons are not to be found. It might be our humanistic science always questioning theories which for scientists can make the work frustrating from time to time but also rewarding when exposing an accepted theory. Another reason I move towards a multiple event theory is due to all the research that has been conducted on the Mayans and still not been able to determine the cause. It might be that scientists desperately have tried to find a single cause but since new evidence always appear theories had to have been re-written or dismissed entirely and from that commence a new approach. It therefore befalls almost unpractical to execute any definite theories.

Three out of the six theories I presented had a climatological approach towards the collapse which also tells the studies of the Mayans emphasis has roughly fallen towards climate changes. It is not surprising since the data it gives grants support to various hypotheses even outside the climate debate. Webster’s vast multiple-theory concerns mostly internal and ecological issues but touches the climate change when adding it to his Total System Collapse. I will not say I am a complete climate change enthusiast as I still question the hypothesis of larger populations failing to adapt themselves against drastic climate changes. I believe the collapse of the Classic Maya is likely caused by major droughts combined with minor diseases spreading due to weaker immune system and high population densities which ipso facto caused elite rules to diminish. This hypothesis of course wouldn’t completely explain the whole timeline of the collapse of approximately 200 years and how the population failed to bounce back afterwards. Populations are known through history to always recover after major epidemics or wars but for the Mayans the Classic collapse was, in gentle words, the beginning of the end as they finally suffered annihilation in 1697 by the Spaniards.
9. Summary

This paper is a theoretical analysis of the demise of the Classic Maya occurring between AD 770 and 900. It aims to shed light on the archaeology that has been conducted in the Maya areas since the 1840’s, how the perception of the Mayas have shifted among scientists through time and explain as well as put into discussion the most relevant theories explaining the collapse. The earliest theories discussed here are from the 1970’s. Billie Turner discusses population densities in 1976 and diseases of maize explained by James Brewbaker in 1979. It then follows with a climatological approach by William Folan from 1983 and Tom Abate from 1994. The climatological approach gains support in the early 21\textsuperscript{st} century by Lisa Lucero in 2002 but is also met with a different kind of an explanatory theory by David Webster who is considered by the whole system of Maya civilization. This paper also touches the whole concept of a collapse and what it means in general. It questions the fact if the term collapse can be used in various scenarios of ancient civilizations disintegration. Not only are the views of an archaeologist or an anthropologist reviewed but also botanists and climatologists to get a wider grasp of the whole subject matter. This paper intends to erupt into an active discussion where all the theories are put against each other in order to resolve the most plausible scenario of the Classic collapse. The discussion is concluded by not excluding any theory but instead a change of view of the collapse from single event theories proposed by scientists into a more of a multicourse resolution that might have contributed to the collapse with some theories more plausible than others.
10. Bibliography


Pictures

Figure 1
Accessed: 10/05/2011
URL: http://www.latinamericanstudies.org/maya/preclassic-map.jpg

Figure 2
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