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The Geoarchaeology of a moat in the Tappeh Garan site, Southwestern Iran

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ABSTRACT

The Tappeh Garan consists of several mounds and the mounds are separated from each other by a network of depressions, the largest mound at the site is surrounded by a deeper, wider depression in comparison with other depressions. We named it the moat of Garan. During the first excavation and survey season led by Mohsen Zeynivand, a test pit inside this moat was dug by Jaafar Jotheri to reveal its geoarchaeology. As a result, 12 recognisable beds of sediment have been identified up to a total of 6 m. in depth. These beds are mostly silty clay with some pottery fragments, pebbles, and plant roots. The bottom bed of the test pit has a considerably greater amount of sand and pottery fragments than other beds. It is highly likely that this moat was used for defensive purposes and was filled with water several times.

Keywords: Dehluran, Trenches, Khandaq, Garan

دراسة جيولوجية اثارية لخندق موقع تابي كاران الاثري - جنوب غرب ايران -

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الخلاصة:

تابي كاران هو احد المواقع الاثرية الواقعة في سهل دهلوران جنوب شرق ايران والقريب من الحدود العراقية الإيرانية شرق محافظة ميسان. تم اجراء عمليات مسح وتنقيب اثري فيه في الموسم الأول في أوائل عام 2019 من قبل بعثة تنقيب جامعة طهران برئاسة محسن زينفاد . تولى فيها جعفر الجوذري عملية المسح الجيولوجي الأثري الميداني للموقع اذ تم اكتشاف خندق يحيط بأكبر تل في الموقع وتم تسميته بخندق كاران وتبين انه يحيط بالتل الكبير من جميع الجهات . تم بعد ذلك حفر مجس داخل الخندق بأبعاد 2متر طول و 1,5 متر عرض 6 متر عمق . أظهرت نتائج حفر هذا المجس وجود 12 طبقة من الطين الغريني المخلوط بكسر فخار وحصى صغير وان قاع الخندق مكون من طبقة من الطين والرمل وكمية كبيرة من قطع الفخار . من المرجح انه كان لهذا الخندق غرض دفاعي مهم وانه وكان يملأ بالمياه بين الحين والآخر.

الكلمات المفتاحية: دهلوران، الخنادق، التحصينات، كاران

Introduction:

Digging a moat around a fortress or castle was a well-known defensive strategy in ancient civilizations. Moreover, trenches or khandaq were dug for boundary and frontier purposes (de Gruchy et al., 2021) and also for strategic use on a battlefield (Amer et al., 2021). The landscape of moats, trenches and khandaq can be recognised in satellite images utilizing the shape of the moat and the tone of its soil cover (Jankowski et al., 2020). Moates usually follow the shape of the site as it is the area surrounding the site that needs to be protected and therefore the moat follows its extent. In addition, the moats contain soil of different tones concerning other areas because the depressions in the moats are usually filled with subsequent deposits of sediments that consolidated less than in other areas.

The Tappeh Garan (locally pronounced Gharran) archaeological site is one of the important sites in the Deh Luran region (Fig. 1). In 2017, Mohsen Zeynivand obtained a persimmon to study Deh Luran plain of Archaeological Project (DAP) from the Iranian Centre for Archaeological Research (ICAR) to resume long-term and problem-oriented archaeological field research in Deh Luran plain; And with several excavation operations expected to open inside the Garan mounds (Fig. 2). The first excavation season took place in early 2019. The results of this research project will be published elsewhere later. This paper focuses only on the geoarchaeology of the Tappeh Garan moat and presents the preliminary results of the geoarchaeological work carried out during the first season of the excavation and a survey of the Garan archaeological site project (Fig. 3).

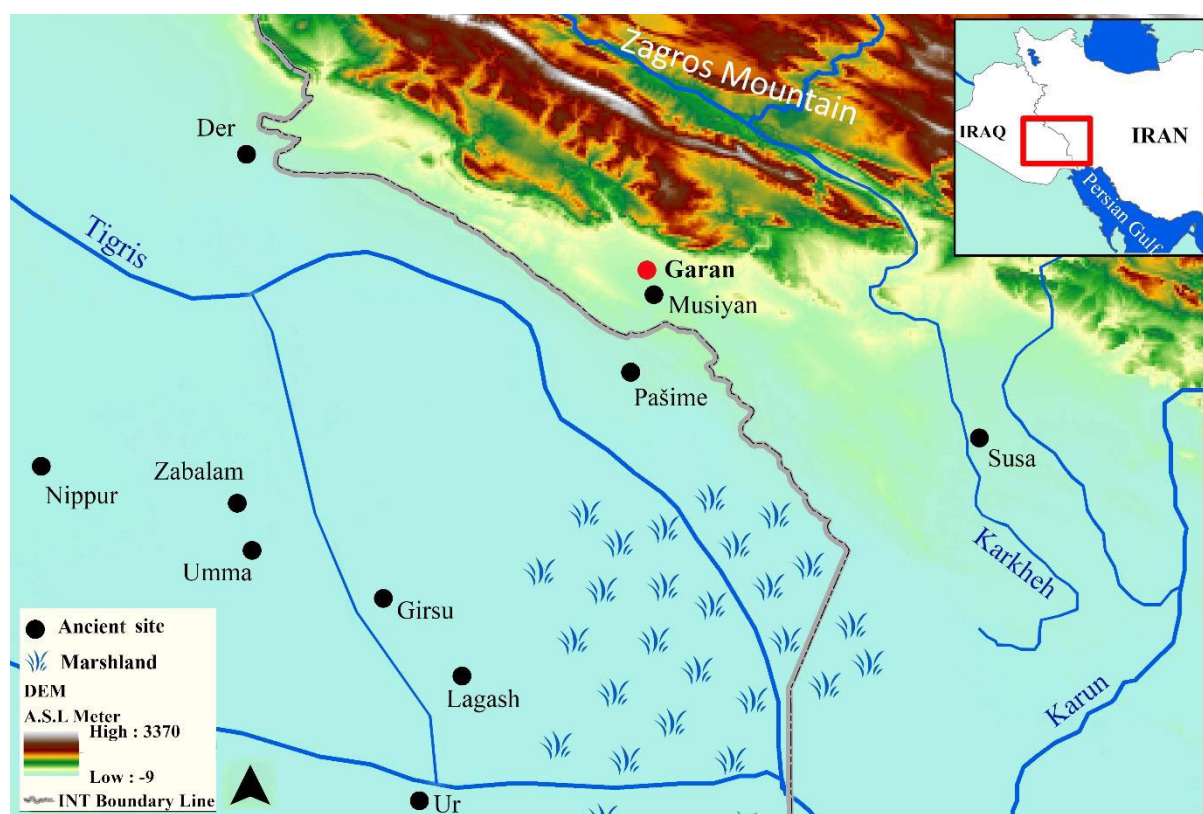


Figure 1 Location map of Tappeh Garan archaeological site (after Saed Bahramiyan)

Deh Luran plain is located in southwestern Iran and it is a low-elevated plain along the foothills of the Hamrin Mountains. The Plain links Susa and Mesopotamia by an eastern-western route along the foothills of Zagros. Given the strategic location of the plain, it functioned as a corridor between Mesopotamia and Elam. Michalowski and Wright (2010) focused on highlighting the importance of Deh Luran and the town of Arawa/Uruea. In the second half of the third millennium BCE, discussing how this area played an important role as a centre of coalition and confrontation both at the time of peace – as a commercial centre – and during the times of war (Zeynivand and Sharifi, forthcoming).



Figure 2 Google Earth images showing the Garan archaeological site, divided into 11 areas according to its topographic appearance. Area J is the suggested moat.

Tappeh Garan site, along with Tappeh Musiyan site, is the largest ancient site in the Deh Luran plain. The site is approximately 17 ha and is not far from Musiyan in the centre of the plain. Surface findings suggest that the site has been occupied since the third to the late first millennium BCE. For example, there are pieces of evidence of occupations from Elamite, Achaemenid, and Seleucid/ Pathian periods. There is evidence for the presence of Mesopotamian polities of the late third and early second millennium BCE at the site. Tappeh Garan consists of a high mound and several low surrounding hummocks. The high mound is about 19 m high, while the hummocks are between 3 to 6 m high. Around the high mound, there is evidence for a low depression, some 20 m wide that separates the high mound from the surrounding hummocks. We suspect that this depression may have been the remnant of a moat that once surrounded and protected the high mound.

From about 50 years ago, James Neely carried out an intensive survey on Tappeh Garan and its adjacent area to locate the possible ancient canals before the modern agricultural expansions could damage them (Neely 1969). These activities included the land levelling and digging of irrigation canals that have irrecoverably changed the landscape.

Today a small structure, including a room and a coop is visible on a small hill on the northern side of the site.

In two seasons (2016 and 2019) of pre-excitation surface surveys (Zeynivand 2016; 2019), a few fragments of baked bricks were found, several of which have heavily eroded inscriptions. Only in one example, a few Akkadian words were discerned. The general shape of these bricks suggests that they ought to belong to the time of the Third Dynasty of Ur, where a large number of which have been discovered in Mesopotamia.



Figure 3 Drone images of the Tappeh Garan, a view from above, showing the location of test pit J1 (at the bottom of the image) inside the moat and the A1 excavation area (at the left of the image) and the A2 excavation area (at the right of the image).

Methodology:

In February and March 2019, the first season of excavation and a survey took place at the Tappeh Garan. It is worth mentioning here that The first season was excavation in Tappeh Garan led by Mohsen Zeynivand and consisting of Jaafar Jotheri, Kamyar Abdi, and Fereshteh Sharifi, Faezeh Dadfar, Massud Nuzohour, Ramin Yashmi, and Manouchehr Pourmirza. Jaafar Jotheri was responsible for digging and explaining a test pit inside the moat. From the first viewing of the satellite images of the Garan archaeological site, it can be suggested that Area J is a moat surrounding the largest, tallest mound of the site (Fig. 2). The reasons behind such a suggestion are first, it is a depression area concerning other areas; second, it is nearly rectangular - i.e. it is a geometrical feature that cannot be formed by natural processes; and finally, it is common that archaeological sites in Deh Luran Palin were mostly surrounded by a moat for defensive purposes. Therefore, and to determine Area J, we decided to dig a moat inside the moat. We selected the location of the moat to be close to the A1 main excavation area to obtain a complete view when the A1 excavation is completed (Fig. 2). The moat pit is rectangular (2 m. in length and 1.5 m. in width) (Fig. 4). Careful, slow digging was begun, with every finding being reported.



Figure 4 A rectangular (2 x 1.5 m. and 6 m. deep) test pit in the J1 moat.

Results and discussion:

We dug to a depth of 6 m. (Fig. 5), and we found 12 layers that can be easily recognised even from their field characteristics. We started the field descriptions of the layers from the top to the bottom as follows: the first layer (L.01) is the topsoil, consisting of loam, dark grey, rich in vegetation, pottery shards and pebbles. The second layer (L.02) also consists of loam but light red. It also contains animal holes, pottery shards and pebbles. The third layer (L.03) is like the second layer but with no animal holes. The fourth, fifth, sixth and seventh layers (L.04, L.05, L.06 and L.07) consist of silty clay, light red, containing a few pebbles with no pottery fragments, but separated by discontinuity boundaries that might represent a period of no sedimentation and drought. The eighth, ninth, tenth and eleventh (L.08, L.09, L.10 and L.11) are the same, consisting of silty clay, light red, containing a few pottery shards and pebbles. They are also separated by discontinuity boundaries as mentioned above. The twelfth layer (L.12) consists of sandy pebbles, light grey with a large number of pottery shards.

As the goal was to reach a version of soil, i.e. a layer that has no pottery in it and that was deposited naturally, before any occupations of the site. However, we did not find such a layer as pottery shards were continuously present in all 6 m. of the J1 test pit. This means that

the 6 m. sediments had been deposited after and/or together with the periods of occupation. Therefore, it is highly possible that Area J was a moat dug to a depth greater than 6 m., then possibly abandoned or disused.

It is difficult to sustain the argument that this section is part of the floodplain because there must be no pottery shards in floodplain sediments. Furthermore, we investigated several moats that have been already dug by the government for irrigation and road purposes and we found that the sediments were massive, homogenous, and thick-bedded red clay while J1 moat sediments were not in massive or homogeneously thick beds (Fig. 5).

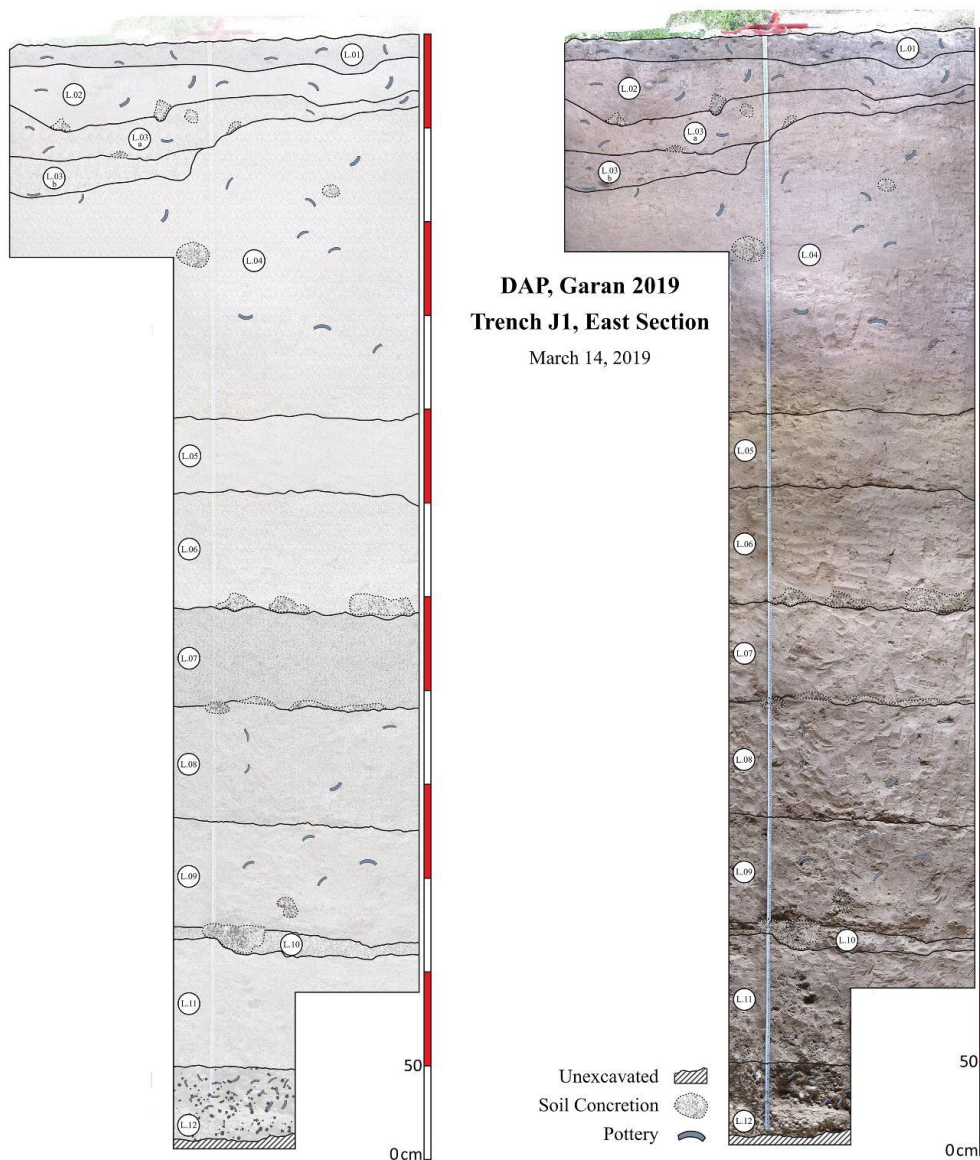


Figure 5 Right: combined photos of the full section of the J1 moat showing all the distinguished 12 layers from L.01 to L.12. Left: a sketch of the full section of the J1 moat showing all the distinguished 12 layers from L.01 to L.12. (Interpreted by Jaafar Jotheri and illustrated by Ramin Yashmi)

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