

**Hydrology of the Great Fayoum Depression till the 12<sup>th</sup> Dynasty:  
Archaeological and Philological Evidences of Artificial Water  
Entry**

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**Abstract**

The current research emerges from the fact that the topography, history, and archaeology of the Great Fayoum Depression have been controlled over time by its hydrology. It aims to figure out the archaeological and/or the philological evidences that confirm whether water entry to the depression during the dynastic period of the Egyptian history was artificial. Qualitative approach was used in this paper to investigate the research question and documentation was used as a method to collect and analyze secondary data. Results proposed some evidences which confirm that the entry of water to the Fayoum was never artificial before the beginning of the 12<sup>th</sup> Dynasty.

**Keywords**

Fayoum Depression, Great Fayoum Depression, Hydrology, Old Kingdom, Middle Kingdom, Qarun Lake.

**1. Introduction**

In the Egyptian Western Desert or the so-called the Libyan Desert, seven major depressions, surrounded totally or partially by escarpments, exist and some minor ones. The major depressions include: Siwa, Qattara, Dakhla, Kharga, Farafra, Bahariya, and the Fayoum; while the minor ones include Qara, Wadi Natrun, Wadi Rayan, and Kurkur.<sup>1</sup> The Great Fayoum Depression is formed by wind erosion and is basically below sea level and slopes northward.<sup>2</sup> It is bounded by escarpments and plateaus and; thus, is a basin of

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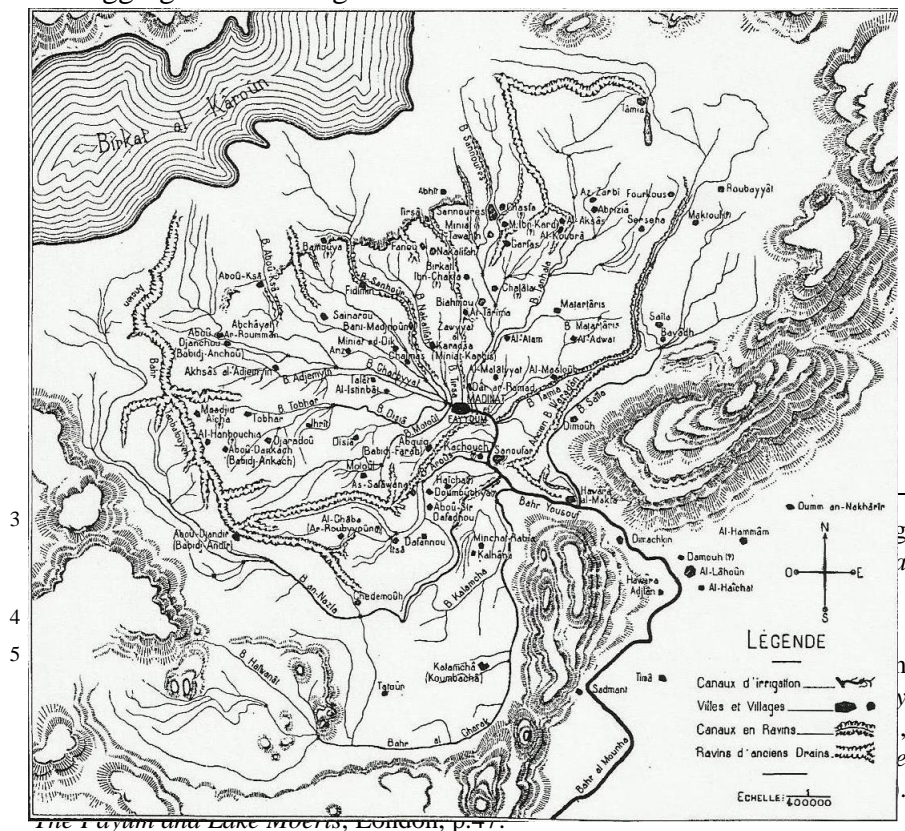
<sup>1</sup> Vivian, C., (2002). *The Western Desert of Egypt, an Explorers Handbook*. The American University of Cairo Press, Cairo, Egypt, p.9.

<sup>2</sup> El-Shabrawy, G.M.; Dumont, H.J., (2009). The Fayoum Depression and Its Lakes. In: Dumont H.J. (ed) *The Nile. Monographiae Biologicae*, vol 89, Springer, Dordrecht, pp.95-124.

internal drainage which is the same function of Wadi Rayan minor depression.<sup>3</sup>

No doubt that the hydrology of the Fayoum depression - which encompasses the study of its water in terms of resources, distribution, movement and management - formed both the topography and the history of the Fayoum region, including the landscape of its archaeological sites (see fig.1). The probable stability of the Lake formation and its water level started about 1980 BC. (i.e. during the reign of Amenemhat I of the 12th Dynasty) and fed directly by the Nile water through Lahun gap.<sup>4</sup>

However, it is not evidently confirmed whether the entry of water to the Fayoum Depression was natural or artificial. Literature revealed that water entry to the depression is a controversial issue. Some scholars assert that it was artificial in certain periods of history via Lahun Gap, as kings widened the gap allowing a canal to connect the depression with the Nile<sup>5</sup>; while others - such as Abu Al-Izz (1971), argue that this Gap is ‘naturally’ cut slowly through frequent water aggregation and degradation actions.<sup>6</sup>



<sup>6</sup> Abu Al-Izz, M. S., (1971). *Landforms of Egypt*. Translated by Fayid, Y. A. and Eleanore Saari, The American University in Cairo Press, Cairo, p.23.

**Figure (1): Map of the Fayum Depression showing the surface hydrology (after Soliman, 1989)<sup>7</sup>**

This uncertainty has led to this research aim which is to critically investigate the archaeological and philological evidences which prove artificial water entry to the Fayoum Depression. It answers major questions; did the entry of water to the Fayoum Depression during the Old Kingdom was natural or artificial? Did kings of the Middle Kingdom directed the water to Fayoum Depression through Lahun Gap? and what archaeological and philological evidences prove emerging results?

**2. Hydrology and Early History of the Great Fayoum depression**

Hydrology of the Great Fayoum depression played an integral role in shaping both its topography and history as the depression is extricably linked with water existence. It is believed that it had already begun to be formed in the Jurassic Period (c.190-136 million years ago, and belongs to the Precambrian supereon, the Phanerozoic eon, and the Mesozoic era).<sup>8</sup> Afterwards during the Eocene epoch, (c.55-35 million years ago, and belongs to the Cenozoic era, the Paleogene period), the depression was completely formed along with a series of deep depressions in the Eocene limestone plateau in the Western Egyptian Desert, others are Baharia and Farafra.<sup>9</sup>

At that epoch, the whole Fayoum depression was part of the Tethys ocean and vertebrate specimens of whales and other water-related creatures can easily be watched in the Valley of Whales<sup>10</sup> which is a paleontological site that is located some 150 km southwest of Cairo in the Fayoum Governorate. The site was designated a UNESCO World Heritage Site in 2005 as it provides evidence for

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<sup>7</sup> Soliman, G.F. (1989). The Hydrology of Lake Qarun, Fayoum Province, Part 1: Physical Environment Conditions. Bull.Inst. Oceanogr.&Fish. ARE, 15, pp.75-92.

<sup>8</sup> Ball, J., (1939). *A Contribution to the Geography of Egypt*. Survey and Mines Department, Cairo, p.339; El-Shabrawy and Dumont. The Fayoum Depression and Its Lakes. pp.95-124; Gradstein, F.M.; Ogg, J.G.; Schmitz, M.D.; Ogg, G.M. (editors), (2012). *The Geologic Timescale 2012 (volume 1)*. Elsevier. p.301; Pieńkowski, G.; Schudack, M.E.; Bosák, P.; Enay, R.; Feldman-Olszewska, A.; Golonka, J.; Gutowski, J.; *et al.*, (2008). "Jurassic". In McCann, T. (ed.). *The Geology of Central Europe. Mesozoic and Cenozoic*. London: Geological Society. pp.823–922.

<sup>9</sup> Vivian, *The Western Desert of Egypt*. p.11.

<sup>10</sup> Murray, A.M.; Argyriou, T.; and Todd, D.C., (2014). Palaeobiogeographic relationships and palaeoenvironmental implications of an earliest Oligocene Tethyan ichthyofauna from Egypt. *Earth Science*, 51, pp.909–918.

one of the greatest mysteries of the evolution of whales which is the emergence of the whale as an ocean-going mammal from a previous life as a land-based animal.<sup>11</sup>

The Oligocene epoch (c. 35-23 million years ago, and belongs to the Cenozoic era, the Paleogene period) witnessed the last inundation of the Tethys over the Fayoum depression. Vertebrate findings of the Oligocene are mixed with those of numerous large petrified forests preserved in giant channel deposits of the Paleonile. These deposits are as well preserved as those of the famous Petrified National Forest National Park in the United States<sup>12</sup>. Oligocene deposits of sand, fluvial gravel with fossil plants, petrified wood, and fossils of elephants, crocodiles, Arsinoitherium, and other animals were left between the Fayoum and Bahariya oases.<sup>13</sup>

During The Miocene epoch (c. 23-5.3 million years ago, and belongs to the Cenozoic era, the Neogene period) spotted the dry of the Mediterranean Sea and the Fayoum turned into a dry hollow. The Nile flowed into the bottom of a 2.400-meter-deep canyon - where Cairo is now. After the Mediterranean reflooded at the end of the Miocene epoch, the Nile canyon became an arm of the sea reaching farther than the modern Aswan and gradually formed the Nile valley.<sup>14</sup>

During the Pleistocene epoch (c. 2.5 million - 11.700 years ago, and belongs to the Cenozoic era, the Quaternary period), the bed silt of the Nile valley became high enough to let the Nile flood overflow into the Fayoum empty depression, making a lake in it (which is the ancestor of Lake Qarun). Therefore, a branch of the Paleonile streamed into the Fayoum and provided it with fresh water for the first time.<sup>15</sup> Therefore according to Abu Al-Izz<sup>16</sup>, the Fayoum depression has a dual personality; it has the features of a desert

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<sup>11</sup> UNESCO World Heritage Center (Retrieved 20 July 2016). *World Heritage List: Wadi Al-Hitan (Whale Valley)*. Website: <http://whc.unesco.org/en/list/1186> [accessed at 20 Sep. 2018].

<sup>12</sup> Dolson *et al.*, (2002). Field Trip Report, Vision Statement and Draft Action Plan: For Preservation and Interpretation of Geological Features in the Greater Fayoum Basin. Cairo, Egypt, p.76.

Vivian, *The Western Desert of Egypt, an Explorers Handbook*. p.8.<sup>17</sup>

<sup>14</sup> Lyell, C., (1833). *Principles of geology, being an attempt to explain the former changes of the Earth's surface, by reference to causes now in operation*. London: John Murray, Volume 3, p.54.

<sup>15</sup> Lyell, *Principles of geology*, p.42.

<sup>16</sup> Abu Al-Izz, *Landforms of Egypt*. p.12.

depression with no outlet to the sea and it shares also the characteristics of the Nile valley and delta.

Around 35.000 years ago, water level was degredating from +40m. to +20m. That level never exceeded +20 after that time. Moreover, since Kiman Fares (ancient Shedt) is +23m, it is higher than water level at the end of that time. As a result, the area Kiman Fares was never submerged since then.<sup>17</sup>

Eventually during the Holocene epoch (c. 11.700-4.200 years ago, and belongs to the Cenozoic era, the Quaternary period), the lake level was fluctuating between degradation and aggradation phases. These phases were associated with high and low waters in the Qarun Lake; from +20 m. to -45 m. Strand lines spot the high water levels, whereas gypsum and diatomite are expression of low water level in the lake.<sup>18</sup>

### **3. Archaeological Evidences during Prehistoric Period**

In the prehistoric period, the Fayoum was lush and full of water as the lake was much larger. According to Hassan and Tassie<sup>19</sup>, the lake level – during the Paleolithis Period (300.000 to 10.500 BC) – was estimated at +30m above sea level, though fluctuated by +15m and -7m from this level. During Qarunian (7.200 to 6.200 BC), the lake is estimated at +10m, although it fluctuated by +9m from this level. Therefore before the Neolithic period (the Fayumian 5.200 – 4.000 BC), hunting and fishing were the main occupations. Plants and animals were just beginning to be domesticated. During Fayumian (5.200 – 4.000 BC), the lake is estimated at +20m, although it fluctuated by +4m and -1m from this level. Therefore, the first known agricultural communities flourished. During the Predynastic (4.000 – 3.050 BC), the lake is shown at +15m, although fluctuated by +5m and -25m from this level.

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<sup>17</sup> Issawi, *et al.* The Fayium Depression-Qarun Lake. pp.37-322.

<sup>18</sup> Issawi, *et al.* The Fayium Depression-Qarun Lake. pp.37-322; Zalat, A.A., (٢٠١٥).Holocene diatom assemblages and their palaeoenvironmental interpretations in Fayoum depression, Western Desert, Egypt. *Quaternary International* (369), pp.86-98.

<sup>19</sup> Hassan, F., and Tassie, G ., (2006). Modelling environmental and Settelment Change in the Fayum, *Egyptian Archaeology*, 29, pp.37-40.

As a result, more people lived in the Fayoum than in the Nile Valley.<sup>20</sup> Caton-Thomson and Gardner discovered a great number of these settlement scattered in the North of Qarun Lake.<sup>21</sup> However, it is obvious that the distribution of Prehistoric settlements in the Fayoum indicates the absence of any civilized areas in the region except in the north and east of Qarun Lake which is evident from the discovery of paleo-tools (i.e. hand axe).<sup>22</sup> The reason for that is that the south of Fayoum was submerged by water except Kiman Fares area (ancient Shedt) which was full of swamps that habitat crocodiles. This viewpoint is assured by the legend of Diodorus Cecelus which indicates that Shedt was a hunting and fishing place full of swamps during Protodynastic Period.<sup>23</sup>

Around 4.000 BC, however, the climate changed and the Fayoum began to dry up and people migrated to the Nile Valley. By 3.500 BC Fayoum people had grain silos, they made pottery and used sickles; however, no shelters have been found. Once the Nile Valley became dominant, the Fayoum was abandoned and became hunting and fishing paradise and an area for salt and limestone mining. By 3.000 BC., the Fayoum capital, Shedet<sup>24</sup> had become a cult center for the crocodile god Sobek.<sup>25</sup>

#### **4. Archaeological and Philological Evidences during the Old Kingdom**

In the Early Dynastic and Old Kingdom (3.050 – 2.181 BC), Lake level is estimated at +15m, although fluctuated by ±5m from

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Vivian, *The Western Desert of Egypt, an Explorers Handbook*. p.78. <sup>٢٠</sup>

Caton-Thomson, G., and Gardner, E. W., (1934). *The Desert Fayum*, <sup>٢١</sup>  
Anthropological Institute of Great Britain and Ireland, London, p.39.

Vivian, *The Western Desert of Egypt, an Explorers Handbook*. p.76. <sup>٢٢</sup>

Oldfather, C.H., (1933). *Diodorus Siculus*. Library of History, I, Cambridge, p.305. <sup>٢٣</sup>

<sup>24</sup> Dieter, A., (1977). Fajjum. *LÄ* II, p.88; Brovarski, E., (1984). Sobek. *LÄ* V, p.996.

Dieter, Fajjum. pp. 87-93; Shaw, I., (2004). *The Oxford History of Ancient Egypt*. <sup>٢٤</sup>  
Oxford University Press, p.32; Lehner, M., (1997). *The Complete Pyramids*. Cairo, pp. 96-97; Verner, M., (2002). *The Pyramids, The Mystery, Culture, and Science of Egypt's Great Monuments*. Cairo-New York, p.185; Hewison, R. N., (2002). *The Fayoum: a Practical Guide*. The American University of Cairo Press, Cairo, Egypt, p.36.

this level; therefore, most of the the Fayoum region was covered by water.<sup>26</sup>

Since Shedet was higher than this level of water, it represented an island that is not submerged by lake water. Analysis to the archaeological remains from the Old Kingdom indicated that rulers of the Old Kingdom paid little attention to the utilization of the Fayoum Depression; they, therefore, used the region only for two purposes: I) As a hunting and fishing place - as evident from Diodorus legend - because much of the low land was swamps and marshes, appropriate hunting-ground for sporting pharaohs.<sup>27</sup> II) as a basalt mining place as evident from Basalt mines on Widan El-Faras Quarries on Qatrany Mountain. It can, therefore, be noticed that North of Qarun Lake was still the location of archaeological sites – such as Basalt mines.<sup>28</sup>

The Nile River was being connected to Qarun Lake in its annual summer flood. The transmission of Basalt through Qarun Lake was carried out during high water level of a Nile flood so that Qarun Lake had an easy connection with the Nile. Boats came to the quay to pick up loads of basalt, and then sailed across the lake, through the Hawara gap, and down the Nile River to the Memphite necropolis. However by the end of the Old Kingdom, when water level deggregated to -2m, Basalt mines were no longer utilized as the connection to the Nile was difficult.<sup>29</sup>

Thus archaeologically, Old Kingdom kings did not do any efforts to direct the water artificially to the Fayoum Depression although the religious significance of Shedet at that time appeared in the pyramid texts.<sup>30</sup> This is evident from the scarceness of archaeological sites that date back to the same period even in Shedet itself, except Sila Pyramid on Gebel El-Ros. This is normal as Sila pyramid is located +115m. higher than the level of water at that time.

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<sup>26</sup> Hassan and Tassie, *Modelling environmental and Settlement Change*. pp.37-40.  
Hewison, *The Fayoum*. p. 60. <sup>27</sup>

<sup>28</sup> Storemyr, P., *et al.*, (2003). *Widan el-Faras Ancient Quarry Landscape, Northern Faiyum Desert, Egypt: Site Description, Historical Significance and current Destruction*. Expert Center for Conservation of Monuments and Sites, Report No. 2003.062, 16 November, pp.1-23.

Storemyr, *et al.*, *Widan el-Faras Ancient Quarry Landscape*. pp.1-23. <sup>29</sup>

Pyr. (1908-1910), 1564 b-c (P, N); 416c (W).<sup>30</sup>

The lake water level severely decreased at the end of the Old Kingdom and then grew at the end of the First Intermediate Period or early Middle Kingdom.<sup>31</sup> So it can be emphasized that political and economical troubles in Egypt were linked with degradation phases, while Egypt prospered politically and economically during aggradation phases. This is obvious as all invasions to Egypt happened during degradation phases, whereas Egyptian Empire extended beyond its political borders during aggregation phases. This is also applied on the case of the Fayoum which was suffering economical and political problems during the degradation phases while it was prosperous during the aggradation ones.<sup>32</sup> The low level of water also caused another issue; salinity of the lake happened during the degradation phase from 3000 BC to 2040 BC, probably during the Sixth dynasty as revealed from salty sediment of this period.<sup>33</sup>

Moreover, philological analysis provides evidences that supports our archaeological evidences. It proves that only Shedet – out of all other parts of the depression – flourished during the Old Kingdom. The Fayoum Region was mentioned in Niwserre's *Nome* List, as a part of nar.t xnt.t, the 21<sup>st</sup> *nome* of Upper Egypt; while, the capital Shedet was mentioned twice in the Pyramid Texts.<sup>34</sup> It is noticed that the common writing of Sdj.t in the Old kingdom includes the  determinative which appeared on the false door of kA nfr at the reign of king Senefru for the first time.<sup>35</sup> Then, this determinative continued to be used in the Pyramid Texts' versions of king Wnis of the 5<sup>th</sup> dynasty and Pepi I of the 6<sup>th</sup> dynasty.<sup>36</sup> The same determinative also appeared on blocks from the south jamb of kA nfr

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Hassan and Tassie, Modelling environmental and Settlement Change. pp. 37-40. <sup>31</sup>

Hassan, E.A., (1998). Climate Change, NileFloods and Civilization. *Nature and Resources*. Vol. 34, No. 2, pp.34-40. <sup>32</sup>

Issawi, Osman, and Meibed. The Fayium Depression-Qarun Lake. pp. 37-322. <sup>33</sup>

Pyr. (1908-1910), 1564 b-c (P, N); 416c (W). <sup>34</sup>

James, T.G.H. (1961). *The British Museum. Hieroglyphic Texts from Egyptian stela*. I, London. pl.10. <sup>35</sup>

<sup>36</sup> Pyr.1564c.



chapel entrance in Giza (G2150).<sup>37</sup> Using this determinative of the word Shedet in the Pyramid Texts emphasizes that it was a “town” during the Old Kingdom. Texts also indicate that this town was vigorous and flourishing for the following reasons:

1. The existence of a temple dedicated to Sobek in Shedet as appeared in inscriptions on Niwesserre Solar Temple at Abu Ghorab.<sup>38</sup>
2. The great religious significance of Shedet that appeared in Pyramid texts.<sup>39</sup>

It is now clear that free entry of water to/from the Fayoum depression and the Nile Valley happened during that period. In this context the word Sdt which was once appeared in texts during the 4th dynasty doesn't mean “the reclaimed land” as most of scholars assume<sup>40</sup>, it means the “the extracted land” from the lake since it is on a higher ground (+23m.).<sup>41</sup>

In a word, the scarcity of archaeological sites in the Fayoum during the Old Kingdom recommends that Kings at that time interested only in Shedet and the North of Qarun Lake.<sup>42</sup> The utilization of these two sites was due to their location higher than water level at that period. Therefore, Old kingdom kings did not conduct any hydrological projects into the Great Fayoum Depression or even a trial to control or direct the water into it.

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Reisner, G.A., (1942). *A History of the Giza Necropolis*. I, Oxford, pl.396. <sup>TY</sup>

Bissing, V., and Kees, H., (1923). *Das Reich des Königs Ne-Wser-Re*, Band <sup>TA</sup>  
II, Leipzig, pl.4.

Pyr.1564c. <sup>TA</sup>

Morenz, S., (1973). Traditionen um Menes. *ZÄS* 99, p.x-xvi, xiii; *Wb*. IV, p.563; <sup>TA</sup>  
Ćwiek, A., (1997). Fayoum in the Old Kingdom. *GM* 160, p.18; Brugsch, H., (1893).  
Der Möris-See. *ZÄS* 31, pp.27-28; *Wb*. IV, p.567, 13-14; Ibrahim, O., and Abd El-  
Sattar, I., (2011). Major Historical, Archaeological, and Religious Features of the  
Fayoum Region during the Old Kingdom, in: Pirelli, R., (ed.), *Natural and Cultural  
Landscapes in the Fayoum*. UNESCO, Cairo, p.142f.

<sup>41</sup> Abd El-Sattar and Ibrahim, Philological Development of 'Sdj.t'. pp.22-27.

<sup>42</sup> Ćwiek, Fayoum in the Old Kingdom. pp.17-22; Piacentini, P., (1997). The  
Fayoum in the Old Kingdom. *Archaeology and papyri in the Fayoum*, Syracuse,  
pp.21-39.

### 5. Archaeological and Philological Evidences of artificial water entry to the Fayoum Depression in the 12th Dynasty

At the end of the Old Kingdom, the lake water level drastically decreased and then grew by the end of the First Intermediate Period or by early Middle Kingdom. During the First Intermediate period due to the degradation of Qarun lake to a very low level (-40 to -50)<sup>43</sup>, the name Sdj.t has disappeared from literature along with the name of Sobek.<sup>44</sup>

The first serious attempt to utilize water and exploit the Fayoum seems to have been made in the Middle Kingdom (c. 2.160-1.785 BC), when Amenemhat I of the 12<sup>th</sup> dynasty built a dam with flood gates at Lahun and possibly another one at Hawara<sup>45</sup> at what we call now Lahun Gap. Boak asserted that these gates were opened at the time of high Nile level. The construction of these dams converted Qarun Lake into a reservoir from which water could be drawn off for the use of the fields in the Nile Valley by opening the flood gates in dry seasons.<sup>46</sup>

Amenemhat I had widened and deepened the channel of connection between the Nile and the Fayoum depression by digging operations, thus causing a greatly increased volume of water to pass annually into the lake. As a result of this increased annual influx, the surface of the lake gradually rose, finally reaching a height of about +18m. and the lake being then in hydraulic balance with the Nile. This is archaeologically evident as all the twelfth dynasty monuments in the Fayoum are located at +18m. or above. While the water level was fluctuating, the high land in the southeast, around the capital Shedet remained untouched by the flood water throughout the year.<sup>47</sup>

Historical evidence for this artificial raising of the lake level could be known from the writings of Herodotus who was told by some priests that the lake was dug by king Moeris, the last of 300

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Hassan and Tassie, Modelling environmental and Settlement Change. p.39. <sup>43</sup>

Zecchi, M., (2010). *Sobek of Shedet. The Crocodile God in the Fayyum in the* <sup>44</sup>  
*Dynastic Period.* Todi, p.20.

<sup>45</sup> Boak, A. E. R., (1926). Irrigation and Population in the Faiyum, the Garden of Egypt. *The Geographical Review.* Vol. (XVII), No. 3, PP. 353-364, July, American Geographical Society of New York.

<sup>46</sup> Boak, Irrigation and Population in the Faiyum, PP. 353-364.

<sup>47</sup> Hewison, *The Fayoum.* p.62.

kings who reigned over Egypt after Menes. This king Moeris, Greek name of King Amenemhat I?, was said by the priests to have died less than 900 years before the time of Herodotus visit.<sup>48</sup> This writing might indicate the immense effort undertaken by Amenemhat I? to transform the lake into a huge water reservoir.

However as a reservoir, Qarun lake will not allow land reclamation because the district subjects to uncontrolled seasonal inundation. Thus, it will possibly remain in a marshy condition. Apparently under Amenemhat III, the waterway from the Nile to the natural lake was widened and deepened to make a canal that is now known as the Bahr Yussef. This was meant to achieves three aims: I) control the Nile flood; II) regulate the water level of the Nile during dry seasons; and III) serve the surrounding area with water for land reclamation.<sup>49</sup> As a result, the low level of Lake Moeris was fixed at +17.5 m., and the land lying above that level was restricted for cultivation. He built a dike to impound the waters of Qarun lake when they were allowed to rise above the +17.5-m. level until they were drawn off as needed for irrigation purposes in the valley. It is not certainly known when the policy of using the lake as a reservoir was neglected; however at about 200 BC, it was practically at sea level.<sup>50</sup>

Philologically, kings of the 12th Dynasty paid a great attention to exploit the Fayoum Depression especially in terms of economy and religion. They conducted extraordinary hydrological engineering program in the Fayoum Depression and constructed temples in Shedet and pyramids in Hawara and Lahun.

This was reflected in kings' titles and also the titles of god Sobek appeared in Coffin Texts. Amenemhat II was entitled *mry sbk Hr Sdj.ty* "the beloved by Sobek, who is upon Shedet" on a circular object in Brooklyn Museum 37.1746E from unknown provenance and this is considered the oldest examples of writing *Sdj.t* during the Middle Kingdom.<sup>51</sup> Also, Senusret II was entitled *mry sbk nb Sdj.t* "the beloved by Sobek, the lord of Shedet" on cylinder seal preserved in Brooklyn Museum 44.123.56 also from unknown provenance. However, Amenemhat III reign witnessed most examples of




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<sup>48</sup> Hewison, *The Fayoum*. pp.62-63.

<sup>49</sup> Boak, *Irrigation and Population in the Faiyum*. PP. 353-364.

<sup>50</sup> Boak, *Irrigation and Population in the Faiyum*. PP. 353-364.

<sup>51</sup> James, T.G.H., (1974). *Corpus of Hieroglyphic Inscription in the Brooklyn Museum, I. From the Dynasty I to the Dynasty XVIII*, Brooklyn- Newyork, p.42, no.96, pl.XXXIII.

mentioning Sdj.t during the Middle Kingdom.<sup>52</sup> Moreover, Sobek the main deity of the Fayoum Region was entitled Sbk Sdj.ty in the Coffin Texts such as  (B4C) -  -  (B10Ca and B10Cb).<sup>53</sup>

However, 12<sup>th</sup> Dynasty (*ca.* 1990-1800 BC.) kings' great attention to exploit the Fayoum Depression through this extraordinary hydrological engineering program can be understood through the series of hieroglyphic texts/graffiti inscribed on the Nilometer at the Semna South fortress. The fortress is located at the south of Wadi Halfa in the second cataract (Semna Cataract) at the southern borders of Egypt.<sup>54</sup> Established under Senusret I of the 12<sup>th</sup> Dynasty (*ca.* 1965-1920 BC.), the whole Semna region was fortified as it contained four fortresses: Semna East, Semna West, Semna South, and Kummeh.<sup>55</sup> However, they are all submerged under the water of Naser Lake since the construction of Aswan Dam in 1971. The inner area of Semna South temple contains a stone staircase which was probably used as a Nilometer to measure the seasonal Nile flood levels.<sup>56</sup> It is inscribed by graffiti texts that encompass 17 graffiti inscriptions belongs to the reign of Amenemhat III (*ca.* 1860-1814 BC.) and 3 graffiti to Amenehat IV (*ca.* 1815-1806 BC.).<sup>57</sup> They inform merely about the unusual high flood-level records of the Nile which continued for more than half a century from the reign of

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<sup>52</sup> James, Corpus of Hieroglyphic Inscription in the Brooklyn Museum. pp.47-48, no.108, pl. XXXV.

CT.I, sp.61, 260 d-e. <sup>oT</sup>

<sup>54</sup> Arriaza, B.T.; Merbs, C.F.; Rothschild, B.M., (1993). Diffuse Idiopathic Skeletal Hyperostosis in Meroitic Nubians from Semna South, Sudan. *American Journal of Physical Anthropology*. 92, pp.243-248; Vercoutter, J., (1966). Semna South Fort and the Records of Nile Levels at Kumma. *Kush*, 14, pp.125-164; Bard, K.A., (2008). *An introduction to the archaeology of ancient Egypt*. Malden: Blackwell, p.42; Shaw, I. and Nicholson, P., (2003). *The Dictionary of Ancient Egypt*. Harry N. Abrams, p.258.

<sup>55</sup> Reisner, G.A., (1929). Egyptian Forts at Semna and Uronarti. *Bulletin of the Museum of Fine Arts*, 27, pp. 64-75; Vercoutter, Semna South Fort. pp.125-164.

<sup>56</sup> Žabkar, L.V. and Žabkar, J.J., (1982). Semna South: A preliminary report on the 1966-68 excavations of the University of Chicago Oriental Institute Expedition to Sudanese Nubia. *Journal of the American Research Center in Egypt*, 19, pp.7-50.

<sup>57</sup> Žabkar and Žabkar. Semna South. pp.7-50.

Amenemhat III to Amenemhat VI, the seventh ruler of the 13th Dynasty.<sup>58</sup>

There might be a correlation between this high inundation level and the engineering projects conducted by the 12th Dynasty kings especially Amenemhat III in the Fayoum Depression. As, they may provide a justification for these projects including the digging of a 16-km long and 1.5-km wide canal linking the Fayoum Depression to the Nile, and the construction of a dam to organize the flow of water into the depression. As a result, a massive body of water - Qarun Lake - could store 13 billion cubic meters of annual flood water.<sup>59</sup>

## **6. Conclusions**

This paper investigated the archaeological and/or the philological evidences that may confirm that water entry to the depression during the dynastic period of the Egyptian history was artificial. Some questions were addressed in the introduction part and the discussions provided possible answers to them. The archaeological and Philological evidences which prove artificial water entry to the Fayoum Depression were critically investigated. Results revealed that the entry of water was never artificial before the 12<sup>th</sup> Dynasty.

In our way to find out the answers the hydrology history of the Fayoum Depression has been chronologically analyzed since its early history. The whole Fayoum depression was part of the Tethys ocean from the Eocene epoch till the end of the Oligocene epoch. Then it turned into a dry hollow during the Miocene epoch. During the Pleistocene epoch the Nile flood overflow into the Fayoum empty depression, forming Qarun Lake and a Paleonile branch streamed into it. Since 35.000 years ago, water level never exceeded +20 and Shedet was never submerged since then. During the Holocene epoch the lake level was fluctuating between degradation and aggradation phases.

During Prehistoric Period, the distribution of Prehistoric settlements in the Fayoum indicates the absence of any civilized areas in the region except in the north and east of Qarun Lake. Around 4.000 BC, the climate changed and the Fayoum began to dry up and

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<sup>58</sup> Keegan, P., (2014). *Graffiti in Antiquity*. Routledge, London and New York, p.223.

<sup>59</sup> Keegan, *Graffiti in Antiquity*. p.223.

people migrated to the Nile Valley and the Fayoum was abandoned and became hunting and fishing place.

Old Kingdom archaeological evidences proved that kings did not do any efforts to direct the water artificially to the Fayoum Depression although the religious significance of Shedet proved in the pyramid texts. They paid little attention to the utilization of the Depression which is restricted for hunting and fishing, and mining basalt. The Nile was being connected to Qarun Lake in its annual summer flood which helped the easy transmission of Basalt to the Memphite necropolis. However by the end of the Old Kingdom, when water level degenerated to -2m, Basalt mines were no longer utilized as the connection to the Nile was difficult. The scarceness of Old Kingdom archaeological sites is a clear evidence of this negligence. The lake water level severely decreased at the end of the Old Kingdom and then grow at the end of the First Intermediate Period or early Middle Kingdom and water salinity increased.

Old Kingdom philological evidences also proved that only Sdj.t was mentioned in the Pyramid Texts. Also, the word Sdt can be translated “the extracted land” which indicates the submergence of most of the Depression under water.

Middle Kingdom archaeological evidences revealed that Amenemhat I built a dam with flood gates at Lahun Gap and dig the channel to connect the Nile and the Fayoum depression by digging operations, thus causing the lake being in hydraulic balance with the Nile. The writings of Herodotus about king Moeris, might indicate the immense effort undertaken by Amenemhat I to transform the lake into a huge water reservoir. Under Amenemhat III, this channel was widened and deepened to make a canal that is now known as the Bahr Yussef in order to control the Nile flood; regulate the water level of the Nile during dry seasons; and serve the surrounding area with water for land reclamation. Therefore, the level of water was fixed at +17.5 m., and the land lying above that level was restricted for cultivation.

Middle Kingdom Philological evidences revealed that kings of the 12th Dynasty conducted extraordinary hydrological engineering program in the Fayoum Depression as clear in kings' titles and also the titles of god Sobek appeared in Coffin Texts which include Sdj.t the capital. Amenemhat III reign witnessed most examples of mentioning Sdj.t during the Middle Kingdom. The hieroglyphic texts/graffiti inscribed on the Semna South temple Nilometer informed about the unusual high flood-level records of the

Nile which provided a probable justification for these projects to store 13 billion cubic meters of annual flood water.

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