

## The Roman Fountains in the Province of Numidia : The Fountain of Liberalis (Thamugadi) as an Example

Djeida Aliat

University of Batna 1, Batna, (Algeria)

Email : djeida.aliat@univ-batna.dz

Received : 13/01/2026 ; Accepted : 26/06/2026 ; Published: 23/07/2026

### Abstract :

Archaeological research and historical studies have demonstrated that the Numidian province was one of the most important provinces which played a major role in political, social, and economic life. It was home to some of the most beautiful cities and buildings that fulfilled a specific function. Among these functions were water supply systems and the very lifeblood of inhabited and urban areas.

The Romans undertook the construction of vast hydraulic infrastructures to connect various water sources including dams, springs, valleys, and rivers in order to supply the cities with water. These infrastructures also provided water to the baths, public toilets, temples, fountains and other buildings, as well.

Fountains were among the most remarkable hydraulic features, which the Romans excelled in their construction. Their architectural design, dimensions, and forms varied, ranging from the monumental to the simplest. However, fountains were not only used to supply cities with water ; they also provided gathering places where inhabitants could relax and be entertained. Furthermore, fountains played a religious role, especially those fed by sacred springs. These structures also contributed to other aspects of daily life. This is why we have focused our study on some of these fountains, particularly the Liberatis Fountain (Timgad).

The Liberatis Fountain (Timgad) was built to the east of the ancient city. Archaeological research indicates that it did not only serve an aesthetic function but also acted as a water reservoir to supply the city's monuments. Therefore, a question arises : why was this fountain built outside the city's grid walls? Was its function dictated by its location ? Did this unique fountain have other uses ?

**Keywords :** Water basin – Hydraulics – Cornice – frieze.

### Résumé :

Les recherches archéologiques et les études historiques ont démontré que la province numide était l'une des plus importantes, jouant un rôle majeur dans la vie politique, sociale et économique. Elle abritait certaines des plus belles villes et des plus beaux édifices, chacun remplissant une fonction spécifique. Parmi ceux-ci figuraient les systèmes d'adduction d'eau, véritables artères vitales des zones habitées et urbaines.

Les Romains s'attachèrent à construire d'immenses infrastructures hydrauliques pour relier diverses sources d'eau, notamment des barrages, des sources, des vallées et des rivières, afin d'approvisionner les villes en eau. Ces infrastructures fournissaient également l'eau aux thermes, aux toilettes publiques, aux temples et autres édifices, ainsi qu'aux fontaines.

Si les fontaines comptaient parmi les éléments hydrauliques les plus remarquables, les Romains excellaient dans leur construction. Leurs conceptions architecturales, leurs dimensions et leurs formes variaient, allant du monumental au plus simple. Cependant, les fontaines ne servaient pas uniquement

à approvisionner les villes en eau ; elles offraient également des lieux de rassemblement où les habitants pouvaient se détendre et se divertir. De plus, les fontaines jouaient un rôle religieux, en particulier celles alimentées par des sources sacrées. Ces édifices contribuaient également à d'autres aspects de la vie quotidienne. C'est ce qui nous a amenés à concentrer notre étude sur certaines de ces fontaines, notamment la fontaine Liberatis (Timgad).

La fontaine Liberatis (Timgad) fut construite à l'est de la ville antique. Les recherches archéologiques indiquent qu'elle ne remplissait pas seulement une fonction esthétique, mais servait également de réservoir d'eau pour alimenter les monuments de la cité. Dès lors, une question se pose : pourquoi cette fontaine fut-elle construite hors des remparts quadrillés de la ville ? Sa fonction était-elle dictée par son emplacement ? Cette fontaine unique avait-elle d'autres usages ?

**Mots-clés :** Bassin d'eau – Hydraulique – Corniche – Frise.

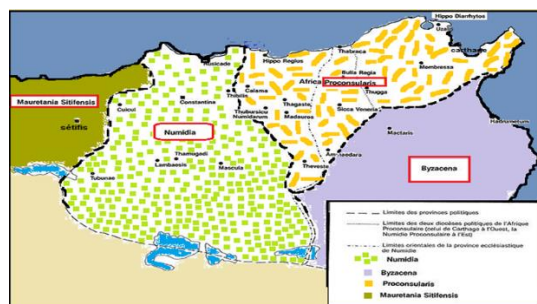
### Introduction :

Water features were among the most important infrastructure projects undertaken by the Romans, whose presence extended throughout the ancient African provinces, including Numidia. These features were widespread across the aforementioned lands, despite the specific climatic characteristics of this geographical area, namely low rainfall and aridity. The Romans considered how to control this phenomenon, so they constructed dams and wells, and built aqueducts to transport and supply cities and villages with water. These aqueducts varied in form and construction techniques, ranging from those built on bridges and aqueducts, such as the Zaghuan aqueducts that supplied Carthage (Tunisia), to the Cherchell aqueduct. It is also worth mentioning the underground aqueducts that played the same role, all of which were dedicated to providing water by transporting it to reservoirs and cisterns, in addition to fountains that varied in shape and size from one city to another.

The Metasunds fountain in Rome is one of the Roman fountains built next to the Colosseum. Like other fountains, it served an aesthetic and decorative purpose, in addition to storing water. This fountain is one of the most important Roman fountain models we are studying, among which is the Liberatis fountain (Timgad).

### 1- Geographical and Climatic Data of the Numidia Province :

**Geographical Framework :** The lands of Numidia Province are located in the far northeast of Algeria, between longitudes 7°08' and 8°37' East and latitudes 36°43' and 37°07' North. They are situated in the middle of the coastal plains, which lie on part of a rocky massif, between Annaba and El Kala. They are bordered to the north by the Mediterranean Sea, to the east by the Proconsular Province, and to the west by Setif and Caesarea Provinces<sup>1</sup>.



<sup>1</sup>-Belouahem-Abed (D), Belouahem (F), Benslama( M), Gérard de Bélair ,Muller ( S-D), The alder groves of Numidia (N.E. Algeria): floristic biodiversity, vulnerability and conservation, *Comptes Rendus Biologies*, Volume 334, January 2011, pp. 61-73.

Map 01 : Represents the geographical framework of the Numidian province

On : Adapted by the researcher

Ghaki (M), Laporte (J-P) and Dupuis (X), "Numidians, Numidia", Berber Encyclopedia [Online], 34 | 2012, document N76, put online on December 15, 2020, accessed on August 12, 2025.p. 5633-5668.

### **Climatic characteristics :**

The northern part is characterized by low mountain ranges receiving relatively abundant rainfall. These are followed by high plateaus extending to the foothills of the Aurès Mountains<sup>1</sup>. This region was fertile and conducive to abundant agriculture, particularly fruit trees, especially grapevines, particularly in coastal areas or near the sea. Olive trees were also widespread in central Numidia, as were cereal crops<sup>2</sup>. In addition to agriculture and vegetation, livestock farming, which predates agriculture, contributed significantly to the supply of food and clothing<sup>3</sup>. Cattle, especially horses, also played an important role. Numidia was a grain-exporting region during the reign of Massinissa. This activity continued until the Roman period, as proved by the mosaics discovered in Wadi al-Uthmaniya, southwest of Cirta, depicting horse farms. To the south, inland, lie the Aurès Mountains, and to the southeast, the Nememcha Mountains, characterized by a steppe landscape. These differences in climate and rainfall were reflected in patterns of human settlement. In the north, the Numidians, who were farmers, settled, and in the south, the Gaetulians, who were perhaps partially (but not entirely) nomadic, settled on lands whose belonging to the Massylian kingdom is doubtful<sup>4</sup>.

### **Historical Data of Numidia :**

The Numidian province witnessed many historical events and conflicts. After the fall of Carthage in 146 BC, Numidia saw the beginnings of the Roman presence, which resulted from the Punic Wars. These wars neutralized Carthage and its empire, and paved the way for the Latins to enter North Africa. Despite the good relations between the Romans and the Numidian king, Masinissa, due to his alliance with them<sup>5</sup>, one of the conditions of this alliance was the unification of his ancestral lands. Thus, the Numidian kingdom was built and unified by Masinissa. The project to unify the Numidian lands stretched from the Gulf of Sirte in the east to the Melouche Valley in the west. Masinissa worked to expand agricultural activity and focused on farming and animal husbandry. Agriculture was widely adopted throughout the Numidian lands, with various crops such as grains (wheat being the primary crop), in addition to orchards of fruit trees like vineyards, date palms, and olive trees. Furthermore, Masinissa was interested in literature and arts<sup>6</sup>.

<sup>1</sup>-Harash (M\_H), Ancient Maghreb Political and Cultural History from the Dawn of History to the Islamic Conquest, National Printing Corporation, Algeria, 1992, p. 14.

<sup>2</sup>-Camps (H-F), Oil and Olives in North Africa during the Roman Period. Translated by Aggoun (L.), Dar Al-Huda, Algeria, pp. 43-44.

<sup>3</sup>- Aggoun (M\_ L.), Economy and Society in Ancient North Africa, University Publications Office, Algeria, 2008, pp. 27-28.

<sup>4</sup>- Laporte (J-P.), Ghaki (M), and Dupuis (X), "Numidians, Numidia", Berber Encyclopedia [Online], 34 | 2012, document N76, put online on December 15, 2020, accessed on August 12, 2025.pp. 5633-5668.

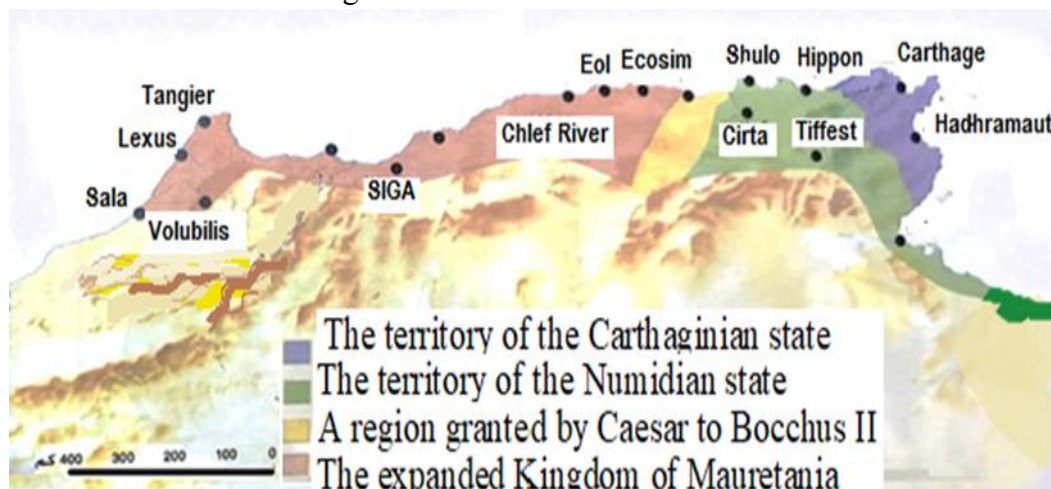
<sup>5</sup>-Djennas (M), The Saga of the Numidian kings between Carthage and Rome, Casbah Editions, Algiers, 2010, pp. 167-168.

<sup>6</sup>- Aggoun (M\_ L.), Massinissa and the Building of the Numidian State 238-148 B.C : An Approach to His Political Project, Libyca, Numidia, Massinissa and History, Issue 2 CNRPAH, Algeria 2017, pp. 60-61.

However, after the fall of the Kingdom of Numidia by the Roman Emperor Julius Caesar in 46 BC, following his victory over Juba I, the political, economic, and social landscape of Numidia changed dramatically. Caesar distributed agricultural lands to discharged and retired soldiers, encouraging Roman farmers to flock to the African territories under the Roman control. They sought to benefit from the settlement policy promoted by Caesar and subsequent emperors<sup>1</sup>. Despite the fierce resistance the Romans faced in many of these regions, they came to control the fertile Numidian lands as a top priority. They aimed at integrating the Numidian economy into the Roman economy by seizing property and land from its owners and granting it to the Roman settlers. All these actions and the policy of subjugation employed by the Romans were designed to politically and militarily subdue Numidia by dismantling its economic and social foundations<sup>2</sup>.

## 2-Water Fountains in Numidia:

Undoubtedly, what distinguishes Roman architecture is the presence of public fountains, which were among the most functional landmarks, serving to store water and adding to its decorative and aesthetic appeal<sup>3</sup>. Archaeological research and studies indicate the widespread use of these water features in the province of Numidia, similar to other African provinces. Water was brought from rivers and springs and naturally channeled through aqueducts to storage basins, which had to be constructed in every city according to the Roman architectural plan described by Vitruvius<sup>4</sup>. From these basins, water was then transferred to the fountains. Field studies conducted by specialists have identified that most of the fountains were found in the Roman cities of this province. Among these fountains are water fountain at Timgad and the conical fountain.



**Map 2 :** This map shows the political landscape of Numidia and North Africa after the transformations brought about by Julius Caesar following his victory over Juba I.

On : Cheniti (M.B.), Numidia and Imperial Rome : Economic and Social Transformations under Occupation, Treasures of Wisdom, Algeria, 2012, p. 27

<sup>1</sup>- Cheniti (M-B.), Roman agricultural expansion and the phenomenon of nomadism in ancient Algeria, Journal of Historical Studies, Issue 1, Algeria, 1986, p. 11.

<sup>2</sup>-Qasim (M.), The social and economic conditions in the Roman province of Numidia, Journal of the Arabic Language, Volume 25, Issue 1, Algeria, 2023, pp. 155-156.

<sup>3</sup>- Gros (P.), Roman Architecture from the Beginning of the 3rd Century BC to the End of the High Empire, I, Public Monuments, Series edited by Gérard Nicolini ; 2002 ; p. 418.

<sup>4</sup>- Vitruvius, The Ten Books on Architecture, Book VIII, (Corrected and translated), Paris.

### ***Liberalis Fountain – Tingad – :***

**Location :** The fountain is located on the edge of the main street, the Decumanus Maximus, on the east-west axis of the ancient city of Tingad. It lies approximately 100 meters behind the western gate of the city (Lambaz Gate) and 200 meters from Trajan's Arch, which marks the original urban boundary of the city. It was erected along the Decumanus Road<sup>1</sup> and is 12 meters from the valley that cuts through the western part of the city<sup>2</sup>.

-The fountain was discovered during excavation work carried out by researcher Albert Ballu in 1902, during cleaning work that took place on the western part of the Decumanus Maximus square<sup>3</sup>.

### ***Description of the landmark :***

#### **• History of the fountain :**

Fountains are generally considered part of a city's natural water supply system ; they are the location or structure where groundwater rises to the surface upon encountering an impermeable layer that allows water to pass through from the underground aquifer<sup>4</sup>. As for the "Liberalis" fountain, some hypotheses suggest that its construction dates back to the 2nd or 3rd century AD, that is, to the Severan

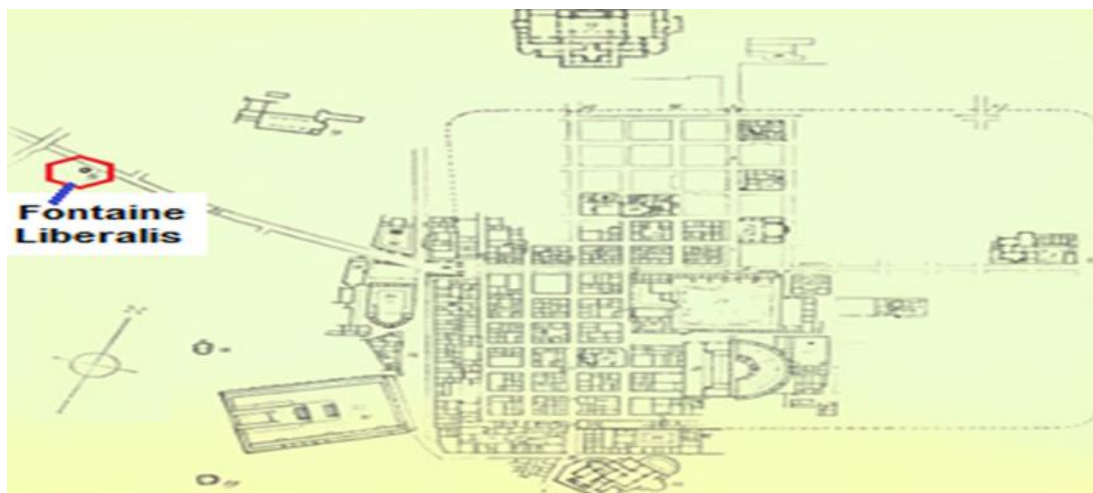


Diagram 01 : Shows the location of the Liberalis fountain in relation to the ancient city of Tingad (adapted)

From: Ballu (A), The ruins of Tingad, Ancient Thamugadi, New Discoveries, Ernest Leroux. Publisher. Paris, 1903, p.6.

period. It is implausible that such a massive fountain would have been built outside the city walls; it is believed that it was constructed during the urban expansions the city underwent in the 3rd century

<sup>1</sup>- Lamare (N.), Monumental Fountains in Roman Africa, Publications of the French School of Rome, Rome, 2019, pp.211-247.

<sup>2</sup>- Boeswillwald (F), Cagnat (R.), Ballu (A), Tingad An African City Under the Roman Empire, Ernest Leroux. Publisher. Paris, 1905, p. 317.

<sup>3</sup>

<sup>4</sup>-Buxo (R.), The water management in ancient greek-roman city (I) : an exemple in the north-east of Spain, In : El-Moujabber M. (ed.), Shatanawi M. (ed.), Trisorio-Liuzzi G. (ed.), Ouessar M. (ed.), Laureano P. (ed.), Rodríguez R. (ed.). Water culture and water conflict in the Mediterranean area. Bari : CIHEAM, 2 008, pp. 9 -16, (Options Méditerranéennes : Série A. Séminaires Méditerranéens ; n. 83), p12.

AD. This also explains the presence of significant landmarks such as the Capitol and the market (the Sertius Market), in addition to houses and streets, which confirm the idea that this suburb was indeed urban. It is unlikely that the Liberals would have built such a magnificent fountain in a deserted or sparsely populated area<sup>1</sup>. An inscription found engraved on the fountain's frieze indicates that it was built at the expense of Publius Julius Liberalis<sup>2</sup>.



**Photo 01 :** Shows the Liberalis Fountain from different angles

#### • **Architectural Design :**

The Liberalis Fountain was constructed in an octagonal layout. This landmark consists of two sections, namely :

- **The base:** This forms the center of the fountain and is an octagonal structure built on a foundation of large stone pillars or a massive stone framework, with the walls constructed in accordance with an octagonal plan. These stone pillars are approximately 1 meter thick; they are hollow inside and built of brick in a circular shape. What is striking is the precision of the construction and the builders' attention to this feature, as the diameter of this cavity is estimated to be about 1.40 meters. This cavity is topped by well-polished stone slabs that also surround this central section. This section was also surrounded by eight columns topped by a frieze 3 meters long. It was adorned with a Latin inscription carved in large letters. The name of this octagonal fountain is LIBERALIS. Although only five of the six pieces bearing these Latin letters have been found.

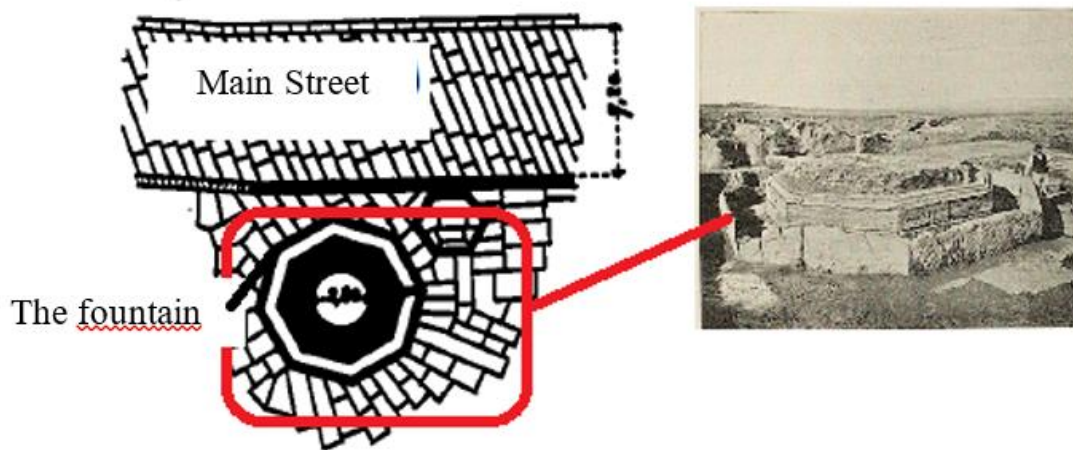
Although we found no traces of marble, we assume that the fountain was adorned with marble slabs or covered with carved and decorated stone tiles that reflected the aesthetic of water feature.

**The base :** This forms the basin surrounding the center of the fountain and is also octagonal in shape. This basin is made of interlocking sandstone tiles, grouted is together to prevent water leakage, and laid directly on the ground, as a basin should be<sup>3</sup>. It believed that it was once decorated with marble tiles, which provided strength and durability in addition to aesthetic and artistic value.

<sup>1</sup>-Lamare (N) , Op.cit., pp. 211-247.

<sup>2</sup>-Gsell (S), Atlas Archéologie de l'Algérie, F N° 27, p 28.

<sup>3</sup>-Boeswillwald (F), Cagnat (R.), Ballu (A), op- cit, p. 318.



**Diagram 02 :** Depicts the Liberalis Fountain according to Boeswillwald (F), Cagnat(R.) Ballu (A), op. cit., p. 317.

### **The Hydraulic Function of the Fountain :**

Before discussing the fountain's hydraulic system, we must first address its water supply. Although opinions and hypotheses regarding the fountain's water source vary, some have suggested that the basins located southwest of the Baptistery of the Donatists were its water source. However, this hypothesis is somewhat far from reality. It is more likely that the pipes located north of the cathedral (approximately 200 meters from the fountain) supplied it with water. The water arrived through a pipe, likely driven by pressure, flowing toward the center of the stone structure (a visible opening). It then flowed to the statue atop the fountain -that of the goddess Fortuna- and directly into the basin, then into the ground basin through spouts or along the ledges.

- As for water drainage, this process takes place through drainage channels carved into the floor alongside the road, leading to a possible outlet at the bottom of a panel in the basin (a visible opening), located 6 meters away.

### **Decorative Elements :**

Despite the damage sustained by the fountain, we found some decorative elements that indicate the monumental and artistic construction that characterized this octagonal fountain. Among these decorative elements are :

**The frieze :** a decorative element characteristic of Roman architecture, particularly in significant structures such as temples, basilicas, and others. The Liberalis Fountain was distinguished by a frieze that adorned the central part of the fountain, or the shaft. This frieze was distinguished by its composition of well-polished sandstone slabs, as it served as a surface for inscribing the Latin text ; it was also adorned with a raised band along the lower edge of these slabs.

### **The complete Latin text <sup>1</sup>:**

P(ublius) Julius P(ubli) filius Papiria Liberalis sacerdotalis p(rovinciae) A(fricae), f(lamen) p(erpetuus), q(uin)q(uennalis), duumvir, praef(ectus) i(ure) d(icundo), q(uaestor) et in col(onia) Thysdritana f(lamen) p(erpetuus) lacum quem super legi[t]imam flamoni(i) summam promiserat ex sestertiis XXXII (milibus) CCCXLVIII fecit idemque dedic(avit). D(ecreto) d(ecurionum) .

### **Translation of the text :**

<sup>1</sup> Boeswillwald (F), Cagnat (R.), Ballu (A), op- cit, p.p 318-319.

Publius Julius, son of Publius of the tribe of Papyri, a Liberal, and priest of the province of Africa, and also served as a permanent priest and official for five years, as well as governor, judge, and financial official in the colony of Thesdrus and as commander. He built the fountain in accordance with the law of the High Priesthood, which amounted to 32,348 sesterces, and he was the one who inaugurated it based on a decree of the local council.

***Cornice :***



**Image 03 :** Shows the frieze and cornice of the fountain

Unfortunately, only a small piece of decorated marble was found, due to damage sustained by the fountain, particularly its upper section. Researchers Kania, Bas Willold, and Palo have suggested that this cornice likely topped the eight columns. However, we did not find it at the site. As for the remaining part of this decorative element, we noted that it was more beautiful due to the geometric and floral motifs that adorned it. It consisted of three bands : the upper band featured flowers, the middle band featured intaglio-carved circles, and the third band featured alternating raised leaves and circular geometric shapes.

***Statue of the Goddess Fortuna :***



**Image 04 :** Bust of the goddess Fortuna - Cirta Museum

During excavations conducted by the researcher Ballu, a headless statue of the goddess Fortuna, carved from white Pentelic marble and measuring 1.32 meters in height, was discovered. It is

currently preserved in the courtyard of the Timgad Museum, and it is likely that the statue once rested against the wall of the portico that stood above the fountain or one of its columns. The goddess is depicted standing on her left leg, with her right leg bent slightly backward. She is shown wearing a stola, cinched at the waist with a cord, and the sleeves are attached along the arms with ribbons. The headdress (palla) hangs over each shoulder and was wrapped around the left arm, which holds a cornucopia filled with fruit, symbolizing abundance and prosperity. The sleeves are attached to the arms with straps, and the lower part of the robe appears to be clinging to the legs, suggesting that it is wet with water—this explains the fine details on the statue's legs. The statue shows signs of a break in the middle, as if it were split into two halves.

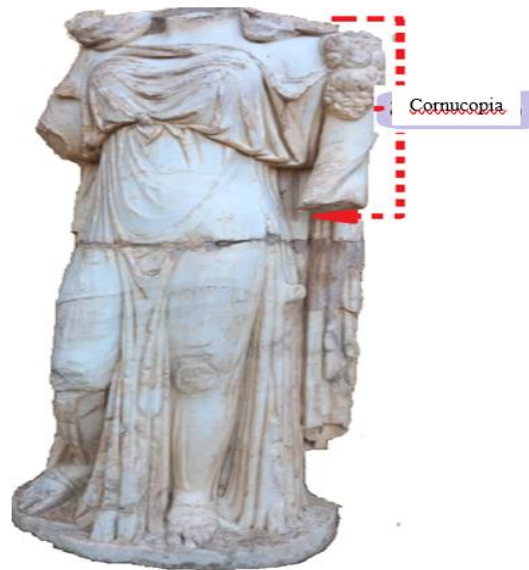


Photo 05 : Statue of the goddess Fortuna—Timgad Museum

— The goddess Fortuna is an ancient Roman deity known to most ancient peoples ; she was known to the Greeks as Tyché, the goddess of wealth and prosperity<sup>1</sup>. Myths state that Fortuna is the mother of “Jupiter” and ‘Juno’, the two most revered deities of the Roman Empire. She appears in some clay statues in a seated position, holding Jupiter and Juno on her knees and nursing them. This has been interpreted as representing a subject of special worship by mothers, and the first appearance of the cult of Fortuna dates back to rural areas<sup>2</sup>.

In the beginning, she was worshipped as a goddess associated with agriculture and harvest; as the protector of harvest and abundant production, she was revered by farmers. Later, her worship spread to the cities, where she became the patron goddess of the city and the bringer of blessings to the army and victory, which further increased the popularity of her worship<sup>3</sup>. In addition to these attributes, she was also the goddess of luck, happiness, and hope, as well as the goddess of wealth and money<sup>4</sup>.

<sup>1</sup>-Daremberg (Ch.), Saglio (E.), Dictionary of Greek and Roman Antiquities, based on texts and monuments. Vol. 2, Hachette Bookstore and Co. 79. Paris, 1896, pp.1264-1265.

<sup>2</sup>-Ibid., p.1270.

<sup>3</sup>-Daremberg (Ch.), Saglio (E.), Op- Cit, p.1268

<sup>4</sup>

## **Data Analysis :**

### **1- The Role of the Fountain :**

Most researchers, especially those specializing in Roman architecture, agree that fountains were built primarily for decorative purposes, adding an aesthetic touch that reflected the beauty of Roman architecture. They served as gathering places for residents to enjoy the beauty of the water features. However, while this view is undeniable, fountains also had other functions. Among their public utility was providing drinking water for the city's inhabitants. They were also used for watering animals, as seen in the fountain in the southern part of the city (Timgad), which shows traces of animal drinking. The same is true of the conical fountain in Cuicul. Furthermore, fountains were considered sacred, especially if they were fed by water drawn from sacred springs. This gave them a sacred quality, as residents would seek blessings from their water.

### **2- The Relationship Between the Goddess Fortuna and Water and the Fountain:**

Based on the aforementioned data and the archaeological research and excavations conducted at the Fountain of Liberalis, which indicated the presence of a statue of the goddess Fortuna within the fountain, it is clear that the statue represented the upper part of the fountain. It is worth noting that there is a connection between the goddess Fortuna and water, which explains the placement of her statue at the fountain, as a protector and guardian. This is supported by inscriptions and dedications found in Rome, which were placed in honor of this deity in the baths, and maritime festivals were held in her honor. We assume that the city's inhabitants intended, through the presence or placement of the goddess's statue at the top of the fountain, to sanctify and bless the water, especially given its role, as previously discussed, as a reservoir supplying most of the city's architectural structures, such as temples, baths, and houses.

## **Conclusion :**

Our research and study reveal that the Roman cities of Numidia in general, and Timgad in particular, were similar to other Roman cities throughout the Roman provinces of North Africa. This reflects the extent of Latin culture's spread in African lands, especially since fountains were among the most important features of urban infrastructure. This indicates the presence of aqueducts and water reservoirs that transported and supplied water to cities. Roman architects utilized every possible means to access water sources such as valleys and rivers. The aqueducts of Rome, for example, serve as a prime example, as the city was supplied with water from rivers.

## **Bibliographie :**

1. Aggoun (M\_ L.), Economy and Society in Ancient North Africa, University Publications Office, Algeria, 2008.
2. Ballu (A), The ruins of Timgad, Ancient Thamugadi, New Discoveries, Ernest Leroux. Publisher. Paris, 1903.
3. Boeswillwald (F), Cagnat (R.), Ballu (A), Timgad, an African city under the Roman Empire, by Ernest Leroux. Publisher. Paris, 1905.
4. Buxo (R.), The water management in ancient greek-roman city (I) : an exemple in the north-east of Spain, In : El-Moujabber M. (ed.), Shatanawi M. (ed.), Trisorio-Liuzzi G. (ed.), Ouessar M. (ed.), Laureano P. (ed.), Rodríguez R. (ed.). Water culture and water conflict in the Mediterranean area. Bari : CIHEAM, 2 008, pp. 9 -16, (Options Méditerranéennes : Série A. Séminaires Méditerranéens ; n. 83).
5. Camps (H-F), Oil and Olives in North Africa during the Roman Period. Translated by Aggoun (L.), Dar Al-Huda, Algeria, 2014.

6. Champeaux( J) Fortuna. The Cult of Fortune in Rome and the Roman World. I - Fortuna in Archaic Religion. Rome: French School of Rome,1982.
7. Darember (Ch) , Saglio (E), Dictionary of Greek and Roman Antiquities, based on texts and monuments. Vol. 2, Hachette Bookstore, Paris, 1896.
8. Djennas (M), The Saga of the Numidian Kings between Carthage and Rome, Casbah Editions, Algiers, 2010.
9. Dupuis (X), et Ghaki (M), Laporte (J-P) «Numidians, Numidia”, Berber Encyclopedia [Online], 34 | 2012, document N76, posted online on December 15, 2020, accessed on August 1025.
10. Gérard de Bélair ,Muller (S-D), Belouahem-Abed (D), Belouahem (F), Benslama (M), Alder forests of Numidia (N.E. Algeria): Floristic biodiversity, vulnerability and conservation, Comptes Rendus Biologies Volume 334, , January 2011.
11. Gros (P), L'architecture romaine du début du IIIe siècle av. J.-C. à la fin du Haut-Empire, I, Les monuments publics, Collection dirigée par Gérard Nicolini, 2002.
12. Gsell (S), Archaeological Atlas of Algeria, F No. 27, 1911.
13. Haresh (M\_H), Ancient Maghreb Political and Cultural History from the Dawn of History to the Islamic Conquest, National Printing Corporation, Algeria, 1992.
14. Lamare (N) , Les Fontaines monumentales en Afrique romaine, Publications de l'École française de Rome, Rome, 2019.
15. Laporte (J-P.), Ghaki (M), and Dupuis (X), “Numidians, Numidia”, Berber Encyclopedia [Online], 34 | 2012, document N76, put online on December 15, 2020, accessed on August 12, 2025.pp. 5633-5668.
16. Vitruvius, The Ten Books on Architecture, Book VIII, (Correct and translated) Paris.1995.