Water, geomythology and cosmology in late Neolithic Malta

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INTRODUCTION

Water is one of the most widely encountered elements in the environment. Indispensable for most forms of life, its significance for humans is primordial and universal. Yet because it is so fluid and evanescent, it is sometimes under-represented in our readings of the material record of past behaviour. The present paper revisits one such example, where the use of water and its influence on human behaviour have until recently received little attention in the interpretation of the evidence (Bonanno 2009). The example comes from the prehistory of the Maltese archipelago. It promises to be an interesting case. Notwithstanding the considerable changes that the island environment has undergone since prehistory, one may still make reasoned inferences on where fresh water was more available. Furthermore, the remoteness of the example in time, together with the complete absence of written or oral evidence, make it an interesting case to explore some possibilities and limitations in the reconstruction of past attitudes to water from the material record alone.

The present paper sets out to explore the question of attitudes to water among the Neolithic inhabitants of the Maltese archipelago, best known for the series of remarkable megalithic monuments they created during the 4th millennium BC and the first half of the 3rd millennium BC, usually referred to as 'temples' in the literature. The landscape setting of these monuments is considered below, followed by the hydrology of the archipelago, and some of the associated beliefs and toponyms that are documented from more recent periods.

The prehistoric evidence for the use of water in different contexts is then examined against this background.

THE LANDSCAPE CONTEXT OF MALTESE MEGALITHIC MONUMENTS

The Maltese archipelago is located in the central Mediterranean, around 90 kilometres south of Sicily (Fig. 1). It consists of two principal islands and several minor ones, with a total area of around 316 km^2. In spite of its small size, the topography of the archipelago varies considerably. Geological structure, erosion and faulting have created a highly fragmented

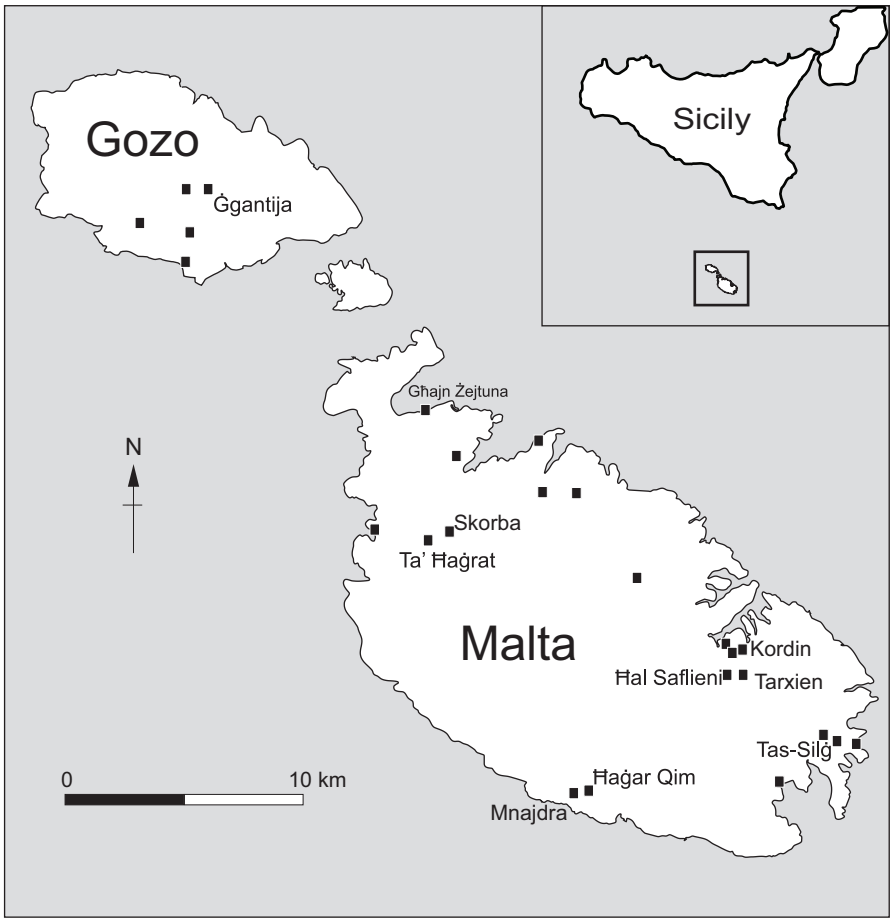

Fig. 1 Map of Maltese archipelago, showing the main sites referred to in the text

landscape. Sheer cliffs created by faulting form a high proportion of the coastline. The interior is also broken up by faults and deeply incised wadis. The generally rugged landscape is punctuated by some areas of low slope, which in the north and west of Malta are small and sharply defined.

The location of known megalithic buildings from the late Neolithic shows some interesting patterns, which have been examined and tested statistically (Grima 2004; 2005). The results have shown that, on the one hand, factors such as variability in surface geology, elevation, slope or viewshed seem to have little influence on the location of these buildings. On the other hand, their location has a very specific relationship with certain other characteristics of the landscape, such as accessibility of the sea, proximity to areas of low slope, aspect of the terrain, and proximity to fresh water springs. These may be considered rapidly, starting with the relationship with the sea.

Although the sea is never far away on a small island, much of the Maltese coastline is unsuitable for embarking or disembarking on a small craft, and convenient embarkation points tend to be highly localised. Megalithic buildings are generally located near these embarkation points (Caruana 1896; Pace 1996; Zammit 1929). The archipelagic context, coupled with the often dramatic topographic obstacles that punctuate the terrain, made the sea an important medium of connectivity within the archipelago itself, as well as with the outside world.

The position of the megalithic complexes also shows a preference for locations near the edges of areas of low slope, which may represent core areas of agricultural exploitation. The natural fragmentation of the landscape into discrete areas of low slope separated by more rugged terrain may have provided the basis for organisational units. Another preference evident in the location of these buildings is for terrain with a southern aspect. Likewise, the location of fresh water springs also influenced site location, as discussed in greater detail below.

Taken together, these patterns show that megalithic sites were positioned at points in the landscape that permitted access to key resources, suggesting that monumental architecture probably played a central role in the social appropriation of the landscape. Megalithic sites are positioned along natural corridors of archipelagic interaction, and more particularly, in places that permitted access between the areas most favourable for agriculture on one hand, and the sea on the other. This is all the less surprising when it is recalled that several of these sites, most notably Skorba (Trump 1966), have yielded evidence that the monumental buildings were built at locations that had already been used and lived in for centuries. The location and distribution of the monumental buildings that emerged around the mid-fourth millennium BC therefore appear to be a direct reflection of settlement patterns established during the fifth millennium BC.

THE HYDROLOGY OF THE ARCHIPELAGO

The hydrology of the Maltese archipelago is determined by its geology. The geological structure of the islands consists mostly of a succession of porous limestones that retain a body of fresh water at sea level, which is usually deep beneath ground level. There is however one layer of impervious clay in the sedimentary sequence, often referred to as the Blue Clay formation. Where this clay layer is present, it creates another, perched aquifer (Newbery 1968). Water escaping from the edges of the aquifer forms the major springline, supplying a large number of perennial springs. Some strata within the permeable Lower Globigerina Limestone formation also have enough clay content to create a barrier to water, which may give rise to a minor springline (Dr Saviour Scerri, pers. comm., 11 January 2012). Bedding planes, joints and faults may also control and channel water flow through the Globigerina Limestone (Fig. 2). The spring near the end of the Valletta peninsula, for instance, is one well documented instance of a spring emerging from Globigerina Limestone (Bosio 1602: 781–2). Generally speaking, however, in areas where the Blue Clay formation is absent, such as southeastern Malta, springs are relatively rare. In such areas, there is a much heavier dependence on the curation of surface run-off when this is available, and on its storage for the drier summer season.

Fig. 2 Example of ground water flowing along a bedding plane, exposed by a modern cutting along the Marsa-Floriana shoreline

The hydrology of the islands may have changed somewhat since prehistory. Climatic variations are one possible cause for such change. Conditions in much of the Mediterranean are believed to have undergone a process of aridisation during the Neolithic (Grove & Rackham 2001) and the palaeoecological evidence available to date from Malta suggests that regional aridity around 2350 cal BC may have contributed to the collapse of the Neolithic Temple Culture (Carroll *et al*. 2012: 37). The availability of fresh water has also been affected by human agency. The intensive extraction of water from perched water tables in recent times has reduced the volume of water held and released by these aquifers. However, some general observations that may be made about the hydrology of the archipelago today also held true during the late Neolithic. The evidence available suggests that mean annual rainfall may have been quite similar to that recorded in Malta during the 20th century (Carroll 1998a 2012: 37). Partly as a result of the small extent of the archipelago, the annual rainfall varies widely from one year to the next (Mayes 2001). Dependence on precipitation suggests that during the late Neolithic, the archipelago was no less vulnerable to periodic drought than in more recent periods (Trump 1976). The archipelago has no rivers or reserves of surface water, and the valley system that drains the islands of rainwater runoff runs dry during the summer. The reserves of freshwater held in the ground were therefore vital to make the islands habitable.

EARLY MODERN HYDROLOGICAL KNOWLEDGE AND GEOMYTHOLOGY

Although the geological structure of the island had such an important bearing on the storage of fresh water and the formation of springs, these processes were poorly understood until quite recently. Early modern descriptions of the archipelago pay considerable attention to its hydrology, allowing us a glimpse of how this was understood (Abela 1647; Houel 1787). In the mid-17th century, the extraction of water from the sea-level aquifer was described as a recently introduced development, suggesting that it had remained largely untapped until then (Abela 1647: 128). In the same account, the existence of the sea-level aquifer was explained as the result of water being driven up through the rock by winds blowing over the sea (Abela 1647: 129). As late as the last quarter of the 18th century, a well educated visitor could still believe that spring water was formed by condensation in the rock (Houel 1787: 75).

The role of the Blue Clay formation in the creation of a perched water table was only explained in the mid-19th century by T.A.B. Spratt, a commander in the Royal Navy and a competent geologist (Zammit Maempel 1986). Nevertheless, Spratt concluded his explanation of the perched water table, which he compared to a natural 'sponge', with these words:

> Most fortunate it is therefore, that the sponge occupies the most elevated portion of the Island – for otherwise it would be useless as a tank for the supply of so necessary an article to the Harbours and cities surrounding them. It is Nature's cistern or reservoir for such a requirement. And in so viewing it, one cannot but perceive design and foresight on the part of the great hand that so retained this important fragment there.
>
> Spratt 1852: 19

He then goes on to explain that this foresight was in fact meant "…to meet the wants of a prolific people, intended by Providence to be placed upon this little rock in the sea". What is striking is not only that the island's water supply is perceived as a planned act of providence, but also the way this is interpreted in contemporary historical terms.

If these natural processes could still inspire such readings in a modern scientific mind, we can only begin to imagine the wonder that they may have held when they were less understood. The oral and written evidence that has come down to us from Medieval and Early Modern times speaks of a fascination with the source of springs, their origin in time, the reason that they occur in a particular place, and the properties of their water. There is a considerable repertoire of Maltese and Gozitan legends that seek to explain the origin, location or source of various springs. The best known of these aetiological legends

is perhaps that of Għajn Rasul, in Saint Paul's Bay, which was already a well known site of commemoration in the 17th century (Abela 1647: 26). This spring was believed to owe its origin to Saint Paul, who reputedly struck the rock, Moses fashion, and performed a miracle there after being shipwrecked in the vicinity.

Another instance of a spring associated with the sacred is the rock-cut cave-sanctuary in Mellieħa, dedicated to 'Our Lady of the Grotto'. The focal point is a statue of the Virgin that stands at the centre of a basin fed with freshwater through a rock-cut gallery that taps the perched aquifer (Fig. 3). Folklorists have documented several popular beliefs concerning the supernatural properties of the statue and the site (Cassar Pullicino 1948: 174–5). One belief is that the water of the spring has supernatural healing properties. In the mid-twentieth century, it was recorded that "…people still go there to drink of its healing waters" (Cassar Pullicino 1948: 174).

Another instance of the well-documented belief that water from certain places was imbued with rare qualities is recorded from the chapel dedicated to St Paul the Hermit, built into a cave on the side of a deep wadi near Mosta. Water still trickles from a rock-face in an anteroom to the chapel, to collect in a series of small basins, purposely hewn into the rock. During the 17th and 18th centuries, water from this source was believed to have rare and salubrious properties, for which it was highly prized and even served at the table of

Fig. 3 Statue of the Virgin, at the centre of a basin of spring water in a cave sanctuary, Mellieħa

some of the Grand Masters who ruled the islands (Ciantar 1772: 245–6; 1780: 204). It is worth noting that the 17th-century chapel, which still stands today, is arguably built around this water source, which may have been a significant factor in the choice of such a remote and unlikely location, clinging to the side of a cave with limited access, perched over a deep wadi (Fig. 4).

Fig. 4 Chapel of St Paul the Hermit, Mosta

Legends about water sources are not limited to healing, but may also refer to retribution and punishment. According to one legend, it was widely held that the spring of Għajn Abdul, on the island of Gozo, was named after a slave or corsair who had been walled up in a cave for his wrongdoings. He desperately dug into the ground until he discovered the spring, and promptly drank so much water that it killed him. Another legend from Gozo also weaves together hydrology, the sacred, and punishment following inappropriate behaviour. The church of il-Madonna taż-Żejt (literally 'Our Lady of Oil'), on the outskirts of Għarb, was reputedly given this name because of a miraculous source of oil that sprang from the ground on this site, which also had healing properties. In one version of the legend I heard in 1991 in the nearby hamlet of Birbuba, the oil turned to water when it started being sold for profit.

Yet another well known story recorded by Cassar Pullicino about the Mellieħa cave-sanctuary of Our Lady of the Grotto is that "…twelve maidens were lost while trying to find one of them who had disappeared through an opening (now walled up) in the side of the cave". In this narrative, the extraordinary nature of the cave, where miraculous water springs from the earth, is also bound up with the idea of an opening into the earth that may lead to a hazardous underworld. This narrative is reminiscent of the preoccupation with the passage between different cosmological domains, found in various cosmological systems, as in the case of the 'earthnavels' of the Tewa Indians (Ortiz 1969: 21–5).

Several of the examples of legends that have just been noted fall clearly into the category of aetiological myths, created to explain the origin of some feature of one's surroundings. More specifically, because they are concerned with the origin and nature of freshwater springs, they may be described as geomythology, a term coined in 1968 to describe mythological narratives that attempt to explain geological and related phenomena (Vitaliano 2007). These stories and beliefs are also very comparable to the wider tradition of such narratives that is attested much further afield (*e.g.* Chapman Davies 2008; Hope 1893). What characterises such narratives in early modern Malta is not only their apparent frequency, but also how they are often built around the most modest of water sources, shedding some light on the beliefs and attitudes to hydrogeological phenomena that prevailed in the archipelago at the time. Against a backdrop of water scarcity, sources of water were carefully stewarded, and appear to have inspired a sense of awe and wonder, often being associated with the supernatural and the sacred, even while they were being exploited for more mundane purposes.

HYDROLOGICAL TOPONYMS

It is evident from such stories that the presence of springs loomed large in the inhabitants' mental topography. The naming of places after springs is another indication of the importance that they held for the islanders across different periods. A large number of place names still in use today are Medieval in origin. Many other Medieval place names have been preserved in late Medieval and Early Modern written documents. A large proportion of these names have been gathered in a published corpus (Wettinger 2000). Several hundred place names make references to hydrology, allowing a valuable glimpse of how the hydrological landscape was perceived and organised during the Middle Ages (Bonanno 2009). An interesting contrast may be drawn between the distribution of two of the most common types of these toponyms (Grima 2005: 69–70). In parts of the islands where the clay formation is present, toponyms that refer to an *għajn* (spring), are common. Where the clay formation is absent, *għajn* toponyms are far less common, and are probably associated with minor springlines which may occur in the Globigerina Limestone. On the other hand, *bir* (cistern) toponyms are widespread in areas away from the perched aquifer (Fig. 5). In the absence of springs, the alternative strategy to ensure a supply of fresh water throughout the year was to collect rainwater in rock-cut cisterns, for use during the dry summer months. The place name evidence shows how closely the choice between these strategies was dictated by the geological structure of the archipelago. This is also borne out by the archaeological and documentary evidence of these strategies from different historic periods, as demonstrated by a very recent and thorough study (Buhagiar 2014). Although the prehistoric evidence is rather more meagre, it follows the same basic rules of island survival. This evidence is considered next.

WATER SUPPLY AND THE LOCATION OF NEOLITHIC MONUMENTS

As already noted, the hydrology of the archipelago may have changed considerably since the Neolithic, partly as a result of aridisation, and partly because of the extraction of water

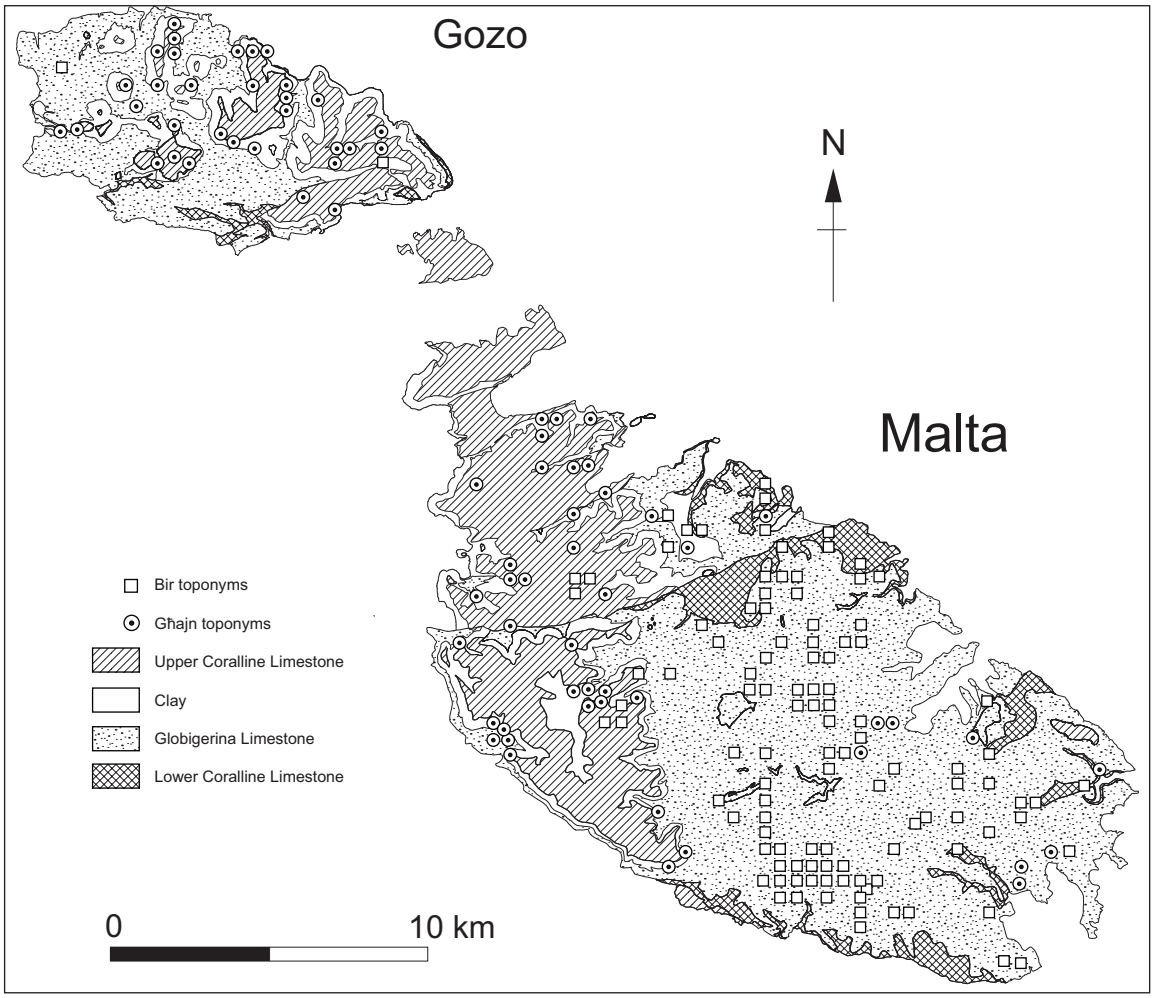

Fig. 5 Approximate location of hydrological toponyms, plotted against a simplified geological map

from the water table, which accelerated during the Modern period. Artificial systems of water storage and management have caused further changes. On the other hand, Medieval toponyms allow some useful inferences to be made about the archipelago's prehistoric hydrology, for the following reasons. First, these toponyms were recorded before the more drastic anthropogenic impacts on hydrology that took place during the Modern period. Second, they include springs fed by minor springlines, which would escape an analysis based solely on the major springline round the perched water table. A third advantage is that a toponym referring to a spring suggests a water source that was significant and permanent enough for it to become a useful landmark. Furthermore, a toponym referring to a spring is a firm indication that spring water was detectable and accessible at this point, without the aid of complex technology.

In light of the above, toponyms referring to springs were treated as a useful index of spring location during prehistory. When the approximate location of 93 such toponyms was mapped, this could be compared to the distribution of known late Neolithic megalithic sites (Grima 2004). The distributions were compared statistically as part of a broader, GIS-based multivariate analysis of the influence of different variables on monumental site location (Grima 2005). The results showed that there is a distinct preference to locate megalithic monuments in places that are nearer to spring toponyms. Further inspection of the position of these buildings lends more support to the idea that the availability of fresh water was an important consideration. In those parts of the island where the clay formation is present, megalithic complexes are usually positioned close to the spring-line. Sometimes, the position of megalithic sites even coincides with an *għajn* toponym. One megalithic site in northern Malta is located at Għajn Żejtuna (the spring of the olive tree). On Gozo, the

district where Ġgantija is located is known as tal-Għejun ([the place] of the springs). The sites of ta' Ħaġrat and Skorba are located in the district of Mġarr, which also means 'the springs'. The area immediately south of ta' Ħaġrat is known as 'ta' l-Għajn', and even today, there are springs in the immediate vicinity of ta' Ħaġrat as well as Skorba (Vassallo 2000).

In southeastern Malta, where the Blue Clay formation is absent, some *għajn* toponyms are also known, probably referring to springs fed by minor springlines within the Globigerina Limestone. Megalithic monuments in this part of the island are often located near these toponyms. There is also some evidence that the second alternative strategy to ensure a permanent water supply, that is the curation of rain water, was already being practised. There are various examples of rain water management associated with megalithic sites. These features are often difficult to date, partly because they tend to be kept in use and modified over long periods of time. The megalithic complex at Tarxien is the most extensive one to be excavated during the 20th century (Zammit 1916; 1917; 1920; 1930). Three rock-cut features that may be related to rainwater storage were recorded here. A bell-shaped cistern is cut into the rock in the forecourt outside the façade of the 'West Temple'. The excavator attributed this to later activity on the site, on the grounds that only late Punic or Roman sherds were found inside it (Zammit 1920: 191–2). However the ceramic evidence only marks the date of its latest use. Another rock-cut feature found near the entrance of the 'Middle Temple' was interpreted as a cistern or granary (Ashby 1924: 25–6). There is another bell-shaped cistern immediately to the southeast of the 'East Temple', fed from a catchment basin for rainwater connected to it by a rock-cut channel (Zammit 1920: 183).

A number of large rock-cut wells and cisterns are also present at Tas-Silġ, where a Neolithic monumental complex was extensively modified when the site was re-used as a cult centre throughout the Phoenician, Roman and Byzantine periods (Cazzella & Recchia 2012). The present form of these cisterns is datable to later periods (Bonanno 2009: 27–8). Because Tas-Silġ remained in use for so long, it is difficult to establish whether any of these features were created by modifying or enlarging prehistoric water management systems. The question of dating is also problematic at the Misqa Tanks, a group of rock-cut features near the late Neolithic complex at Mnajdra. They are still in use today as water cisterns, and are practically impossible to date with any certainty (Fig. 6; Evans 1971: 200). Zammit was

Fig. 6 View of Misqa Tanks, north of Mnajdra

convinced that they were contemporary with the megalithic complexes. He also observed that their location was carefully chosen for the relatively impervious and workable rock that it afforded (Zammit 1927: 37). The cisterns are in fact cut into a small outcrop of the lowermost part of the Lower Globigerina Limestone formation, which appears to be impervious enough for the cisterns not to require any lining.

WATER IN NEOLITHIC RITUAL PRACTICE

> …a necessary element in the ritual of this ancient sanctuary
>
> Zammit 1917: 271

The evidence discussed so far has shown a correlation between the distribution of Maltese megalithic monuments and areas where fresh water springs are more abundant, as well as suggesting a concern with the curation of water on or near these monumental sites. These trends fit perfectly well with the broader pattern noted earlier, that the distribution of these monuments probably reflects settlement distribution. A secure, perennial water supply is crucial for the survival of any society, more so if it is practising horticulture. The evident concern with water availability can be explained in the most straightforward of utilitarian arguments. There are some clues, however, that suggest that the significance of water on these monumental sites may have extended beyond such pragmatic considerations. One pioneer of Maltese prehistory, Themistocles Zammit, appears to have been convinced that water played an important role in the rituals practised in the megalithic complexes, as he argued while discussing the evidence from Tarxien. He repeated this assertion when discussing the Misqa Tanks, located near Mnajdra:

> The Misqa Tanks, therefore, were cut by the Neolithic people and used by them to keep the temples supplied with water, which, together with fire, was an essential element in every place of worship
>
> Zammit 1927: 37

Since Zammit's day, this suggestion appears to have been largely forgotten, and was not pursued further. This possibility will be revisited here, and is considered next.

As a point of departure, it is useful to recall the extensive Early Modern evidence of geomythology surrounding sources of water, rehearsed earlier. Without suggesting any facile comparisons or anachronistically imposed interpretations, it may be noted that the Early Modern evidence should alert us to how complex and manifold the significance of water sources may be. The mundane exploitation of a water source may exist side by side with beliefs about its supernatural properties, and in an environment characterised by water scarcity, belief systems may attribute potency even to the merest of trickles. In prehistoric contexts, Whitehouse's (1992) seminal study has made a persuasive case for the cultic significance of specific forms of water. Armed with these observations, we may take a closer look for any evidence of the use or manipulation of water in a ritual context.

A good place to start is the megalithic complex at Tarxien. Being the only Maltese megalithic complex of this scale ever to be documented in such great detail, it allows us valuable glimpses into the furniture and equipment that was used in monumental buildings during the late Neolithic. A considerable number of vessels were found throughout the complex. The repertoire included stone as well as ceramic vessels. Many of the vessels had exceptional dimensions, some having capacities in the order of a cubic metre. The largest vessel known from these sites is a colossal stone bowl found in the Central Temple at Tarxien. The bowl was found in fragments on the threshold of an elaborate doorway arrangement leading into the inner part of the building (Fig. 7; Zammit 1915). Various closed forms are also represented among the more moderately sized vessels found at Tarxien. A concentration of well preserved vessels was found in an area immediately south of the 'East Temple', near some of the hydraulic features referred to above (Zammit 1916: 144). The size and number of vessels prompted the excavator to suggest that water "…must have been a necessary element in the ritual of this ancient sanctuary" (Zammit 1917: 271).

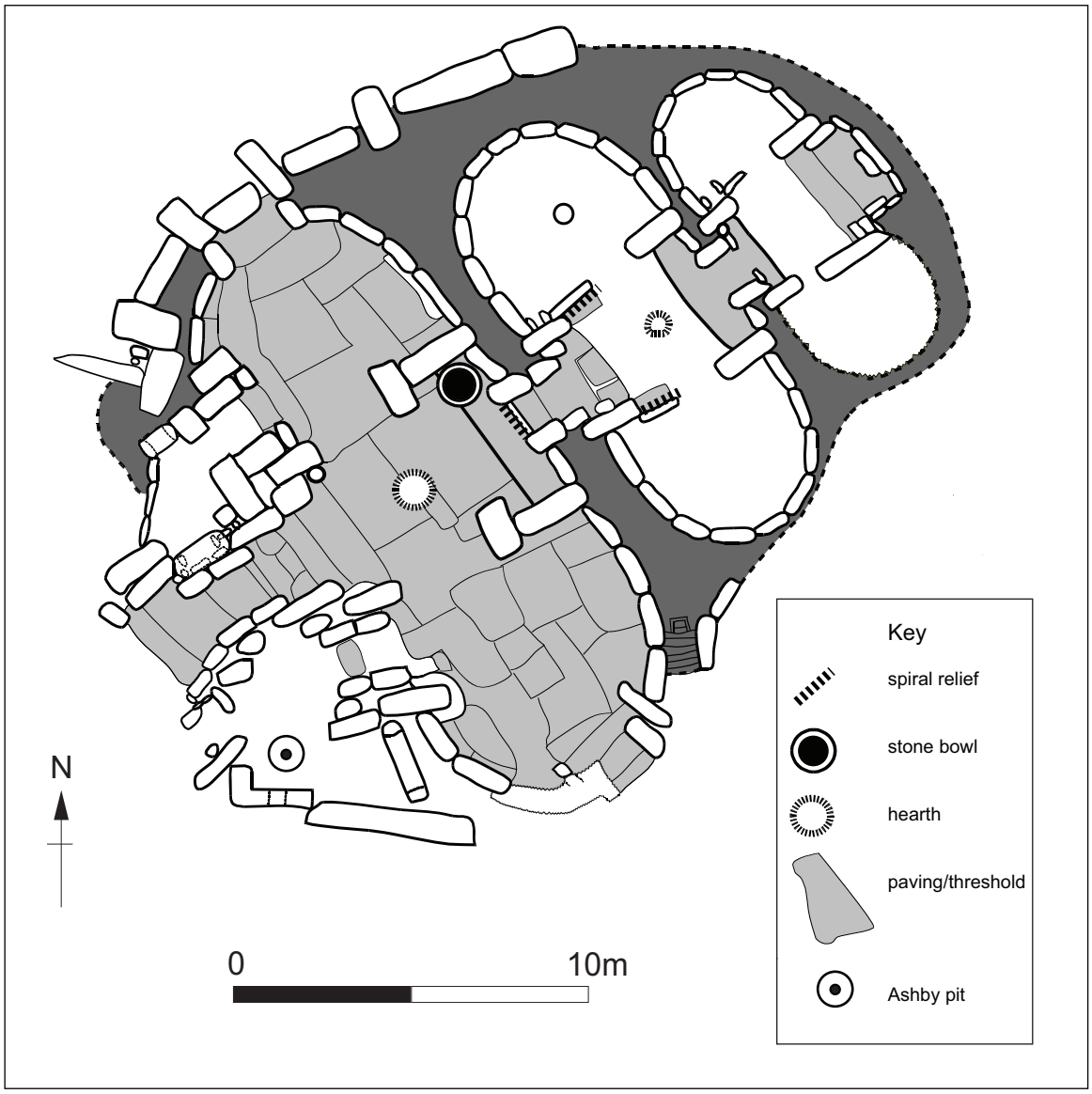

Fig. 7 'Central Temple', Tarxien, showing location of colossal stone bowl and Ashby pit

One of the most compelling examples of deliberate manipulation of water at Tarxien was largely forgotten till quite recently. In 1921, during one of his several fieldwork visits to Malta while Director of the British School at Rome, Thomas Ashby conducted some supplementary excavations at Tarxien, which had been excavated by Themistocles Zammit shortly before. The main purpose of Ashby's excavations was to shed more light on the chronology and sequence of the megalithic complex (Ashby 1924). During the course of this work, a bell-shaped rock-cut feature was found sealed beneath a *torba* (pounded limestone dust) floor, in one of the smaller chambers of the Central Temple (Fig. 7). The bell-shaped feature, which appeared to have remained sealed and undisturbed since the end of the Neolithic, measured 1.58m deep and 1.3m in diameter. The section drawing published by Ashby (1924: fig. 2) shows a curious lateral cavity in one side of the chamber (Fig. 8). The cavity is discussed briefly in Ashby's report:

> The lateral depression seems something like a catchment basin: but, on the other hand, the fact that only 2 cm. (3/4 in.) of soil (in which were a few bones and one piece of pottery) was found at the bottom of the pit militates against the idea of its having contained water, unless the water conveyed through the fissure reached it in an exceptionally pure state.
>
> Ashby 1924: 95

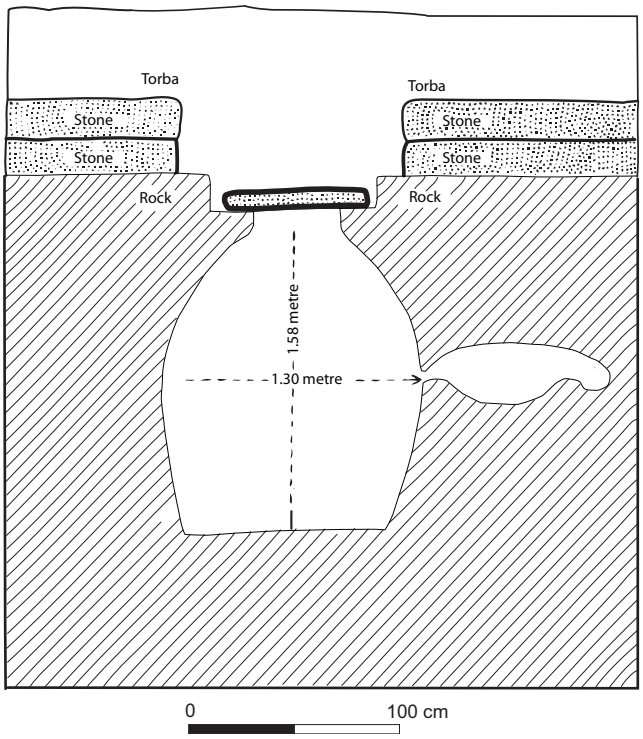

Fig. 8 Section of pit at Tarxien, redrawn from Ashby 1924: Fig. 2
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As the feature was resealed and reburied after the excavation, the reference to a 'fissure' remained unexplained until the feature was relocated and reopened by Heritage Malta in 2010. The 'lateral depression' was found to be a carefully carved water catchment basin with a raised rim (Fig. 9), cut into the side of the chamber precisely along a fissure that follows a bedding plane in the Globigerina Limestone (Fig. 10). Although the hydrology of the neighbourhood must have been affected by the urbanisation of the surroundings of the complex, water introduced along the fissure could still be observed gathering in the catchment basin.

This indication of interest in collecting water emerging from a geological feature is corroborated by further evidence from the nearby rock-cut burial complex known as the Ħal Saflieni Hypogeum. The best-known feature that may be related to the manipulation of water is a deep, well-like shaft cut into the rock in the upper level of the site. While the rock-cut feature evidently dates from the late Neolithic, the deposits that were found within it were Early Modern in date (Evans 1971: 47). The prolonged and repeated use of this feature for the storage of water appears to be the most likely explanation. In the intermediate level between the upper and middle level of the site, however, there are two features that bear a much closer comparison to the water-collecting feature just noted at Tarxien.

The south wall of Chamber 12 (Evans 1971) is formed by a vertical fault-plane. This smooth wall is perforated by two recessed, elliptical basins along the line of a sub-horizontal fissure that follows a bedding plane in the rock (Fig. 11). Today the eastern of the two basins is prone to fill with water (Bonnici 1989: 183–208) that has percolated through the rock and travelled along the plane of the fissure, and it is probable that this also took place when the feature was excavated in the late Neolithic. It would be logical to conclude that the basin was deliberately shaped to trap and accumulate water emerging from the fissure. The second, similar basin that is recessed into the same wall also lies along the same fissure, but appears less prone to filling up with water in the present. Changes in the hydrological behaviour of the site are likely to have been caused by the urbanisation of the neighbourhood, which may explain this apparent anomaly.

Fig. 9 Lateral catchment basin in 'Ashby Pit', Tarxien, October 2010, when still empty after the dry season
reproduced by kind permission of Heritage Malta

Fig. 10 360-degree photograph of interior of 'Ashby Pit', Tarxien, 2010, showing relationship between lateral basin (centre) and bedding plane *reproduced by kind permission of Heritage Malta*

The examples that have just been noted from Tarxien and from the Ħal Saflieni Hypogeum suggest an interest in the collection of water in spaces that are highly charged with significance. These carefully designed water-collecting features are reminiscent of the much more recent examples of water-collecting basins noted earlier, such as those in the Chapel of Saint Paul the Hermit. In spite of the chasm in chronology that divides these instances, they share some characteristics dictated by the local hydrogeology. In both instances, very limited volumes of water appear to have been channelled by geological features to emerge at specific points, where they became a focus of attention and were carefully curated. In both instances, the context suggests a concern with the supernatural.

Fig. 11 Two elliptical basins hewn into south wall of Chamber 12, Ħal Saflieni Hypogeum, artificially illuminated, showing relationship with bedding plane

Attitudes to water from such sources are inseparable from the understanding of and attitudes to the geological structures that give rise to them. In the Maltese prehistoric context, the evidence from the Hypogeum suggests a complex engagement with the fissures, faults and joints in the geological matrix which the Hypogeum was carved from. As argued in detail elsewhere (Grima in press), the way these geological features are treated suggests that they were associated with boundaries with the underworld. The evidence for curation of associated sources of water strongly suggests that this water was also integrated into the same belief system, and was probably believed to be imbued with distinctive properties. Another parallel, this time much closer in time, that may be made is with the curation of specific forms of water in caves in Neolithic Italy, which Whitehouse (1992) has compellingly argued was associated with underground cultic practices.

Widening the search for further evidence of manipulation of water in other megalithic complexes yields more examples. At the megalithic complex of Tas-Silġ, a large stone basin hewn from a single megalith measuring over 3m by 5m (Ciasca 1969) has been dated to the prehistoric period of use of the site. The sheer size of the basin, and the fact that it appears to have stood in the open air, a short distance from the megalithic building, raises the question whether it was meant to collect rainwater. Another arrangement that occurs within several of the megalithic buildings also raises the question of whether rainwater was being deliberately manipulated, in this case within the buildings themselves, as described below.

ARCHITECTURAL SPACE

The megalithic complexes consist of a series of sub-circular chambers organised around one or more rectangular courts. The surviving walls of these chambers are often corbelled inwards, and they were almost certainly roofed over with a corbelled vault. The volumes that were created in this way are astoundingly ambitious, pushing the available materials and technologies to the limit in order to create the largest possible interiors. The vaulted

apses are linked together by central courts. It remains an open question whether the courts were roofed over or left open to the sky.

As discussed in greater detail elsewhere (Grima 2001), the division of space within the buildings is heavily emphasised. Boundaries are strongly demarcated. In particular, the contrast between court and apse is emphasised in a number of ways. Floor levels within apses are usually higher than they are in courts. Durable limestone paving is often used to floor courts, while compacted limestone dust is more often used within apses.

Yet another device that is used occasionally is the insertion of unusual materials near thresholds. The threshold slab at the entrance to the 'South Temple' at Mnajdra is made of a Lower Coralline Limestone block. The block chosen for this purpose has a calcite formation formed of mineral deposits left behind by evaporating water. The block was positioned so that the calcite forms a dark line across the width of the threshold (Tilley 2004: 112). The same type of calcite also appears on a megalith that is built into the poorly preserved structures to the east of the main complex. The megalith is positioned so that the face covered in calcite is facing outward, in the direction of Ħaġar Qim (Fig. 12). The use of petrified deposits left by water in prehistoric ritual contexts is well attested elsewhere (Whitehouse 1992), and although the examples from Mnajdra are unusual in the Maltese context, they are almost certainly deliberate.

Fig. 12 Calcite formation on the surface of a megalith, Mnajdra

Another instance of the insertion of unusual materials in these buildings is recorded in the 'Central Temple' at Tarxien. Five small recesses were cut near the base of a megalith that stands at the entrance to the second apse on the right. Dark coloured marine pebbles and fossilised seashells had been carefully fitted into these recesses (Zammit 1917: 271; 1930: 29; Evans 1971: 130). Once again, the choice of materials is highly suggestive. In the Maltese context, the dark pebbles are likely to have come from one of the horizons of phosphatic pebbles that occur within the Globigerina Limestone formation (Pedley *et al.* 2002: 49), which are most evident in coastal environments where they tend to be selectively eroded out of the more friable globigerina matrix. Fossilised seashells are at once marine in origin, yet they are found in a terrestrial context, because of the sedimentary origin of the Maltese geological sequence. During the 17th and 18th centuries, conflicting interpretations

of this conundrum became the cause of a long-standing and often vitriolic polemic (for example Abela 1647: 135–6; Ciantar 1772: 412–9). The deliberate use of fossils of seashells in monumental contexts suggests that they were objects of curiosity and wonder even in prehistory.

RAINWATER MANAGEMENT

The use of different floor levels in different areas within the buildings has interesting implications for the management of rainwater. As already noted, while it is generally accepted that apses were roofed, it remains unclear whether courts were roofed. If courts that were open to the sky are admitted as a possibility, this immediately raises the problem of rainwater management. The clearest example is probably the sunken court at ta' Ħaġrat. Here the court is separated from the main entrance by a raised threshold that would effectively have prevented water from escaping from the court and flowing out of the site. The raised threshold is at a lower level than the three raised apses around the court, meaning that even if the court were flooded, the apses would remain dry. It should also be noted that the floor of the court is paved with what may have originally been a single huge slab (Evans 1971: 31). The paving, which in itself represents a tremendous investment in effort and planning, would also have slowed down the draining away of any ponded water, unlike the floors of crushed limestone usually found in the apses. Considered together, these different characteristics suggest a rather surprising possibility. If the court at ta' Ħaġrat was not roofed over, it could be argued that it was designed to allow periodic ponding of rainwater.

A similar arrangement may be observed in at least four other sites, namely Tarxien, Kordin III, Xrobb l-Għaġin and Ħaġar Qim, as described in greater detail elsewhere (Evans 1971; Grima 2001: 52–3). These curious features deserve further investigation, and until they are more fully understood, the possibility that they form part of a system for the deliberate control of water cannot be discounted. If courts were unroofed, a further distinction between court and apse would have to be added, namely that while apses are 'dry' spaces, courts may be 'wet'.

SYMBOL AND CONNOTATION

Apart from spatial order, deployment of special materials, and possibly the manipulation of water, Maltese late Neolithic buildings are also characterised by panels of low- relief carvings representing a variety of themes, including fish, quadrupeds, tree-like motifs, and running spirals. As argued elsewhere (Grima 2001; 2003; 2005) these images appear to be systematically ordered, and may be making cosmological references, including references to the island environment. The significance of all these different devices cannot be considered in isolation, but must have been experienced as a single continuum, in which their context, the way they are juxtaposed, and the temporality of how they were experienced were all integral to their significance.

Some theoretical considerations need to be rehearsed here, in order to have a more informed discussion on the way different symbolic devices, including the deployment of water, are being used in Maltese Neolithic monuments. To begin with, the deployment of such devices in an architectural space means that they are not encountered simply by being viewed, but need to be performed. Assemblages of spatially ordered symbols and representations create meaningful spaces, and they may only be encountered by entering these spaces. The bodily practices of engagement with such spaces and images are essential to their meaning. The system of representation that is in operation here may be primarily one of performance or 'mimesis' (Donald 1998).

The significance that water may have had in such contexts may have been complex and manifold, and evidently formed part of a wider symbolic system. Barth's ethnographic

work in New Guinea has paid particular attention to the way cosmologies are constructed, transmitted and developed, and is useful to recall here (Barth 1987). An important observation that he makes is that when material objects from daily life are given a symbolic value, they may become "associated with a fan of connotations, and split into a multiplicity of levels of ambiguity…" (Barth 1987: 21). Connotations may vary according to context (Barth 1987: chapter 5). Furthermore, it was observed that a symbolic schema, once established, could be linked to a growing number of facts, interpretations and dichotomies (Barth 1987: 50). Water could even acquire very different connotations among neighbouring groups. While for the Bimin-Kuskusmin, water is associated with cold as opposed to hot, for the Baktaman it is associated with ideas about increase and removal (Barth 1987: 32–4). A pervasive element such as water has the potential for considerable latitude of interpretation and symbolic connotation. When working with prehistoric evidence, such connotations are of course extremely difficult to reconstruct, but their possibility should be borne in mind.

ARCHITECTURE, COSMOLOGY AND TEMPORALITY

Since the 1990s, several contributions to the debate on how people engage with their environment have strongly argued that arguments couched in terms of a nature/culture dichotomy are highly problematic. More specifically, there has been a shift from speaking of the 'cultural construction of nature' towards speaking of people 'attending to', 'engaging with' (Ingold 1996: 115) or 'performing' (P. Richards 1996: 124) their environment. This more reflexive approach emphasises that perception is not a passive gathering of data about some 'natural' reality, but is an active process of inhabiting and understanding our surroundings (Ingold 1996: 114–7).

The role of architecture in the creation of models for the understanding of the world is widely attested in the ethnographic literature (Barth 1987; Bourdieu 1990; Parker Pearson & Richards 1994; Strathern 1998). Such considerations have become increasingly important in the interpretation of prehistoric monuments. Monumental architecture often had a central role in defining and expressing attitudes to the environment. A growing body of research has underlined the importance of monuments in the creation of order in the prehistoric landscape (Bradley 1993; 1997; 1998a; Fraser 1983; Louwe Kooijmans 2000; Nash 2001; C. Richards 1996; Scarre 2002a; 2002b; Thomas 1996; Tilley 1994; 1996; Tilley & Bennett 2001; Watson 2001).

Much of this work has focused on the relationship between architectural spaces and the ordering of space in the surrounding environment. The experience of space is however inseparable from that of time. Ingold's work in particular has underlined the temporality of the experience of landscape (Ingold 2000b). The debate on prehistoric monuments has also begun to address the question of temporality (Barrett 1994; Bradley 1998b; 2002; Thomas 1996). The primary concern of this work has been to chart the changing life histories of monuments as they unfolded over time. Explorations of the relationship between time and ritual in archaeological contexts have focused on how the ritual engagement of monuments with the surrounding landscape may have varied at different stages in these life histories. A further issue when considering the relationship between monumental architecture, ritual and time is the temporality of ritual itself (Watson 2001). Ritual and ceremonial activity takes place in time. Moreover, many rituals go through a number of temporal stages, which are recognised and understood as representing distinct events, processes and transformations (Gell 1992).

Ethnographic evidence of cosmological systems embedded in architectural space has often shown how such frames of reference acquire and maintain their meaning through their enactment by people. Strathern has emphasised this point with reference to her work in the Mekeo villages of Papua New Guinea. The spatial ordering of a Mekeo village embodies a series of cosmological ideas and values about their place in the world. These

values maintain their meaning and potency because they are constantly being enacted in the daily activities of the inhabitants, as they cross boundaries between different domains within and around the village (Strathern 1998). The importance of enactment has also been recognised in the study of prehistoric monuments, in which cultural knowledge is perpetuated through its performance (Thomas 1996: 137). The forms of monuments are closely related to the bodily practices that take place inside and around them. For example, it has been argued that at the Mount Pleasant henge in Dorset, the architectural form was closely related to prescribed ways of moving through it (Barrett 1994: 104; Thomas 1996: 199).

Our present-day perception of space and time is deeply influenced by the bird's-eye view of the landscape, and even of the globe itself (Ingold 2000a). This Cartesian approach to space is primarily visualist in focus. As Gell is at pains to explain, while the metaphysical nature of time and space is universal, the way it is modelled and represented by different cultures may vary immensely (Gell 1992: 233–41). Furthermore, the direct, first-hand experience of space and time is sequential rather than Euclidean or Cartesian (Golledge 1999). It has also been emphasised that the criteria of Euclidean geometry are inappropriate to assess prehistoric systems of representation, which may be more concerned with topological than scalar accuracy (Delano Smith 1987).

A further consideration regarding temporality is that special places in the landscape, marked out by monuments or some natural characteristic, may become places where the awareness and memory of the past is more present and persistent, and where the boundaries between past and present are more permeable (Witmore 2006: 279–80 quoted in Lymer 2010; Kortum 2014: 339–40).

DISCUSSION

Against the backdrop of the theoretical issues that have just been considered, the Maltese Neolithic evidence for engagement with water in its many forms takes on added significance. The range of evidence of an interest in manipulating water in these monuments appears to confirm the assertion made by Zammit a century ago, that water was an integral component of the rituals that were practised there. Here we may only add some more flesh to that assertion. Water appears to have been gathered from a variety of sources, and in various forms, ranging from rain, to springs and minor springlines, to the petrified traces of water. It was also evidently manipulated in various ways in spaces that appear to have been loaded with cosmological significance.

The presence of a source of water within such spaces, such as the carefully curated water emanating from fissures at Tarxien and the Ħal Saflieni Hypogeum, must have contributed to their symbolic potency. In turn, the manipulation of water in monumental contexts acquired its significance through its spatial position in relation to other features, such as geological features, distinctive materials and objects, architectural boundaries, and the use of sculptured images. In the case of the colossal stone bowl noted earlier at Tarxien (Fig. 7) for example, its liminal position next to one of the most elaborate doorways in all the megalithic complexes suggests that it played a schematic role in performances connected with movement through this doorway.

The relationships and juxtapositions between the various symbolic devices and features that have been described suggest that they formed part of a system of cosmological significance. The role of water in this system varied according to context; in the case of the Ħal Saflieni Hypogeum, for instance, it may be associated with cosmological boundaries with the underworld, while in the context of a megalithic building above ground, it may form part of a system of references to the world of the living. Movement through these sites would have been in constant engagement with this framework of significance.

A further characteristic of water that is likely to have attracted attention is that a body of still water, however large or small, may provide a highly effective reflective surface. In

appropriate light conditions, small pools of water in a rock-cut basin or bowl also have this property, and may have captured reflections of the sky above, the places they formed a part of, or the faces and bodies of individual observers. In a world where other reflecting surfaces were practically non-existent, the prehistoric inhabitants must have been no less intrigued than Narcissus, and would almost inevitably have associated this property with further layers of significance.

Another aspect of the use of water, and of the symbolic systems that it formed a part of, was that of temporality. Several intersecting cycles of temporality are at play here. On one level, seasonal cycles would have influenced rainfall and the availability of water, as well as the behaviour of water sources below ground. Pools of water that were filled through natural processes had a rhythm of their own, filling and emptying in ways that were perhaps not wholly predictable, perhaps even laden with portent. On another level, rituals performed by individuals had their own temporality, in which engagement with the different forms of water curated in these sites would have been experienced as part of a temporal sequence, which more than likely would itself have been loaded with symbolic significance. On yet another level, special places such as natural springs and monuments may be associated with ancestral memories, and behave as places with a more porous temporality, where the past is more present and persistent, as argued in other contexts by Witmore (2006: 279–80), Lymer (2010) and Kortum (2014: 339–40). The manipulation of water percolating out of the rock in the Ħal Saflieni Hypogeum is particularly resonant with this reading. In a funerary site where it has been argued (Grima in press) that the geological faults and fissures may have been associated with the boundary between the world of the living and the underworld of the dead, the percolation of water across and through these boundaries may have lent itself as a metonymic medium between the dead and the living, between the ancestral past and the present of the prehistoric islanders.

The webs of meaning that water had for the Neolithic islanders are likely to remain largely out of our reach. The few tantalising fragments of evidence that have come down to us, however, speak eloquently of the islanders' concern with water, not simply as a practical necessity, but as an important element of the belief systems that gave shape and meaning to their daily engagement with their world.

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Fig. 8 is redrawn from Ashby 1924, Fig. 2, by kind permission of Cambridge University Press. The 360-degree photograph in Fig. 10 was taken in October 2010 during a survey conducted by DMT GmbH, as part of the Archaeological Heritage Conservation Project, co-funded by the European Regional Development Fund for Malta, Operational Programme I – Cohesion Policy 2007–2013. Fig. 9 and Fig. 10 are reproduced by kind permission of Heritage Malta.

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