EXPLORING THE ROLE OF WATER IN THE SOCIAL DYNAMICS OF THE OLD TESTAMENT

by

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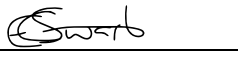
Exploring the Role of Water in the Social Dynamics of the Old Testament

I declare that *Exploring the Role of Water in the Social Dynamics of the Old Testament* is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.



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ABSTRACT

The availability of water and subsequent systems that developed around it played an important role throughout biblical lands and their surroundings. Water's contribution spanned across all facets of life, times of peace and war, affecting the elite and the poor. The research focuses on the different aspects of water, both in its natural and anthropogenic distribution. The combination of archaeology, anthropology, and geography explores the following questions: What can be learnt from contemporary civilisations? What social implications did water systems have on ancient Palestine's society? Did the extent of the impact lessen once water was secured? The multi-disciplinary approach aids in understanding the effect of water availability the social structures required for the creation, use, and maintenance of the different water systems. Water was, at first, a basic need for survival in rural areas, turning into a magnificent show of power of the ruling elite of ancient Palestine.

Keywords
Water; ancient Palestine; social complexity; Old Testament; Mesopotamia; Egypt; biblical narratives; geography; irrigation; archaeology; drainage

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CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND

Water has done much more than provide for all living things since the beginning of time and has continuously impacted, and perhaps even dictated social development. The desire to further study the topic stems from two points of interest. First, to this day, the world faces challenges in securing water sources. Second, seeing first-hand the extent of man's accomplishments in securing water millennia ago. With changes over time, there existed a need for humanity to manipulate water in their quest for social complexity. This, in turn, inspires the investigation of the magnificent ancient water systems, as they exist as evidence of human ingenuity and innovation. Perhaps these water systems can provide a better understanding of the lives of those who lived thousands of years before us. The water systems might not only show us how humans have had to adapt and manipulate their environment for their own survival but could grant us the ability to glance into the lives they had and how they flourished where complex water systems had been developed.

This research seeks to explore conditions in ancient Palestine[1] where large areas were and still are, considered arid and the need for securing a permanent supply of water cannot be overstated. As such, different aspects of water both in its natural and anthropogenic distribution must be considered. There is also a need to look at the water uses and systems throughout the archaeological periods of the Old Testament to gain insight into the evolution of water systems over time.[2]

1.2 PROBLEM STATEMENT AND RESEARCH QUESTIONS

Statements such as: 'All developed civilisations based their progress and flourishment on the development of water resource systems, and the decline of each civilisation began with neglecting and ruining these systems' (Dordević & Dašić 2011:9) and 'The success and/or failure of the

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[1] The use of the term 'ancient Palestine' and debates surrounding it are discussed further in 1.7.

[2] The periods that will be looked at include mostly the Bronze and the Iron Ages (including Canaanite, Israelite, Assyrian, Babylonian) followed by the Persian period, the Hellenistic period and the beginning of the Roman period (Noll 2001; Stern 2001).

ancient civilisations depended upon their awareness and ability to work with water resources sustainability issues' (Mays 2010a:vi) indicate the importance placed on the link between water and society. Much of the developments of water technology appear to have been linked to finding more efficient water supply systems in terms of both labour and cost rather than conservation (Mays 2008:283). Considering this, there is an apparent gap in research that revolves around the water systems of ancient Palestine. Additionally, it seems that there has been little research focusing purely and intensively on water during the archaeological periods that cover Old Testament times in terms of the role water systems might have played in the changing social dynamics of the time (cf. Mithen and Black 2011a; Mays 2010a; Scarborough 2003). Mays touches on the difficulty that exists in trying to write a history of water technology in ancient times and, thus, the various authors from his book cover but a few civilisations one can study. Civilisations in the book include the Egyptians, Mesopotamians, Indus Valley, Romans, Nabateans, and Aztecs, to name but a few (2010a:v). For the purpose of this research ancient Palestine's surrounding nations will be discussed with theories added from Mays' book where applicable.

It is not yet fully known whether a clear correlation can be made between social advancements and its reliance on the evolution of water systems - ever increasing in complexity - in terms of whether it was a major driver or a resulting necessity. Ultimately, there is a question as to whether water can be said to be the major inspiration for advancements in terms of social, economic, and physical distribution patterns during the time of the Old Testament.

To attempt to answer this question, various aspects will need to be considered. This includes, first, looking into ancient Palestine's neighbouring civilisations to determine if developmental patterns exist. Second, it must be determined what environmental conditions were prevalent from the time of the Canaanites through to that of the time of Roman occupation in ancient Palestine. Third, along with the environmental conditions, one must look at the evolution of water systems over time in terms of what caused these changes as well as what made them possible. Fourth, there is also a need to explore insights granted from the Hebrew Bible[3] as it reflects the times and place in question. Finally, the impact that this evolution of the water systems had on changes in social

[3] A similar outlook that was advocated for by Dearman will be followed in that the Bible will be used in conjunction with other historical, archaeological and anthropological sources to name a few. This stems from the personal belief that the Bible serves as a source of the outlook of the narrators and times of the Bible while extra-biblical sources should be considered as well to ensure the multi-disciplinary overview aimed at for this research (1992:7). The 2005 New International Version of the Holy Bible will be used for textual referencing in the Old Testament.

complexity will need to be determined. Part of this will involve looking at the role that water played in daily life and determining whether society and its classes were affected once access to this precious resource had been secured. Indeed, as with any history, none of these events would have been isolated and so it should be possible to also draw on comparisons with other areas of the ancient Near East. These aspects lead to a division between what aspects of human life was driven by *environmental determinism* and what was accomplished by *environmental possibilism* (cf. 1.6).

1.3 AIM

The aspects of the changing social dynamics that will receive the most attention are the increasing division between the different classes and the changing role of water through time as is seen in biblical accounts and archaeological evidence alike. By combining research from ancient Palestine with examples from that of the rest of the ancient Near East, a comparison between the possible influences across the different regions should become apparent.

These social changes were dependent on: environmental conditions, at least in the beginning; then technological and engineering advancements such as a shift from necessary sources of water like wells to social structures like baths and pools; and urbanisation that led to larger population sizes and defensive considerations. As such, it is hypothesised a shift will be evident from water as a driving force needed for development in the beginning of Old Testament times towards a point where it played an important role, more with regard to society and its contribution to a division of classes as it became a luxury commodity rather than a basic necessity.

1.4 HYPOTHESIS

A multi-disciplinary approach might illuminate these considerations of water in daily life and how it allowed for societal development during different archaeological periods of the Old Testament. It might also shed new light on our understanding of the social and cultural background to the biblical text by involving different interpretations and arguments from various disciplines. As seen from Black, Mithen, Hoskins & Cornforth, the study of water and society does not belong to a single discipline, is not bound by defined geographical regions, and spans across time (2010:5108). Bearing these considerations in mind, a comparative analysis might add to our understanding of water uses and influences in ancient times.

1.5 METHODOLOGICAL CONSIDERATIONS

1.5.1 Approach

The methodology to be used for this research will be *qualitative* and *multi-disciplinary* in nature as can be seen in the different approaches to be used. *Qualitative research* is useful for a topic such as this since: '…the bulk of the analysis is interpretive' (Strauss & Corbin 1998:11). It is, thus, appropriate for this study as it involves an interpretation of the lives of the people in ancient Palestine. This is due to the fact that it explores the world and its different entities as ever changing rather than that which can be measured quantitatively (Merriam 2002:3-4).

Due to the apparent lack of information available about water systems in ancient Palestine specifically, the study will also take on the form of, in part at least, a *comparative analysis*. Haas stated that comparisons have led to the expansion of knowledge in science (1962:294). In order to gain a better understanding of the technology that existed during the archaeological periods of the Old Testament, research from other areas of the ancient Near East will be utilised. This will include some basic information about the uses of water and the technology that ensured its availability for civilisations like the Mesopotamians, Egyptians, and Greeks (Mays 2010a; cf. Chapter Two).

Part of the study revolves around exploratory research to determine what influence water and the development of complex water systems might have had on the societal changes (some of which should be apparent in the Hebrew Bible) in terms of class, as well as *environmental possibilism* (cf. 1.2), among others.

A large part of the research in question will also be based on a *historical geographical* approach. This is defined as 'an independent, interdisciplinary, border discipline, which concerns earth and man, combines space with time and natural with social sciences' (Kučera 2008:6). Thus, this approach will be applied as the study seeks to explore social development in terms of a natural phenomenon that is governed by landscapes and climatic conditions. As such, the parallel between this discipline and the proposed project cannot be overstated.

An *anthropological approach* is also necessary and will serve the purpose of determining the social implications of water in ancient Palestine and, subsequently, the subfield of social anthropology will shape some of the arguments to be made. Social anthropology as a discipline

focuses on understanding how different aspects of daily life relate to one another from the viewpoint of a specified culture in terms of their ideals and beliefs (Lewis 1968:xi).

Finally, an *archaeological approach* will also be utilised in that archaeology provides the data that will be necessary to determine the physical advancements of water systems as well as the layout from different sites. An archaeological approach identifies what ties existed between people and their surroundings (Branch et al. 2014:1). The environmental archaeology branch of the discipline takes both biological and physical geographical information into account in an attempt to infer information about the past based on facts from the present that we know to be true (Branch *et al.* 2014:3).

Therefore, the *multi-disciplinary approach*, which is proposed to be most informative for this study, includes various disciplines such as geography, history, anthropology, sociology, archaeology, literature, and environmental studies. Whitelam argued that there are many possible benefits for using such an approach and, perhaps, that it has become necessary, as the lives of those we study were far more complex than one discipline can fully explore (1986:46-47 & 65).

1.5.2 Structure

Some main aspects stand out as influential in this study. These will need to be considered to create a holistic view of ancient Palestine and its water systems. The layout that follows briefly touches on these points of study that will follow in the chapters to come:

Chapter Two: Water management in the ancient Near East and beyond will focus on the neighbouring civilisations of ancient Palestine, from their earliest water management systems. This is because the influence of interconnected settlements and civilisations, in general, logically seems to be crucial to the development of society. Some examples of advancements related to water as a resource will be drawn from Mesopotamia, Egypt, the Indus Valley, and Greece. Much evidence exists of the importance of water for agrarian purposes in the development of complex societies (Abudanh & Twaissi 2010:67; Van De Mieroop 2007:11). For this reason, agricultural practices are also included in the discussion. The social aspects connected to the development of such practices, become apparent as the size of projects increase and a need arises for a combined and managed workforce (Smith 2007:3-4). This trend is important for the comparison with ancient Palestine and their society.

Chapter Three: Geography of ancient Palestine forms part of environmental archaeology in which the environment dictates, at least to some extent, the possibilities of habitation to the human race (Renfrew & Bahn 2008:231). The geography will act as an orientation for the reader regarding the environmental conditions that were prevalent in ancient Palestine (Matthews 2007:19). This would add to the rationality of different settlement patterns. These patterns refer to the sites of habitation as they were governed by the need for water from the beginning, to the flexibility granted to the people of the different archaeological periods of the Old Testament as technological advancement occurred. Such patterns have been illustrated in previous research, with the use of distribution maps in relation to geographical landforms, rainfall, soil types, and temperature patterns (cf. Matthews 2007:25-32 & 38). Along with the physical geographical aspects that includes climatic conditions, a brief occupation history will be given as an overview of what external factors moulded the history of ancient Palestine.

Chapter Four: Case studies: Water management in ancient Palestine forms part of the exploratory nature of the research that will be conducted and an attempt will be made to determine whether the changing layout of cities and their water systems could attest to its role as a social divider. Many cisterns have been found within the homes of cities and villages (Callaway 1999:76). The social implications of the development of private cisterns can only be hypothesised about, but it would probably have meant a stronger sense of self-reliance within families rather than communities as a whole. During the Iron Age, the water supply used for the cities came from groundwater, springs outside the city walls with access through hidden tunnels, and, finally, directing water from outside the city with the use of channels (McNutt 1999:153-154). De Vaux also lays out three main techniques used to secure water availability throughout the year, namely tunnels, deep wells, and cisterns. Some examples of case studies that show the development of water management systems over time are as follows: Regarding cisterns, there are some dating to the Middle Bronze Age (around 1600 BCE) which have been found at Gezer (1973:238-240). These systems already made use of lime plaster technology to seal the cisterns. This attests to the engineering capacity that existed already and would only continue to develop with the passing of time as even larger populations had to be sustained (Dever 2003:117). Along with cisterns, channels and moats were used quite extensively during this period (Golden 2004:84). Water tunnels that date to the Canaanite period have been found with some being altered and upgraded as was necessary (De Vaux 1973:239). This shows the evolution of water systems along with the populations they supported. Hazor, Gezer, Gibeon, Megiddo, Arad, Ai, Jericho, Jerusalem, Lachish, Dor, Ashdod, and Ashkelon are given as examples of water use and water system development.

Chapter Five: The role of water in the social dynamics of ancient Palestine will focus on the development of water systems throughout the archaeological periods of the Old Testament. It involves aspects like the changing uses of water and the technological advancements, such as plaster technology that went with it. These changes stemmed from a need for greater quantities of water, being stored more efficiently, to sustain the population of an ever-urbanising world (Finkelstein & Silberman 2001:337). The development of water systems is an unending cycle. As mentioned above, the earliest settlement patterns were dictated by natural water sources until the use of cisterns and wells provided water throughout the different seasons. During the Chalcolithic period (4th millennium BCE), basin irrigation and floodwater farming was already used and shows some of the earlier technological advancements in the manipulation of water sources (Golden 2004:74; Bright 1981:31; cf. 2.2.1 & 2.2.2). Examples of wells throughout Palestine can also be found throughout the Hebrew Bible (cf. 5.4.9).

It is hypothesised that when survival was assured with agricultural and industrial developments, political and social systems developed around these technologies (Matthews 2007:38). An example of the development of more complex water systems is seen in 2 Kings 20: 'And the rest of the acts of Hezekiah, and all his might, and how he made a pool, and a conduit, and brought water into the city…' It is here, with structures like pools, that social impacts become more apparent as opposed to an earlier time when water was primarily a consumable resource. These social changes will be explored. Finally, this becomes even more clear with the beginning of the New Testament, where certain water systems, such as pools and baths, become an increasing sign of status and wealth, as evidenced by Herod's endeavours to ensure that his power was evident to all at Masada (Eshel 2009:111). Thus, there was an apparent change from water as a necessity to a luxury item reserved for the elite, which forms part of the basis of the chapter.

Water in daily life also forms an important part of the chapter, as it seeks to gain an understanding of the role water played throughout the different archaeological periods of the Old Testament. For example, in the Jacob narrative, wells were important in the daily lives of the ancient Israelites[4]

[4] There is an ongoing debate about who exactly the Israelites were and where they had their origin (Dever 2003; Hoffmeier 2008:65-68; Silberman 1992). However, this debate falls outside of the scope of this research and thus will not be discussed further. Where the term 'Israelite' is used in this work, it refers to the people who initially settled in the hill country (the so-called proto-Israelites) and later across the rest of ancient Palestine which once

before urbanisation: ‘There he saw a well in the field, with three flocks of sheep lying near it because the flocks were watered from that well’ (Genesis 29:2). The role of water with regard to religion and the purification process will also be considered in which anyone or any item that was impure had to be cleansed with water either before or after religious practices (De Vaux 1973:461). An example is found in Exodus 29:4: ‘…Then bring Aaron and his sons to the entrance of the Tent of Meeting and wash them with water’. It seems like an inevitable effect that with any change in society towards modernity that class division will occur. The changing extent to which water would be manipulated throughout the Old Testament would have contributed to the division as it led to the creation of different jobs. These spanned from water carriers through to the engineers who installed the systems such as those found at Gezer, Jerusalem, and Hazor (Dever 1996; Issar 1976). The low social standing of water carriers can be found in Joshua 9:23, in which it states that leaders of the deception became ‘drawers of water’ (Flanders, Crapps & Smith 1996:235). The role of women with regard to water will also be explored with a probable similarity to ancient Egypt, where peasant women carried water (Watterson 1991:35-36).

Chapter Six: Conclusion

1.6 DEFINITIONS

On the outset, some definitions have to be established for terms used throughout this dissertation, especially in relation to advancing societies:

- Urban – There appears to have been a time where a settlement’s status as being ‘urban’ was related directly to whether it was ‘fortified’ and, subsequently, many scholars searched for evidence of walls surrounding cities (Dever 1987:154). The definition of a city seems more appropriate for the use of ‘urban’ areas as it might not be appropriate to limit the definition to fortifications alone.

- City – The term is not easily defined as it can be based on the population numbers of an area and perhaps the distribution of different jobs, especially those that go beyond farming (Van De Mieroop 2007:21). A good definition seems to be that the city links the population living

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belonged to the Canaanites. Thus, the Israelites are God’s people from the Old Testament narratives from before the United Monarchy to the end of the period of time covered in this research.

outside its confines with those that live within it. As such, the city will also be where goods and services are distributed. Finally, there are no longer a majority of self-sufficient entities, but rather shared roles of who provides goods and services (Van De Mieroop 2007:21). Fritz has also provided some characteristics of what an Early Bronze Age city might have looked like: protected by defences; large building projects; city planning that includes a working drainage system; as well as class stratification and distribution of professions (1995:19).

- Civilisations – 'Early civilisation' is used by some anthropologists as a reference to the first societies where social status was no longer based on kinship, but rather a division of classes in terms of 'power, wealth and social prestige'. In these civilisations, those in power used surplus produce as part of their control over those they ruled (Trigger 2003:44-45). Cities with large population densities and a social structure in place where one class dominates another. Evidence of structured religious practices and large-scale building projects that include monuments and fortifications (Issar & Zohar 2007:99). 'Thus, stratified societies living in towns and cities' with duties and occupations spread across the population to ensure the success of the co-dependency between classes (Issar & Zohar 2007:103; Bertman 2003:62).

- City-state – often used as a term for a built-up area that controls it surrounding areas and they are bound together by a unified partnership. During the Middle Bronze Age in ancient Palestine, the city-states seem to refer to the urban centres being unified by their culture (Dever 1987:165; Issar & Zohar 2007:67-68; Saggs 1989:114). States can be seen as the evolvement of the tribe and chiefdom social systems. In states, there was an increase in the control and use of resources and required the unity of the population. There would also be a governing body (Rast 2001:521).

- Hydraulic society – The hydraulic society as used by Wittfogel (1957) relates more to agriculture than merely water but seems to form part of much of the early research related to water and society. Dever substantiated part of Wittfogel's theory in stating that the main consideration for the growth of settlements was their 'agriculturally based subsistence economy' (1987:159). There might be enough evidence to suggest that where an economy was based on agriculture, a family's standard of living and class would be linked to the amount of surplus they can produce (Ebeling 2010:33; Bertman 2003:262). The invention of irrigation, industry, and an infrastructure that includes water systems was what allowed for the exploitation of the world's resources both above and below ground (Ambroggi 1980:101). Bearing this in mind, it is no surprise that land, water, and labour are and were intertwined

(Liverani 2011:22). Irrigation on a large-scale required the availability of labour and the means to organise the project (Tubb 1998:36). However, defining this term is more to explain a lack of its usage throughout as focus is not only on agriculture but water as a whole.

- Social hierarchy – Social systems are not necessarily clear-cut from archaeology in its initial stages. However, artefacts can reflect some aspects of the layout of society (Dever 1987:163). The development of social hierarchies is not an unexpected part of urbanisation or even merely sedentary life. There is an argument to be made that as the hunter-gatherer dynamic shifted towards a sedentary one, women's importance in terms of social dynamics decreased. This occurred as women became more bound to the home and their focus shifted to child-rearing (Dever 1987:163 & 164). Social hierarchies thus relate to a shift in the balance of power where one group of the population is governed by another.

- Environmental determinism – is defined as an outlook where environmental conditions dictates and shapes human behaviour (Fellman, Getis & Getis 2008:506). Issar and Zohar provide Jericho as one example of how the earliest people who moved towards a sedentary life were governed by their surroundings (2007:65).

- Environmental possibilism –refers to a view that humans themselves, not the environment, dictate what cultural developments occur. In other words, as economic and cultural development transpires, the environment holds less sway on societal choices (Fellman *et al.* 2008:40).

1.7 NAMING DEBATES

Although naming the area in question has been contentious for many millennia, today it is an even more complex issue as both of the names 'Israel' and 'Palestine' have different political and ideological connotations (Eybers 1978:4; Dever 1998:39). It is not an unexpected occurrence, since the naming of geographical areas change over time (Jacobson 1999:66). The biblical lands have been referred to as ancient Palestine, Syro-Palestine, or ancient Israel (cf. Noth 1972:8; Dever 1998; Lemche 1994; Ben-Tor 1992a:2).

The lands that acted as the stage for the biblical narratives has had many different names throughout history that was often related to its inhabitants at certain points in time (Beitzel 2009:29-30; De Vries 1997:133). The naming was, and remains, difficult as well, since the

boundaries of the different regions were not permanent (Ben-Tor 1992a:2). For example, in its history it has been called the land of Canaan, which stemmed from the name for the people living there i.e. the Canaanites, as referred to in a *Mari Text* (18th century BCE) and the *el-Amarna Letters* (14th century BCE) (Aharoni 1979:67). The Land of Israel was also used for the regions inhabited by the early Israelites, but in time it would come to encompass the larger area with the creation of a united monarchy (Aharoni 1979:77). The name Israel would again change in meaning when the kingdom split into Israel in the north and Judah in the south (Aharoni 1979:77).

It has been argued that the Greek name 'Palestinē' was used as a reference to the Philistines and the area they inhabited. This label can also be dated to the 5th century BCE, where *Herodotus* described the Land of Israel as such (Jacobson 1999:65). In 3rd century BCE *papyri*, the Greeks also referred to the area as 'Syria and Phoenicia' or just 'Syria' (Jacobson 1999:65-66). The Romans, however stuck to the names used by Herodotus and Aristotle, by referring to the region as 'Palaestina' (Jacobson 1999:66). The term 'ancient Israel', which is often used in biblical studies, is a contested one, with debates existing on what it truly means to use the term and, to some scholars, it even seems to attempt to take away from Palestinian history (Dever 2012:13-14).

Perhaps none of the names given to the lands of the Bible can cover each of its archaeological periods in time, nor the ones given by its different inhabitants (Beitzel 2009:29-30). Although these debates have value, it is a complex and time-consuming effort to determine the validity of each term. As such, for the purpose of this research, 'ancient Palestine' will be used when referring to the area of occupation throughout the time of the Old Testament, which today encompasses modern-day Israel and its surroundings.

1.8 LITERATURE REVIEW

1.8.1 Primary sources

One of the main primary sources that will be used to conduct the research in question is the *Hebrew Bible* and how it reflects on the social (and religious) significance of water and water resources. The Bible grants insight into the lives of those who are being depicted during the different archaeological periods of the Old Testament by providing insight into the lifestyles of the people as well as the physical environment in ancient Palestine. The biblical narratives also serve as an account of the uses of water in ancient times. For example, water sources also served as meeting places as can be seen in Joshua 11:5: 'All these kings joined forces and made camp together at the

waters of Merom, to fight against Israel'. The role of water in the Bible also forms an important part of the change in social complexity, as religion will undoubtedly have changed with it.

Other primary sources that will be used are the *archaeological reports* from sites throughout ancient Palestine. These reports are important as they provide information on the material finds of the ancient world as it was discovered after lying hidden for millennia. For example:

In *Excavating at Tel Arad: Preliminary report on the first season, 1962* by Aharoni and Amiran (1964b); *Excavating Ai (et-Tel): 1964-1972* by Callaway (1969); *The 1968-1969 'Ai (et-Tell) excavations* by Callaway (1970); Dothan and Ben-Shlomo's (2005), *Ashdod VI: The excavations of Areas H and K (1968-1969); Five seasons of excavation at Tell el-Hesi (1970-77)* by Fargo and O'Connel (1978); *The excavation of ancient Gezer* by Masterman (1903); *City of David: Excavation 1978* by Shiloh (1979) provide background information is given on the site's history as well as indicating what was found.

For example, Rozenberg's (2008b), *Hasmonean and Herodian palaces at Jericho: Final reports of the 1973-1987 excavations: Volume IV: The decoration of Herod's third palace at Jericho* grant great insight into water usage by the elite; *Excavations at Hazor, 1968-1969: Preliminary Communiqué* and *The fifth season of excavations at Hazor, 1968-1969* by Yigael Yadin in 1969 also yielded insightful results in terms of water usage and complex systems at Hazor. These results come from a drainage system, which dates to the Bronze Age, through to the underground water system that Yadin believed dated to the Iron Age. This water system also shows different phases of its development into the final product that was used in the Hellenistic period.

Lastly, *tablets*, *reliefs, ostraca, inscriptions, papyri,* and *hieroglyphic depictions* will be referred to as it describes the role of water systems in city planning and daily life. Such tablets and inscriptions include the tablets from *Kin Ur-Engur* and *Hammurabi's Code*, translated by Harper in 1904 (cf. 2.2.1.3). Reliefs include the *Lachish Reliefs* (cf. 4.3.5.2) and *hieroglyphic* examples in turn includes that of the watering of plantations which was found in the *Tomb of Khnumhotep* (Eyre 1994:62; cf. 2.2.2.3 and Fig. 2.19 etc). The tablets include plans for the creation, maintenance, and expansion of waterworks in Mesopotamia (Delaporte 1970:106). Other primary sources that provide insight into water use and the symbolism of water includes the *Epic of Gilgamesh*, *annals of Thutmosis III* and *Papyrus Harris I*, the *Mari Texts* and more (cf. 2.2.1.3; 2.2.2.4).

1.8.2 Secondary sources

Various secondary sources will be consulted for the proposed research, some of which includes: *Archaeology: Theories, methods and practice* by Renfrew and Bahn (2008) will be used as it grants insight into the role that environmental conditions can play and have played in settlement patterns of the human race. They also discuss changes in technological advancement. Even though the focus of their case studies falls outside the scope of the proposed research, the theories behind it can be applied to the biblical world. Matthews's (2007) *Studying the ancient Israelites: A guide to sources and methods* grants important insight into the historical geography of the biblical world. This is necessary, as the historical geography is a major consideration for any study that involves the natural resources of the past.

Reports published by the Israel Antiquities Authority such as *Jericho: The Jewish cemetery of the Second Temple Period* (*Report 7*) that was written by scholars such as Hachlili and Killebrew (1999b) acts as a good compilation of information with regard to societal elements affected by water at Jericho.

Along with biblical texts, the following books will form an important part of the groundwork in the chapter exploring the water use in ancient Palestine (Chapter Five). These are books that cover the history of the biblical world and not only provides descriptions and interpretations of the geography but also of the lives and religions of the people who lived there: Miller and Hayes's (1986), *A history of ancient Israel and Judah*; McNutt's (1999), *Reconstructing the society of ancient Israel* and Golden's (2004), *Ancient Canaan and Israel: An introduction*; Dever's (2012), *The lives of ordinary people in ancient Israel: Where archaeology and the Bible intersect*; De Vaux's (1973), *Ancient Israel: Its life and institutions;* and Flanders, Crapps and Smith's (1996), *People of the Covenant: An introduction to the Hebrew Bible* will also be referred to throughout the proposed research as it involves in-depth studies of the biblical lands and its people.

Another important book that will be used as a basis in the research to be conducted is *Ancient water technologies,* by Larry Mays, that was published in 2010. This book deals with many important questions that need to be asked about water in the quest for sustainability for ancient societies as well as what technologies were used. Although the book does not focus on ancient Palestine in particular, many of the views can be applied. This book also forms an important part of the proposed study as Mays gathered information from many different disciplines, which is also a goal for the current research; Van De Mieroop's (2007), *A history of the ancient Near East ca.*

3000-325 BC grants a useful overview of the Near Eastern cities and what life was like in them; Gates' (2011), *Ancient cities: The archaeology of urban life in the ancient Near East and Egypt, Greece, and Rome* will also form part of the comparative analysis by granting insight into the world surrounding Palestine during Old Testament times. This is in order to gain insight into both the internal and external factors that would have influenced water system development and the role it played in rising social complexity.

As a result of the lack of more specialised books on this topic as well as securing the most up to date sources, various articles will also be used to conduct the research as those articles deal with the issues surrounding water supply throughout the ancient world and in many instances focus on specific sites at a time. For any case studies surrounding the different sites in ancient Palestine, these articles will be vital. Mays, Koutsoyiannis and Angelakis described the importance of water in their (2007) article 'A brief history of urban water supply in antiquity' when they stated: 'Throughout the history of urban centres, a sufficient water supply has been the backbone of each city'. In this article, the authors discuss the importance that all the different aspects of water had with regard to both natural and social aspects. Although this article focuses on the role of water in the lives of the ancient Greeks, it is applicable to the Israelites and Canaanites as well, as they had similar considerations. Another important contribution that arises from this article is with regard to the extent to which water was already being manipulated during the time of the Minoan civilisation of Crete, which provides context for the ancient world.

Articles like Issar's 1976: 'Evolution of the ancient water supply system in the region of Jerusalem' add to how the development of water systems occurred. Issar focuses on Jerusalem as a case study with how the complexity of ancient water systems changed over time. Although the premise is not the same as that of the research in question, some of the theories are applicable. 'The Suba water system as a clay-production plant in the Iron Age II' by Shimon Gibson in 2009 indicates how the water systems of ancient times not only changed in use and layout over time, but also how they might have formed an integral part of daily life long after water security had been assured. He also mentions how the reuse of the water systems occurred in the Iron Age of systems that had their origin long before in the Bronze Age. The article 'The water systems at Hazor and Gezer' by Dever (1996), 'Ancient desert agriculture in the Negev and climate-zone boundary changes during average, wet and drought years' by Bruins (2012) and 'The water system at Gibeon' by Pritchard (1956) are examples of some of the sources that will be consulted as case studies of water systems and uses throughout Palestine in terms of what similarities and differences existed resulting from natural and anthropogenic conditions at the time. Articles such as these will be important as they

provide in-depth information on specific water systems while also providing context of the natural environments that surround it.

1.9 LIMITATIONS AND DELIMITATIONS

There are many aspects to consider when looking at the development of any civilisation or area, as human history is greatly complex in nature. When looking at the role of water on affecting such development, it is true that one does not necessitate the other, but with the knowledge acquired up to this point, it would certainly appear as though, to a large extent at least, an influence still remained. This study will show how the changes in water systems, processes, and technology surrounding the storage and usage of water coincided with social changes. The goal is to explore these social dynamics from the point where it acted as a uniting force in the rise of cities to when it became a divider of classes. Once water availability for general use is secured, a shift can occur where water as a necessary resource becomes a symbol of status. This hypothesis is supported by the theory that general resource scarcity would mean that luxuries were not a concern. In contrast, with increased resources, it is natural that ranking would occur to manage such resources in order to gain the most value from it (Algaze & Fessler 2001:11).

Some obstacles related to the study of practices involving water should be mentioned at the outset as they could limit some of the conclusions to be drawn. One element of water systems and the impact they had on societal advancements is related to the use and reuse of such systems over time. Along with reuse, refinement of existing systems also plays a part. This makes dating the different systems difficult as later use could have obscured evidence of a creation date (Cole 1980:10). With uncertainty regarding dates, determining evolutionary characteristics becomes an issue as it could skew results. Similar questions regarding dating can be seen from the case studies, such as that of Gezer (cf. 4.2.2.3).

In the 2nd millennium BCE, it was necessary for settlements to be within a short distance of a perennial water source (Kenyon 1974:38). As time went on settlement patterns became less dictated by the distance to a water source as methods developed for securing water regardless of the proximity to a perennial water supply. Har-el has voiced the opinion that water supply in the time of the Canaanites (Bronze Age) is believed to have been dictated by a proximity to water, while the Israelites (Iron Age) were able to manipulate the environment to the point that allowed them to settle wherever they saw fit (1997:154).

Hopkins has argued that the impact of some technological advancements has been exaggerated and includes the crediting of waterproofing to the Israelites as an example. He also mentions the importance that has been placed on the development of tools made from new materials (1987:183). Har-El mentions six water sources or systems that had to either be created or developed by the Israelites namely: cisterns filled with rainwater, reservoirs, natural springs, wells, aqueducts and cisterns filled through flooding[5] (1997:151 & 154). Theories about different dates and attribution of knowledge to different population groups could change the basis on which future research is approached. Some focus might need to be placed on creating a standardised theory since primary resources would be difficult to exclude in many studies.

Another possible obstacle of the study could be whether there can be stated with any degree of certainty what social implications the water uses- and systems would have had and whether there will be substantial evidence to support the theory for different sites across ancient Palestine and its surrounding civilisations. However, as with many research questions further information is required to answer it. The chapters that follow seek to explore different aspects of social development and changes in water sources and uses and, finally, to determine the extent of the correlation that exists between these aspects.

Although the need for water is constant, its uses and distribution changes over time. For this reason, in order to fully understand whether social complexity arose with these changes it needs to be explored over a larger timespan and across the periods of different people in power within the same environmental conditions. The archaeological periods of the Old Testament provide an opportunity to see how the uses of water changed and how rulers from different lands and backgrounds were manipulating it as their needs demanded. It is also necessary to attempt to determine the extent of its use and reuse in different periods while determining whether the spread of knowledge from other regions were being applied in ancient Palestine. Importantly, this dissertation is not meant to be an exegesis of the biblical narratives that will be mentioned but rather serves as a look at water uses and their social impacts across time. The biblical narratives will be used as an indication of the role of water in society. Furthermore, the case studies from across ancient Palestine, and its surroundings, is not meant to include a complete history of the

[5] Drainage systems that were sealed with plaster was also used for the general water supply of the city. Water was diverted via these drains to cisterns. These cisterns were so successful that where they were properly maintained, they were used for generations into the Iron Age (Dever 1987:159).

sites' history, but rather shows the role of water in social dynamics based on the archaeological record.

Since looking into the surroundings of ancient Palestine covers such a vast area with its history spanning across millennia, there will only be some examples given with data inferred from them. It should be noted that even though only some parts can be explored at a time, it is necessary to include the area as a whole as its history became the history of ancient Palestine. The archaeological periods of the Old Testament from the 3rd millennium BCE onwards are used as the timeframe for ancient Palestine's research because the different water systems and practices including water changed over time.

CHAPTER TWO
WATER MANAGEMENT IN THE ANCIENT NEAR EAST AND BEYOND

2.1 INTRODUCTION

Van De Mieroop describes the challenge of writing any history best in that: 'History rarely knows clear-cut endings'. This is seen even in the destruction left behind after civilisations come to an end. In these times of decay, some part of the civilisations' legacy and their people still endure in history and, where it ends, is wholly dependent on which aspects are being researched (2007:2). These 'endings' can refer to periods of time, groups of populations, technological developments, etcetera. Any history, of course, also requires that main attention is paid to the focus group/focus area, but also of supporting importance are the influencers that surround them. The Greeks saw knowledge as a compilation of understanding that the natural working of the world includes patterns that are repeated (Haas 1962: 294). Similar to this approach, we will look at the world that surrounded ancient Palestine to determine if there are patterns and methods of development of water management and use that might be repeated. Geographically, ancient Palestine's position between major civilisations, like those of Mesopotamia and Egypt (McNutt 1999:36) made its rise in importance unavoidable, and so, it is these civilisations that will be discussed next.

With the difficulties that exist in writing a history (cf. 3.3) in general, so too can it be difficult to choose where to start with writing a history of water development. This is because, in some form at least, water management can date back as far as six million years (Mithen 2012:15). With the purpose of this research being on water uses and developments in the time and lands mentioned in the Old Testament, its management and technological advancements and the environment of surrounding urban settlements, need to be discussed. The methods used to combat any inhibitors must also be looked into, because regardless of what the environmental deterministic approaches act as reasons for social changes, the environment remains one of the most important factors to examine in understanding the history of mankind (cf. Jones 2003:17).

There has always been interaction between humans and their environment, but there comes a point where it is a less harmonious relationship. Although it might not be an easy task to identify where and when exactly an imbalance occurred, it is possible that this happens because of human reactions to changes in environmental conditions (Jones 2003:25-26). For this reason,

once the surrounding civilisations of ancient Palestine and their environmental management has been examined, we can begin to compare these elements of daily life across the regions and some correlation might become apparent in the following chapters.

2.1.1 Water and the early civilisations

A great deal of human development is reliant on technological advancements and to implement ideas to further civilisation by using available resources (Saggs 1989:195). When looking at the development of water systems or urbanised living in general, there is a large emphasis that is placed on agriculture as it is possibly one of the crucial requirements for permanent settlement (Van De Mieroop 2007:11). This becomes clear in some of the examples to follow, such as looking at the different methods of water manipulation that had to be implemented by the Egyptians and the Mesopotamians because of the natural flow characteristics of their main rivers (cf. 2.2.1.1 & 2.2.2.1) (Saggs 1989:22; Issar & Zohar 2007:112). Water was also very much a part of the legends of these civilisations in terms of their rulers and their gods. One example is found in the *Curse of Akkad* that describes the city of Akkad's destruction occurring because of a lack of appeasement of the gods. This came as a result of Sargon the Great's grandson desecrating a temple for which the punishment was that all the freshwater would become brackish and the land abandoned as a consequence (Bertman 2003:10).

In capitals of the ancient world, cities acted as the central authority for the nation and whenever it fell, the entire nation was at risk to follow. This was the case when Nineveh[6] was captured, and Assyria lost its importance or, when Babylon fell, and the entire Babylonian state followed in 689 BCE (Hoyt 1962:243). To remain strong, large cities also needed the inhabitants of the surrounding areas to supply them with the necessary products and services along with having a proper supply of water from rivers, wells, aqueducts, and cisterns (Hoyt 1962:241; Biswas 1985:207; Bertman 2003:204-206). These products are surely largely contributed to by crop yields. As cities came into being, some forms of more focused work existed that included professions like brick-making, weaving, metalworking, etcetera. Regardless, because of a

[6] Nineveh is located east of the Tigris and became Sennacherib's capital. The palace housed famous carved reliefs and the city was beautified with gardens and parks. Such plant-life undoubtedly also required large quantities of water (Bertman 2003:26-27).

general reliance on agriculture, cities would often fall if enemy forces gained control over their farms. Such an example is found in the history of Megiddo, whose people were driven to starvation when the Egyptians invaded the area in 1468 BCE (cf. 4.2.4.2) (Saggs 1989:118).

2.1.1.1 The origin of agriculture

There are differences in opinion on where and when exactly agricultural practices had its origin, with some placing it in either Syria, Babylonia or Egypt etcetera. Agriculture was an important factor in the development of complex societies and required vast amounts of fresh water (Abudanh & Twaissi 2010:67). However, it is also one of the most fragile practices when that supply is threatened (Ambroggi 1980:103). In the view of some, the origin in the Nile Valley makes the most sense as the inhabitants of the region needed only to copy the natural flow/inundation patterns of the Nile itself. Over time, they then began to transport the water farther from its source with the use of channels for greater crop yields over larger expanses of land (Smith 2007:2). Whether dry-farming[7] or irrigation farming was used to combat environmental conditions was entirely dependent on the rainfall that the different regions received. For example, dry-farming required at least 200 millimetres of rain per year. Thus, where settlements of the ancient Near East were located in the rain shadows of the mountain ranges, they were reliant on rivers and irrigation systems to transport water to their fields (Van De Mieroop 2007:8).

2.1.1.2 Development of hierarchy

Of equal importance, if not more for this study, is the look at how such developments in water use gave rise to a system where an individual was put in charge of many. Here he would be responsible for a group of people who had to work together towards their common goal (Smith 2007:2-3; Frangipane 2007:171). In other words, where social classes begin to come into effect. For example, it is believed that the first 'engineer' of such a process became one of the first kings in world history and, by apparently granting his subjects with food and wealth because

[7] Dry-farming is a method used in semi-arid regions where reliance is on the effective use of natural, but limited, precipitation rather than irrigation systems (Bowden 1979:45).

of it, was seen as an embodiment of the resource itself (Smith 2007:3). This idea appears to be a logical conclusion drawn by an ancient people who saw how their nation would fail without the intervention of these kings and their methods of government (Smith 2007:3-4).

2.1.2 The ancient Near East

2.1.2.1 Background

It has become common practice to speak about the Near East (Fig. 2.1) as a region, however this means that there are no clear indications of where it reaches end. This is because there was not a stable boundary for the area and instead the area shifted to include and exclude portions of land over time (Van De Mieroop 2007:1). Politically speaking, this was no different as the Near East knew many different rulers and many different empires in power in short periods of time. In spite of this, Mesopotamia appears to be central to any history of the Near East even though some aspects of development did occur without its influence (Van De Mieroop 2007:3).

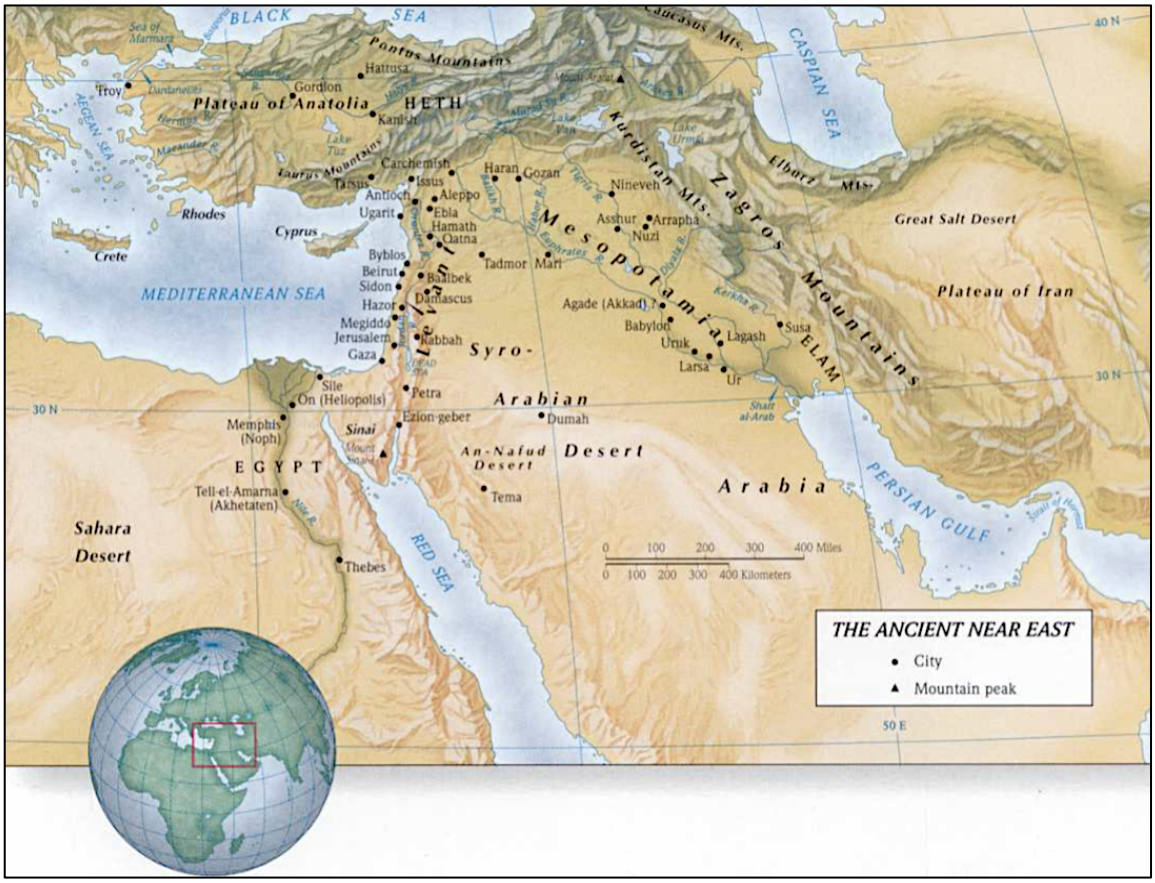

Fig. 2.1 Map of the ancient Near East (Ridling [nd]:Plate 1)

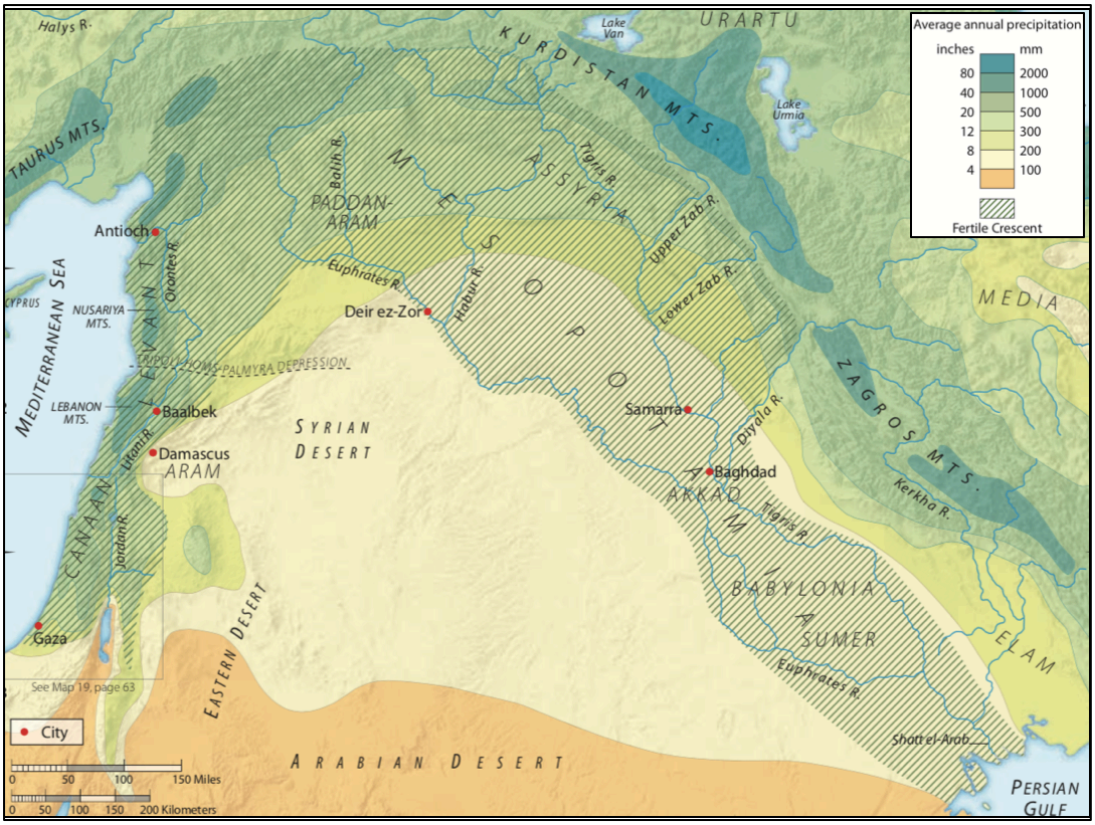

Fig. 2.2 Map of the Fertile Crescent and rainfall pattern (Beitzel 2009:22)

The Fertile Crescent (Fig 2.2) is also often used as a simplified way in describing the Near East. This is a region spreading from the Levant[8] to Syria and Mesopotamia where conditions favoured agricultural societies (Liverani 2011:17; Lemche 1988:11).

2.1.2.2 Environment

However, when analysing it in more detail, it becomes clear that the Fertile Crescent is rather filled with a collection of fertile areas, hills, mountains, deserts, oases, wadis, and plateaus (Liverani 2011:17). In short, the different ecosystems of the Near East had different effects on how creating vast and permanent settlements were attempted. For example, the northern and eastern parts of the Near East contain the mountain ranges of Zagros and Taurus where the rivers of the area find their origin. Moving southwards, the topography flattens into the Syrian and Arabian deserts before becoming, once again, mountainous in the south (Van De Mieroop

[8] The Levant refers to what is known today as Israel, Palestine, Jordan, Syria and Lebanon (Derricourt 2015:171; Mithen 2012:12).

2007:7). The topography as well as other geographical and climatic conditions means that although the area is often described as a whole, it is made up of a collection of vastly different environments with its own causes for possibilities and concerns (Van De Mieroop 2007:7). Further evidence of the topographic diversity of the Near East is seen where some mountain ranges are 5 000 metres high and the lowest area being that of the Dead Sea at 395 metres below sea level (Liverani 2011:17).

Geographically speaking, the very nature of the Near East means that because of limited favourable environments, inhabitants would be drawn to the same areas. Interaction between different population groups and the spread of local knowledge would then also have been inevitable (Van De Mieroop 2007:10). Interesting to note is that the development of permanent settlements often occurred on the border where different environmental conditions met to create a diverse set of natural resources (Van De Mieroop 2007:11; Frangipane 2007:168). This would allow access to forests, pasturelands, metals, and stones, which would not be readily available simply in the fertile plains (Liverani 2011:21).

Much of this chapter covers a time before that of which will be focused on for ancient Palestinian development in Old Testament times. However, as the archaeological periods under discussion will shift from the Bronze Age into the Iron Age, the history of the Near East in its various states of the rise and fall of its impacting powers will be important for developing background conditions in ancient Palestine. This is substantiated by the idea on which scholars agree that there was a shift in the fundamental make-up of the Near East between 1250 and 1050 BCE, however what exactly caused it is not entirely agreed upon. It appears that the most profound changes were located to the west around the Aegean, Anatolia, Syria, and the Levant. Initially, Egypt and Mesopotamia remained strong, but the decline of its bordering regions eventually impacted them as well (Van De Mieroop 2007:192). Nippur, for example, lost its important characteristics that made it an urbanised centre and by 1000 BCE very little remained and even its canal infrastructure was in disrepair (Van De Mieroop 2007:197). Environmental conditions also caused the flow of the Euphrates to shift towards the west, causing a possible collapse of cities who no longer had ready access to water. The central powers began to fail and creating large-scale projects to combat the water shortages was then impossible (Van De Mieroop 2007:197).

2.2 EXAMPLES FROM THE ANCIENT WORLD

2.2.1 Mesopotamia

2.2.1.1 Geography

Mesopotamian environmental constraints form part of one of the focal points in a study of the history of the area. This is due to the major impact it had on the way that development took place (Crawford 2004:6). Both in terms of the climate and the geography, the area described as 'Greater Mesopotamia' is by no means a uniform unit and can generally be divided into three main zones (Crawford 2004:6).

(a) Three zones of 'Greater Mesopotamia'

The first zone refers to the northern areas where the Zagros and Taurus mountains begin. Initially, this would have been a good area for settlement because water availability was favourable in the valleys and conditions were conducive to grazing (Crawford 2004:6). The reliance of agriculture on rainfall rather than irrigation made farming possible, although these yields from dry-farming were far less than in the south of Mesopotamia (Van De Mieroop 2007: 54; Nemet-Nejat 1998:253).

The second zone includes the plain from the east of the Tigris to the Euphrates and the plateau between them. For a large part of this area, rainfall alone could not sustain the agricultural practices required as civilisations evolved and thus, the inhabitants turned to irrigation to overcome that obstacle (Crawford 2004:6-7). Also important for the water systems of ancient Mesopotamian settlements, was the availability of bitumen, a naturally occurring petroleum tar, which was found at Hit and was used for waterproofing (Crawford 2004:7; Schwartz & Hollander 2000:83-84). Bitumen was also used as cement in construction to secure bricks together as well as in art (Bertman 2003:4). In terms of productivity in the second zone, the area between the Tigris and the Zagros mountains were most favourable and would, in turn, become a central part of the Assyrian empire's success. Evidence of this can be found in the remnants of major Assyrian settlements in the form of tells and their creation would have been aided by the favourable conditions for crop yields that did not require irrigation systems (Crawford 2004:8).

The third zone is that of the alluvial plain between the Tigris and Euphrates. It is within this zone that the ancient kingdoms of Akkad and Sumer, respectively to the north and south of the zone, existed in ancient times (Crawford 2004:8-9). Two important insights can be gleaned from Sumer in particular. The first is that the fertility of the soil made the production of a large surplus of food possible, which would secure the ability of the Sumerians to thrive. The second is noted by Crawford as the example it provides of the Toynbee Theory of 'stimulus and response' (2004:9). This is based on the idea that for a development such as can be seen at Sumer, to be possible, it would require a social system to be put in place that would be able to divert resources of surrounding groups of people. With this system in place, the creation of large-scale projects such as irrigation systems required in the area became a possibility (Crawford 2004:9). So, as to ensure optimal results from their water resources, the Mesopotamians also made use of weirs and bunds to be able to control the rivers to some extent (Nemet-Nejat 1998:254).

(b) Rivers

The Tigris and Euphrates have their origins in Iran and Turkey resulting from rainfall and snowmelt in the mountains (Van De Mieroop 2007:8-9). These rivers rise below 30 metres above sea level, even though they cover a distance of more than 500 kilometres (Van De Mieroop 2007:8). With the continuous flow of the two rivers, with proper management from the inhabitants and creating appropriate systems, they would act as a constant source of water. This management was of the utmost importance, since even though there might only have been slight climatic differences over the past 10 000 years, in marginal areas even a slight change could have had drastic effects (Van De Mieroop 2007:9). The importance was also noted by the very first inhabitants as they found that without an effective method of draining and watering the plains between the Tigris and Euphrates they would not be successful (Delaporte 1970:105; Mays 2008:471-472). The Tigris is the faster flowing river with higher river banks, while the Euphrates has a slower flow and a meandering nature. The Euphrates's lower banks caused some problems for Mesopotamian civilisations reliant on it as its flow could shift or flood. When its flow moved too far from the cities it provided water for, they would need to rework the irrigation canals that was no longer sufficient (Gill 2011:12). When water was available in rivers and canals instead of having personal access to wells or cisterns, it was transported to within cities with the use of donkeys or by hand (Trigger 2003:122).

2.2.1.2 A brief history of region's development

(a) Settlement

The archaeological data indicates that more permanent farming villages had already existed in the northern parts of Mesopotamia by 7000 BCE. They made use of irrigation systems to water their crops and, although the technology of transporting water was used before this in the Levant, it had to be refined for successful settlement in the desert regions of the Mesopotamians (Van De Mieroop 2007:12; Mays 2010b:1-2). This was due to the fact that the naturally occurring flood patterns of the two main rivers of the region would have destroyed the crops. Thus, with the use of basins and canals, the water levels and courses were manipulated as needed (Van De Mieroop 2007:12-13). At El Kowm, around 6500 BCE, evidence was found of one of the first instances of water management for domestic purposes. Such purposes included drainage systems for wastewater, which transported water throughout the house and discharged it outside the house (Mays 2017:1279). In Lower Mesopotamia, entire ecosystems were changed such as with the creation of marshes where previously there were none (Liverani 2011:22). This means that as with food production, increased numbers in population both needed the resources readily available, but also caused an increase in production thereof (Liverani 2011:22-23).

The 4th millennium BCE was a time of major developments, as a more complex form of living became more prevalent. Along with the development of cities and writing, a hierarchical structure of society was popular and, with that, requirements meant that labour also had to become specialised to meet the needs of the new standards of living (Van De Mieroop 2007:19).

The permanent settlement of some Mesopotamians was entirely dependent on water from surrounding rivers and of using them to irrigate their fields. Canals were used to transport water from the rivers, and through smaller channels, was further diverted. Diverting channels were necessary along with head regulators and dykes (Trigger 2003:289-290). Around 2500 BCE original channels were being replaced by longer lasting ones and by the 1st millennium BCE, medium sized systems of progressive engineering were constructed. Feeder canals allowed water to flow to fields that were surrounded by low banks. Embankments were also used to

claim marshland areas when population increases required an increase in food production (Trigger 2003:290). In order to protect the area against floods, embankments could be strengthened with reeds and bricks (Bertman 2003:204). To counter the detrimental effects of salinisation on crop production in areas with poor drainage, fields were fallowed in alternating years. By flooding dried-out fields, salt was transported deeper into the soil and subsequently lessened the effect it had on land fertility. This was, however, not a permanent solution. In time, salt made the soil unusable and human intervention was ultimately detrimental (Trigger 2003:292; Gates 2011:32; Issar & Zohar 2007:141). Another method used to minimise the effect of excess salt was to plant more salt resistant crops, like barley (Tamburrino 2010:49).

(b) Water use

In ancient Mesopotamia, it was believed that mankind was created to do the physical labour that had fallen to the gods in earlier times. After some of the gods revolted against the hard work they had to do, man was created to dig and maintain canals along with their other responsibilities (Tamburrino 2010:33). The amount of effort required to ensure the success of canals can be seen in a Babylonian curse: 'May your canal become clogged with sand!' (Bertman 2003:204). Apart from the physical labour, the management thereof was of equal importance. In times when water was scarce, the *gugallum* or 'canal inspector' had to regulate the flow. In times of flooding, the regulators had to be utilised to ensure that the fields would not flood and crop loss would not occur (Postgate 1992:177-178; Saggs 1965:69-70). One more important role stemmed from water usage and the management of much of the rest of daily life: that of the scribes. As Bertman explains:

> Kings might extend their sway over hitherto unknown regions, merchants might organize the importation of rare commodities from distant lands, the irrigation officials might set the labourers to utilise the bountiful waters of the rivers and to bring fertility to the soil, but without the scribe to record and transmit, to pass on the detailed orders of the administrators, to provide the astronomical data for controlling the calendar, to calculate the labour force necessary for digging a canal or the supplies required by any army, the co-ordination and continuity of all these activities could never be achieved. Mesopotamian civilisation was above all a literate civilisation (2003:147; Issar & Zohar 2007:114).

With records of irrigation systems in Mesopotamia seemingly focusing on the labour required to create the necessary systems and, taking the above quote in mind, the labour division can be placed into two classes, being that of the labourers and that of the scribes (Tamburrino 2010:42). The upper class not only included the scribes but also the surveyors who would need to do the appropriate calculations and designs of the irrigation channels. The labourers, in turn,

were uneducated and managed by a foreman (Tamburrino 2010:42). Calculations would include the slopes of channels since a steep slope could cause erosion, while a slope that was not steep enough could lead to clogging (Bertman 2003:204).

Water-clocks were in use in ancient Mesopotamia to tell time based on the amount of water the clock discharged (Tamburrino 2010:236). In terms of water distribution for food production, the Mesopotamians made use of gardens, vineyards, and orchards for food production throughout the year (Fig. 2.3). Water was diverted to necessary areas with the use of canals and stored in reservoirs (Fig. 2.4). The 'three-tiered pattern' used by them meant that fruit trees like apples, figs, and pomegranates were planted in shaded areas of date palms. Vegetables like onions and garlic were then planted beneath the smaller trees (Trigger 2003:290). The levees, along which these gardens were planted, had to be secured as the flooding season of Mesopotamia's rivers would be detrimental to crops (Trigger 2003:291-292; Saggs 1965:70). Because of sediment being deposited in canals through this flooding, the canals were often recreated rather than cleared (Mays 2008: 472; Mays 2010b:2).

Many of the cities of Mesopotamia possessed wastewater drainage systems linked to individual houses. These systems had been in place as early as the end of the 4th millennium BCE (Tamburrino 2010:38-39). Wastewater was disposed of either by diverting it to the drainage channels in the streets towards pits within the city at a close proximity; and for the inhabitants close to the city walls, it was diverted directly outside the city walls with the use of canals (Tamburrino 2010:39). Private latrines in some homes were also discovered in Mesopotamia dating to between 2335 and 2155 BCE. Some were built-up from bricks with a bitumen coat on top (Tamburrino 2010:41).

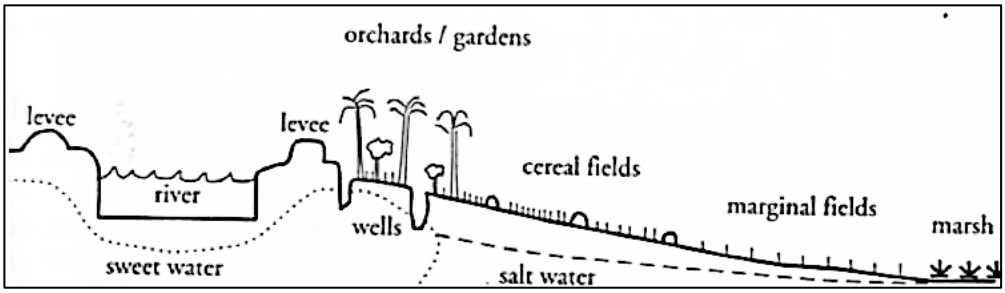

Fig. 2.3 Cross-section of Mesopotamian orchard irrigation (Trigger 2003:291)

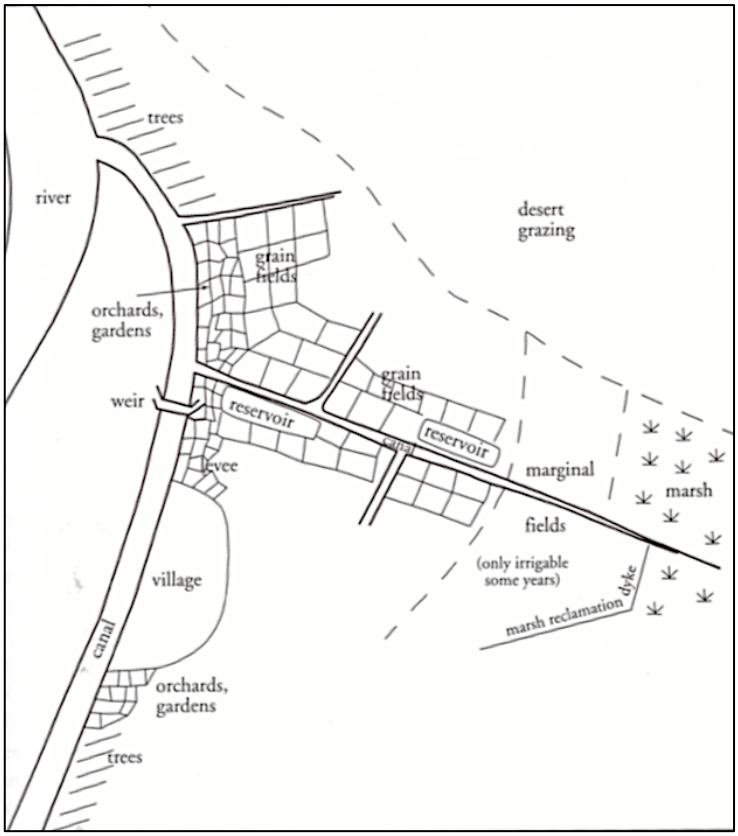

Fig. 2.4 Plan of Mesopotamian irrigation system (Trigger 2003:291)

The layout of such canals and irrigation systems were also found on a tablet dating to about 1500 BCE. Although most of Mesopotamia's irrigation systems were similar, the physical layout might have differed between sites. With this in mind, this tablet (*Tablet CBS 13885*; Fig. 2.5) is a depiction of canals close to Nippur (Tamburrino 2010:46):

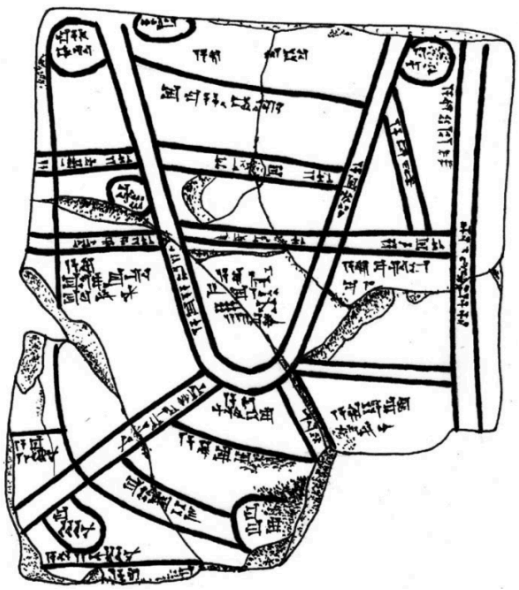

Fig. 2.5 Canals mapped near Nippur (Tamburrino 2010:46)

Mesopotamians also made use of chain lifts that incorporated the use of either horses or donkeys as well as irrigation diversion dams. One such a dam, the Nimrud Dam, that was fed by the Nahrawan Canal and was located about 180 kilometres from modern Bagdad (Mays 2008:472). The *shaduf* [9]was also used in Mesopotamia around 2300 BCE. Its importance in daily life might be hinted at by the fact that it forms part of the myth of Sargon of Akkad's beginning. In the story, his mother left him in a canal from which he was later raised with this device operated by a man (Mays 2008:472; Mays 2010b:2-3).

2.2.1.3 Civilisations of Mesopotamia

(a) Sumerians

In terms of the political history of Mesopotamia, there were many different periods of changing groups being in power (Gill 2011:18; Issar & Zohar 2007:99). The Sumerians, who were one of the first of these groups, settled in the southern parts of Mesopotamia where they began their period as the principal entity in the region around 3500 BCE. They inhabited southern Mesopotamia into the early 2nd millennium BCE (Gates 2011:30-31). Between 2900 and 2400 BCE, they moved into a more restless time and included fortification to their settlements. This time also sees a move towards a division of classes between the upper class rulers, the poorer farming communities, and slaves. Some of the first major Sumerian cities (Fig. 2.6) were Uruk, Ur, and Lagash (Gill 2011:18). Sumer was situated in an alluvial depression situated between the Zagros Mountains and the deserts of Iraq (Wilkinson 2013:35).

It was the ancient Sumerians and Egyptians who created the first complexly developed societies with a social structure in place (Rice 2003:6-7). The Sumerians, for example, began by making decisions affecting the society, as a whole, by a group discussion. In time, this system would become time consuming and an *Ensi* (ruler) would be appointed for decision-making with regards to agricultural practices (Saggs 1965:28-29; Issar & Zohar 2007:112). In

[9] A *Shaduf* is a lifting machine that essentially has a container for the water at one end tied to a pole/beam on an axis that allows for the easy movement of the container into the canal and out to its sides for use. These devices were only used where small amounts of water was required (James 1979:26). It made use of a beam and a weight (sometimes made of mud from the Nile) at the end opposite from the container (Mays 2008:472; De Rustafjaell 1913:854).

times of unrest, a *Lugal* (king) would be elected for military decisions. This system developed from elected officials to their permanent appointment with successors, largely based on a birth right through blood (Saggs 1965:29; Issar & Zohar 2007:112). It is, perhaps, in this society that the first democratic system moved to one of where subjects were ruled by a single entity and where an elite class developed as land became privately owned (Saggs 1965:29).

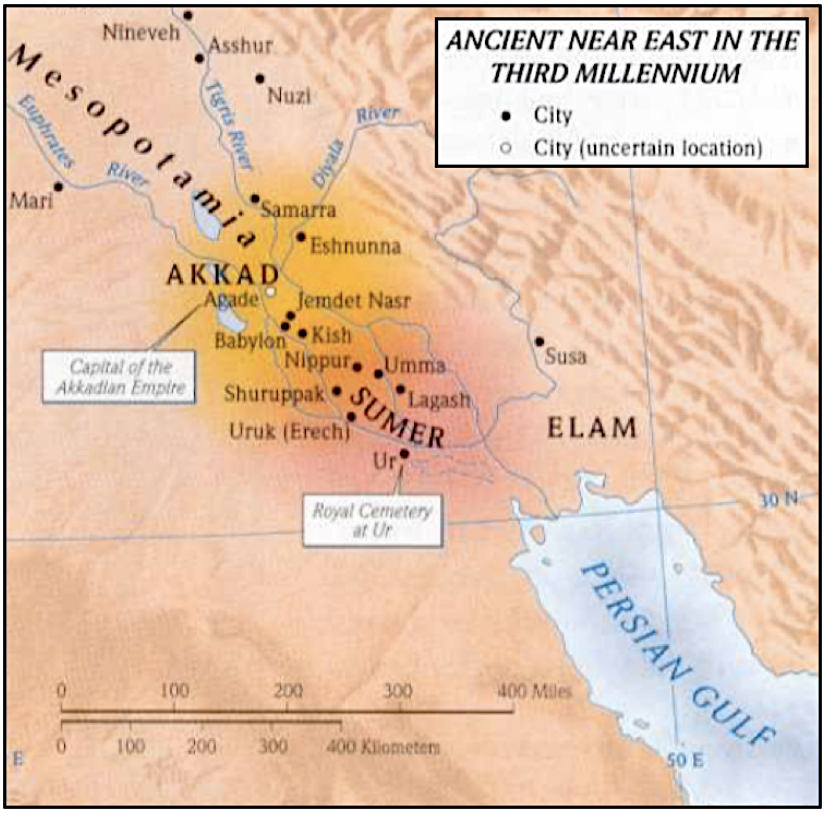

Fig. 2.6 The cities of Akkad and Sumer (Ridling [nd]:Plate 17)

The Akkadians, in turn, might be associated with the development of ruling from a single governmental capital (Saggs 1965:31). Some aspects of development found in these complex civilisations can be seen in other societies such as at Jericho or Çatalhüyük. However, it did not reach the success of Egypt and Sumer and so ceased to exist over time (Rice 2003:7).

By the end of the 3rd millennium, Sumer and Akkad had been major economic powers. Along with the economic gains the kings were known for, they were also given special mention for their contributions to growing agricultural zones with the increased digging of canals (Van De Mieroop 2007:75-78). Both civilisations used such canals to divert water from the Euphrates River and major streams as a source of water as well as a means of navigation (Mays 2008:474). In order to meet the labour requirements in general, citizens were conscripted to help with

harvesting or to dig and maintain canals in exchange for items like barley, oil, or wool (Van De Mieroop 2007:78). Mari serves as an example of servant women carrying water between the canals and cisterns in order to fill them (Mays 2010b:6).

The importance of water works and the method in which they appear to be have been constructed suggests an intensive process of surveying, planning, levelling, and measuring. Some such strategies have been found on a tablet fragment dating to before 2300 BCE. It contained information on the canal Hummadimsha, which would be attached to a reservoir able to contain more than 1 000 hectolitres (Delaporte 1970:106). During this time, water was drawn by simply using a bucket or by using oxen to manoeuvre the elevating machines (Delaporte 1970:107).

Other evidence found has the account of works undertaken by Entemena and King Urukagina who strengthened the reservoir. Urukagina also restored the Girsu canal with levies that were noted on a tablet. It required more skilled labourers, excavating with a plan (Delaporte 1970:106). Under Ningirsu, canals, watering machines, and channels became the responsibility of the 'cultivator of the sacred territory' (Delaporte 1970:106). *Tablets from Kin Ur-Engur* of Ur's creation of a 'basin equal to the waters of the sea' shows the wages received by the women who made a reed dam for the frontier canals Nanna-gugal (Delaporte 1970:106). When the 3rd Dynasty of Ur fell and after years of unrest between different groups, Babylonia's 1st Dynasty emerged as a major kingdom, among others, that included Assyria (Saggs 1965:37-38).

(b) Babylonians

Babylonia was the area situated between modern-day Baghdad and the Persian Gulf, which needed irrigation systems reliant on the Tigris and Euphrates to successfully maintain their agricultural practices (Van De Mieroop 2007:7-8). A desert region dominates the northern parts of Babylonia, where the only water sources readily available are those directly from rivers, as they flow downstream until, to the south of Babylon, they branch off into shifting streams (Van De Mieroop 2007:8). The redirection of water through canals can be seen in the reconstruction of Babylon's layout, where canals ensured that water was available throughout the city. A moat surrounded the city as well as being an extra measure of protection beside the city walls (Fig. 2.7) (Bertman 2003:12-14).

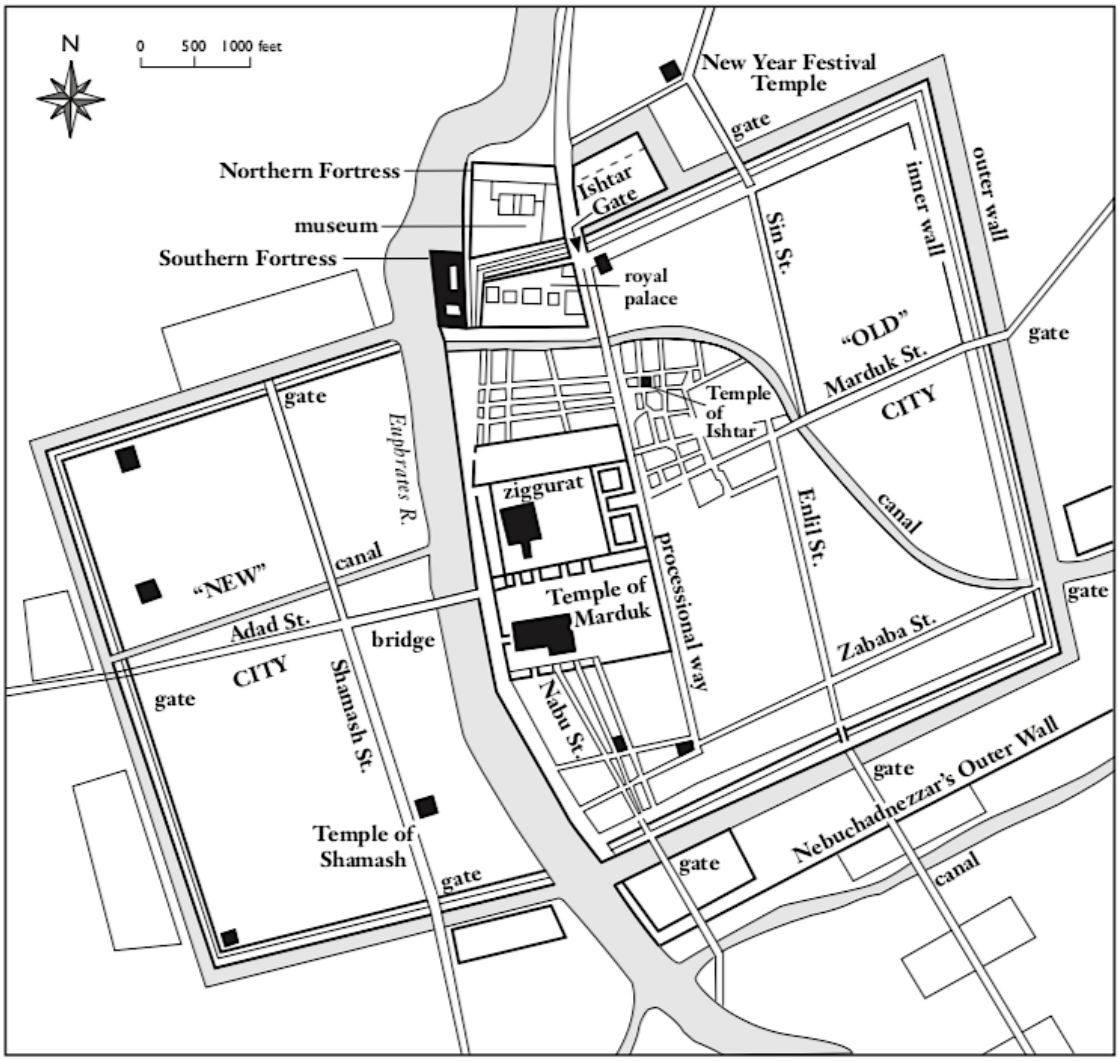

Fig. 2.7 Map of Babylon's water distribution (Bertman 2003:13)

Even farther south, past where Ur and Lagash were located in ancient times, marshlands are present, and agriculture is no longer viable (Van De Mieroop 2007:8). As such, the different areas of Babylonia were not equally favourable for the cultivation of crops, but the northern and southern plains, at least, allowed for irrigation farming (the south needing added furrows not required in the north) (Van De Mieroop 2007:8; Hicks 1976:77).

It seems probable that smaller scale irrigation systems were used near the Zagros Mountains and to the south of Babylonia, but more development was required before it could be useful in the south. This was due to the flatness of the plain, where flooding would have been a major problem and had to be managed with human intervention (Van De Mieroop 2007:13; Postgate 1992:180).

Another, naturally occurring impediment that impacted soil fertility includes the large amounts of salt that was deposited because of a combination of a lack of natural drainage and high evaporation rates (Van De Mieroop 2007:13; cf. 2.2.1.2). Wrongfully executed irrigation could also have caused damage to crops by raising the water table level to a point where the roots of the plants were drowned in too much water. In order to counter events like this, technology developed over thousands of years until larger areas were being irrigated even more successfully (Van De Mieroop 2007:13).

Due to the material used for the roofing of houses in ancient Babylonia being mostly wood and mud, measures had to be taken to protect it in times of severe rains. The system the Babylonians chose were also meant to keep excess water away from the walls to maintain their structural integrity (Saggs 1965:171). Ceramic drains diverted water from the roofs into the streets where a 'soakaway or sump' reduced surface runoff. These were also used to dispose of domestic and ablution wastewater (Saggs 1965:171). Bathrooms were located within the house with the floor (plastered with a bitumen and limestone mixture) slanting to the centre of the room for efficient drainage. There is an apparent lack of baths, in contrast to other Mesopotamian sites, which might indicate a preference for water being poured from jugs by slaves (Saggs 1965:173).

Between 2900 and 2350 BCE, Babylonia functioned in the city-state system. The urbanised centres worked in collaboration with their farming communities in the surroundings whose agriculture was largely reliant on a close proximity to the Euphrates, since canals at the time did not cover large distances (Van De Mieroop 2007:41-42 & 45).

Succeeding the laws of Ur-Nammu 350 years earlier, Hammurabi created some of the earliest known human laws that dictated the use and management of water and its systems. Around 1760 BCE, Hammurabi had successfully made use of the Tigris and Euphrates rivers and ensured its proper use through the *Code of Hammurabi* (Narasimhan 2005:791; Bertman 2003:62; Tamburrino 2010:29). These laws also allow us a glimpse of the different levels of society that existed. The first level includes those citizens who own land and tops the social structure. The second level involves societal members who are free but do not own land themselves. The third level identified relates to people who did not own any land, nor their own freedom (Bertman 2003:62).

From the time of Hammurabi, orders have been found that commands all the people with fields next to Damanum canal be summoned for maintenance (Delaporte 1970:107). The considerable amount of labour necessary to maintain these canals was the result of soft soil, causing the banks to fall in (Delaporte 1970:107). Hammurabi's laws also made provision against the theft of water raising machinery as well as to protect inhabitants against damage due to the negligence of neighbours not keeping their channels in proper order (Delaporte 1970:108; Postgate 1992:182). These laws are noted in number 54 to 56 for neglecting duties of maintenance of canals; and number 260 for the theft of water devices. These examples are based on the translation of Hammurabi's Code by Harper (1904:31 & 91). The role of different classes in canal maintenance is also shown in a letter sent to Hammurabi from Sin-iddinam in which he details the work required to clear built-up soil from canals (Tamburrino 2010:45). The main canals were managed by an official reporting to the king himself, while smaller scale ones were managed by a local authority (Tamburrino 2010:45).

Fig. 2.8 Map of the 6th century ancient Near East (Ridling [nd]:Plate 82)

Economic texts have also been found that reveals the details of expenses for building and maintained channels and trenches (Hruška 2007:56). The Babylonian empire saw a new period of prosperity under Nebuchadnezzar II (also referred to as the Neo-Babylonian empire; Fig. 2.8) with the fall of the Assyrian empire (Saggs 1965:52). The effect of Nebuchadnezzar's

power and his role as an instrument of God's wrath is reflected in various biblical narratives that include Jeremiah 25:8-11. He is also a key figure in the narrative found in the book of Daniel. Nineveh fell to the Babylonians in this power struggle. The Babylonian king finished the city's destruction by demanding that it is flooded. A similar fate had befallen Babylon at the hands of the Assyrians under Sennacherib about a century before (Bertman 2003:27). After conquests in ancient Palestine that included battles at Jerusalem and the exile of the Jews to their kingdom, the Babylonian empire, and Babylon itself, fell to the Persians under the rule of their king, Cyrus (Saggs 1965:52).

(c) Assyrians

Assyria had its origins in the north of Mesopotamia where dry-farming (cf. footnote 5) was the common practice (Nemet-Nejat 1998: 253; Tamburrino 2010:29). This form of farming was favourable for crops like barley and other cereals (Nemet-Nejat 1998: 254). The Assyrian empire reached the peak of its power between the 14th and 7th centuries BCE. Instead of being a time of steady expansion, their growth ebbed and flowed (Saggs 1965:42). Tiglath-pileser I added to a time of growth by creating roads and bridges to ease the travel of his army (Bertman 2003:208). The construction of bridges was impressive, as it was challenged by natural elements such as soft soil, fast currents, changing flow patterns, and a lack of necessary building material (Bertman 2003:208). By 745 BCE, Tiglath-pileser III became Assyria's ruler and him and his successors expanded their empire to include the lands of ancient Palestine (Saggs 1965:46-49). Sennacherib was one of these rulers (704-681 BCE) and he took great pride in his extensive beautification project at Nineveh, which was made his capital. An impressive aqueduct was built as part of this project to ensure that his parks, gardens, orchards, and plantations received sufficient water (Saggs 1965:49-50; Mays 2010b:7; Tamburrino 2010:38). Sennacherib seems to have showed his wealth further by his gardens' control of the waterflow being with 'levers of bronze, and buckets of bronze…' (Tamburrino 2010:37). Sennacherib also designed a swamp area where excess water from snowmelt in mountains could be diverted. Within it, reeds, wild pigs and birds could thrive (Tamburrino 2010:38).

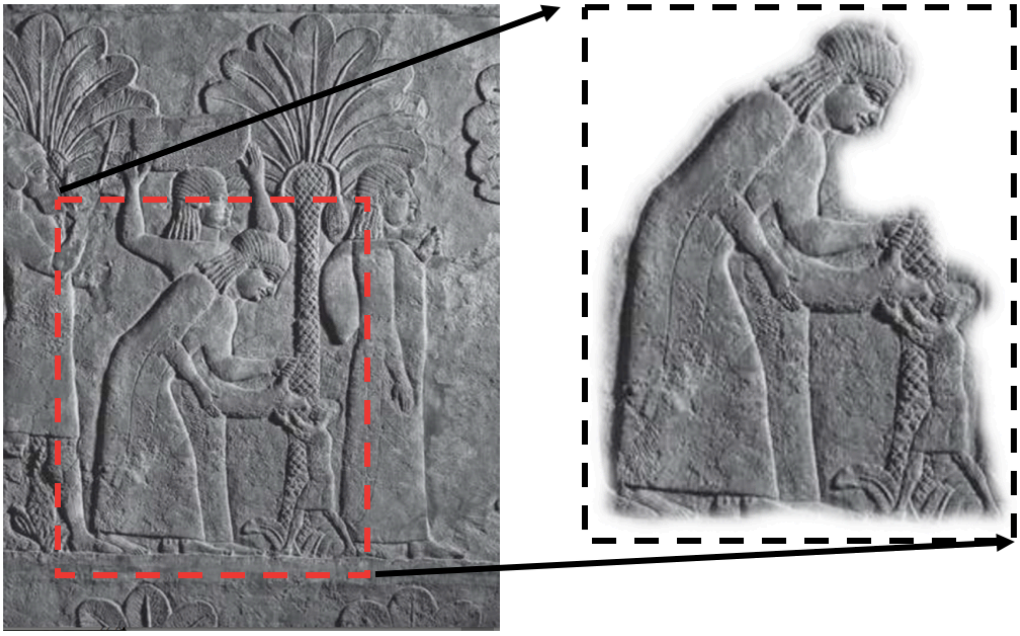

Fig. 2.9 Woman and child with waterskin (adapted from Stol 2016:355)

The reliefs at Nineveh not only show the conquers of the Assyrians (cf. 4.3.5.2) but also serve as a glimpse into the lives of those they conquered. An example can be seen by a woman giving water to her child from a waterskin as they travel from their homes after being deported (Fig. 2.9) (Saggs 1965:112-113). Nineveh was sieged in 612 BCE and a final attempt at protecting the empire was made, albeit in vain, with the battle at Carchemish (Saggs 1965:49-50).

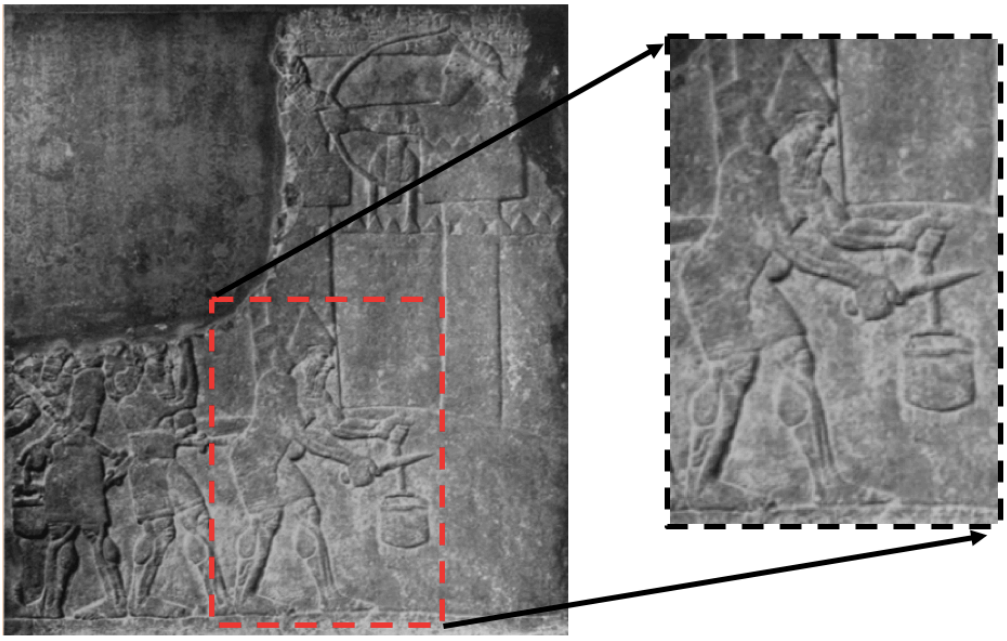

Fig. 2.10 Assyrian relief of an unknown city under attack and water sabotage (adapted from Albenda 1972:43)

Another relief from the 9th century BCE in Assyria has been a topic of discussion since its meaning and location is not entirely clear (Fig. 2.10) (Albenda 1972:42). One of the theories that has been argued is that the depiction is of an attack on a city from ancient Palestine. The cutting of the bucket's rope could be an indication of the city's water supply being cut off, leaving the inhabitants at the mercy of their attackers. (Albenda 1972:42-44). Interestingly, Issar & Zohar refer to a similar situation noted in the *Epic of Gilgamesh* with regards to the battle between kings Agga and Gilgamesh of Kish and Uruk respectively. In the account, Gilgamesh speaks to the elders and tells them of his plan to block the water supply to the city they will attack and using canals to lead the water away, ultimately leaving the city at their mercy (Issar & Zohar 2007:115).

(d) Persians

Modern-day Iran was the core region in which the ancient Persian empire once existed. The Persians arrived at the Iranian plateau around 1000 BCE where the Elamites had settled about 2 000 years earlier (Brosius 2006:3). It was in the province of Persis where the Persian empire first came into being under the rule of King Cyrus II (Brosius 2006:5).

As the empire grew, it soon covered a massive area of land of more than three million square kilometres (Waters 2014:6). This meant that different environmental conditions prevailed throughout the region and, although much of it received enough rain to sustain farming practices without much human intervention, this was not always the case (Waters 2014:6; Brosius 2006:5). In the southern parts of Mesopotamia, irrigation was required since urbanisation first began. This was due to the flood patterns of the Tigris and Euphrates not being naturally favourable for agriculture (Waters 2014:6; Mays 2008:471).

By 550 BCE, Persia had become a major empire (Fig. 2.11) in the ancient world seen in accounts of how the Greeks both respected and feared their power (Waters 2014:5). Oddly enough, it is to the Macedonians under Alexander the Great that Persia would fall in 331 BCE (Saggs 1965:54-55; Bertman 2003:5-6).

Fig. 2.11 Map of the Persian empire[10] (Ridling [nd]:Plate 84)

[10] Figure rotated due to the size of the map.

The ancient Near East had been connected via trade routes for many years before the Persian empire became the ruling party. Such routes include the road between Susa and Persepolis and then diverting from there to Babylon and Anatolia, with other routes connecting the Indus Valley with Egypt (Waters 2014:6-7). These routes undoubtedly served as a means to spread knowledge of local technological advancements.

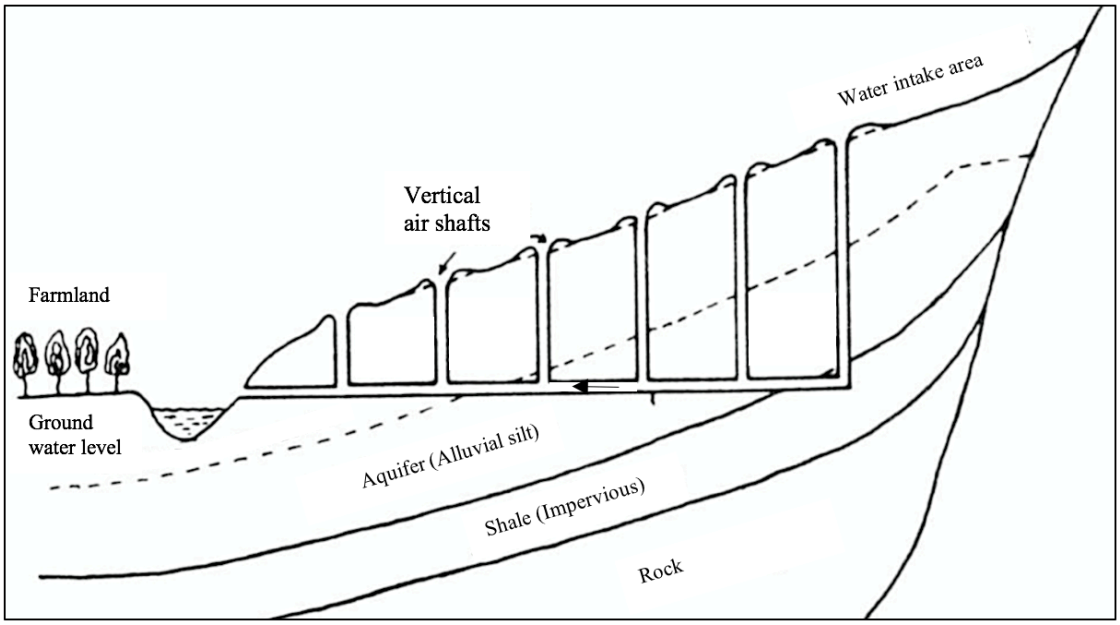

Fig. 2.12 Cross-section of a qanat (adapted from Biswas 1985:209)

One example of this is related to the spread of the *qanat* (Fig. 2.12) technology. The *qanat* is a system of tunnels that run underground, transferring water from springs or the water table across large distances (Mays 2008:473). The construction of qanats provides an example of different levels of jobs being created through water systems. An engineer, or *muqanni*, was charged with finding water in the strata beneath the ground by making use of test wells. Successful wells with access to water were then connected by creating a tunnel (Biswas 1985:208).

The Persians had to make use of this dangerous, expensive, and time-consuming practice of creating *qanats*, because they needed to transport water throughout their empire in a way that would protect the water from evaporating in the heat by allowing it to travel underground (Hicks 1976:78; Biswas 1985:208). These tunnels had openings to the surface through the use of shafts, which eased the process of digging the tunnels by providing circulation and light (Mays 2008:473). The oldest found *qanats* are about 3 000 years old and were created by the

Aryans (Mays 2010b:4). Although the origin of this technique in Persia appears faulty, the Persians certainly refined it and spread the technology across the ancient world (Hicks 1976:78; Mays 2010b:4). Some of the most impressive installations of this kind is found in its ancient city of Zarch. This is the longest *qanat* system with a length of 71 kilometres (Mays 2017:1282). When the Persian empire began to expand from the Indus to the Nile around between 550 and 331 BCE, the technology of the *qanats* spread (Mays 2008:473). As new civilisations adopted this system, they renamed it and made it their own, for example: *Foggara/Fughara* in the north of Africa and *Korez* in today's region of Afghanistan and Pakistan (Mays 2008:473).

2.2.2 Egypt

2.2.2.1 The Nile

The Nile's water comes from the Ethiopian highlands and the Sudan basin and flows to the north until reaching the Mediterranean at the mouths of the Delta (Rice 2003:10; Mays 2010c:55). Even in hot and barren conditions that might have prevailed around the river, with the melting of the snow from the highlands feeding the river and providing the necessary floodwater, the Egyptian society could still flourish. It was this contrast in conditions that aided in the sense of divinity that surrounded the Nile (Rice 2003:11). Bearing this in mind, the ability of communities to develop is still heavily reliant on human involvement (Rice 2003:11). In terms of Egypt's further advancements, it is possible that this was aided by the fact that their full attention was no longer required for securing food, with the establishment of their cereal crop production since the natural environment was of great assistance (Smith 2007:5).

Egypt has been described as 'the gift of the Nile' (Mays 2010c:52). This description is an accurate one, especially considering that the river is, in all probability, the main resource that secured the chances for settling in the area (James 1979:17). By the time Egyptian civilisation began to flourish, to the east in the southern parts of Mesopotamia, the kingdoms of Sumer and Elam had come into being. There appears to be a generally accepted theory that Sumer was the first to create a system of city life with large-scale monuments and religious and political structures (Rice 2003:5). Another theory is that because of the advantage granted to the ancient Egyptians with the natural inundation of the Nile acting as their teacher, the inhabitants of Mesopotamia must have learnt about irrigation technology (necessary for settlement) from

them. This is based on the very different characteristics of the Tigris and Euphrates which was not naturally favourable for the crop planting seasons (Smith 2007:5; Trigger 2003:307).

The valley around the Nile, on the other hand, was especially resourceful not only because of its agricultural possibilities but also for its hunting, fishing, and herding areas. From this view, the available environment in ancient Egypt needed only to be used for initial settlement (Rice 2003:14). In between the desert regions, sites like Nabta Playa and the Dakleh oasis could also provide necessary water resources due to availability of groundwater. Wells built secured water throughout the year (Rice 2003:13). To what extent, if any, contact was first established between the predynastic Egyptians and the inhabitants of southwest Asia is not entirely clear, but a theory does exist that it began because the Nile Valley was a source of gold. If this theory holds, it would also be a possible origin of specialist craftsmen moving between the regions (Rice 2003:34).

Some authors have posited that water availability impacted class division in ancient Egypt. As a rebuttal, Trigger notes that this theory might be more valid in areas of dense populations, but perhaps less so others (2003:297). Evidence in support of spreading local knowledge between Egypt and Sumer is the emergence of both civilisations around the same time in history, common factors being present in both developmental phases and, finally, them being close enough geographically to allow for cross-pollination (Rice 2003:35). The closeness of these locations is also clear by the trade routes that have existed between them since the earliest historic times. The major route led from Egypt along the Mediterranean coast and then to the Euphrates (Rice 2003:35). With the Sumerians and Egyptians developing their irrigation systems at about the same time, it adds support to the theory of early communication occurring (Rice 2003:37). In later times, this communication is clearer with the spread of technologies like the Archimedean Screw (Fig. 2.13) or the *saqiya* (water raising devices) from Greece to Egypt in the Greek period (Petrie 1940:143-144; Mays 2010b:16-17; cf. Venit 1989).

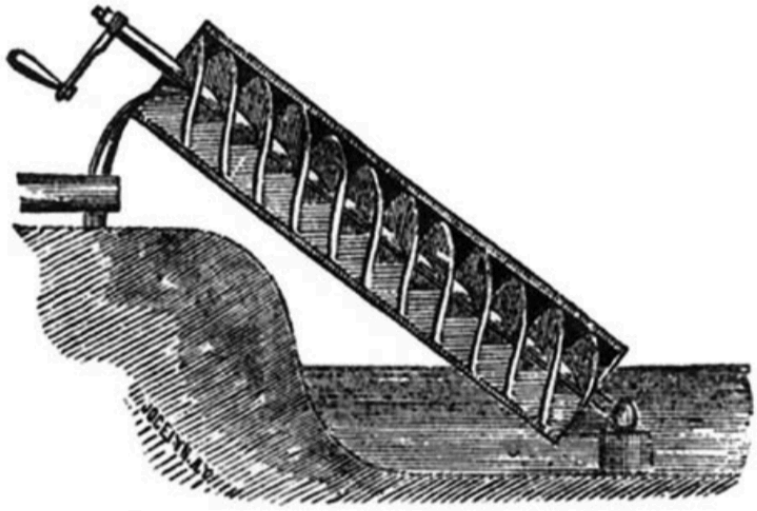

Fig. 2.13 Archimedes Screw (Mays 2010b:17)

Fig. 2.14 The Wardian tomb image of an ox-driven *saqiya* (Venit 1988:75)

The *saqiya* worked as follows: containers, like ceramic pots or wooden buckets, were fastened to a wheel that could be turned. This was turned by oxen with the use of a cogwheel, a vertical shaft, and a pole to tie them to. As the oxen walked around, the waterwheel lifted the filled containers out of the water (Mays 2008:473; cf. Venit 1989). The depiction of the waterwheel in the Wardian tomb in Alexandria (Fig. 2.14) has been a useful source to determine when this technology spread to Egypt as well as confirming how it developed (Venit 1989:219-222).

2.2.2.2 Civilisation of Egypt

The ancient Egyptian civilisation and its politics was based on a single ruling party (pharaohs), whereas in and around Sumer, the existence of city-states was prevalent and there was a continuous struggle for control by different groups (Rice 2003:37). The difference in environmental conditions is another possible main topic of consideration. Although the approaches will have had to be different, water supply was still of central importance (Rice 2003:36).

Around 4000 BCE, Egypt's population was made up of communities of family members and likely had a similar structure to that of a tribe (Wilkinson 2003:120). Before permanent settlement in Egypt, the inhabitants' movements were governed by the needs of their herds. With the flooding of the Nile during its annual inundation process, they moved towards the east where the eastern Savannah provided a valuable source of food. As winter approached, most of the Predynastic Egyptians lived at the edge of the Nile Valley in semi-permanent villages (Wilkinson 2003:120-121; Bright 1981:32). By this time, it also appears as though hereditary rule was taking effect. This is in contrast to before, when the heads of the communities were elected (Wilkinson 2003: 121; Bright 1981:32).

At the beginning of Egypt's glory from 3200 BCE (from the Predynastic and Early Dynastic periods) onwards, a society was being developed that was more literate and complex than any that existed in the region before (Rice 2003:1). By 3100 BCE, they already made use of a system of basin irrigation under King Menes (Mays 2017:1280). The Nile gave the ancient Egyptians seemingly endless possibilities of high standards of living to the extent that they could think nothing else than that they were in the good graces of their gods (Rice 2003:36; Mays 2010c:53). Egypt also has one of the first large-scale dams, known as 'Dam of the Pagans', which was built around 2650 BCE and capable of holding an impressive volume of 0.5 million m^3 of water (Mays 2008:472). This emerging civilisation's legacy would last an eternity and whose influence would spread across the world.

In some descriptions of what life in ancient Egypt meant, it is depicted as a perfect balance between man and nature. Rice gives such a lamentation of this nearly perfect civilisation along a narrow strip of land around the river Nile, which came to an end thousands of years ago (2003:1). White aptly said that 'Egypt was the river Nile'. It provided the Egyptians with an

opportunity for permanent settlement on its shores as their gods had chosen (1963:15). With a hundred days a year where the river flowed to the agricultural plots, the soil was fertile enough to sustain their population (White 1963:16). The reliable inundation pattern of the Nile provided a regular deposit of alluvium that provided the nutrients favouring larger scale agriculture (James 1979:17; Mays 2008:471). The importance of the Nile is also described as follows: 'To say the Nile is Egypt is no more than to express a simple self-evident truth' (Rice 2003:10). To the ancient Egyptians, the Nile was the source of life within a desert region and it gave them an understanding of stream flow in general (Rice 2003:9). The inundation pattern of the Nile also provided near perfect conditions for fields along the river as well as filling the canals with enough water for more distant croplands. This rising of the river occurred in the summer months (Rice 2003:10). The importance of the fertile areas can be seen in the very naming of it as the *Kami/Kemet* (the Black Land[11]) (James 1979:17; Rice 2003:10).

With the development of society in both Egypt and Sumer, large-scale construction projects were being undertaken that in turn is a form of social engineering (Rice 2003:19). The importance of large-scale irrigation projects, such as the creation of canals is clear as it is noted as major contributions by rulers of old in Sumer, Egypt, and more. These projects meant securing water, but also manipulating its distribution which, in turn, gave them some independence from a reliance on the rivers' natural flood patterns (Rice 2003:36). The pride the Egyptians took in their methods of irrigation was attested to by the legends told - such as that of Narmer who is said to have created his capital at Memphis only after he relayed some of the Nile's flow there. This would have aided in his mission of unifying Upper and Lower Egypt, as it then lay close to the point where these lands met (Rice 2003:36). It is also important to learn that the major water projects were part of provincial and central resource management responsibilities in Egypt (Rice 2003:36). What led to the initial advances in hydraulic engineering is difficult to tell exactly, but it could have been the result of observing natural flow patterns, experimenting with different techniques, or merely by accident (Rice 2003:37). It is most likely that it was a combination of all three that finally perfected the systems for large-scale civilisation to ensue.

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[11] 'The Black Land' refers to the regions next to the Nile where the soil was favourable for crop cultivation. This is in contrast to the *deshret or* 'Red Land' which was used as a description for the desert regions beyond (Issar & Zohar 2007:30; Tyldesley 1995:1-16).

The pattern of the rising of the water level of the Nile seems to have always been relatively consistent in that it was at its lowest in May, steadily rising at first and then more rapidly around August, until it starts to decline again after October (James 1979:23; Mays 2010b:2). This was especially important, as with many civilisations, agriculture formed an important basis of Egypt's income (James 1979:24). When having a surplus of food available became more important for the country's financial wellbeing and large-scale agriculture was necessary, it also meant that more than ever a combined effort was required from all the inhabitants to ensure that the system was in full working order for the next year (James 1979:25; Bertman 2003:274). This was done as part of the rehabilitation phase where labour was conscripted. It was necessary to get the work done as fast as possible and workers came together to clean the irrigation canals and ditches along with surveying the fields themselves (James 1979:25; Bertman 2003:204).

2.2.2.3 Water management

It is in these processes that some of the first examples occur of where water systems and management acted as a means of establishing a social standing. This was done as the people who were able to afford paying someone else to take their place in the conscripted work process were able to avoid having to do the actual work themselves (James 1979:25). This work was such an integral part of the lives of the Egyptians that they believed that these functions they needed to perform would also be required of them after death (James 1979:25). In terms of the settlement distribution in Egypt, other than the land along the Nile, oases that were easily accessible also formed part of the country's liveable areas (James 1979:20). Moving east towards the Arabian Desert, the mountainous topography was a source of raw material for building projects as well as minerals. There was, however, a big reliance on wells for water, with the lack of oases in these parts (James 1979:21). With this reliance in mind, it is not surprising that by 1700 BCE, Egypt had dug wells up to 100 metres in depth (Narasimhan 2005:7 91).

The Nile also served other purposes. Looking at transportation, the Nile acted as kind of highway. This is of great importance since it is not until around 1600 BCE that horses and wheeled transportation was used in Egypt (James 1979:21). It was especially useful to use the inundation patterns of the Nile. When the Nile flooded over to the croplands, boats were able

to travel farther than during the drier seasons and, in so doing, transport building materials from the cliff areas to the sites for monumental construction projects more easily (James 1979:21). Among the many positive elements that the Nile provided the inhabitants of Egypt, the natural flow of the water to the north made transportation easy and for the most part there was a prevalence of the wind blowing to the south, which meant that by using sails, it would have been easy to travel both up and down the river Nile (James 1979:21). Then, by the time King Menes had built his dam to divert water to Memphis, the Nilometers[12] were being used to better plan water management with officials being appointed specifically to measure the amount that the river had fallen or risen (Friedman 2008:1751).

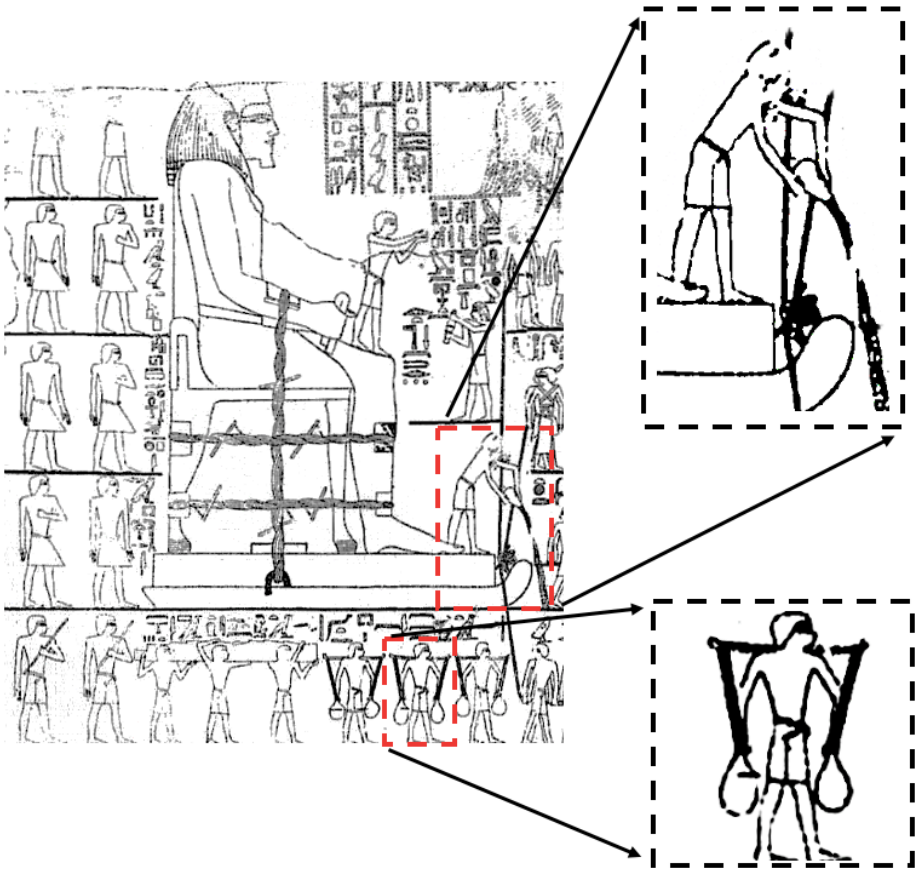

Fig. 2.15 Statue transportation scene from the tomb of Djehuty-hotep (adapted from Shaheen 2007:371)

[12] The Nilometer was used for determining the possible crop yields based on the measurement of the Nile's flood level. Nilometers used cubits and fingers for measurements. Nilometers have been found throughout Egypt at sites that include Elephantine, Kom Ombo, and Edfu, and were used from pharaonic times onwards (Friedman 2008:1751-1755). Three methods of measuring the water levels existed: marks were placed at the water level of the harbours or river cliffs; steps leading into the river acted as measurement for flood level; water was transferred to within wells or cisterns (Mays 2010c:64).

Another possible use for water in transporting statues comes from Djehuty-hotep's tomb located in Deir el-Bersha (Shaheen 2007:370-371). The scene reflects on the moving of one of this governor's large statues with a man being at the front of the sled-like base to aid in its movement (on the right-hand side). This man is seen pouring liquid (either milk or possibly water) from a jar to further the process of moving the logs underneath the sled (Fig. 2.15) (Shaheen 2007:370-371; Bard 2015:206-207). At the bottom, this scene also portrays the carrying of large ceramic vessels which were tied to a yoke with rope. This method was used to transport a variety of goods, such as oil and beer, and similarly to transport water (Fig. 2.15) (Shaheen 2007:370-371). Such an apparatus was excavated in a tomb at Qurneh (Fig. 2.16) (Shaheen 2007:369-370).

Fig. 2.16 Yoke and ceramic carrying device from tomb at Qurneh (Shaheen 2007:370)

Being a water carrier was also a profession as attested to in some depictions. For example, when Thebes was targeted by looters in 1191 BCE, eight people were tried for robbing tombs. Of these, five were named, including: 'The water carrier, Kemwese, of the shrine of King Menkheprure (Thutmose IV) (Nagle & Burstein 2010:16-19). Similar to other peoples of the time, water also had symbolic uses in purification rituals undertaken by the pharaohs. For example, on feast days, the king would have to be sprinkled with water from pools in the 'House of the Morning' (a building found at all temples) by priests before continuing with other duties (James 1979:139; Katz 2012:378).

Basin irrigation (Fig. 2.17 and 2.18) was used in Egypt to water the fields from the Nile's floods. It was an established method as early as 3100 BCE (Mays 2008:472). This technique

involves the use of natural and man-made levees that form basins into which water was routed through canals (Trigger 2003:295). This method trapped enough water in the created basins to water the soil, while also using 'siphon canals' that diverted excess water to lower basins and back into the river. This collection of basins had to be managed to maintain the integrity of provincial boundaries and so could stretch throughout the length of a province. This means that some basin systems could be as long as 35 kilometres (Trigger 2003:295; Mays 2008:472; Mays 2010c:56).

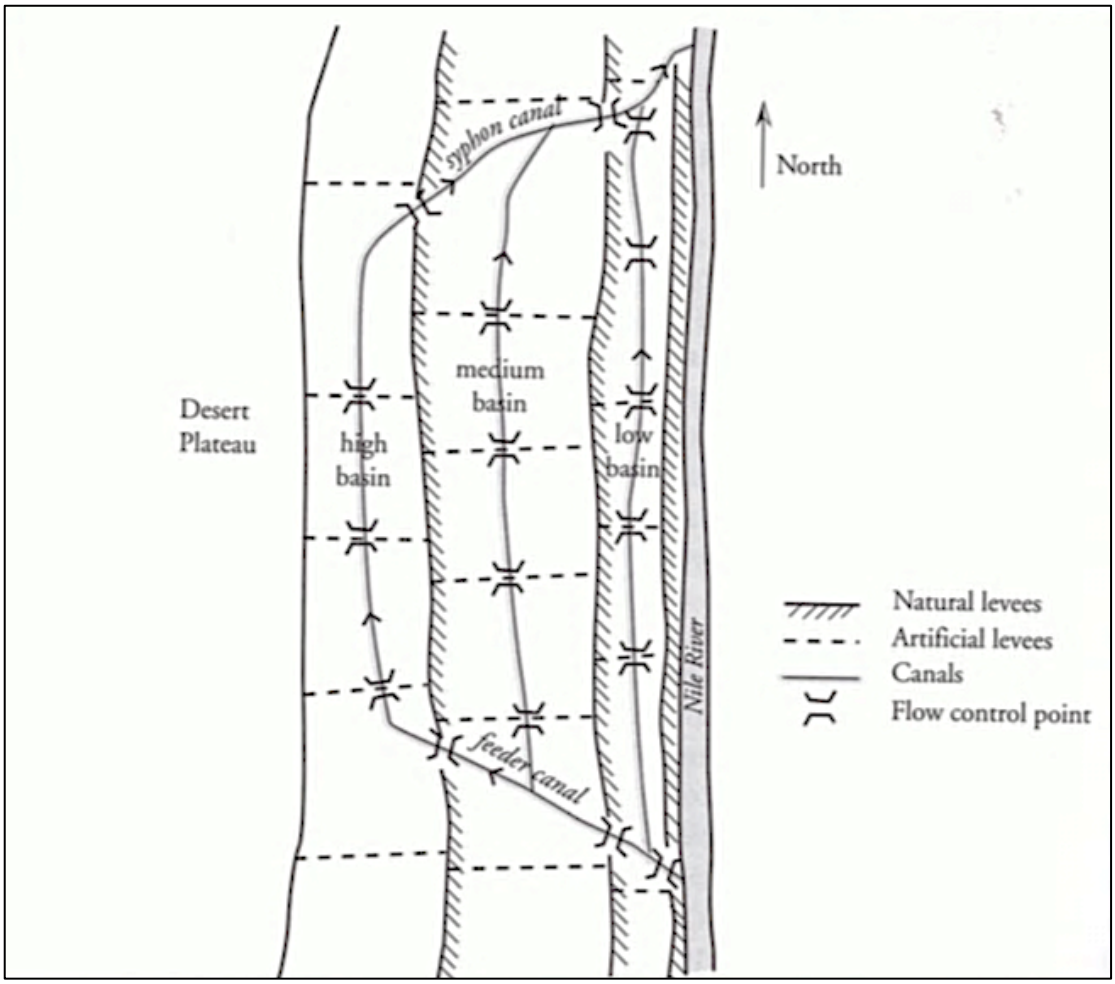

Fig. 2.17 Plan of basin irrigation system (Trigger 2003:296)

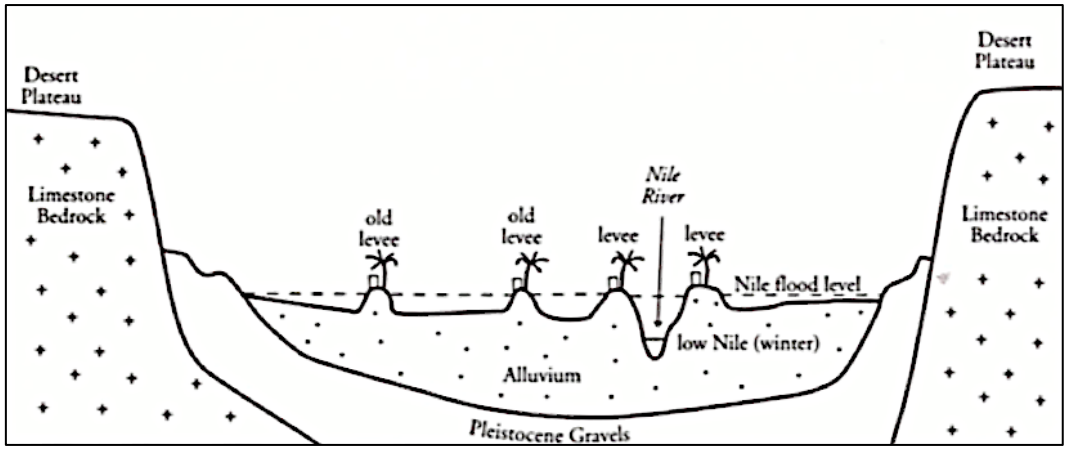

Fig. 2.18 Cross-section of the Nile Valley (Trigger 2003:296)

Water sources were also used for the beautification of the cities and providing food all year-round, especially the homes of the rich. Gardens, orchards, and plantations (Fig. 2.19) formed part of beautifying cities along with contributing to the agricultural sector. Due to the nature of the work, it would probably have been performed by a hired gardener (Eyre 1994:57-58; James 1979:30). Water was raised from canals leading water from the Nile or pools with the use of a *shaduf* (cf. 2.2.1.2b). The water was transported from there, either through canals or by using pots to carry the water, where a distance had to be covered (James 1979:30; Mays 2010c:59). Before the New Kingdom, it was an even more laborious effort, since devices like the *shaduf* had not yet been invented (Trigger 2003:294-295).

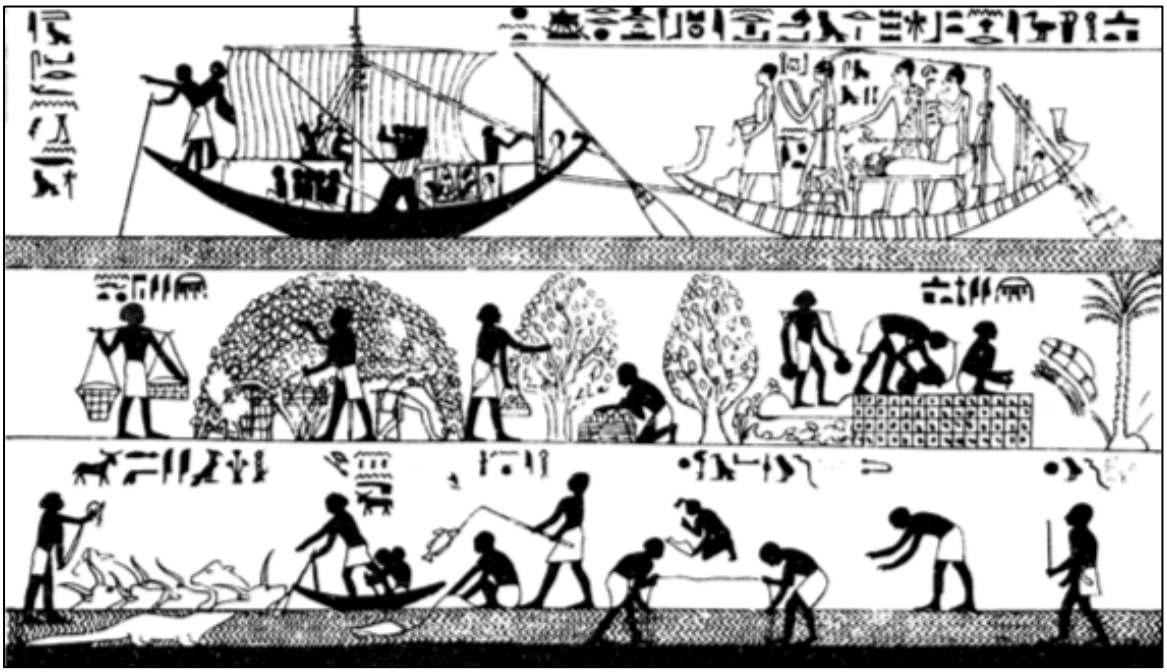

Fig. 2.19 The watering of plantations is depicted in the Tomb of Khnumhotep (Eyre 1994:62)

Other than the use of the Nile for agricultural practices or sustaining human life, it also meant that there was a rich collection of animal life in and around the Nile Valley and the papyrus growing at its shores were used for everything from building material, decoration, or for record-keeping (James 1979:31-32). Similar to uses such as these, ponds served a similar purpose. Aside from its aesthetic value, fish and ducks could be kept in them and flowers could be grown (Eyre 1994:64-65).

Fig. 2.20 Painting of a pool in a villa garden of the elite (Silverman 1997:72)

Nero's advisor, Seneca, had an interesting view on the creation of pools (such as the one in Fig. 2.20), which adds to the theory of water manipulation used by the elite: 'I do not believe that Philosophy invented these cleverly devised buildings of ours, which rise one above the other'…'any more than Philosophy invented fish ponds for the purpose of sparing gluttons from having to risk storms at sea. No matter how bad the weather, luxury always has safe places to raise exotic kind of fish' (Nagle & Burstein 2010:241).

2.2.2.4 Egypt's reputation

With any history of a people that is written from an outsider perspective, there are some differences in the way that these histories are being told. This is no different in the cases where

scholars are either focused on Sumer, Egypt, or ancient Palestine. For this reason, it is no surprise that the biblical tales that include Egypt might, in some instances, underplay the value that it had or the power it wielded when it comes to its role as an influencer of ancient Palestine and the rest of the Levant (Derricourt 2015:108; Dever 1998:40). The superiority that biblical writers felt is seen in the ultimate supremacy of their god. Such an example can be seen in Ezekiel 29 where God condemned Egypt. Yet, even though there might have been an attempt to specifically suppress Egypt's greatness, there are still hints of the true impact it had and the respect it earned as a nation. One example of this is in the tale of Solomon in I Kings 4:30 where it is stated that '… Solomon's wisdom excelled the wisdom of all the children of the east country, and all the wisdom of Egypt.' Egypt's relationships with its neighbouring civilisations is seen by the Egyptian finds in Palestine. Such contact would have been necessary to supplement Egypt's resources, such as the wood that had to be imported from the Levant (James 1979:34 & 53).

The conquest of ancient Palestine by the Egyptians seems to attest to the power and wealth that Egypt had by the Late Bronze Age (Issar & Zohar 2007:158). It has been posited that the Egyptians were not driven to control the land of Canaan for its natural resources to add to food security. Rather, it might have been the case that these resources were used to support the Egyptian armies passing through the region and to sustain the Canaanites so that they might continue to be useful to Egypt's development (Ehituv 1978:93-96). Canaan still provided Egypt with tributes as can be seen in the *annals of endowments of Thutmosis III* and *Papyrus Harris I*. However, it seems that this was as proof of loyalty rather than a need for resources (Ehituv 1978:96).

2.2.3 The Indus Valley

Around 2600 BCE, the first urban settlements of the Indus Valley (Fig. 2.21) began to develop. This development is an interesting one as it appears to differ from the general pattern of urbanisation. This specifically refers to the way that Indus Valley's settlements did not develop around palaces or temples. By this time, the rise of other cities like those of the city-states of Mesopotamia or the cities of Egypt, had been well underway (Kenoyer 1999:15; cf. 2.2.1; 2.2.2). In terms of the belief system in the Indus Valley, we do, however, gain insight into the importance of water. For example, their god of existence, Lord Vishnu, was associated with water by his other name: 'Narayana' (Nair 2004:163). Another legend revolves around the

Ganges River that is seen as a heavenly entity that King Bhagirath brought to earth to cleanse the sins of his ancestor (Nair 2004:165).

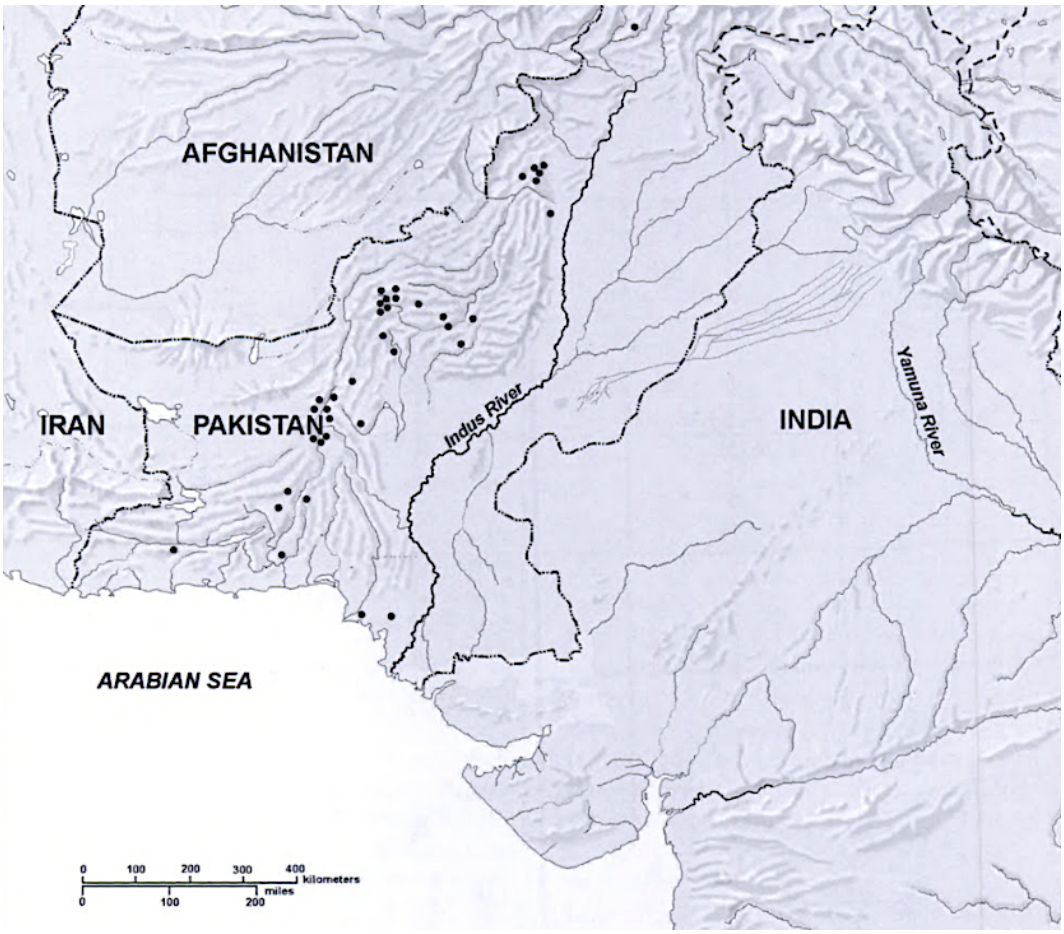

Fig. 2.21 Sites of the Indus civilisation (Possehl 2002:33)

The different communities in the region that came together to create large cities, had various water-related resources available such as wells, bathing rooms and drainage systems (Kenoyer 1999:15). At the same time these cities were developed, the kings of Mesopotamian city-states were fighting over the fertile lands near the Tigris and Euphrates rivers and building large monuments. Similarly, Egypt had built their monuments, including the Great Pyramids (Kenoyer 1999:15).

Since it is fairly difficult to create one set of criteria to use to define a city, a civilisation or even an urban area, many scholars choose to define what they mean to be core characteristics to define any of these terms and more. An example can be seen in the preconditions set out by Kenoyer in his depiction of the Indus Valley's earliest rise in city developments (1999:40).

2.2.3.1 Agriculture in the Indus Valley

According to Kenoyer, one such a precondition for an urbanised civilisation that he points out is that the agricultural and pastoral subsistence system has to be of such a nature that it can provide food security. This means that the city will not be vulnerable to short-term disasters, either natural or man induced. For the civilisations of the Indus Valley, this was ensured through the two river systems that provided them with water along with their climate (1999:40; Wright 2010:166-167). The rivers were used in conjunction with an intricate network of canals to water the crops (Nair: 2004:161). Wright noted that there is a lack of extensive evidence for technologies that could be used to control water flow in the Upper Indus (2010:167). The lack of evidence should not be taken to mean that such systems did not exist in the region in ancient times, as they might have been destroyed by modern agricultural practices (Wright 2010:167).

At sites that were not located near the rivers, springs acted as one source of water along with the creation of garbarbands to control water and distribute water. These check dams could also serve as a method to remove sediment from water (Wright 2010:100). Climatically, the peoples of the Indus Valley faced two main weather systems: The cyclones in the western highlands during winter months and the monsoons hitting the peninsula in the summer (Kenoyer 1999:30). Either one of these would have been able to sustain agricultural practices from year to year with only rare occasions of both systems failing (Kenoyer 1999:30). Another aspect of avoiding disasters include that of flooding that was counteracted by building the city on higher ground than the flood plains as well as building walls to block encroaching water. As the city grew, these walls were extended to include the areas that were newly added (Kenoyer 1999:15 & 40-42).

2.2.3.2 Examples of waste management from the Indus Valley

One more key characteristic of what makes an urbanised settlement in the Indus Valley is the development of waste disposal systems. As such, by the time that these cities had grown in size, infrastructure like latrines, drains and washing areas had been developed (Kenoyer 1999:42; Nair 2004: 161). Bathrooms at the homes were situated on a wall on the outside and were linked to a drainage system that joined with the main drainage system in the street or a pit (Wright 2010:237; Mays 2010b:5). Water and waste were also diverted into pits created by

ceramics. Such ceramics were found at Harappa (Fig. 2.22) (Wright 2010:237). These pots allowed liquids to leak through into the ground while solids remained (Wright 2010:237).

Fig. 2.22 Ceramic drainage pot at Harappa (Wright 2010:239)

2.2.3.3 Drinking water

The wells that exist in the Indus Valley are in all likelihood also datable to an early period, but since the nature of well use is one of repair and reuse, it would be more difficult to tell the exact time of its original reconstruction (Kenoyer 1999:42). The last condition that Kenoyer deemed necessary for urbanism is the control and distribution of resources available. These resources would also be acquired unevenly among the inhabitants and a social class difference becomes apparent (Kenoyer 1999:43). This appears to be a pattern of human development, as will be seen in the development of other groups in and around ancient Palestine. Other considerations can be gained from excavations undertaken at the Indus Valley cities like Harappa and Dholavira (Kenoyer 1999:56). What seems clear is that it is not only the availability of water for drinking and bathing that is important to complete a cycle of urbanisation. This means that although water was technically available for use through the rivers in close proximity, for the sake of convenience, it had to be relayed to the cities themselves (Kenoyer 1999:58).

2.2.3.4 Mohenjo-daro

Mohenjo-daro (Mound of the Dead) is an example of the advanced cities from the Indus Valley in the Bronze Age and was located about 400 kilometres north of modern-day Karachi in

Pakistan. After its establishment in 2450 BCE, the water supply for the city was supported by at least 700 wells (Mays 2008:474; Wright 2010:237; Mays 2010b:5). These wells were lined with bricks with its creation theorised to have been part of protecting water supply in times of siege (Mays 2010b:5). This city was also an example of the aforementioned waste disposal knowledge that existed in the Indus Valley. It possessed bathrooms in personal dwellings as well as a sewer system (Mays 2008:474; Mays 2017:1281). In terms of their agricultural practices, the population of Mohenjo-daro made use of sheet flooding to water their crops. This was reliant on the floodwaters reaching the fields while not destroying the city. For this reason, the city was located on a raised area (Wright 2010:167). Mohenjo-daro provides some possible evidence of a class system being required. A large-scale project had to be undertaken to build platforms before construction, in order to protect buildings from flooding (Wright 2010:237).

Fig. 2.23 Mohenjo-daro's 'Great Bath' (Wright 2010:239)

Mohenjo-daro also boasts with its 'Great Bath' with dimensions of 12x7x2.4 metres (Fig. 2.23). The pool was built with carefully placed bricks plastered with gypsum and then lined with bitumen to prevent seepage (Wright 2010:238). The pool was fed by a well and drained through a channel in the corner on the southwest (Wright 2010:240). The possible function of this pool has been speculated about. It might have been used for ritualistic purposes, for health, or merely for bathing. Regardless, it was a civic installation that brought people together. It is unclear whether this was restricted to a portion of the population or open to all (Wright 2010:240).

2.2.4 Greece

Greece holds evidence of the use of aqueducts in several of its ancient cities. These were created with the use of terracotta pipes to convey water from a single point at the city entrances to the rest of its inhabitants (Mays 2008:275). There are also examples of how droughts affected their water usage, as seems to be the case at Corinth. Wells that were used before, were replaced with cisterns in times of water scarcity and features like the bath was no longer used (Camp 1982:15-16). Finally, by the end of the 4th century BCE where wells were used by shops, they were filled with tunnels diverting water rather than by the water table (Camp 1982:15-16). By the Hellenistic period, advances in hydraulics included baths, harbour management, toilets, and drainage systems (Mays 2008:275-276; Katz 2012:374). As the knowledge of the Greek scientists included a comprehension of hydrostatics, it became possible for water to be transported across valleys with the use of inverted siphons (Mays 2008:276). Hydrostatics also led to the creation of what some refer to as the first pump, in the form of the helix/water screw of Archimedes (Mays 2008:277; Fig. 2.13). Greece also has evidence of public and private lavatories spanning from homes and palaces to public buildings like gymnasia and asclepieia. In both its public and private function, lavatories serve as an indicator of an area's economic success and a higher standard of living (Antoniou 2010:67).

2.2.4.1 Crete

The Minoans from Crete rose to power in the Bronze Age and is believed to have been responsible for the development of water systems throughout ancient Greece. In the Early Bronze Age, they already made use of wells, cisterns, aqueducts, and fountains as well as using water for activities of leisure (Mays 2008:474). The Minoan rulers had ceramic baths as well, evidence of which has been found within the palaces (Katz 2012:374). In the Early Minoan Period II (2900-2300 BCE), the roofs and courts of the buildings supported increased rainwater collection. By the time the Minoan civilisation reached its full status (1700-1400 BCE), Knossos further used wells and the rainfall system to support the population that had increased to tens of thousands (Mays 2008:474; Mays 2010b:8). Terracotta pipes discovered within the palace at Knossos might have been used to distribute water within with the use of pressure (Mays 2010b:8).

Fig. 2.24 Stepped channel for rainwater and desilting basin at Knossos (Mays 2010b:9)

Tylissos was another important city of Crete between 2000 and 1100 BCE, which shows evidence of the knowledge the inhabitants possessed to remove sediments from the water supply. The conduits were used to transport water to a sediment tank that could be cleaned (Mays 2008:475). Similar desilting basins have been found at the palace of Knossos (Fig. 2.24) (Mays 2010b:9). Tylissos also made use of ceramic and stone channels as well as cisterns with stone steps providing access (Mays 2010b:10-11).

2.2.4.2 Athens

The Greeks left their own mark on the history of ancient Palestine, but they faced other challenges in securing water supply. Excavations at the Agora in Athens have revealed a great deal about water-related practices. Installations discovered there range from fountain houses to wells (Camp 1982:9). More than 400 wells have been found throughout Athens (Fig. 2.25) (Lang 1968:5).

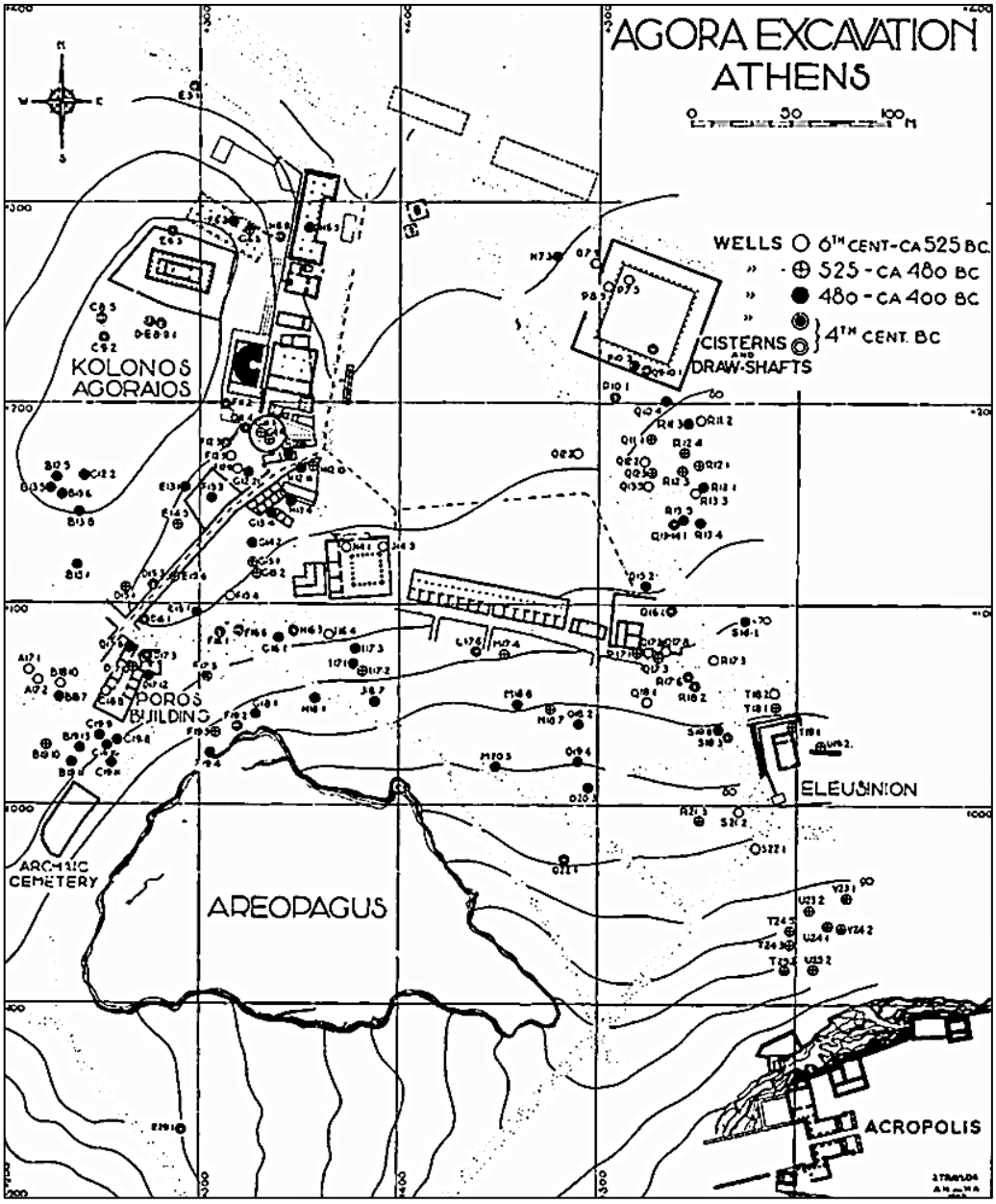

Fig. 2.25 Map of wells around the Agora in Athens (Lang 1968:5)

Fountain houses were fed by stone aqueducts and contained basins accessible to inhabitants (Fig. 2.26). They could also be a large project that would require a workforce (Camp 1982:10-11). Athenian history shows the need for unending work to refine water systems for all its different uses (Camp 1982:9).

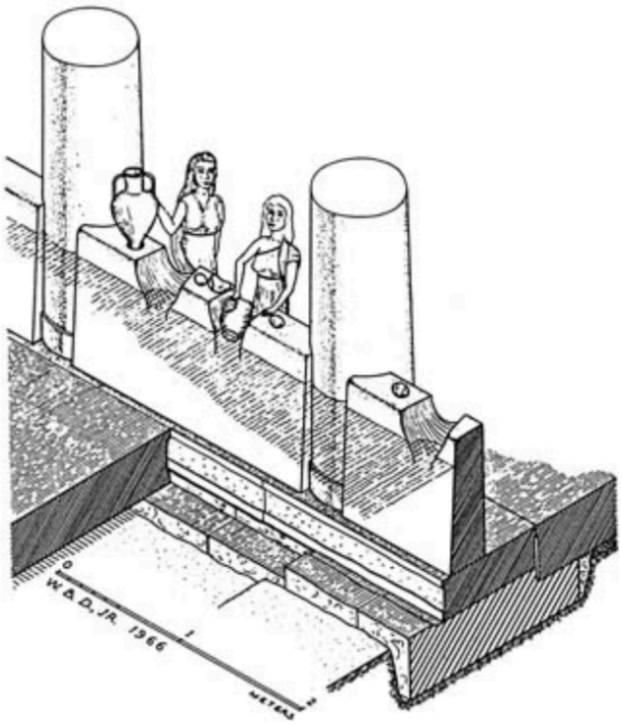

Fig. 2.26 Reconstruction of a fountain house (Lang 1968:18)

Different periods of time are noted to be important for water developments, but emphasis can be placed the last part of the 8th century BCE when a severe drought hit and on the 4th century BCE when intensive focus was placed on both public and private waterworks (Camp 1982:9). Athens famously also made use of the 'Acharnian aqueduct' that transported water over 18 kilometres from the foot of Mount Parnes to the city (Camp 1982:11). The *inscriptions* related to the aqueduct tells of the collecting galleries as well as different rules that had to be followed to ensure the success of the aqueduct as a water source. It was mostly based on gravitational flow that attests to the engineering knowledge the Athenians possessed and was probably built under the financial administrator Lykourgos (Camp 1982:11). Gutters made from stone were also used as a water source from runoff water. These channels had 'settling-basins' where water could be collected for washing as well as providing water for animals and crops (Lang 1968:22).

The importance of water commissioners from the 4th century is also apparent with examples such as a decree that honours Pytheas of Alopeke for his work. These commissioners or Superintendents of the Fountains also differed from most other positions in Athenian democracy, in that the position was not left to chance but rather elective (Camp 1982:11; Lang 1968:4). In complete contrast to these positions of power were the well diggers and cleaners, evidenced through the niches found in wells for climbing up and down it to perform their duties

(Lang 1968:6). Wells might also have been used to keep food and drinks cool by lowering it into the well in ceramic containers (Lang 1968:8).

In terms of private houses, the 4th century BCE in Athens also sees a shift from using wells to more use of bottle-shaped cisterns cut in soft bedrock and waterproofed (Camp 1982:12; Lang 1968:10). These cisterns were generally dug to a depth of between three and seven metres. Water was collected from roofs and diverted to the cisterns that were often located in the courtyards of homes (Camp 1982:12; Katz 2012:376; Lang 1968:12). The exact dating of such cisterns is difficult because they were often cleaned out and reused, and, as such, archaeologists are often only able to tell when it went out of use based on material remains (Camp 1982:12). The move to cisterns was, in all probability, an attempt to no longer drain the water table that would be an increasingly serious problem in times of drought (Camp 1982:13-14).

2.3 WATER AND POWER

When there is an attempt at writing an account of any group of humans and settlement, there are three main aspects identified by Saggs as being key considerations namely: The need for humans to have access to water for survival; to eventually to become fully established; and finally, that humans created waste that would have to be managed to avoid detrimental health implications (Saggs 1989:121). In order to create systems to manage water on the scale required for urbanisation, a large labour force was necessary as well as a central body to control and distribute tasks (Mithen 2012:7). Due to the size of some such water systems, it is expected that labourers might have been drafted for its construction (Dever 1987:163). No city of significant size would be able to reach any potential or, frankly, exist at all without continuous access to water year-round (Saggs 1989:121). Any country or society is so reliant on where it is located, which, in turn, include its climate and then the ability to use these conditions in their favour (White 1963:15).

Water was also clearly used for more than just sustenance as it was seen to be necessary for maintaining gardens of various cities. The garden area of Ugarit, for example, had a sink and drain that supplied the garden with water. It is believed that the garden was not just for beautification, but also for offerings, celebrations, and rituals (Starodoub-Scharr 1997:254, 268). Other examples about water systems indicating the ruling party's power can be seen in

the sheer size of feats of engineering as well as the undertaking of projects not necessary for survival but rather for luxury.

Another aspect of water impacting power relationships within a society and between civilisations are related to its use in trade. In the coastal cities of ancient Palestine, this will become even more apparent. Presently, focus is on ancient Palestine's neighbouring peoples where as early as the 5th millennium BCE, ships connected Mesopotamia with modern-day Oman and Bahrain. By the 3rd millennium BCE, the Indus Valley could also be travelled to by ship (Bertman 2003:5).

2.4 CONCLUSION

For much of the history and development of socially complex societies and the evolution of their water systems in particular, one clearly cannot fully investigate it without simultaneously looking into the agricultural practices. This is where much of the ingenuity lies in the development of such systems and what acted as a basis for future improvements in service delivery to the inhabitants.

It is clear from examples of water management in Mesopotamia, Egypt, Greece, and the Indus Valley, that water systems reached a point where it became necessary for groups of people to work together to build and maintain it. As a result of changing dynamics in water distribution and use, a shift in societal basics occurred. Here, examples are clear of individuals being 'ranked' according to their contributions to the development and maintenance of water provisions. These class systems included both the difference in use of water between the poor and the elite, as well as in the job titles assigned stretching from the engineers and scribes to the slaves.

Another important factor that has come to light from this chapter is that accounts from areas around ancient Palestine provide written and visual aids to complete the picture of water use in ancient times. With the use of reliefs, paintings and tablets, to name only a few, as well as what is seen with the archaeology in ancient Palestine, we are guided to a better understanding of daily life and challenges faced on a personal and regional scale.

CHAPTER THREE
GEOGRAPHY OF ANCIENT PALESTINE

3.1 INTRODUCTION

The water systems of the ancient world bring into light many aspects and avenues of research that relates to daily life and human ingenuity. It is in these systems that a question arises with regard to what role the availability of water played in determining changes in social advancements and a differentiation of classes. Before moving on to the role of water management in the society of ancient Palestine (Chapter Four and Chapter Five), we must first explore the landscape in which they lived. As with any civilisation that has come into being, those of ancient Palestine included, the successes and failures they experienced were in all probability related, at least in some part, to the environmental conditions that surrounded them. In terms of environmental research, it is only when combining both the physical and cultural world that it becomes at all possible to write a history of ancient Palestine. It is with this view that a historical geographical approach forms an important base for this research topic onward, as it will combine the most important disciplines that look at the natural environment as well as human history. To do this, it is imperative to begin to discuss different geographical factors.

With the broader setting of the physical world of the ancient Near East (discussed in Chapter Two), the backdrop for the history of ancient Palestine, and the biblical world, the cultural aspects that governed daily life will be explored. Once this task is complete, in subsequent chapters, focus can shift to more specific conditions that could have directed the course of history and social development in ancient Palestine. Such considerations beg the question of whether human ingenuity surpassed the power of nature in the analysis of whether the environment completely determined the actions of the population or merely created the possibility for them to flourish. To determine what came first is probably a philosophical question if there has ever been one. For this reason, rather than debating which one of the two absolutely describes the circumstances in ancient Palestine, the chapters from here on, explore which best describes the different archaeological periods of development that are found throughout the narratives of the Old Testament with particular focus on water availability.

3.2 THE IMPORTANCE OF GEOGRAPHY

Geography has impacted all aspects of history in one way or another and includes not only natural aspects like climate and topography but also cultural, political, and economic aspects as well (Aharoni 1979:3; Dennis 1991:279). The geological characteristics of the land also impacted human settlement as it allowed water to be stored below the earth's surface and could be accessed by the inhabitants through springs and wells (Lemche 1988:15-16). With all it entails, geography is often divided into the two sub-disciplines, namely human and physical geography (cf. 3.2.1; 3.2.2). It is also in these sub-disciplines, with the focus on the past (historical geography) (cf. 3.2.3), that it becomes evident how important it is in a study of society and their natural resources to combine all the aspects of each field of study. This method aids in creating a view as close as possible to reality.

In an attempt to comprehend the history of ancient Palestine, McNutt lists two important geographical factors to bear in mind. These are: the location of ancient Palestine within the world of the ancient Near East as well as the vastly different conditions that existed within it (1999:36). Ancient Palestine, different from Egypt and Mesopotamia, did not make use of such large-scale river irrigation because of the different characteristics of its rivers (Rosen & Rosen 2001:541). The physical location of any country has many impacts on the settlement patterns of inhabitants and it also plays a distinct role in the possibility of trade with neighbouring countries. In the example of ancient Palestine, it was ideally located for trade and the settlements that were created along major trade routes would thus be able to grow to become formidable in time (Lemche 1988:24).

Also, when looking at geography in terms of location it makes sense that it would often be used as a means of describing places or events relative to one another. By doing this, the world becomes even more interconnected and it becomes easier to imagine the physical world beyond where you have been by expanding on what you currently know. This is true for ancient societies where locations of cities are given relative to others around it as an estimation, as can be seen in the example of the mosaic map of Madeba (Madaba) (Fig 3.1). The Madeba Map was discovered in 1890 in a Byzantine church in Madeba, Jordan, that was built around the end of the 6th century CE (O'Callaghan 1951:57; Aalton 2017:235; Gold 1958:50).

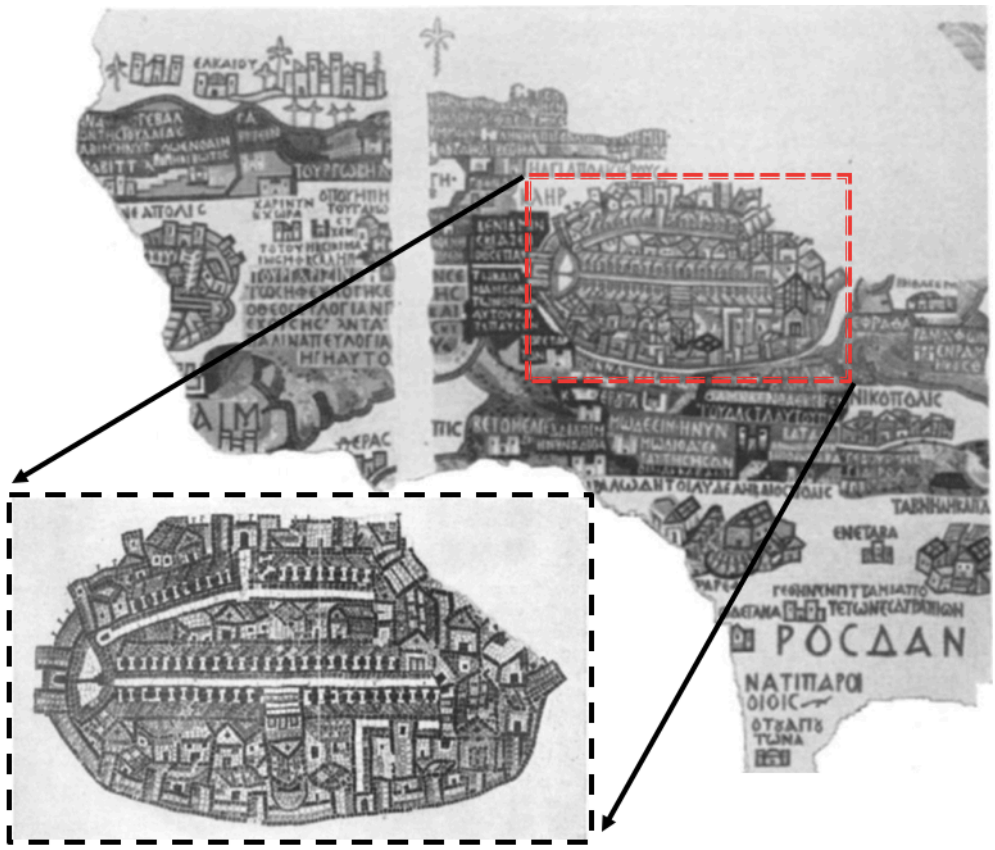

Fig. 3.1 Madeba Map - extract of Jerusalem (adapted from Gold 1958)

The Madeba Map is an example of how the cartographers presented the world from their perspective. It is theorised that Jerusalem, for example, is depicted in great detail because it was a familiar region. Madeba and Moab are also noted as being depicted close to reality (Gold 1958:56). Structures that are shown on the map include: 'a bath at Betomaresa, the pools at Callirhoe, the fish-pond near the Saitic arm of the Nile' (Gold 1958:57). Features included in the map, such as these water-related ones, would have been important in daily life, otherwise they would not have had significance in orientating map users.

3.2.1 Human geography

The relationship between humans and their surroundings is a subject that has been studied in various ways by academics from across disciplines. At the core of this research, there is a debate about whether the environment is a separate entity entirely or whether all human life is a collection of different relationships with the world they live in (Gosden 2013:277). This can be seen by the division created by Leslie White, who split the entities of the world into three groups. These groups are: physical, which includes earth scientists that study the natural and

physical aspects of the planet; cultural, where social scientists study the human world; and biological, where the focus is on all living things (1949:4-5). In her division of the cultural aspect of the world, White also states that technology is a determining factor of social organisation (1949:366; Gosden 2013:277). As civilisations in the ancient world developed into mighty kingdoms whose influence was felt across borders, it becomes apparent that much of that development is dependent on technological advancements. Technology is used to bring into practice the ideas that allows different societies to control their surroundings (Saggs 1989:195).

Technology and culture, in turn, forms an important part of human geography, as it dictates how humans interact with their surroundings. Culture has been acknowledged as a possible cause for changes that occur in society, where in the past, the focus was firmly placed on environmental conditions and populations increases (Gosden 2013:278). With the shift to include the cultural aspects in these determinisms, care must be taken not to isolate it so much that other important parts of the equation remain unexplored. These equations include, but are not limited to, climatic and environmental conditions (Gosden 2013:278). To ensure important aspects are explored, the study of human geography acts as an important approach to use as it combines different parts. This is emphasised by the definition of human geography by Fellmann et al. as: ‘The spatial analysis of human populations, their cultures, their activities and behaviours, and their relationship with and impact on the physical landscapes they occupy’ (2008:508). From this definition, it is clear human geography, especially in terms of human impact on nature, requires the study of the natural environment. Importantly, the historical geography must be limited to the period from the Bronze Age to Roman rule in order to complete the setting of biblical events and times.

3.2.2 Physical geography

The physical geography of ancient Palestine, both in terms of its location and the environmental conditions, had a great impact on the history thereof. The area, although small, has many different conditions, climates, and landscapes (Wittke, Olshausen & Szydlak 2010:44). Physical geography is defined by Fellman et al. as follows: ‘Study of structures, processes, distributions, and change through time of the natural phenomena of the earth’s surface that are significant to human life’ (2008:510).

The extent to which ancient civilisations were dependent on these 'natural phenomena of the earth's surface' can be seen from the very earliest times (Saggs 1989:22). In Egypt, the Nile was the main source of water and with the inundation patterns being rather consistent, the Egyptians planned their agricultural practices around it (Saggs 1989:22). Similarly, the south of Mesopotamia was reliant on the Tigris and the Euphrates. However, unlike the Nile, these rivers' inundation cycles were not favourable for agriculture, which meant that it became necessary to control the water to make farming possible (Saggs 1989:22; cf. 2.2.1.1 and 2.2.2.1). With both sub-disciplines of geography discussed, it is also important to note that in archaeology, both physical and human geography are incorporated into the study of historical geography.

3.2.3 Historical geography

In trying to define historical geography as its own discipline, it must be noted that there is perhaps not one universally agreed upon definition and debates on what the discipline entails are never ending. To some, such as Dear, defining historical geography is unnecessary as the argument exists that all geography is, in itself, historical (1988:270). This is because geography seeks to understand time and space. With the sub-discipline of human geography, research further seeks to understand both time and space in terms of social processes (Dennis 1991:265). For the sake of clarity, however, the need exists to define historical geography as it is meant for this research.

Some scholars describe historical geography as being involved with how settlements were made in close correlation with historians' research that looks at how the environment influenced those who built the settlements (Dennis 1991:274). The importance of historical geography becomes clear as it acts as the method to link all different aspects of the past which includes texts, material culture, and the environment where historical events occurred (Rainey 1982:219). The discipline seeks to explore a combination of both physical and social sciences, as it combines both the natural environment and the history of man crossing the barriers between space and time (Kučera 2008:6).

It seems that often a line is drawn in an attempt to separate one discipline from another, as can be seen with the divide between geography and history. Inevitably though, it has become difficult to separate geography and archaeology (Renfrew 1983:322). In this approach, those

who study the environment looks at where people lived while the humanities seek to understand who they were and how they lived (Rainey 1982:217-218). However, more now than ever, we must look at people and their world both in terms of how they changed it and how it governed them (Rainey 1982:217). By looking into aspects such as these, with the use of both archaeology and geography, we might be able to create a clearer picture of the different periods of time.

3.2.4 Geography, archaeology and the Bible

Gosden provides an example in support of the interconnectedness of the disciplines in question by looking specifically at a collection of fields (2013:279). Although the development of this system was the desire for food, the process is infinitely more complex than this original purpose would indicate (Gosden 2013:279). The desired results can only be achieved by various further actions, such as creating the necessary hydrological systems that would provide water to the crops as required. Furthermore, there now exists a need for different households to come together to both create and maintain this field system (Gosden 2013:279). In turn, larger and larger settlements, where interrelationships become of the utmost importance, will come into existence.

3.2.4.1 Combining geography and archaeology

It is clear that the world and the people who live in it have been entwined since the very beginning and our view of the world is also greatly influenced by our surroundings. Perhaps Gosden has made an important observation in that we see the world very much from the capitalistic view that surrounds it today, rather than with the outlook of the people we seek to study (2013:280). He also confirms one of the major challenges faced by researchers, in that there is still a tendency to look at entities separately when seeking a better understanding of humans and the ecosystems we live in (Gosden 2013:282). Since human history and the environment they lived in appear to be very closely related, they can no longer be kept as

separate entities. Geography and archaeology[13] would, in turn, also be more intertwined as disciplines than previously believed, since the basis for each is the same with only their approaches differing. In geography, we look at human interaction with the environment and in archaeology at humans in time (Renfrew 1983:316). Even though the methods might differ, both disciplines involve the main focus of the other. For example, geography is pointless without time to determine changes in patterns and archaeology cannot look at man's life without knowing how they lived which, in turn, is very much determined by their environment. With this interconnectedness in mind, a multi-disciplinary approach remains favourable.

Related to these approaches, there are two 'landscapes' referred to by Renfrew that describes the perceived difference in geography and archaeology: The physical landscape, which is what is known through science as fact and is believed to be the focus of the geographer (1983:319). The perceived landscape, which focuses on the environment as it is seen through the eyes of those who live in it, is described as the area of concern for the archaeologist, although these lines have become blurred (Renfrew 1983:319). Regardless of the initial distinction, it seems abundantly clear that archaeology cannot be successful without both approaches and even more so in a study such as this, which involves the natural environment as much as it does the people whose lives we seek to reconstruct.

Matthews confirms this by saying that the 'archaeological record consists of nothing more than what we are able to observe at particular stages in our careers'…'and within the limits of our imaginations' (2007:59). When we limit ourselves to one discipline rather than looking at the world as a whole, we limit exactly what we are able to observe. It is only in combining the study of archaeology, geography, and the Bible that the research questions posed has any hope of being answered.

Finally, in the world today where so much focus is placed on sustainability there exists a new and even greater need than ever before to look to the past for answers. This is because in times

[13] Archaeology seeks to determine what life was like in a particular time in history by looking at the material remains that are left (Kitchen 1977:9). Biblical archaeology more specifically looks at the archaeology of the ancient Near and Middle East (Kitchen 1977:9). Because the area of study is that of ancient Palestine, wherever reference is made to archaeology in general it can be applied to biblical archaeology all the same.

long gone, the ancient civilisations managed to find a way to sustainably expand their empires either by adapting to their environment or by adapting the environment itself (Gosden 2013:282).

3.2.4.2 Application to biblical archaeology

In recent times, the desire to cement archaeology and anthropology more as sciences has come to exist (Gosden 2013:277-278). This desire only adds to the rationality of conducting further research that is multi-disciplinary in nature. With this rationality in mind, Matthews aptly describes the importance of understanding the geography of the world that the Canaanites, Israelites, and others lived in. By noting that without understanding the conditions that were prevalent, he adds that it would leave a gap in comprehending all the challenges that existed in their daily lives (2007:20; Miller 1987:57).

Aharoni also provides a good explanation of the importance of studying the geography of ancient Palestine in the quest of studying the history thereof by likening the geography to a stage and the history to the play (Aharoni 1979:ix). History and geography can hardly be separated and even less so for the history of ancient Palestine, where its geographic location meant that it was continuously involved in the struggle for power by all the surrounding major civilisations (Aharoni 1979:ix).

One of the major constraints facing biblical scholars is that the time and space we live in is so different from that of the subject we study. Beitzel acknowledges this and urges researchers to not isolate research from the Bible's own environment (2009:16; Paton 1929:367). To ensure this does not happen, a combination of sources need to be used. So, over the course of time, the sources used to create a geographical layout of ancient Palestine and write a historical geographical account has included, and must continue to include, both biblical and extra-biblical (written documents from authors like Josephus and archaeological excavations) sources (Eybers 1978:9).

3.3 TIME AND SPACE OBSTACLES OF WRITING A GEOGRAPHICAL ACCOUNT

It makes sense that regardless of what nation, area, or time one chooses to write a history of, one major question that will always be asked is where to begin. In the attempt of writing a history of ancient Palestine, Bright, for example, suggests that one must look beyond the period of the so-called Patriarchs (cf. 3.7.1). This approach is chosen because that which came before most certainly set the foundation of the history of the people who Bright, and this research, attempts to study (Bright 1981:23). For this research, it was decided that the focus will be on the Old Testament period spreading from the Bronze Age to the Roman occupation. This period of time will be used to study water systems and uses by the focus groups of biblical narratives. Fig. 3.2 below provides a chronology of the different archaeological periods that are mentioned:

THE ARCHAEOLOGICAL PERIODS OF ANCIENT PALESTINE OF THE OLD TESTAMENT	
Pre-Pottery Neolithic	**8500-6300 BCE**
Pottery Neolithic	**6300-4500 BCE**
Chalcolithic	**4500-3500 BCE**
Early Bronze Age	**3500-2250 BCE**
Early Bronze I	3500-3100 BCE
Early Bronze II	3100-2650 BCE
Early Bronze III	2650-2250 BCE
Middle Bronze Age	**2250-1550 BCE**
Middle Bronze I	2250-1925 BCE
Middle Bronze II	1925-1550 BCE
Late Bronze Age	**1550-1200 BCE**
Late Bronze I	1550-1400 BCE
Late Bronze II	1400-1200 BCE
Iron Age	**1200-586 BCE**
Iron Age I	1200-1000 BCE
Iron Age II	1000-586 BCE
Iron Age III (Neo-Babylonian)	586-539 BCE
Persian period	**539-332 BCE**
Hellenistic period	**332-53 BCE**
Roman Period	**53 BCE -**

Fig. 3.2 Archaeological periods of ancient Palestine (adapted from King & Stager 2001:xxiii)

When looking at the history of the people of the Old Testament events, there are various locations that it, none of which is more important than ancient Palestine, as this is where the

proto-Israelites found their Holy Land (De Vries 1997:133). The historical period began in the 3rd millennium BCE. From the start of the historical period onward, the very core of the history of ancient Palestine was directly related to the rise and fall of their surrounding superpowers in the Babylonians, Egyptians, and Hittites between 2900 and 1100 BCE (Lods 1962:43 & 46). These surrounding areas have been discussed in Chapter Two, while ancient Palestine will be focused on in the remaining chapters.

3.4 PHYSICAL WORLD OF THE OLD TESTAMENT

In a geographical location, such as modern-day Israel and its surroundings, the environmental conditions vary vastly throughout its different regions. Even though it is very small in area, it formed an important part of the history of the entire Near and Middle East because of its location (Karmon 1963:263). The world of the ancient Near East revolved around the major powers of Egypt, Mesopotamia, the Aegean, Anatolia, and Southern Arabia - all of which combined to form a boundary around ancient Palestine and forming part of its history over millennia (Karmon 1963:363; Derricourt 2015:192). This setting meant that the area was rarely under the control of one authority (Lemche 1988:12).

3.4.1 Vegetation and environment

In a most basic description, the land of ancient Palestine can be described as an area that sees a change from sea on the west to desert on the east and south, with the very layout of the region affecting which areas get rainfall and experience further changes in atmospheric conditions (Abramsky 1963:9). As an example of how abrupt changes like vegetation are, the area of Jerusalem has trees and environmental conditions that allow for agricultural practices but a mere 15-minute drive away lies the Judean Desert, which is barren (Fig. 3.3) (Karmon 1963:363).

Fig. 3.3 Vegetation in ancient Palestine (Curtis 2007:33)

Using Jerusalem further as a point of orientation, ancient Palestine was laid out as follows (Matthews 2007:47): To the west, the Judean Hill Country gave way to the Shephelah and then the Coastal Plain. To the north, the Central Hill Country is followed by Samaria, the Jezreel Valley, Galilee, and the Lebanon Mountains. Northeast was Damascus. To the east, the Jordan Valley turns into the Transjordan Plateau where Moab and Edom were located. Lastly, to the south, the Judean Wilderness leads to the Dead Sea, the Negev, and finally, Sinai (Matthews 2007:47).

Towards the north and surrounding the Sea of Galilee, the environment becomes greener with a prevalence of springs. Also, to the north, the mountains served as some form of a natural boundary. However, closer to the coast there were no clear obstacles that divided the northern part of ancient Palestine from the south of Syria (Aharoni 1979:65).

It is generally accepted that changes in the climate and the hydrological make-up of a region have an impact on the functioning of settlements and societies, but it is believed by some that it cannot in itself bring about the end of them. Particularly in the ancient Near East, where the drastic shifts in precipitation from year to year occurred often and the impact on crop yields were expected, it is believed that they will have prepared to minimise detrimental effects (Rosen 1995:36). According to Rosen, it has been the habit of many archaeologists to look to environmental conditions when searching for the source of pressure on societal stability. However, she argues that where societies were truly developed, they knew how to adapt to such changes. As such, where a collapse did occur, underlying instability within the society is seen as the main cause for destruction (Rosen 1995:26). Others, such as Mithen, hypothesise that by being able to determine when milestones in water management occurred it allows you to see when some of the main aspects of the rise of civilisation occurred (2012:14-15).

Environmental concerns are related to natural resources that surround humans and the way we interact with it (Wenham 1999:86). For example, settlements that were located close to permanent sources of water would have been less vulnerable to environmental changes. In contrast, people living in marginal regions were forced to move as conditions changed. Settlement patterns indicate that during wetter phases, it was possible to move southward, whereas during dry phases there was a move to the north (Finkelstein & Langgut 2014:220-226). The marginal regions would have been areas that react to changes in rainfall, water table levels, deforestation, and erosion. Along these lines of thought, it is believed that where water is readily available and agricultural conditions favourable, a city's economy could thrive (Rosen 1986:55-56).

To nomads who live in areas with water scarcity, travel patterns were dictated by existing sources of water (De Vaux 1973:3). Where a tribal system was in place, there were disputes over resources of which water was an important part. The Bible reflects such disputes, as can be seen in the book of Genesis (26:19-22). The Old Testament aids us in providing a view of what life was like for the 'Israelites', particularly between 1200 and 500 BCE (Wenham 1999:87). During this time, for the unskilled or specialised workers, heavy reliance was placed on the environment to sustain them (Wenham 1999:87). With the establishment of a centralised monarchy, economics became one of the most important aspects of daily life and social classes developed (De Vaux 1973:69).

Clearly, the variety of environmental conditions that exist throughout ancient Palestine leads to questions regarding what areas were populated as well as how the social structure within communities led to the use and allocation of natural resources (Ahlström 1982:133). The Hydraulic Hypothesis from decades ago is based on providing a possible explanation for the creation of permanent settlements in ancient times. It includes the theory that irrigation systems were necessary for the creation of socially complex populations. As becomes clear with research into water systems as a whole and the creation of urban settlements, irrigation might aid in aspects of such complex societies, but probably does not solely dictate its possibilities or establishment (Harrower 2009:58 & 66; cf. Mitchell 1973; Lees 1994; Lane 2009).

Even the paths for travellers in ancient Palestine were often affected by hydrological features throughout the land. For example, *wadis* dictated the paths that they would take either by limiting their movements as obstacles or by acting as roads between major cities (Matthews 2007:48-49). Where water flowed, rivers and streams also had to be navigated, either by swimming across or by following it until reaching places to cross. This is also indicated in biblical narratives, such as Judges 12:5-6 when Ephraim and Jephthah fought, the surviving Ephraimites request to cross over (Matthews 2007:49).

3.4.2 Topography

In terms of topography, the landscape differs vastly between regions (Fig. 3.4). The very important Jordan River runs from Mount Hermon through Lake Huleh and then the Sea of Galilee down to the Dead Sea in the south (Lemche 1988:14). Because of the rift within which Jordan River lies, the Jordan Valley requires a steep slope to be overcome when approaching it from the west, providing an obstacle for invaders (Lemche 1988:14). When establishing permanent settlements, the topographical layout also acted as a key factor in selecting sites, since defensive measures and water availability, among others, were governed by it.

Throughout the archaeological periods of the Old Testament, the early Israelites, like the Canaanites before them, often settled on higher ground that had been abandoned (Aharoni 1979:ix; Issar & Zohar 2007:107). These mounds usually show signs of habitation that spans across centuries and different occupational periods. The rationality behind it relates directly to the physical world they lived in. The original settlement would have been built as a prime

location near a water source and with enough natural attributes that would make the site easily defendable in the event of a raid. Where the incoming populations in ancient Palestine decided to resettle on abandoned mounds, their occupation adds to the stratigraphic layers studied by archaeologists today, while in other areas, the sites remained abandoned (Aharoni 1979:ix). These tells can still be seen across the landscape of modern-day Israel.

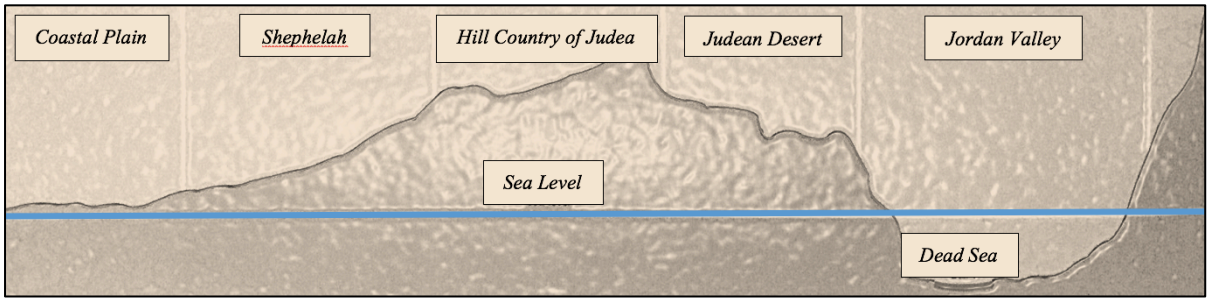

Fig. 3.4 Topography of ancient Palestine (adapted from Haywood 2003:58; Rogerson 1996:58)

Regarding the natural conditions that are still prevalent now, the relatively small land area that encompasses ancient Palestine can be divided into vastly different geographic regions in terms of vegetation, elevation, precipitation, climatic conditions, and more (McNutt 1999:37). For example, the elevation of the country varies from around 2 815 metres above sea level on Mount Hermon down to more than 390 metres below sea level at the Dead Sea (McNutt 1999:37). Where the geographical layout of the region could and did act as a divider between different settlements, the highways that ran through it did the opposite, by unifying different regions in terms of trade and communication (Aharoni 1979:43).

3.4.3 Boundaries

Ancient Palestine consisted of the area covered today by the State of Israel, the Transjordan, coastal Syria, which includes Lebanon, and southern parts of Syria (Tubb 1998:13). The borders of the land, although roughly remaining the same, did vary somewhat throughout history with the rise and fall of the major kingdoms surrounding the land. These kingdoms include Babylon, Assyria, Persia, the Hittites, and Egypt (Tubb 1998:20-21; Eybers 1978:7).

The geographical layout also provided some natural boundaries for ancient Palestine. In the west, the Mediterranean acted as a permanent frontier, with desert lands lying southwest (Lemche 1988:12-13; Abramsky 1963:9). In the east, the Jordan River gives way to the Arabian Desert. Of note is that the Jordan River itself did act as a natural boundary at times, but it was

also easily crossed. Finally, to the north, Mount Hermon also acted as a barrier (Lemche 1988:12-13; Abramsky 1963:9).

3.4.4 Regional divisions

Fig. 3.5 Map of regional zones in ancient Palestine
(adapted from De Vries 1997:134; Ridling [nd]; Earth Snapshot 2011)

Ancient Palestine has been divided longitudinally into different regional zones. This division is based on soil types, climatic conditions, and topography (Rogerson 1996:58; Tubb 1998:21). Beginning with the far west, the Coastal Plain is first, followed by the Shephelah or foothills of the central hills. The Central Hill Country then turns into the Jordan Rift Valley and, finally, becomes the Arabian Desert in the east (Tubb 1998:21). This division can still be noted as 'rough', since it is very difficult to create clean boundaries in the natural world as transitional areas are normal and ragged in reality (Matthews 2007:26-29). Regardless of the absolute accuracy of the divisions, it does still help to orientate researchers to general areas of similar topographic and climatic conditions. This orientation further adds to the creation of a holistic picture of the ancient world. These different zones are illustrated further on in the map in Figure 3.5.

3.4.4.1 The Coastal Plain

The Coastal Plain is the area along the coast to the far west, beginning at the Mediterranean Ocean. This area played a vital role in trade and transport, as one of the major international highways, the Via Maris, ran through it (McNutt 1999:37). The Via Maris ran from the Euphrates to the Maritime Plain to Egypt (Eybers 1978:5). Along the Coastal Plain, the occurrence of dunes and drifting sands led to the creation of swamps which, in turn, led to the Via Maris turning inland (Tubb 1998: 21). This turn was located at Mount Carmel and the highway headed to Megiddo from there (Miller & Hayes 1986:43). This road was also used in military campaigns by the Egyptians under Rameses II, among others, the Assyrians under Sargon and Sennacherib, and the Babylonians under Nebuchadnezzar (Eybers 1978:5). Nearing the Mediterranean in the west, the climatic conditions would become ever more tropical and so it is there that the ancient inhabitants would have found a fertile area to settle in. Urbanisation occurred here from the Bronze Age onward (Wittke et al. 2010:44).

3.4.4.2 The Shephelah

Moving east from the Coastal Plain, another geographical region that has also been identified is that of the Shephelah (Eybers 1978:8). The Shephelah is the region forming the foothills of the central hills (Tubb 1998:21). In ancient times, the Shephelah was a region favourable for settlement as it was both wooded and provided access to water. The climatic conditions and the fertile valley lands also made it possible for the inhabitants to grow wheat, vines, and olives

(Tubb 1998:21; Ussishkin 2014:19). It should be noted that a scarcity of springs in the Shephelah seemed to prevail, with water being provided through wells and cisterns for storage (Amiran 1953:209).

3.4.4.3 The Central Hill Country

The Central Hill Country, also known as the Highlands, can be divided into a northern and southern part and covers a large part of the region between the Coastal Plain and Jordan Valley (Miller & Hayes 1986:43; McNutt 1999:38). It is also often referred to as the backbone of the land and is the area where the Israelites first settled (De Vries 1997:134). They would only be able to move into other regions once the Egyptian influence was diminished (Tubb 1998:108 & 110). The northern region of the Central Hill Country is known as Samaria and was able to sustain some form of agriculture on the eastern steppe. Samaria stretched from Jezreel to Jerusalem (Miller & Hayes 1986:43; McNutt 1999:38). The southern part, known as the Judean Hills, is marked with rocky formations and is far less favourable for large-scale settlement and more conducive to a pastoral living (McNutt 1999:38). The Judean Hill Country spans from Jerusalem to the Negev (Miller & Hayes 1986:43). The Central Hill Country generally provided opportunity for settlement regardless of the north-south division, as it provided protection against attack. However, at places, the lack of access to the readily available springs and streams found in the Lowland Plains meant that agricultural practices would be difficult to maintain and might not be substantial enough to sustain a large population (Esse 1991:14). Where there was access to water or methods in collecting it places like Hebron and Jerusalem came into being (Wittke et al. 2010:44). This was possible as the west-facing slopes did receive precipitation and, with the use of terrace farming, could be utilised. The east-facing slopes, however, fell within a rain shadow and were thus less fertile (Wittke et al. 2010:44).

3.4.4.4 The Jordan Valley

The Jordan Valley exists as part of a geological rift that spans from the east of Africa where it formed the Red Sea all the way through the Dead Sea, Lake Tiberias, and Lake Huleh (Tubb 1998:21-22). The Jordan Valley was difficult to navigate at places, as it was quite deep with steep slopes (Dever 2012:38). Conditions here were favourable for settlement and saw expansion under Jeroboam II (Finkelstein 2013:131). The extent of its prosperity can be seen

in the 8th century BCE, where the region saw great success with a population surpassing that of Judah by threefold (Finkelstein 2013:110).

3.4.4.5 The Arabian Desert

Rainfall across ancient Palestine decreased from the north to the south and from the west to the east. Although this is only in very general terms, it is apparent at the eastern boundary where the Arabian Desert begins (Tubb 1998:23). This desert acted as a natural boundary, since even the winds came from the east and there were periods of drought. This, in turn, would be very detrimental in any quest for permanent settlement and urbanisation (Abramsky 1963:9).

3.5 Climatic conditions

Looking at any geographical region, it cannot be viewed without a clear understanding of hydrological and climatic conditions. This is because water dictates the very existence of permanent settlement in an area (Macumber 2001:1). In ancient Palestine, the weather and geomorphological layout of the land created micro environments dictating which areas were favourable for settlement. The different conditions facing the different groups where they settled would initially have acted as a divider between the communities, as they all will have had to adapt to their own specific environments (McNutt 1999:37).

Deuteronomy 11:11 refers to Canaan as a land fed by rain. As the population increased, methods would have to have been developed to ensure optimum techniques of water collection and transportation, since rainfall might not have been enough. This is because of the variations of precipitation, not only geographically, but also annually. The biblical authors hint at the flipside of this gift from God, in that He could both bless and curse the Israelites by bringing rain or by withholding it (Wenham 1999:87). Water is thus shown as a source of life, a theory which is only enhanced by the harsh environment of the arid Near and Middle East (Wenham 1999:87).

Many of the settlements in ancient Palestine, such as Hazor, Ai, and Arad, made use of rain and runoff storage to sustain their communities (cf. 4.2.1.4a; 4.3.1.3; 4.3.2.3). The use of springs, rivers, and groundwater sources, such as at Megiddo and Gibeon, was also of increasing importance (4.2.3.3; 4.2.4.3). However, their usefulness was reliant on technology

and knowledge of environmental conditions (Frumkin 2002:21). To change environmental conditions, such as that of the hill country or the desert, so that it becomes possible for humans to settle there is only possible through immense projects of intensive work and planning. This includes, but is not limited to, the creation of terraces around Jerusalem so that crop cultivation could take place as well as ensuring that enough water is collected for periods of drought (Har-el 1997:149-151).

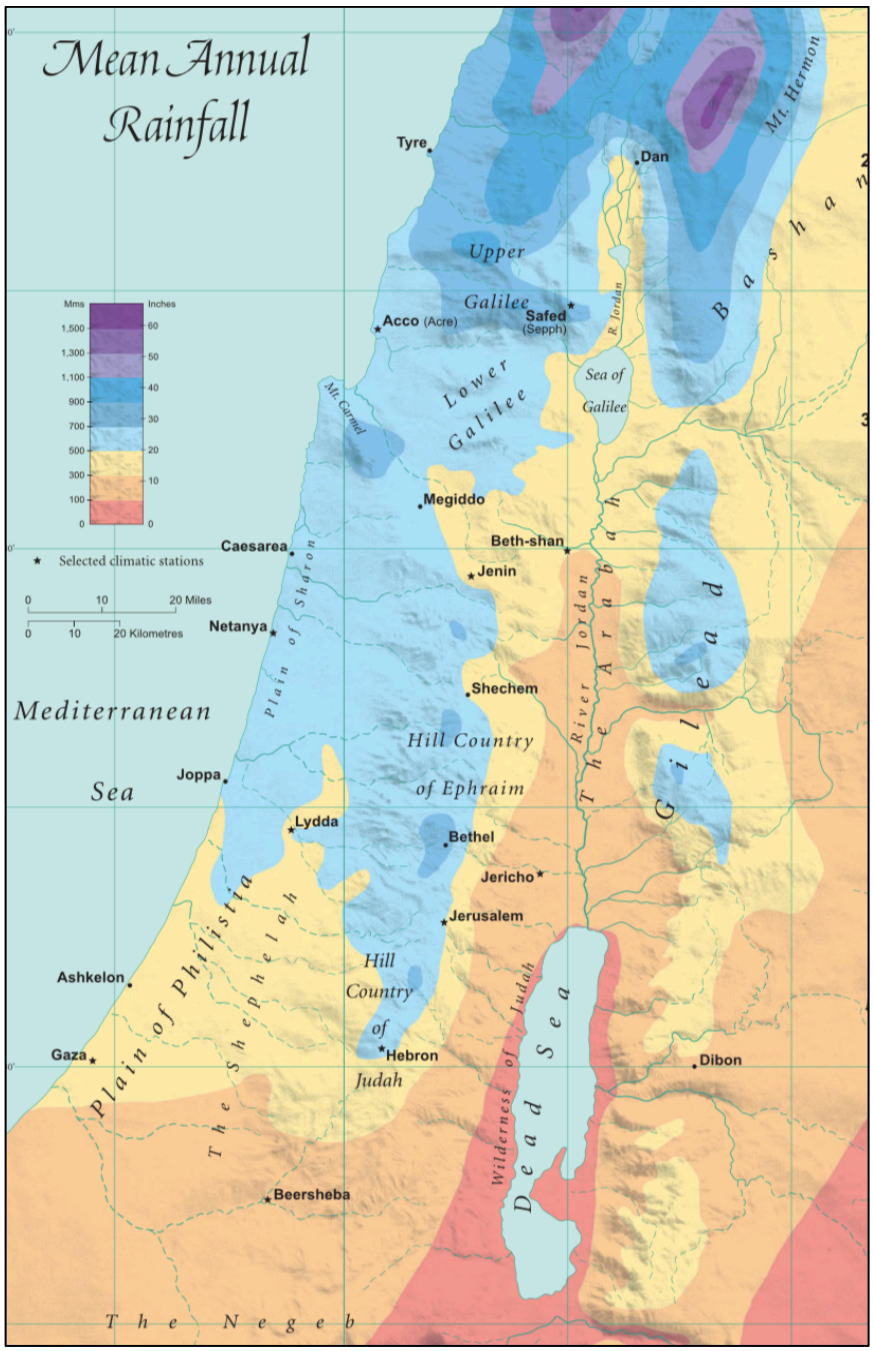

Fig. 3.6 Map of annual rainfall pattern of ancient Palestine (Curtis 2007:30)

The prevailing climatic conditions where rain is concerned are as follows: The summer months are generally dry with the necessary start of the rainy season only beginning around September (Lemche 1988:15). The amount of rainfall received varies greatly between the different regions (Fig. 3.6). In some areas of the country, like the northern and western areas in particular, this rain is enough to allow for agricultural practices throughout the year. This phenomenon does not extend to all regions such as the Jordan Valley and the Negev where rainfall alone is not sufficient (Lemche 1988:15). Another factor that the inhabitants of ancient Palestine had to bear in mind was that the rainfall could be unpredictable and sometimes not enough to supply the need that existed. In areas of such variability and unpredictability of rainfall patterns, flooding was caused in areas where the soil did not permit fast enough draining (Karmon 1963:364-365). For example, in the north of ancient Palestine, the drainage patterns could have had detrimental effects on those settling within a close distance of drainage basins, as heavy rain could cause them to fill (Esse 1991:12). Areas in the south, such as the valleys of the Negev mountains, were prone to flooding (cf. 5.4.4).

Around 60 percent of what is Israel today (thus forming part of ancient Palestine) can be defined as desert and, as such, with a lack of precipitation, water is and was of great importance to those living there (Kenyon 1974:38). The rainfall in ancient Palestine is very little between the months of April and November. For this reason, although winter months do provide rainfall in the hills, it had to be stored to provide for the remnant of the year (Kenyon 1974:38; Cole 1980:9). In areas where the rainfall is not sufficient in itself, the need existed to have other water sources readily available to sustain the population (Lemche 1988:15). Water was either stored in cisterns over long periods of time from rainfall or collected from springs and rivers (when rivers were not dried-out) (Lemche 1988:15).

The rainfall patterns of the region are also responsible for the division of the land into different areas for settlement because of variations of soil fertility (Lemche 1988:16). Looking at the area in terms of where the most favourable conditions existed for permanent settlement, the valleys in the west were preferable. In areas surrounding the Huleh and along the coast, there was, however, also the concern of contracting malaria, which hindered settlement (Lemche 1988:16). The area of Galilee was also good for food production, while the more mountainous regions could also be utilised if the proper technology was available to the people settling there (Lemche 1988:16). Close to the Coastal Plain around the Shephelah, more arid conditions

prevailed. Finally, to the east past the Jordan River, there also existed favourable conditions for agriculture (Lemche 1988:16).

It is important to remember that looking at average rainfall amounts is not enough in itself, as the slightest variation can have drastic effects. In general, the rainfall in ancient Palestine decreased towards the east and south, but on the eastern slopes of the Rift Valley for example, a rain shadow was created, giving this area a different rainfall pattern forms its surroundings (Esse 1991:11). Regardless of the variations, these patterns still provide the setting for the biblical events in general. Once more specific sites are looked at for information on occupation patterns, more regional climatic conditions can be analysed.

3.6 Settlement patterns

The general patterns that has governed permanent settlement is that it blooms in areas where the fertility of the area is great enough so that it can support populations of greater numbers and in greater densities (Lemche 1988:17). Among the factors that dictate settlement patterns, water availability was definitely a deciding factor (Scheepers 1984:133). In less favourable areas, permanent settlement was also possible, but it would occur in smaller quantities, as the land could not support a large enough crop yield to sustain large groups (Lemche 1988:17).

In northern Mesopotamia, the same settlement patterns that were prevalent in ancient Palestine can be seen, although development in Mesopotamia preceded that of Israel by many years (Bright 1981:31). As agricultural practices became more refined and able to sustain a larger number of people, the crude settlements gave way to the rise of cities. With community projects surrounding water supply, such as drainage and irrigation systems, economics and trade also developed, and city-states and central governments came into being (Bright 1981:24-28 & 32). When looking at the development of an area with such a complex history, the development of different cultural groups needs to be considered. For example, when groups like the early Israelites first settled in the Holy Land, they were a nomadic people (De Vaux 1973:3). This meant that their very movements were dictated by the natural environment and, more specifically, by the availability of water sources. This, in turn, led to more and more contact between them and the more settled regions that they would, in time, inhabit (De Vaux 1973:3).

Ancient Palestine was the home for many groups that include the Canaanites, Israelites, Philistines, Jebusites, and more. During the time of the United Monarchy, the Israelites gained supremacy over the other groups but would again lose it later with the arrival of the Assyrians in the 8th century BCE (De Vries 1997:134-135). The Babylonians would follow, destroying Jerusalem in 587 BCE and after them control of the area went to the Persians, the Greeks, the Egyptians (Ptolemies), and the Romans (De Vries 1997:135; Rowley & Taylor 2006:43).

Looking at the initial settlement patterns in ancient Palestine in terms of climate, people settled first in areas with greater rainfall, only moving to the more 'marginal' regions when sustainability was problematic (Matthews 2007:24). Where settlements were not clearly along strategic locations, it seems a fair assumption that they were located elsewhere for the natural resources such as minerals or constant water supply (Matthews 2007:33). Amnon Ben-Tor's summary of what made Hazor (cf. 4.2.1) able to become a great city-state can surely be applied to all major settlements. According to Ben-Tor, these factors are: having fertile soil for agriculture, access to a substantial water supply, and a proximity to the most important trade routes (2016:10). Settlements were also often built on hills, as this created a more defendable area against external threats, while also providing more protection from floods (Eybers 1978:10; Cole 1980:9). When there were no security threats facing settlements, it was normal to have the water source at the base of the mound with women and slaves being tasked with transporting water within the settlement. However, when war ensued, the nuisance of the collection method was far outweighed by the threat of death for the water carriers (Cole 1980:9).

Some scholars suggest that more rural settlements and smaller agricultural communities lived in an egalitarian society[14] due to the homogeneity of the population (Lemche 1988:22). Lemche also discusses arguments against an egalitarian society by noting how fierce competition would have existed between the different groups to secure resources necessary for survival (1988:22). Lemche does add that this, in turn, could have been responsible for the joining of communities.

[14] The different models of how the settlement of the early Israelites occurred fall outside of the parameters of this study. However, it can be noted that some, like Algaze and Fessler, have found that an egalitarian society in its purest form does not exist as it is in the nature of man-kind that there will be an uneven distribution of power, class and material possessions (2001:9).

By communities joining, they would avoid large-scale disputes and create advanced settlements by working together to create food production and defensive systems, among others (1988:22-23). Lods attributes the lack of homogeneity in the different groups to the frequency of ancient Palestine's invasion (1962). With the development of urban settlements social division occurred as well (Lemche 1988:22-23). With water supply being one of the main factors required for permanent settlement we might infer that it was then also a factor in the rising social complexity.

Specialisation in terms of different professions did occur and became a more common occurrence from the 1st millennium BCE, with the development of more urbanised settlements. In villages and smaller settlements, the inhabitants were mostly responsible for working the land, whereas in the cities, specialisation of labour was evident. These specialised occupations included weavers, metalworkers, butchers, ferrymen, brickmakers, and more (Saggs 1989:115). Regardless of such job specialisations, ancient cities were still fiercely dependent on their agriculture. So much so that if their farmlands were to be seized by enemy troops, the cities could fall. This is seen in the example of Megiddo in 1468 BCE when the Egyptians gained control of their fields, causing starvation in the city (Saggs 1989:115; cf. 4.2.4.2).

3.7 WATER AND ARCHAEOLOGICAL PERIODS OF ANCIENT PALESTINE

3.7.1 The Bronze Age

The Bronze Age lasted from around 3400 BCE to 1200 BCE (Dever 1987:150). The Early Bronze Age in Palestine saw a period of decline by the end of it with many towns left in destruction or abandonment. The inhabitants that remained were largely scattered and many pursued a semi-sedentary life. In the Negev and southern Transjordan, this would continue right up to the Iron Age (Bright 1981:54). In other regions, a recovery period began in the Middle Bronze Age and western Palestine, for example, saw the establishment of cities (Bright 1981:54). This proposed theory of settlement patterns is also substantiated by the *Execration Texts* mentioning Jerusalem and Ashkelon in the south (*Sethe group*) and towns in Phoenicia, southern Syria, and northern Palestine (*Posener group*) (Bright 1981:54-55). In terms of the biblical stories, it is now that the so-called Patriarchs also appear, as they seem to fit best within the Middle Bronze II period, although no precise date has been proven and with others doubting their existence altogether (Rogerson 1996:24; Bright 1981:80-85). They have been referred to

as having been semi-nomadic. With little to no control of the land by Egypt at the time, their free movement, as described in the Bible, would have been possible (Rogerson 1996:24; Bright 1981:80-85).

Where tribal systems were common in specific groups, there occurred various events of raids and disputes. This was mostly in the pursuit of gaining more control over the natural resources that the land offered. In particular, there was a quest to control the wells and cisterns. These disputes will have taken place at regular intervals as a result of the lack of an enforceable legal system (De Vaux 1973:9). This is also attested to in various biblical accounts, such as Genesis 21:25 where Abraham speaks to Abimelech about the well that was taken by his servants; and Genesis 26:19-22 where Isaac and the herdsman of Gerar quarrelled over the well Isaac's servants found in the valley. Where nomadic lifestyles reigned, the groups consisted of families with little division in terms of classes (De Vaux 1973:69). When settlement patterns became more permanent, the equality that existed before, fell away and gave way to monarchical systems and changes in social distribution (De Vaux 1973:69).

A revival of urbanisation seen in the Middle Bronze Age II period in ancient Palestine included the creation of large fortified Canaanite cities, villages, as well as smaller farms (Finkelstein 1988:339). With the coming of the Late Bronze Age, however, settlement patterns were once more in decline and a theory exists that nomadisation occurred, shrinking the population sizes of cities (Finkelstein 1988:242). This happened as the Canaanite city-states were faced with threats from Egypt and their natural resources were fast being diminished by them. Canaan also faced the threat of the Sea Peoples, droughts, and conflicts between their own city-states (Finkelstein 1988:341 & 346; Ehituv 1978:105).

3.7.1.1 Early Bronze Age

The first villages of Syria and Palestine appear to indicate that permanent settlement was not fully dependent on agriculture. This is based on the theory that settlements near a reliable water source could serve as a basis for subsistence in other ways, such as fishing or other naturally occurring fauna and flora (Miller 1980:331). Agriculture later became a more important part of the economy, as settlements grew and was developed around both irrigation and dry-farming (cf. footnote 5) systems (Miller 1980:331). The view is supported by findings from the Pre-pottery Neolithic B site of Beidha, which lies in an environmentally fragile area. This was in a

time 7 000 years BCE, where rainfall patterns could not sustain agricultural practices and with the nearest source of surface water being more than five kilometres away, it appears as though irrigation was not the main concern for its inhabitants (Miller 1980:332).

The end of the Chalcolithic period in ancient Palestine sees some evidence of engineering systems focused on storing runoff water in reservoirs and cisterns. One such an example is that of the Jordanian Jawa reservoir, where water storage was necessary to supplement naturally occurring water. They implemented canals to divert water to these storage structures (Miller 1980:335; Mays 2010c:58). In the late 4th millennium BC, the water system underwent an upgrade to store larger quantities of water, but the site was abandoned before completion. Although not complete, it grants insight into the capability of engineers in these early times (Miller 1980:335-336). The Early Bronze Age thus comprised the beginning of a period of urbanisation in ancient Palestine (Richard 1987:22).

Byblos[15] had similar aspects to their water system to that of Jawa in place until the end of the 3rd millennium BCE. Then, the area around the spring was cleared and a pool was created with an area around it secured to avoid pollution from the town's inhabitants. This was done by keeping burials and household buildings at a distance (Miller 1980:336). The spring was an important part of the planning of the town layout, including public buildings that were built outside the cleared area where two important streets crossed. Maintenance was also part of the system, with reinforcement of the retaining walls as the town developed and the building of a staircase to reach the water (Miller 1980:336). Another part of maintenance involved clearing canals to remove any possible obstructions from silt build-up and reeds affecting the water flow (Postgate 1992:178-179). Settlement patterns of the Early Bronze I period, appears to indicate a need for creating settlements closer to sources of water that would be both safer and conducive to farming (Richard 1987:26). The beginning of the Early Bronze Age saw the development of large-scale building projects and bureaucracies as well as developments in trade with Egypt (Adams et al. 2014:32; Richard 1987:27).

[15] Byblos was located on the coast of Lebanon, north of modern-day Beirut (Dever 1987:171).

The settlement patterns of the Early Bronze II period, despite a rise in urbanisation, still included some small villages existing alongside the new city-states (Richard 1987:27-28). Between 2350 and 2300 BCE, however, the city-states of ancient Palestine collapsed. The reasons behind this breakdown are not certain but might include drought, societal instability and the search for less confined means of living, which is the result of sedentary life (Richard 1987:34; Dever 1987:149; Miller 1987:58). Various terms have been used to describe the period between this collapse and the following one of reurbanisation, either linking it to the end of the Early Bronze Age or the beginning of the Middle Bronze Age. Others describe it as the Intermediate Bronze Age (Cohen 2009:1l; Issar & Zohar 2007:136).

3.7.1.2 Middle Bronze Age

As a simplified explanation, much of ancient Palestine once again returned towards an urbanised society by around 2000 BCE and thus the beginning of the Middle Bronze Age (Dever 1987:149; Cohen 2009:9). Cohen has argued that the beginning of the Middle Bronze Age saw a synergy between evolving urban settlements and their rural counterparts that acted as providers of needed resources (Cohen 2009:10). Regardless of when an urbanised way of living reached all areas, in general, the Middle Bronze Age saw a rise in urban population, more complex societal systems, and fortifications (Dever 1987:153; Cohen 2009:1-2 & 10). Social hierarchy is also reflected during the Middle Bronze Age by grave goods like jewellery, alabaster, and ivory (Dever 1987:163). It is possible that wetter conditions occurred later in the Early Bronze Age and with that more springs would have been available for use as well (Rosen 1986:58). The settlement of the Middle Bronze Age shows a compilation of different patterns, governed by what the region they existed in allowed (Yasur-Landau, Cline and Pierce 2008:60). By Middle Bronze II, conditions became drier. With the availability of rock-cut wells, however, cities could still develop (Rosen 1986:58-59).

The 2nd millennium BCE thus saw the use of cisterns and wells for supplying the towns of the Levant with water (Miller 1980:337). Cisterns lined with plaster have been found at sites like Ta'annak, dating to the 15th century BCE. Others have been found that were filled with runoff water (Miller 1980:338). Another cistern at the site grants insight into limitations put on the creation of water systems with regard to tools available at the time. This shaft was dug with the intent to reach the water table, but the hardness of the geology and lack of proper tools made the task impossible and the project was stopped (Miller 1980:338). Before the arrival of

iron tools to ease the process of rock-cutting, older tools and techniques were used. These include bronze tools, stone picks, hammers and the technique known as fire-setting (Miller 1980:339). Some of the rock-cutting techniques used in ancient Palestine was being used in Egypt and Greece (Mycenae) by this time, leading some to believe that the technology was transferred to the area through relationships with these regions (Miller 1980:338-339).

3.7.1.3 Late Bronze Age

Canaan of the Late Bronze Age provides differing views of what life was like at this time (Gonen 1984:61). Throughout much of the Late Bronze Age, Egypt had control over the area (McNutt 1999:36). On the one hand, there exists the idea of a system of strong cities hinted at by material evidence, such as the *el-Amarna Letters,* while on the other, archaeological finds show an impoverished and often abandoned region (Gonen 1984:61). This could possibly be the result of the Egyptian campaigns into Canaan in the 16th century BCE, which left destruction in its wake. If the area did lose its position of power, it would mean that Canaan could only serve as a geographic link between major powers of the time (Gonen 1984:61-62). Competing views suggest that the tribute paid to Egypt by Canaanite cities show that wealth and power remained intact (Gonen 1984:61-62).

Part of the challenge to determine the political and social status of settlements is that their size is difficult to establish. This challenge exists because walls around settlements were often used in this determination, however, population sizes grew and decreased within the confines of the fortifications. Another element used was the creation, disuse or repurposing of structures such as water cisterns, because of their durability (Gonen 1984:62-63). It appears that there was a period of decline by the end of the Middle Bronze Age into the first parts of the Iron Age (Gonen 1984:63). Some possible reasons for this decline include: the aftermath of the Egyptian presence in Canaan; political disturbances; climatic conditions; or a weaker economy (Fritz 1995:43-44). Some major cities like that of Hazor, Megiddo, and Lachish were strong enough to ride out the period of decline (Gonen 1984:66 & 69).

3.7.2 The Iron Age

The first presence of Israelite tribes in ancient Palestine is not dated to an exact point in history, but it would have been between the 15th and 12th centuries BCE (Lods 1962:53). Regardless,

by the beginning of the Iron Age, the Israelites had settled in the hill country, although they would not be able to sustain their growing population for long. The Israelites made use of water accessing and storing installations to secure water in the marginal areas of the hill country and the desert. Such installations included reservoirs, wells, springs etcetera (Har-el 1997:151; Benson 2006:85). Cisterns were of particular importance in these areas where natural springs were not in a close enough proximity. To create these cisterns, iron tools were a welcome technological advancement to cut into the limestone of the Jerusalem hills. Once the cisterns were cut, plaster was applied to prevent seepage. By the beginning of the Iron Age, lime-based plaster existed and was sometimes mixed with olive waste or ash before application (Har-el 1997:152). Mud mortar would probably have been used first as the better equivalent made from lime was only available later (according to Kenyon, from the 1000 BCE). The mud used as sealant first would have worn over time, dissolving in the water from the cisterns (Kenyon 1974:38). Generally, wells were not used in the hilly regions because of the nature of the underlying geology being too hard for easy digging into the limestone (Har-el 1997:153). In areas close to riverbeds, channels were created to transport water into cisterns in times of floods. It was used for agriculture, watering animals, and for the use of travellers (Har-el 1997:154).

What began as battles with the natural environment would soon turn into competition with the Canaanites for arable land (Finkelstein 1988:349-351). Because of the common threat facing the future of their people, the Israelites had to come together to defeat the surrounding inhabitants. This led to the unification of the Israelites because of nationalism, religion, and common ethnicity that would give rise to the United Monarchy (Finkelstein 1988:351; Stern 1993b:22). With the split of the United Monarchy following the death of Solomon, Israel was ruled by Jeroboam while Rehoboam ruled Judah (Stern 1993b:22).

3.7.2.1 Iron Age I

Proto-Israelite occupation was located in the hill country for the most part. The area was available for settlement because the lack of a reliable supply of water hindered previous inhabitants from settling there (Wright 1955b:56; Fritz 1995:50-51). The settlement of these areas became possible with the Late Bronze Age development of plaster made from lime slaking. With the ability of preventing water seepage, cisterns could be used to store water in marginal areas (Wright 1955b:56-57; Benson 2006:85). After the 12th century BCE, it became

a common occurrence for personal dwellings to have their own rock-cut cisterns for water storage, probably dug into the floor of the main room of the house. These cisterns were fed by rainwater being diverted from roofs (Wright 1955b:57; Benson 2006:85; Ebeling 2010:30).

The hill country saw an increase in the number of inhabitants at the start of the Iron Age even though the environment was not altogether favourable for settlement. The earlier centres that already existed in the area, such as Jerusalem, Shechem, and Hebron, did not have the capacity for an influx of new people and new centres had to be established. This also formed part of urbanisation under the United Monarchy (Ahlström 1982:133-135). One theory about the creation of a central authority is that it was necessary for facing the Philistines (Lance 1967:37). Cities created a link between those in power and the people living outside the city walls. Cities also served as a place of refuge in the event of an attack. From Iron Age remains, like that of Megiddo, it seems apparent that this was the case based on the lack of housing in the archaeological record from this time. Israelite farmers did not live on their farms, but rather in towns in close proximity. These towns, and the cities that connected them, were mostly established on hills and with a spring close by (Wright 1955b:56). Securing access to these springs were very important and evidence of projects aimed at this goal is seen at Jerusalem, Gezer, Gibeon, and Megiddo (Wright 1955b:56). When the Assyrians gained control of Megiddo, the situation changed with more private dwellings being erected. The lack of houses in the Iron Age record is mirrored in the remains at Hazor (Ahlström 1982:136-137; cf. 4.2.1).

3.7.2.2 Iron Age II

The development of different water systems was dependent on the environmental conditions in the region chosen for settlement. For example, in the desert regions around the Dead Sea, securing water was the first consideration (Wood 1984:45). Some of the water systems in the southern parts of ancient Palestine from the 10th and 9th centuries BCE, show some similarities (Kaplan 2010:25). At sites such as Arad, Beth-Shemesh, Tel Sheva, and Kadesh-Barnea, reservoirs have been found underneath the settlements. They were filled by channels diverting rainwater towards the reservoirs (Kaplan 2010:25).

The Iron Age II period relating to settlement of the highlands in the Negev region can be useful to look at initial patterns and trends with the start of permanent occupation. Due to the environmental elements that govern the region, there are vast differences between the different

settlements in terms of their sizes and numbers (Haiman 1994:48). An important characteristic is that many of the sites in the area did not seem to take proximity to a naturally occurring water supply into account as the major factor for choosing a location to settle. This is seen by the number of sites that are situated more than 10 kilometres away from the closest water source. The occurrence paints a very different picture from that of the Early Bronze and Middle Bronze I Ages (Haiman 1994:47). The Iron Age II inhabitants made use of water storage systems in the form of pools and cisterns (example at Gibeon); as well as creating artificial access to water sources with the use of tunnels and channels (examples at Jerusalem and Hazor); or wells (examples at Arad and Lachish) (Barkay 1992:332-333; cf. Chapter Four).

The rural settlements of Iron Age II period were reliant on the inhabitants working together and to provide the possibility of equality (Faust 2000:17). It seems that the inhabitants of the highlands did make use of cisterns to store water, but permanent populations, and certainly those with greater numbers, would struggle to live on it alone (Haiman 1994:47 & 50). Some of the cisterns that have been found were open ones, dug into the ground (they ranged in diameter between 3 and 20 metres) (Haiman 1994:49). Use of open cisterns in such arid conditions do not make the most practical sense when taking evaporation rates into account. Haiman thus theorised that they might have been used as part of a traditional belief (1994:49).

Other cisterns found in the area were rock-cut cisterns with ceilings covering them or ones with small openings at the top (Haiman 1994:49; Benson 2006:85). Because of the difficulties presented in sustaining populations in the region, it is believed that settlement in the Negev Highlands might have been focused on gaining control of land space rather than using the natural resources (Haiman 1994:58). This theory might be supported by the abandonment of the area that followed with the division of the Kingdom of Israel. With shifting borders, it seems fortresses were created at Beersheba and Arad, but scattered settlements were no longer needed (Haiman 1994:61).

3.7.2.3 Iron Age III to Roman times

The area of ancient Palestine would also come under the influence of many foreign rulers, such as the Egyptians, Assyrians, Babylonians, Persians, Greeks, Romans, and more, which would, in turn, affect many aspects of societal organisation throughout its history (McNutt 1999:36; Van De Mieroop 2007:3). The Egyptian rule of ancient Palestine (known at the time as Canaan)

that existed through much of the Bronze Age ended in the 12th century CE when they withdrew from the area (Tubb 1998:96). These different influences will be looked at in more detail in specific cities in Chapter Four.

By the time of the Roman occupation of the Holy Land, there were many social and political changes that had occurred as a result of all the foreign rulers that had left their mark on the history of ancient Palestine. However, to some extent, the culture in Jerusalem, and probably other parts of ancient Palestine, remained Jewish, as is indicated by the number of ritual baths and the purity rituals that remained during the 1st century CE (Levine 2002:xii–xiv). Under Roman rule, the population of Jerusalem, for example, increased exponentially, and greater methods of securing water needed to be created as the older methods of using the Silwan Spring and Birket el-Hamra pools could no longer sustain them (Levine 2002:213; cf. 4.3.4.3). As such, vast building and conservation projects were undertaken with the building of even more reservoirs and aqueducts (Levine 2002:214-216).

3.8 THE IMPORTANCE OF WATER AS RESOURCE

Esse attributes settlement patterns based on environmental conditions as being an important and undeniable part of looking at the culture of any civilisation (1991:1). For example, the soil type in an area determines various other factors, such as what crops can be grown there as well as how permeable the soil is. The permeability of the soil, in turn, leads to water being stored in the sub-surface (Esse 1991:1). Vegetation could dictate the lengths that the people of ancient Palestine would need to go to in order to secure valuable resources that they might need for the vast building projects of which evidence still exists to this day. It is by looking at these conditions that one can gain insight into what challenges faced the people of ancient Palestine and, equally important, what opportunities it provided for their development (Esse 1991:1).

The quest for water has not ceased since the Neolithic period as it was, and still is, a major driver for social, political, and economic development. The security of a water supply also largely affected the rise and fall of ancient civilisations (Mithen 2012:279). Water could either have been a reason for dispute between different groups or have acted as a unifying factor between groups in order to work together to ensure optimal use and maintenance (Mithen 2012:7).

Before the beginning of the Iron Age and, as such, the United Monarchy, ancient Palestine was split into different areas related to the favourability of environmental conditions. The most favourable areas for settlement had been utilised almost without interruption and fell within the region of the Coastal Plain, the Shephelah, and valleys in the north (Finkelstein 1988:338). Other areas, less conducive to permanent settlement, were subsequently occupied with interludes throughout history because of challenges presented by topography, access to water and infertile soils (Finkelstein 1988:338-339). The human material culture and, thus, their entire lives were governed first and foremost by the environmental conditions and socio-economic aspects that surrounded them (Finkelstein 1988:338). Of these conditions, access to water was in all likelihood, the most important consideration.

3.9 CONCLUSION

As seen by looking at the geographical layout of ancient Palestine, it is clear that for an area so small in size, yet so largely different in terms of environmental conditions within its sub-divisions, there would have been different methods used to reach urbanisation. It is also quite evident that in the quest to determine changes in society, there is a need to include other disciplines for a holistic view, perhaps none of which adds more value than that of geography. Certainly, with the current research involving the natural resources available and the manipulation thereof, this is even more important. For this reason, we must now, more than ever, explore the relationship between man and the environment which has never been stagnant. With the use of both archaeology and geography, a more complete picture comes to light of different periods in time. In the chapters that follow, there will be reference made to the different boundaries, divisions and periods that have been laid out by historical geographical research. As such, Chapter Three serves as a means of orientation as well as providing insight into what geographical conditions affected ancient Palestine and its people.

CHAPTER FOUR
CASE STUDIES: WATER MANAGEMENT IN ANCIENT PALESTINE

4.1 INTRODUCTION

Case studies provide the opportunity for more focused research from which inferences can be made. Different technologies used, knowledge available and methods of labour can be better understood once separated. With the geographical layout of ancient Palestine discussed in the previous chapter, focus now shifts to the use of environmental resources at some sites. The case studies are divided into the north, the south, and the coastal regions. The selection of these sites was made on the basis of including examples from different regions with different drivers and constraints. These are not the only sites with valuable information, but they have been shown to have some published information available with regard to their water systems and uses.

By looking at various sites throughout ancient Palestine, and throughout history, we might learn how each reacted to water resource stress and whether similar patterns are found between them. The societal impacts of handling such pressures are discussed in the next chapter but start to become apparent below. Similarities also become clear when looking at practices such as ritual purification at *miqvaot*, social interaction at bathhouses and methods of protection employed with regards to water systems in time of war. Sites such as Hazor, Megiddo, Gezer, Jericho, and Jerusalem also seem to be the some of the most well-known and published about. The coastal cities, although not providing much information on the water systems used for daily life, were important in the development of sea trade and, thus, the spread of knowledge from across the Mediterranean.

4.2 NORTHERN SITES

4.2.1 Hazor

4.2.1.1 Background

Tel Hazor (Fig. 4.1) was a city of major importance in ancient Palestine's history. Hazor's importance is echoed in Joshua 10:11, where it is described as having been 'the head of all

those kingdoms.' It controlled an important route that ran through the Jezreel Valley, linking the north (modern-day Lebanon and Syria) and the southern parts of Israel (Zuckerman 2010:163). The Huleh basin, in which Hazor lies, provided enough water and favourable soil conditions to support agricultural production (Scheepers 2000a:57). At the height of its power, in the Bronze Age, the Canaanite city (including the acropolis and surroundings) covered an area of over 80 hectares (Ben-Tor 2013b:66). The Upper City served as the centre of Hazor's development (Scheepers 2000a:57). The Lower City developed as Hazor expanded in the Middle Bronze Age (Scheepers 2000a:57).

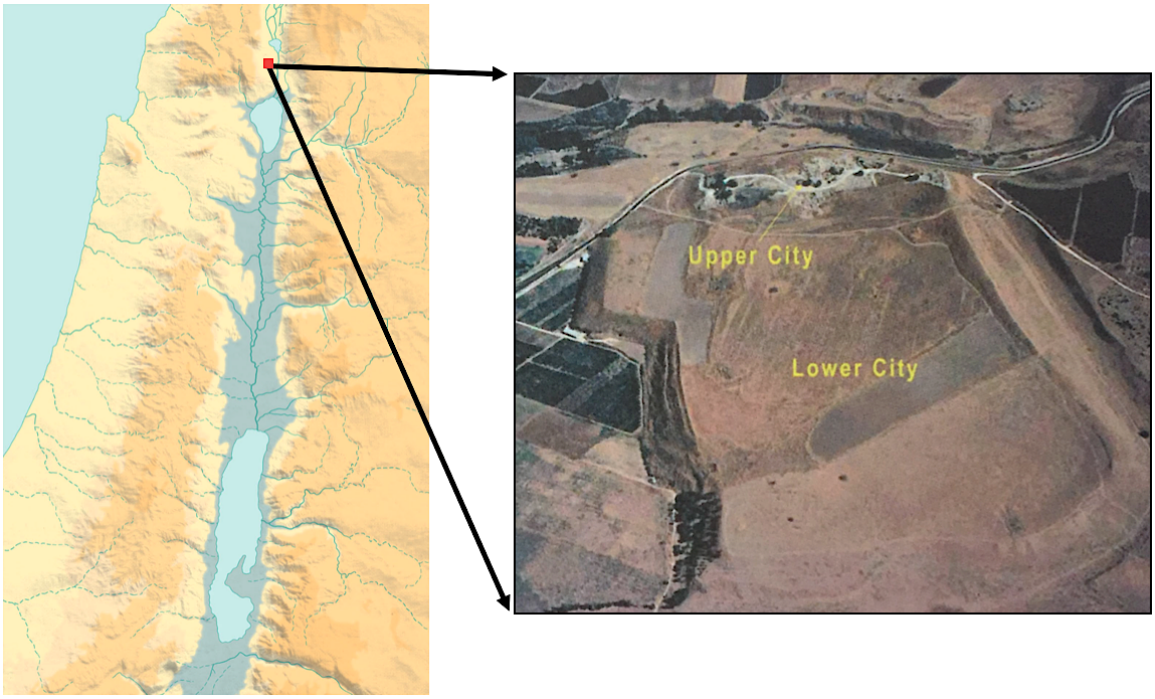

Fig. 4.1 Aerial view of Hazor (adapted from Ben-Tor 2016:10; Beitzel 2009:32; Curtis 2007)

There seems to be little doubt that the initial excavation of Hazor was due to its role in biblical accounts, such as those from the books of Joshua (11:10) and Judges (4:17) (Ben-Tor 2013b:66). Hazor was excavated by Garstang in 1928 (Cline 2009:43; Scheepers 2000a:59). During following excavations at Hazor, which were conducted by Yigael Yadin in the 1950s and 1960s, many impressive finds came to light from the Upper and Lower City. These finds include temples, fortifications, and statues. Importantly, it also included water systems. Throughout the initial excavations, there were disagreements as to which biblical book's history was represented at Hazor (Ben-Tor 2013b:67; Cline 2009:43-44). Further information of water use at Hazor was uncovered when the Hazor museum was being built (cf. 4.2.1.4). In 1990, excavations at Hazor were once again conducted, now with Amnon Ben-Tor as director (Scheepers 2000a:60-61).

4.2.1.2 Occupational levels

(a) Bronze Age Hazor

Hazor has an impressive occupation history that spanned about 2000 years with two brief interruptions: one occurred in the first half of the Middle Bronze Age, and the second followed when the Bronze Age at Hazor transitioned into the Iron Age (Ben-Tor 2013b:66). Hazor guarded the trade and military routes involving the Nile Valley and the Tigris and Euphrates valleys. Hazor's prominence was mentioned in various finds from surrounding areas, showing its importance in the greater layout of the ancient Near East. Hazor appeared in the *Execration Texts* from the 19th century BCE, the *Mari Texts* of the 18th century BCE, as well as archives from *Amarna* in the 14th century BCE, indicating its prominence in the ancient world (Rabinovich & Silberman 1998:51; Malamat 1960:12-13; Yadin 1957:84). The importance of the site is also hinted at by the remains from the Middle and Late Bronze periods, which include fortifications as well as public and religious buildings (Zuckerman 2010:163). After Hazor's conflagration between 1700 and 1600 BCE, Hazor was rebuilt. The 15th and 14th centuries BCE saw Hazor as a powerful city with around 40 000 residents (Scheepers 2000a:80).

(b) Iron Age Hazor

After the 12th century BCE, the Lower City was abandoned with the Upper City being used only for two short-lived settlements over the next 200 years (Fritz 1995:51). The 10th century BCE saw building projects being undertaken that included the fortification of the city. The nature of the projects seems to imply that a 'central authority' was responsible for it (Rabinovich & Silberman 1998:51-55; Fritz 1995:81). The city's defences included the gate and walls, a fortress and the water system, all adding the safety of its population (Sandhaus 2013:117).

During the 9th century BCE, Hazor was extended across the acropolis to the east (Ben-Tor 2013a:105). Yadin's date was based on the threat facing the city from the approaching Arameans and Assyrians (Kaplan 2010:24). The city eventually saw a destructive end with the arrival of the Assyrians under their king, Tiglath-pileser III around 733/2 BCE (Wright

1955a:108; Ben-Tor 2013b:66; 2 Kings 15:29). The final phases of Hazor's habitation was in the Hellenistic phase after which complete abandonment might explain Hazor's absence in New Testament narratives (Scheepers 2000a:91).

4.2.1.3 Water systems and use at Hazor

(a) Water storage

Hazor is made up of the tell and the plateau (Yadin 1957:83). The Upper City was created in the 3rd millennium BCE, with the Lower City following in the Middle Bronze II period (Malamat 1960:18). It has been theorised that the Upper and Lower City was separated by a type of moat (Bonfil & Zarzecki-Peleg 2007:25). Middle Bronze Age remnants of Hazor have indicated that many underground, waterproofed (by using plaster) cisterns were used for water supply in daily life. These cisterns were fed with runoff water from roofs. They are believed to have been able to hold about 23 cubic metres of water (Miller 1980:337; Ben-Tor 1992b:289). The use of these Middle Bronze Age cisterns lasted until a single, large reservoir was constructed. It reached a depth of about 30 metres, which was, in all probability, the depth of the water level (Miller 1980:338).

Miller maintains that once the cisterns were made redundant by the new reservoir, they were repurposed as graves. Tunnels were then used for drainage of these graves, as well as storm sewers, away from the city's centre (1980:338). This system seems to be a detrimental one to general public health, but, as Miller states, with the success Hazor would reach as a power city, our own interpretation might be biased by modern standards (1980:338). The 2nd millennium Hazor water systems shows advancement as changes were required. More than this, it attests to the ability and knowledge that existed in ancient Palestine at the time with another cistern from between the 16th and 15th century BCE which had a storage capability of 150 cubic metres. It was created by cutting into the limestone at Hazor, with steps leading to the water (Miller 1980:338).

(b) Hygiene

While there was a time of unrest within ancient Palestine in the Late Bronze Age, Hazor withstood the decline that befell its neighbours (Gonen 1984:68). Perhaps this was the case

as they could take control of the natural resources that were previously in the hands of their neighbours. This is just one possibility given to explain Hazor's resilience (Gonen 1984:68). Archaeological finds from Hazor's Middle and Late Bronze Age layers (2000-1200 BCE) indicates the Canaanite's success with temples, palaces and fortification dating to this time (Rabinovich & Silberman 1998:51). One of these large-scale building projects is that of the palace complex in Area A. Two roads lead from the Lower City to this complex, one from the north and another from the east (Bonfil & Zarzecki-Peleg 2007:28).

The Ceremonial Palace in Area A (also known as the 'Black Building') shows the inclusion of water features in the planning stage, with the bathroom situate behind the throne room (Fig. 4.2). The bathtub was in the southern part of the room. A theory also exists that the drainage channels found in the southwestern corner might have diverted water from the tub (Bonfil & Zarzecki-Peleg 2007:30-31).

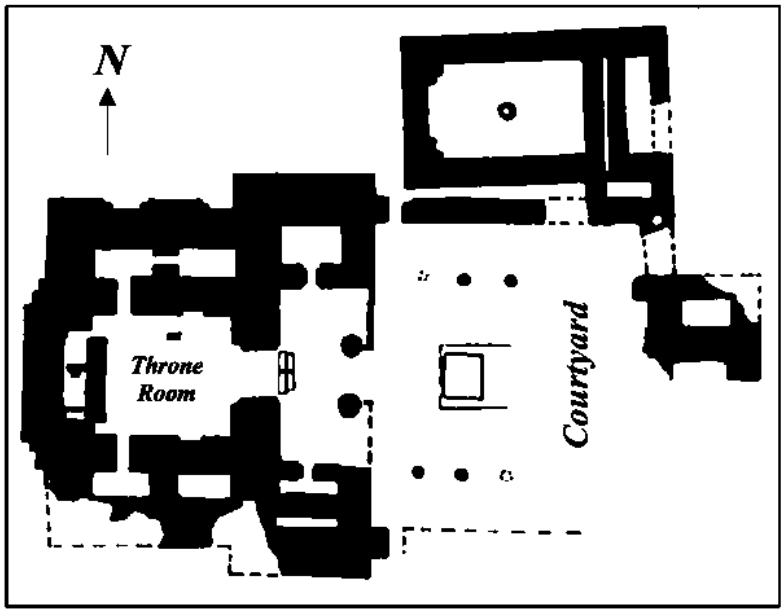

Fig. 4.2 'Black building' at Hazor (adapted from Bonfil & Zarzecki-Peleg 2007:28)

The bathroom has contributed in the debates on whether the building should be classified as a palace or a temple. Based on other Canaanite and Syrian temples, the area behind the throne would be the 'Holy of Holies' (Bonfil & Zarzecki-Peleg 2007:40). With the general cross-pollination of ideas, similar layouts are found at different sites (Bonfil & Zarzecki-Peleg 2007:43). Bearing this in mind, an element such as a bathroom can be indicative of building characteristics that could alter the view of a site.

(c) Drainage and irrigation

At the area where the Hazor museum building project was undertaken, a channel was found, build from large stones. Its discovery led to questions on what the structure's purpose was, as it could be for irrigation, drainage, or water supply (Yadin 1969a:8). The directionality of the channel's slope seemed to be oriented towards Hazor's fields (Yadin 1969a:8). This probably indicates the channel's use for irrigating agricultural fields. Yadin postulated that this channel joined with part of Hazor's complex of tunnels and channels and so concludes that it was probably used for drainage purposes as well (1969a:8). An entrance from Area M's buildings had a drainage channel to divert water from the road. This channel is one of many found as part of Area M's complex system of drainage channels that were discovered underneath the courtyard of the western entrance lined with orthostats (Zuckerman 2010:167).

(d) Tunnel system

Hazor's water system, dated to around the 9th century BCE by Yigael Yadin, and thus the time of Ahab, (Fig. 4.3), was made up of four parts (1969a:17; Cole 1980:16-18; Fritz 1995:154). The four parts are: a sloped entrance that lead to a 30 metres shaft cut through rock, a chiselled tunnel with steps that led to the level of the water (about 25 metres long) and finally, a water chamber (Kaplan 2010:24; Weinberger, Sneh & Shalev 2008:3038; cf. Yadin 1969a & 1969b). The water system that preceded this one (dating to the Bronze Age) will certainly show impressive engineering and coordination, since the city would have had ten times the number of inhabitants than that of the Iron Age (Ben-Tor 2016:201).

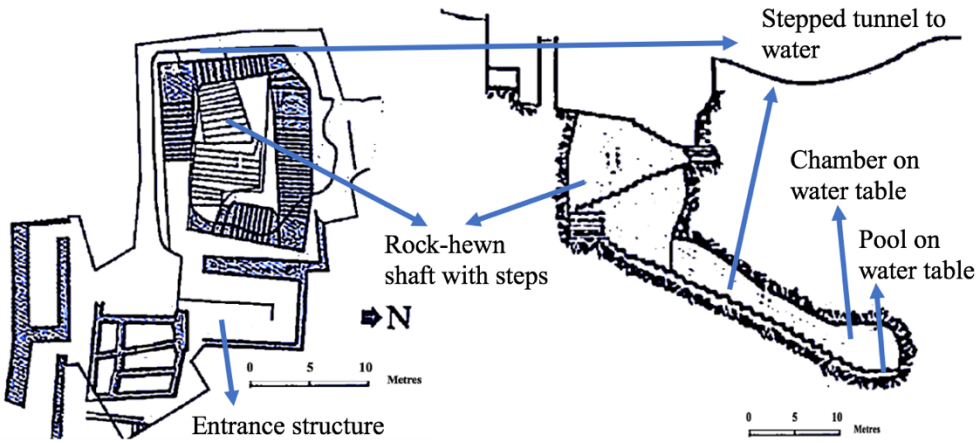

Fig. 4.3 Plan and section of Hazor's 9th century BCE water system (adapted from Cole 1980)

Fig. 4.4 Hazor's rock-cut steps to the 9th century BCE water tunnel (Yadin 1969b:50).

The shaft had a rock-cut staircase around its side with enough space (three metres wide) for multiple people or animals to carry water from the bottom of the sloped tunnel (Fig. 4.4) (Weinberger et al. 2008:3038; Yadin 1969a:14). The westward direction chosen for the tunnel serves as an example of the geological knowledge that existed at the time. This theory is based on evidence that the engineer at Hazor did not aim towards the direction of the known springs, but rather to the water table which would have required more labour (Yadin 1969a:15; Ben-Tor 2016:192). Due to the lack of any hesitation by the engineers and physical labourers, the argument has been made that Hazor's engineers gained the knowledge from somewhere else (Cole 1980:16-18). One of the theories presented is that the technology spread from Mycenae. Due to trade between Canaan and its neighbours, which included Greece, this is a viable theory (Cole 1980:21).

By using this design, they reached water in a much more efficient manner from within the walls of the city that also served the required function of providing access to water in times of war (Yadin 1969a:15). Near the entrance to water system, excavations revealed a structure that was classified as a possible dwelling, used by the water system's caretaker (Yadin 1969a:16).

The abandonment of the major water system's shaft, after its destruction by the Assyrians, led to its reuse as a pool. The pool functioned by collecting rainwater in the Hellenistic

occupation at Hazor, and possibly during the Persian period (Yadin 1969a:13; Scheepers 2000a:74). A similar occurrence of reuse is seen at Megiddo and Jerusalem (Yadin 1969a:13; cf. 4.2.4.2; 4.3.4.2). The last occupation is believed to have ended with the Persian period around 350 BCE (Rabinovich & Silberman 1998:51).

4.2.2 Gezer

4.2.2.1 Background

The site of Gezer (Fig. 4.5) is located at the edge of the Shephelah. It acted as a guardian of two important roads, one leading to Jaffa and the other to Jerusalem. Gezer's role as a meeting place for travellers was supported by the natural springs in the area that provided a source of water (Masterman 1903:407-409). Gezer was excavated by Macalister between 1902 and 1909 as well as Wright, Dever and Seger between 1964 and 1973 (Ben-Tor 1992a:5; Cline 2009:45-46; Ortiz & Wolff 2012:6).

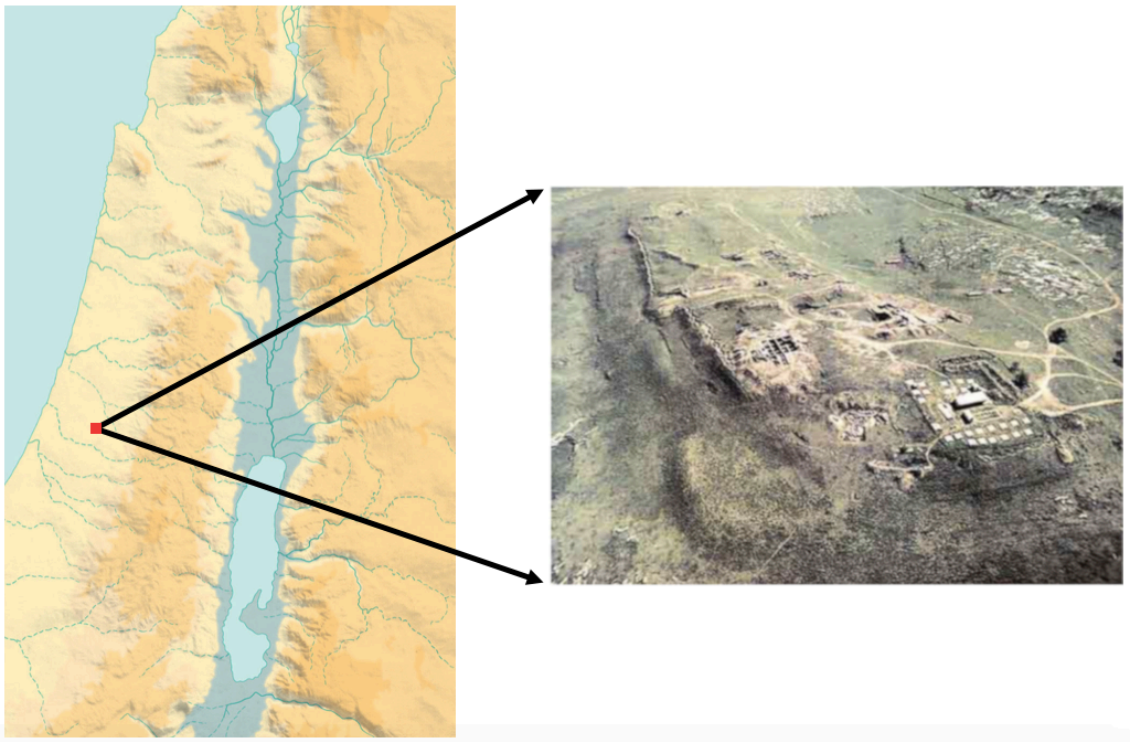

Fig. 4.5 Aerial view of Gezer (adapted from Shanks 1985; Curtis 2007; Ridling [nd])

The western, northern and north-eastern parts of Gezer's usable land was favourable for agriculture, while the southern and south-eastern regions were more hilly and provided an opportunity for goat and sheep herding. These characteristics, along with sufficient water availability, meant that large population numbers could be sustained there (Lance 1967:36).

4.2.2.2 Occupational levels

(a) Bronze Age Gezer

Gezer was inhabited as early as the mid-4th millennium BCE. By the end of the Middle Bronze Age, Gezer had become a major city that was fully fortified with walls and guard towers (Ortiz & Wolff 2012:5). Around 1500 BCE, however, this city was destroyed. As Egyptian power reigned during the Late Bronze Age, Gezer was rebuilt (Ortiz & Wolff 2012:5).

(b) Iron Age Gezer

Gezer is mentioned in the biblical narrative of Joshua's conquests in ancient Palestine. Joshua 10:33 describes the death of Gezer's king at Lachish. The city was destroyed, presumably by Pharaoh Shishak, in the 10th century BCE (Dever 1984:216). Gezer remained a Canaanite city until being gifted to Solomon by Egypt as offering with the marriage between Solomon and the Pharaoh's daughter (Ortiz & Wolff 2012:5). Iron Age II Gezer was completely fortified, theorised to have been part of Solomon's building projects (Ortiz & Wolff 2012:16). The city saw a period of decline in the 9th century BCE (Dever 1984:216). Gezer fell into the region of the Kingdom of Israel, after the split of the United Monarchy, until being dominated by the Assyrians (Lance 1967:39-46). A relief, attributed to Tiglath-pileser III, depicts such an attack of Gezer with battering rams (Dever 1984:213). With the fall of the Assyrian Empire in the 7th century BCE, control of the city went to the Judean king, Josiah (Lance 1967:39-46).

4.2.2.3 Water systems and use at Gezer

Initial excavations at Gezer revealed an example of the reuse of cisterns with the finding of 15 bodies within the cisterns (cf. 4.2.1.4). Whether this was the result of a religious or cultic practice or as a consequence of crimes committed, was not clear at that time (Masterman 1903:420-422).

Springs in the southern valley provided water in the winter, while a perennial spring to the east supplied the rest. To ensure that access to the springs were not jeopardised in the event of an invasion, a massive project was undertaken to connect the inhabitants to the water from inside the safety of their walls (Lance 1967:36). As is the case with Hazor, Gezer's importance is clear, in that it is mentioned in the *Egyptian reliefs* at Karnak as well as the *Merneptah Stele* (Lance 1967:36-37).

Gezer boasts with an impressive underground water system (Fig. 4.6) that was probably built in the Bronze Age before the site's 13th century abandonment. This system is thus believed to date to the end of the Late Bronze Age, due to the relative position of the water system and other architectural features (Dever 1969:74 & 77; Cole 1980:19). It must be noted that dating estimates for the construction of the system differ between scholars and range from Middle Bronze Age II to Iron Age II dates (Kaplan 2010:24-25). For example, Yadin argued for a 9th century BCE creation date (Cole 1980:18-19). Because of the destructive nature of initial excavations, to provide an accurate date without contention, is unlikely (Cole 1980:19).

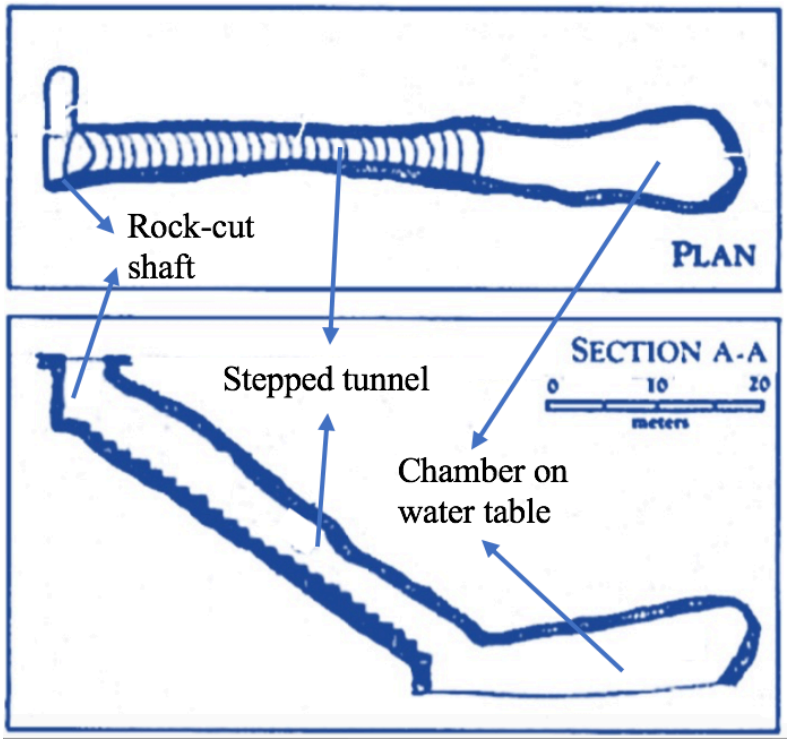

Fig. 4.6 Plan and section of Gezer's underground water system (adapted from Cole 1980)

An eight metre deep shaft was dug to where a tunnel began. The tunnel was cut through rock and descended at a gradient of about 38 degrees (Miller 1980:338). The tunnel, which was

stepped, was about 41 metres in length until reaching a chamber at water level (Kaplan 2010:24; Dever 1969:74 & 77; Fritz 1995:151). Similar systems to this one has been found at both Megiddo (cf. 4.2.4) and Hazor (cf. 4.2.1), however, there exists a margin of uncertainty regarding absolute dates, with their construction being attributed to the 9th century BCE. One possibility is that the systems at Hazor and Megiddo were merely reused and upgraded in the 9th century, which could have covered evidence of the initial systems (Miller 1980:338). Another possibility is that water systems, such as those at Gezer and Gibeon provided the knowledge that the Israelites would have needed to create similar systems centuries later (Kaplan 2010:24).

4.2.3 Gibeon

4.2.3.1 Background

Gibeon (Modern el-Jib) (Fig. 4.7) is mentioned as part of various biblical narratives which adds to its fame. Such narratives include accounts of Joshua, Joab, and Solomon (e.g. Joshua 9-10; 2 Samuel 2-3; 1 Kings 3:4-5) (Pritchard 1961a:2; Cole 1980:21). The city seems only to have been settled for a short time in relation to some of ancient Palestine's other sites. Its occupation spanned from the time when Joshua is said to have conquered much of the land to the arrival of the Babylonians (Pritchard 1961a:2).

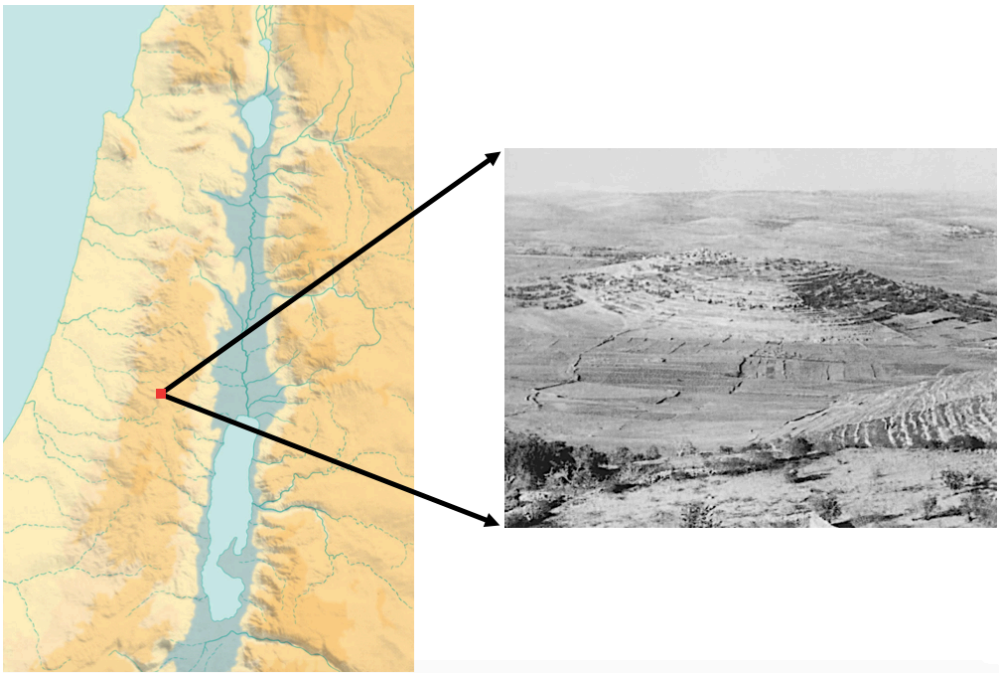

Fig. 4.7 Aerial view of Gibeon (adapted from Pritchard 1961a:4; Curtis 2007; Ridling [nd]:Plate 18a)

Gibeon's settlement might have existed since the site was a manufacturer and exporter of wine (Pritchard 1960:26). Pre-exilic Gibeon was thus linked to its surrounding cities through trade (Pritchard 1960:29). Gibeon was excavated by Prichard from 1956 until 1962 with Eshel leading surveys between 1983 and 1984 of caves used for burial (Pritchard 1993:512).

4.2.3.2 Occupational levels

Initial occupation at Gibeon was limited and dated to the Middle Bronze Age (Pritchard 1993:513). Evidence for a Late Bronze Age occupation was found through the discovery of tombs from this period by local inhabitants (Pritchard 1961b:22-23). Gibeon, it is said, was once attacked by the Amorites in response to their treaty with the proto-Israelites. As a result, the city served as the scene for a great battle between the Amorites and Joshua's forces (Joshua 10:6; Pritchard 1961a:5). In the 10th century BCE, Pharaoh Shishak gained control of Gibeon, as was displayed at Karnak (Pritchard 1961a:9). The city's occupation seems to have ended after the 6th century BCE until the 1st century BCE (Pritchard 1993:513). Important finds from Pritchard's excavations in 1956 included the uncovering of two of the city's water systems (Scheepers 1984:146; Cole 1980:21-23).

4.2.3.3 Water systems and use at Gibeon

Gibeonites are mentioned in Joshua 9 where their acts of deceptions meant that they received the punishment of becoming water drawers (Pritchard 1993:511). The 10th century BCE water system found at Gibeon (Fig. 4.8 & Fig. 4.9) has a similar layout than others found at Hazor, Gezer, and Megiddo. It is made up of two different parts, namely a tunnel system (Fig. 4.10) and a pool. The Roman period finds included stepped baths and water channels (Pritchard 1993:513).

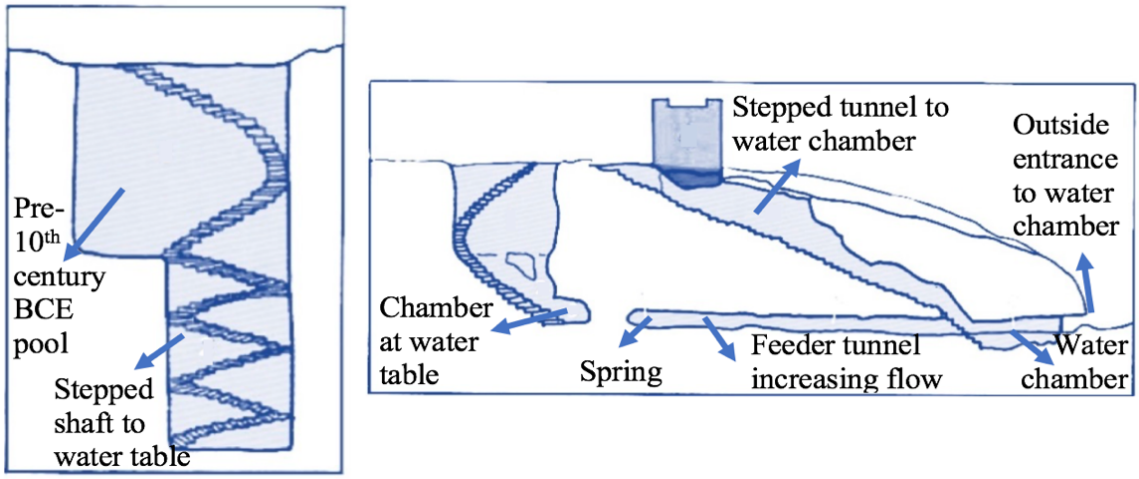

Fig. 4.8 Section of pool and tunnel water system at Gibeon (adapted from Cole 1980)

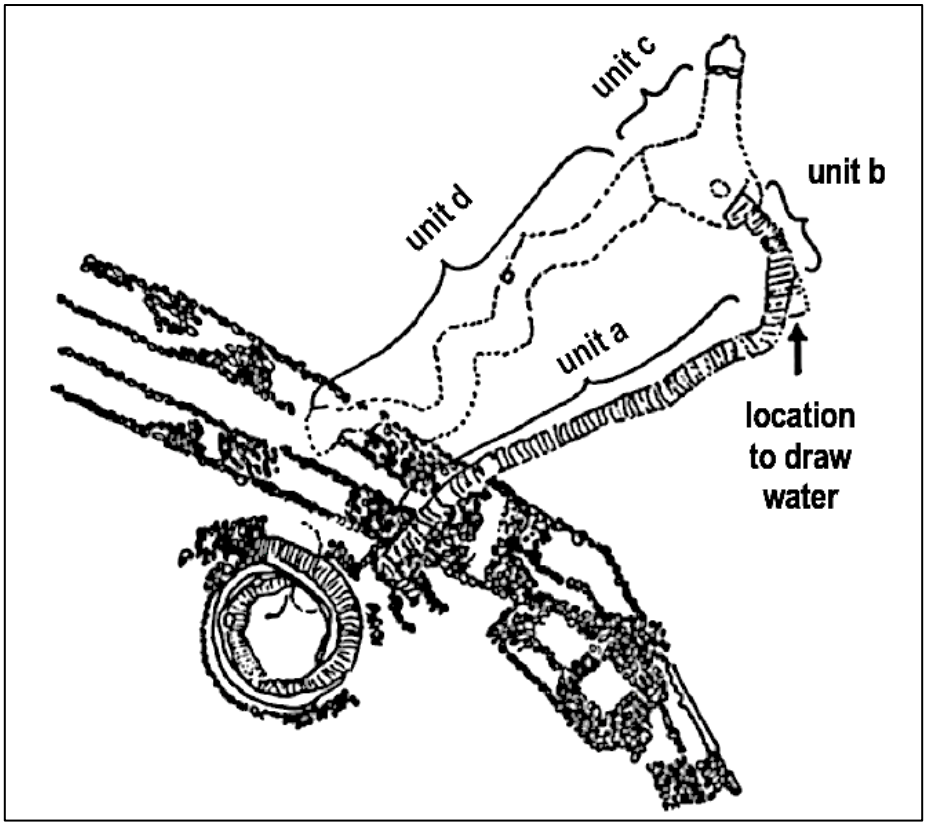

Fig. 4.9 Gibeon's gallery and cistern water system (Issar 1976:133-135)

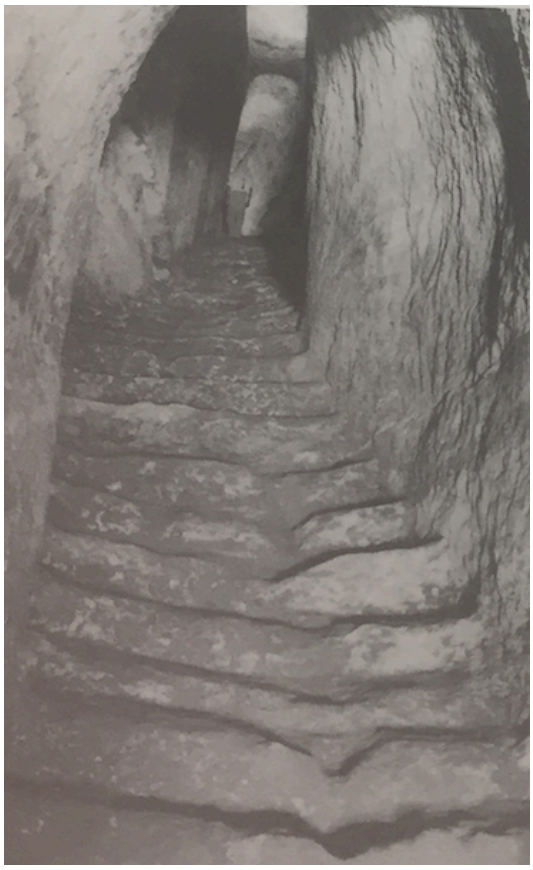

Fig. 4.10 Gibeon's stepped tunnel leading to the spring (Pritchard 1993:512)

(a) Tunnel system

The first consists of a shaft being built in the Iron Age I period. At the bottom of the shaft, a stairway was created to reach a space at the same depth as the water table (unit a) (Kaplan 2010:24; Cole 1980:25-27). A cave was cut out and a reservoir created to collect water (unit b). The second part begins next to the first but leads outside the town by means of a tunnel (unit d), ending with a chamber (unit c) (Fig. 4.9) (Kaplan 2010:24; Issar 1976:134-135; Cole 1980:25).

The tunnel system was built to reach the spring outside the city's walls. Initially, a gate in the wall would have been sufficient for use by water carriers. However, the upgraded version would have been necessary in times of unrest. This system allowed the city's population to seal off access to the spring from the outside with a stone door (Pritchard 1956:71; Kaplan 2010:24). This system might date to the time of the United Monarchy, which would make it older than the rock-cut pool (Fritz 1995:154). The possibility exists that Gibeon's system acted as the example followed by the engineers at Hazor and Gezer (Cole 1980:28).

(b) Rock-cut pool

Gibeon's water supply system also included a round pool cut into the natural rock with a diameter of over 10 metres. Looking at the archaeological remains that were found in the pool, it seems that the pool was not used any later than the 6th century BCE (Fritz 1995:152; Pritchard 1956:68-69; Pritchard 1961a:8). Pritchard estimated that the pool's construction dated to the beginning of the Iron Age (1960:24). The pool might have gone out of use as a result of the spring that fed it drying up. This could have been the result of the anthropogenic change to the natural drainage pattern that fed the spring throughout the development of the area (Issar 1976:134). Cole has stated that the pool's construction might have begun as an attempt of creating a cistern that was later expanded (1980:28). This reservoir fell within the walls of the city to maintain the cities' security. Steps were created around its side, leading to the bottom (Fig. 4.11) (Fritz 1995:152; Pritchard 1961a:8; Issar 1976:134).

Fig. 4.11 Gibeon's rock-cut pool (Pritchard 1961a:8)

The reservoir was not plastered, although the properties of the stone it was cut into suggests that it would be able to hold water without being sealed. The weathering of the steps in the reservoir indicate that it was generally filled to within two metres of its top (Pritchard

1956:70; Issar 1976:134). One question this brings is with regards to how it was filled. With a lack of an apparent feeder channel, water might have been carried to the reservoir from the spring lying beneath the city, or it might have been dug into an existing spring (Pritchard 1956:70; Issar 1976:134).

(c) Other

Another reservoir, square in shape, was discovered by Edward Robinson at the beginning of the 19th century CE (Cole 1980:23). This reservoir served to collect and store excess water from the nearby spring. It was also the first suggested feature named as the biblical 'Pool of Gibeon'. However, the theory was nullified by Pritchard's dating of the reservoir to the Roman period at the earliest (Cole 1980:23). Plastered stone-cut vats were reused as water cisterns once their purpose as part of the wine industry ended. Some have even been plastered and used in the 20th century CE (Pritchard 1960:26-27).

4.2.4 Megiddo

4.2.4.1 Background

Megiddo (Fig. 4.12) was strategically located on the road linking Egypt with Mesopotamia and so it is unsurprising that parts of its many years of occupation is noted in archives from Egypt and Assyria (Silberman et al. 1999:32). The site is on the border of the Jezreel plain and the Carmel Ridge, thus acted as an important city along the *Via Maris* (Davies 1986:7; Scheffler 2000a:94). The valley in which Megiddo lies is favourable for crop cultivation and animal husbandry (Scheffler 2000a:93). Due to a lack of rivers within the close proximity of the tel, the city of Megiddo would have made use of the spring ('Ain el-Kubbi), which lies to its western side (Scheffler 2000a:94).

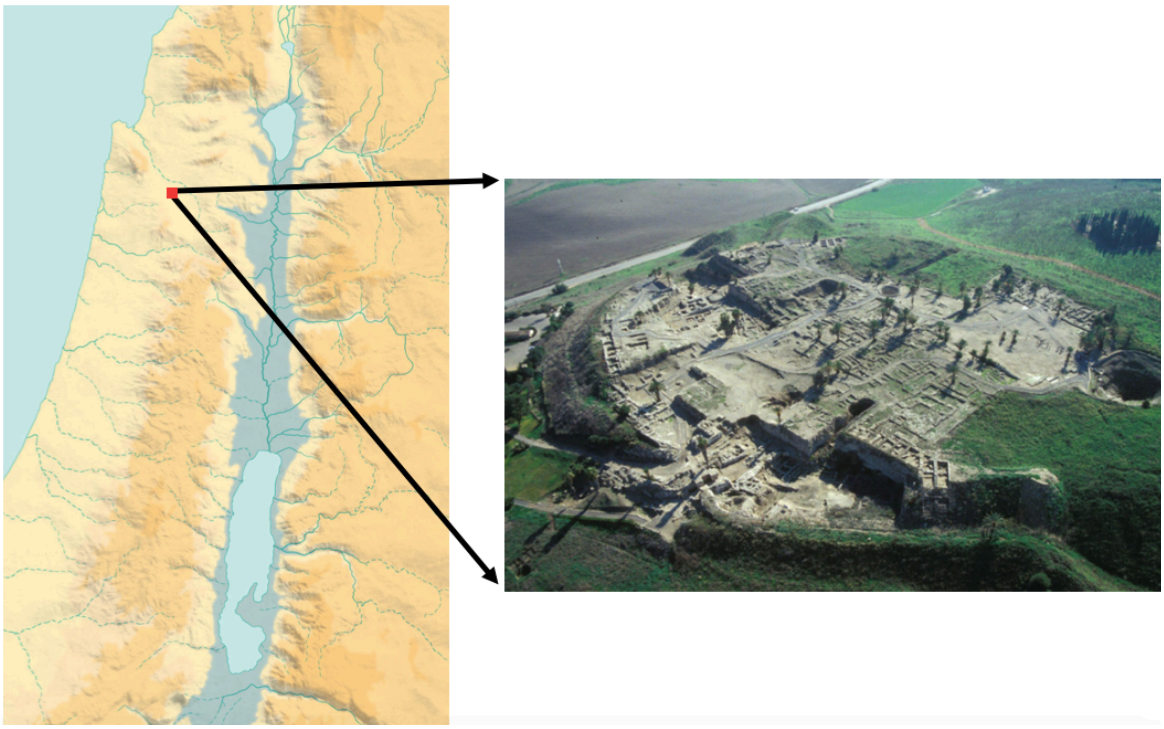

Fig. 4.12 Aerial view of Megiddo with water shaft at far right (adapted from Curtis 2007:1 & 96)

Because of Megiddo's geographic location, it became the focus of various nations who fought for its control. Perhaps these battles have attributed to it being assigned as the site of Armageddon in Revelations (Scheffler 2000a:94). Megiddo was excavated by Gottlieb Schumacher as early as 1903, with many archaeologists following him, who include Clarence Fischer, form 1925; Yigael Yadin for interrupted seasons between 1960 to 1971; and Israel Finkelstein and David Ussishkin in 1994 (Davies 1986:12; Cline 2009:44; Scheffler 2000a:95-97).

4.2.4.2 Occupational levels

(a) Bronze Age Megiddo

The history of the site is one of power and decline. Beginning with the Early Bronze Age, Megiddo increased in size. Around 3000 BCE, Megiddo was already a fortified city (Scheffler 2000a:104). It seems that the site was later in slight decline as trade in the region suffered around 2200 BCE (Silberman et al. 1999:34). The city had water available as well as opportunities for agricultural endeavours. Megiddo was also in contact with many of its neighbours, like the Egyptians and Phoenicians. These elements would all have aided the

city in its rise to power in the Middle and Late Bronze Ages and to withstand external stressors threating their survival (Silberman et al. 1999:34; Gonen 1984:69).

With the rise of some Canaanites protesting against their Egyptian influencers, the princes of Megiddo joined the other rulers in the attempt at gaining sovereignty. The Egyptians were able to block this attempt and Megiddo remained under their rule until the Bronze Age came to an end (Silberman et al. 1999:34-35). The defeat of Megiddo by Pharaoh Thutmose III is described in the annals at Karnak (Fritz 1995:40-41; Scheffler 2000a:131). Megiddo was able to withstand the assault for seven months with its stored supply of food and access to water, but eventually had to surrender to the Egyptians in the 15th century BCE (Davies 1986:52-55). The source of their water is not entirely certain, since the main water system that was built as part of the city's fortifications date to centuries after this siege BCE (Davies 1986:55 & 92-93). Other water-related structures found at Megiddo from the Middle and Late Bronze Ages include possible bathing areas and drainage systems (Davies 1986:57-58).

(b) Iron Age Megiddo

The shift between the Bronze and Iron Ages might not have an exact date as some Canaanite elements are found at Megiddo from a time when the Israelites had already settled there (Silberman et al. 1999:35). In the book of Judges (1:27-28), Megiddo is mentioned as one of the last cities that formerly belonged to the Canaanites to become ruled by the Israelites (Davies 1986:37). The so-called Solomonic city of Megiddo had large palaces and homes, although the defences were more limited (Ussishkin 1990:73; Fritz 1995:87). Megiddo is further referenced as being part of Solomon's district governors (1 Kings 4:12). In the following centuries, the fortifications were enhanced, and a stable compound was established (Ussishkin 1990:73; Fritz 1995:87).

It is believed that with the United Monarchy being divided around 930 BCE, Megiddo became focused on defence rather than being a residential centre (Ussishkin 1990:73). By 922 BCE, the Egyptians had taken control of Megiddo, and later the Assyrians followed (Silberman et al. 1999:39; Fritz 1995:90). By the 8th century BCE, Megiddo was focused on public functions and had a water system in place that linked the inhabitants to the water supply without leaving the protected area (Fig. 4.3). Under Assyrian rule, Megiddo was

made into the capital of its province (Fritz 1995:95; Scheffler 2000a:136). However, as the Assyrian empire later fell into decline, so too did Megiddo (Silberman et al. 1999:39). The city was destroyed in Pharaoh Necho's campaign around 609 BCE (Fritz 1995:96). This battle against, and the death of, Josiah, is reflected in 2 Kings 13:29. During the Babylonian period, Megiddo appears to have been uninhabited, with only a small settlement following in the Hellenistic and Roman periods (Scheffler 2000a:136).

4.2.4.3 Water systems and use at Megiddo

Before Megiddo's Iron Age tunnel water system (Fig. 4.13) was implemented, water was carried to within the city walls from at least two springs in the proximity (Scheffler 2000a:120). Either at the end of the Bronze Age, or beginning of the Iron Age, steps were cut that led to a spring. The spring was widened by creating a rock chamber around it (Cole 1980:13). A second system from the 10th century BCE worked as follows: a tunnel was used to reach the outside of the city. Stairs led from above the spring and chamber to the water at the bottom (Cole 1980:13). The main water system created in the Iron Age replaced the earlier methods to ensure security in periods of unrest (Scheepers 1984:140).

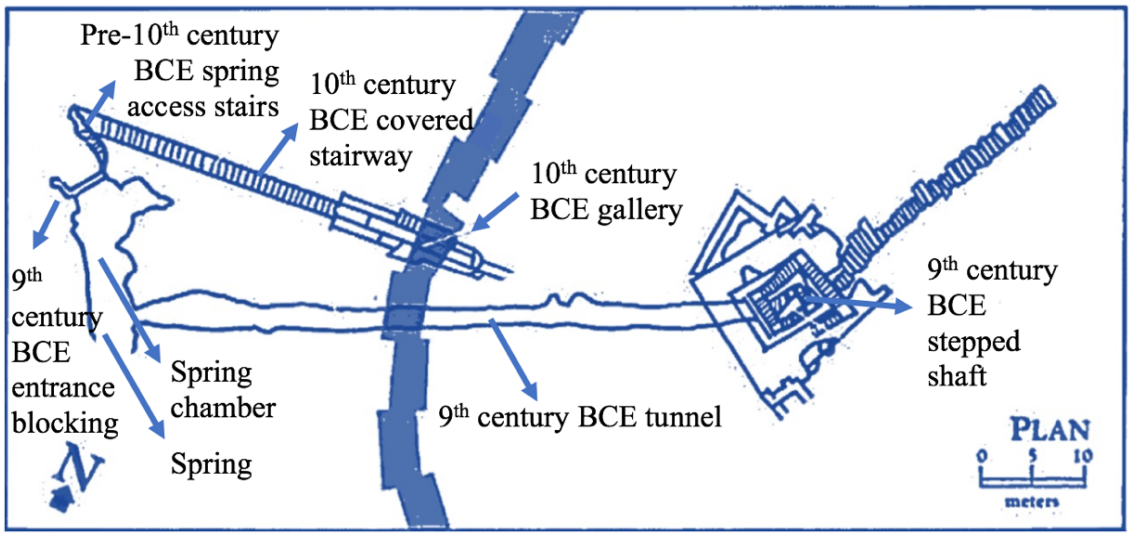

Fig. 4.13 Plan of Megiddo's water systems (adapted from Cole 1980)

Megiddo's water system is slightly different from some others, such as that of Hazor (4.2.1.4), in that water was diverted from an underground spring to the surface. The construction of this system began with a staircase being created to reach the spring and then with a tunnel being cut into solid rock so that the staircase could be reached from within the city (Kaplan 2010:25; Davies 1986:92-93; Cole 1980:10). A 36 metre long shaft connected

to the tunnel. The system had initially been dated to the end of the 12th or 11th century BCE and then re-dated to the 9th century BCE instead by Yadin (Kaplan 2010:25; Fritz 1995:154; Cole 1980:12). This water system was located on the southwestern side of the city and was initially discovered by the American expedition at Megiddo (Davies 1986:92; Fritz 1995:154). It remained in use even after the control of the city went to the Assyrians (Fritz 1995:96; Scheffler 2000a:122). Another spring was apparently discovered around the 9th century BCE that provided an extra source of water accessible to water carriers (Davies 1986:97). Megiddo also shows the reuse of a water tunnel's shaft as a reservoir once the rest of the original water system lost its functionality (Yadin 1969a:13).

4.3 SOUTHERN SITES

4.3.1 Arad

4.3.1.1 Background

Settlement around Arad began as early as the Chalcolithic period. Canaanite settlement continued through the Early Bronze I and II periods when it became a centre that connected its surrounding villages (Finkelstein 1990:35-38; Ilan 2001:317; Scheffler 2000b:273). Arad covered an area of over ten hectares and could support up to 3 000 inhabitants (Aharoni et al. 1993:76). The importance of settlement at Arad has been linked to its close proximity of the road that connected Beersheba and Edom (Scheffler 2000b:275). Agriculture and trade contributed to Arad's economy (Aharoni et al. 1993:79).

The area in which Arad (Fig. 4.14) falls, in the Negev, is classified as semi-arid with unreliable rainfall patterns (Finkelstein 1990:35-38; Ilan 2001:317; Aharoni et al. 1993:75). Due to the lack of rivers and springs, the inhabitants of Arad were forced to use cisterns to capture and store whatever rainwater they received (Callaway 1993:75; Scheffler 2000b:273). The underlying geology, consisting of Eocenic rock, of Arad was naturally favourable for water storage due to its impermeability (Aharoni et al. 1993:75). The topography of Arad with a natural bowl shape, sloping towards the centre, allowed for optimal drainage (Aharoni et al. 1993:75).

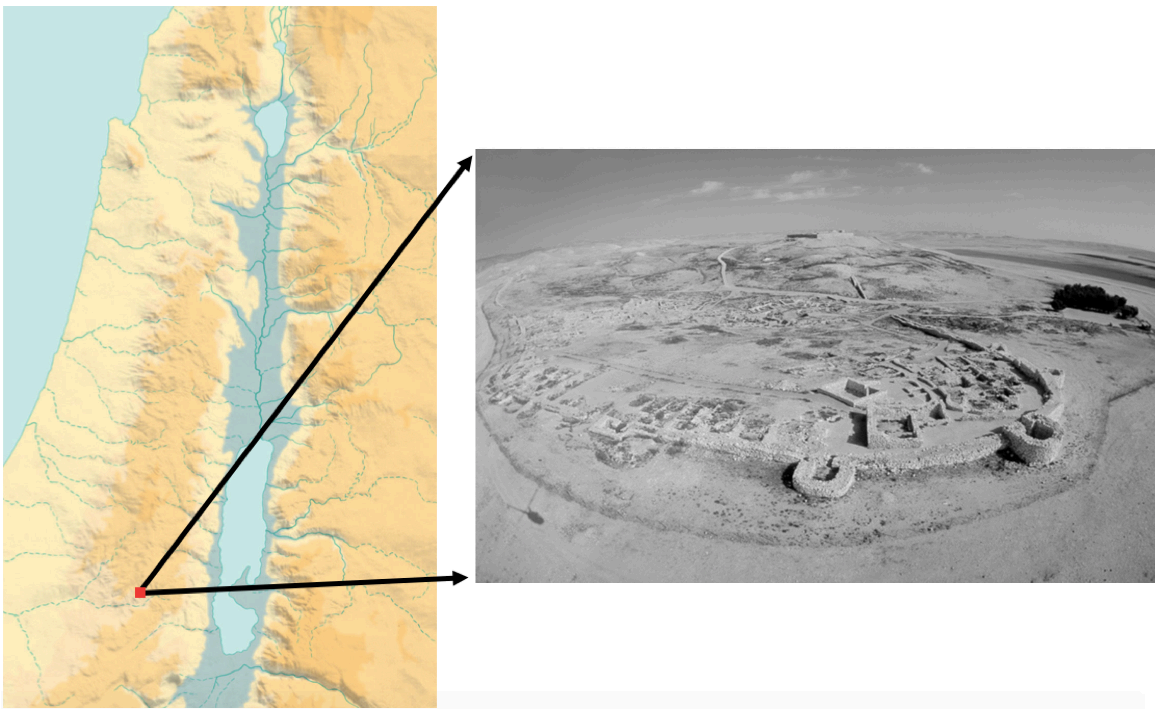

Fig. 4.14 Aerial view of Arad (adapted from Issar & Zohar 2007:108; Curtis 2007)

Due to limited water supply, livestock that could survive the environmental conditions of Arad, was kept. Agricultural products would presumably have been imported (Scheffler 2000b:275). During the Early Bronze Age and Iron Age respectively (4000 to 2650 BCE and 1100 to 600 BCE), Arad served a cultural and commercial role (Scheffler 2000b:275). Aharoni and Amiran excavated at Arad in the timeframe between 1962 and 1967 (Ben-Tor 1992a:5).

4.3.1.2 Occupational levels

(a) Bronze Age Arad

Arad, as well as Ai, existed as villages in the Early Bronze I, followed by their fortification without a break in occupation (Richard 1987:25). By Early Bronze II, it had become an important Canaanite centre with around 2 500 inhabitants (Finkelstein 1990:35-38; Amiran 1991:153). The distribution of different home sizes separated into neighbourhoods in the Early Bronze Age advocates for a class division (Ilan 2001:322). The natural landscape was used to create a fortification with a water system since no naturally occurring water source was sufficient (Finkelstein 1990:35-38). The Bible describes Arad as an important town in both the Bronze and Iron Ages with its role in disputes between the Canaanites and the early Israelites (e.g. Numbers 21:1 & 33:40). Other than this, Arad is not often mentioned in the

Bible, but its importance remains clear based on excavation results (Aharoni & Amiran 1964a:43-44).

Tel Arad was made up of a large lower city along with a fortress on the east. By the beginning of the 3rd millennium BCE, Arad was a fortified city (Aharoni & Amiran 1964b:133). The layout of the city related to the reservoir indicates that water projects was part of governmental responsibilities (Richard 1987:28). The street network diverted water to the reservoir at its centre (Scheffler 2000b:281). After being brought to ruin around 2659 BCE, the site remained without a population for more than one and a half thousand years until being settled by Israelites, coinciding with the construction of their stronghold (Aharoni & Amiran 1964b:145; Richard 1987:30; Issar & Zohar 2007:142).

(b) Iron Age Arad

The story painted by archaeological evidence does not fit with the biblical tale of the Canaanite kings. The Bible describes how they were defeated and the narrative includes the king of Arad (Joshua 12:7-23). It appears as though there was a lack of occupation at Arad during the time the biblical narrative would have taken place (Scheffler 2000b:304). The solution granted for this discrepancy is that there existed two different areas named Arad close to one another. Shishak's boasting of cities defeated, which was immortalised, supports this theory. An element that brought these theories to light was related to the lack of a reliable water source seen up to that point in excavations (Aharoni & Amiran 1964b:145-156). After the end of the Iron Age, Arad's upper city remained occupied from the Persian, Hellenistic, and Roman periods (Scheffler 2000b:275). Arad's importance in trade has been argued for with evidence that appear to indicate the control of trade in copper and bitumen being distributed from this city (Richard 1987:30).

4.3.1.3 Water systems and use at Arad

Arad's Bronze Age water system was similar to the one at Byblos in the north, in that it was integrated into the very layout of the town (Miller 1980:336). The system was created to store runoff in a reservoir located in the middle of a collection of streets leading to it. The example can be found in the lower left corner of the Early Bronze Age II reconstruction of Arad (Fig. 4.15).

Fig. 4.15 Reconstruction of Arad in the Early Bronze Age (Richard 1987:29)

This reservoir is believed to have had a capacity of more than 2 000 cubic metres of water that would have been sufficient for thousands of townspeople (Miller 1980:336; Fritz 1995:151). The reservoir was created by digging into the soft limestone of Arad. It has been theorised that this the shaft that was dug reached the water table, but regardless, it was filled with runoff water (Ben-Tor 1992b:104). During winter months, the reservoir was filled with rainwater while animals were used to transport water to fill the reservoir in summer months (Fritz 1995:151). This method of filling reservoirs was extremely labour-intensive and, as such, was only used when other sources could not satisfy the water requirements of the population (Fritz 1995:151). Houses excavated at Arad show the use of punctured parapets to direct and collect rainwater from roofs (Ilan 2001:326). Arad's public structures could have included a dam wall for capturing overflow (Scheffler 2000b:281). Various public buildings surrounded the reservoir that include industrial buildings requiring water and a house for the water administrator (Aharoni et al. 1993:76; Scheffler 2000b:289).

The Israelites at Arad made use of a well reaching a depth of 21 metres, dug in the lower city at the same position as the preceding reservoir, from which water was transported to the citadel (120 metres uphill). A channel diverted the delivered water to cisterns within the walls (Scheffler 2000b:289 & 294; Aharoni et al. 1993:79). Arad's later water system that

was developed through the 9th century BCE included a cistern, lined with stones and dug in a circular shape in the valley (Kaplan 2010:25). A feeder channel then led to a reservoir and cisterns (Kaplan 2010:25; Aharoni & Amiran 1964a:44; Scheffler 2000b:289). This ensured the transporting of water across the border created by the fortress wall. It was built after the destruction of Arad at the hands of the Egyptians under Pharaoh Shishak I's rule the century before (Kaplan 2010:25; Aharoni & Amiran 1964a:44). Transporting water to within the city walls was done by hand and perhaps the use of donkeys, but in times of unrest, these water carriers would have been left unprotected while outside the fortification walls (Scheffler 2000b:289 & 294). As a counter measure, a channel was dug from the well to cisterns within the city walls (Scheffler 2000b:295). The well was cleaned and reused as late as the Roman period when it also fed a pool and a ritual bath (Aharoni et al. 1993:79).

4.3.2 Ai

4.3.2.1 Background

Ai (Fig. 4.16), also known as et-Tell (the hill on which it was built), began as an unwalled village between 3100 and 3000 years BCE, becoming fortified in the Early Bronze Age II (Callaway 1976:18-19; Fritz 1995:54; Ilan 2001:317). Different locations were initially proposed as the site of biblical Ai, including Khitbet Khaiyan and Khirbet Khudriya, with et-Tell, which was proposed by Albright, becoming the favoured site (Callaway 1993:39). Ai's location falls within the Central Hill Country (cf. 3.4.4.3) with a Mediterranean environment (Ilan 2001:317). A spring within half a kilometre of Ai might have provided some water, but the main supply was from man-made storage systems as will be seen below. Ai was excavated by Garstang in 1928, followed by Marquet-Krause between 1933 and 1935, and Callaway between 1964 and 1972 (Ben-Tor 1992a:5; Callaway 1993:40).

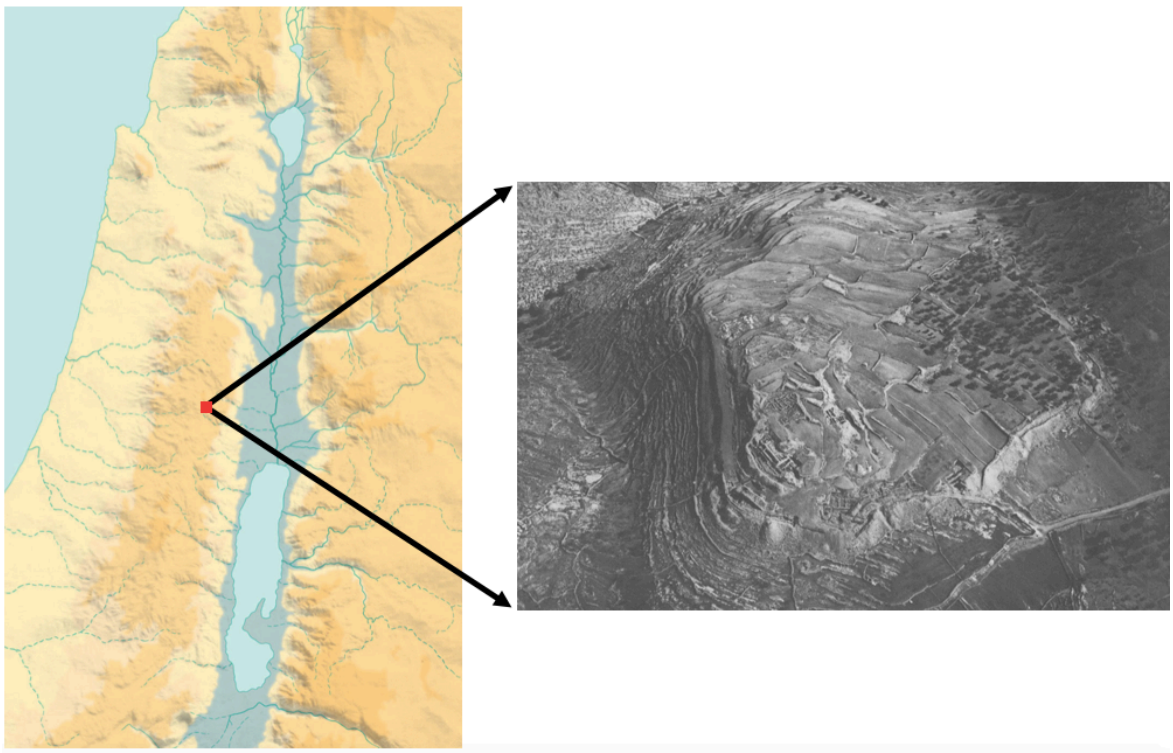

Fig. 4.16 Aerial view of Ai (adapted from Callaway 1976; Curtis 2007)

4.3.2.2 Occupational levels

(a) Bronze Age Ai

At the end of the Early Bronze Age, Ai had become a fortified city with thick walls and towers to defend it (Richard 1987:28). 2860 BCE saw the city destroyed in a conflagration, although the assailants' identity is not clear (Callaway 1993:42). The city was rebuilt, but Bronze Age occupation of the site did not last beyond the Early Bronze period. The city that once covered over 11 hectares was destroyed around 2400 BCE and occupations ceased (Callaway 1993:39 & 42). After the Early Bronze Age, the city was abandoned until a new village was created in the Iron Age (Ben-Tor 1992a:5).

(b) Iron Age Ai

By the beginning of the Iron Age around 1220 BCE, Ai had once again fallen back to merely being a village (Callaway 1976:18-19). The unwalled settlement Joshua 8 recounts the destruction of Ai at the hands of the Israelites. Ezra 2:28 lists Ai among the people who returned to their home towns after their deportation by the Babylonians (Ben-Tor 1992a:5). The Early Iron Age settlement that followed was built on the same mound as that of Early

Bronze Age (Fritz 1995:54). The 12th century saw the expansion of the initial Iron Age village as population numbers increased. This period, which continued until 1050 BCE, appears to indicate a lack of public buildings being in use and maintained. Following this trend, personal cisterns provided the inhabitants with water (Fritz 1995:55-56). The Iron Age settlement only covered about a tenth of the area that the Bronze Age city covered (Callaway 1993:39).

4.3.2.3 Water systems and use at Ai

Ai's reservoir, used between 2700 and 2550 BCE, was based on a system of collecting water in a corner within the fortifications, which was fed by channels collecting rainwater (Callaway 1993:42). This reservoir had a capacity of about 1 800 cubic metres, with walls on three of its sides and slabs of stone and clay plaster to minimise the possibility of water loss through seepage into the soil. A possible Egyptian influence relating to the creation of this reservoir has also been posited (1980:336; Ben-Tor 1992b:104; Callaway 1993:42). Reservoirs from Egypt are noted in texts dating to the Old Kingdom, although they appear to have been meant for use by quarrymen and not the general population, as is the case at Ai (Miller 1980:336). The reservoir was built above the level of the ground and red clay was transported into the city for its floor and field stone walls. With a lack of evidence of other water systems, the spring in Wadi el-Jaya could have been used to add to the city's supply of water (Aharoni & Amiran 1964b:28-29). Estimates show that this reservoir may have provided sufficient water supply for around 2 000 citizens (Callaway 1993:42).

The runoff water would probably have been sufficient in quantity for its intended population. This is based on the following evidence of the large amount of runoff received at Ai: The gate from the Early Bronze II period had a drain as part of its design, showing a need to control runoff water. With the rebuilding of the city by the Early Bronze III inhabitants, even more care was taken to avoid erosion. Water had already caused part of the wall to weather and fall apart. In order to counter this, the engineers used a terrace construction in conjunction with buttressing the wall to secure it (Callaway & Livingston 1970:20-23).

Excavations of the Iron Age I period at Ai has shown that all of the homes of the villagers had one or more cisterns (Callaway 1993:45). With evidence of cisterns cut into rock for private dwellings and agricultural terraces, it appears as though the new settlers brought this

knowledge with them (Aharoni & Amiran 1964b:29; Callaway 1993:45). A bronze chisel was also found, which might have been used for cutting cisterns into the rock (Callaway & Livingston 1970:18). The cisterns were bell-shaped and cut into the underlying geology consisting of Senonian Chalk. This meant that no plaster needed to be applied, as it forms a natural sealing product when interacting with water (Aharoni & Amiran 1964b:29-30; Callaway 1969:58). Cisterns in the outer regions also grant insight into daily life until at least Iron Age I (based on pottery finds). It appears to show how shepherds could provide their flock with water in these outskirts (Aharoni & Amiran 1964b:29-30; Callaway 1969:58; Callaway 1993:45).

4.3.3 Jericho

4.3.3.1 Background

The site of ancient Jericho (Fig. 4.17) is located to the north of the Dead Sea within the Jordan Rift Valley (Issar & Zohar 2007:57). Excavations at Jericho by Kathleen Kenyon lasted from 1952 to 1958 (Issar & Zohar 2007:60). The area in which the site of Jericho lies appears arid in nature, with its position within a rain shadow. However, as one moved to within a closer proximity of the site itself, water was available as a result of the alluvial fan it lies in, which had three freshwater springs namely: ‘Ain es-Sultan (Ein es-Sultan), ‘Ain Duk (Ein ed-Duyuq), and ‘Ain Nu’eima (Ein en-Nu’eima) (Bartlett 1982:15; Hachlili 1999:1; Issar & Zohar 2007). Rainfall at Jericho was minimal (around 144 millimetres per annum) and inhabitants had to rely on these other sources of water (Bartlett 1982:16; Tushingham 1953:46; Hachlili 1999:1). Geographically, Jericho acted as a central point on various routes that led to different sites across for example Jordan, Bethlehem, Jerusalem, Bethel, and Shechem (Bartlett 1982:26). The situation at Jericho was, however, not just favourable, as it was located above fault lines.

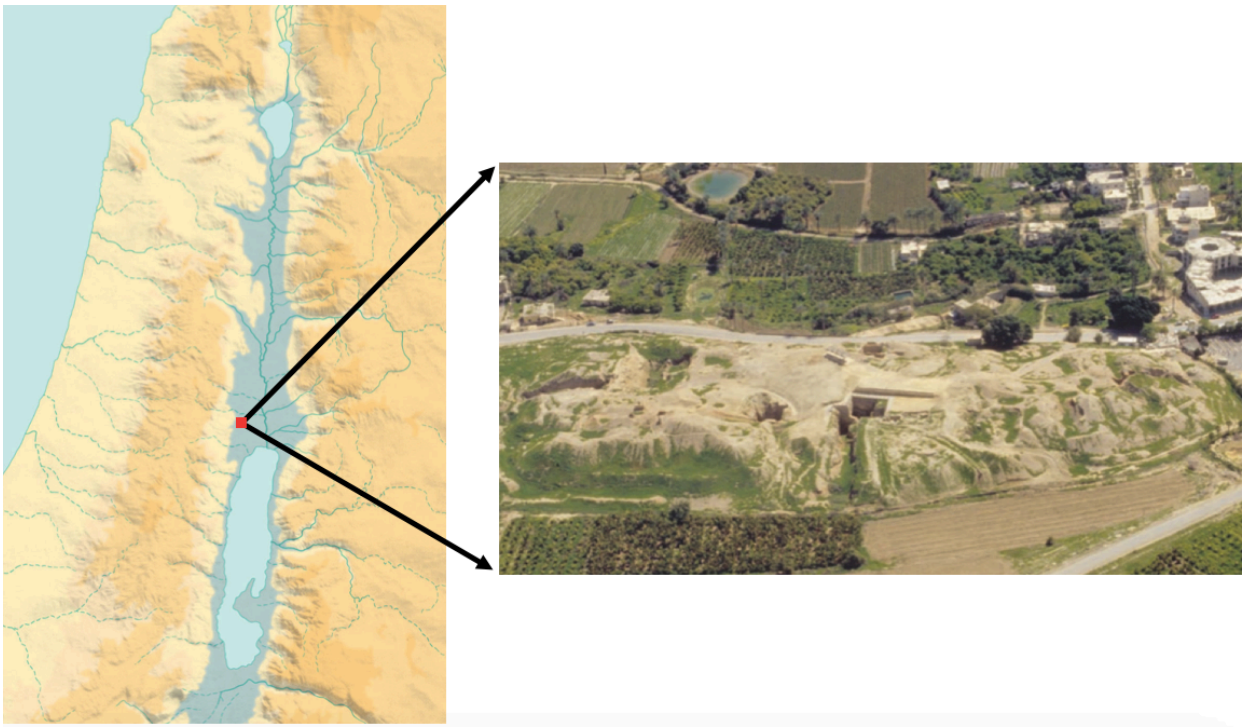

Fig. 4.17 Aerial view of Jericho (adapted from Beitzel 2009:17; Curtis 2007:14)

There are also biblical accounts of the people of Jericho relaying complaints of conditions to Elisha, in that the water of the area was not good (2 Kings 2:19; Bartlett 1982:11-14). This, in turn, seems to have left the soil in a bad condition for attempts at agriculture (Bartlett 1982:11-14). Although the complaint indicates a problem for the inhabitants of Jericho, it is believed that this situation was a temporary one caused by the contamination of water through earth movements (Bartlett 1982:14).

4.3.3.2 Occupational levels

(a) Bronze Age Jericho

Jericho in the Early Bronze Age saw a time of urbanisation with the site acting as guardian of the coveted areas of Palestine from those trying to enter from the desert (Kenyon 1954:81). During this time, between 3100 and 2100 BCE, Jericho prospered and functioned as a civilisation with defensive structures, tombs for the wealthy, homes of impressive construction, and bronze tools. Jericho was able to produce grapes, figs, lentils, chickpeas, pomegranates, dates, etcetera, by at least as early as the Early Bronze Age (Bartlett 1982:21). The city's life continued until 1550 BCE, when it was left in destruction (Tushingham 1953:48).

(b) Iron Age Jericho

The biblical narrative recounts the destruction of Jericho at the hands of Joshua when God spoke to him about the coming defeat of Ai by Joshua's army (Joshua 8:1-2). By the time of foreign rulers at Jericho, in the form of the Persians, the city became the place where rulers could go to while being protected by its fortifications. Jericho thus became a capital in Persian times (Rozenberg 2008:1). By the arrival of Hasmonean rule in Jericho, winter palaces were constructed, and agricultural produce was increased by their installation of aqueducts throughout the area (Hachlili 1999:1).

When Roman rule began in ancient Palestine, Jericho was second in size of all the cities of Judea. Its large population was not just limited to its centre but spread across the plain of Jericho in different villages (Hachlili 1999:1). It is believed that Jericho was divided among the elite (the priests and the wealthy) in the form of plots used for farming. These were most likely tended to by hired farmers (Hachlili 1999:1). Such difference in wealth and labour allocation adds to the examples of class division occurring after water manipulation had been developed for maximum efficiency.

4.3.3.3 Water systems and use at Jericho

Jericho's environment presented possibilities for agricultural practices based on irrigation. The 'Ain es-Sultan spring provided the water necessary for crop cultivation with limited labour required (Miller 1980:332). The Jordan Valley that surrounded Jericho provided both fresh water, a warm temperature and fertile soil. Conditions were so good that Josephus described it as being a blessed area (Bartlett 1982:11). The work required to maintain the agricultural plots at Jericho was not near that of what was required for large-scale projects (Miller 1980:332). In order to maintain water availability for irrigation, some method of storage would have been preferable, and perhaps necessary, to avoid marginality. To fill this role, Kenyon attributed some structures against the wall of a pre-Chalcolithic tower to this function. However, this theory is not universally accepted, as these structures, plastered with mud, was not conducive to long term storage (Miller 1980:332). The area around Jericho has also been noted as the site where Herod the Great had his brother-in-law, Aristobulus,

drowned in one of the pools (Josephus 2009:Book I, Chapter 22 translated by William Whiston).

(a) Jericho's palaces

The palaces' construction in Jerusalem's surroundings included adding various swimming pools and gardens, only increasing in number as Queen Salome Alexandra's rule began in 76 BCE (Rozenberg 2008:1-2). After her reign, a decorated bathhouse was added on the north-western side of the mound. A few years after its construction, a large earthquake led to severe damage in 31 BCE and the end of the Hasmonean rule of Jericho followed (Rozenberg 2008:2).

This palace complex was later rebuilt as one of Herod's major projects with a new swimming pool complex and extravagant buildings. Herod included various gardens to the layout and created a bathhouse with mosaics and paintings (Hachlili 1999:2; Rozenberg 2008:2-3). His 'garden city' also included a complex system of aqueducts for water distribution from the springs (Hachlili 1999:2).

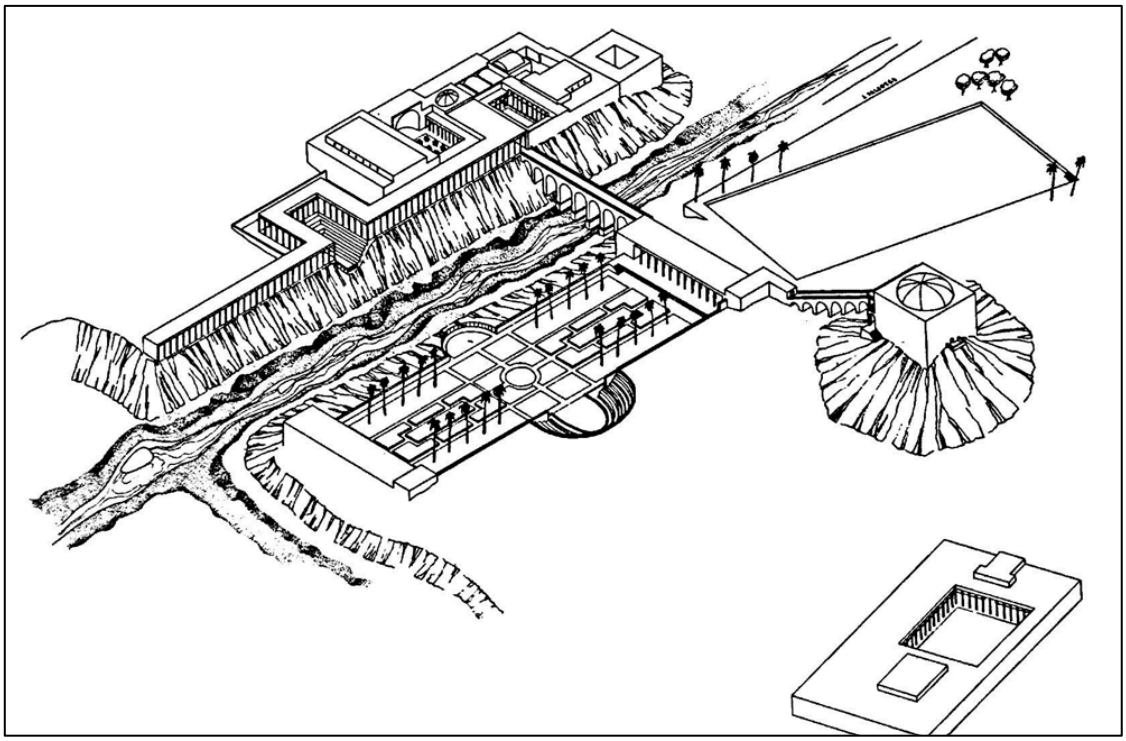

Fig. 4.18 Herod's Third Palace at Jericho (Rozenberg 2008:6)

Herod's Third Palace was also an amazing feat. It included the addition of water-reliant installations like a bathhouse, pools and gardens as well as spanning across a small ravine that divided the palace into two wings (Fig. 4.18) (Rozenberg 2008:3-7). Similar features where water-related structures show the power that Herod had can also be found at Masada (Yadin 1973).

(b) Jericho's baths

During surveys of the ancient water systems of Jericho's western plain, an important grieving enclosure from Herodian times was discovered at the cemetery. In this cemetery the so-called Goliath Tomb, for example, was linked to a courtyard and, subsequently, the ritual bath that was excavated (Netzer 1999:45). The ritual bath could be reached from two entrances, one to the east and the other to the south (Netzer 1999:47). It is believed that two pools were used to store water for the ritual bath and were filled from the 'Ain Duk spring (Hachlili and Killebrew 1999a:167). The aqueduct transporting the water ran through the cemetery to the inhabited areas of Jericho. It seems that this is not a singular occurrence, since Jerusalem also had an aqueduct running through the cemetery and even breaching the tombs (Hachlili and Killebrew 1999a:167). The pools were sealed with an ash-lime plaster. The same plaster was found on a bench in the chamber that seems to indicate that it had been used for changing clothes (Netzer 1999:47).

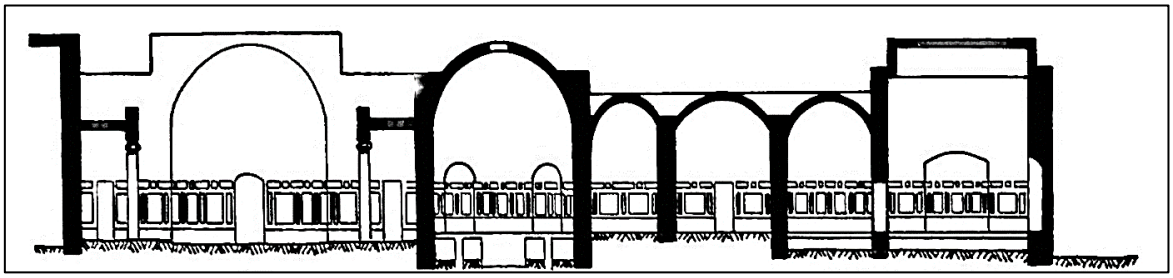

Fig. 4.19 Herod's bathhouse cross-section (Rozenberg 2008:190)

One of the bathhouse complexes used in the Third Palace was laid out in adjacent rooms as follows: On the left was the *laconicum* (sauna), followed by the *tepidarium*, *apodyterium*, *tepidarium* and *caldarium* (Fig. 4.19). A *frigidarium* was located to the north (Rozenberg 2008:189-193). The *apodyterium* served as an entry room with doors leading east and west to the *tepidaria* (warm rooms) and one on the north to the *frigidarium* as well as being a dressing room (Rozenberg 2008:190). It seems probable that the complex's *caldarium* (hot room) was heated by a furnace to its north (Rozenberg 2008:192-193).

4.3.4 Jerusalem

4.3.4.1 Background

Jerusalem (Fig. 4.20) is a city that has been settled by various inhabitants over the course of its history, all adding to the city's development (Kenyon 1965:84). These include its status as a stronghold to the Jebusites in the Bronze Age (Joshua15:63), then falling into the hands of the Israelites under David's rule, being destroyed by the Babylonians, and more. Jerusalem was first a Jebusite town that controlled an important route of the hill country. In time, it would become David's capital, and Jerusalem became a controlling power of its neighbouring settlements (Kenyon 1965:84; Fritz 1995:122).

The location of Jerusalem on a mountain ridge meant that it received significantly more rain (100 millimetres per annum) than areas within the rain shadow within which the Judean wilderness fell (Scheepers & Scheffler 2000b:139). More than this, the valleys that surrounded the area of settlement provided added security to its inhabitants (Scheepers & Scheffler 2000b:141).

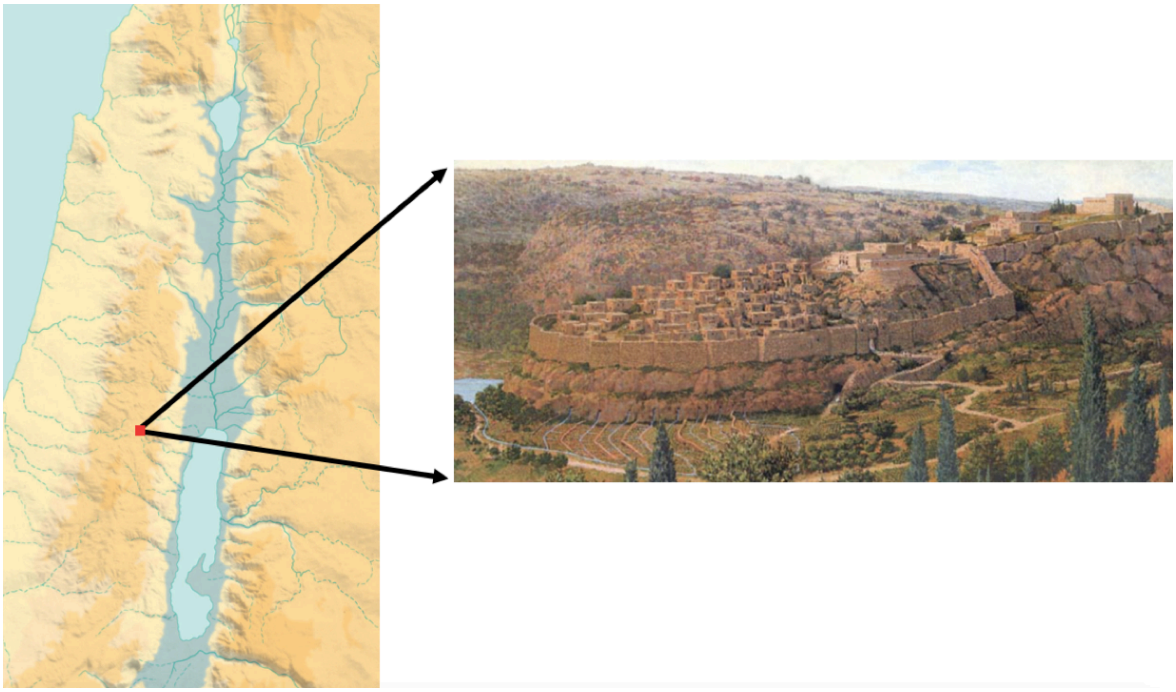

Fig. 4.20 Aerial view of Solomonic Jerusalem (adapted from Shanks 1985:34; Curtis 2007)

Jerusalem has been excavated by various archaeologists within the last century. These archaeologists include Kathleen Kenyon (in the Old City), Benjamin Mazar, Nahman

Avigad (concentrated on the Jewish Quarter), Yigal Shiloh (Eastern slope of Ophel Hill), Ronny Reich and Eli Shukron, to name only a few, and their findings have contributed to what is known today (Shanks 1999:31-33; Ben-Tor 1992a:5; Scheepers & Scheffler 2000b:145-147).

4.3.4.2 Occupational levels

(a) Bronze Age Jerusalem

Architectural remains have led to the conclusion that the earliest evidence of structures at the site can be dated to the beginning of the Early Bronze Age (Shanks 1985:25). By the 18th century BCE, Jerusalem was an established and walled city that formed part of the Canaanite city-states (Reich 2011:284-285; Shanks 1985:25). The Late Bronze Age Jebusite city was captured by David around the beginning of the 10th century BCE and became known as the City of David (Shanks 1985:26; Scheepers & Scheffler 2000b:141).

(b) Iron Age Jerusalem

After David's infiltration and defeat of Jebusite Jerusalem (Jebus), it became known as the City of David (1 Chronicles 11:4-9; Scheepers & Scheffler 2000b:172). During the Israelite rule of Jerusalem in the Iron Age, the city was split into an area for religious and palatial buildings; another for administrative purposes; and the last, the lower city, was used for housing the population (Shanks 1985:27). Under Solomon's rule, various positions were created or further developed for the city's administration. Such positions include that of the speaker, commander, scribe, and, importantly, an overseer of forced labour (Fritz 1995:163). The city also expanded to the north (Scheepers & Scheffler 2000b:152). This position was of special importance for this study, as the forced labour was what made large-scale building projects possible, which might include water systems (Fritz 1995:164). After the United Monarchy came to an end, Jerusalem was made the capital of Judah (Scheepers & Scheffler 2000b:173).

The city remained a site of conflict throughout the Iron Age, such conflicts included a 925 BCE attack by Pharaoh Shishak (Scheepers & Scheffler 2000b:160). Jerusalem later had to expand quite drastically in the 8th century BCE, since many people were fleeing from the

north towards Jerusalem to escape Sennacherib's army (Shanks 1985:30; Scheepers & Scheffler 2000b:153). In 701 BCE, the Assyrians attacked the city of Jerusalem but ultimately, were not able to capture it (Shanks 1985:30; cf. 2 Chronicles 32:1-23). In 586 BCE, Jerusalem was destroyed by the attacking Babylonian empire and many of its people were deported to Babylon (Shanks 1985:25-36). The Old City was located between the Kidron Valley on its eastern side and the Hinnom Valley to the west on the Ophel ridge (Kenyon 1965:84 & 86). It also had a water system that shows how resources would have been allocated by those in power to ensure the completion of such a project. It also shows what knowledge they would have had available for cutting through stone (Reich 2011:284-285).

(c) Second Temple period Jerusalem

Jerusalem saw another change in power during the Second Temple period[16] with the arrival of, first the Persians, followed by the Greeks, and then the Romans. Each of these brought with them their own way of life. This includes architectural practices, such as the creation of gymnasiums, theatres and hippodromes being built in the city (Levine 2002:xii-xiii). Even with these external influences, Jerusalem was still a 'Jewish city' at its core (Levine 2002:xiv). Evidence of the importance of this culture and religion remained and can be seen with the presence of many ritual baths and an apparent lack of idolatry by the 1st century BCE. This indicates that ritual purity was still observed (Levine 2002:xiv). During this time, Jerusalem saw a massive increase in its population and its previous systems of water supply were no longer able to sustain it. These systems had been focused on using the springs to the east and south of the city along with the Birket el-Hamra pool in the Tyropoeon Valley (Levine 2002:213).

4.3.4.3 Water systems and use of Jerusalem

[16] The Second Temple period lasted from about 538 BCE – 70 CE (Levine 2002). It began with the arrival of the Persian king, Cyrus allowing the rebuilding of the temple (Scheepers & Scheffler 2000b:175).

An example of reuse and upgrading of water systems depending on external and internal factors can be found at Jerusalem. The Jebusite and Israelite period of occupation of Jerusalem saw the use of the Gihon[17] Spring as its source of water. During the Bronze Age, water was collected from the Gihon Spring through the city's gate (Fritz 1995:157). With the irregular flow characteristics of the spring, it is possible that water was stored with a reservoir before it was transported within the city (Fritz 1995:157). The water systems in Jerusalem (Fig. 4.21 & 4.22) were quite complex and included various installations and water diversions. With the spring as the source, Channel II (the Siloam Channel), Warren's Shaft[18] and Hezekiah's Tunnel all came into being (Gill 1991:1467; Fritz 1995:156-157).

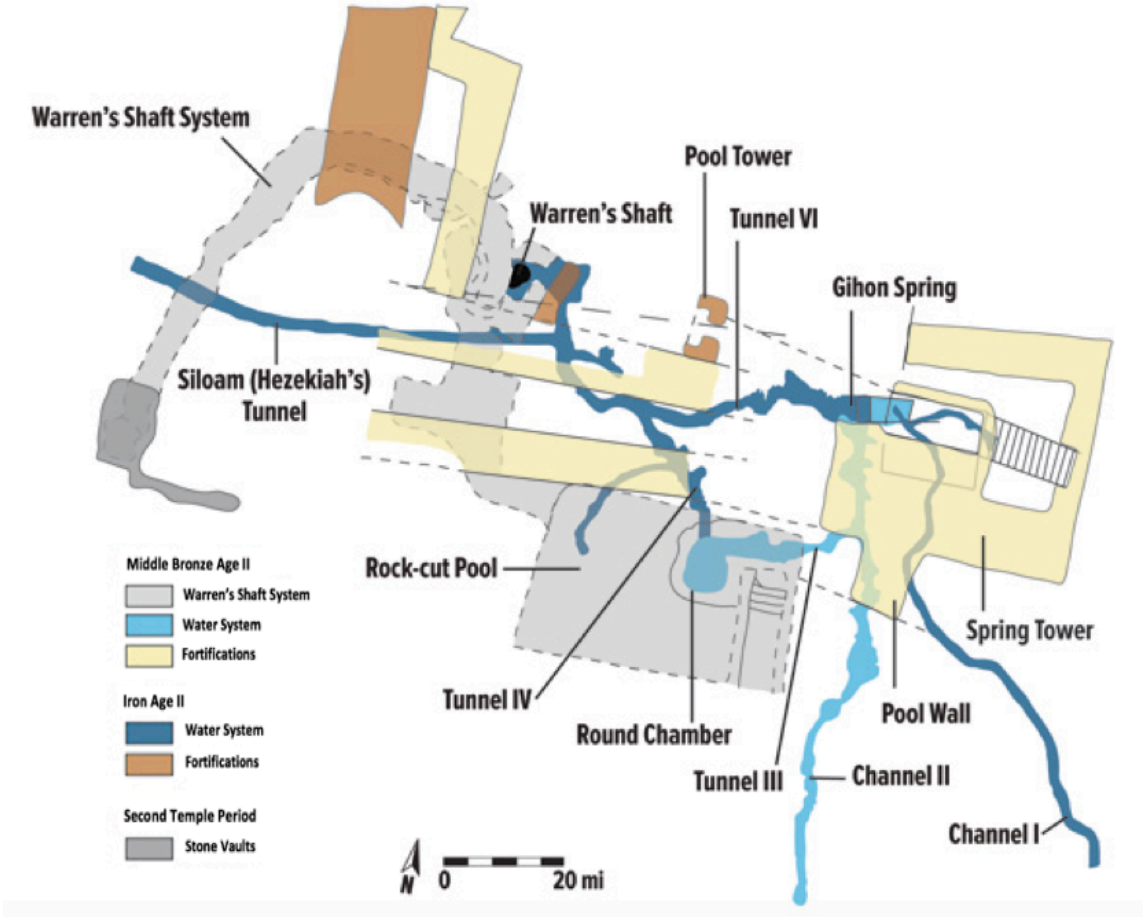

Fig. 4.21 Jerusalem's water systems over time (Biblical Archaeology Society 2018:Online)

[17] There are some contentions about the naming of the water system and spring of Jerusalem. The possibility exists that the entire system from the Bronze Age was known as Gihon, not just the spring. That Siloam was the Second Temple period name of that system has been posited and it included the Siloam Tunnel and pool. Another theory that Isaiah's probable reference to Siloam in the Iron Age II was not based on the system, but on the spring itself rather than the name Gihon (Reich 2011:300-301).

[18] It has been proposed that this shaft was the oldest of the three most well-known water systems of Jerusalem. The shaft was named after Charles Warren, who discovered it in 1986 (Cole 1980:9; Isaiah 8:6).

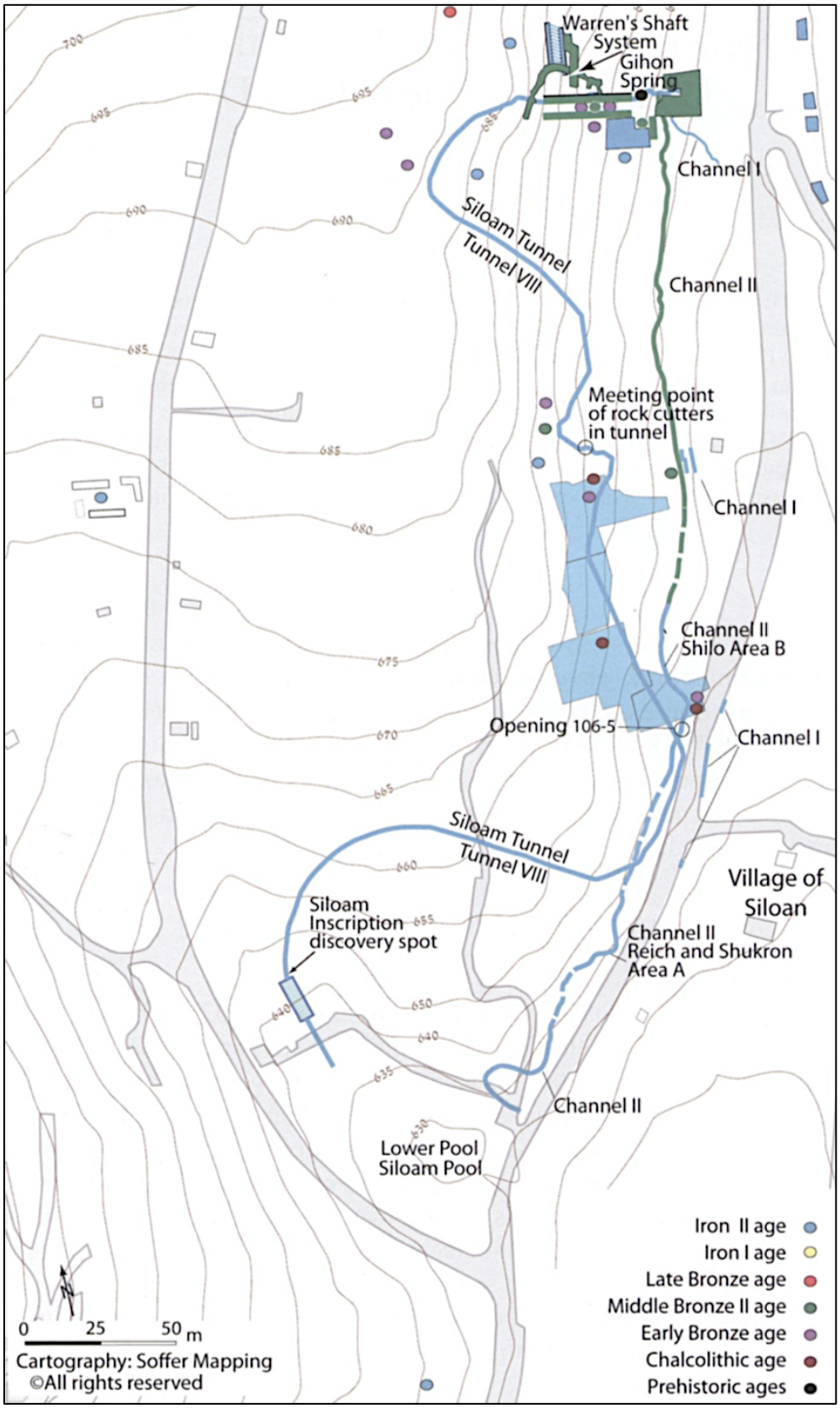

Fig. 4.22 Water systems and topography of Jerusalem (Grossberg 2013:206)

(a) Warren's Shaft

Warren's Shaft was thusly named after its discoverer, Charles Warren, in 1967 (Klopper 2002:124; Cole 1980:9). This shaft formed part of the Jebusite water supply of Jerusalem (Fig. 4.23 & 4.24).

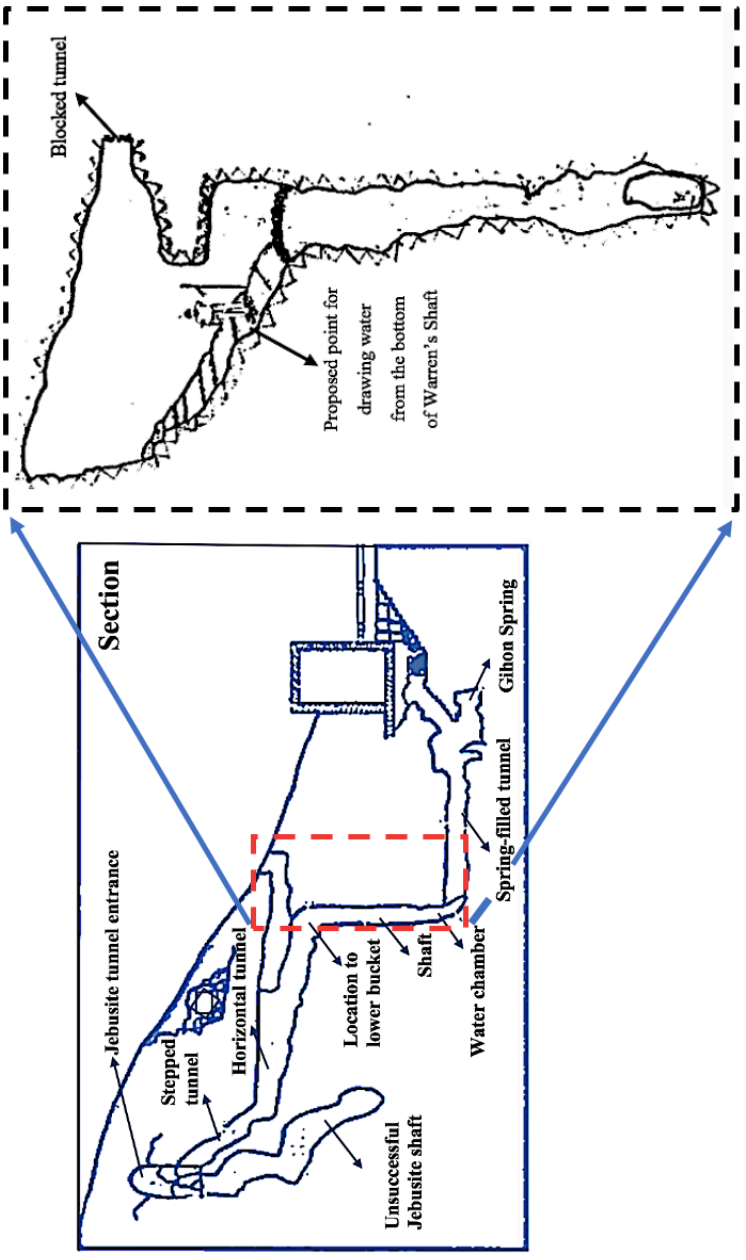

Fig. 4.23 Section of Jebusite water system and possible entrance used by Joab[19] (adapted from Scheepers & Scheffler 2000b:159; Cole 1980)

[19] Figure rotated due to the size of the image.

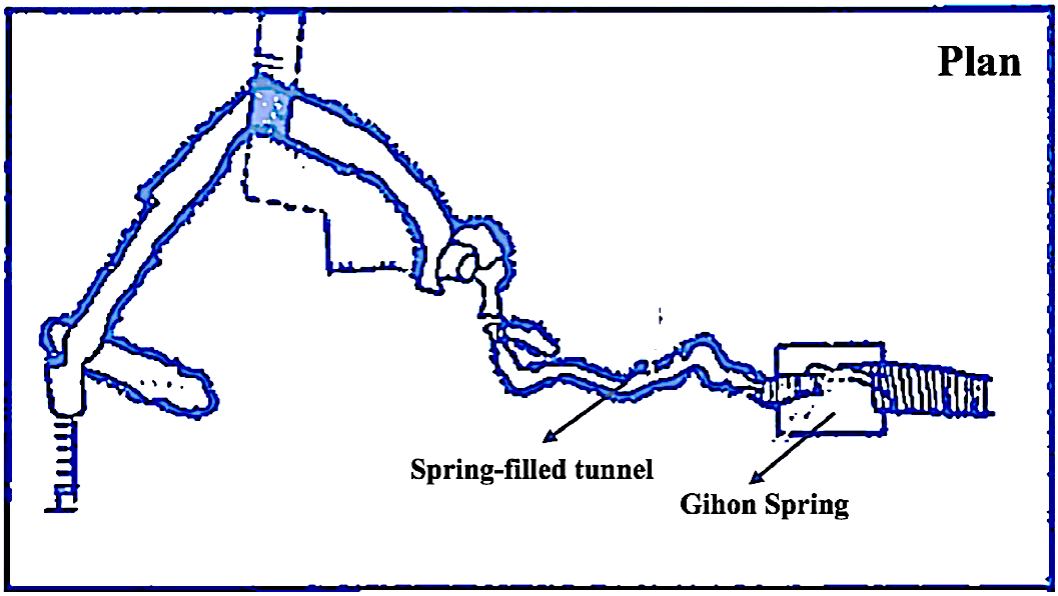

Fig. 4.24 Plan of Jebusite water system (adapted from Cole 1980)

Warren's Shaft, dated to Jebusite Jerusalem that preceded the 10th century BCE, worked as follows: water was diverted to a reservoir from the Gihon Spring. The tunnel transporting the water has been theorised to have been a natural feature (Shanks 1985:36-38; Gill 1991:1467). Warren's Shaft has also been referred to as the 'Jebusite Shaft', as its use before the 10th century BCE would imply. It would then have formed part of the Jebusite city's water supply (Cole 1980:9). Water was then presumably drawn from this reservoir with the use of a bucket being lowered down a vertical shaft from the surface to the pool (Shanks 1985:36-38; Gill 1991:1467). The shaft seems to have too many protrusions, which also cause some to doubt that it could even be used to draw water from (Shanks 1999:31-34; Cole 1980:9-10). Although many debates exist on whether this shaft was a natural feature that was used to draw water, if indeed it was a water system, it seems that excess water was diverted with the Siloam Channel (Fritz 1995:157-159).

The word *tsinnor* is used in the Bible to describe Joab's method of entry into Jerusalem's city walls and has various possible translations, but the translation of it meaning a 'water shaft' is generally accepted (Kleven 1994:34; 2 Samuel 5:8). However, Warren's Shaft being the source of entry for Joab as described in 2 Samuel 5:6-10 has been largely rejected (Shanks 1985:36-38; cf. Shanks 1999). Another option provided as a possible entrance for Joab has been proposed as being a tunnel that might have been blocked after this infiltration took place (Fig.4.23).

(b) Channel II (Siloam Channel)

Channel II and Tunnel II transported water from the spring to the Siloam Pool (Reich & Shukron 2000:6). Channel II in the City of David is made up of two parts. The first, and northernmost part, was possibly created in the Middle Bronze II period, based on a technique to cut the channel from the surface and covering it with large stones (Grossberg 2013:205; Fritz 1995:157). The southern part of Channel II is thought to have followed later, in the Iron Age II period. If the dating of this second part is correct, it might be attributed to King Solomon's expansions to the northern parts of Jerusalem (Scheepers & Scheffler 2000b:160). This part consists of tunnel being cut through rock with openings to the surface at several intervals. It implies that the shaft tunnel technique was used for its creation (Grossberg 2013:205; Fritz 1995:157).

The creation of a channel, such as the southern part of Channel II, would undoubtedly require a coordinated project with specialists and contract workers (Grossberg 2013:209). An estimation was made to try and determine how long it would have taken to cut this part of Channel II using previous results for calculating the creation of the Siloam Tunnel. Geologically, Channel II's cutting would have been easier as the rock was softer, making the time required shorter (Grossberg 2013:209). Two other elements contributing to a shorter timeframe are the use of the shaft tunnel technique, which would mean that more people would be able to work on the channel at a time; and the fact that the tunnel is narrower than that of the Siloam tunnel (Grossberg 2013:210). The 1995 excavation area, which was focused between 290 and 325 metres south of the Gihon, supports this theory by revealing a cavity linking to the tunnel. The tool marks left behind by the original tunnel cutters' chisels indicate that the rock was cut in both directions from these points (Grossberg 2013:205).

Taking these elements into account and using previous estimations, the following timeline was posited: If half an hour is allocated for shift changes between the worker groups and the cutting volume taken into account, a cutting speed of almost one metre per day was possible. This theory is also based on actual working hours adding up to 18 hours a day for six days of the week (Grossberg 2013:210). Because of the sensitive political situation based on the imminent threat on the city, it is reasonable to assume that the maximum work force would

have been deployed. This is also substantiated by evidence of the speed rather than quality driven work on the channel (Channel II). The longest section between shafts found thus far was 50 metres. Based on halving that length (because of dual direction cutting method used on the south part of Channel II), it could have taken about a month to cut the required estimated distance of 200 metres (Grossberg 2013:211).

Channel II not only diverted water from the Gihon Spring to reservoirs to ensure its availability at all times, but also for use in the agricultural plots of the Kidron Valley (Shanks 1985:36; Scheepers & Scheffler 2000b:160). Water could also flow towards the Kidron Valley where the fields needed to be irrigated. This was presumably controlled with the use of openings that could be sealed and unsealed at will to avoid excess water flowing down the slope (Shanks 1985:36). Lastly, this channel also captured rainwater overflow (Shanks 1985:36). This system's greatest flaw was it being located outside the city walls (Shanks 1985:36).

(c) Hezekiah's Tunnel (Siloam Tunnel)

The tunnel's name stemmed from the initial theory that it dated to the Judean king, Hezekiah (Scheepers & Scheffler 2000b:161). Hezekiah's Tunnel sought to rectify the city's vulnerability in the search for water in times of war. By transporting water within the city walls towards the Siloam Pool, along with the city's other reservoirs, water could be stored (Shanks 1985:36; Gill 1991:1467; Cline 2009:19). The tunnel was excavated by a team starting at either end, theoretically following the natural fissures in the rock, then ensuring that the tunnel possessed the proper slope to transport water effectively (Cole 1980:10; Scheepers & Scheffler 2000b:163).

Historically, this construction has been attributed to Sennacherib's campaign in Judah around 701 BCE and thus the rule of Hezekiah (Grossberg 2013:211-213; Scheepers 1984:138). However, many arguments have been made that the tunnel was not constructed in Hezekiah's time (Shukron 2013). The Bible describes Hezekiah's reaction to this threat by sealing off the water source that could be used by the Assyrian army. These accounts are found in 2 Chronicles 32:2-4 and 2 Kings 20:20. Perhaps, as Grossberg believes, this sealing off refers to the southern end of the northern part of Channel II, where it flowed into the Kidron Valley and by doing this, diverting all water towards the southern part of the channel

(2013:211-213). The water was collected in the Lower Pool and would later be renamed the Pool of Siloam (Grossberg 2013:215).

(d) Second Temple period

With the Romans known for their large supplies of water required for fountains, baths and waste disposal (Levine 2002:213), it seems likely that they would implement similar methods in cities of importance captured. Water conservation became a focus to sustain both the population and the visitors to the city with the use of public reservoirs for collecting rainwater (Levine 2002:214). These reservoirs include the Pool of Israel, Bethesda Pool, Hezekiah's Pool, Mamillah Pool, and Solomon's Pool, to name a few (Levine 2002:215). A collection of aqueducts was also created to feed the reservoirs. The construction of these aqueducts stretched from Hasmonean times to that of Pontius Pilate (Levine 2002:215-216). By the 1st century BCE, hundreds of *miqvaot* existed in and around Jerusalem. Large numbers of these ritual baths are limited to places with religious-centred goals, such as Jericho and Qumran. Many of the baths were also located in farming areas, which seem to indicate a goal of ensuring the purity of food sources meant for the city and temple (Levine 2002:390-391).

The Temple Mount included more than 35 cisterns, constructed under Herod's orders for the pilgrims who visited Jerusalem. These were filled with rainwater as well as with water transported via an aqueduct (Har-el 1997:152 & 154). Arguably one of the greatest aqueducts in Jerusalem was used to transport water 68 kilometres to the Temple Mount with a drop in elevation between the start and end points of under 80 metres. The aqueduct was fed by springs in the Hebron Hills (Har-el 1997:153). Jerusalem's method of construction was very much focused on water preservation with drainpipes and the paved streets all channelling rainwater into storage areas. Water was also transported from these to other parts of the city with the use of underground channels (Har-el 1997:154). In order to supply water to Jerusalem's people during the Second Temple period, valleys were dammed up to create reservoirs (Har-el 1997:152).

4.3.5 Lachish

4.3.5.1 Background

Lachish (Fig. 4.25), also known as Tell ed-Duweir, which was first identified by Albright in 1929, is an important site in the Shephelah (Wright 1955b:56; Ussishkin 1982:19; Ussishkin 2014:19). This importance was linked to the road between the Coastal Plain and Hebron passing by Lachish (Scheepers 2000b:215). Lachish stretched across an area of over 11 hectares, with the valleys and alluvial basins in its surroundings being the only source of fertility (Scheepers 2000b:215). There are valleys on most of the mound's sides and access to the city would have been difficult (Ussishkin 2014:20; Scheepers 2000b:215-216). Nahal Lachish's (a streambed) flow pattern passed nearby and in winter and spring was fed by rainwater (Ussishkin 2014:20). The southwest thus provided the best option for reaching the top of the mound where a saddle connected it to its surroundings (Ussishkin 1982:19; Ussishkin 2014:19). The top of the mound, however, grants a view from the west and its Coastal Plain and the east to the Judean Mountains (Ussishkin 2014:19).

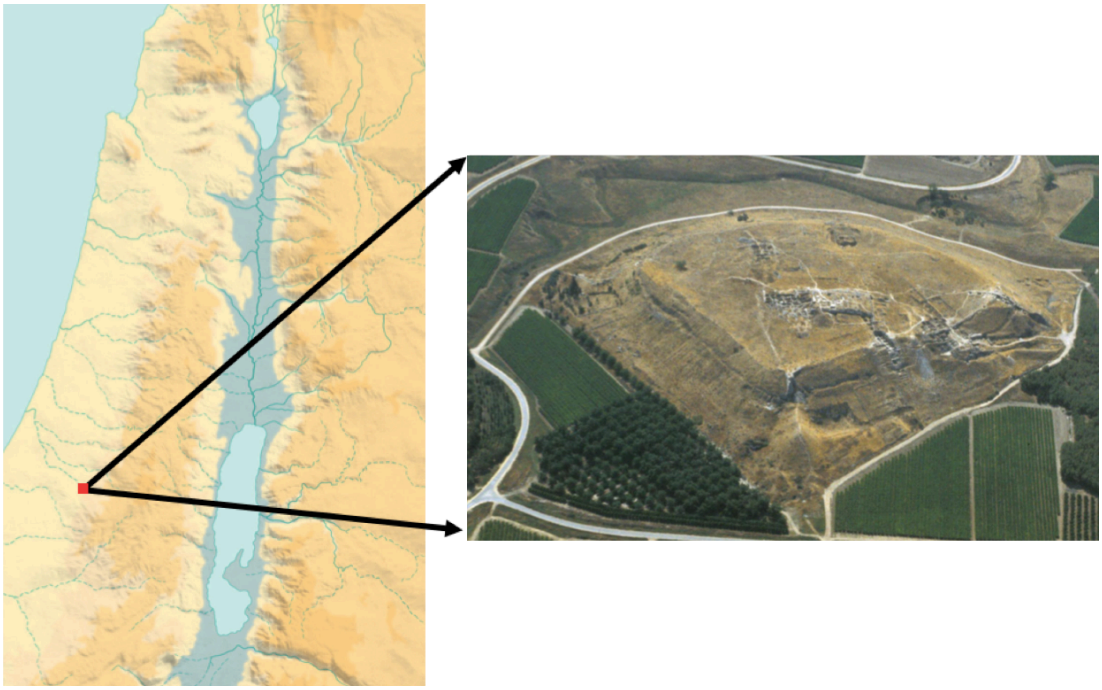

Fig. 4.25 Aerial view of Lachish (adapted from Curtis 2007)

The first excavations at Lachish were led by James Leslie Starkey from 1932 until his murder in 1938 (Ussishkin 2014:31-48). Aharoni followed in 1966 until 1968 and then Ussishkin in the renewed excavations from 1973 until 1994 (Ussishkin 2014:9, 61 & 67).

4.3.5.2 Occupational levels

(a) Bronze Age Lachish

Settlement at Lachish began long before the period of this scope of study, but during the Early Bronze Age it had become an important city only to be destroyed by the end of the Early Bronze Age (Ussishkin 2014:106-107). Lachish remained mostly abandoned for centuries after this destruction (Ussishkin 2014:107). During the 2nd millennium BCE, the city once again came to exist on the mound (Ussishkin 2014:22). Throughout the Middle Bronze Age, a palace and fortifications were constructed, and Lachish became one of the Canaanite city-states (Wright 1955b:56; Ussishkin 2014:108-111). The Middle Bronze Age at Lachish ended as fire destroyed the city (Ussishkin 2014:119). During the Late Bronze Age, the area was slowly being settled again and rebuilt. Lachish was also one of Egypt's vassals during this time (Ussishkin 2014:123). This was before being brought to destruction through fire once again at the end of the 13th century (Ussishkin 2014:129). It is not clear who exactly was responsible for this destruction, with theories varying based on the belief of Israelite conquest in the Holy Land (Scheepers 2000b:229). Again, the city was rebuilt and became one of the largest and most prosperous Canaanite cities of the time, although unfortified (Ussishkin 2014:139-186).

(b) Iron Age Lachish

During the 12th century BCE, Lachish started to decline, presumably linking to the decline of Egypt's rule of Canaan (Ussishkin 2014:187-188). It was then completely destroyed and burnt down by the end of the 12th century BCE (Ussishkin 2014:194). It is unclear who was responsible for this destruction, but possible candidates include the tribes of Israel and the Sea Peoples (Ussishkin 2014:196-198). If indeed the Israelites were responsible, this destruction might refer to the biblical tale in Joshua 10:32-33. Lachish then remained uninhabited for about two centuries (in the time of the Judges) (Ussishkin 2014:202; Fritz 1995:103; Scheepers 2000b:230).

After the period of abandonment, lasting until the 10th century BCE, Lachish was slowly resettled at first and then rebuilt under orders of the Judean king (Ussishkin 1980:56; Fritz

1995:50; Ussishkin 2014:203). The construction project included the building of fortifications and a palace, and has been attributed to Rehoboam's rule by some, while other advocate for the time of King Asa, King Jehoshaphat, or King Hezekiah (Wright 1955c:9-10; Ussishkin 1982:27; Ussishkin 2014:207-208). The rebuilding of the city might have been driven by a strategy to protect Judah's border on the southwest against the Philistines (Ussishkin 1982:28; Ussishkin 2014:207; Scheepers 2000b:231). With its access to water and the topographical advantages of Lachish, it is not surprising that Lachish was chosen to be that protector (Ussishkin 1982:28; Ussishkin 2014:207).

(c) The end of Lachish

By the time of Sennacherib's arrival at Lachish an inner and outer gate, towers, and walls existed as a means of protection (Ussishkin 1982:30-31). Regardless, the city fell to the Assyrians after their arrival in 701 BCE in one of the most extensive destructions found in ancient Palestine (Ussishkin 1982:24; Fritz 1995:104; 2 Chronicles 32:9). This victory, which includes the siege and the aftermath, is celebrated in the *Lachish Reliefs* from Nineveh (Ussishkin 2014:327-350; Fritz 1995:106). The city was completely abandoned until the later part of the 7th century BCE, with its inhabitants either dead or deported (Ussishkin 2014:368).

Lachish was repaired and served as one of Judah's fortress cities although it did not equate with the fortified city that came before (Ussishkin 2014:370; Fritz 1995:107). The city was then destroyed at the hands of Nebuchadnezzar between 588 and 586 BCE (Ussishkin 1982:24; Ussishkin 2014:375). Lachish and Azekah are named as the last fortified cities that existed in Judah as Nebuchadnezzar attacked Jerusalem (Jeremiah 34:7). This was probably done without much of a defence by Lachish's weakened population (Wright 1955c:14-16). Lachish is also known for the discovery of the ostraca, now known as the *Lachish Letters*, which were found inside the city's gate. These ostraca were created with the fall of Judah to the Babylonians being imminent (Ussishkin 1982:24). It is not agreed upon whether these letters were meant for Jerusalem to convey the military situation at Lachish; whether they were sent by Lachish's commander; or whether they were copies or drafts of letters already sent (Ussishkin 2014:381; Scheepers 2000b:239). One of the letters found at Lachish contained a message of the Babylonians' movements and the fate of Azekah: '…and I can't see the (smoke) signals from Azekah anymore…' (Scheepers 2000b:239). At this time, the

area was again left in ruin, until the 5th or 4th centuries BCE when rebuilding occurred (Wright 1955c:14-16; Ussishkin 2014:391).

Lachish was restored by the Persians to be used as an administrative centre (Ussishkin 1980:56). Structures attributed to this period include the Residency, the city wall and gate, and the Solar Shrine (Ussishkin 2014:392). It appears that the city was still inhabited in the Hellenistic period, although it lost its status granted by the previous rulers. By the middle of the 2nd century BCE, perhaps after years of decline, settlement at Lachish ceased completely (Ussishkin 2014:392).

4.3.5.3 Water systems and use at Lachish

The geography of the region did not provide springs as a water source, so it is believed that wells were used instead (Ussishkin 2014:23; Rosen 1986:56). A large well has been found that supplied at least some, and perhaps most, of the water to the inhabitants of Lachish (Fig. 4.26). The well, of more than 40 metres deep, was dug at Lachish in the beginning of the Iron Age, or earlier, at the site (Wright 1955b:56; Ussishkin 1982:43). Ussishkin once raised a possibility of another water system that might have existed at Lachish as well to provide another source of water. Perhaps one similar to those of Hazor, Megiddo, and Gezer (1982:44). Regardless, a recent opinion is that the well provided the main supply of water (Ussishkin 2014:23).

Fig. 4.26 Large well excavated at Lachish (Ussishkin 1982:43)

Much attention was also focused on solving the problem of excess water. During winter months, the heavy rains could lead to flooding within the city. Drainage channels diverted the excess water, and perhaps sewage water as well, outside the city to the north of the gate (Ussishkin 1982:42; Scheepers 2000b:237). Another theory is that these channels might have transported rainwater to a reservoir (Ussishkin 2014:233-235).

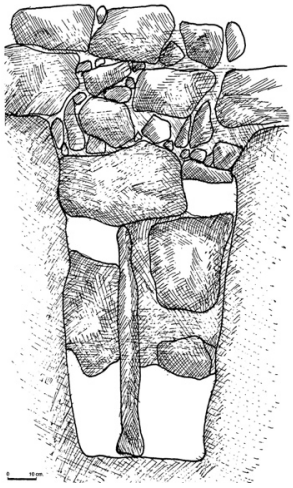

Fig. 4.27 Protected drainage channel leading outside the city wall (Ussishkin 2014:263)

The main channel leading water to the outside was reused and linked up with newer channels built in the following period. To prevent a breach in the city's security from the outside, the drain was secured with a stone obstruction with narrow openings (Fig. 4.27) (Ussishkin 1982:42; Ussishkin 2014:233). This did not seem sufficient with the imminent arrival of the Assyrians and, so, the main drain was blocked up (Ussishkin 1982:43).

4.4 COASTAL SITES

4.4.1 Introduction

Coastal sites had a unique role to play in the investigation of water use and social complexity. Because of its location between the world across the Mediterranean and ancient Palestine, these cities have histories impacted by their external stakeholders (Master 2003:47). A simple example of how external cultures impacted the coastal regions can be seen in cultic practices. Baths have been found that are believed to have been part of cultic practices. These appear to stem from the culture of the Philistines, who settled at the coastal sites. Such baths have been found at Ekron, Ashdod, and Tell Qasile (Katz 2012:374-375). Trade was impacted by the coastal sites in terms of the economic benefits of using water transportation instead of land-based ones. Such economic benefits are linked to the ease with

which a large number of goods could be transported. In terms of the impact this would have on the society of these cities, it must be viewed in comparison to land-locked ones. In particular, when looking at agricultural societies, their development was reliant on access to land and was limited to harvest seasons. Maritime trading societies could then be looked at as commercial and their success was reliant on maintaining good relationships (Master 2003:48-49). Ashdod and Ashkelon which are discussed (cf. 4.4.3; 4.4.4), formed part of the Pentapolis of Philistine cities along with Ekron, Gath and Gaza (Joshua 13:4; Stager 1993:104).

4.4.2 Dor

4.4.2.1 Background

The port city of Dor (Fig. 4.28) was located on the Carmel coast, was first established in the Middle Bronze II period, and was probably chosen for the natural marinas at the location (Gilboa 2015:248; Stern 1993a:24). The surroundings consisted, for a large part, of marshes and thus affect agricultural possibilities. However, nearby valleys, such as the Maharal Valley, could be utilised for such purposes. The mountains of Carmel provided wood and the ocean provided fish (Gilboa 2015:247). Other endeavours pursued include bronze recycling, cultivating murex shells for dye, and the creation of ceramics (Gilboa 2015:247-248).

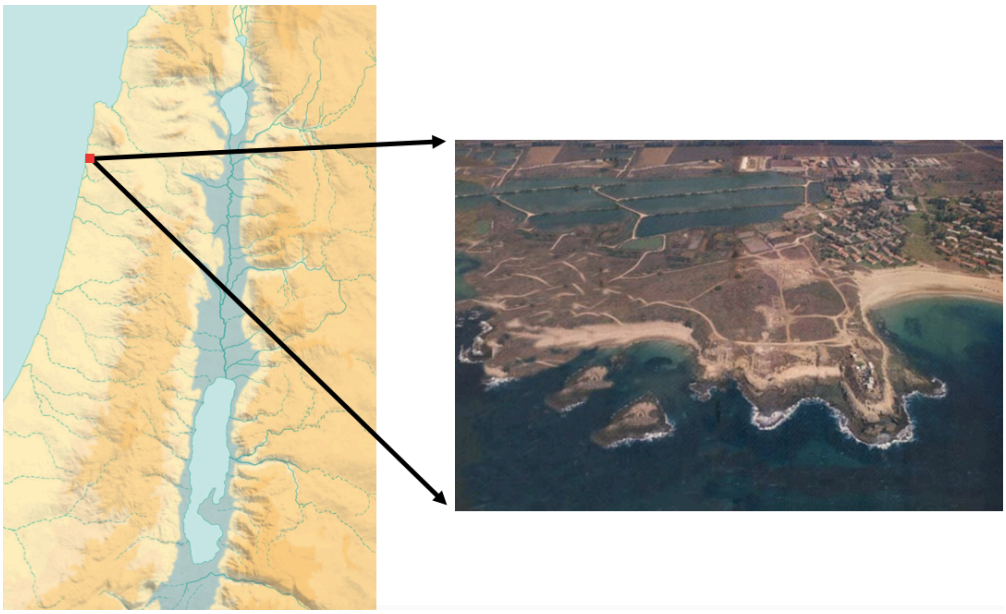

Fig. 4.28 Aerial view of Dor (adapted from Stern 1993a:22; Curtis 2007)

Dor's importance in maritime trade can be seen in its mention in ancient texts that include inscriptions of Ramesses II, the *Tale of Wenamun* (11th-10th century BCE) and *Esarhaddon's treaty* with the king of Tyre (7th century BCE). Both name Dor as an important port city between Egypt and Lebanon (Gilboa 2015:248-250; Stern 1993a:24-26). Dor matched four other main cities as equal in size and status under Phoenician influence from the end of the 11th century BCE. These cities are: Byblos, Tyre, Sidon, and Arwad (Stern 1993b:19). Regionally, the city was also close to the Nahal Me'arot stream that could be used to cut down on travel time between Dor and the Jezreel Valley (Gilboa 2015:250). Dor was excavated by Garstang between 1923 and 1924, Leibowitz between 1950 and 1952, and Stern from 1980 (Stern 1993c:358).

4.4.2.2 Occupational levels

(a) Bronze Age Dor

Dor had a complex history affected by various conquests. For example, some believe that Dor's Late Bronze Age settlement ended due to a destruction by the 'Sea Peoples'. During the time of the United Monarchy, Dor was utilised as the kingdom's main harbour city (Stern 1993b:21). The wealth that did exist at Dor from the Middle Bronze Age through to Byzantine times can be seen in finds such as: fish tanks, docks, ship yards, washing channels, and more (Raban 1987:119-120).

(b) Iron Age Dor

Evidence for Israelite rule at Dor is, however, scarce apart from the biblical descriptions of David and Solomon's territories due to the prevailing Phoenician culture (Stern 1993b:22). The city was then taken by Pharaoh Shishak in 918 BCE and later by the Assyrians in 732 BCE, followed by the Babylonians and Persians to name only a few (Stern 1990:16, 1993b:22; Gilboa 2015:247). Regardless of the various rulers of Dor, the Phoenician culture remained dominant for centuries (Stern 1993a:31). Because of its location on the coast, it was important for maritime trade between different regions. Aside from various defeats, the city also saw periods of success. Some of these successes can be attributed to its Phoenician contact (Stern 1990:17).

A large-scale building project was undertaken after the 10th century BCE. The buildings were used until conflagration destroyed the city in the 8th century BCE (Stern 1990:20). During this time, the city was largely Phoenician in terms of their population (Gilboa 2015:250). By the end of the 9th century BCE, Dor was ruled by the Kingdom of Israel (Gilboa 2015:251; Stern 1993a:31). Dor remained as a capital after the Iron Age, throughout the Babylonian period and perhaps for part of the Persian period (Stern 1990:25).

4.4.2.3 Water systems and use at Dor

A rectangular well (Fig. 4.29) was found with pottery sherds from the 13th century BCE at its bottom. Freshwater from the well was raised from above the level reached by saltwater. Such wells required maintenance (Gilboa 2015:123-124). Wells found at Ashkelon shows evidence of how wells that fell out of use was repurposed as pits for waste. Wells could not be used without end, with the one dated in the paper by Carmi et al. having had a lifespan of about 300 years (1994:198). In general, however, barring external influencers and proper maintenance wells could be used for a long time (Carmi et al. 1994:199; Amiran 1953:209).

Fig. 4.29 Rectangular Iron Age well from Dor (Gilboa 2015:123; Stern 1993c:369)

Main reasons for the abandonment of wells include salinisation, better sources being discovered, and war (Carmi et al. 1994:199). Sea trade reliant on the wealth to build a fleet

has been noted by some as being important for securing the needs of rulers are met (Gilboa 2015:261). Contrasting these views, evidence exists of trade across the Mediterranean during a collapse in the areas ruling powers (Gilboa 2015:261). Simple installations, such as those found at the four-chambered gate at Tel Dor, shows some of the less spectacular, but equally interesting, uses of water in daily life. These are rectangular basins, which are believed to have been used by visitors as they entered. This occurrence is not limited to Dor (Stern 1990:19).

Channels cut into stone protected buildings close to the shore by absorbing some of the wave impact (Stern 1993c:358). Fish pools cut into bedrock, that were filled with a continuous supply of seawater, have been discovered at Dor (Stern 1993c:371). The Persian period saw installations at Dor to the northwest that included a square pool. It is believed that this pool was used to soak wood for ship construction and repair (Stern 1993c:370). In Roman times, an aqueduct diverted spring water from the Carmel Range to Dor (Stern 1993c:364).

4.4.3 Ashdod

4.4.3.1 Background

The site was located around six kilometres from the ocean, and so, was probably closely connected to Tel Mor which might have acted as Ashdod's a port (Dothan 1973:1-3; Dothan 1993:93). Ashdod consisted of an upper and lower city with (Dothan 1973:9). The upper city covered over eight hectares and the lower city over 28 hectares (Dothan 1993:93). Excavations at Ashdod's Areas H and K appears to indicate a long period of continuous occupation from the Late Bronze Age through the Hellenistic period (Ben-Shlomo 2005:1-2). Ashdod (Fig. 4.30) was excavated by Moshe Dothan between 1962 and 1972 (Ben-Tor 1992a:5).

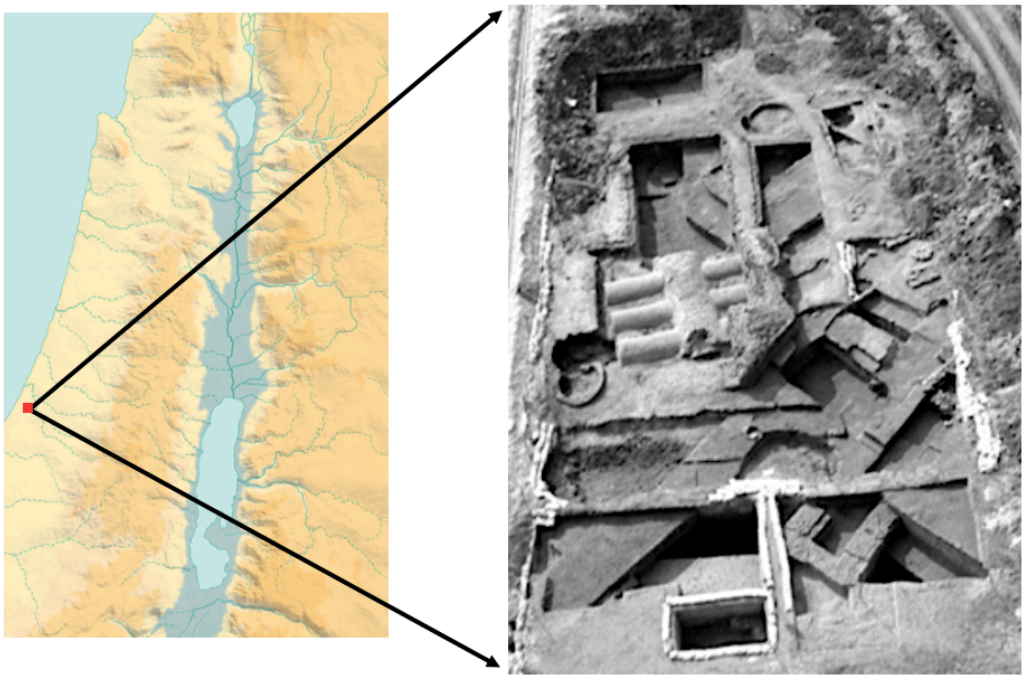

Fig. 4.30 Aerial view of Ashdod (adapted from Curtis 2007)

4.4.3.2 Occupational levels

(a) Bronze Age Ashdod

Ashdod's initial Canaanite establishment has been dated to the Middle Bronze Age between 1648-1540 BCE as a fortified city (Dothan et al. 1993:9; Dothan 1993:95 & 97). Excavations indicate that occupation at Ashdod during this phase was limited to the acropolis (Ben-Shlomo 2005:2). By the Late Bronze Age, there seems to be signs of an impressive urbanisation and the presence of various Egyptian artefacts (Dothan et al. 1993:41-43; Ben-Shlomo 2005:2). Late Bronze Age Ashdod was mentioned in an Akkadian text in relation to its role as a dye and textile centre (Dothan 1993:93). An example would be a building complex that was fortified and had a pool as part of the construction (Dothan et al. 1993:41-43). Egyptian artefacts, such as amulets and scarabs from Ashdod, indicates that the city continued a trading relationship with Egypt (Ben-Shlomo 2005:8).

(b) Iron Age Ashdod

The beginning of the Early Iron Age buildings has revealed finds and architecture that hints at the success of the Philistine city (Ben-Shlomo 2005:3). A period of transition then appears in the archaeology in the middle of the 11th century BCE and between the 10th and 9th

centuries (Ben-Shlomo 2005:8). This time was the height of settlement at Ashdod and it expanded to include the lower city (Ben-Shlomo 2005:6; Dothan 1993:98). The city was eventually destroyed by the Babylonian army and, thereafter, had limited settlement. As Persian control ensued, Ashdod was rebuilt on an entirely new layout with the Hellenistic settlement following (Ben-Shlomo 2005:6; Dothan 1993:101).

4.4.3.3 Water systems and use at Ashdod

To conserve water, there appears to be a system of rainwater collection from roofs, which was transported with the use of drainage channels. Attention was also paid to keep water damage to a minimum (Dothan et al. 1993:41-43). When this building suffered damage, it was not destroyed entirely but rather reused. Some of the drainage channels were blocked off by new constructions, while elements like pools were plastered and reused (Dothan et al. 1993:47). At the end of the 9th and during the 8th centuries BCE, the main street shows evidence of the drainage of excess water through subterranean channels. These channels connected to a stone-cut channel to transport water further (Mazar & Ben-Shlomo 2005:44-45).

4.4.4 Ashkelon

4.4.4.1 Background

Ashkelon was a coastal city with access to fresh groundwater for agricultural practices and daily use (Stager 1993:103). The groundwater was in the form of an underground river that flowed underneath the port city (Stager 1993:103). Ashkelon was excavated by John Garstang between 1920 and 1921 (Stager 1991:29). Various scholars have since taken part in debates surrounding Ashkelon's settlement. One example of such debates involves the arrival of the Philistines at the site. Dothan, for example, opted for the theory that a smaller group of Sea Peoples arrived first, while Stern believes that the group arrived at the same time as the rest of the coast of the Levant (Stager 1991:31-35). Because of its location, excavations were not just limited to the land, but also to underwater expeditions in the ocean (Stager 1996:58).

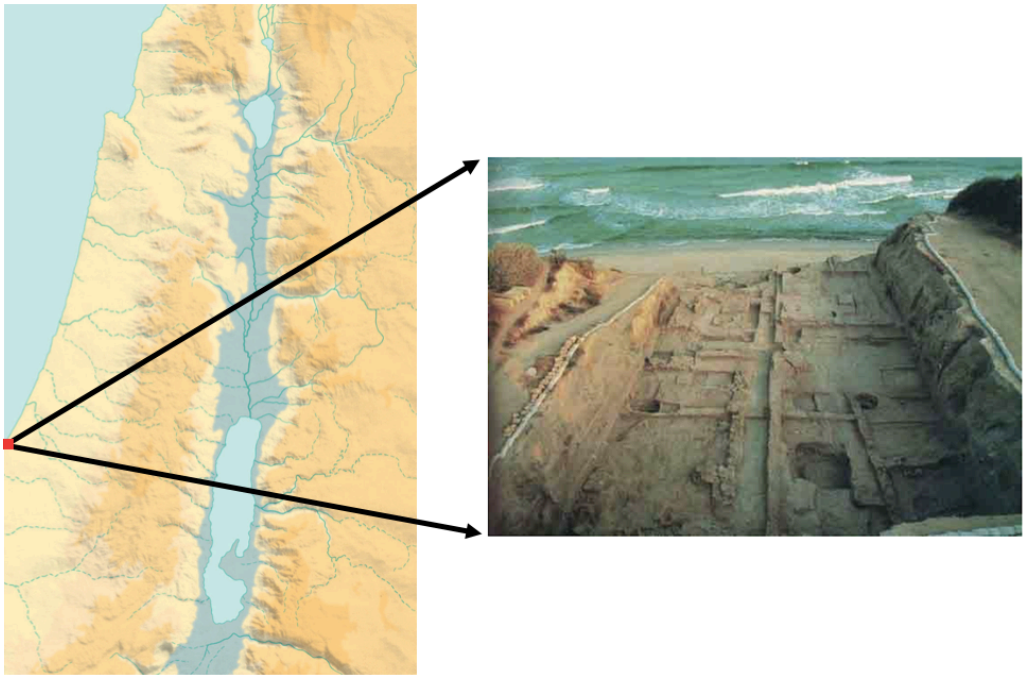

Fig. 4.31 Ashkelon's market and street leading towards the ocean (adapted from Stager 1996; Curtis 2007)

Sea trade at Ashkelon (Fig. 4.31) began as early as the 4th millennium BCE and its proximity to the Via Maris and the ocean led to its economic expansion by the Early Bronze Age (Master 2003:47; Golani 2013:96). Ashkelon acted as middleman between regions to facilitate trade, as they did not possess either timber or luxury goods (Master 2003:47). Throughout its history, Ashkelon could support up to 15 000 inhabitants at the peak of its success (Stager 1993:103).

4.4.4.2 Occupational levels

(a) Bronze Age Ashkelon

Because of its southern location, Egypt was mostly in control of Ashkelon during the Bronze and Iron Ages, either as ruler or partner in trade (Master 2003:47). Late Bronze Age Ashkelon, inhabited by Canaanites, saw the city as mostly under the dominion of Egypt (Stager 1993:103). Archaeological remains from the Early Bronze Age shows that Ashkelon possessed metal works (Golani 2013:97). Aside from this, Ashkelon was also caught in the turmoil of the surrounding changes of power (Master 2003:49). Ashkelon fell under Philistine control after the arrival of the Israelites in the 12th century BCE and remained that way until 604 BCE (Stager 1993:107). This Ashkelon is referred to in the Bible (Stager 1991:28).

(b) Iron Age Ashkelon

The Philistine city of Ashkelon covered over 60 hectares (Stager 1993:107). The impact turmoil was felt with the arrival of the Assyrian empire by the end of the 8th century BCE (Master 2003:49). The Assyrians treated the cities of Philistia different than the rest of their conquered ones. They were made to be vassal states instead of having their people deported. This may have been for economic reasons or so that they may serve as a buffer between the Assyrian rulers and Egypt (Master 2003:50-51). Assyrian occupation rule of Ashkelon saw revolts under some of Ashkelon's rulers, as well loyalty by others like Rukibtu (Stager 1993:104). The 7th century BCE finds indicate that a Phoenician influence remained prominent in their economic development (Master 2003:58-59). At the end of the 7th century, however, Ashkelon was destroyed by Nebuchadnezzar (Master 2003:61; Stager 1996:58). A gap of a few decades followed until the arrival of the Persians (Stager 1996:69). This combination and balancing of economic affluence and political strife acts as proof of what Ashkelon's world was like in ancient times (Master 2003:60).

4.4.4.3 Water systems and use at Ashkelon

The location chosen for settlement appears to have been particularly favourable in terms of its other environmental characteristics that includes: access to fresh water, agriculturally favourable soil, and a variation of plant and animal life (Golani 2013:96). The underground water would probably have meant that digging wells would have been an efficient method of securing water with minimal effort in terms of labour. This logic is confirmed by the many wells found at Ashkelon, with the oldest excavated by 1993, dating to around 1000 BCE (Stager 1993:103). The lack of efficient drainage in Ashkelon's surroundings would later become problematic, as marshlands spread (Golani 2013:98). Drainage within in the city was successfully managed with drains as part of the street network (Stager 1993:107).

4.5 CONCLUSION

From this chapter, there appears to be various aspects that influence both the role that cities played as well as what their requirement were as far as water is concerned. It appears that there were political, economic, and defensive reason for the development of the different

societies. Water played similar roles in some settlements such as drainage systems, irrigation systems, and use for everyday life. However, there were also other uses that stemmed from site specific situations. This includes transportation, both across the Mediterranean and within ancient Palestine, through the use of rivers. It is theorised now that these different uses would also have affected a further division within class, as they are characteristics of an evolved society. These social aspects deriving from the case studies, are discussed in the chapter to follow.

CHAPTER FIVE
THE ROLE OF WATER AND SOCIAL DYNAMICS IN ANCIENT PALESTINE

5.1 INTRODUCTION

There are many aspects to consider when looking at the development of any civilisation or area, as human history is greatly complex in nature. In order to create a scope, focus has been placed on water as the common denominator. When looking at the role of water in affecting the societal development of populations, it is true that one does not necessitate the other. However, with the knowledge acquired up to this point in time, it would certainly appear as though, to a large extent at least, an influence still remained. Biblical narratives can be used to see how the changes in water systems, processes, and technology surrounding the storage and usage of water related to social dynamics. Such changes include the point where it acted as a uniting force for permanent settlement with the rise of cities to becoming a divider of classes. This means that a shift occurred from water as a necessary resource towards part of a symbol of luxury and power (cf. 4.3.3.3). As society shifted towards modernity, perhaps by focusing on water-related elements in daily life of Old Testament times, some examples will be brought to light. In theory, it seems probable that the changing extent to which water would be manipulated throughout the archaeological periods, the Old Testament would have contributed to the divides in a class system as it led to the creation of different jobs, spanning from water carriers to the engineers and officials who installed the massive systems, such as those found at Gezer (cf. 4.2.2), Jerusalem (cf. 4.3.4) and Hazor (cf. 4.2.1).

With the need for humanity to manipulate water in the quest for social complexity, the investigation of the magnificent ancient water systems (cf. Chapter Four) remains a topic of awe and, in some instances, of debate. Such debates might stem from an oversimplification of an aspect of life that cannot be studied in isolation. Factors like the environment, climate, political stability, etcetera, all play an important part in how development occurs. With the focus of this research being centred around ancient Palestine and its vastly variable environmental conditions, this setting had to be described (cf. Chapter Three). The need for securing a permanent supply of water was thus not necessarily a straightforward approach. Depending on which sites are being looked at, different methodologies might have been followed to secure water resources. There is also a need to further look at the water uses and

systems throughout the archaeological periods of the Old Testament to see how societal changes were impacted by it.

5.1.1 Examples from Bronze and Iron Ages

The 15th century BCE saw many inhabitants of Canaan living in urban environments for safety reasons. In times of unrest, when the town's watchtowers were not sufficient, cities provided refuge. Agriculture was a major part of the lives of most Canaanites, seen through evidence in the *el-Amarna Letters* and with the uncovering of cisterns, wine-vats, and oil-presses (Paton 1902:25-28). One of the main methods created for conserving water in agricultural practices was to create terraces that would lessen the amount of water that would be lost through runoff. Although successful for this purpose once implemented, it would have been a very labour-intensive method (Hopkins 1987:184; Ebeling 2010:33; cf. 3.4.4.3; 3.5; 4.3.2.3).

To the early Israelites, agriculture was the main economic activity, although animal husbandry did still form a part of their livelihood, albeit in a secondary capacity (Callaway 1999:75). With the creation of terraces in the hill country, runoff water was captured and used to improve the probable success of farming on hillsides. Wheat, barley, vegetables, and olive trees, among others, could now be cultivated in areas where natural water sources would not have sufficed (Callaway 1999:83). Due to the small population sizes of villages in the Iron Age, food production would not have had to be done on such a large-scale. However, towns also had granaries where they could store the excess food that could later be used in trade or simply for sustenance (Dever 2003:115). Typical crops that would have been planted would include wheat, barley, and millet, which were planted so that it would be ready for harvest by late spring or early summer. Spreading of crops was also practiced to attempt to avoid the risk of losing all the available crops in a season (McNutt 1999:71). Each family was also responsible for their own specific agricultural area, although pasture land was public land (McNutt 1999:71-80).

5.2 WATER AS INFLUENCER

This part of the investigation involves aspects like the changing uses of water and the technological advancements that went with it. These changes stemmed from a need for

greater quantities of water, being stored more efficiently, to sustain the population of an ever-urbanising world (Finkelstein & Silberman 2001:337). Looking at dating the different water systems, a suggestion was made by Issar. It is posited that one can look at the changes in hydrogeological and technological advancements based on the theory that there will be a shift from basic and simple towards elaborate and complex (1976:130). However, because the very nature of human development spans across time and space (cf. 3.2.4; 3.3.1), in practice, there are too many external variables. Perhaps, such quests for simplifying systems is applicable to searches for quick and universal answers surrounding water systems in general.

Based on Issar's description of how technological and hydrological knowledge influence different types of water supply systems, it seems important to indicate that this ranges from the most basic of systems which requires the least amount of knowledge of hydrological elements to advanced systems that would be dependent on advanced knowledge of both hydrology and geology (1976:130-131; cf. 4.2.1.4). Water in its naturally occurring form, such as springs, might also have aided in the identification of sites suitable for building sanctuaries. The theory is based on the creation of man-made holy places where the environment itself (for example the form of mountains, glades, or fountains) was previously used as a high place (Le Roux 1999:135).

As was seen in previous chapters, the ancient Near East (cf. Chapter Two) has always been heavily involved with securing water sources. The systems created to secure its conservation was only possible due to technological advancements and an ability to either conform to the environment or adapt in a different way. It would, in turn, impact social and economic structures (Roberts 1977:143). Kenoyer has stated that people use material and religious aspects to create an identity for themselves as a group (1999:39). From this statement, it seems reasonable that the same applies to the construction of specific water systems and practices that surround it.

5.2.1 Economic prospects

Along with clear evidence that the environment would have given early inhabitants pause for consideration when deciding on a location for settlement, it is within reason that economics would have been another driving factor. Water would still need to be secured,

but marginal areas would have been attractive enough to inhabit. Perhaps this is even more fathomable, because it still makes sense for modern creation of cities, towns, etcetera. The creation of some settlements might have been economically motivated rather than environmentally, as seen at Arad.

5.2.1.1 Examples of economically driven settlements

With the case study of Arad (cf. 4.3.1), the environmental conditions appear to have been a major consideration of where to settle. The environment was important because of a lack of technological knowledge on how to secure water artificially. In times with moister climatic conditions at Arad (e.g. Early Bronze Age), settlement could easily be successful, whereas when drier conditions became prevalent (e.g. Middle Bronze Age), destruction ensued (Frumkin 2002:21). The settlement of the area was probably to support an economic function and form part of the social dynamics developing within settlements and regions as a whole (Amiran 1991:158-161). During the Iron Age, Arad came to serve the kings of Israel and Judah as a guardian of the route followed to reach Edom and Elath. In terms of economic interests, the road it protected was of major importance for trade in copper, spices, and perfumes with Arabia (Aharoni & Amiran 1964a:43-44).

At Ashkelon (cf. 4.4.4), the importance of its role in maritime trade along with the availability of water through shallow wells because of the high water table, made the occupation at the site favourable Ashkelon serves as an example of an area with favourable environmental conditions. That led to continuity and transition rather than a complete abandonment and re-uptake of a settlement. This was the case until the Early Bronze II period, where increases in precipitation created marshlands and led to abandonment (c.f. 4.4.4.1; Golani 2013:96-98). Although environmental conditions still dictated how long the site could be settled, it seems that possibilities of trade would have driven the inhabitants to remain there as long as possible. With technological advancements, the environmental elements, at least as far as water is concerned, would have had less severe consequences, as it could be manipulated by man-made inventions, such as tunnels (cf. 4.2.1.4; 4.2.4.3; 4.3.4 etc.).

5.2.2 Fortification driven

Cities were built on higher areas, such as at the tops of hills, for security. This left the problem of collecting water, as the naturally occurring sources would not necessarily have fallen within the high area of habitation. It meant that securing safe access to water was necessary for defending the city of the Canaanites and Israelites alike (Weinberger et al. 2008:3035). Creating water systems that would satisfy this need often required engineering expertise. Some installations, like those at Jerusalem (cf. 4.3.4.2) and Megiddo (4.2.4), were aimed at creating secure shafts and tunnels to reach springs from within the fortifications (Weinberger et al. 2008:3035; Fritz 1995:151). The tunnel requested by Hezekiah in Jerusalem, for example, was forced by the imminent arrival of the Assyrians (Grossberg 2013:211). At Gibeon, a tunnel connected the pool to the spring (cf. 4.2.3); at Gezer, a tunnel was created up to a cave with groundwater (cf. 4.2.2); and at Arad a cistern was constructed (cf. 4.3.1) (Weinberger et al. 2008:3035).

The reservoirs from Arad, Ai, and Byblos (cf. 3.7.1.1) show evidence of the use of water systems to ensure the inhabitants' safety in times of war. Arad shows evidence of a deep well being dug, while Beth-Shemesh and Lachish (cf. 4.3.5) made use of cisterns to store runoff rainwater (Dever 2012:126-127). One theory is that the distance of the reservoirs, at Arad, Ai, and Byblos, to the closest constant water source and to the agricultural fields, meant that they were not used for irrigation (Miller 1980:337). A different theory is that the reservoirs would have stored water so that the town's flocks could stay within a close perimeter of the town itself when natural surface water sources dry up (Miller 1980:337). Having a permanent source of water in times of political unrest made the creation of underground shafts a favourable technique to access natural water sources and making it reachable within the safety of the towns or cities. However, even though the technique was known, it would have required the knowledge of experts in the field, thus making it an expensive endeavour (Miller 1980:339). Hazor and Megiddo are good examples of where maintaining the defensive integrity of the city was a major consideration in the planning of creating water systems (cf. 4.2.1; 4.3.4).

The water systems developed over time had a great impact on the outcomes of sieges when invaders no longer had access to the city's water supply (Biswas 1985:207). During Hezekiah's rule, Judah, and subsequently Jerusalem, faced the arrival of the Assyrian army

under Sennacherib. In order to protect the city against the looming siege, walls were repaired and towers built. Hezekiah also ordered that a workforce be sent to block the springs and stream in the area so that Jerusalem's attackers would not have access to this necessary resource outside its walls (2 Chronicles 32:5). The message from Sennacherib to the people of Jerusalem as a chance to surrender and perhaps remain independent included water availability as an incentive: 'Make peace with me and come out to me. Then every one of you will eat from his own vine and fig tree and drink water from his own cistern...' (2 Kings 18:31).

Other examples of water security affecting the military chances of a city can be seen in: Samaria, where they were able to fend off the Assyrians for two years from 723 BCE, as well as at Jerusalem where they held out against the Babylonians for a year and a half during the onslaught by Nebuchadnezzar from 587 BCE (De Vaux 1973:238; Rowley & Taylor 2006:43). After the death of Ahab, Moab revolted against the Kingdom of Israel. As the coalition from Israel, Judah, and Edom set out to end Moab's revolt, they faced challenges of water shortages. The prophet, Elisha, then spoke on behalf of God and said that water will flow if they make the valley full of channels. Along with the provision of water for the armies, it was also prophesied to the king of Israel that: 'You will overthrow every fortified city and ever major town. You will cut down every good tree, stop all the springs, and ruin every good field with stones' (2 Kings 3:19-25).

5.2.3 Population driven

With the expansion of settlements and increases in population numbers, water engineers had to focus on increasing water supply. Different methods were used to achieve this, depending on the need of the sites. The first includes the use of different sources of water in combination either by using ground- and surface water or by diverting runoff water. As is the case in Jerusalem, sometimes the existing systems were expanded rather than creating an entirely new one (cf. 4.3.4) (Frumkin 2002:23). A second method focused on storing large quantities of water through the construction of reservoirs (Frumkin 2002:23). It would mean a secure water source in times when rainfall was not sufficient. The pools, like that of Solomon's Pool in Jerusalem, were fed by groundwater, springs, and runoff (Frumkin 2002:23). Lastly, increasing the amount of water that could be gained from groundwater was another method. This was done by enlarging the parts springs flow from. The tunnel created

to increase flow from the El Jib spring of Gibeon (cf. 4.2.3), was one example. The engineers often used the geological components to ease the process by excavating along fissures (Frumkin 2002:23).

The large-scale creation of water systems is linked to royal cities. This makes sense since only where cities had the economic means, could they manage such projects. These include digging tunnels and shafts for securing water within the confines of the fortifications (Herr 1997:141). As is the case at Megiddo (cf. 4.2.4), the inhabitants would use water jars tied to ropes lowered into shafts to collect water. At Lachish (cf. 4.3.5), such a shaft was located in the area around the homes located near the palace (Herr 1997:141-143).

Evidence exists of the upgrading of older water systems as need arose. Iron Age inhabitants also might have used other systems as blueprints for copying it at their preferred settlements (Gibson 2009:45). In all probability, this too was not limited to copying between the Bronze and Iron Ages, but rather a general transference of knowledge that is inevitable with the interconnectedness of the ancient world.

5.2.4 Agriculture driven

The variety of environmental conditions that exist throughout ancient Palestine leads to questions regarding what areas were populated as well as how the social structure within communities led to the use and allocation of natural resources (Ahlström 1982:133). The Hydraulic Hypothesis (cf. 3.4.1) from decades ago is based on providing a possible explanation for the creation of permanent settlements in ancient times. It includes the theory that irrigation systems were necessary for the creation of socially complex populations. As becomes clear with research into water systems as a whole and the creation of urban settlements, irrigation might aid in aspects of such complex societies, but probably does not solely dictate its possibilities or establishment (Harrower 2009:58 & 66). Water management has been at the forefront of thought as communities began to settle and pursue agriculture (Black et al. 2010:5107). However, because of the interdisciplinary nature of a study such as one involving elements of water and society, there is an interest in it for researchers from atmospheric physics to religious symbolism (Black et al. 2010:5107-5108).

In history, many of the settlements in ancient Palestine was focused on rain and runoff collection to sustain their communities. The use of springs, rivers, and groundwater sources then became of increasing importance; however, their usefulness was reliant on technology and knowledge of environmental conditions (Frumkin 2002:21). To change environmental conditions, such as that of the hill country or the desert, so that it becomes possible for humans to settle there is only possible through immense projects of intensive work and planning. This includes, but is not limited to, the creation of terraces around Jerusalem so that crop cultivation could take place (Har-el 1997:149-150). In the Jerusalem hills, man-made springs were created by digging into the hill itself until reaching water. By digging into natural springs with bad returns, their discharge could be optimised (Har-el 1997:152). In ancient Palestine, the three climatic regions had different sources of water and the inhabitants would use the best suited options for where they were. In the hilly areas, dry-farming was possible because the annual rainfall was enough. In the valleys of the Negev Mountains, floodwater was the main source of water for growing crops. Around En Gedi, irrigation systems supplied water for growing incense and spices (Har-el 1997:150; cf. 3.5).

5.2.5 Social dynamics

Before the large-scale manipulation of water, natural sources were used to determine settlement locations. The springs granted desert settlements the ability to still produce the resources necessary to sustain a permanently settled group of people, as can be seen from the example at Jericho (Lemche 1988:16; cf. 4.3.1). The major water systems that would be developed later meant that access to water could be secured even in areas with less precipitation. This was a basic requirement in the quest for urbanisation. To build these systems would, however, also require vast amounts of labour and bureaucracies (Mithen 2012:7). This securing of a water supply thus clearly formed a major part of the societal organisation in general.

With little focus being placed on the more vulnerable inhabitants of ancient civilisations in research conducted, there have been instances of skewed perceptions, possibly being created due to a lack of a holistic approach being followed. Holistic research would have to include not only the elite, but also those who built water systems, drew water from them and were the most vulnerable to natural disasters (Mithen 2012:6). The elite were more affected by water in terms of what it meant to them relating to power and luxury when its basic access

was secured (Mithen 2012:7). One example would be the use of proper drainage systems that would first be accessible to the elite (cf. 5.4.8) (Neufeld 1970:414-415). For example, in the Middle and Late Bronze Age periods, archaeologists have found evidence that drainage systems existed for houses. However, these systems were limited to the homes of the upper class (Neufeld 1970:414-415). On the other side of the spectrum falls those of lesser social standing, who were tasked with securing water for their homes and animals, as indicated above.

5.2.5.1 Work allocation

In terms of work allocation, when wells had to be dug, it fell upon the servants to perform the required manual labour (Katz 2012:375; Lemche 1988:16). This can be seen in the account of Isaac in Gerar: 'And Isaac's servants digged in the valley, and found there a well of springing water' (Genesis 26:19). When Moses was told to create new covenant between the Israelites and God at Moab, the differentiation in status is apparent in the description God's people. 'All of you are standing today in the presence in the Lord your God-your leaders and chief men, your elders and officials, and all the other men of Israel, wives, and the aliens living in your camps who chop our wood and carry your water' (Deuteronomy 29:9-11). In Joshua 9:21, there seems to be particular discontent with those tasked with drawing water, where it translates to a punishment of sorts: 'And the princes said unto them, Let them live; but let them be hewers of wood and drawers of water unto all the congregation; as the princes had promised them'. This reflects the low social standing of water carriers (Flanders, Crapps & Smith 1996:235).

In the 8th century BCE, water still impacted daily life, as it would have been a time-consuming business for young girls who would have to collect water from wells or springs in storage jars and stockpile them in their homes (Dever 2012:164). Watering the animals was also part of a young woman's duties (Ebeling 2010:46). Based on ethnographic examples from Palestine, there only the older girls were revered to as drawers of water, while the younger ones might still have helped to carry it (Ebeling 2010:46). There were cases where wells and cisterns were created in close proximity to the house, but this was certainly not always the case (Dever 2012:164). Biblical narratives reflect these duties being assigned to women: '… until all the flocks are gathered and the stone has been rolled away from the mouth of the well. Then we will water the sheep. While he was still talking with

them, Rachel came with her father's sheep, for she was a shepherdess' (Genesis 29:8-9) and 'Now a priest of Midian had seven daughters, and they came to draw water and fill the troughs to water their father's flock' (Exodus 2:16).

5.2.5.2 Ritual baths and methods of healing

When looking at Israelite and Jewish religion at the time of the Old Testament, there are two important aspects highlighted by Ricks in that there existed a need for ritual purity, but that this also meant the need existed for water-related infrastructure to support this practice (Ricks 1996-97:278). The question of infrastructural examples has been covered above and insight into ritual practices follow below in brief terms: Biblical rules from Leviticus dictated what actions had to be taken for ritualistic purification, which preferably meant cleansing in flowing water, alternatively salty or warm water, and if that was not possible, by pouring water from vessels onto the body (Ricks 1996-97:278-279). Due to the scarcity of naturally flowing water for dry parts of the year, ritual baths were created to serve the purpose. These ritual baths are present in the archaeology of the Second Temple period and have been excavated at, for example, the Herodium, Masada, Jericho (cf. 4.3.3.3) and Jerusalem (cf. 4.3.4.3) (Ricks 1996-97:279). There appears to be an absence of ritual baths before the Babylonian exile (Katz 2012:370). This indicates that the method of cleansing, and the seriousness with which it was applied, evolved over time or spread from other civilisations.

Lawrence identified three separate sectors for the use of ritual baths (for both washing and purification) that is referred to in the Hebrew Bible (2006:26-31):

- General washing refers to the purification practices of all the Israelites to cleanse them from impurities. Aspects that were regarded as impure was written in Leviticus 11-15.
- Priestly washing is related to the purification practices used only by the priests and Levites. Aaron and his sons washing before entering the tent in Exodus 30:17-20 is an example of such practices.
- Washing of theophanies involved the washing of all Israelites as they prepared for special events. It is theorised that an example can be found in Exodus 19:10-15.

Aside from the ritual baths found in the homes of the elite, so too are many such washing facilities associated with the richer citizens (cf. 4.3.4.3). This is because of the architecture required for such facilities, which include, but are not necessarily limited to, a proper drainage system and waterproofing (Katz 2012:373). Examples are found throughout the lands of the Aegean and the Near East. An Assyrian example of a bathing room was found near Tel Ashdod (cf. 4.4.3) in the residence of, presumably, an Assyrian governor from the 8th century BCE. Similar installations have been found at Tell Abu Hawam and Tel Dan (Katz 2012:373-274).

Water formed part of rituals performed by priests to heal diseases. After the priest has sprinkled the infected individual, the diseased person must clean his clothes and bathe in order to be pronounced clean (Leviticus 14:5-10). Similar steps were part of the purification of homes by priests (Leviticus 14:49-57) and cleansing after touching the dead (Numbers 19:11-22).

5.2.5.3 The purpose of water systems

Similarities exist between sites and so we can draw conclusions on what different water systems were used for. For example, some water systems were used to secure water such as in times of war, while others were primarily used to sustain the agricultural practices of the settlements (towns, cities etcetera) and other systems were used for social advancements. Water had varying impacts on society that are not limited to one aspect of their lives but rather to most of it. This includes their survival in terms of sustenance, their development in terms of hygiene and technology, and their societal divisions in terms of use and distribution. Har-el stated that the people living in hilly regions needed access to a lot of water, although it did not necessarily have to be clean (1997:152). This water would be used for other purposes, like laundry, bathing, and animals, and captured in reservoirs (Har-el 1997:152). Food was mostly prepared by either boiling or broiling (Neufeld 1970:425).

5.2.5.4 Water sources as meeting places and means of orientation

In the Old Testament, water supply elements are also used as a means to orient the reader. For example, the Gihon Spring is believed to be both the spring where Solomon was

crowned king in 1 Kings 1:33. In the story of Abraham and Isaac, wells are also used to describe where much of their daily life would have taken place (Gen 21:25-31). This attests to the role water sources played in ancient times, as it is used as markers that would be known.

Further examples include 2 Samuel 2:13: 'Joab…and David's men went out and met them at the pool of Gibeon.'; as well when Isaac's wife, Rebekah, was introduced when Abraham sent a servant to find a wife for his son in Genesis 24. Other meeting stories at wells is that of Jacob meeting Rachel for the first time (Genesis 29:1-13) and Moses meeting Zipporah (Exodus 2:11-23).

5.2.5.5 Water in disputes and punishments

Wells led to episodes of unrest between different groups as mentioned in the book of Exodus (Lemche 1988:16). This was because the control of the water supply should certainly, in turn, grant the opportunity to expand settlements and cement a greater future in terms of economics and politics. For example: 'Isaac reopened the wells that had been dug in the time of his father Abraham, which the Philistines had stopped up after Abraham died…Isaac's servants dug in the valley and discovered a well of fresh water there. But the herdsmen of Gerar quarrelled with Isaac's herdsmen and said, "The water is ours!"' (Genesis 26:18-20).

In terms of the infiltration of a city, 2 Samuel 5:6-8 describes the strategy that David prepared to attack the Jebusite city of Jerusalem. He said: 'Anyone who conquers the Jebusites will have to use the water shaft to reach…David's enemies.'

Water systems that have gone out of use were also used as means of imprisonment (Klopper 2002:50). For example: Joseph's brothers threw him into an empty cistern in the desert when he arrived before selling him to Midianites (Genesis 37:23-24 & 28): 'So Joseph went after his brothers and…they plotted to kill him…they said to each other "Come now, let's kill him and throw him into one of these cisterns…"' (Genesis 37:17-20) and Jeremiah was punished for his proclamations of the impending fate of Jerusalem falling into the hands of the Babylonians. He was put in a cistern belonging to King Zedekiah's son. 'They lowered

Jeremiah by ropes into the cistern; it had no water in it, only mud, and Jeremiah sank down into the mud…' leaving him to die of starvation (Jeremiah 38:2-9).

The physical labour required for the construction of large-scale building projects, such as some water systems, fell to the lowest classes. Accounts, such as those found in the 9th century BCE *Mesha inscription,* also appears to indicate the use of prisoners from Israel to build King Mesha's large-scale water systems in Moab (Kaplan 2010:28; Scheepers 1984:150).

Finally, water formed part of rituals used by priests to detect the infidelity of women. Numbers 5 describes how priests would test and punish women for infidelity by taking holy water mixed with dust from the tabernacle as part of a curse. If the woman drinking it is guilty, the bitter water would then cause suffering. If the suspected woman is innocent, she would be spared from the curse.

5.2.5.6 Reputation

Water systems that required impressive projects to complete are used as an example of leaders' abilities to care for their people. One example is that of King Mesha's projects at Baal-Meon and Dibon that received mention in the *Mesha Inscription* (Kaplan 2010:23). Similar examples have been mentioned in previous chapters from the neighbouring regions of ancient Palestine (cf. 2.3). The effect that the successful creation of a monumental water system would have on a ruler's reputation is, however, also clear when looking at the naming conventions of water systems mentioned above for Jerusalem - for example, Solomon's Pool and Hezekiah's Tunnel being named after the kings. This immortalises the rulers and shows the importance of these elements of water supply.

Of note for the role of water systems in terms of social classes, is that aside from the public ritual baths, many private homes of the wealthy citizens or priestly families had private *miqvaot* (ritual baths). Examples were found in the Upper City of Jerusalem and outside the Old City, close to the Dung Gate (Ricks 1996-97:280). Class division is hinted at here, with a lack of similar installations in lower class dwellings.

5.2.5.7 Industry

Large quantities of water were necessary for daily uses when looking at industrial-sized practices. This includes practices such as that of the large-scale production processes used in pottery industries. The Suba water system was created away from the settlements that existed at the time of its construction in the Iron Age (Gibson 2009:51). Dating seems to indicate that the Suba system was in use in the Iron Age II period, acting as part of a 'royal Judahite enterprise' (Gibson 2009:52-53). Initial theories on the function of this system being related to agriculture has been set aside in favour of one indicating that it was used for industrial work. This was based on the discovery that water circulation formed part of the system. Remnants of clay silt found in two pools support the theory of clay cleansing on a large-scale (Gibson 2009:51). The process involved with purifying the clay included basins and settling tanks, where workers would walk on the clay mixed with water. After draining the basins, tempers could be added, and the clay could be moulded (Gibson 2009:45). The Suba system appears to have gone out of use in terms of its original purpose by the end of the Iron Age. However, as an example of reuse, the reservoir might have remained in use until the 2nd century BCE. Perhaps it was reused again for ritualistic purposes in the first two centuries CE (Gibson 2009:53).

5.2.5.8 Hygiene

Aspects of hygiene and sanitation in ancient Palestine are another consideration in how and why certain elements of water systems were created (cf. 5.2.5). In terms of personal hygiene, generally, the practice of washing hands and feet were common practice for religious reasons. Washpots or basins were used for this purpose (Neufeld 1970:421). Upon Joseph's brothers' arrival in Egypt, for the second time such washing is reflected in Genesis 43:24: 'The steward took the men into Joseph's house, gave them water to wash their feet and provided fodder for their donkeys.' God also commanded that Moses: 'Make a bronze basin, with its bronze stand, for washing. Place it between the Tent of Meeting and the altar, and put water in it. Aaron and his sons are to wash their hands and feet with water from it…they shall wash with water so that they will not die…' (Exodus 30:17-21).

When bathing, a jar was probably used to pour water onto the body while standing, as being totally submerged was only used for ritualistic reasons for general families (Fig. 5.1)

(Neufeld 1970:421; Ebeling 2010:137). If similar practices were followed to that of the ancient Greeks, warm water would have been used and an instrument like a strigil might have been part of the process of cleaning the skin (Neufeld 1970:421).

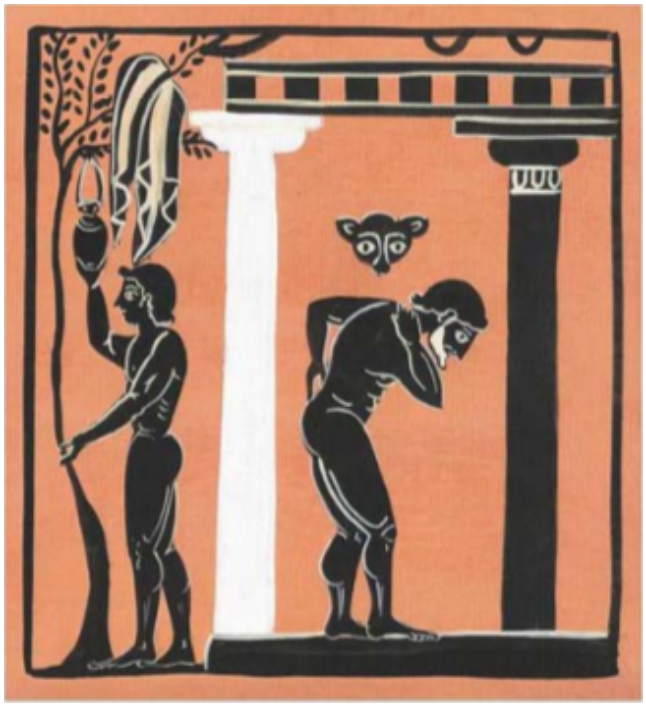

Fig. 5.1 6th BCE public bathing place example from Greece (Mamassis & Koutsoyiannis 2010:104)

The more refined hygienic practices are linked to the wealthier parts of the population. They would have bathed in rivers and streams as well as pools or bathtubs in the homes (Neufeld 1970:422). Immersion pools existed for bathing specifically related to religious cleansing. By Herodian times, bathhouses with heating techniques were used for personal hygiene (Neufeld 1970:422). Generally speaking, however, some baths for the public were not present in many villages and cities, but where they did exist, they were not aimed at the elite but rather for the use of any inhabitant (Neufeld 1970:422-423).

5.2.5.9 Further biblical references to water

(a) God's mercy and wrath

The Bible uses water as a representation of God and the power he has to bestow life on the land and its people (Wenham 1999:87). This is not a surprising conclusion, as similar beliefs existed in the ancient world, such as in the case of the Egyptians. They saw the Nile and the

opportunities it presented them as an indication of the favour they had with their gods (Rice 2003:36). As such, to the people of the Old Testament, the natural environment was not just necessary for survival, but a God-given gift. This is attested to in Deuteronomy 11:11 serving as an example of where the biblical writers give a sense of gratitude to God, but not without the knowledge that favourable conditions in terms of water availability could also be taken away (Wenham 1999:87).

Leviticus reflects this opinion as well: 'If you follow my decrees and are careful to obey my commands, I will send you rain in it season, and the ground will yield its crops and the trees of the field their fruit' (Leviticus 26:3-4) and 'If after all this you will not listen to me, I will punish you for your sins seven times over. I will break down your stubborn pride and make the sky above you like iron and the ground beneath you like bronze. Your strength will be spent in vain because your soil will not yield its crops, nor will the trees of the land yield their fruit' (Leviticus 26:18-20). Jeremiah 14:2-4 tells of the hardship that befell the people of Judah as God warned would come for their sin: 'Judah mourneth, and the gates thereof languish; they are black unto the ground; and the cry of Jerusalem has gone up. And their nobles have sent their little ones to the waters: they came to the pits and found no water; they returned with their vessels empty; they were ashamed and confounded, and covered their heads'. Water carrying was usually left to women (Power 1921:88; Klopper 2002:96). In context leads to a better understanding of why, in the New Testament, Jesus could tell Peter and John to meet with 'a man carrying a pitcher of water' as it was not a common occurrence in society (Power 1921:88).

Further examples of God's mercy include:

- 'Observe the commands of the Lord your God, walking in his ways and revering him. For the Lord your God is bringing you into a good land – a land with streams and pools of water, with springs flowing in the valleys and hills…' (Deuteronomy 8:6-7).
- When Eliphaz replied to Job's mourning, he notes many of God's wonders that are beyond the understanding of man. One of the miracles mentioned is God's provision of rain to water the countryside (Job 5:9-10).
- Elisha purified the water at Jericho by throwing salt into the spring with relaying God's message: 'I have healed this water. Never again will it cause death or make the land unproductive' (2 Kings 2:19-22).

- Exodus 15:22-25: Moses leading the Israelites from Egypt. After three days in the desert without drinkable water, the Israelites turned their anger to Moses. God then instructed Moses to throw a piece of wood into the bitter water at Marah after which it became sweet. Exodus 17:1-6: The Israelites again argued with Moses after water was scarce again. God commanded Moses to strike a rock with his staff so water would flow from it and the community's thirst could be quenched (Numbers 20:1-13).

Another example of God using water as a punishment for sin include:

- As punishment for their sins against God and desecrating His temple, the people of Judah proclaimed: '…Let us flee to the fortified cities and perish there! For the Lord our God has doomed us to perish and given us poisoned water to drink…' (Jeremiah 8:14).

(b) Water used as metaphors

Water is used in the Bible as part of metaphors. For example:

- A metaphor for fidelity is found in Proverbs 5:15: 'Drink water from your own cistern, running water from your own well.'
- A metaphor for God's blessing of His chosen people: 'For I will pour water on the thirsty land, and streams on the dry ground…and my blessing on your descendants. They will spring up like grass from the meadow, like poplar trees by flowing streams' (Isaiah 44:3-4).
- A metaphor for the consequences of people giving way in the face of wickedness: 'Like cold water to a weary soul is good news from a distant land. Like a muddied spring or a polluted well is a righteous man who gives way to the wicked' (Psalm 25:25-26).
- A metaphor for God's punishment of His people for rebelling against Him as was conveyed to Isaiah (Isaiah 1): '…therefore the Lord is about to bring against them the mighty floodwaters of the River – the king of Assyria…' (Isaiah 8:6).
- Finally, a metaphor for the abandonment of His people is given as God's declaration: '…They have forsaken me, the spring of living water, and have dug their own cisterns, broken cisterns that cannot hold water' (Jeremiah 2:13).

5.3 Conclusion

Water had varying impacts on society that are not limited to one aspect of their lives but rather to most of it. This includes their survival in terms of sustenance, their development in terms of hygiene and technology, and their societal divisions in terms of use and distribution of water. Urbanisation in its most rudimentary stages already brought some challenges for water supply, but these were necessary and would be overcome to enable large-scale settlement of the Holy Land. Some common challenges of urbanisation include the stresses placed on water resources because of changes in the natural environment. With large increases in population numbers and densities, drainage, runoff and water quality, among others, are affected (Zaporozec 1985:203). Human intervention is then further required to mitigate these effects.

Various hypotheses exist regarding the impact of water systems on society in the ever-present quest to find what came first e.g. the Hydraulic Hypothesis (cf. 3.4.1). Although many cases have been made for and against these approaches, it is becoming clearer by the day that the relationship between humans and water (and the world in general) involves an intricate and complex set of scenarios (Mithen 2010:5251). However, in its most basic form, there is no denying that water and the development of water systems directly impacted the rise to urbanised living and, in turn, formed part of what social classes are based on. This is not limited to water use for agricultural practices. From the current chapter, there is also evidence of the impact large water systems had on political status, while water installations focused on smaller scale use impacted societal differentiation. This is seen across purposes of water use.

From this chapter there seems to be a few main themes that can be directly associated with water use and systems. These includes reasons that forced such developments, such as securing a city's water supply in times of war, furthering the goals toward economic security and the need for food, all of which would experience more stress as population numbers increased. In terms of the societal role of water in class divisions, one can look at other aspects of daily life which includes, religion, hygiene and more.

CHAPTER SIX
CONCLUSION

6.1 INTRODUCTION

This research began as a general point of interest due to challenges facing the world today and seeing how such challenges have been faced before and, in times of great difficulty, sustained empires. There is no doubt that no civilisation can function without access to enough water supply to sustain the nation's population. However, there have been many theories over past decades about what other impacts the development of water systems had on society. Karl Wittfogel, for example, is known for his 'Hydraulic Hypothesis' or 'Hydraulic Societies' (cf. 1.5) which is still mentioned in much of today's research. His position was that the development of control over large quantities of water was a necessary aspect required to see civilisation as we know it to develop. His view was focused almost entirely on its application with regard to agricultural practices, but his theories have been cited in various works until today (cf. Mitchell 1973; Lees 1994; Lane 2009). Wittfogel's theory has been largely challenged, since evidence exists of irrigation works that existed before a centralised authority could manage it (Tamburrino 2010:31-32). In contrast, it has been found that agriculture occurred after social division had occurred (Algaze & Fessler 2001:13-14). The amount of research that has stemmed from Wittfogel's work shows the impact that the relationship between water and society (ancient and modern) has had on the very history of mankind.

Wittfogel's theory was not sufficient for this study, as the goal was to not be confined to one aspect of water that impacted social development. The unique view provided by researching an area with such a rich history as the ancient Near East adds to previous work on both the same and different regions. The reason for such value being that it is here where we find the first complex societies in Egypt and Mesopotamia. By combining different disciplines such as archaeology, geography, and anthropology, interesting results come to light.

As the title implies, the overarching aim was to determine the impact that water had on the changing dynamics within the societal development in Old Testament times spanning mostly from the Bronze and Iron Ages, with examples relating to the arrival of the Roman's at the turn of the end of the first century BCE. There was also a question as to the role that environmental conditions played in how water systems developed as well as how it changed the social hierarchies within

settlements. Lastly, the question of how this applied to ancient Palestine, if at all, had to be answered.

6.2 NEIGHBOURING TECHNOLOGIES

In its most basic form, the water technologies that were developed by the civilisations that surrounded ancient Palestine are important, since without them, these civilisations might never have come to be. If these powers, such as that of Egypt and Mesopotamia, did not reach the status they had, ancient Palestine might not have acted as the bridge between them (Eybers 1978:5), which probably gave it its original importance.

There was not any clear indication from the sources that were consulted that the technology of the rest of the ancient Near East directly spread from these civilisations to ancient Palestine (apart from the *qanat* that appeared in the mid-6th century BCE; cf. 2.2.1.3). However, it is not beyond the realm of realism that knowledge spread through word of mouth, as these different peoples interacted through trade, war, migration etcetera.

By looking at the daily lives of ancient Palestine's neighbours, we begin to learn about their social classes and how water use and technology impacted on them. Perhaps one of the most extreme examples being the story of how the first 'engineer' who organised the development of a major water project became the first king (cf. 2.2.1.1). This project not only led to one man being in control of many but would also require physical labour to put into effect. A division of classes was the result. The class structure was as follows: the ruling elite followed by farmers, and, finally, those bound in slavery (cf. 2.2.1.1).

Different evidence that attests to the importance of water system developments come in the form of Sumerian tablets that sang the praises of rulers. As the Babylonians followed, Hammurabi makes his mark on history with the creation of his laws, among other deeds of course. These laws included some encompassing water management and responsibility (cf. 2.2.1.3).

In comparing Mesopotamia with Egypt, it is apparent that they face the similar problem of securing water, but Egypt's environmental conditions granted them an advantage. It also appears that only after water was readily available, could other large-scale building projects be undertaken. The impact on the class system becomes clear with examples of the rich paying the poor to do their

conscripted work. Beautification through gardens and orchards was another application of water use that separated the elite from their subordinates. To maintain these gardens year-round, workers had to manually water them (cf. 2.2.2). It must be noted here that although there are water-related impacts on class development across the examples from ancient Palestine and its neighbours, a key difference relates to Mesopotamia and Egypt using river irrigation. Ancient Palestine did not make use of such large-scale river irrigation because of the different characteristics of its rivers (Rosen & Rosen 2001:541; Klopper 2002:43). Similarly, the terrace farming techniques used in ancient Palestine are not found in Mesopotamia and Egypt (Rosen & Rosen 2001:541). Visual representations and tablet inscriptions provide details of water uses in the ancient world that could add to the picture created of ancient Palestine

From this summary we begin to see that where it became necessary for groups of people to work together to build and maintain water systems and when water use became separate from just being used for sustenance, a shift in societal basics occurred. Another positive outcome was the number of visual representations found of water use as well as written accounts of projects undertaken. These include hieroglyphics from Egypt, reliefs from Assyria, paintings from Greece and more.

6.3 THE IMPACT OF GEOGRAPHY

Geography involves an intense relationship between humans and the natural environment (cf. Chapter Three). For this reason, the field is split into the sub-disciplines of 'human' and 'physical' geography. Theories surrounding '*environmental determinism*' posits that the environment dictates what is possible in terms of human development. By looking at the initial settlement patterns, it is logical that the environment was the main consideration of where the best chances of survival were. An example for this would be the settlement around rivers like the Nile, the Tigris and Euphrates, and the River Jordan (cf. Chapter Two and Three). However, looking at the technological advancements related to water security, there was a shift towards '*environmental possibilism*'.

Once permanent settlement is secured, it would follow that man would be able to begin using their environment, not only to survive, but also to develop a world ruled by them. In terms of the role of geography in the subject of water and social complexity in ancient Palestine, different aspects can be looked at. First, in order to better understand the lives of the people who lived in ancient Palestine, one must look at the world they lived in. The environment differed greatly from one

region to the next and so, would undoubtedly have had to apply different methods of securing water. Environments range from coastal areas with marshland to contend with to the dry conditions of the desert. This meant that in areas with limited rainfall, and only in winter months, had to develop a method of storing water for the remainder of the year (cf. 3.5). Environmental conditions related to water also determined the population size of settlements as marginal areas could not support as many people as fertile areas.

In time, the environment, and water especially, was manipulated to the will of cities, where excess water was diverted through drainage channels and enough water could be controlled for irrigating fields (cf. 3.6). Settlement in ancient Palestine saw many different groups taking control of the land and its people. The focus of this research was aimed at how each historical period dealt with water use and perhaps, how they could reuse and improve the systems implemented by those before them (cf. Chapter Five).

The main methods used to secure water supply was tunnels, wells, and cisterns. The choice of which method was deemed most appropriate depended on the needs of the population as well as the kind of water supply they could use, such as springs, rainfall, or diverting water from rivers (cf. 3.7.1). These decisions could be affected by aspects like the protection of settlements in times of war, the need to store water for later use and the quantity of water necessary.

Geographic characteristics dictated settlement locations and city layouts, as can be seen at Arad where the natural slope was used in conjunction with street planning to fill the reservoir (cf. 4.3.1.3). The natural springs at sites such as Jericho and Jerusalem allowed settlements to flourish in these regions (cf. 4.3.3; 4.3.4). The water table allowed for water systems to be created that would provide water with as little labour as possible (cf. 4.2.1.3; 4.4.2.3; 4.4.4.3).

6.4 WATER AND THE BIBLE

The Bible provides an important set of characteristics that come in use with any history of ancient Palestine, but in this case specifically with regard to water use. Aside from giving a view of what daily life might have been like, specific examples of water systems are mentioned as part of important narratives, such as that of Hezekiah’s move to protect the city (cf. 4.3.4.2).

Phenomena regarding water, such as droughts, floods and a lack of it on quests undertaken in God's name, was seen by the biblical writers as communication by God. With wells drying up, it was seen as punishment for the Israelites' previous actions. In contrast, the description of the Holy Land in Deuteronomy shows how God favoured His chosen people by giving them a land with valleys and rainwater (cf. 5.2.5.9). In terms of religious practices, water was also used as means to purify themselves (cf. 5.2.5.2).

6.5 THE RISE OF ANCIENT PALESTINE'S COMPLEX SOCIETY

The social impact of the development of water systems and methods of manipulation become clear across different fields. These systems that have been found throughout ancient Palestine serves as material evidence of what life was like and to what measure sites were able to secure water and how they might have failed if they could not (cf. Chapter Four). Water played an important part in many aspects of daily life in ancient Palestine. Such areas of impact include industries that formed part of the economic structure of cities, which includes potters that required large quantities of water (cf. 5.2.5.7). Such industrial activities, in turn, form part of social complexity with different classes being part of different stages of the process from the creation of goods to the trading thereof. The profit from such practices would undoubtedly have gone to the elite first, trickling down to the lowest class people of the chain.

With regards to large-scale projects that were undertaken, such as the water systems of Hazor, Jerusalem, Megiddo, and Gezer, many workers would have been required. Again, differentiation of classes would be clear in terms of the job allocations from the person in control of the project to the engineers, specialty workers and then unspecialised workers. Simple aspects of life in general, such as the drawing of water, could also be used as an example of class division, since it appears to be a job left to the lowest parts of society (cf. 5.2.5.1).

Developments in health and hygienic uses of water (across archaeological periods), such as the different baths at Masada and Jericho (4.3.3.3) or a bathroom at Hazor's palace, are some of the examples related to ordinary life rather than large-scale projects. However, there might also be evidence of water systems being used to better society as a whole by looking at public baths. Although, the first evidence found of this is found in Herodian times (cf. 5.2.5.2; 5.2.5.8).

The chapters that came before sought to explore different aspects of social development and changes in water sources and uses and, finally, to determine the extent of the correlation that exists between these aspects. There are so many of these aspects to consider when looking at the development of any civilisation or area as human history is greatly complex in nature. Because of these aspects, the multi-disciplinary approach that was used throughout allows insight into most aspects of water that governed social dynamics in ancient Palestine. When looking at the role of water on affecting such development, it is true that one does not necessitate the other, but with the knowledge acquired up to this point in time, it would certainly appear as though, to a large extent at least, an influence still remained. In time, we will see how the changes in water systems, processes, and technology surrounding the storage and usage of water coincided with social changes. This is from the point where it acted as a uniting force in the rise of cities (cf. 3.8) to when it became one divider of classes with a shift from a necessary resource towards a luxury commodity.

6.6 AREAS FOR FUTURE RESEARCH

Future research has many routes that it could follow, since water systems and social complexity both involves the study of many sub-disciplines. Perhaps with more research, different sites could be compared by looking at only one of the archaeological periods, which would allow for more intensive details. Many of the sources found in the quest to gain insight into the physical layouts of large water systems could only be found in Hebrew. For this reason, another research opportunity might arise by adding these sources as they might illuminate more aspects to compare. In general, water and society does not necessarily form the centre of research, barring a few exceptions of course, and so there are many one-sentence pieces of information hidden in between massive quantities of information.

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