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Landscape Archaeology of Southern Mesopotamia: Identifying Features in the Dried Marshes

Jaafar Jotheri [1,2,*], Malath Feadha [1], Jassim Al-Janabi [1] and Raheem Alabdan [3]

1 Department of Archaeology, University of Al-Qadisiyah, Diwaniyah 58001, Iraq
2 Department of Archaeology, Durham University, Durham DH1 3LE, UK
3 Department of Geography, University of Thi-Qar, Nasiriayh 64001, Iraq
* Correspondence: jaafar.jotheri@qu.edu.iq

Abstract: The landscape of the Mesopotamian floodplain is mainly structured by channel processes, including the formation of levees, meanders, scrollbars, oxbow lakes, crevasse splays, distributary channels, inter-distributary bays, and marshes. Moreover, several human-made features also form and shape this landscape, such as canals, roads, trenches, farms, and settlement sites ranging in size from villages to cities. A significant part of the Mesopotamian floodplain is covered by marshes, especially the southern region. These marshlands have thrived for thousands of years and are well known for their sustainable biodiversity and ecosystem. However, after the deliberate draining of the marshes in the 1990s, the areas have become dry and only small areas of shallow water and narrow strips of vegetation remain. Several kinds of archaeological landscape features have appeared on the surface and can be clearly identified in both ground surveys and with the use of remote sensing tools. This paper aims to determine the type and nature of the preserved archaeological features that appear in the landscape of the dried marshes and whether they are different from other features elsewhere in the Mesopotamian floodplain. An intensive ground survey was carried out in a selected area of the dried marshland, resulting in the identification of six types of archaeological features: settlement sites, rivers, canals, farms, grooves, and roads (hollow ways). These features used to be covered by bodies of deep water and dense zones of vegetation (reeds and papyrus).

Keywords: wetland; landscape archaeology; geoarchaeology; remote sensing

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1. Introduction

The floodplain of southern Mesopotamia (Figure 1) mainly consists of riverine environment deposits that can be divided into six sub-environments, which are channels, floodplains, levees, crevasse splays, marshes, and irrigated soil [1]. The marsh sub-environments played a significant role in the evolution of early Mesopotamian civilisation as they all have the natural resources required for sustainable human occupation [2]. The marshes were described in cuneiform tablets and historical texts as an important area for habitation, hunting, and escape from organised states. They were first settled when a dynasty called the 'Sealand Dynasty' ruled the area between 1739 and 1340 BC [3]. Although Al-Dafar's study is the first record that we have of settlement, there could have been an earlier occupation that simply has not yet been found.

The area in question is where the modern Tigris and Euphrates meet to the north of the Persian Gulf. It is an area once called the Garden of Eden, which previously covered more than 15,000 square kilometres and thus was the largest wetlands in southwest Asia [4]. However, the marshes were drained for political motivations by Saddam Hussein in the early 1990s as a counterinsurgency campaign against the Marsh Arabs [5]. As a result, the marshland became dryland and a large number of archaeological sites and other archaeological features surfaced for the first time.

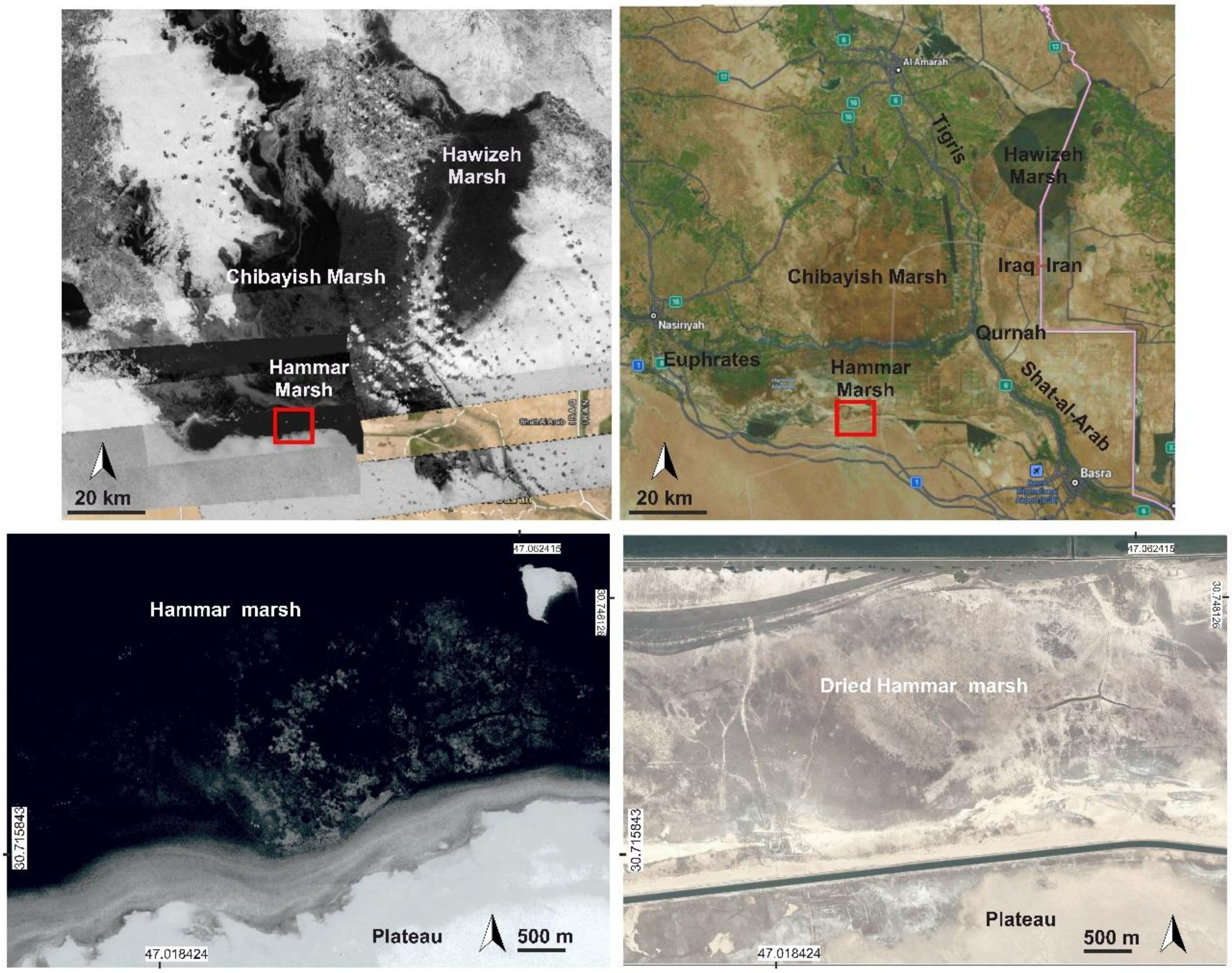

Figure 1. (**Top left**), a Corona image (1968) showing how the marshes of southern Mesopotamia (Hammar, Chibayish, and Hawizeh) were covered by water. (**Top right**) QuickBird images of the same marshes in 2020. (**Bottom left**) is a Corona image of the case study area in 1968. (**Bottom right**) shows the case study area, indicated by a red square, in 2020.

Several archaeological surveys have been carried out to identify the archaeological features in the dried marsh area. Some of these studies relied only on remote sensing tools such as Pournelle [2], which traced only the rivers and the archaeological sites, with little focus on other landscape features. Other studies used integrated methods of remote sensing and ground surveys, such as that by Al-Hamdani [6], who reconstructed only the ancient rivers and settlement sites in the dried marshes of southern Mesopotamia but did not map other archaeological features. Jotheri et al. [7] mapped the traces of boat movements (hollow ways) across the floodplains, including the dried marsh area, but they did not investigate other features. Therefore, the present study focused on determining the number of types of archaeological features found in the dried marshland, in other words, mapping the full extent of archaeological site types in the research area.

2. Methods

The research was carried out using two main survey methods: remote sensing and intensive fieldwork. Because it is not feasible to carry out an intensive, comprehensive fieldwork investigation and survey for the whole area of the dried marshland, an area of 5 × 4.5 km was selected for this purpose (Figure 1). This area now accessible and completely dry, was totally covered by water in the past except the plateau area (Figure 1). Moreover, the ancient course of the Euphrates ran through this area [3,6,8] meaning that there is a strong possibility of finding more archaeological features such as irrigation canals, settlements, and farms. After selecting the area, CORONA intelligence satellite imagery (launched and utilised by the United States between 1959 and 1972) was examined. It showed that the area was entirely covered by water at that time. In other words, there would be no point in examining other historical imagery or photographs (also implemented by the United States) such as HEXAGON intelligence imagery (in use between 1971 to 1986), or U2 plane photographs taken between 1958 and 1960, because the whole area was under water until the marshes were drained in the early 1990s. It is worth mentioning that using remote sensing tools in archaeology has become essential in archaeological surveys and excavations, and it continues to develop (see, for example, Cowley et al. [9] and Cowley et al. [10]). Moreover, using historical satellite imagery and photographs has made a significant contribution towards identifying and mapping massive numbers of different types of archaeological features because these resources provide a record of the landscape in the past, before modern urbanization and extensive agriculture schemes. The best examples of research are Ur (2013) [11], Hammer and Ur (2019) [12], Soroush et al. (2021) [13], Hammer et al. (2022) [14] and Altaweel et al. (2022) [15]. QuickBird high-resolution satellite images have been used to identify archaeological features in the selected study area. The methods for landscape feature identification in the Mesopotamian floodplain are explained in detail by Jotheri and Allen (2020), including several visual elements such as tone, pattern, shape, elevation, size, and situation. In the present study, these observations have been applied to the marsh area features. The landscape features in the study area are different in their tone (e.g., the relative brightness and colour of the features in the satellite images. Among the reasons behind the tone, the difference is the degree of salinity [16], where the more saline the soil, the darker the tone. Similarly, the finer the sediment particle size [17], the darker the tone.

After completing the examination of the QuickBird satellite images and identifying archaeological features, fieldwork was carried out in February and March 2022. It consisted of systematically investigating every part of the selected study area and mapping every archaeological feature that could be identified in the field and satellite images. However, in some cases, the geomorphological surface features, such as ancient crevasse splays, could be identified in the field, although they are very recognizable in satellite imagery. Consequently, a number of boreholes were dug across some landscape features, including crevasse splays using hand-augers to obtain samples for absolute dating and also to determine the nature of the features. (The results will be published elsewhere.)

3. Results

Six kinds of archaeological landscape features (Figure 2) were identified in both surveys (QuickBird and fieldwork), namely settlement sites, rivers, canals, farms, grooves, and roads (hollow ways).

3.1. Settlement Sites

The settlement sites can be divided into two types based on their size and age. The first type is the large archaeological sites that date back to the Sasanian and Islamic periods (between 226 AD to 1500 AD). The second type is relatively small, dating back to a period between the Ottoman Empire and the time before the draining of the marshes (between 1500 AD to 1990s AD). In the study area, four archaeological settlement sites are associated with two ancient rivers (Figure 2).

3.1.1. The Large Settlement Sites

Most of the surface findings at these sites are from the Sasanian and Islamic periods. However, these sites might have had occupations before the Sasanian period [3]. There are two main criteria that can be used to identify these archaeological mounds: the relative height (more than 2 m in relation to the surrounding area) and the net of radial hollow ways around the site. Sites, which can be found everywhere in the marsh area, associated with ancient rivers and canals [18,19], have different colours, tones, and heights in relation to their surrounding area (Figures 3 and 4).

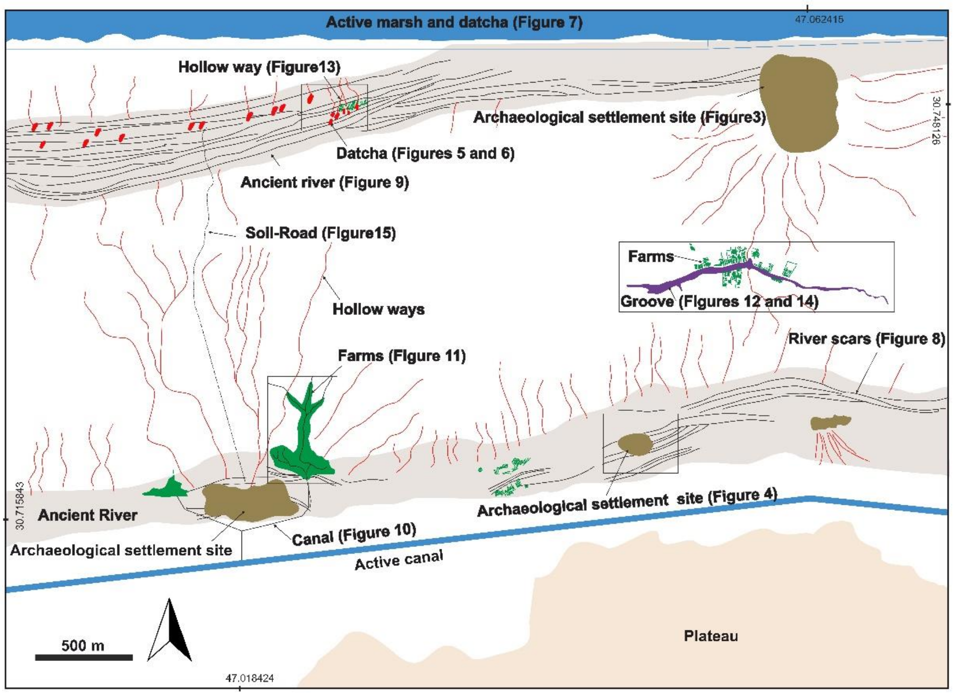

Figure 2. A map showing locations of the six landscape archaeological features, namely: settlement sites, rivers, canals, farms, grooves, and roads (hollow ways) traced in the case study; see Figures 3–14 for more details.

Figure 3. A photo showing the relatively high elevation of archaeological settlement sites in relation to the surrounding area. People in the present-day select such sites in the study area for settlement to avoid flooding; see Figure 2 for location.

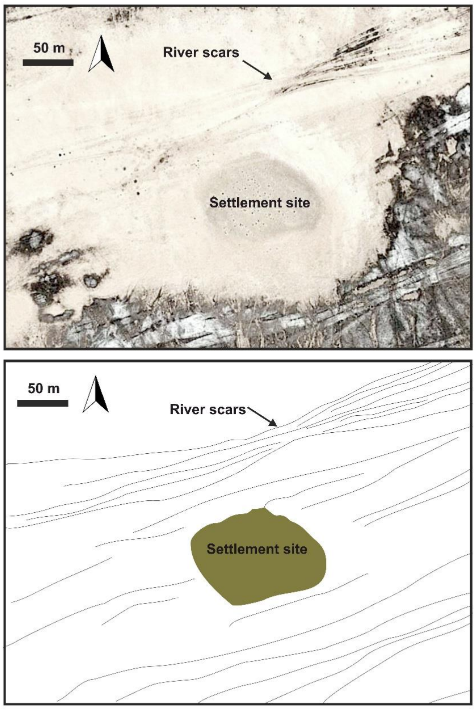

Figure 4. QuickBird image showing how an archaeological settlement mound can be recognised by its colour and tone, which differ from the surroundings in the study area; see Figure 2 for location.

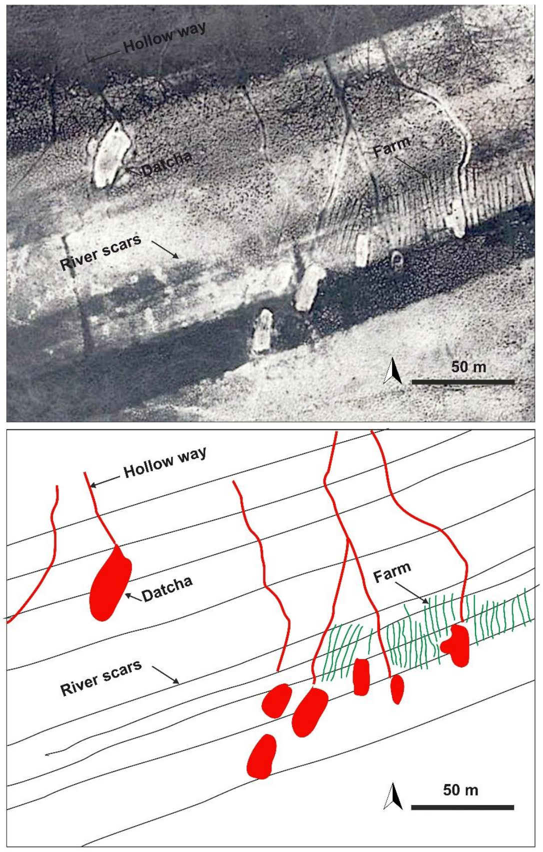

Figure 5. A QuickBird image showing a datcha, hollow ways, river scars, and farms in the study area; see Figure 2 for location.

Figure 6. A photo showing a datcha on a dry marsh in the study area; see Figure 2 for location.

Figure 7. A photo showing a datcha on an active marsh beach in the study area, see Figure 2 for location.

Figure 8. A photo showing river scars in the study area; see Figure 2 for location.

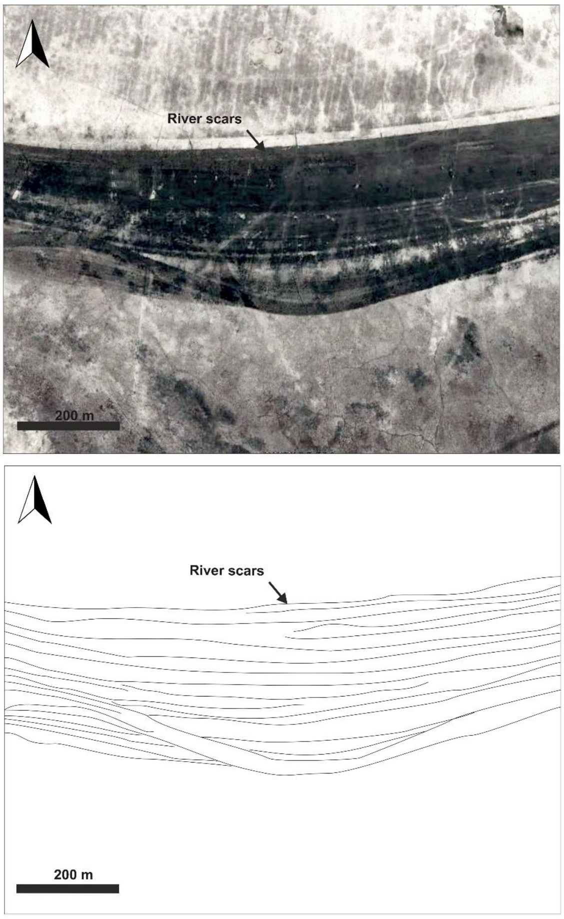

Figure 9. A QuickBird image showing river scars in the study area and how a river appears different in colour and tone from the surrounding area; see Figure 2 for location.

Figure 10. A photo showing how a canal in the study area is not forming scars like a river; see Figure 2 for location.

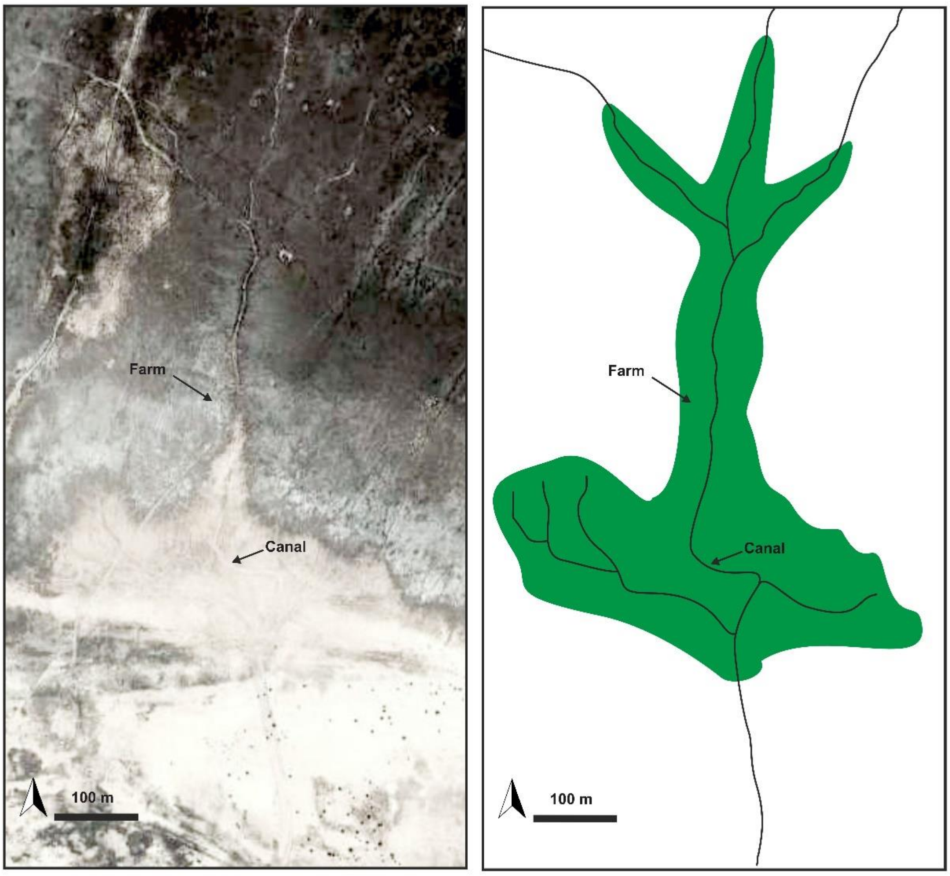

Figure 11. A QuickBird image showing farms in the study area; see Figure 2 for location.

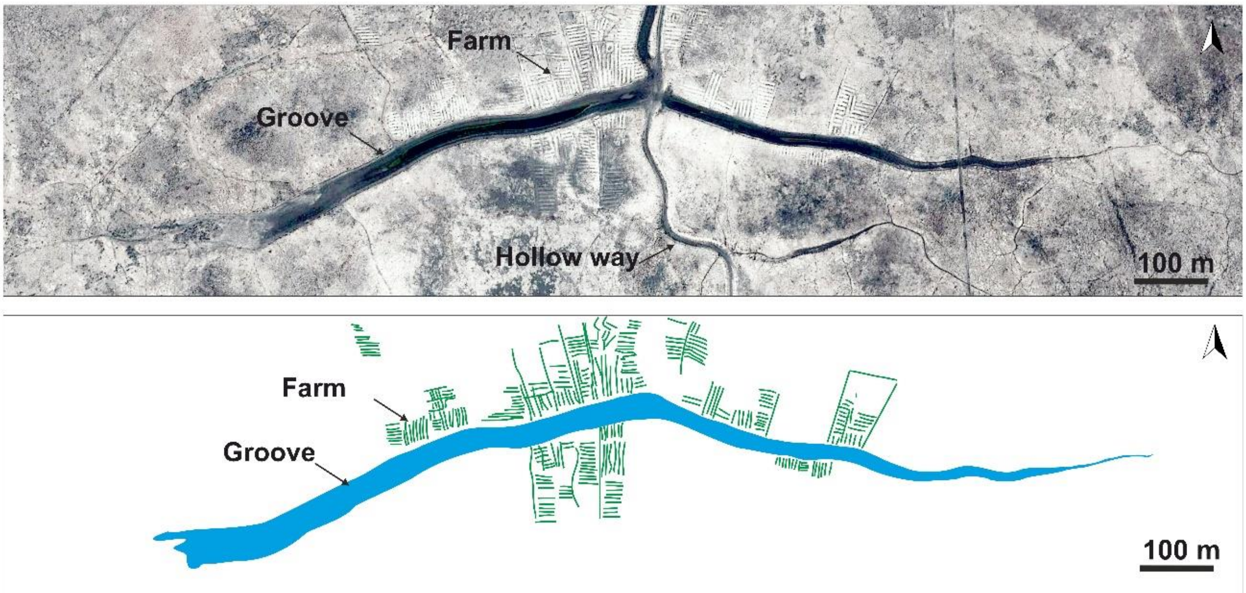

Figure 12. A QuickBird image of farms and grooves in the study area; see Figure 2 for location.

Figure 13. A photo showing a hollow way in the study area; see Figure 2 for location.

Figure 14. A photo of a groove in the study area, see Figure 2 for location.

3.1.2. The Small Settlement Sites

There are islands or platform-like features widely distributed in the marshes which have a similar appearance to archaeological mounds but are smaller (Figures 5–7). These features, locally called 'datcha' or 'chabsha', were built by the inhabitants of the marshes from reeds, papyrus, and mud to make a rounded or square foundation to support a reed or mud house [3].

3.2. Rivers

Rivers in the marshes can be mainly recognised according to two criteria: the alignment of archaeological sites (Figure 2), and meander scars (Figures 2, 5, 8 and 9). They normally appear as strips shaped differently from the surrounding areas, which are also different in colour and tone (Figure 9) and relatively higher in elevation (Figure 8). It is worth mentioning here that, in southern Mesopotamia, including the marshes, sites are associated with waterways and irrigation (Figure 2).

3.3. Canals

Canals are different in shape from rivers as they are relatively straight and narrow. Rivers are suitable for downstream and upstream movement, forming meanders and leaving behind scars (Figures 2, 3, 5, 8 and 9) of where the rivers had once been. Canals are less likely to form meanders; therefore, they have no scars (Figure 10).

3.4. Farms

Farm features are common in the marshes (Figures 2, 11 and 12) and can be found in different layouts. However, in the selected study area, two forms of farms were identified: herringbone-pattern layouts and crossed linear ridge layouts. The inhabitants of the marshes built their farms as a series of linear ridges made from reeds, papyrus, and mud to raise the ridges above the level of the surrounding marshes to keep the ridges dry and suitable for growing crops away from the danger of flooding.

3.5. Grooves

Grooves are natural that breaks transverse gaps across levees or ridges. These features are different from hollow ways or rivers in terms of shape, size, and formation. Grooves can be formed through the breaching of older channel levees by flooding from younger channels [18].

3.6. Roads (Hollow Ways)

Hollow ways are important linear features formed through erosion by the movement of people and animals that serve as trace fossils of past human behaviour [7,20,21]. For example, they can be darker in colour due to the salinity. The network of hollow ways surrounding the sites is also indicative as sites are in the centre of radial hollow ways (Figure 2). The hollow ways (Figures 2, 5 and 13) resulted from the movements of small wooden boats—the main means of transportation in the marshes—and buffalo traffic through dense reeds [2,3]. Hollow ways appear as a linear feature with a depression in the middle and are confined by two relatively elevated banks (Figure 13). They can be easily recognised by their linear shape and their connectivity to archaeological mounds (Figure 5).

4. Discussion

This study shows that the currently dried marshland contains a substantial number of different kinds of archaeological features (Figure 2). Some of these features are unique to the marshes and cannot be formed in another sub-environment elsewhere in the Mesopotamian floodplain, such as the platform-like 'datcha' (Figures 5–7), the grooves (Figure 12), the hollow ways (Figures 5 and 13), and ridge farms (Figure 12).

The number and type of archaeological features of the marshes present a clear indication of the sustainable, biodiverse, and resilient ecosystem that lasted for thousands of years. Moreover, the present study illustrates how human impact has played a leading role in shaping the landscape of the area and reveals how the marsh sub-environment was able to preserve the record of human activities over time. People's movements across the marshes with their boats and animals can be clearly seen in the hollow ways network. Their settlement in preferred places in the marshes can be understood by their construction of small and large sites. Their intention to grow crops apart from using other naturally available vegetation in the marshes can be proven by their development of ridge farms.

The continuous cycles of flooding and desiccation of the marshes had a significant impact on inhabitants' movements in this part of Mesopotamia because they had to leave an area when it was dry and move again when it flooded, thus leading to the formation of a unique archaeological landscape. The features of the marshes are well preserved in this area, possibly because river avulsion and sedimentation processes are slower than in the rest of Mesopotamia.

For any future survey of the dried marshland in southern Iraq, all possible remote sensing tools and techniques should be considered before the fieldwork and ground truthing. The ideal methodology is primarily identification of archaeological sites using historical satellite images and ariel photographs, high-resolution satellite images, and unmanned aerial vehicles (UAVs), followed by intensive fieldwork checking. It is worth mentioning here that some works have been carried out in the region recently, such as Iacobucci et al. [22] and Forti et al. [23], using multidisciplinary methods, including remote sensing, which led to identifying archaeological features in dried marshes area. This approach will minimise the possibility of missing some archaeological sites during the survey. The ground truthing will improve the certainty of identifying archaeological sites. Some other features appear similar to archaeological features in remote seining. For example, some modern small soil mounds made by farmers or fishermen appear similar to ancient platform-like 'datcha'. Another example is that modern livestock's tracks appear similar to old hollow ways, and the current vehicles' soil roads (Figure 15) are identical to ancient canals or river scars.

Figure 15. A photo showing a soil-path in the study area.

5. Conclusions

The marshes of southern Mesopotamia have provided a sustainable, biodiverse, and distinctive ecosystem for thousands of years in the region. Therefore, the entire area of dried marshland should be systematically and intensively surveyed using the modern tools of both remote sensing and fieldwork to identify and document the archaeological features before any future destruction resulting from urbanisation or agricultural projects.

Moreover, it is evident that the region is suffering from drought and severe shortages in water supply because of climate change, mismanagement of water in Iraq, and an increase of dams and irrigation projects in Turkey and Iran. Therefore, reflooding the currently dried marshes is becoming an even more unachievable plan.

However, some small areas of the current marshes still thrive and are sustainable and biodiverse. These small areas need regular maintenance to keep the Marsh Arab dwelling in their unique lifestyle of raising water buffalo and travelling by boat. Such preservation will also contribute to keeping the biodiversity of the wildlife of rare species of animals, birds, and plants.

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