DIVING THE MAYA WORLD

Reassessing old excavations with new techniques: a case study on the Sacred Cenote of Chichen Itza

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Image on cover: aerial view of the Sacred Cenote at Chichen Itza by Edward Kurjack

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Introduction

In the early twentieth century the American Edward Thompson (1932; Coggins 1992) attempted a first proper research on a grand cenote near the site of Chichen Itza by dredging the site with a machine after learning about offerings that were done at this source according to historical records dating from the sixteenth century. His attempt had been successful in retrieving artifacts from the cenote in the period between 1904 and 1909. Many artifacts were found during his research and conclusions were made about the function of the site. Can we as scientists just regard these assumptions and conclusions about the cenote correct? That is the question of interest which sparked the writing of this thesis. Over fifty years had passed when in the 1960's another research project began at the cenote of Chichen Itza. With this research they were hoping to make additions to the former research and gather new insights on the site and its relation to Chichen Itza as a whole. With new research techniques they tackled the same cenote and surprisingly gained more knowledge about the site in the process and indeed discard the former conclusions drawn and provide new insight about the cenote at Chichen Itza. Clearly we can define that there is a problem with accepting conclusions drawn from previous researches. And that there is a need for different approaches during researches and to not just expect older excavations and their conclusions to provide the most accurate conclusion based on different types of information sources providing a multidisciplinary approach.

Archaeology has become a rising field of research, originating from the explorers at the end of the nineteenth century who wanted to learn more about ancient sites and cultures. Many researches from this developing phase of the archaeological field tend to be biased and done from a less objective and with a different perspective and expectation than current research would have. Throughout the years research techniques have changes and become more modernised and technologically advanced. In this change of perspective and techniques lies a problem about the accuracy and trustworthiness of older researches done. This thesis is on the relevance of reflecting on old excavations through new modern techniques and in what way a different perspective of research can contribute in understanding a site and its purpose. Through a case study it is shown that we can gain more information on a site and their contemporary society by applying modern techniques and that these can be of

relevance to consider when conducting research, even with other researches done on the site in the past. This leads us to the main question of this thesis:

Is there a need for reassessments of old excavations and will modern archaeological research techniques provide us with new insights?

Main goal of this research is to learn about the way future research can influence the conclusions drawn from previous researches and also to provide an advice for future archaeological research. Through a case study in which a site and research done on it in the past and more recent periods an answer will be provided to the main question of this thesis. Only one case study was chosen in which old researches on a site will be compared with the more recent ones using different more technological advanced techniques. It is a clear example of how researches from two different periods of time at the same site can have different outcomes.

The subject of the case study is the Sacred Cenote of Chichen Itza, a prominent feature of the best known Maya sites situated in the Yucatan peninsula of Mexico. In this part of Mexico there are many *cenotes* (underground spaces with water with an opening to the outside formed by natural elements) in different types and each of them with different characteristics to be found and presumably many of them were important ceremonial- and offering sites during the Maya presence heydays at the peninsula. Due to their large numbers and the possible archaeological value they can contain *cenotes* are interesting sights to focus more research on in the archaeological field. The case study is based on research done in the early twentieth century, a time when there were no concrete research techniques regarding research on *cenotes* and underwater archaeological research, later researches done in the 1960s and there techniques with regard to cenote archaeology are also expanded on. What were the differences between these researches and would we have had a completely different view on the site and its finds if we had used the modern techniques and the knowledge of today? It is an important and relevant question to expand on and try to provide an answer to.

This subject was motivated by a personal affiliation with underwater archaeology and Maya archaeology. Besides this personal interest, the subject was also chosen because of diving techniques improving and the professionalising of the field of underwater archaeological research, it will become important in future Maya research. Scientifically, underwater research with regard to *cenotes* is a

rising archaeological field of research when it comes to learning about the Maya. Thus the subject of the case study is a relevant issue to expand on and learn from.

The research is mainly based on literary work with regard to the Maya, *cenotes* and underwater archaeological research. Focus is on several issues such as geographical, social, political relevance such as the meaning of sacred space. Besides the desk study a fieldtrip was made to the Yucatan peninsula of Mexico for inspiration and to gain knowledge which would help contribute to a more complete research. Several *cenotes* on the Yucatan peninsula in Yucatan, Campeche and Quintana Roo were visited and information has been gathered with regard to the *cenotes* and their research, providing a more solid base to the thesis research. The fieldtrip offered more insight into the subject and provided more personal understanding in the subject of the thesis and why there is a need to expand on this subject. Hermeneutics is also touched upon as well as modern research techniques with regard to *cenotes*. Hermeneutics is on the science of interpretations and mentioned because of the importance that a change of methodology and techniques also collects new types of evidence. It makes us aware of different perspectives on viewing ancient societies and understanding their world and worldview.

The main input of this thesis is in methodology. This regards new theoretical ways of research and puts primary focus on the techniques of subaquatic research with regard to *cenotes*. Methodology is considered the theoretical part of this thesis.

Expectation of this research is acknowledge that the way of conducting archaeological research definitely makes a difference in gaining knowledge about a site and history. That it indeed can be of relevance in general to make a reassessment of older excavations and not just except outcomes and interpretations from previous researches from times when modern techniques and an objective approach to science were almost nonexistent. Speculation and wrong conclusions are an element to consider when interpreting and reading about older researches such as the one I chose as a case study, the Sacred Cenote of Chichen Itza. The gain of this research will be for people to be critical towards old researches and their conclusions. A critical eye and a reassessment of a site and their meaning or purpose within its contemporary society will tell whether or not the older research that has been done was correct. Also another new insight is that when it comes to underwater archaeological research to *cenotes* in the Yucatan

area of Mexico a recommendation is provided on the methodological part of research and show the necessity of *cenotes* and research thereof in Maya based archaeology. Cenote archaeology in the Yucatan peninsula is expected to become an important field in Maya archaeology of Mexico and therefore this research attempts to provide an advice on future cenote archaeology.

The first chapter will be general introduction on Mesoamerica, the Maya of Yucatan and the site of Chichen Itza. Explaining about the Maya and provide a background for the case study which will be introduced in the second chapter.

The second chapter is on *cenotes*, their relation to Maya religion, the role of cenote research and ends with the introduction of the case study regarding cenote of Chichen Itza. Sacred space and hermeneutics are also referred to in this chapter, to understand the importance of gaining more knowledge about *cenotes* and their role in society. *Cenotes* are looked at in relation to caves. Similar connotations to caves provide that we can learn much more about the worldview of the Maya.

The third chapter is the theoretical part of this thesis and provides an overview of underwater archaeological research. It discusses techniques of research, diving techniques and what role this can play in cenote archaeology and in Maya research. The research techniques are subdivided in survey techniques and excavation techniques and each of these will also look at *cenotes*.

The fourth chapter provides an overview of the different periods of research at the Sacred Cenote of Chichen Itza It discusses the different researches from the past, their archaeological finds and preservation information when being waterlogged in *cenotes.* These research periods and findings will be part of an analysis in the next chapter.

The fifth chapter provides an analysis of the case study, its researches and the archaeological information provided in the previous chapter. It provides conclusions from the periods of research on what the archaeological evidence and different research periods can learn us about the use of the cenote and the relevance of new methodological research. Different phases of activity at the cenote are mentioned concluded from the artifacts found at the site.

The final chapter six is the conclusion, providing an overview on the thesis and answer to the main question. It also discusses the analyses of the case study, future research on *cenotes,* the use of sacred space and hermeneutics and the chapter ends with discussing the issue of human sacrifices.

Chapter 1:

Maya Yucatan & Chichen Itza

This first chapter is an introduction on Maya and their presence in the Mexican Yucatan Peninsula. Providing general information about the Maya, explaining who they were and when they reigned in the Yucatan peninsula. The chapter ends with information on the archaeological site Chichen Itza, situated in the Yucatan area of Mexico.

1.1 Maya of the Classical and Postclassic period

The Maya have remained one of the most well known of Mesoamerican cultures, which they became through their scripts and calendar knowledge (Evans 2008, 39). Their contemporary documentation of their history through hieroglyphic script was inscribed into stone, painted into books and onto ceramic vessels and plastered walls. Just as important was the Maya calendric system, lasting over 600 years, starting from AD 250. Besides these two parts representing their culture they also became known for their architecture. Due to these aspects the Maya soon became one of the most favored subject to study (Joyce 2004, 34). The following quote by Coe (2011, 117) reflects how special the Maya are regarded and why it has intrigued so many to learn about their contemporary lives:

'The great culture of the Maya lowlands during the Late Classical period is one of the "lost" civilizations of the world, its hundreds of cities and towns often buried under what was until recently an almost unbroken canopy of tropical forest.'

We learn about the ancient Maya civilization through four means to extract a common line about the periods and when they started and ended. Through the means of archaeology, carbon dating, ethnohistorical sources and finding correlations between calendars Mayanists attempt to provide an accurate as possible historical overview on the Maya civilization (Coe 2011, 25).

Periods of Maya flourishing in Mesoamerican history

There are different periods in Mesoamerican history: Paleoindian period, Archaic

period, Formative period, Classic period, Postclassic period and finally the Colonial period which started when the Spanish arrived in the New World. Focus in this thesis lies with the Maya from the Late Classic and Postclassic period, which is the main period in which the site of the case study, Chichen Itza, thrived. In the following timeline we can see the different periods of the Maya presence in Mesoamerica.

Table 1 (Joyce 2004, 15)

Classic period	A.D 250 - 1000
Early	A.D 200 - 500
Late	A.D 500 - 800
Terminal	A.D 800 – 900/1000
Postclassic period	A.D 900 - 1521
Early	A.D 900 - 1100
Early-Middle (transition period)	A.D 1100 - 1200
Middle	A.D 1200 - 1430
Late	A.D 1430 - 1521

The Classic Maya period dates from c. A.D. 250 to approximately A.D 1000. During this period many states and proto- states developed, mainly in the Central Mexican Highlands and the Maya Lowlands. This period was one of the highest cultural value and complexity. All other periods in Mesoamerican history either led up to this or fell away from this peak period. Large cities were realized, however at the end of the Classical period a breakdown followed and they soon fell in what is now known as the Maya collapse, following a reorganization and migration creating a new thriving area in the Northern lowlands (Joyce 2004, 14).

The Postclassic period was during the period of c. A.D 900/1000 up until the year of the conquest of Mexico by the Spaniards in 1521. This period also had their share of state development and the rise of the empire of the Aztecs (Evans 2008, 29). Moving populations and the increase of localized population as well the growth of two great centers, Tula and Chichen Itza, marked the Early Postclassic period. Similarities between these sites, which are hundreds of miles apart, show that these were in relation with one another, however the nature in which this happened remains unknown (Evans 2011, 422). During this period the

frontier of the Maya advanced north of the Yucatan peninsula. It is thought this change was due to change in the climate, permitting agriculture in a region that would previously have been to arid. With this new region came the development of new trading routes and different types of item to trade. With the decline of the northern cities such as Chichen Itza around AD 1200, the northern frontier declined with them. Migrations were prompted by cultural and environmental changes and focus came back once again in the central-highlands and the south central-highlands. These changed brought with them the rise of many city states throughout Mesoamerica. And at the end of the Postclassic several of them were powerful enough to control larger areas (Evans 2011, 422).

Area of the Maya in Mesoamerica

The Maya area was a great large area covering a great deal of Mesoamerica. It was an area with homogeneity, which was surprising since the area was widespread different societies with different peoples and tongues. These facts of unique unity made them safe to a great extend from invasions by other native groups such as the neighboring Aztecs. Even though there seems to be some sort of unity or relationship between the two we cannot say that there is such thing as having a Mayacentric outlook. The Maya cannot really be regarded as the same type of community of people. It was an assemblage of different areas throughout Mesoamerica in which certain values and ideas coincided and therefore created a connection between these through trade and contact creating similarities. Consider it a bit like the westernization of the current world in which poorer countries come in contact with Europeans and Americans and attempt to create a world similar to theirs in order to become part of that world, which can be regarded as the same effect as food chains like Mc. Donalds have in our current world as a factor stimulating globalization. At the same time they keep elements of their own culture and their own native tongue. Keeping in contact with neighboring civilizations in other parts of the Mesoamerican world was part of the Maya way of living in their version of a global interconnected world. Similarities in traditions indicate that people of the Mesoamerican core did not view their northern neighbors as outside their social and historical world. It is hard to define boundaries with regards to Mesoamerica and their regions. Farmers with important trading partners. Objects made in the Maya area have been recovered archaeologically as far as Costa Rica, and gold ornaments of Cost Rican or

Panamalian style have been found in sites in the Maya lowlands (Joyce 2004, 12).

Settlement patterns of the Maya

Large impressive stone buildings are easy to detect, but we cannot find evidence anymore about the wooden huts that would have accommodated the common people. In the eight century the Maya civilization reached their prime glory, however at the same time it was the beginning of decline as well. Unfortunately only a century and a half later most of the magnificent Maya sites declined in its power and suffered abandonment (Evans 2008, 318). Despite the decline in the Maya highlands, the northern areas such as the Puuc region and the area of Chichen Itza, achieved an amazing rise and powerful areas with some of the most impressive architecture in the entire New World. Developments like these made the Terminal Classic period a period of both loss and triumph where powers declined and cities well in the southern parts and where a new flourishing period began in the northern parts of the Maya area. This period was also marked by the widespread movement of peoples and the rise of a new power, the Toltecs (Coe 2011, 169). One of the biggest mysteries regarding the Maya is the reason for their political system collapse during the end of the Classic period. Even with these changes their culture continued to thrive although several changes occurred such as in the locations and their ceremonial practices. They continued to thrive in the central and northern parts of the Yucatan lowlands (Evans 2008, 40). The reason for the great Mayan collapse between the Classical and Postclassical period is still uncertain. Scholars attempted to find fitting explanations such as warfare, natural disasters, epidemic diseases, etcetera. We know for a fact that this decline and collapse was not due to a singular reason. Just like the collapses of other great empires, such as those of the Romans and the Khmer several causes and accumulation of unfortunate events led to the falling apart and loss of power.

Maya Religion

All over Mesoamerica was the idea of a cosmic cycle of creation and destruction and of a universe oriented to the four directions (Matthews and Garber 2004, 56; Ashmore 2004, 183). Specific elements were assigned to each of these points and to the center. Similarities between the diverse cultures of Mesoamerica tell us that its people must have shared a common origin and that in the interest of archaeologists to discover (Coe 2011, 11). The Maya were known for their affinity

with the natural world and the supernatural. This will elaborate on this subject further in the second chapter when I discuss Maya religion in regard to *cenotes*.

1.2 Yucatan area of Mexico

The Yucatan area of Mexico is referred to as the Maya lowlands due to their flat plain in comparance to other sites in Mesoamerica where the Maya have been present. These Maya lowlands can be divided in a northern and a southern part due to differences in rainfall patterns. Each bringing with them different types of soils and types of culture areas. The southern Maya lowland was more prominent in the Early and Classic period of Maya reign and the northern lowlands became more important during the Late Classic and Postclassic (Evans 2008, 293). The site of Chichen Itza, main subject of this thesis, is part of the northern culture area. After the collapse of the Maya civilization in the southern parts of the lowlands, the northern part thrived throughout the Late Classic, Terminal Classic and periods beyond as explained above (Evans 2008, 377).

Figure 1. Depiction of the entire Maya area (map adapted from Famsi).

The Mesoamerican region is one of the most geographically diverse places on the planet with many types of archaeological extremes. In the Maya area there are two types of natural settings: the highlands and the lowlands. Each of these areas has their own distinct flora and fauna representing their region and these natural environments were obviously also of influence on the politics, religion, architecture and social elements within these Maya people. The Yucatan area is special since there are no fresh water lakes present. Water is gathered from underground sources such as caves and sinkholes instance (Coe 2011, 17). Maya elite had their special needs and a craving for special luxury items coming from all over the Mesoamerican region such as jade, quetzal feathers and shells from the oceans. There are less mineral resources in the Maya lowlands. However, their

access to the coast gave the people in this area marine resources such as shells and salt. Moving these resources and trading these and others between the lowlands and the highlands and also within these areas created contacts and became slowly part of the creation of a homogeneous Mesoamerican world (Joyce 2004, 14).

1.3 The site of Chichen Itza

The archaeological site of Chichen Itza was an important site in the Late Classic and especially during the Postclassic period in Mesoamerican history. Chichen Itza means "mouth of the well of the serpent people" in which "*chi*" is Maya for mouth, "*chen*" means well and "*Itza*" stands for masculinity or rattlesnake (Thompson 1932, 193) or "mouth of the well of the Itza" is also a common translation due to the facts that the word Itza often changes meaning depending on the author who refers to it (Evans 2008, 388). Historical sources refer to the arrival of a man calling himself K'uk'ulkan (K'uk'ul – "feathered", Kan – "serpent) in a K'atun 4 Ajaw which ended in AD 987. He is regarded as the founder of Chichen Itza. The reference to the serpent people is expected to be because of this story, explaining the name of Chichen Itza (Coe 2011, 183).

Size and architecture of the site

Total coverage of Chichen Itza is about three square miles, making it one of the largest Maya sites. Central point of importance at the site is El Castillo or temple of Kukulcan, a pyramid of nine terraces and stairs on each site of the pyramid with 104 steps each (Thompson 1932, 194). This temple acted as an *axis mundi*, making a connection between heaven, earth and the underworld (Brown 2005, 391). Commercial interest and long distance trade is what made Chichen Itza a thriving settlement during the Late Classic and Postclassic period. Between AD 850 and AD 1150 was the main period in which Chichen Itza was at its heyday. During these years Chichen Itza transformed from a small settlement into the greatest center of the Yucatan peninsula with impressive architecture. The site was a late Maya capital, home to a diverse group of peoples that forged a new social order with many innovations such as governance and architecture (Kristan-Graham 2001, 317). The rise to power meant a decline in power of other big centers. The architecture at Chichen Itza is on grand scale and represents different important themes within Central American ideas. Political, religious and military power are expressed in the monumental art at the site. Central American

culture is thus found within the site of Chichen Itza, implying cultural influences between the southern and northern parts of the Yucatan peninsula and the general Maya ideas throughout the Mesoamerican region (Evans 2008, 385). The massive structures surrounding the central plaza are in Central Mexican style (Evans 2008, 388). The combination of Maya and the Central Mexican cultures is reflected through architectural elements (Evans 2008, 350). During the Terminal Classic period Chichen Itza is represented by two different styles, the Puuc style and Toltec Maya and a hybridization of the two (Coe 2011, 178). During the transition period of Maya collapse between the Classic and Postclassic period the site Chichen Itza became the largest and a great known city in Mesoamerica (Coe 2011, 184). One of the most remarkable parts on the grander site of Chichen Itza is that of the Sacred Cenote. It lies about 300 meters from the northern part of the great pyramid at Chichen Itza and it is a remarkable part of the site (Thompson 1932, 197). This cenote is the source of research in this thesis in an attempt to find out whether or not revising old excavations and applying modern techniques can provide us with new insights. The following chapter will continue on the subject of Chichen Itza, presenting the case study.

Chapter 2:

Cenote of Chichen Itza

This chapter is on the *cenotes*, their history meaning and an introduction to case study regarding the cenote of Chichen Itza. Maya religion in relation to these *cenotes* of the Yucatan peninsula is also discussed. As well as the way Maya religion relates to caves, sacred space and the archaeological view on hermeneutics. The role of *cenotes* in relation to the Maya is discussed and the chapter will end with the Sacred Cenote at the site Chichen Itza.

2.1 Cenotes

In the Yucatan peninsula of Mexico there are no rivers or streams to be found. The whole Yucatan peninsula is a limestone shelf, full of natural sinkholes called *cenotes*. The word cenote stems from the Maya word *Dz'onot* meaning natural well of water (Sandoval *et al.* 2008, 143) or *Ts'onot* (Coggins 1983, 23; Coe 2011, 17) and is the Spanish equivalent to the Maya word for cenote. This meaning of the word implies *cenotes* as being just a simple well, however they are a more dynamic system which is continuously changing and complex in its presence on the Yucatan peninsula. Something about the consistment of the Yucatan Peninsula:

'The karstic constitution of the Yucatan Peninsula is comprised chiefly of calcium carbonate (CaCO3) and is hence highly permeable... This has been the cause,..., of the formation of a complex and vast network of underground caverns, shelters, cenotes and rivers, which at present account for much of the peninsula's physical geography' (Lopez 2008,101).

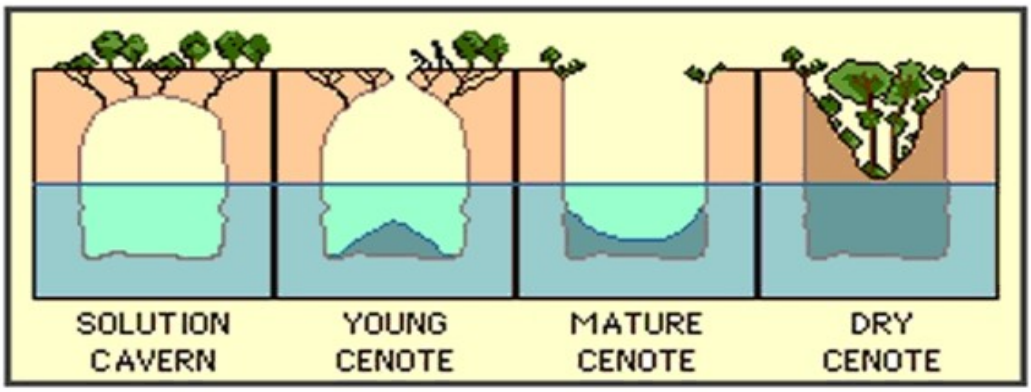

Figure 2. Depiction of several types of cenotes (adapted from www.transcaribbeantrust.com).

There are different types of *cenotes* to be found on the peninsula depicted in the picture above. In general we can distinguish three main types of *cenotes* and many different characteristics to classify them by. The first type is the 'open cenote', which is cylindrical and also known as an open doline. This type has a large mouth and can have steep vertical walls with a lot of exposure to the outside. The 'bottle-shaped cenote' is the second type with a more closed restricted entrance and little light from the outside. The third and final type of cenote is the 'cavern cenote', which is the most closed of the three types. This type comprises of subterranean galleries with at least one cavity. Access to these types of *cenotes* are often not more than a narrow opening that often resembles a toad's mouth (Lopez 2008, 101). Besides these main types *cenotes* can be classified according to their different characteristics, which can differ greatly between Young or Lotic *cenotes* and Old or Lentic *cenotes*. Classification can be done through several geological, biological or chemical characteristics (Lopez 2008, 101). These *cenotes* can be regarded as ways to expose the underground richness of water with the surface. Due to lack of rivers and the limited rainfall in the northern part of the peninsula, *cenotes* were of great importance being prime water sources (Evans 2008, 292-394).

2.2 Maya religion in regard to cenotes

These water filled sinkholes or *cenotes* have been connected to ritual offering practices within the Maya contexts. They are regarded as apertures to the world of the spirit world, underworld or otherworld, connecting the earthly world with that of the divine. Maya offerings have been found in many different types of contexts from tombs and caves to *cenotes* often making connections to gods or the otherworld (Evans 2008, 292). Intentions behind the sacrifices that were done in the context of *cenotes* are still uncertain. The Maya were deeply spiritual people connected to their natural environment through cosmological concepts of space and time relating our world to that of the supernatural (Coe 2011, 219). *Cenotes* are regarded as dangerous and sacred places seen as entrances to the underworld and dwelling places of deities such as the rain god Chaak. Anything that inhabits these places is sacred such as plants, tortoises and other animals. *Cenotes* are seen as the cosmological center of the village and villages are built surrounding these spots. In the Maya religion *cenotes* were considered as passage ways to the Xibalba, the netherworld. The same consideration applies to caves and other orifices into the Earth. The rain god Chaac is associated with *cenotes* because of his relationship to water. Offerings were made by the common people, throwing in elements such as gold, ornaments or household items to appease the gods (Coggings 1992).

Ethnohistorical sources on cenotes

During the Spanish conquest of the Americas, almost all ethnohistoric evidence of the Maya was destroyed. Friar Diego De Landa was responsible for this act and due to this loss little primary source information is known on the early Maya history (Coggins 1992, 4). The Spanish king had ordered De Landa to write a history of the Maya they had encountered and their culture. In this rewritten history of 1566 by De Landa the cenote of Chichen Itza, case study of this thesis, was mentioned as well (Coggings 1992, 4). In his book *La relacion de las cosas de Yucatan (De Landa 1959)* from the sixteenth century Friar De Landa mentions that during times of trouble such as drought or disaster people would made pilgrimages to the Sacred Cenote. Here they would try to appease the gods they believed were responsible for their troubles in society, the Maya believed that their deities lived in the depths of the *cenotes*. The account of De Landa regarding *cenotes* describes warriors and maidens were made human sacrifices by throwing

them into the well of *Chen Ku*. Because of this description the cenote is referred to as the Cenote of Sacrifice (Coggings 1992, 3). Figure 3 below is a drawing of how these human sacrifices were done according to the romantic way they are described in the ethnohistorical sources such as that of De Landa. It shows a young virgin dressed in white being cast into the well. This by no means a depiction of the true situation, but it provides a good insight in how some few sacrifices and ceremonies done at the cenote. Since most of the human remains that were found show different results from the romantic stories. The ethnohistorical sources provide quite a distorted biased view on how these ceremonies were done.

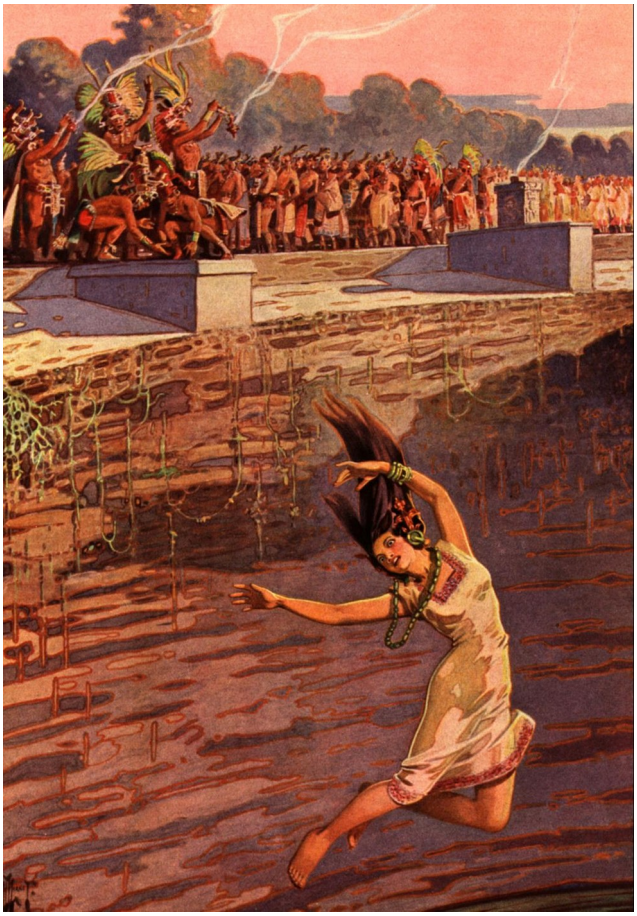

Figure 3. Illustration of human sacrifice at the Sacred Cenote (adapted from National Geographic).

The rites that included sacrifices were led by leaders who were considered shamans within their society. Living things, animals as well as humans, were sacrificed together with other artifacts made from different materials. Autosacrifice was also a common element within the Maya ritual contexts (Evans

2008, 297). *Cenotes* are considered important sites because of their role as water source and as sacred function being portals to communicate with deities and the otherworld. It also functions as a symbolic control for rulers to create political and social order. Attributes of the *cenotes* also made them special to the Mayan belief system, creating a link to the time of creation with its humidity and darkness attributes. The ritual and everyday importance of *cenotes* are also mentioned in the books of Chilam Balam, Colonial period native books written in Yucatec Maya language but using roman script (Brown 2005, 384).

Caves in relation to cenotes

Books edited by Brady and Prufer (2005) regarding Maya religion in cave contexts and importance of the entrances to the earth is very relevant to the understanding of *cenotes*. It is only a recent development within the field of archaeology to give attention to the interpretations of natural elements like caves or *cenotes* in attempting to understand ritual and religion of ancient cultures. With the emerging of cave archaeology only being as recent as the 1980's (Brady and Prufer 2005, 3). Entrances into the earth are referred to as *che'en* or ch'een or *ch'e'e'n* by the Maya (Vogt and Stuart 2005, 155; Prufer 2005, 186; Brown 2005, 384). These entrances into the earth are associated with religious activities, ceremonies connecting with deities such as the rain god Chaak (Vogt and Stuart 2005, 155). Interest and research of these *Ch'een* has become part of the archaeological field only since the 80's and 90's, with the realization that these natural elements were used in pre-Columbian times as the locations where ritual activities took place (Prufer 2005, 186). Research on caves and *cenotes* as being part of a sacred landscape should be more about the significance and on their part of the site as a whole rather than only research the function of such an element (Heyden 1983; Brady and Prufer 2005, 4). Caves, just like *cenotes* are connected to the underworld, Xibalba. This idea derives from conclusions constructed from the Popul Vuh and other types of Maya ethnography (Brady and Prufer 2005, 5).

Thompsons (1959) article *Religious Rights in Caves* presents us with different types of uses with regard to caves and these can also be applied to *cenotes*. First function is being a source of drinking water since there are no rivers on the peninsula of Yucatan. They were important for living opportunities. Second, they were sources of virgin waters to use for religious rites. To be regarded similar to the blessed holy water we have in churches today. Third,

religious rites were conducted at these locations. Many deities were supposedly created in caves and places such as *cenotes* and they were seen as gateways to the otherworld connecting our world with the divine. Finally these cave rituals can be connected with burials, cremations and the deposition of discarded ceremonial utensils.

Sacred Space

When it comes to sacred use of space and architecture, there are a few questions that come to mind. In what way does the way people use religious space provide us with information about the Maya. Can we still see this in current use of sacred architecture? These elements are important to keep in mind when researching the Maya world and their remnants in our present one. However, even though sacred space is an important element that is connected with everything in the Maya world and their deposits it is not the main focus of this thesis. This subject will briefly be touched upon and is on connecting the Maya deposits and archaeological remains to their worldview and daily life (Jones 2000). This following quote is on *cenotes* and it is a nice concise explanation of their relevance:

'Cenotes..functioned as notable elements of sacred geography, symbolic scenarios and holy spaces for rainmaking rituals and ceremonies associated with the concepts of life, death, rebirth and fertility.' (Lopez 2008, 105).

In this research on the relevance of types of research techniques and the outcome it can give to a certain research I think it is necessary to mention the hermeneutics of sacred space, the use of spatiality and space as a way to look for answers about the past is one very important to archaeology. Hermeneutics is the science of interpretations. By conducting hermeneutical analysis we can learn that there are differences between the intention of the author and the interpretation of this by others. For example, if archaeologists in the future would find a depiction of Jesus nailed to the cross on the wall, not knowing about our religious connotation to it. How would future archaeologists interpret it? Would they assume we were all treated this way after death, seen as punishments? Or would they indeed understand our religious meaning behind it? Just to be clear, without proper knowledge of the time and place and the worldview from that specific era it is just merely guessing and a society and its meaning can never fully be understood. Due

to this issue we face as archaeologist is extremely important to always regard different types of information from several fields, making archaeology a multidisciplinary subject. Space is a crucial link between people and social formation and a catalyst for memory. Because of that it is important when attempting to understand the past to learn about the space of the site and its relevance in the worldview of people at that time. Space is a natural phenomenon and an invisible cultural product, the latter by virtue of spatial conceptions and uses. Through looking at the use of space we can attempt to learn about symbolic and social dimensions (Rapoport 2002, 478). Spatial personality (Kristan-Graham 2001, 318) and spatial environment such as *cenotes*, caves and mountains can be regarded as an anthropomorphic extension of sanctified space and has implications for agency and the creation of a spatial order becomes an important element obtained through rituals. Location thus becomes a tool of agency and control (Stone 2005, 251-252). A spatial analysis provides us with a context of a site and can generate a different form of understanding the past (Blake 2004, 230)

The aim of ritual action is restoring the cosmic equilibrium when it seems off (Stone 2005, 260). It is believed by ancient Maya that all the space that surrounds us belongs to deities. And that our use of this space is validated by periodic reciprocity in the form of sacrifices and offerings, thus stating that ritual ceremonies are obliged periodically to appease the owners of the space we live in often these ritual ceremonies are performed in relation to the agricultural cycle, just like in many other ancient societies. 260-day ritual cycle of the Maya indigenous calendar, with regard to the human life cycles (Joyce 2011, 22). Prufer (2005, 188) describes those who perform the rituals as ritual specialists due to the fact that we just don't know what the most correct term is to describe such a person. If we describe it as a priest, it would derive from our modern perception of religion. And if we describe it as shaman it seems almost like a charlatan, due to our current connotation to that word. Prufer is right in describing the ritual performance leader of the ceremony in a common description such as ritual specialist. Hierarchies of ritual specialists are named under the common term of *h'men* (Prufer 2005, 197; Prufer and Brady 2005b, 27). Interpreting archaeological data gathered from sites of religious activities can be a challenge (Prufer 2005, 198). Archaeological evidence regarding the importance of natural places such as caves and *cenotes* is not only looking into the architecture and artifacts of a site. It is important to keep in mind the powerful presence these landmarks would have

had in their time. We tend to overlook the importance of *cenotes* at sites today due to their decrease in everyday presence the importance of those cenotes tends to be overlooked. They were important not only as sacred ritual places but also of importance in everyday life as sources of water. The use of the name *chen*, which derives from the Maya word *ch' een*, shows us the importance of these wells and caves to the cities that surrounded them. Examples of this use are in the names of sites such as Hopelchen, Chichen Itza, Kancabchen, etcetera (Brown 2005, 385-386). *Ch'eenob*, is also mentioned used as a common term comprising caves, wells, springs, *cenotes* (Prufer and Brady 2005, 26) These *cenotes* presumed to be important points of focus in the sacred landscape of Yucatan making a connection with religious activities and social organization, making *cenotes* an essential part within their society (Brown 2005, 398). In the northern lowlands of the Yucatan area *cenotes* were sources of potable water (Prufer and Brady 2005, 30). Maya communities settled near these *cenotes*, to be close to their water sources. In the Late Postclassic period the density of settlements correlates with the presence of *cenotes* (Pugh 2005, 51) Chichen Itza is such a settlement which incorporated the *cenotes* into their urban landscape (Prufer and Kindon 2005, 30). Our western perspective classifies elements such as *cenotes* as natural features as part of the landscape that surrounds us, the Maya however contributed many meaning more to these locations. They were considered houses of gods and seen as part of a divinely built environment (Pugh 2005, 52). *Cenotes* were seen as of such importance that decisions of land utilization and placements of settlements were chosen near the presence of these natural landmarks (Patel 2005, 104). Even the Spanish incorporated the layouts of sacred space of the indigenous into their Colonial designs until this day *cenotes* are found in the proximity of churches throughout the Yucatan peninsula. They are still associated with the deity Chaak, but also with the Virgin Mary since the Colonial influence on Mexico (Pugh 2005, 58). Natural elements like *cenotes* are still important elements in modern Maya rituals (Thompson, 1932).

2.3 Role of cenote research in relation to the Maya

Cenotes will become important in future archaeological research understanding the Maya, at the moment it is still a rising area of research within the archaeological field of Maya and Mesoamerican history. When it comes to researches within this field, people are often more interested in the bigger

archaeological elements such as temples, tombs or other grander built objects focusing more on the earthly elements of traditional archaeological research on land rather than underwater research. However, when it comes to offerings *cenotes* often played an important part within the religious community, through them we can learn more about the symbolic and cultural world of the ancient Maya. Therefore research on *cenotes* is an interesting subject to put focus on within the future of Maya archaeological research. Many *cenotes* can be found on the Yucatan peninsula in the provinces Yucatan, Campeche and Quintana Roo. Hundreds of these *cenotes* can be found on the peninsula, many of which many were used during the Maya heyday period of the peninsula. Since there are many *cenotes* in Mexico which can be subjected to archaeological research. There lies a great opportunity, in the future to gain more knowledge about the Maya, their rituals, worldview and usage of these *cenotes*. In the future this could become an important field within Maya archaeology in the Mexican area. The next chapter discusses underwater archaeological research with regard to *cenotes* and elaborate more extensive on this matter. The interest in a more anthropological approach to archaeological research and expanding research means came with the uprising of Processual Archaeology or also referred to as New Archaeology (Prufer and Brady 2005b, 3). Investigating ritual activities through a systematic search regarding the remains of these activities lead to better understanding and provide archaeologists with a more holistic perspective on the societies that we study. At the moment there is a lot of inadequacy of how we as researchers deal with the interpretation of the material remains that indicate the past presence of ritual activity (Prufer and Brady 2005b, 6).

2.4 Cenote of Chichen Itza

The case study to regard old excavations with modern archaeological research techniques chosen for this thesis is the cenote of Chichen Itza as an example. This cenote lies north of the site Chichen Itza, about 300 meters from El Castillo, the impressive temple of the main square. From the main site of Chichen Itza to the cenote runs a sacred entrance way, the Sacbe. This sacbe was a procession road to the cenote.

Figure 4. Aerial view of the main square of Chichen Itza with the Sacbe leading to the Sacred Cenote (adapted from www.americanegypt.com).

The Sacred Cenote is one of the most impressive in the Yucatan Peninsula being 60 (200ft) meters in diameter and having cliffs of 27 meters (89ft). It is not the only cenote in the near proximity of the site, there are several small ones but there a two well known *cenotes* connected to this site, the Xtoloc cenote and the Sacred Cenote, the latter being the main focus in this thesis. The Sacred Cenote is known by different names regarding its infamous history with names such as Sacred Well, Well of the Sacrifice, Sacrificial Cenote. These names were based on ethnographic stories and some of the artifacts that were found such as human skulls. The original Maya name referring to the cenote is *Chen Ku*.

Thompson (1932, 275) describes the color of the water of the Sacred Cenote changes throughout different periods due to changes in the natural environment. Most of the time the water is dark colored, but can change from dark brown from the decaying leaves to a jade green caused by algae and sometimes through flower and seed capsules also the color of a kind of blood red. The water is so turbid that it can reflect light like a mirror instead of deflecting it like crystals would do (Thompson 1932, 275). The cenote of Chichen Itza is one of the biggest examples of research on *cenotes* and at the same time an example of how not to conduct research, which will become clear by the end of chapter five. The precious goods that were recovered from the site had been deposited as some sort

of offerings and many of them came in large quantities and different types. The most common finds at the site were ceramics and bones, providing us with a lot of information.

Activities at well

Thompson (1932) described activity at the sacred well as a priestly procession with victims that were alive descending the stairs of the temple of Chichen Itza between the snake head columns and carrying rich offerings. The city would be silent and you would only hear the beat of the sacred drum and the whistle as they walked down the sacred way. As they approached the cenote the high priests made an invocation to the rain god Chaac that resides in the well. This was done from the platform of the stone shrine that was located on the edge of the well. From this location they tried to appease their deity by presenting him with offerings. Human offerings that were alive are described as captive warriors and fair maidens that were tossed in the cenote with other types of offerings. These offerings consisted of different types of materials such as food, jewels and other materials of great value with a votive purpose (Thompson 1932, 58-59), which will be discussed thoroughly in chapter five. Of course this view on how sacrifices were done is a romantic view described by Thompson, inspired on ethnohistorical sources from the past in which beautiful virgins were cast into the well as a tribute to their gods in time of crisis. This however seems to be a distorted biased look at what actually happened at these *cenotes* and how ceremonies were conducted. Ritual leaders took the lead making sure that their followers made the cycles of time and generations continue, through various practices of sacrifice. As we have seen, in many contexts such as caves, tombs and *cenotes* Maya offerings have been found. And as mentioned at the beginning of this chapter, ethnohistorical documents described the Sacred Cenote of Chichen Itza as a place of pilgrimage for the Maya. Offerings that were done at the cenote will be explained more thoroughly in the fourth chapter regarding archaeological research on the cenote and their conclusions. The cenote at Chichen Itza had both a pragmatic use supplying water, and a sacred use being a portal to the otherworld. Small ritual buildings were built besides sinkholes, and both were integrated into the system of roadways that ran throughout the site. Understanding space and architecture can give new insights by treating space as a dimension of social relations. Before was already mentioned how sacred space is important to look at to understand their worldview (Pugh

2005, 56).

Chapter 3:

Underwater Archaeological Research

This chapter provides an overview of current methodology regarding underwater archaeological research and in what way it can be applied to research in *cenotes* such as our case study of the Sacred Cenote of Chichen Itza. Underwater survey techniques are discussed as well as excavation techniques and proper preservation and documentation relevance when it involved artifacts that have been submerged in water for a period of time.

3.1 Applying underwater archaeological research in Maya research

There are many terms related to archaeology and its involvement with the underwater realm. Maritime Archaeology describes the relationship with the sea. Involving shipwrecks, sunken cities or ports and studies the interaction between humans and water through the study of physical remains. There is Nautical Archaeology which studies vessel construction and use; and Underwater Archaeology, a more general term applicable on every type of archaeological research involving water, which studies the past through any submerged remains be they of maritime interest or not. In this thesis references are made to the term underwater archaeology when discussing the research on Mayan traces of the past in *cenotes*. Underwater archaeology is a relative new field within archaeological research. Some attempts of underwater research were done during previous centuries, dating even into the 18th century when large trading companies such as the Dutch East India Trading Company made attempts to recover cargo from their lost shipwrecks. However just only since the 1980's it began to emerge as a promising new way of conducting research due to technological ingenuities such as the development of diving equipment. This development of underwater archaeology is mainly the case with foreshore archaeology, researching archaeological remains in seas and larger lakes. George Bass is often seen as the founder of underwater archaeology as a professional field in its own right within archaeology as a science (Juncqua-Naveau 2003). His fame came with the research he had done on a wreck in Turkey during the 1980's, he was the first

archaeologist to ever fully research a shipwreck and founder of the Institute of Nautical Archaeology (INA). Also divers such as Jaques Cousteau triggered interest in underwater treasure search with the broadcasting of his underwater expeditions.

The role of underwater archaeology in Maya research

When we have a general look of what Maya research has been about throughout the years, little attention has been given regarding underwater archaeological research, whether it regards the Maya seaworthiness or their relationship to *cenotes*. The focus seems to be more on the research on land regarding elements such as tombs and impressive architecture at Maya sites. The lack of underwater research with regard to the Maya is quite a missed opportunity since they were very much connected to nature and thus also thought highly of natural places such as *cenotes*. An important name inside the National Institute of Archaeology and History (INAH) of Mexico is Luis Alberto Martos Lopez (2009), he also recognizes the importance of this form of Mayan exploration and has written an article regarding this matter on it for the Museum International published by UNESCO in 2009. He explains the current use of *cenotes* as economical means to lure tourists and make profit of. They are seen purely as commercial exploitation instead of platforms for scientific research. Due to this exposure to humans in the form of urban growth or tourism, these *cenotes* become more and more endangered when it concerns the quality and quantity of the deposits within. It appears to be a promising archaeological subdivision.

3.2 Research techniques

This part presents some contemporary research techniques which can be applied when conducting archaeological research on the underwater parts of the *cenotes*. There are a lot of different books on research techniques when it involves underwater archaeology. I have chosen to expand this chapter on the information given by the Nautical Archaeology Society (NAS) regarding foreshore archaeology. An internationally recognized way of conducting underwater archaeological research. The NAS is a non-government organisation based in the United Kingdom with a dedication to advancing education in nautical archaeology at all levels, improving techniques of excavation, reporting and conservation. Its main goal is to preserve the archaeological heritage in marine environments,

focusing primarily on coastal and marine archaeology driven by an interest of underwater cultural heritage. The NAS attempts to make everyone with an interest in underwater heritage aware of the constant threat of natural and human agencies and showing that the research on underwater sites is important and that recording the past should be done as accurate as possible. They want to improve archaeological research techniques en encourage an improvement in making more publications of researches. More information on the NAS and IJNA: www.nauticalarchaeologicalsociety.org. These techniques that the NAS regards when excavating however can be applied universally to all sorts of underwater research and can thus also be considered when exploring flooded areas such as cenotes. Articles published by the NAS in their International Journal of Nautical Archaeology (IJNA) are important sources within the nautical scientific community, keeping a close eye on the most recent developments within the field of underwater archaeology. The most important stages in underwater archaeological research are area survey, site survey and excavation in order to gain enough information to make a complete as possible site interpretation. In this subchapter an overview is given beginning with survey techniques, followed by excavation techniques and thereafter shortly discusses the preservation of those waterlogged objects that were collected during the excavation.

3.2.1 Underwater survey techniques

When it comes to underwater archaeological research a survey is often done at first. This could happen for different reasons. First, survey can be done to establish that specific place underwater where the excavation can be most fruitful in its finds. Second, surveys can be done in order to gain a general knowledge about the lay-out of a certain site, depending on its size. When it comes to research on cenotes the second one can be applied, since the archaeological evidence is not found too far in the underground tunnels of the cenote in the form of a predisturbance survey. Often only the main entrance has been used as a deposition location. Except for some cases from prehistoric sites, dating from a time when there was drought and these underground systems could be reached deeper within. However, this is not applicable when it comes to the Maya research of cenotes.

Cenote survey

The need of area reconnaissance regarding cenotes is diminished due to that there are no destructive investigation techniques needed such as probing and sampling to determine a certain site location. The cenotes are regarded as sites of their own, as almost all cenotes in the Yucatan peninsula are known. It is different when searching a location of a shipwreck in an ocean or lake, where you have to scan a large area in order to determine where exactly the location of excavation will be. An important element of good research regarding underwater archaeology is planning to define the scope of the area making a reconnaissance of the site, the predisturbance survey. This is important to learn about the condition of the site before the start of an excavation. It can offer us information about what the site looked like, its condition and the registration of every detail of information of a site and its research, because once you start excavating information like this which is an important source of information would otherwise be destroyed. When it comes to archaeological research only one opportunity is given to do it right. Research is not only about the artifacts found, it covers many more facets than that. Context, environment, biological evidence and historical sources about the site are types research elements which we need to comprise a more holistic, complete picture on a site and its history. Three important elements in the research are recording all possible types of information during survey and excavation; to learn about the history of the site by conducting historical research; and to provide additional information through the means of photography and video. Tuttle (2011, 116) provides a fitting quote explaining the relevance of good underwater survey:

'Archaeological survey is fundamental to archaeological data collection. Underwater archaeology is developing and maturing as a discipline. The levels of technology available for investigations are variable depending on the objectives of surveys. Prior to entering the field, it is essential to do a complete desktop research, an in-office examination of available literature, and to develop a survey plan…. In addition to understanding the cultural potential of a survey area, it is imperative to understand the physical environment. Rivers, lakes, cenotes, and offshore areas for instance all have their own dynamic.'

Any survey relies on accuracy. Therefore measurements during surveys are expected to be clear. When collecting evidence, record everything that you find, because documentation is the basis of information when researching and

interpreting a site and its finds. A survey or pre-excavation is generally conducted to obtain information on what type of cultural material may be found in an area or to document a particular site thoroughly, whether in preparation for an excavation or for long term management purposes. Surveys tend to be noninvasive, and artifacts will not be removed until an excavation plan has not been developed. However, sometimes removal of artifacts occurs for conservation or redeposition. Once a general survey had located acoustic targets, magnetic anomalies, or other areas of interest, a predisturbance site survey of the targets may be conducted. Accurate positioning during a predisturbance investigation is critical (Tuttle 2011, 115).

Elements of underwater archaeological research are: positioning, swim searches, probing, remote sensing, (possible use of underwater vehicles), predisturbance site survey and finally the recovery of artifacts through excavation (Tuttle 2011, 119). Positioning is on finding the whereabouts of a certain site, through literature studies or other sources. After a positioning of the area where the survey and excavation should take place, swim searches are done to determine the site. During these swim searches divers swim between buoys to conduct a survey of the area and record the data. These searches are either done with snorkels or scuba diving depending on the type of site, depth of the water and visibility (Tuttle 2011, 119). Examples of these searches are the circular search, the swim-line search and the jackstay or corridor search. The latter type of these swim search techniques is similar to search method used when doing an archaeological survey on land. During these techniques the divers follow a certain line or circle in which they will search for certain artifacts learning us about the concentrations of artifacts at a site and where the main excavation should take place. Probing is a simple and efficient method to examine subsurface features or defining the extent of a site. It is a method which can be used both above and below water to determine the depth of the burial of an object. Different methods and tools are used for probing, which are used for examining subsurface feature or defining the extent of a site. Remote sensing is an effective method to search for cultural material in a marine context, but unfortunately it is expensive. One of the most important pieces of remote sensing equipment is the use of a Global Positioning System or GPS. This GPS will let the researchers know where they are and keep them with accurate position. Another piece used for remote sensing of equipment is the fathometer, measuring sound energy to calculate depth.

Knowing the depth will provide insight in what type of scuba supply should be used and what type of equipment may be deployed for subsequent investigation. Sub-bottom profiler works in the same way as the fathometer. Another sonic device is the side-scan sonar, emits sonic energy from its transducers. The echo is capable of producing near photographic images of the seafloor and any material lying on its surface. A tool similar to this is the multibeam echo sounder. Basic principles are the same, however a three-dimensional representation of the area can be created with this tool. There is also the tool of magnetism by using a magnetometer. Remote sensing tools are usually towed behind a survey vessel. The capacity to conduct in field analysis of remote sensing data is crucial to the success of a survey. Underwater vehicles can be used during underwater research when the research site lies beyond the capabilities of human divers at a great depth. These Remotely Operated Vehicles (ROV) and AUV autonomous underwater vehicles (AUV) reach places beyond the reach of normal divers and they will play an important role within future underwater archaeological research since we will want to learn more about the treasures that lie at the bottom of the oceans and seas.

Once a general reconnaissance survey has located the area of interest, a predisturbance survey can commence. If positioning and survey data were properly acquired during the general search as described above, there should not be any trouble returning to the site. There are many ways to initially record a site prior to excavation by sketching, offset measurement, trilateration, photographic and digital imaging, and etcetera. Through the use of establishing baselines or datums underwater measurements can easily be recorded using a slate and a pencil (Tuttle 2011, 126). Drawing and sketching are the main components of the recording procedure. When requirement for accuracy is higher during recording, then creating a grid at the site is an option. Advantages to working with these grid systems relate to accuracy and control (Green 2004, 238). They are made of strong material and create a plan above the work area of the archaeologists. Areas directly under each grid square can be subdivided and recorded individually. Further on in the process these individual drawings of each area can be merged together create a single image of the entire site (Tuttle 2011, 128). Erecting a grid over a site allows for the efficient collection of 3D data and can also be of use during underwater photography and digital imaging. Grids can rapidly create an evident representation of a site. Plus points of digital photography is that they can

be downloaded and manipulated and thus make it easy to create photo mosaics and site analysis. If excavation is to follow the survey then installing a grid during the survey is a good investment.

Figure 5: example of a grid system (adapted from www.nauticalarch.org).

When an area survey is complete or a predisturbance survey has been properly conducted, the next step in the archaeological process is excavation of the site.

3.2.2 Underwater excavation techniques

After establishing the contents of the cenote and the general lay out through survey it is time to take the research to the next level in order to gain more detailed knowledge. Research and diving techniques differ with any type of underwater archaeology, not all techniques used in foreshore underwater archaeology can be applied to archaeology in underground caves, lakes and cenotes. Underwater archaeology of cenotes can be regarded as a discipline of their own, combining their own type of research techniques with research issues. This type of archaeology keeps developing into something professional with the

increase of efficient diving equipment making exploration more efficient and provides possibilities for new and improved recording techniques. The necessity to conduct proper archaeological excavation is explained by the NAS as followed:

'Archaeological excavation can be likened to reading a book and then tearing out the pages and burning them; the process is destructive. For this reason it is necessary to maintain excellent records and accurate site plans' (Reader NAS, 35).

It cannot be stressed enough that underwater archaeological research needs to be done thoroughly to gain as much information from a site as possible. Only one chance is given to excavate a site, so accuracy and noting every detail is of importance. Main considerations, aside from the specific archaeological aims, objectives, methodologies, and artifact conservation, include safety, accommodation, transport, size, composition, and experience of the team, equipment requirements, maintenance, funding, as well as other things that sometimes may not seem obvious, such as allowing time for media and local public events, which can have significant benefits in promoting community involvement, goodwill, and support for the project (Underwood 2011, 135). In this type of research there is a need for a professional scientific diver and a need to develop a project safety policy, which is an intrinsic part of project designs to minimize the possibility of hazards. Depth, visibility, temperature and tidal flow are elements that can have influence on the way in which the work is organized and the time required to achieve the project aims and objectives. When describing the locations of the found artifacts there triangulation, datum offsets and a grid can be of assistance to gather as accurate information at possible. Just as we have discussed during the previous part of this chapter with regard to survey techniques.

Underwater research in cenotes

There are some issues to stress when we regard archaeological research in the Mexican *cenotes*. When we look at the different types of *cenotes* as explained in the first chapter the focus of the archaeological research techniques depend on diving skills associated with speleological or cave diving. Often *cenotes* tend to lead into deeper cave systems within which archaeological deposits can be found.

Due to drought in earlier times, depositions were done here before the caves were flooded.

Figure 6. Divers exploring the clear waters of a young cenote (adapted from www.topnews.in).

These diving techniques have been considered by Mexican sport divers who dive caves and *cenotes* for fun. When excavating underwater it is important to keep in mind that the clarity of the water differs per location due to the different types and ages of *cenotes*. Younger *cenotes* have clearer water then the older. Due to the presence of suspended particles the water in the older *cenotes* are more turbid (Lopez 2008, 102). Production of organic matter which can make the difference in the water clarity depends on the exposure of the cenote to the outside and on the incidence of light. Geological elements as these should be taken into account when attempting to conduct underwater exploration in *cenotes*. When *cenotes* are old, exposed and have little water clarity it is possible to make the water more clear for research by inserting certain chemicals to the water making research more easy in registering information and applying the general techniques regarding underwater archaeological research. This method was used at the final or Mexican phase of research (1968-1969) at the Cenote of Sacrifice at Chichen Itza.

The principles and methods of excavation of a cenote are similar to

excavations done on a land site. The environment is only different, taking place underwater. The use of tools and recording information remains the same. Important tools used in underwater archaeological research are your hands, a trowel and a paint brush to clear surfaces (Bowens 2009, 141-147). *Cenotes* can have a lack of stratigraphic layering, providing it a challenge to see context differences (Bowens 2009, 142).

Just as archaeological researches done on land sites, excavation consists of two main procedures with each their own tools and their own sub elements. The first main procedure is that of the actual digging and recovering artifacts. Excavation techniques and tools are relatively the same as used during excavations on land. The second procedure during excavation is the removal of spoil, unwanted sediments which are of no relevance to the research gets loosened during the process of digging. Removing this spoil is different than research on land due to its underwater environment. At land excavations spoil is removed by items such as shovels, buckets, wheelbarrow, and etcetera. During underwater research a suction device is needed to remove this spoil. During early excavations on sites the use of these suction devices was as a way of digging, combining the two activities and thus a great mishap with loss of information. Due to the use of this type of suction device potential important information gets sucked up together with the spoil, because that can create a messy outcome and not an accurate way of conducting research to its fullest potential (Bowens 2009, 144).

Recording techniques

Recording information is the most important part of archaeological research. When finishing research on a site it is relevant to create a site plan of a site and their contents with the use of sketches measurements done on site during the excavation. This site plan can be drawn by hand or made digitally with the use of a computer. Both these types are done during excavations. Programs such as GIS and CAD can help in creating this site plan most accurate (Bowens 2009, 127).

Besides writing down measurements and other details on finds, area, etcetera is important to collect data through several multimedia techniques such as photographing and video recording (Green 2004, 234). Underwater photography is one of the most important (Sandoval *et al.* 2008, 144). By combining a collection of pictures taken during research an overview of the site and its contents can be created. After excavation it is also important to gather

photographic information on all the artifacts recovered from the site. Photographing artifacts are important since the process of decay can never be fully stopped. Digital pictures can last forever and provide insight into the state the artifact was in when collected during research. Recording information with a video camera provides an image of a site in the underwater state before the excavation. Recording is done before the start of an excavation as part of a reconnaissance survey learning about the layout of the site and the visual artifacts that lay within.

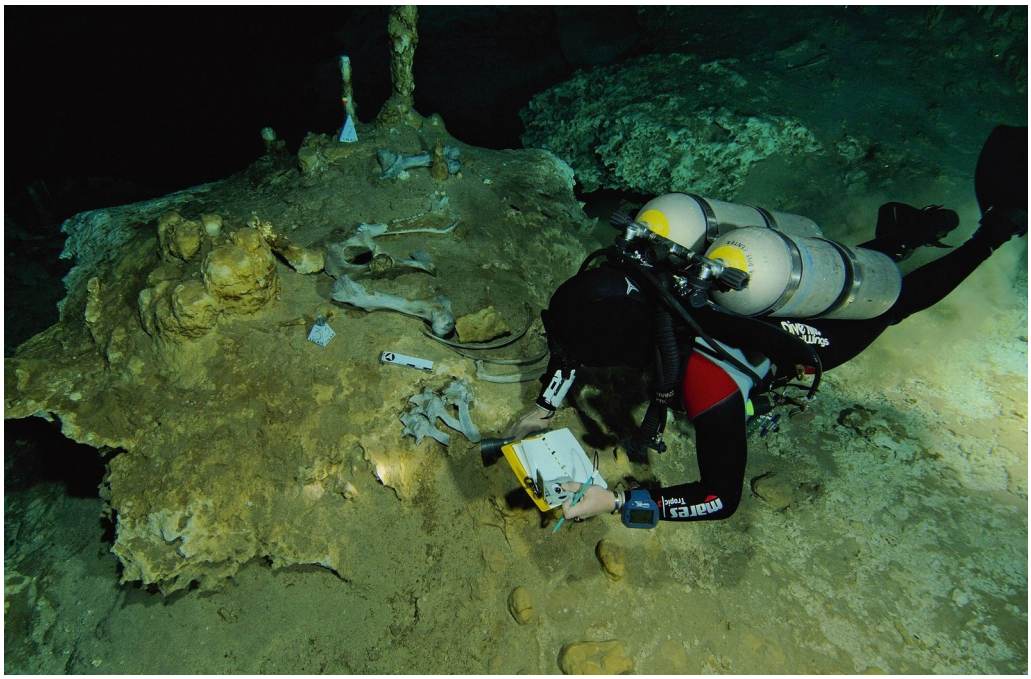

Figure 7. Underwater archaeologist working in a cenote (Rolex, Kurt Amsler).

Modern research on cenotes

The Mexican government in combination with INAH (Instituto Nacional de Antropologia e Historia) have recently made an important contribution in promoting cenote archaeology as a new field in Prehispanic archaeology through the introduction of an interdisciplinary project *Atlas arqueologico subacuatico para el registro, estudio y protecction de los cenotes de la peninsula de Yucatan* or the underwater archaeological atlas for the recording, study an protection of the cenotes of the Yucatan Peninsula. The purpose of this interdisciplinary project is systematic survey of cenotes mapping them through a Geographical Information System (GIS) and making records on the historical, paleontological and archeological evidence. To this day the project has already provided some

significant results once again underlining the potential importance of research of cenotes (Lopez 2008).

3.2.3 Preservation of waterlogged artifacts

An important part after the archaeological survey and excavation is the preservation of the artifacts recovered. Once taken out of its location on site, preservation becomes essential in order to keep these artifacts from damage or evaporation due to change of environment and the sudden presence of oxygen, a change from anaerobic (without oxygen) to and aerobic (oxygen) environment.

Types of materials and their state of preservation

Just as on land there are different types of materials that can be found at a site excavation. Inorganic, organic and composite artifacts (Bowens 2009, 151). Inorganic materials are from non-living elements such as ceramics, metals, stone, and etcetera. When these artifacts are recovered some of them are covered in concretion form being in an underwater environment. This concretion is a thick overgrowth on the surface of an artifact, often covering the shape of the content. When it involves metals it may develop conglomerates of several materials together, for instance coins that grow together to a group of conglomerates. Organic materials involve artifacts made from living things for example wood, textiles, bone, and etcetera. It is important to always be extremely cautious with organic materials during underwater research because of their danger to evaporate when taken out of their anaerobic environment. When exposed to air and drought, the objects could lose their structure, become broken or even evaporate. Composite artifacts comprise of objects that are made of more than one type of material. Mostly this involves a combination of objects consisting of both inorganic and organic materials. Extra attention should be given to these objects such as a knife with a wooden handle or other types of objects with different types of materials because of their preservation issues that involve both these different types involved. The next chapter discusses these waterlogged conditions with regard to the artifacts found at the Sacred Cenote.

Chapter 4:
Expeditions, research and their archaeological data

This fourth chapter gives an overview of the different expeditions that were archaeologically involved at the Sacred Cenote, the finds that were collected and their time period. There were several different phases through time in which the cenote was in use. This chapter is a synthesis on the finds within the Sacred Cenote at Chichen Itza, given to provide insight in the types of finds that can be found at *cenotes*, the condition they were in and what we can learn from them. In the next chapter they will be discussed to show the importance of cenote archaeology and new methods of research.

4.1 Expeditions and research at the cenote

Interest in the exploration of *cenotes* began in the 19th and early 20th century. There are two main periods of research at the Sacred Cenote that involve underwater expeditions. In the first period there were two attempts to recover the artifacts from the Sacred Cenote of Chichen Itza.

First period of research

The first real attempt to search for objects from the Sacred Cenote was by French explorer Desire Charney in 1882. He attempted to dredge the cenote of Chichen Itza with two Toselli sounding machines, however due to the heights of the walls and the depth of the water is was impossible to get to work and gather some objects from the water (Coggings 1994, 9). The irregular bed of the cenote in combination with the presence of roots and stones prevented the bucket that was lowered to extract anything from the cenote. Several failed attempts to gather any artifacts from the cenote were done and failed to gather any objects. Charney gave up and the well was not touched until the beginning of the twentieth century.

The second attempt during this first period of research to excavate and learn about the Sacred Cenote was done by Edward Thompson. He conducted his research on the cenote between 1904 and 1910. His recovery of archaeological material from the Sacred Cenote by Thompson is one of the most famous early cenote related excavations and his research is often described as the orange-peel

bucket dredge. Thompson was an American consul stationed in the Yucatan city of

Merida, best known for the famous dredging of the Sacred Cenote at the Chichen Itza site. Thompson was a man with an extraordinary change of career and interest, since he was formerly placed as an American consul in the Yucatan peninsula. During this period he visited and studied different sites throughout the peninsula and Thompson decided that his life work would become Chichen Itza. He bought the great abandoned plantation that comprised the site of Chichen Itza and its sacred well (Thompson 1932, 191).

Figure 8. Thompson standing next to his device to haul in the buckets from the dredge (from the online collection at www.peabody.harvard.edu).

The equipment necessary for the dredge was had been placed on a platform next to the remnants of the shrine that lies at the edge of the cenote. From the point of this shrine, from where presumably offerings were cast into the cenote a preliminary search was done to establish a so called fertile zone where the primary research focus would be on. This fertile zone was established by throwing wooden logs into the water from the location of the shrine. These wooden logs were shaped like human beings and the weight was that of the average native (Thompson 1932, 270). A lot of brown material or spoil was hauled up from the

bottom during the dredge. This material consisted of natural elements such as leaves and broken branches. Many objects that were brought up during the dredge were of great scientific interest and due to their waterlogged positions many objects were in surprisingly well preserved (Thompson 1932, 274).

Figure 9. Picture depicting the hauling of the dredge and collecting it on the raft (from the online collection at www.peabody.harvard.edu).

During the final years the dredge research did not deliver any more new artifacts and mostly buckets of mud were hauled in. Thompson decided that it was time to change his research approach and take it to a more hands on level. Nooks, crevices and crannies would be his next focal point in his research on the cenote of sacrifice, through underwater exploration. Thompson had followed a diving course and together with a Greek sponge diver named Nikolas, he attempted to collect from artifacts from the bottom of the well. The natives that were helping him in his research were taught on how to assist and to operate the pump on the raft (Thompson 1932, 280). The dredging ceased and an underwater research period at the cenote began. Changing research methods provided more artifacts adding to an already great collection. The diving suits that were worn are not like those light and slick ones that we currently use. Their suits consisted of waterproof canvas with big copper helmets weighing up to thirty pounds. These helmets had plate glass goggle eyes and air valves that were near the ears. A lead necklace was also part of the suit as well as canvas shoes with thick wrought-iron soles (Thompson 1932, 281). Work was done at a diving depth of sixty to eighty feet. Just as with any type of underwater research this was not without danger.

Falling rock masses from the walls and instability from removal of residue provided serious challenges. During these last few years of excavation Thompson recovered a large quantity of artifacts from the cenote consisting of a great variety of materials. Thousands of artifacts were found and seen as attestments of sacrifices by the cenote cult. In 1926, the Mexican government seized Thompson's plantation, charging that the artifacts were removed illegally. The Mexican Supreme Court in 1944 ruled in favor of Thompson and the greatest part of the collection from this site has been shipped to America and is now part of the collection at the Peabody Museum at Harvard University.

Second period of research

The second period of research on the Sacred Cenote of Chichen Itza commenced during the 1960's between 1961 and 1968. This second period has often been described as the Mexican research period. The beginning of the this research period was led by William Folan as field director and this expedition was initiated by the Mexican National Institute of Anthropology and History, the INAH (Cobos 2007, 50; Lopez 2008, 104). Research during this period differed from that used in the first period of research at the start of the twentieth century by Charney and Thompson. They conducted their research with the use of divers and an airlift suction device which could be operated from a raft in the cenote. When it became clear that the use of the airlift caused destruction to fragile objects and causing disruption to any stratigraphic indications on the site the expedition was stopped. The same type of artifacts found by Thompson during the first period of research in the early 1900's were found by Folan in this expedition. There were only a few unique objects found (Coggings 1994, 27). Unfortunately the finds that were done during the Mexican expeditions have not been published properly.

The final years (’67-’68) of this second research period INAH worked together with the Club de Exploraciones y Deportes Acuaticos de Mexico (CEDAM) or Mexican Exploratory Club with a new research type (Cobos 2007, 50; Lopez 2008,104). These final years of the research expedition were led by Roman Pina Chan as field director. During this latter part of the expedition they worked with new methods of research. These methods were partially successful assets to the research. The first new method used was an attempt to empty the cenote or at least lower the water level. The water level was lowered, but only by four meters. The second new method used was clarifying the water of the cenote

in order to gain more sight for the divers during their underwater research. The tailings on the small beach in the cenote left by Thompson after his research was sifted and surprisingly these muddy tailings, from the earlier excavation more than fifty years earlier, contained several smaller objects such as jade beads, shell mosaic and bones. Primary location of excavation was chosen beneath the shrine of the cenote, as it seemed to be the most promising location. During earlier research Thompson did not attempt to research that part of the cenote thoroughly due to many large stones that were in the water at that spot that haven fallen from and were presumably part of the shrine area above. Beneath this layer of rock sediments is where field director Pina Chan wanted to put the main focus on when excavating. An important first step in this excavation was the removal of these large stones.

The excavation of this spot comprised of four different layers of soil, referred to as stratums by Coggins (1992, 27). The first stratum consisted of those large stones that had fallen into the water from the shrine area. These stones were either plain or carved, among these for instance was one depicting a serpent head. The second layer of stratum contained numerous smaller types of objects such as textile, copal, blue painted bowls, jade beads, human bones, and etcetera. The third stratum researched contained even smaller objects and was more fragmented. Items found in this layer even more copal, polychrome shards, bells, worked jade, rubber, human bones and even some complete Puuc period vessels were found. Objects from this third stratum are types that resemble those that are in the Peabody collection, collected during earlier periods of research by of Thompson. The fourth stratum was never researched during the expedition or in any period after. Lack of funding put an end to the excavation at this layer and thus we still have no complete excavation on the cenote. Never again has an attempt been made to finish research at the cenote. The findings that were done during this period of research can be found in Mexico. They are now part of the collection of the National Museum of Anthropology in Mexico City and in the collection at Palacio Canton Museum in Merida, Yucatan.

Modern types of research on cenotes

In 1999 there was a study initiated by the INAH regarding cenotes, in search of cultural and paleo-ontholohical materials (Cobos 2007, 50; Lopez 2008, 104). A variety of archaeological remains was found at different *cenotes*. Archaeological

research is a necessity to find out if the osteological remains were results of sacrifices, wars, deceases or funeral deposits. In situ recordings of deposits were done to analyse and provide complete information on a site and its research. Importance of underwater video and photography. Preparing maps through GIS. Analyzing small samples of evidence. So it is not an excavation on a grand scale such as the one done at the Sacred Cenote. But more a general type of research collecting data from most *cenotes* on the Yucatan peninsula (Sandoval *et al*. 2008, 143-44).

4.2 Types of findings at the cenote and their preservation conditions

This part of the chapter is based on a few sources which together give a clear overview of the types of archaeological artifacts that were found in the Sacred Cenote of Chichen Itza. Most of these sources discuss the finds done by Thompson in the earlier, since the Mexican research failed to be published properly. Different types of materials were used as offering or as part of a sacrificial rite. Most types of objects that have been found in the cenote can be found in the overview I present below. It includes materials such as gold, jade, wood, shell, cloth, obsidians as well as animal and human remains. Some information on these found objects and their connection to Maya religion will be discussed and looking different ways of interpreting artifacts as part of a new method of research which will be analysed in the fifth chapter. Some of the types of artifacts presented below include a description on their condition when being waterlogged for long periods of time.

Textiles

From the first period of excavation over 700 fragments of textiles were found, only to be more extended after the finds of the second period of research (Coggins 1984, 26). Most of these pieces have been examined in an attempt to gain more knowledge on the types of material, the way the fibers were spun or woven and many other types of information. It is exceptional to recover that many examples of textile, most examples get lost over time because of their fragile organic nature. However, due to the continuously wet environment of the Sacred Cenote the textile had a longer life and thus provided us with an interesting insight on the use and manufacture of textiles (Lothrop 1992, 33). It is likely that the steel jaws of the orange peel bucket tore the delicate wet fabric during the dredge by

Thompson. Damage to the textiles was also caused by heavier objects falling onto the material during the years and also during research. Fragmentary and blacked carbonized cloth was collected at the cenote. It was black due to its long emersion under water, they have become degraded by carbonization as a result of their long immersions under water and possibly also through subsequent treatment after the recovery from the cenote. Textiles are highly perishable materials. Although of fundamental archaeological significance, the time element involved is difficult if not impossible to estimate for this collection. The textiles appear to be homogeneous with uniformity in manufacturing, the general appearance is uniform, but close examination reveals that there is a substantial variety in weave. The textiles found were probably made in one area, however possibly spanning more than just one time period. The designs of the textiles are too geometric or generalized to serve as indicators of date or cultural affiliation. All the fabrics were constructed from vegetal fibers such as agave, bark and cotton. Objects found in relation to textile were spindle whorls and other weaving tools as well. Attempts to recover the original dyes were unsuccessful, it was lost due to deterioration over time (Lothrop 1992, 36-37). It is suggested that offering textiles is often regarded as possible wrappers of items such as wooden idols or seen as clothes the sacrificial victims wore during the ceremonies (Lothrop 1992, 75).

Basketry, twined sandal soles, and cordage

One of the most perishable artifacts is basketry. They probably served as containers for offerings thrown into the Sacred Well. In total the cenote must have contained large quantities of items such as basketry, cordage and related objects. These served as carriers and additional use to artifacts that were cast into the Sacred Cenote. Due to their fragile condition however most of those items were perished and only a few items made it to the collection (Mefford 1992, 91). Organic items such as these decay, even in waterlogged conditions and especially in a warm water environment. The basketry that was found was coiled basket fragments and impressions of plaited baskets were found on several copal offerings. Sandal soles fragments of twined yuca with pile as well as others. However to far deteriorated to determine exactly the materials. About ten types of cordage specimens were collected from during his excavation at the cenote (Mefford 1992, 91).

Lithics

The stone tool assemblage found at the cenote is important. It provides us with information about what types of ceremonial activities took place at the Sacred Cenote. These ceremonies include the intentional destruction of materials, killing, bloodletting, offerings, burning and use of copal. Several indicators in the lithics such as chipped, broken or burned elements give us insight in their functional use during time of deposition. Indications of breakage or burning can provide us with information on the way in which the tools have been destroyed (Sievert 1992, 111). Reasons why tools were sacrificed in the cenote can be because of functionally not usable any more, discarded after ceremonial use or that they were possibly produced with the sole function being sacrifices (Sievert 1992, 111). About 250 chipped stone artifacts have been recovered during excavations at the Cenote of Sacrifice in the past. Learning about their chronological information and the identification of external affiliations of the lithics found at the cenote are the objectives of researchers. It is obvious that not all the lithics were home grown Maya household lithics that were tossed into the cenote. The materials, form and technology indicate a widespread external connection (Sheets *et al*. 1992, 153). The collection consisted of large bifaces, tanged bifaces, side-notched bifaces, corner-notched bifaces, lanceolate bifaces, unclassified bifacially flaked fragments and thinning flakes, microcrystalline and obsidian debitage, obsidian prismatic blades and obsidian polyhedral cores (Sheets *et al*. 1992, 153-172). Analyses and comparisons do contribute somewhat to the dating of the cenote cult. Several items of European origin suggest that the Sacred Cenote at Chichen Itza was still in use as a pilgrimage center well into the historic period. (Sheets et al. 1992, 172) The cenote seems to be discarded as deposition place for lithics during the Late Postclassic. A similar shift can be found in the ceramics at the cenote where most of the lithics were made and deposited during the Late Classic and Early Postclassic periods (Sheets *et al*. 1992, 174). During the Late Postclassic the Sacred Cenote continued to be a suitable repository for sacred goods, but for some reason chipped-stone implements and debitage were rarely among them. In terms of ethnicity of manufacturing, indigenous tradition can be isolated form the externally derived characteristics. Indigenous tradition is represented as items made of crude, rough chart and were mostly subjected to pyroclastic treatment.

Within the foreign category the use of pyroclastic treatment is rare. In the Maya tradition, ritual treatment for the cenote and ceremonial burning is presumably a standard part of termination rituals and ceremonial emplacements. However this was not the standard at the ritual emplacements of good at the homeland of the intruders of Chichen Itza. The Sacred Cenote is notable for many centuries of bicultural ritual deposition of lithic artifacts (Sheets et al. 1992, 178-179). Five use contexts of lithic of which we can learn from lithics about their function and purpose are substinance, ornamental, special elite purposes, manufacturing for substanence and ceremony (Sievert 1992, 107). Understanding which purpose the lithics at a site served can provide us insight about their social context. In general they are very well preserved in waterlogged conditions.

Ceramics

The ceramics recovered are not homogeneous. They represent two distinct major periods of ceramic. The first being the Terminal Classic- Early Postclassic often also referred to as the Florescent period roughly between AD 800-1200. The second being the Middle through Late Postclassic often also referred to as the Decadent period which lasted between about AD 1200-1550 (Coggings 1984, 31). In general the ceramic data suggests that the primary function of a cenote was water well during the florescent period at Chichen Itza. The offerings that connect to the later period suggest a single synchronous episode of manufacture and use-deposition. It is thought that a careful reanalysis of the ceramics recovered from the cenote might finally resolve the question of its time of use as a receptacle of public offerings and clarify the composition of the ceremonial ceramic sub complex associated with this use. There is evidence of complex functional history encompassing at least two and possibly even three or more discrete use-episodes. Each of these appears to have been distinct in nature, material correlates and duration as well as in date (Ball and Ladd 1992, 192) two broadly overarching patterns characterize the materials available for consideration. One consists of whole and nearly whole but broken vessels. The other comprises highly fragmentary shard material (Ball and Ladd 1992, 194). Glazes on the ceramics are fragile and can deteriorate, paint is also a type of protective layer. Depending on the chemistry of the water is the speed of decay and how much of it takes place. High fired wares survive submergence better than the lower fired softer types of ceramics such as terracotta. These higher fired wares are found more often in a

better state (Singley 1988). Ceramics are very important because they can serve as index fossils, making it possible to make identification by comparing them to those from other periods making it possible to build a sort of chronology (Joyce 2004, 16-17).

Wooden artifacts

Artifacts like these need extra preservation attention due to decay that occurs when wooden objects come in contact with oxygen after being waterlogged for a long period of time as explained at 3.2.3. There is a great variety in the use of wood in objects, unlike the other categories wood was found on items such as idols, tools, weapons (Coggins 1984, 26). Over more than 300 pieces of worked wooden artifacts were found. These wooden finds make the cenote collection extremely diverse and very special. Wooden objects are not often recovered in a good state of preservation. Due to their anaerobic location at the muddy bottom of the cenote, they were in perfect condition for good preservation (Coggings and Ladd 1992, 235). As discussed at the end of the third chapter, change of environment from being waterlogged to reaching the surface and an environment filled with oxygen can cause severe damage to such a fragile artifact and in some cases even cause total evaporation. Biological organisms have an impact on the preservation of these artifacts. These organisms can be microscopic or macroscopic, ranging from bacteria to little bugs and underwater plants (Bowens 2009, 150). Wooden artifacts quickly tend to rot and decay, especially in areas where there are warm temperatures. It begins to rot and is soon being slowly devoured by insects (Coggings 1984, 26). During the Mexican expeditions at the cenote similar wooden artifacts were found as the earlier attempts to dredge the cenote. Not many have been published properly unfortunately. Few wooden artifacts had surface treatment on them varying from stone mosaics, coating of stucco or paint. Maya Blue paint was a common addition to these types of artifacts during the Late phase of the cenote ritual, probably seen as an essential part of the offering at the cenote. The Early phase there seems to be some sort of dry red pigment, it appears to have the same sacred additional purpose as the Maya Blue color in the Late phase (Coggings and Ladd 1992, 235). Some sporadic residue of other colors such as white, green and yellow were found as well on some wooded artifacts. The Maya coated many wooden artifacts with some sort of resinous preservative which kept them in a fairly good condition

(Coggings, 1984, 26). A type of surface treatment used on the artifacts was paraffin, with which most of these objects were covered when they were placed in the museum collection to keep them preserved. Types of wooden artifacts found at the cenote were ear ornaments; weapons such as atlatls, darts, shafts; handheld objects such as clubs, handles of chart bifaces, baton, wands and scepters; effigies such as idols representing gods, animal effigies, phallus effigies; perforated ornaments such as pendant discs; Implements such as whorls and other types of weaving tools, rods and sickle like tools. There were also some other miscellaneous artifacts (Coggings and Ladd 1992, 236-336). The most primitive find at the sacred well was that of the Hul Che, a throwing stick that one of the most primitive type of weapons which can be found in the Mesoamerican region that was manmade. On the bottom of the cenote of Chichen Itza a great variety of these throwing sticks were recovered, showing elements of change in shape and decorative patterns. Some of them were beautifully carved with gold encrusting and gem mosaics to be used as votive objects (Thompson 1932, 291). Many wooden objects, as did other artifacts from the cenote, were cut and broken on purpose before being deposited into the sacred well. However it is hard how many broken objects were done at the time and how many destruction was done by the dredge of the archaeological research in the past (Coggins and Ladd 1992, 340).

Copal and rubber offerings

A great quantity of copal offering was found at the cenote of Chichen Itza. After the category of ceramics, copal was the most numerous in its presence. Copal is often described as the preferred food of the gods (Coggins and Ladd 1992, 350). Many of the copal offerings remained intact throughout the centuries, just a third of the collection is fragmentary or damaged. Copal was found in several forms at the cenote. Half of the found copal were arrays on top of other offerings, they were either offered in vessels of wood, ceramic or in a basket. Other copal offerings at the cenote were modeled in the shape of copal figures or served as lighting. Variation in copal occurs in the way it is added to other materials used for offering and the different shapes and functions it served. These copals often were painted red, brown or Maya blue. These items were commonly used during ceremonies in the Maya culture and burned for ceremonial purposes (Coggins 1984, 26). Rubber is often found in a combination with copal. The Maya word for rubber is *K'ik'* which also stands for blood. Rubber was considered as blood from

the tree just like copal. It was used for different purposes and different kind of offerings during the Late phase at the cenote. It was modeled and molded into various shapes (Coggings and Ladd 1992, 353). Rubber and copal in a waterlogged position becomes fragile. Both being created from organic materials, when exposed to heat and light it becomes sensitive to deterioration and softens, causing cracks on its surface.

Mammalian remains

Many faunal remains were found at the cenote such as bones of birds, reptiles, fish, invertebrates and mammals. Despite the colorful legends surrounding the cenote and its sacrifices, most of the recovered bones were of non-human remains. Only 250 mammals were found of the total 750 faunal remains found by Thompson. We can never know for sure if all the animal bones that were found at the cenote came from sacrifices and if they were deposited on purpose. Hopkins (1992, 370) mentions that those mammalian bones came from animals that either:

1. lived in the cenote;
2. lived near the cenote and fell in, either before or after death;
3. were brought to the cenote after death by predators;
4. were deposited by humans, either as refuse or sacrifices

Interpretations of these remains are biased since most of them have no signs of modification by either men or other types of predators. Not only because of the uncertainties regarding how the bones got into the cenote the interpretation remains biased, but also because of the incompleteness of the collection. A great deal of bone material was missed by Thompson in his attempt to dredge the cenote. It is hard to know whether or not an animal placed at the cenote was part of a sacrifice. There seems to be a dichotomy between the cultural deposition and natural deposition of bones. Bones that were retrieved at the cenote were exceptionally well preserved due to their placement underwater. However, most of them had a sort of eroded look with a dark greyish brown color (Hopkins 1992, 371). To conclude, the mammalian bones are a mixture depositioned either through a natural or cultural deposition process.

Metals

The use of bronzes within the Maya culture differs per region. Most objects that

were found at the cenote, such as gold and copper, were foreign to the region of Yucatan and seen as exotic riches. Gold and silver were regarded as the sacred excrement of the moon and sun (Evans 2008, 365). These metals from other regions testify to the hypothesis that there was widespread contact throughout Mesoamerica with Chichen Itza (Coggins 1984, 27). Many gold artifacts were found showing extreme precision in craft ranging from carved out pendants to embossed discs. Metals in waterlogged positions become concreted during their time under water. Often they even conglomerate, becoming one big bulk sticking together.

Stones and precious stones

One of the most curious stone items found during the dredge was that of a large stone figure representing half human, half jaguar. It weight about 400 pounds and was very curious artifact to be part of the assemblage. Unfortunately this figure was lost due to extreme damage caused during a big fire in the temporary museum and during the attempt to remove the object to be restored (Thompson 1932, 178). Jade objects found at the Sacred Cenote were numerous. According to Thompson (1932) jade was the most romantic and mysterious of all the gems. The history of jade is interwoven with the ancient cults regarded with the sun and the serpent. They were seen as high prized tokens by great rulers and had the same type of value and importance at the time as diamonds have in our contemporary society. Their Maya name was "*chalchihuitl*" (Thompson 1932, 294). Most of the true worked items of jade were found in ancient burial places and sites on the peninsula of Yucatan. They presumably originated from this area during that period of time. In general these items were recovered in good condition from their waterlogged conditions within the Sacred Cenote.

Human remains

Human remains can provide us with information about the person behind the skeleton, such as the gender and age (Tiesler 2005, 351). About seventy-three complete and fragmented specimens of human skulls were found at the bottom of the Cenote Sagrado at Chichen Itza. Some of these showed signs of weathering or rodent marks, indicating they were second burials. With these bones it is clear that sub adults predominate (Owen 2005, 333) and also advanced ages occur. Despite the stories of the young female virgins who were cast into the cenote, two thirds

of all the specimens seem to be of the male gender. Ernest Hooton (1940) wrote on the remains of 42 individuals that were found by Thompson in the early 1900's (Tiesler 2005, 351). Ninety-three percent of the skulls seemed artificially modified by cradle boards, deforming the skulls and creating broad and high elongated head shapes creating diversities in headforms. The evidence of the head modifications is common to the classic period and strengthens the idea that the cenote served as a ritual human depository during that period (Tiesler 2005, 352-353). When we regard the ethnohistorical stories on the cenote and human sacrifice osteological remains are the only direct sources of evidence that can link these humans as part of sacrificial rituals. Mutilation to skeletal remains indicate often violent deaths make a link between human bodies and sacrifice as described in iconographic and ethnohistorical sources mentioned in the second chapter (Owen 2005, 324). It is difficult to make an interpretation or reconstruction from skeletal remains found in cenotes due to their placement under water. Complex taphonomic processes that occur in the process of decay make it difficult to see clear relations. Due to the decomposition body parts become scrambled up and relationships between the remains are hard to find (Tiesler 2005, 341). Water chemistry influences the preservation of bones, since they have great porosity and easily absorb elements from their environment. The sacrifice of victims by throwing them in the cenote has been properly documented by both ethnohistorical sources and as conclusions of archaeological researches from the past. It is however not a question if these sacrifices occurred but rather how much these human sacrifices occurred (Scott and Brady 2005, 276). In total about 73 were found expanding a period of hundreds of years, and when we look at these numbers it can be concluded that these human sacrifices were quite rare and seemed to only occur during extreme times of need or special occasions.

Tedlock (1994) reminds us not to uncritically accept accounts of human sacrifice purely based on ethnohistoric sources. The interpretation of osteological remains as reflecting human sacrifice remains a controversy. It is hard to attribute human sacrifice and a violent death on bones or skulls reflecting no indications of such a thing. There are some critical points against this point of view. First, not all sacrifice leaves little signature on the osteological records, examples such as strangulation, disembowelment, etcetera; Second, there is a need to look at the archaeological context surrounding the human remains; Third, you cannot just assume they all died of natural causes or sacrifice.

We can look at these remains as funerary, sacrificial or punitive-legal. The funerary practices entail commemorating a deceased person. Sacrificial practices regard the human body as part of the ritual offerings to a deity. And punitive-legal practices regard an act of violence to punish, such as being disobedient or as a captive of war (Sandoval *et al*. 2008, 150). Was the ritual disposing human remains funery or sacrificial? And did they die before or after the placement in the well or cave? Little is known about the role of *cenotes* as places of primary burials or as ossuaries. Underwater placement of deceased in a non-sacrificial way needs consideration as a possibly to explain these human remains when researching cenotes and human skeletal remains that were found within. Not one clear synthetic interpretation with regard to ritual sacrificial activities has been provided to enlighten us about why these human remains were placed in waterlogged environments (Tiesler 2005, 343). It is often the case that special contexts are for special population, it is not part of a normal burial. Making it clear that archaeologists cannot just assume some idea without regarding every element to come to a more concise interpretation on human sacrifices in *cenotes* (Scott and Brady 2005, 277). Another idea could be that that just singular bones were offered by family members, presenting a part of their loved on to the deity of the underworld connecting them to the other side. Unfortunately the story behind the human bones still remains an object of discussion for some within the field of Maya and Mesoamerican archaeology.

General other artifacts

Other artifacts are types like shells, palm nut artifacts, decorated gourds, leather, and stucco. Many of those were of too fragile material or just not well represented in the collection of artifacts from the cenote and thus not mentioned. In freshwater preservation is better than salt water, which adds salts which eat away at artifacts (Bowen 2009, 150; Singley 1988, 8). Decay differs per individual object, being influenced by many different factors such as the depth, temperature, light, and etcetera. These artifacts found at the Sacred Cenote mentioned above are just a general overview of the types of artifacts that were found there. The following chapter will present an analysis of the differences between the research periods to state the different phases of use at the site and provide a conclusion about the cenote based on these artifacts. Considering the long duration of use of the cenote as a ritual depository, securely documented by artifacts dated to the Terminal

Classic until well after the Spanish contact.

Chapter 5:
Analysis of archaeological data

This chapter is an analysis of the finds within the cenote and the use of archaeological context. I will have a look at the conclusions of the old research and have a look at how we would possibly interpret it today. Will it be the same, or would we have had different insights? As mentioned in the previous chapter, there have been two main periods of research regarding the Sacred Cenote. The first period was between 1882-1909 and the second 1961-1968. Each of these periods had their own approach on archaeological research and own techniques. The question if these different approaches also provided a completely different conclusion on the history and purpose of the Sacred Cenote and its relation to Chichen Itza the site as a whole.

5.1 Conclusions of the periods of research

The artifacts that were found during the different research periods consisted either of organic, inorganic or composite materials. Through the archaeological assemblage that was found at the Sacred Cenote we can learn about traces of use and gain insight in ritualistic behavior. Researches done by Thompson and the Mexican research on the cenote are discussed below.

Thompsons research at the Sacred Cenote

Thompsons results of the dredging and diving into the sacred well showed that in its essence the details about the traditions regarding the sacred well are true when it comes to the type of offerings that were done there (Thompson 1932, 287). The archaeological evidence that has been found during the research done by Thompson gave an idea of what the cenote of Chichen Itza was used for. Many of the objects that were found at the Cenote of Sacrifice were fragmented. These could have been in this state by purpose as being votive objects. These votive objects would have been broken before being thrown into the well, to break the spirit of the object. The spirit of these objects have been broken or killed to serve as an ornament for the messenger (Thompson 1932, 288). It is hard to learn about the exact phases of the cenote ritual. Thompson could not say anything about a

stratigraphy so the relationships between types of artifacts from this excavation and other in the area to determine a general sort of clarity on the periods in which the artifacts were cast into the well. It is unfortunate that many objects cannot be dated just from their seriation alone, since we need to get insight in the periods ceremonies took place at the cenote.

Mexican research on the Sacred Cenote

More recent research on the cenote was done during the sixties. This period of research used different techniques from those of the early research period at the beginning of the twentieth century by Thompson. The archaeological finds from the project are now part of collections at the Palacio Canton museum in Merida and at the National Museum of Anthropology in Mexico City. This period of research put some of the conclusions drawn from previous researches to rest and provided understanding on the use of the cenote and the meaning of it within the Maya community. Not one of the attempts in the past to remove objects from the cenote has succeeded in establishing stratigraphic or other type of relationships. The Mexican research in the sixties was the most successful by dividing the cenote into four stratums as explained in the previous chapter. If Thompson had not dredged and dived in the cenote for seven years in the early 1900s, the techniques of modern underwater archaeology might, theoretically, have salvaged original contextual information, but the many difficulties encountered by the more recent attempts leave this in some doubt (Coggings 1994, 12). Bark vessels that were found during this expedition were a first, since there is no record of Thompson finding these at any of his research. Or these types of artifacts would have been discarded due to the possible difficulties with the conservation of objects like these. For instance wooden masks were also not part of the collection of Thompson. A textile fragment was found of thirty centimeters, which is considerably larger than any of the cenote textiles in the Peabody collection (Coggings 1994, 27).

5.2 Purpose and phases of activity at the cenote

From the artifacts recovered we can derive that the site was mainly in use for ceremonial purposes from the Late Classic period and that the cenote was still used in ceremonies during Thompsons visit to the site in the early 1900’s. The only thing that had changed with time in the sense of how these ceremonies were

performed and what type of offerings were done during a certain period. The collection of artifacts at the cenote of sacrifice and its volume can be considered disproportionally high for a single site and is one context that can be regarded as specialized. Meaning that its finds differ quite from daily domestic or farming activities (Sievert 1992, 108). The majority of the finds at the cenote of sacrifice comprised of ceramic vessels as well as human and animal bones.

A social context of the collection is important to learn about. Artifacts can be used look for correlations between archaeological materials and social ranks. Artifacts are the most important sources of information. Through examining them we can learn about about the local or exotic origin of the artifact, give insight in the degree of skill involved and the amount of labour that would have been needed to manufacture such an item.

The artifacts from the cenote of Chichen Itza can be divided in five categories. Sievert (1992) reckons that materials can be associated with:

1. High ranks
2. Intermediate social ranks
3. Low social rank
4. Unique or undiagnostic
5. Accidental inclusions

The items that are associated with high ranks of society display the widest geographical range in places of origin. Unfortunately just small number of object types had restricted temporal distributions, but some overlaps between periods of use suggest that most of the objects were deposited between the Late Classic and Postclassic periods. Many of the more spectacular finds of the high rank category can be dated to the early Postclassic period. Objects associated with higher ranks are types found on other sites in major tomb burials or structures such as temples. They are rarely recovered at general excavations. Most of the artifacts were intentionally broken, burned or both before deposition in the cenote. Objects associated with the intermediate social rank usually occur in burials, but rarely in tombs. Not all of the items received predepositional treatment like breakage or burning. Materials related to low ranks are of contexts relating to the use by commoners. Usually found in middle deposits and construction fill. Little predepositional treatment is evident. The unique material include a few artifacts

with a wide spatial and long distribution. Infrequently they occur in special deposits that are sometimes associated with all of the social strata. The accidental inclusions regard elements such as the bones of smaller frog and lizard bones from animals living in and around the cenote (Moholy-Nagy and Ladd 1992, 142-3).

The Sacred Cenote at Chichen Itza is unique in Mesoamerica due to the quality, quantity and diversity of the artifacts recovered from it. Its fame being known as a sacred place survived the conquest, which is also very special. Some offerings show very close resemblance with materials recovered from *cenotes* at other Maya sites throughout the Yucatan Peninsula (Moholy-Nagy and Ladd 1992, 142-3). Maya ritual tools can provide insight into the ceremonial use at the Sacred Cenote. The design of a tool, quality of the material and workmanship and traces of use are all elements to regard in research of artifacts and lithics in particular (Sievert 1992, 108-109). Differences in origin, manufacturing and stylistic elements of ceramics between settlements and ritualistic places, such as caves and *cenotes*, show us that there is a strong difference between ritual activities and the use of ceramics in daily live (Woodfill 2011, 221). This type of relative dating can teach us in which period we can place this find and when it was used. By comparing the ceramics to other types and placing them in sequences we can learn a lot on these artifacts and their period in time. The different types of material found in the cenote originated from several parts of Mesoamerica. Indicating a wide trading network throughout Mesoamerica with copper, gold and alabaster coming from the northern parts of Mexico, jade and obsidian from Guatemala and El Salvador to copper being transported Honduras and gold from Panama (Coggins and Shane 1984, 31)

In both the research periods on the Sacred Cenote it is confirmed that *cenotes* were considered as important sources of water and life becoming even sacred and looked at with symbolic meaning. Learning about the interaction and trading routes can be done through several sources besides archaeology. Ethnographic sources and traces of contemporary and historic population movement provide important additional information on the interaction during the Classical and Postclassic period (Woodfill 2011, 219).

Phases of activity at the Sacred Cenote

As mentioned before it is hard to learn about the exact phases of the cenote ritual. There is an evident lack of stratigraphy, and it is provide clarity on periods from seriation and comparing artifacts alone. However, attempts to place the cenote cult into different phases have been done as will be discussed in this part. Most of the depositions of the cenote are from the Terminal Classic and Early Postclassical period of the site Chichen Itza. They can be divided in two broad phases in which the Sacred Cenote was used as a place of ritual. The phases are roughly between A.D 800-1150 and A.D 1250-1539. The Early phase at the cenote A.D 750-1145 and the Late phase at the cenote A.D 1224-1480 (Coggins 1984, 31). The Early phase at the cenote can be subdivided into two parts. The beginning of the Early phase resembled more the Classical Maya. This phase began with the founding of the site Chichen Itza in the eight century A.D. The second part of the Early phase started around 900 A.D. when a change occurred at the general Chichen Itza site and the offerings and ceremony became more Toltec and cosmopolitan. With other cyclic dates and presumably also the type of ritual. In the Late phase, ceremonies and offerings changes, however the periodic ritual continues (Coggings and Ladd 1992, 236).

Tozzer (1959) regarded the purpose of the cenote and its cenote cult in relation with rainmaking and divination. Their ceremonies would be concerned with the calendrical celebrations of certain, presumably some type of agricultural, periods (Coggings and Ladd 1992, 340). The majority of the objects found at the Sacred Cenote were deposited in destructive cyclic completion or termination ceremonies. These ceremonies involved prognostication at several critical dates, rather than more or less continuously during the seven centuries that the cenote was the focus of religious activity (Coggings and Ladd 1992, 341). There seems to be quite a disagreement on when the cenote cult existed at the Sacred Cenote. This seems to be a wrong question to ask, since it assumes that there was one single cult operating within a certain period of time. There could have been more than one cult and more than one period regarding a cult in relation with the cenote. Ritual leaders took the lead making sure that their followers made the cycles of time and generations continue, through various practices of sacrifice. As we have seen, in many contexts Maya offerings have been found (caves, tombs, and

cenotes). The Sacred Cenote at Chichen Itza has been explored and precious goods have been recovered which were presumably, deposited here as offerings, particularly in the Postclassic period when Chichen Itza thrived as an important Maya capital (Evans 2008, 292). The sacrificial or cenote cult at Chichen Itza seemed to peak after the decline of Toltec Chichen but continued into Colonial times and even later. Most objects from the muck of the cenote are of Toltec period manufacture which includes special objects such as fine jades and gold discs (Woodfill 2011, 197).

5.3 Relevance of new methodological research regarding insight on use of site

The third chapter discussed the archaeological techniques regarding survey and excavation underwater when conducting research. I compared cenote archaeology done in the past on *cenotes* to more recent ones done by the Mexicans as well as presented the general ways of research according to the NAS when it comes to underwater archaeology.

Interpretation in the utilization of cenotes

When it comes to achieving the most proficient interpretation, a multidisciplinary research seems to be crucial when learning about ritual activities and their sacrifices. Depositional events at the cenote can occur in two types (Joyce 2004, 18). First natural causes could be at the core of the artifacts reflecting human activity at a site. Second it can be deposited on purpose through human means. Through collaboration and exchanging of data and ideas between actors from different disciplines, fruitful contributions can be done with regard to cenote research (Tiesler 2005b, 357). As we have seen in the second chapter, elements from sacred landscape and artifacts that belong to it can provide a way to learn more about the cultural history of the ancient Maya. There is an article by Brent Woodfill (2011) on the role of cave archaeology in reconstructing Maya history and their interaction through found artifacts and their source of origin. We could apply this same idea to *cenotes* and the type of information that we can gather through the study of artifacts in order to learn about the interaction during the periods the cenote was actively used. During modern researches different types of deposits were found at the studied *cenotes*. Carefully deposited bodies, pre-Hispanic ceramics and animal offerings were mostly found in shallow areas that were likely dry at the time.

Spatial association of cenotes with pre-Hispanic settlements

Not all sacrifices, some were carefully deposited as if a mortuary practice. Using *cenotes* as some sort of aquatic cemeteries. Following our preliminary analyses of the *cenotes* the hypotheses that *cenotes* were selected as places for mortuary practices and/or mortuary deposits in the form of aquatic cemeteries seems to be a plausible explanation of the recovered data collected during a general research on *cenotes* of the Yucatan peninsula (Sandoval *et al*.2008, 151).

As we have seen in the previous chapter *cenotes* provide well preserved ceramics and other artifacts. At least better preserved as they would have been buried and found at a landsite. Artifacts from the cenote can be compared to other assemblages to give us a better insight about the period of the site use, this is especially useful when the surface site has been destroyed or remains undiscovered. In the Maya religion *cenotes* played an important role. Research and the artifacts recovered provide us with insight into the nature of rituals and the role it would have had in their contemporary society. *Cenotes* are rich sources of evidence providing insight in inter regional relations. Materials from different periods of use of the cenote can help create a model regarding the regional culture history (Woodfill 2011, 222). Better preservation of artifacts and sites provides us with the possibility to make quick comparisons to assemblages of different other sites and regions and make a real contribution in finding the most accurate information on artifacts, the site they were found and the period in which this all played a part.

Chapter 6:

Conclusion

This final chapter returns to the research aims as stated in the introduction, and make a synthesis of this thesis. This will be done accompanied by a recommendation and suggestions for future research with regard to cenote archaeology and Maya research. What was the role of the Sacred Cenote within the site of Chichen Itza as a whole and can a reassessment of an old excavation through modern techniques provide us with new insights and different conclusions? Relevance of cenote research and the developing specific underwater archaeological research techniques is also discussed together with a recommendation for future research of *cenotes*. Sacred space and hermeneutics are discussed as being of influence on gaining the most insight possible. The chapter ends with the discussion on human sacrifices in relation to *cenotes*.

6.1 Overview of the thesis

This thesis began with a general introduction on Mesoamerica and the Maya to set the context of the case study on the cenote of Chichen Itza which is presented in the second chapter. *Cenotes* are discussed and how they are regarded in the Maya worldview. Sacred space and hermeneutics are referred to so more insight can be gained on the Maya from looking at different angles and create a better understanding on the role *cenotes* had within their society. Theoretical part of the thesis consists of methodology with regard to underwater archaeological research and how this is applied on *cenotes*. Survey techniques, excavation techniques and preservation of artifacts are discussed. An overview is given on the different periods of research with regard to the Sacred Cenote and their findings. Conclusions are drawn from both and compared, gaining information of the different phases of activity at the cenote.

6.2 Main research question

A problem was defined in the introduction stating that we should be careful with

conclusions that were made during researches from a long time ago. It seems that our interpretation as scientists is important and we must always be objective and biased towards these older researches and their conclusions. Because of interest in this problem the main research question of the thesis was:
Is there a need for reassessments of old excavations and will modern archaeological research techniques provide us with new insights?

The case study of the Sacred Cenote in involves a conclusion from the early twentieth century which differs from conclusions made from research on the site from a later period. This case study presented through chapters two, four and five shows us that there is indeed a need for revising old excavations or at least not to just accept conclusion that were made during past research periods. As we have seen in the third and fourth chapter techniques of research seem to develop and become more technologically advanced broadening possibilities of research. Cave research is regarded to be very similar to that of cenotes. Just like cenotes, caves were used by the Maya as places for ritual deposition or used as ossuaries. Orifices such as these seem to be similar in the way they are regarded as entrances or connections to the otherworld. Through the change of techniques and combining it with different research perspectives such as hermeneutics, we can contribute in understand more about a site and its purpose and not be carried away by a biased view created by past interpretations on sites.

6.3 Periods of research at the cenote: view on the case study

The case study of the Sacred Cenote at Chichen Itza was represented by the description of two main research periods at the site. The first was done by E. Thompson at the beginning of the twentieth century and the second period of research at the cenote was done by Mexicans during the 1960's. What was exactly wrong with the research by Thompson? And what about the Mexican research at the cenote? What can be improved?

During the research on the case study it became clear that over time and different periods of research several different conclusions could have been drawn from the use and meaning of the Sacred Cenote at the site of Chichen Itza. Each of the expeditions that were done in the past, either by Thompson in the early 1900s or the Mexicans over fifty years later came with their own interpretations to the finds and thus their own conclusions on what happened at the cenote. Mistakes

that were made during the research periods is not being accurate and discarding artifacts that are not what you look for. This is what happened in the case of Thompson. He did not conduct his research from an objective scientific point of view. He read the ethnohistorical descriptions on the Sacred Cenote and the human sacrifices that were made and decided to make it his interest of research. Only attempting to find proof of these human sacrifices and of the riches the well would contain he was not being objective in his research. Being biased was not his only mistake. He also failed in conducting accurate research. The spoil that was left by Thompson in and near the cenote after his research was sifted and surprisingly contained several smaller objects such as jade, shell and bones.

What do we need to change with regard to our view and ideas about *cenotes*. The ideas that derive from the ethnohistorical sources and adapted by Thompson provide us with a distorted Colonial view on ceremonial activities at the *cenotes*. Ancestor veneration is also something to consider I which family members of deceased honor their ancestors. It could be that just a bone of a family member was thrown into the well as part of a ceremony to honor their ancestor and connect them with the otherworld. What is also suggests is the function of certain cenotes as human ossuaries instead of places of ritual sacrifice. It seems that many more suggestion can be made on the function of cenotes. And until this day it is still unclear what their exact function was. We do know however that they were not places where young virgins dressed in white were sacrificed. Despite the romantic descriptions from ethnohistorical sources, two thirds of the specimens that were found at the Sacred Cenote were of male gender and remains were found belonging to both children and adults.

We have compared the different research periods and the techniques that were involved. With the increase of modern techniques the conclusions about the Maya and their rituals and worldview reflected in daily lives changed during the second period of research. The conclusion of this case study provides an answer to the main question of this research. In the case study of Chichen Itza and the reassessment of the research during the 1960’s we can tell that there is a relation of space between the cenote and the site Chichen Itza as a whole are definitely connected. Cosmological dimensions are at the base of every site of architecture of Maya settlements.

6.4 Future research on cenotes

Several research techniques have been applied to *cenotes* in the past and during this thesis their approaches have been compared with more recent underwater archaeological researches and modern diving techniques. The field of cenote archaeology is relatively new and only recently been recognized by the INAH as an archaeological field that could provide us with maybe new insights on the ethnographic history and natural history of the Yucatan peninsula of Mexico. As a mean to learn more about the Maya cenote archaeology is an interesting field to focus on to understand cultural societies from the past. With Maya research a holistic approach can so much more knowledge about past cultural societies and help us understand more about them and their social, political and religious elements. There is a need for multidisciplinary approach with regard to cenote archaeology. *Cenotes* are considered as sacred spaces were performances took place in the form of sacrifice. *Cenotes* were used for several functions, depending on the type, location, association with a site. They were used as water sources, seen as sacred places connecting to the underworld and home of certain deities (chaacs) and even suggested to be as aquatic cemeteries.

A personal recommendation on what cenote archaeology will become in the future and in what way research should be conducted. Cenote archaeology should be considered as a sub discipline of their own within the general archaeological scientific field, providing a source of great importance in attempting to understand the Maya and their world view. There are many cenotes on the Yucatan peninsula with a great variation of size and functions. Otherwise it should definitely become part of research on similar types of environment with often the same social, political and sacred connotations such as caves. Cave archaeology as shown in the second chapter, shows many resemblances to *cenotes* and should therefore be considered of interest within the field of cenote archaeology. With regard to the underwater research in the field of cenote archaeology it is important to copy survey and excavation techniques from the field of maritime archaeology and combine their knowledge with speleological diving experience of cave divers. Diving in *cenotes* can be quite a challenge since some are extended though several corridors in which at times of drought depositions were placed. Every cenote is also different, depending on several issues. A survey of *cenotes* throughout Yucatan is highly suggested since cenote exploring is an upcoming trend in Mexican tourism. This touristic interest brings dangers of destruction or looting, leaving little concrete evidence for accurate

archaeological research of which we can learn more about the Maya. More money should be made available for research on *cenotes* and providing courses focused on underwater cenote archaeology of Maya cenote archaeology. Diving techniques with regard to underwater research of *cenotes* are special due to its closed environment, making it a different area to research compared to lakes or seas. Survey techniques should be determined per cenote as well as the need to excavate since not all *cenotes* were used as deposition areas of artifacts. More attention should also be given to the techniques of preserving items from the *cenotes*. These waterlogged objects are often in a good state when found but a challenge with preservation due to the change of their environment.

6.5 Sacred space and hermeneutics

Sacred space was discussed in the second chapter referring the intentional use of architecture and space in connecting that with their cosmological view or worldview. It is interesting to think that the time layouts of cities were thought about and we can learn about their worldview and society through looking at their way of creating space and how architecture fits within. Therefore regarding the use of sacred space is important. Archaeological research at caves in Mesoamerica was the inspiration in regarding the connection between sacred space and cenotes. Archaeological cultures from the past are fascinating puzzles archaeologist try to solve gaining knowledge and understanding about past worlds. But because of the value of things being relative it is hard for archaeologists to completely understand the past and its intentions. As mentioned before relevance lies in the eyes of the beholder. Our present interpretation is different from that of somebody from a decade ago and obviously completely different from centuries ago. That is why the hermeneutics were mentioned in this thesis with regard to gaining understanding in past societies. The science of interpretation is important, keeping in mind the intention of the author and the interpretation of this by others. This hermeneutic type of thinking became part of the postprocessual movement of the early 1990's as a reaction to the positivistic ideas of processual archaeology. It is a challenge to interpret archaeological data gathered from sites of religious activities such as cenotes, because we can never be certain on the actors who were present during these activities.

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Nederlandse samenvatting

Sinds de opkomst van het archeologisch vakgebied zijn er al enorm veel opgravingen geweest. Opgravingen die gedaan zijn aan het begin van de vorige eeuw, zijn gedaan vanuit een andere onderzoeksmethode dan huidige archeologisch onderzoek. Tegenwoordig bekijken we meer aspecten en verschillende disciplines en proberen wij dit te combineren met vernieuwende technieken bij opgravingen. Oudere onderzoeken leveren vaak dan ook andere conclusies dan de moderne. Dit brengt de onderzoeksvraag van deze scriptie met zich mee of er een noodzaak is om oude onderzoeken in twijfel te trekken en te herzien. Aan de hand van een casus, de cenote van Chichen Itza, probeer ik deze noodzaak om te erkennen dat moderne technieken en objectiviteit een andere uitkomst bieden. Twee onderzoeksperioden zullen worden vergeleken en de methodiek zal dieper ingaan op onderwater archeologisch onderzoek in deze cenotes. Onderzoekstechnieken die besproken worden zijn archeologische survey en opgravingen en toepasbaar in cenotes.

English abstract

Since the development of the archaeological field there have been many excavations. Those that were done at the beginning of last century were done from a different method of research than present research. Now we involve many aspects from different types of disciplines to our research. We tend to combine these ways of looking at the past with more technologically advanced techniques. The older researches often result with different conclusions due to their different approach of research. This is the issue of interest which makes us wonder whether we should question and revise old excavations. Through a case study focusing on the Sacred Cenote of Chichen Itza and the change within cenote research this issue will be shown. The different research periods at the cenote will be compared and methodology of underwater archaeological research will be looked at. Research techniques on survey and excavation underwater will be discussed and applied to underwater research at cenotes.