

## TYPES OF NILOMETERS IN EGYPTIAN TEMPLES DURING THE GRAECO-ROMAN PERIOD\*

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### Abstract

*The Nile has a major role in the life of the Egyptians. The Nile flood affected the lands and inhabitants of ancient Egypt. Most of the Nilometers during the Pharaonic and Graeco-Roman period was constructed in conjunction with a temple area. They were used to record the annual inundation of the Nile. During the Graeco-Roman period, the Nilometers may have had a symbolic role in addition to its religious function and related to ritual activities.*

*The researcher spots light on the structural shape of the Nilometer appeared in the Graeco-Roman period. Several shapes appeared such as: wall with descending staircases, circular well, rectangular basin, and the columnar Nilometer.*

**Keywords:** Nilometer- Nile flood- Symbolic function- cubits- crypts- temples.

### The Nile in Ancient Egypt

The Nile had a great influence on the ancient Egyptian civilization. It inspired the ancient Egyptians with the science of land surveying and the observation of the stars for the arrival of the inundation. The Nile affected the economic and financial state of the country. Boats sailed on the Nile to trade with the neighboring country. Tall reeds grew in the marches, that were used in making the Papyrus.<sup>1</sup> Herodotus mentioned the importance of the Nile for Egypt as τὰ ἀμφὶ τῆ γῆ τῆ Αἴγυπτία ποίμαία<sup>2</sup>, which means "Egypt is a gift of the Nile". For the Greeks, the Nile was not only a great river, but the greatest of all other rivers.<sup>3</sup>

Therefore, the ancient Egyptians invented many tools to control the Nile water. Dikes and Dams were built to divide the land into several areas supported by system canals.<sup>4</sup> The most important of all

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\* This research was published as a result of the Graduate Students' Conference at the Faculty of Tourism and Hotels, Alexandria University to encourage the students to present and publish their researches.

is the Nilometer, that was used to predict the inundation. The Nile rises in the beginning of June till mid-September<sup>5</sup>, then begins to fall gradually till next June of the New Year, this was named "hydrography".<sup>6</sup> When the water receded, the lands began to be cultivated and depended on the rich layer of the deposited silt.<sup>7</sup> It is worth mentioning here that the inundation was sometimes measured without using Nilometers, instead they used marks engraved on the rocks. These marks were found in the quays like that of Karank.<sup>8</sup> There are forty-five inscriptions of the Nile levels in this quay from the time of Sheshonq I (25<sup>th</sup> dynasty) to Psammetic I (26<sup>th</sup> dynasty).<sup>9</sup>

### Designations of the Nilometers

Although the Nilometer was used from the Pharaonic period, apparently, no name was used in the ancient Egyptian language for the word "Nilometer". This can be emphasized through the inscription that was found in the chapel of Senusert I (12<sup>th</sup> dynasty) at the Karnak temple. This inscription refers to three Nilometers; however, the inscription doesn't refer to these Nilometers by their names, but by

their locations. It mentions: 3bw  (Elephantine) and Pr-H'py    (Heliopolis).<sup>10</sup> In Greek, the Nilometer was nominated as a *Νειλομέτριον*.<sup>11</sup> The Greek writers described the observation of rising Nile water as *νειλοσχοπειον*, which also refers to Nilometer.<sup>12</sup> The Nilometer in the shape of the well was called *φρεατια*, while that in the shape of the basin was called *ύπονόσπησις*.<sup>13</sup> In Arabic, the Nilometer is known as *مقياس النيل*.<sup>14</sup>

### Examples of the structural Nilometers from the Graeco-Roman Period

The Nilometer is originally an underground structure curved with cubits that indicates the height of the Nile water.<sup>15</sup> One cubit equals seven palms, which equals twenty eight fingers, which in turn equals 0.524m.<sup>16</sup> Zero point is the lowest and the starting point recorded in the cubits of the Nilometer.<sup>17</sup> The varying of the recorder height of the Nile water, was resulted from the varying place of the zero point in each Nilometer.<sup>18</sup> The one located at the temple of Khnum at Elephantine has two zero points; one for the low water level, while the other for the high water level.<sup>19</sup> The Nile level became normal when it reached sixteen cubits, if it decreased or increased, it would lead to a famine or a disaster.<sup>20</sup> Sixteen levels in the cubits symbolized life and prosperity in Egypt.<sup>21</sup> In addition to the cubits that used to be engraved on the walls of the Nilometer, there are also other signs such as the hieroglyphic sign  'nh (life) that was found in the Nilometer of Isis on Philae Island.<sup>22</sup> In the wall of the Satet Nilometer at Elephantine, there are Greek letters such as ΚΔ (24 cubits), and Κπ (23 cubits).<sup>23</sup> The measurements of the Nile water were recorded in the annuals and the documents; The oldest known record is inscribed on Palermo Stone from the fifth dynasty.<sup>24</sup>

These Nilometers used to adjoin the temples in the Pharaonic period. During the Graeco-Roman period, the Nilometers continued to be made within the precinct of the temple. There is the Nilometer of the Serapeum in Alexandria that was made during the reign of Ptolemy III Euergetes I in the third century BC. It is located to the northeast of the temple (fig. 1). Although this Nilometer has the same shape of the Nilometer crypts, it has only one difference as it is connected to the Nile through a canal that once ran from the east of the basin and in underground aqueducts connected with the canal of Scedia.<sup>25</sup> No measuring scales were found engraved on the wall of this Nilometer. Although It might have a symbolic function, the steps of the staircase may be used as a measuring scale.

There is also the Nilometer at the temple of Hathor in Dendera that is located south of the sacred lake. It has a descending staircase leading down to the ground level (fig. 2). Part of the Nilometer is covered, while the rest is uncovered. The cubits can be seen engraved on the walls of the Nilometer. This Nilometer was later restored during the reign of Umar bin al-Khatab (Second caliph of Islam).<sup>26</sup> A Nilometer was found in Esna to the south of the temple of Khnum. It had a descending staircase leading to the ground level, and only a few stones can be seen today.<sup>27</sup>

There is also a Nilometer at the temple of Horus Behdety at Edfu, located between the inner and the outer eastern wall of the temple. It was built during the reign of Ptolemy III Euergetes I. The entrance is situated inside the temple area, while the circular wall is on the outer wall of the temple (fig. 3). The entrance leads to a descending staircase, that ends with a small rectangular opening. This opening gives access to another descending covered staircase (about 45 steps), which in its turn leads to a circular well. The wall of the Nilometer has eight scales. A niche is found in the wall, perhaps was used to place lamps.<sup>28</sup> Another Nilometer is found at the double temple of Horus the Elder and Sobek in Kom Ombo, to the north west of the temple (fig. 4). It was built during the Roman period. It has a doorway, that leads to a short passage, which gives access to a covered descending staircase. At the end of this staircase, there is another spiral staircase surrounding a well. The well is connected with a rectangular basin connected with a canal that has a valve in order to control the quantity of the Nile water. Niches are found on the walls used to keep lamps. Scales were also engraved on the walls.<sup>29</sup>

At Elephantine, a Nilometer is located to the north of the temple of Satet (fig.5). It was constructed in the late period, rebuilt by Emperor Augustus, and restored during the reign of Khedive Ismail after years of neglect. The restoration was made in the nineteenth century on the eastern wall of the sanctuary, which mentions "*After more than million years of abandonment. The Nilometer is completely cleared and a new scale is added, which allowed it to be used in 1870. A good ruler of Egypt, Khedive Ismail by his faithful servant Mahmoud bey*".<sup>30</sup> The Nilometer of Satet has 90 steps, which turn east down to the Nile water. The descending staircase was originally roofed with granite. There are niches made in the walls for lamps. The scales are engraved on the walls of staircases to indicate the level of the Nile. The graduation of cubits, palms and fingers are also engraved on the walls. The numbers of the scale are inscribed in Greek, Demotic and Arabic. Sequences of the Greek inscription show Kπ (23 cubits), then KΔ (24 cubits). Beside the Greek and demotic inscriptions, there are also hieroglyphic signs engraved on small blocks found in the Nilometer. The Roman emperors commemorated their record of the Nile levels through the inscriptions on the wall of the staircase, sharing the year of their reigns and the height of the Nile flood. The famous recorded level was engraved on the walls of Nilometer from the reigns of Augustus to Septimus Severus (from 30 B.C. to 200 A.D), which were varied from twenty four to twenty five cubits.<sup>31</sup> According to the chapel of Senusert I (12<sup>th</sup> dynasty) at the temple of Amon Re in Karank, the ideal measurement in Elephantine was twenty one cubits, or three palms (11.275m).<sup>32</sup> The highest level in this Nilometer is about twenty eight cubits (14.70 m).<sup>33</sup> Some Praefects are also honored to commemorate their names, which curved on the left wall of the Nilometer.<sup>34</sup>

In Philae, two Nilometers were found: The northern one has been well preserved, (fig.6); while the southern was abandoned and filled with sand (fig.7). Both have descending staircases leading down to the Nile water. The northern Nilometer is located to the west of the temple of Isis. It is in a good condition without any cracking. It seems that it used to have a doorway; as there are remains of jambs and hinges. It has a descending covered staircase leading down to the Nile water. The staircase is cut

in the solid rock, which is about 12 m wide for each step. The southern Nilometer was erected behind the western colonnade, between the twelfth and thirteenth columns. It has descending covered staircase, which passes under the western colonnade and goes down to the Nile water. Today, the Nilometer is abandoned and filled with sands. Two scales are engraved in the wall of this Nilometer reached to 17 cubits; while another scale is engraved in the wall of the southern Nilometer with only 12 cubits. The sign  $\overline{\text{nh}}$  surmounts one of this scale to show the suitable height during the flood. The inscriptions and figures indicate the bad type of curving in the walls of this Nilometer.<sup>35</sup>

In Kalabsha, there is a Nilometer located at the southern end of the ambulatory between the inner enclosure wall and the rear chamber of the temple of Mandulis (fig.8). The Nilometer is made of brick well-shaft cut in the bedrock base. The total height of the Nilometer well is approximately 88 m. The entrance of the circular well is in the courtyard of the temple. The Nilometer is 3m deep. It has a descending staircase, which gives access to another spiral staircase. The cubits are engraved in the wall of the staircases from the lowest to the highest level. The lowest level is about 106 m and the highest is about 1.50 m. There are rectangular windows made in the wall of the Nilometer to place the lamps. The windows are approximately 55 x 80 cm. The well has an underground connection with the Nile water.<sup>36</sup>

Sometimes the Nilometers were not used to measure the Nile flood, but had a symbolic role. This can be confirmed by the existence of such Nilometers away from the Nile water with no records of cubits on their walls.<sup>37</sup> Only one known example from the Pharaonic period can prove that; it is the second Nilometer at the temple of Amon-Re in Karnak. It lies to the north west of the sacred lake and dated back to the reign of Taharqa (25<sup>th</sup> dynasty). This Nilometer has a small court ended with a square opening with a staircase, that leads down to an underground chamber (fig.9). It is called Pseudo-Nilometer that probably represents the primeval water Nun from which god Amun stepped out.<sup>38</sup> The other examples of this type date back to the Graeco-Roman period. Similar types can be found in the temples outside Egypt, where there is no river to measure; such as the Nilometers of Serapeum A, B at Delos- Greece, the Nilometer in the Iseum of Gortyn – Crete, and the Nilometer in the Iseum of Pompei – Italy. Inside Egypt, other good examples can be seen in: the Serapeum of Canopus (east of Alexandria)<sup>39</sup>, the Serapeum of Luxor (southwest of the temple) (fig.10).<sup>40</sup>

Examining the Nilometers in the Graeco-Roman temples, reveals four types of Nilometer: walls and descending staircases, circular wells with steps, rectangular basins with steps, and column Nilometers.

### **1. Nilometer in Form of Walls with Descending Staircase**

This shape appeared in the Pharaonic period, it is shown in two Nilometers of temple of Amon-Re at Karnak and the Temple of Rameses III (20<sup>th</sup> dynasty) at Medinat Habu (fig.11). This shape continued to appear in the Graeco-Roman period like that of the temple of Isis in Philae, Hathor in Dendera, Khnum in Esna and finally that of the temple of Satet in Elephantine.<sup>41</sup>

This type consists of two walls between them is a descending staircase, which leads down to the Nile water (fig. 12). The descending staircase can be covered or uncovered. This type of Nilometer is directly connected with the Nile water. Sometimes, this type had a doorway such as that of Philae. The scales were curved in various locations, on the walls of the Nilometer, or on the staircases themselves. The graduation of cubits, palms and fingers are found in the scales. Sometimes, the two walls are supported by horizontal pillars like in the Nilometers of Madinet Habu and Karnak. This type of Nilometers is

provided with windows or niches to place lamps to lighten the subterranean sections such as the Nilometer of Satet at Elephantine.<sup>42</sup>

## **2. Nilometer in the form of Well surrounded with steps**

The earliest known example of this type dated back to the Pharaonic period, which is the Nilometer of Memphis that took the shape of a square well. However, this type disappeared to be replaced by the first type mentioned before (Nilometer in the form of walls with staircase). This type, started to be used again in the Graeco-Roman period, but in the shape of a circular well; as it can be seen in the Nilometers of Horus Behdety at Edfu, Horus the Elder and Sobek at Kom Ombo, and Mandulis at Kalabsha.<sup>43</sup>

In this type the Nilometer consists of a descending spiral staircase that goes down around the circular well, such as the Nilometers of Kom Ombo and Kalabsha (fig.13). Sometimes the descending staircase, leads to another covered descending staircase opens to the circular well; such as the Nilometer of Edfu. The scales are engraved in the walls of the staircases or in the circular well for observing the Nile water. It is marked with cubits, and subdivided with palms and fingers.<sup>44</sup>

## **3. Nilometer in the Form of Rectangular basin with steps**

There is only one known example of this type form Pharaonic period which is the Nilometer of the temple of Khnum at Elephantine (fig.14). However, this type was widely used in the Graeco-Roman period; such as the Nilometer of the Serapeum in Alexandria. It seems that this type was the standard for what is known as the Nilometer crypts, which has a symbolic function such as: the Serapeum of Canopus and the Serapeum of Luxor. Even the Nilometer crypts that were found in the Egyptian temples outside Egypt took the same shape, such as: the Serapeums of Delos (A, B) (Greece), the Iseum of Gortyn (Crete), the Iseum of Pompeii (Italy).<sup>45</sup>

In this type the basin used to be rectangular except for the cases of the Nilometers of the Iseum of Gortyn and Pompeii, and this could be related to the fixed space that the architect had to build the Nilometer in. The basin is provided with descending steps, that leads down to the ground level.<sup>46</sup>

## **4. Columnar Nilometer**

This type appeared in the Roman period. It is a portable device, which is represented as a stick or a rectangular piece. It is about three or four centimeters tall and mainly used as a votive column. The cubits are engraved in the column for measuring the Nile water during the inundation.<sup>47</sup> It was placed in conjunction with the temples. The column was one of the sacred objects placed in the temple of Serapis under the supervision of the priests.<sup>48</sup> The column was carried in the procession for measuring the Nile water and probably used in the rituals of the temple.<sup>49</sup> One of the best example of this column was in the temple of Serapeum at Alexandria. The remains of this column were discovered inside the rectangular Nilometer. Later, Emperor Constantine I (306-337 A.D) ordered to transfer the column from the temple to the church in Alexandria. The pagans spread rumors, that the Nile would not rise because of the anger of Serpapis, but the Nile flood raised during this year. Emperor Julien (361-363 AD) ordered to return the column to the Serapeum temple to regain the pagan cult. The column remained in the temple until the time of Theodosius I who destroyed the temple in 391 AD.<sup>50</sup>

This type of Nilometer can be found depicted on art objects. There is a glass dated back to the Roman period (fig.15), and preserved in British Museum (no.1868.5.919). The glass represents a young naked male carved the Greek letter Zeta (number 7) on a columnar Nilometer. Beside the man, there is a reclining woman holding a sistrum in her hand (probably Isis) in front of a temple. She is standing in front of the tree.<sup>51</sup> The Columnar Nilometer is also represented in terracotta panel (fig.16), preserved in the National Roman Museum, Italy (no. 58192). The panel is divided into three arches. The middle one represents an old man in front of him is an object, that is probably a Nilometer. The right arch represents three dwarfs and a crocodile, while the left one represents a man carrying an object and in front of him is a donkey.<sup>52</sup>

## Conclusion

- The ancient Egyptians were the first to invent the Nilometers for recording the height of the Nile inundation. These records were used to estimate taxes depending on the amount of crops.
- There was no specific name for the Nilometer during the Pharaonic period, as the word Nilometer appeared in the Graeco-Roman period.
- The measurement unite of the Nile water level was the cubit. Sixteen cubits was the ideal level and the Zero point was the starting point of the scale.
- Nilometers were erected in the Egyptian temples from the Pharaonic period till the Græco-Roman period. After the appearance of Christianity in Egypt, Nilometers became independent buildings like Roda Nilometer (slamic architecture building). After the recent construction of the High Dam and Nasser lake, the Nilometer was no longer used.
- From the Graeco-Roman period, the Nilometers were found in the temple of: Horus Behdety at Edfu, Hathor at Dendara, Khnum at Esna, Horus the Elder and Sobek at Kom Ombo, Isis at Philae, Mandulis at Kalabsha and Serapeum at Alexandria.
- There are four types of Nilometer that dated back to the Graeco-Roman period; walls with descending staircases, well surrounded with steps, and rectangular basin with steps, and column Nilometer.
- The form of walls with descending staircase type was the most common type from the Pharaonic period till the Græco-Roman period.
- In the Roman period, the column Nilometer replaced the structural building for measuring the Nile water during the inundation.
- The Nilometer in the Graeco-Roman period continued to play the role of measuring the water height, however, in certain cases it was only used as a symbolic feature.
- All the symbolic Nilometers of the Graeco-Roman period took the shape of a rectangular basin with steps like the Serapeum in Alexandria.
- Although there were no cubits engraved found in the Nilometer of Alexandria, it is assumed that it was used to the measure of the Nile water; as there were aqueducts led to the Scidia canal. The steps of the Nilometer here may have played the role of the cubits.

**Table I****Nilometers in the Temples from Græco-Roman Period**

<b>Name</b>	<b>Location</b>	<b>Existence</b>	<b>Description</b>	<b>Function</b>
<b>Nilometer of The Serapeum of Alexandria</b>	North east of the temple	Still exists	Rectangular basin with descending staircase	Used to measure the Nile inundation in the Ptolemaic period while it was symbolic in Roman period
<b>Nilometer of the Temple of Hathor in Dendera</b>	South west of temple behind the scared lake	Still exists	Descending staircase leading to the ground level.	Used to measure the Nile inundation
<b>Nilometer of the Temple of Khnum in Esna</b>	South of the temple	Doesn't exist	Descending staircases leading to the ground level	Used to measure the Nile inundation
<b>Nilometer of the Temple of Horus Behdety in Edfu</b>	between the inner and the outer eastern the temple	Still exists	Circular well with descending stair case	Used to measure the Nile inundation
<b>Nilometer of the Temple of Horus the elder and Sobek in Kom Ombo</b>	North west of the temple	Still exists	Circular well with descending stair case	Used to measure the Nile inundation
<b>Nilometer of the Temple of Satet in Elephantine</b>	North of the temple	Still exists	Ninety descending Steps leading to the ground level	Used to measure the Nile inundation
<b>Northern Nilometer at Temple of Isis in Philae</b>	West of the temple	Still exists	Descending staircase leading to the ground level	Used to measure the Nile inundation
<b>Southern Nilometer at Temple of Isis in Philae</b>	behind the western colonnade	Still exists	Descending staircase leading to the ground level	Used to measure the Nile inundation
<b>Nilometer of the Temple of Mandaulis at Kalabsha</b>	Southern end of the ambulatory temple	Still exists	Circular well with descending stair case	Used to measure the Nile inundation



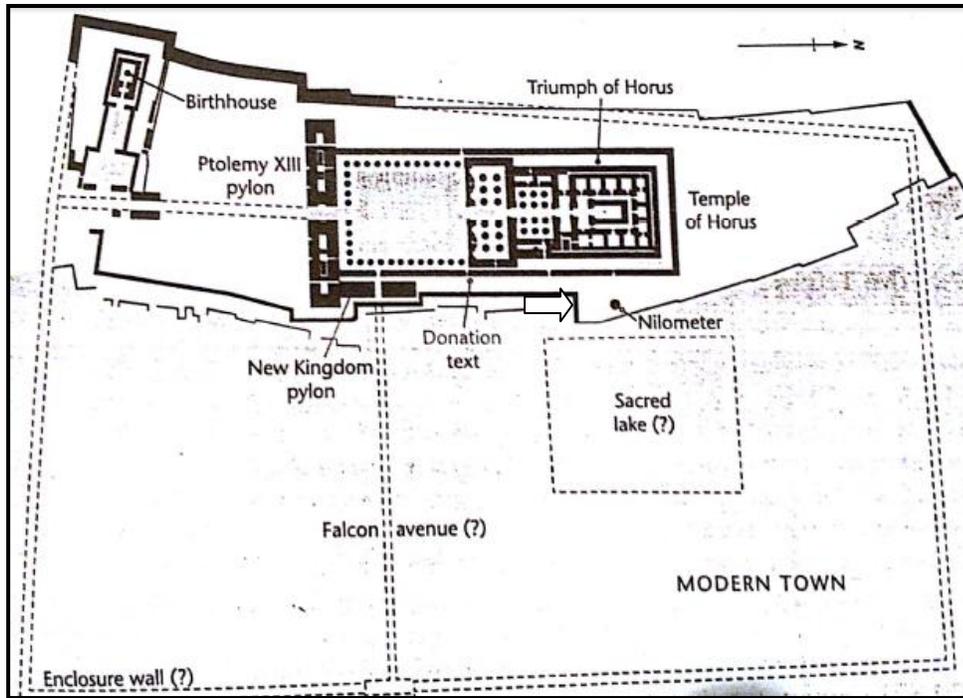
**Fig.1** Nilometer of the Seraperum in Alexandria

*Photographed by the Researcher.*



**Fig.2** Nilometer of the temple of Hathor in Dendera .

*Photographed by the Researcher.*



**Fig.3** Location of the Nilometer inside the temple of Horus Behdety at Edfu

**Ref:** Roger Bagnall and Dominic Rathbone, *Egypt from Alexander to the Copts An Archaeological and Historical Guide*, (London, 2004) , 229.



**Fig.4** Nilometer of the double temple of Horus the Elder and Sobek at Kom Ombo

*Photographed by the Researcher.*



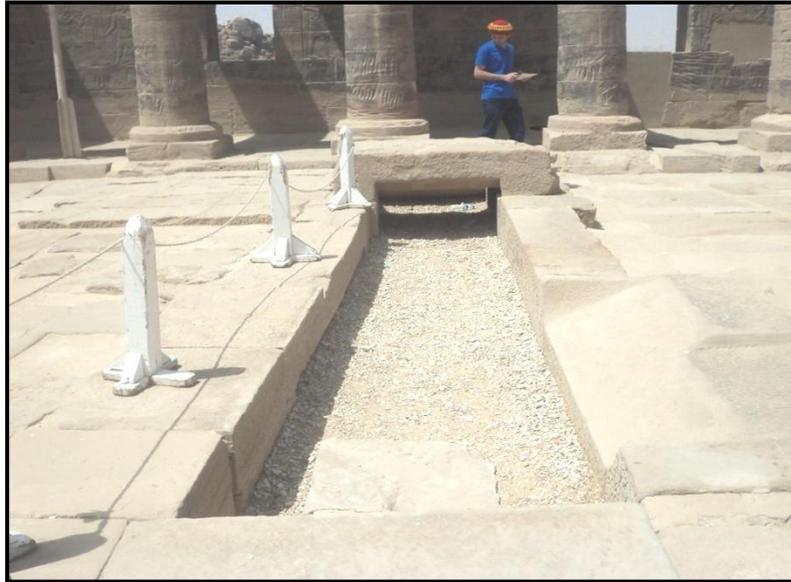
**Fig.5** Scales in the eastern wall of Satet Nilometer at Elephantine

*Photographed by the Researcher.*



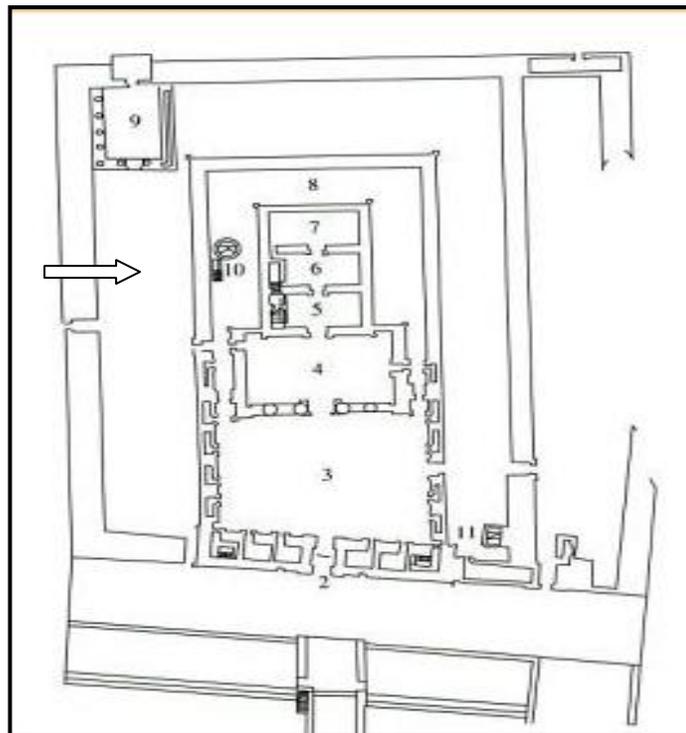
**Fig.6** The northern Nilometer of the temple of Isis on Philae Island

*Photographed by the Researcher.*



**Fig.7** The southern Nilometer of the temple of Isis on Philae Island

*Photographed by the Researcher.*

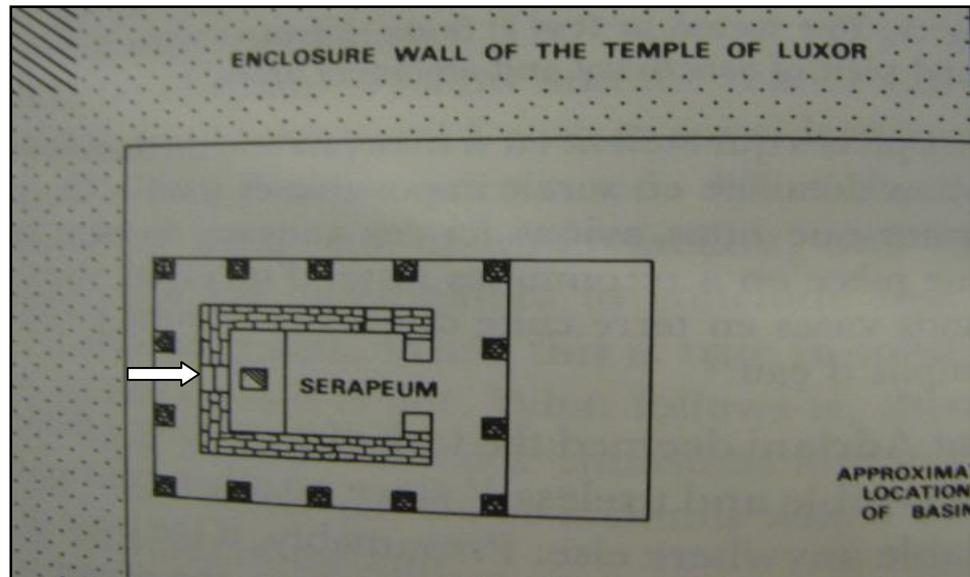


**Fig.8** Location of the Nilometer inside the temple of Mandaulis at Kalabsha

Ref: Zahi Hawas , *The Island of Kalabsha* , (Cairo, 2004), 38.

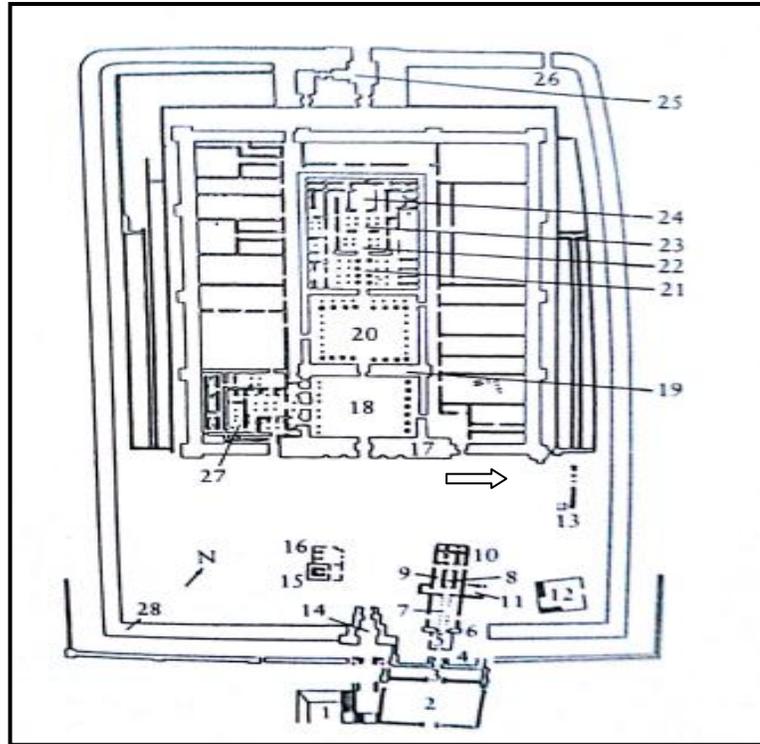


**Fig.9** Second Nilometer of the temple of Amon-Re in Karnak  
*Photographed by the Researcher.*



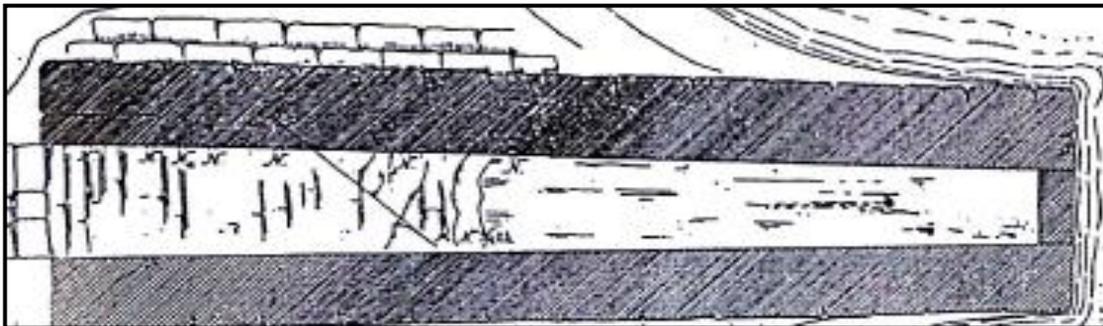
**Fig.10** The basin of the Serapeum temple at Luxor

Ref: Robert Wild, *Water Cultic Worship of Isis and Serapis*, ( Netherland , 1981) , 12.



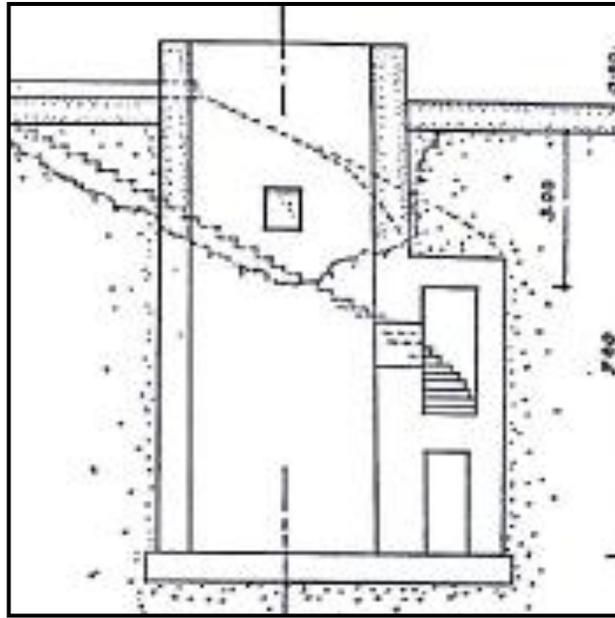
**Fig. 11** Location of the Nilometer in the temple of Ramesses III at Medinate Habu

Ref: Nicola Grimal , *A History of Ancient Egypt* , (Hong Kong , 1994) , 273.



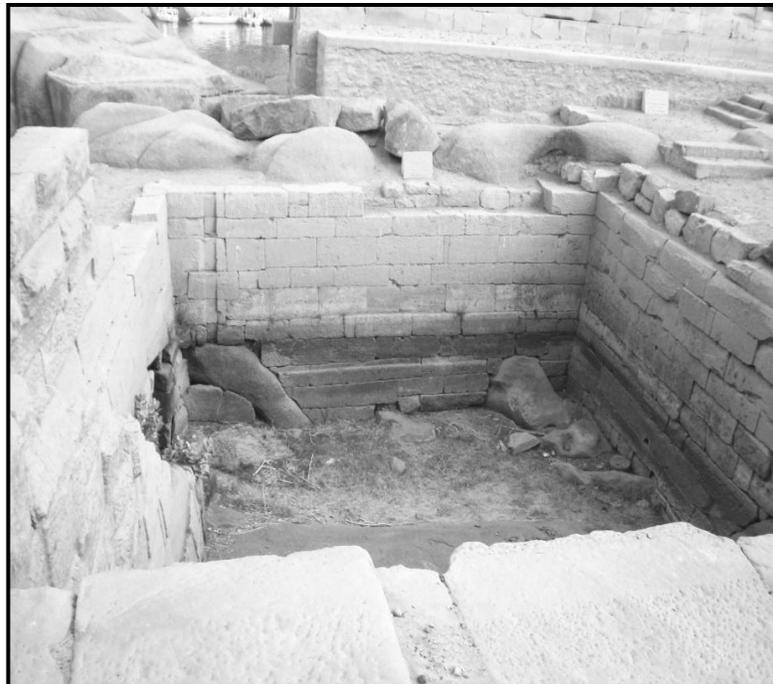
**Fig.12** Two walls with a descending stair case in the Nilometer of temple of Amon-Re at Karank.

Ref: R. Said, *The River Nile geology: Hydrology and Utilization*, (New York, 1993), 153.



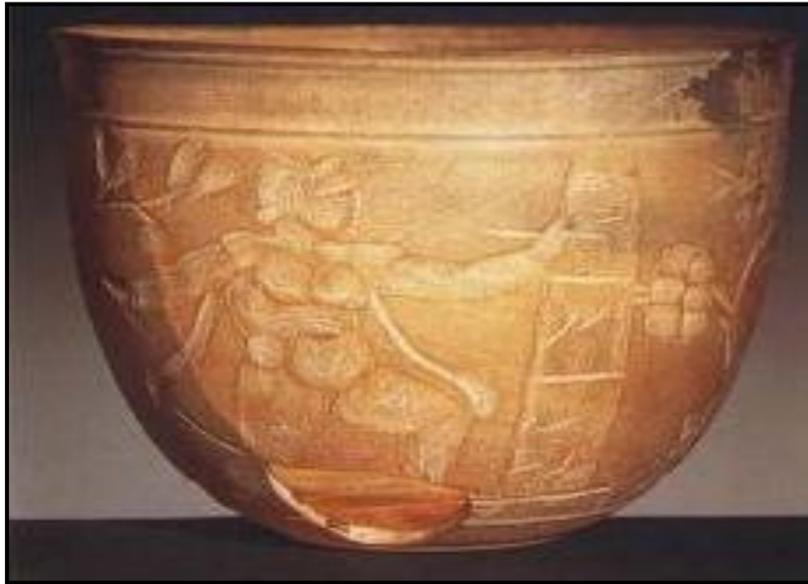
**Fig.13** Nilometer in the form of a spiral staircase surrounds a circular well at temple of Mandaulis at Kalabsha

Ref: G. Wricht, *Kalabsha: the Preserving of the Temple*, (New York, 1972), 49.



**Fig.14** Nilometer of the Khnum temple in Elephantine

*Photographed by the Researcher.*



**Fig.15** Caesars Glass with a depiction of a columnar Nilometer, British museum

Ref: Miguel Versluys , *A Egyptiaca Roman Nilotic Scenes and the Roman Views of Egypt*, (Boston, 2002), 170.



**Fig.16** Panel represents an old man standing in front of a Nilometer

Versluys , *A Egyptiaca Roman Nilotic Scenes* , 89.

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