

Gompu: A Neglected and Remote Sasanian Dam

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Background

Local people know this dam by the name of Gompu. Gompu is constructed in a tight and deep valley situated in Mount Bol¹, Lārestan, Fārs, Iran. This specific choice of name can be related to the Persian word *gomp*. In the majority of the dialects of Fārs, *gomp* or *yomp* means a natural pond or pool no matter what the size, and makes complete sense as we see that down the valley where the dam is located, there is a pond or *gomp* that is in fact a more or less round pool with stone walls². Water flows into the stone pool both from the river bed and from water seeping into it from below, which leaves the pool full of water even months after the flood has subsided. Water flows from south-east to north-west in the valley and the axis of the dam is at right angle to the flow direction.

Construction Date of Gompu

Like most other ancient hydraulic structures, we have no exact information on the construction date of Gompu. Locals believe that the dam is more than 400 years old. Iranian archaeologists of the Cultural Heritage Organization of Iran believe that it is a Sasanian dam and have had it registered as a National Heritage Site in 1999, under the name Gompu Dam. Our current knowledge of the dam dates back to May 2010, when the author had visited the site and taken pictures of it. The western section of the dam has been completely destructed and the flow of water is putting the remaining part of the body of the dam in danger of ruin³. The destructed part is rather small, compared to the size of the dam, and the main wall of the dam is still intact, making it more crucial and important to make an effort to keep the dam safe.

Geographical Situation and Location

The dam is nowadays located in Lārestan, south of Fārs. A straight aerial route situates Gompu at 6.4 km southeast of Mahzeynā, 8 km southwest of Fedāq, 10 km northeast of Beyram and 250 km southwest of Shiraz. Its geographic coordinate is latitude of 27° 31' 08" N and a longitude of 53° 32' 22" E. The elevation of the river bed at the dam site has been measured to be 609 m. using a GPS set. To access the dam site one must pass through the towns of Kavār, Firuzābād, Qir, Khonj, Arād and Mahzeynā, then from there on there is a 5 km route part of

¹ Bol in Middle Persian means "high".

² Some neighboring villages consider the stone pool downstream of the dam as a more or less sacred site with healing powers. Still to this day locals take the aged or the ill to the pool to bathe, and hopefully be healed.

³ Although it has been three years since a letter was submitted to the municipality of Beyram, no reconstruction steps have been taken so far.



which can be traveled with a jeep. The last part of the passage is rocky and only traversable by foot.

Construction Material and Components

Both the bed and the sidewalls of the valley are made of layers of sandstone, which has also been used in constructing the body of the dam, built by binding together crushed sandstone with specific Iranian cement called *Chāru*⁴ or *Sāruj*. Neither the stone used nor the mortar are of good quality. Sandstone is not resistant to erosion, which has resulted in some parts of the upstream face of the dam eroding into dust. The binding mortar is more like soil-lime, which is low in quality. The builders seem to have been economical in using mortar, to the extent that some parts of the wall of the dam show signs of no use of mortar at all. Bad quality mortar and thriftiness in the use of this binding material is the two most important reasons behind the partial ruin of Gompu. The harshness and aridness of the dam's natural and geographical setting⁵ can be viewed as the main reason behind such thriftiness in building this tall dam. The remote location of the dam site makes it more difficult for constructors to carry the needed material to the site with carts and mules and decreases the level of strictness in constructing the dam.

Architectural and Engineering Characteristics of Gompu

Although very unique, Gompu is not very complex in architecture and structure. It basically connects the walls on the two sides of the valley. Nevertheless, there are three interesting points in the architecture and engineering of the dam. The first is that there are three rectangular orifices of the same size all in one vertical line in the downstream face of the dam. In the upstream face of the dam the orifices are covered with dry masonry in order to allow water to seep out gradually from the upstream of the dam. The use of dry masonry in the orifices is to enhance the ease of removal in case of need.

The second is that there are two half cylinder piers also known as thrust blocks on the two flanks of the dam, which enforce more stability. Author believes that the existence of these half cylinder buttresses adds to the theory of this dam belonging to the Sasanian era, as similar half cylinder piers can be seen in the construction of many other Sasanian buildings of Fars such as Qaleh Dokhtar, Ardeshir Palace and Qasr e Bahram. We are not sure if there was a third pier in the destructed part of the dam or not. The lower part of the right bank pier is actually a part of the mountain, initially covered with a layer of stone for aesthetic reasons. The facing stone layer has now fallen off, revealing the rocky core.

The third and final point is that the thickness of the wall of the dam suddenly decreases from 6 m. to 4 m. at the height of 9 m. At present, the total height of the dam is 15 m. The stones used in the face are dressed and square shaped. The dressed stones of each course both in the

⁴ *Chāru* is derived from *Chārug* (McKenzie, 1986), a Pahlavi word for the Iranian cement *sāruj*. *Chāru* is still common in the dialects of southern Iran. *Sāruj* is the Arabic form of *chāru*.

⁵ This part of Fars (Lārestan) does not have any significant stone or lime resources; neither does it have much wood or brushwood resources needed for burning clay and limestone to make *sāruj*.

upstream and downstream faces of the dam, are of equal height but non-equivalent lengths. The height of each course varies from 30 to 50 cm. The upstream and downstream faces of the dam are of regular coursed rectangular stones which, were quarried from the vicinities. Weathering has altered the surfaces of the facing stones. The designer had had the upper face of the dam covered with 2 cm. of finishing saruj mortar, knowing that water penetration could be of grave danger.

Aims behind the construction of Gompu

Although one may assume that the reasons behind building a dam is quite clear, Gompu and its territory does not provide us with the usual supporting evidence and elements. First of all there are not plenty of agricultural sites or lands downstream Gompu. One can also assume that the dam was built for flood control purposes. However there is little sign of the existence of any village or towns that might have needed protection. The last probable theory is that Gompu was meant to store water for consumption purposes. The climate of this area weakens this theory because of the swift and high level of water evaporation, leaving water salty and not drinkable. It must be added that in the dry climate of Gompu's territory, a small amount of water, even if not very fresh will be useful. There is also no diversion dam downstream, or at least the author has not found any trace of it. There is no sign of any water transportation system. Even in the structure of the body of dam there is no sign of an outlet structure meant for controlling the outward flow of water, unless it was part of the destructed section of the dam. There are a few theories behind why Gompu was constructed, which are all rather weak in evidence and not easily provable. One assumption is that the aim of building Gompu and most other dams constructed in southern Fārs which has a very arid and dry climate, was for sediments to accumulate behind the dam and gradually produce a manmade aquifer. Flood water would then penetrate into the aquifer and out of the three orifices and be used as a form of water supply (Javaheri, 1999). Even if this was to be the aim of the constructors; it wouldn't have produced drinkable water, because the developed aquifer behind the dam is the result of the erosion of salty formations in the basin of the dam. Nevertheless, fresh water can still be accessed in case that the aquifer is fully developed and exposed to several years of water impoundment, resulting in salt to be washed away.

When was Gompu destructed?

The destructed part of Gompu is not insignificant or small. It is about 300 cubic m. and there had been an estimate of 10,000 pieces of crushed stone and face stone used in the construction of this section of the dam. Author believes that the destruction had taken place soon after the construction was completed. The first supporting reason is that if water had accumulated behind the dam for several years, there would still be traces of water flow marks on the downstream of the dam and beneath the orifices, while there is no sign of any water flow marks or water erosion on the wall of the dam. The second sign of early destruction is that the depth of erosion in the destructed section of the stone bed of Gompu is more than one meter. It must be noted that this area has a very low level of precipitation and that erosion of the bed of the dam takes a very long time and must be the result of many centuries of water erosion.

Photos:

All photos have been taken by the author, Mohammad Jafar Malekzadeh (Ph.D.) in May 210.



Photo 1: The downstream view of Gompu. The western section of the dam has collapsed, and its debris has been washed away by flood water. The bed, body and abutments of the dam are extremely vulnerable to erosion. The tall eastern pier or half cylinder and the short western one are visible in the photo.



Photo 2: This photo depicts how the thickness of the body of the dam has abruptly decreased from 6 m. to 4 m. Here we can see also that the upstream face of the dam has been plastered with a 2 cm. thick *saruj* mortar.



Photo 3: The upstream face stones of the left upper part of the dam has gradually been worn off and powdered into dust. The weathering and gradual disintegration of the face stones has happened due to the weak quality of the stone not water or wind erosion.



Photo 4: The upstream view of the middle one of the triple orifices. Here dry masonry has been used and it has not been covered with plaster mortar.



Photo 5: The holy stone pool is filled with mainly surface water and a little underground water seepage. During warm seasons when there is little water influent and much evaporation, water does not overflow from the pool.



Photo 6: How has this huge and extremely heavy piece of rock been placed in the body of the dam? The truth is that this enormous piece of rock had been part of a much bigger piece which had protruded from the left abutment. The builders of the dam used this overhanging piece of rock to increase the interlocking of the dam to the mountain and to compensate for a large amount of stonework. However, they were not aware that this is a grave engineering mistake, because no matter how much precision was put into work, they would have never been able to fully fill up the empty space beneath the irregular surface of the overhanging rock. The weight of the stonework on the cantilever rock plus the heavy weight of the overhanging rock itself, the empty space beneath the rock added to the low strength of the rock worked together and resulted in the protruding rock to suddenly break into two or three pieces. It is almost for certain that the broken pieces had fallen a few centimeters, and had had a great impact force on the masonry beneath it, a force so strong that was enough to bring about the disintegration and collapse of left part of the dam.

References:

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