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# **The Practice of Water Regulations and Administrative System in Light of Egypt's Graeco-Roman Records: An Overview of Transformations, Challenges, and Solutions.**

*Nermine S. Ahmed*

## **Abstract**

Institutional and regulatory issues were important agents in the development of water management. The goal was to determine the citizens' duties and rights towards the availability and use of water in different life cases in fair proportion. Water management regulations are not a modern creation, but there is a long tradition of solving complex issues of water supply and use with rather sophisticated legal measures. The purpose of the study is to identify common features, local strategies, and underlying challenges for water availability and management in Graeco-Roman Egypt. The focus will be mainly on the Ptolemaic Period since it was a distinguished and transformational point in the administrative and legal system related to water management. Papyri, mainly of Roman materials, served as the primary literary source, providing valuable insights into the efficient administrative system and legal practices established in Alexandria to regulate, protect, and maintain water resources. The study also highlights the evolution of water regulations in ancient Egypt and Greece, as well as their impact of on the development of this new system.

*Keywords:* Water regulations, Greek papyri, Ptolemaic records, Taxation, Water administration.

## **Introduction**

Surviving documents from Ptolemaic Egypt generated much more paperwork and official correspondences than the previous periods did and are instrumental in understanding the role of the state in establishing a legal framework and practice. One system was overseen by several Greek officials employed by an authority known in

documents as “The administration of water/The directorate of water” (*διοίκησις τῶν ὑδάτων / dioikisis ton odaton*). One of these surviving documents was the third-century BC papyrus ‘*Halensis 1*’, which detailed the cooperation between neighbours in the use of water. In cases of disagreement, an intervention by the officials was needed to guide the users, such as in how each of the neighbours had to participate in expenses and the type of costs.

This article highlights a little-studied aspect of water regulation in Ptolemaic Egypt and some of what is accessible for the Roman period, covering the challenges, grievances, and potential solutions related to this issue. Significant previous studies in this field include Bonneau's (1993) work on the administrative regimes of Nile water and Skalec's (2019) analysis on the norms and legal practice in ancient Egypt, exploring a case study of irrigation system management. In this regard, this study focuses on certain essential concepts related to water laws in Egypt throughout the Graeco-Roman period, revealing the gradual movement from traditional Egyptian standards to newly based rules and how this transformation was fit for the urban Greek life that arrived in Egypt. This article explores this shift through looking at three main approaches that are classified as follows: (1) an overview of earlier Egyptian and Greek water legal forms; (2) the obligations and rights of individuals; and (3) the supervisory role of the administrative institution.

### **Earlier Egyptian and Greek Water Legal Forms**

Much archaeological evidence indicates that ancient Egyptian and Greek civilisations interacted and traded natural resources. A trade network was created to connect the two major cultural centres (known as Aegean-Egyptian relations, c. 1900–1400 BCE), who shared the same concern about the quality and security of the water supply systems. Ancient Egypt and Greece were pioneers in water resource management. They also pioneered the construction of water infrastructure, both civilizations adopting legislation to ensure equitable access to water for use and distribution.<sup>1</sup> Later, the

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<sup>1</sup> Ahmed et al. 2020: 2-19.

administrative methods in Egypt evolved, with some earlier ancient Egyptian norms coexisting with Greek ideas during the Hellenistic period. Further changes occurred over time to meet growing needs.

Little is still known about the water regulations in ancient Egypt or the actual daily tasks of these institutions.<sup>2</sup> Yet the surviving documents from ancient Egypt contribute to understanding the role of the state, the king, and his officials in managing the water supplies to cover the citizens' needs. At different points in time, the king wielded absolute power and established regulations not only for irrigation but also for general water use. Due to the complex legal system, the delegated authority to regional governors and other officials, the vizier was the second in power, in charge of all administrative parts of the government as well as any water-related duties.<sup>3</sup>

The king was responsible for the universal property and regularity of the flood.<sup>4</sup> This explains why water was not a taxable commodity in ancient Egypt due to its sacred conception as a divine gift for everyone's benefit, especially not the water used to sustain a population working for the state. However, the water was necessarily associated with the process of taxation as an indispensable element in agricultural production.<sup>5</sup>

The comprehensive analysis of textual and archaeological evidence strongly suggests that the water supply system in ancient Egypt functioned on a straightforward and distributed scheme. The textual evidence, starting from the Old Kingdom (the second half of the third millennium BCE) through the New Kingdom (c. 1539–1077 BCE), shows the state's activities through the local administration, which acted directly to control the water supply for its inhabitants. Artificial wells and basins were constructed to irrigate a plot of land, to provide drinking water, and to be used for ritual purposes and pleasure. One of the earliest pieces of evidence is a limestone stela (Berlin 17500), which carries a decree of King Pepi I (c.2276–2228 BCE). This stela mentions the location and kind

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<sup>2</sup> Butzer 1976:16.

<sup>3</sup> Driaux 2016: 44.

<sup>4</sup> Bonneau 1982: 69–70.

<sup>5</sup> Goedicke 1994: 191–194.

of installations where water was drawn for the pyramid towns of Sneferu at Dahshur and the water itself did not fall under any form of taxation. The inscription on the stela reads:

(My) Majesty has decreed: [11] That it is forbidden to reckon (with a view to taxing them) the canals, the pools, the šdt-wells, the ḥnmt-wells and trees from these two pyramid towns.<sup>6</sup>

This passage demonstrates that canals and other water sources are of two types: some are man-made (e.g., wells and pools), while others are natural (e.g., cisterns and basins). They were all subject to censuses in the late third millennium BCE.<sup>7</sup> For example, the pyramid towns were likely constructed by the state to accommodate priests associated with the royal mortuary cult and were located probably outside the settlement on the agricultural estates attached to these towns. These agricultural estates were taxed, notably on agricultural yields, but water itself was exempt from taxation because water was used to sustain a population working for the state.<sup>8</sup>

Another inscription from present-day Assiut, formerly the Lycopolite nome, belongs to Khety II's tomb, Tomb IV, dated to the Tenth Dynasty (c.2100–2017 BCE). This inscription indicates his dedication to developing the nome's resources.<sup>9</sup> It was common that officials speak positively of their success and career throughout this period as Khety spoke about him making a water-supply for this city of Middle Egypt in the mountain, by digging a much-needed new irrigation canal of ten cubits to conduct the water to land unreached by the inundation, and his people were pleased with his government.<sup>10</sup>

In fact, the Nile flood was a major issue in the king's royal concerns, and it was part of the state's duties towards the citizens to provide them with the basic necessities of life in rural Egypt. The central administration relied on local officials to handle the work using their own administrative apparatus. The irrigation practices were documented around

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<sup>6</sup> Driaux 2016: 44-45; translation by Strudwick 2005: 103-105: *jw wḏ.n ḥm(.j):nfr r jp mrw šw šdwt ḥnwt nhwt m njwty jptn.*

<sup>7</sup> Moreno García 2022: 324.

<sup>8</sup> Driaux 2016: 45; Goedicke 1994: 191–194.

<sup>9</sup> Breasted 1906: 187.

<sup>10</sup> Breasted 1906: 88-189.

the very end of the third and early second millennia BCE through several inscriptions, reviewed in Moreno García's study about the irrigation and agricultural strategies in Egypt. One of these examples is from Middle Egypt, in a detailed biographical text from Tomb V at Assiut, where the official demonstrates that, due to his authority, he sealed the borders and made it possible that the inundation reaches the high cultivated fields while its neighbours were thirsty.<sup>11</sup>

Challenges were expected while implementing taxation and labour legislation. For instance, inundation paralysed the peoples' work on their land, as a flood could destroy the irrigation work if it was too high. An important administrative text of the Middle Kingdom, Papyrus Brooklyn 35.1446, deals with forced labour. This papyrus explains that the people were obliged to corvée duty, where the king could call upon them for any duty. Sometimes, wealthier people could pay someone else to take on their assigned tasks. These hired people could be used for stone quarrying, gold mining, and building works (like dykes and dams). Punishment was expected in the case of not paying taxes or avoiding compulsory labour, and this penalty could extend to their families and cause them to be imprisoned until their return.<sup>12</sup>

Turning to Greece, early Greek city-states (*poleis*) had a long history of an institutional interest for the day-to-day handling of water issues, as well as developing water legislation to define access to limited water resources, control waste and storm water disposal, and resolve conflicts connected with water. The legal framework for water management was more organised such as through the regulations of the Athenian city-state. The framework was made by Archon Solon (594 BCE), an late seventh century BCE Athenian statesman and lawgiver. Most of Solon's laws were later described by Plutarch (AD 47–127) concerning the legal system to form both the economy and politics of Athens.<sup>13</sup> Parts of these regulations are related to the usage of public and private water supply:

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<sup>11</sup> Moreno García 2022: 331.

<sup>12</sup> Bediwy et al. 2022: 94-102.

<sup>13</sup> Krasilnikoff and Angelakis 2019: 25.

Since the country was not supplied with water by ever-flowing rivers, or lakes, or copious springs, but most of the inhabitants used wells which had been dug, he made a law where there was a public well within a *hippikon*,<sup>14</sup> a distance of four furlongs, that should be used, but where the distance was greater than this, people must try to get water of their own; if, however, after digging to a depth of ten fathoms on their own land, they could not get water, then they might take it from a neighbour's well, filling a five-gallon jar twice a day; for he thought it his duty to aid the needy, not to provision the idle (Plutarch *Solon*: 23.5).<sup>15</sup>

The law specifically established the principles of sharing limited water resources in Attica for the benefit of farmers in need of water, outlining the fundamental requirements of water usage for households and gardens, particularly public artificial wells, their priority and protection, and establishing a balance in the construction and operation of wells, whether for public or private interests. Furthermore, it established ties among individuals to meet all citizens' water demands. The law defined the portion and procedures for each instance, especially large-scale public works such as aqueducts and fountains.<sup>16</sup>

From the seventh century BCE onward, the municipal governments of Greek city-states published rules as inscriptions on stelae to resolve and prevent disputes among residents. The urban and rural developments from the Archaic through the Hellenistic periods were strongly associated with water management, suggesting that many cities of the ancient Greek world depended upon the geological structure of their water supply.<sup>17</sup> Several regulations were enacted to preserve the scarce resources of these cities, as evidenced by an inscription from Gortyn on the island of Crete dating back to the fifth century BCE. The regulation states that individuals, most likely farmers engaged in irrigation, cannot extract water from the River Litheos to keep the water level up to the mark set on the bridge. The River Litheos was vital for Gortyn's water supply,

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<sup>14</sup> *Hippikon* is a Greek measurement for distance, which is equal to four stadia (about 2426 English feet).

<sup>15</sup> Perrin 1914; ἐπεὶ δὲ πρὸς ὕδωρ οὔτε ποταμοῖς ἐστὶν ἀενάοις οὔτε λίμναις τισὶν οὔτ' ἀφθόνοις πηγαῖς ἢ χώρα διαρκής, ἀλλ' οἱ πλείστοι φρέασι ποιητοῖς ἐχρῶντο, νόμον ἔγραψεν, ὅπου μὲν ἐστὶ δημόσιον φρέαρ ἐντὸς ἵππικου, χρῆσθαι τούτῳ: τὸ δ' ἵππικὸν διάστημα τεσσάρων ἦν σταδίων: ὅπου δὲ πλεῖον ἀπέχει, ζητεῖν ὕδωρ ἴδιον: ἐὰν δὲ ὀρύξαντες ὀργυῶν δέκα βάθος παρ' ἑαυτοῖς μὴ εὔρωσι, τότε λαμβάνειν παρὰ τοῦ γείτονος ἐξάχουν ὕδριαν δις ἐκάστης ἡμέρας πληροῦντας: ἀπορία γὰρ ὤετο δεῖν βοηθεῖν, οὐκ ἀργίαν ἐφοδιάζειν. ὤρισε δὲ καὶ φυτειῶν μέτρα μάλ' ἐμπειρώς.

<sup>16</sup> Koutsoyiannis and Mamassis 2017: 31-42.

<sup>17</sup> Angelakis and Zaccaria 2020: 14.

and the regulation likely reflected that the river served both farming and domestic activities in the city.<sup>18</sup>

Plato's *Laws* (427–348 BCE), νόμοι γεωργικοί/*nomoi georgikoi*, agricultural laws, were set to clarify the principles for use, ownership and management of water resources, and to know how provide a consistent and clean water supply for the ideal city. Plato asserts that the importance of these principles as a balance of power that protects states and cities, which will never be healthy unless they are better governed (Plato *Laws*: 844a-d, 845e).<sup>19</sup>

Other written records show that the local administration was concerned about protecting the water supply from pollution, which was another regulated issue by law, as mentioned in an Athenian inscription dating to 440 or 420 BCE. This inscription contains the 'law for tanners', who were required not to dispose of their waste in the River Illissos, a river that ran outside the defensive walls of Athens.<sup>20</sup> In times of war and disaster, regulations were also established to control smaller-scale private infrastructure such as wells and cisterns, as seen in the following quote from Aristotle:

For military purposes therefore the site should be easy of exit for the citizens themselves, and difficult for the adversary to approach and to blockade, and it must possess if possible a plentiful natural supply of pools and springs, but failing this, a mode has been invented of supplying water by means of constructing an abundance of large reservoirs for rain-water, so that a supply may never fail the citizens when they are debarred from their territory by war (Aristotle *Politics*: 7.1330b).<sup>21</sup>

There was a punishment for causing harm to another person's property, as in the case of Demosthenes, whose property was damaged after heavy rain and flooding, and his complaint was against Kallikles (Demosthenes *Orationes*: 55.20-30). This case implies

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<sup>18</sup> Krasilnikoff and Angelakis 2019: 253-254.

<sup>19</sup> Bury 1969: 175; See also Faraguna 2016: 387-408.

<sup>20</sup> *Supplementum epigraphicum Graecum* III, 18; See Pappas 1999.

<sup>21</sup> τῶν δὲ λοιπῶν πρὸς τὸ τὰς πολιτικὰς πράξεις καὶ πολεμικὰς καλῶς ἔχει. πρὸς μὲν οὖν τὰς πολεμικὰς αὐτοῖς μὲν εὐέξοδον εἶναι χρή, τοῖς δ' ἐναντίοις δυσπρόσοδον καὶ δυσπερίληπτον, ὑδάτων τε καὶ ναμάτων μάλιστα μὲν ὑπάρχειν πλῆθος [5] οἰκείου, εἰ δὲ μή, τοῦτο γε εὐρηται διὰ τοῦ κατασκευάζειν ὑποδοχὰς ὀμβρίοις ὑδάσιν ἀφθόνους καὶ μεγάλας, ὥστε μηδέποτε ὑπολείπειν εἰργομένους τῆς χώρας διὰ πόλεμον: ἐπεὶ δὲ δεῖ περὶ ὑγιείας φροντίζειν τῶν ἐνοικούντων, τοῦτο δ' ἐστὶν ἐν τῷ κείσθαι τὸν τόπον ἐν τε τοιοῦτῳ καὶ πρὸς.

that a firm legislation penalised anyone who caused harm to another person's property by obstructing the natural flow of water.<sup>22</sup> The need for water increased due to agricultural and household demands, and the earliest Greek societies managed to access groundwater resources through the construction of wells, cisterns, and fountains, which required an administrative supervision. A position of superintendents or magistrates was needed to ensure the law's implementation and to monitor the various parts of the city's water supply, wells, and wastewater. This was accomplished within the post called the superintendent of fountains, κρουνῶν ἐπιμελητής/*krounon epimeltés*. The administrator oversaw the enforcement of laws and ensured equal water distribution (Aristotle *Athenaion Politeia*: 43.1).<sup>23</sup>

### **Water Regulations in Egypt's Graeco-Roman Records**

The ancient records preserve many cases of new irrigation projects and the instructions that were given to develop Egypt's functional systems. They also demonstrate that priority was given to the new capital Alexandria and other newly founded Greek cities, such as Philadelphia in Fayoum. The Ptolemies had a well-organised administration and economy, which resulted in a pyramid-shaped bureaucracy that oversaw water supplies and resources, among other things. The monarch was at the top of the pyramid, followed by ministers and officials who oversaw various administrative sectors.

The beginning of Ptolemaic rule was characterised by a successful government that managed the water resources through a number of instructions within legal frameworks.<sup>24</sup> The regulations had two components: one is the obligations of the state towards the citizens, and the other is the commitments of these citizens to follow rules laid out to them for benefit from the water resources management system. Later, challenges appeared due to bureaucracy, the corruption of some officials, and high taxation.

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<sup>22</sup> MacDowell 1986:136, 149.

<sup>23</sup> Koutsoyiannis and Angelakis 2008: p.38

<sup>24</sup> Manning 2003: 7-13.

## Obligations and Rights of Individuals

The proper distribution and control of the Nile water were essential to the state's survival. This required a legal framework to define the citizens' obligations and rights in relation to the regulations dealing with the maintenance of canals, and the construction and improvement of irrigation channels, especially in the surrounding countryside, *chora* (BGU IV 1121=Sel. Pap. I. 41, ll. 24-26).<sup>25</sup> *Dikaiomata* is the Alexandrian city law, πολιτικός νόμος/*politikos nomos*, during the Ptolemaic Period, and is the only known legal source related directly to the obligations and rights of the citizen during this period. It provided the legal maxims, instructions, and royal ordinances with no identification of the actual legal practice as observed in other papyri from the Graeco-Roman period. Certain parallels to *Dikaiomata* regulations that could be traced in the fragment of Plato's Laws (Plato *Laws*: VIII 844c-d), since Plato emphasised the need for cooperation between neighbours in the use of water, and an intervention by the officials in case of disagreement.<sup>26</sup> The 259 BCE papyrus 'Halensis 1' demonstrates the *Dikaiomata* regulations (lines 106-114) as follows:

[Cutting and cleaning] of canals. If anyone wishes to cut a new canal or to dig up an old one - - - - - to the neighbors of the land and each shall contribute a share towards the expenses, and he shall cast up] half of the excavated [earth] on each side. If anyone does not wish to contribute, the person cutting the canal or digging it up shall cast up [the earth] for his side onto the land of whichever one is willing, and if successful in a suit he shall exact twice [the expense]. If canal on someone's own land [is choked, they shall] contribute to him for the cleaning the canal - - - each according to his share, and anyone who does not contribute shall be [liable to the person doing the cleaning] for thrice the expense if he is defeated in a suit (*Papyrus Halensis 1*= Trismegistos 5876).<sup>27</sup>

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<sup>25</sup> Hunt and Edgar 1932; Due to the lack of survived papyri from Alexandria, it is still a controversial matter whether these rules in *Dikaiomata* were really applied in Alexandria or not. This contract for a land lease written in Alexandria, dated to the fifth century BCE, mentions the obligations of tenants of lands to clean out the canals without specifying any other details.

<sup>26</sup> Skalec 2019: 378-379.

<sup>27</sup> Bagnall and Derow 2004: 207-208, Nr.124., for original Greek text. For more information about papyrus see <https://papyri.info/ddbdp/p.hal.;:1>: τοῦ πολιτικοῦ νόμου] τάφρω[ν τμήσεως καὶ ἀνακαθάρεως]. ἔάν τις βούληται τάφρον τεμέσθαι κα[ι]νήν ἢ παλαιά[ν] ἀνά-γα[γείν], - ca.17 - τοῖς γείτοσιν τοῦ χωρίου καὶ συμβαλλέσθω τὸ μέρος ἕκαστος [εἰ]ς τὸ ἀνάλωμα, τοῦ δὲ χοῶς τοῦ ἐξορ[υ]σσομένου τὸ ἡμισυ(\*) ἐκατέρωσε ἀναβαλλέτω· ὃς δ[ὲ] ἄμ(\*) μὴ βούλητ[α]ἰ συ[μ-]110βα[λέσθαι], τὸν μὲν χοῦν τὸν κατ' αὐ]τὸν ὁ τέμνων ἢ ἀνάγων εἰς τὸ χωρίον ἀναρριπτ[έ]τω εἰς ὀπότερον ἄ[ν]βούληται, τοῦ δὲ ἀναλώματος τὸ διπ[λ]οῦν πραξά[σ]θω δίκη νικήσας. ὡὶ δ' ἂν τ[ο]ῦ αὐτοῦ χωρί[ο]υ

This document comprises two essential parts focused on the work of digging canal, ἡ τάφρος. The first section (*Papyrus Halensis*: 97, 107-112) concerns making canals, τέμνω, and renewal of canals, ἀνάγω. The regulations would apply in the Alexandrian countryside, *chora*, where an enormous irrigation system existed, rather than within the city limits. Certain requirements related to the maintenance were carried out by the owners of neighbouring land; in particular, an agreement that the majority of farmers should be taken in case of digging a new canal that might cross their lands.

Moreover, it was important to clarify who would benefit from digging a new canal and who was obliged to bear the costs of this work. These details of how each of the neighbours had to participate in expenses and the type of costs were not mentioned in the *Dikaiomata*.<sup>28</sup> There was a legal measure to be taken against those who refused to participate in such works on canals.<sup>29</sup>

The second part (*Papyrus Halensis*: 112-115) is about the canal cleansing, ἀνακάθαρσις, such as the removal of mud or plants that could hinder the natural water flow. There were certain legal consequences to be taken against any person who refused to participate in canal preservation, including double charges to be paid. This imposed the community's greater interest in maintaining existing canals than in establishing new canals, along with the state's supervision over the performance of these duties by the neighbours.<sup>30</sup>

In ancient Egypt, the responsibility for main canal preservation was shared by all farmers, with this idea remaining in the Ptolemaic and Roman periods. This was due to two factors: first, the irrigation system was in the best interests of the entire community, developed over time, and arose from local requirements. It was carried out through annual forced labour on embankments and dams from April to May, when the Nile was at its lowest level. At this point, the entire country was working together to prepare for

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τάφρος - ca.12 -, συμβαλλέσθωσαν αὐτῶι εἰς τὴν ἀνακάθαρσιν τῆς τάφρου] . . . κατὰ μέρος ἔ[κ]αστ[ος]τ[ῶ]ι δ' ἀνακαθαίροντι ὑπόδικος ἔσ]τω ὁ μὴ συμβαλλόμενος τριπ[λ]ασίου τοῦ ἀναλώματος, ἐὰν δίκηνι[κ]ηθῆ].

<sup>28</sup> Skalec 2019: 377.

<sup>29</sup> Skalec 2019: 378.

<sup>30</sup> Skalec 2019: 377-378.

flooding; farmers were repairing irrigation systems, and officials kept an eye on their correct organisation. Second, irrigation in Greece was practiced on very small scale due to natural conditions. As a result, the Greeks largely did not seek to make any change regarding the irrigation standards and relied on the local competency that suited Egypt's natural conditions.<sup>31</sup>

The procedure of cleaning and digging water channels required two types of labour forces that were named canal-diggers or river-workers, ποταμίτη/*tōn ergatōn potamou technē*.<sup>32</sup> This first type of worker did not perform routine work and were hired on demand for related work in dykes. In fact, the river-workers, *Potamitês*, performed work that required certain techniques and experience (*PSI* 83.11). The *Potamitês* appeared at a large number of construction sites along with organized teams under the supervision of *potamitês* entrepreneurs, whose companions are called ἑταῖρος/*hetairos* (*P.Oxy.*1911.157, 2195.134).

The *Potamitês*' daily salary was significantly higher than that of the other workers without qualifications, known as ἐργάτης/*ergatês* (*SB* 9363). They earned double. Ordinary workers were paid two drachmas per day, whereas canal-diggers were paid four drachmas (*P.Oxy.* 10 1288.13). The latter's salary varied according to whether the work was for a whole day or not (*BGU* 14ii, 20), and sometimes included expenses for supplies.<sup>33</sup>

The second category of labour force was a compulsory labour, λειτουργία, which was regularly used in the work of building and upkeep of dykes and canals, along with supplementary labour who might be employed for irrigation works or guarding the banks of the river and canals during the critical flooding period.<sup>34</sup> This category included the soldiers, who were not exempted, as shown by a certificate of work at the dykes, as well

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<sup>31</sup> Skalec 2019: 384; see also Forbes, 1993: 27; Bonneau, 1991:18-19.

<sup>32</sup> Abdelwahed and Shehata 2022: 60.

<sup>33</sup> Bonneau 1993: 137.

<sup>34</sup> Van de Boorn 1988: 231.

as veterans' sons who were also compelled to do so. People whose physical condition prevented them from carrying out these duties were exempted.<sup>35</sup>

The existence of slaves on worker lists gives an interpretation that, in some cases, slaves substituted their masters in obligatory works.<sup>36</sup> However, the slave themselves had a personal responsibility concerning this obligatory work since the slave was subject to the same poll tax as his master (*PSI* 10 1146, 11-12). Priests and the slaves of the priests of prominent temples were exempt from the work on the dykes by a sacred law of the country.<sup>37</sup> The work on the dykes was not liturgy, and no condition or chore was required for the accomplishment of these services; rather, there was a form of tax, as mentioned in the Protection Decree of the King Neferkare for the temple of Min of Koptos, dated to the Sixth Dynasty):<sup>38</sup>

As for any person who required all priests (to assign them) to all chore work and all work of the nome, whether attached to the temple plowing house and itself assigned to chores. But if, as I think, the work at dykes are a form of tax, the priests did not benefit from exemptions, because they paid taxes (*Urkunden* I 171, 12-15).<sup>39</sup>

Bonneau suggests that the exemption was granted for them based on time and place, as in the case in Roman papyrus *SB* 6 9328 (Ad 171), a petition from the priests of Bacchias-Arsinoites, at Kom Um El-Athal town in the Fayoum, who were obligated to carry out the work on the dykes themselves and requested exemption from labouring on distant canal dikes. The priests enjoyed a slight privilege to carry out these works in

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<sup>35</sup> Bonneau 1993: 139; See also documents: O.MICH.832 (son of veteran Serenus A.D. 296 from Karanis); *BGU* 1634, 11.

<sup>36</sup> Bonneau 1993: 139; *P. Tebt* 670: 'Delivered to Kronion the son of Tephorsos who accomplished five days of work in place of Kerdôn, the slave of Paulinos'.

<sup>37</sup> Westermann 1955: 87.

<sup>38</sup> The Coptos Decrees are 18 complete or fragmentary ancient Egyptian royal decrees ranging from Late old Kingdom to First Intermediate. The decree found in Min Temple in Coptos, a city in the Qena Governorate of Egypt about 43 km north of Luxor, under the ruins of a structure of Roman date and carved in hieroglyphic on slabs of limestone. Some stelae date from the reign of Pepy II, and most of them were designed to protect the temple of Min and its priesthood from interference and the corvée. See original Hieroglyph text, Sethe 1933: 280.

<sup>39</sup> Bonneau 1993: 140.

the same place, at the Patsontis canal, which was not far from their village, and they could still fulfill their priestly obligations every day (*SB* 9328; 14 vi 171).<sup>40</sup>

The duty to pay for water usage is well preserved in texts from the Ptolemaic and Roman periods, with two main taxes mentioned: the bath tax (βαλανευτικόν) and the tax for maintenance of dykes (χωματικόν) (*PSI* 4. 388). The bath-tax has been popular since the Hellenistic period in Lower Egypt, but later appeared in Upper Egypt during the Roman period. A study by Blouin refers to the baths taxes in Hellenistic and Roman Egypt, especially about the rise of the bath-tax through the 700 references that were found in Egypt, and demonstrating a high concentration of them in the Upper Egypt.<sup>41</sup> The most well-known Greek papyri mentioning the bath tax are tax receipts in the Archive of Zenon, from Philadelphia (Arsinoites), such *P.Lond.* 7 2036 (memorandum by Isadora about wrong charge for bathing, 263-229 BCE), *PSI* 4 355 (Ricevuta di tassa, 253/252 BCE), and *PSI* 4. 388 (Conti di tasse e di spese, 244/243 BCE).

Another example, the Jewish community's private records also included tax receipts and lists of individual names dating back to the third century BCE. Jewish and Greek names appeared side by side, which suggests that Jews were well integrated with their cultural neighbours in the region during the Ptolemaic Period, while others were associated with the Jewish community in Apollonopolis Magna (Edfu) during the Roman period.<sup>42</sup> For example, the Roman ostrakon *C.Pap.Jud.* II 240 referred to a bath-tax collector (AD 70), an individual who oversaw collecting the bath-tax and whose name implies he was a member of the Jewish community. The text demonstrates that the payment of such taxes did not differentiate between Jews and non-Jews, despite being viewed as other cultural groups, but carried out the same payment obligation.<sup>43</sup> This is similar to a papyrus from Arsinoe (*C.Pap.Jud.* II 432), which alludes to a Jewish individual in charge of paying the Jewish community's water bill.<sup>44</sup>

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<sup>40</sup> Bonneau 1993: 140.

<sup>41</sup> Blouin 2014: 821–834.

<sup>42</sup> LaCoste 2016: 40.

<sup>43</sup> LaCoste 2016: 41-42.

<sup>44</sup> *C.Pap.Jud.* II 432; LaCoste 2016: 42; see Cf. Tcherikover et al. 1957: 138.

The dyke tax was recorded in Jewish records, which mention their payment of the dyke tax during the Roman period. For instance, this can be seen in *C.Pap.Jud.II* 404; and *O.Edfou I* 141. These taxes were paid by both Jews and non-Jews, and waterways were shared between non-Jews and Jews as a part of society. The dyke tax was collected uniformly throughout Upper and Lower Egypt and was for the construction and maintenance of the dyke system.

Payment was required for water delivery to residents (in cities, provinces, and villages), and the water carriers played an important role in transporting, delivering, and selling water, either for household use or for irrigation and construction. The water carrier, ὑδροφόρος/*hydrophoros*, was considered one of the oldest professions linked to the water supply system from the earliest periods.<sup>45</sup>

In the Ptolemaic Period, papyri, ostrakas, and even terracotta statuettes were the primary sources for learning more about the profession of water carriers. Seven papyri dating back to the third century BCE include information about the activities and salaries of water carriers, as well as the cost of buying water.

The first example is *Cair.Zen. IV. 59702*, an account from Philadelphia (263-229 BCE), and presents the daily expenses, mentioning in line 24 the water-carriers – ὑδροφόρῳ, followed by the word half obol, ἡμιωβέλιον, which was the wage of water-carrier and was less than 1/10 drachma during the third century BCE in the case that the water was brought for the feast of Adonis (a religious festival to mourn the death of Adonis, the consort of Aphrodite) (*P.Cair. Zen. IV. 59702*). This was also reinforced by another report from the same period, the papyrus of *P.Lond. VII 2140*. Line three mentions the average cost of transporting water to theatres located near the water supply was half an obol.<sup>46</sup>

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<sup>45</sup> Shaheen 2007: 370-372; Abdelwahed and Shehata 2022:64.

<sup>46</sup> Half-obol was a form of ancient Greek currency and weight equals one-sixth of a drachma.

*P.Ryl.* 4 559 (SB. V. 7642), from Philadelphia, is a letter that dates back to July 14 257 BCE, and was sent by a man called Maron to Zenon:<sup>47</sup>

Maron to Zenon, greeting. Please assign me, if you think fit, 2½ more drachmae for my salary ... to provide for the cost of grinding and for buying water.... But do just as you think right yourself. Many persons are occupied ... those engaged in guarding a salary of 15 drachmae and ...artabas of wheat. (Addressed) To Zenon. (Docketed) Maron about his salary. Year 29, Daesius 14, in Alexandria (*P.Ryl.* 4 559; *SB V.* 7642).<sup>48</sup>

*PSI.V* 528 is another text from Philadelphia (263 – 229 BCE), a memorandum from Kleon to his father Zenon (the agent of Apollonius), which reads:

Memorandum from Kleon to his father Zenon. Please send us the salary or provisions that are for both me and my mother, totaling with the oil, 17 drachmas. Wine is also ours, containing 6 large chous plus 3 small cotyles, also the contribution for the festival of Hermes and the Muses, for everyone else has already contributed. Also give interest concerning the water, for we have been buying it for many days past (*PSI.V.* 528).<sup>49</sup>

These two documents from Maron (to Zenon) and Kleon (to his father) are concerned with the costs of purchasing water, with no indication of the type of water that they requested. However, it could be the drinking water for household use in general.<sup>50</sup> The other parts of the seven papyri highlight the vocation of water carriers, such as in *P. Enteux* 78, which is a fragment from Krokodilopolis (the Arsinoite nome). In this document, a petition was submitted by Eutychos to the king in the year 221 BCE, concerning violence against water-carrier:

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<sup>47</sup> Maron was an employee of Apollonius in Philadelphia before Zenon took charge of the estate, and this letter presents a request for a salary increase.

<sup>48</sup> Roberts 1952: 559; Original Greek text:

1 Μάρων Ζήνωνι χάρειν. καλῶ[ς] [---]

2 φαίνεται, εἰς τὸ ὀψώνιον ἔπι (δραχμᾶς) β (τριώβολον) ὥστε π[.][---]

3 μοι εἰς τὰ τε ἄλιτρα καὶ ὕδωρ ἀγοράζειν [---]

4 σοὶ δ' ὡς φαίνεται οὕτω ποίει. πολλοὶ δὲ διατρίβου[σι] [---]

5 \φυλακίαι/ λαμβάνουσι ὀψώνιον (δραχμᾶς) ιε καὶ πυρῶν ἀρτάβας [---]

*p.ryl.4.559\_2*

6 20Ζήνωνι Μάρων περὶ τοῦ ὀψωνίου.

7 (ἔτους) κθ Δαισίου ιδ,

8 ἐν Ἀλεξανδρείαι.

<sup>49</sup> Trans. Rowlandson 1998: 76; Orrieux 1983: 134-135; Clarysse 1995: 61-62; For original Greek text, see <https://www.trismegistos.org/text/2150>.

<sup>50</sup> Shehata 2019: 1-2.

Eutychos, the water carrier to the king Ptolemy, salute, I was hurt by the sons of Apollonius. When I got up my work at Elias's house ... "They rushed towards me and poured (water on the ground). ..... They assaulted me and my wife as well with hands... (*P.enteux*. 78, 1-6).<sup>51</sup>

## The Supervision Role of the Administrative Institution

Several papyri from the Graeco-Roman period, mainly containing correspondence between officials, provide valuable information about the evolving administrative positions and titles. These positions were put in place to facilitate the management, guarding, and maintenance of the water system throughout the country. Exclusive administrative measures and dedicated preparations were taken to ensure optimal use of water resources. This administrative system involved a division of responsibilities among administrative staff, technicians, guards, and workers who carried out the tasks. At the summit of water administration in ancient Egypt, under the king's supervision, was presented through the *Dioikétes*, *Idios Logos*, and *Economos*, as well as other subordinate authorities of the nome, such as *Nomarchos*, *Strategos*, and *Basilikogrammatos*.

The *dioikétes*, or διοικήτης, was an official who held a second highest hierarchical position after the king during the Ptolemaic Period, specifically in water administration. This title is believed to have originated in ancient Egypt, as Yoyotte mentioned the word Ψεντής/*senty* as an Egyptian title for the Minister of Finance or Economy.<sup>52</sup>

Two essential elements continuously appeared to be linked to the *dioikétes*: the data on flood heights and the determinations regarding the expansion of the hydraulic network.<sup>53</sup> This was in action during the reign of Ptolemy II when the official in charge, *Dioikétes* Apollonius, was instructed to devise a plan for the construction of

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<sup>51</sup> Guéraud 1931: 1132; Original Greek text:

1 [βασιλεῖ] [Πτολεμαίω] [χαίρειν] Εὐτυχος, ὕδροφόρος, ἀδικοῦμαι

2 [ὑπὸ] [---] [καὶ] [---]ς, τῶν Ἀπολλωνίου υἱῶν.

3 [---]αργατειῶν ἐν τῷ Ἀλιᾶτος οἴκ[.]ατ[---]

4 [---] παραγενόμενοι ἐξέβαλλον [..]

5 [---] γυναῖκά μου καὶ τὰς χεῖράς μ[οι]

6 [προσήνεγκαν] [·] [τῆ] [δὲ] [---]τηι τοῦ Τύβι, τηρήσαντες ἐμὲ [.]

<sup>52</sup> Yoyotte 1989: 81.

<sup>53</sup> Abdelwahed and Shehata 2022: 49.

canals, known as *dôréa*,<sup>54</sup> that aligned with the king's vision of expanding agricultural development. This plan involved gathering information about flood heights and making decisions about the hydraulic network with the help of technical advisors.<sup>55</sup>

The studies conducted by Bonneau and later by Huss shed light on the terminology used in water administration, specifically highlighting the existence of a department of water management that operated under the authority of the *dioikétes*.<sup>56</sup> It had no specific name other than the Administration of Water, διοίκησις τῶν ὑδάτων/*dioikisis ton odaton* (*P.Col.V 1 Verso 4,88,97*),<sup>57</sup> in modern terms it can be rendered by the Ministry of Water Resources. The water administration was mainly centered in Alexandria, along with a number of local offices for the administrative representatives to be distributed in the main city of the nome (*P.Oxy. 57, 18*).<sup>58</sup>

The term '*dioikisis* of water' was rarely mentioned but had a certain continuity from the early Ptolemaic until the Byzantine period. It was used by Diodorus of Sicily in his work *Bibliotheca Historica* Volume One, concerning the administrative charge of the nilometers (Diodorus *Bibliotheca Historica*: I. 36. 11), and also mentioned in a papyrus concerning the expanses of water that were registered in the Ptolemaic period (*BGU 6. 1216, 14*). It reappears in a survey of villagers of the Lykopolites nome (presently Assiut) (*P.Oxy.44 3167, 18.*), in which Bonneau reconstructed the administrative procedures as follows: first, from the bottom up in the administrative scale: 1. a request from the people to address the strategist regarding the execution work; 2. at the same time, the same demand to be sent to the man in charge (the official who receives the orders concerning the irrigation through the basins in these places), to obtain effectively what

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<sup>54</sup> *dôréa* (δωρεά) is the name given to the large estates that the kings granted to their favorites or high government officials. The *dôrea* of Apollonios (the *dioikétes* of Philadelphieia) in the Fayoum covered a vast area including several villages and the town of Philadelphieia.

<sup>55</sup> Bonneau 1993: 249; An Ostraka of Karnak (Dios Polis –Thebes east), in Demotic, dating from year 28 of Ptolemy I (637 B.C.), a royal order for a land survey and the scribes conjugated the *dioikétes* with the status of the flood, dykes, irrigated lands, water and their opening (1. 4-7). It is certain that a cadastral register plan for the valley was established primarily for fiscal purposes. See Mähler and Strocka 1976: 31-37; collection: Karnak excavations Centre Franco-Egyptien d'Étude des Temples de Karnak no. ODK-LS 462.4.

<sup>56</sup> Bonneau 1993:250; Huss 2011: 31-32.

<sup>57</sup> Pittakion Register with Tax Payments in Kind, AD 160-180 Theadelphia, = Trismegistos 10473 = [columbia.apis.p335](https://www.trismegistos.org/text/10473). For original Greek text: TM texts, <https://www.trismegistos.org/text/10473>.

<sup>58</sup> Bonneau 1993: 250; Grenfell and Hunt 1898: 115-116.

they demand; and, then, 3. the request is being transmitted to the Ministry of Water under the authority of the strategist. Then, from the top to bottom of the hierarchy: 1. a response in duplicate forms was sent from the Ministry of Water, with one copy intended for the water official and the other for the strategist; 2. the opening of the basins once was made by the water officials, the strategist had to inform the Ministry of Water upon completion of the work. The papyrus designates that the *dioikisis* of the water was probably located in the metropolis of the nome.<sup>59</sup>

On the other hand, the *dioikétes* was obligated to send the circulars concerning the irrigation as it was mentioned in a papyrus *P.Oxy. XII 1409, TM 21819* (circulars of a *strategos* and *dioikétes*), which distributed in April 278 BCE by the central information spokesman of the nome in order to designate that the strategist was in charge of this task. This was a letter from Aurelius Harpocraton, the strategist of the Oxyrhynchite nome; to the finance committee of the city council of the nome, known as δεκάπρωτοι/*decaproti*,<sup>60</sup> which enclosed a copy of a circular written by the *dioikétes* Ulpius Aurelius mentioning the approaching of Nile inundation, and Ulpius Aurelius gave orders to start the construction of dykes, the cleansing of the canals, and the appointment of special supervisors. Labours were anticipated to be of the cultivators, and with mostly no monetary compensation (*P.Oxy. XII 1409.17*).<sup>61</sup>

The financial affairs were overseen by the *Idios Logos*, ἰδίος λόγος, an official of the private accounts of the sovereign for the arrangement of the finances of the Lagid kingdom (*BGU 8. 1782, 4*). This position dates back to the third century BCE and may have originated in ancient Egypt as a way to manage the king's finance register.<sup>62</sup> The *Idios logos*' responsibilities included to manage the hydraulic network and oversee the expanding water system across Egypt. The land in Egypt was recorded in a cadastre; a register of property, showing the value and ownership of land for taxation purposes. The survey included measurements of canals and water supplies, with the waterways'

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<sup>59</sup> Bonneau 1993: 251.

<sup>60</sup> Decaproti (δεκάπρωτοι) was the finance committee of the city council which concerned with the civic revenues.

<sup>61</sup> For original Greek text: Papyri Info, see <https://papyri.info/ddbdp/p.oxy:12:1409>.

<sup>62</sup> Bonneau 1993: 252.

area added to the tax account (*BGU* 6. 1216, 17-29).<sup>63</sup> The regulations found in the papyri applied to all of Egypt and were related to the sovereign lands, as the irrigation network was under the sovereign's supervision (*P. Oxy.* 38. 2847 V, 12 and 18).<sup>64</sup>

The position of *economos*, οἰκονόμος/*oikonomos*; was established by the time of Alexander the Great, who appointed an *economos* as the treasurer and manager of royal financial affairs, along with assistants. Tracing the origin of this position before Alexander the Great, it already functioned in ancient Egyptian administration during the Old Kingdom as the chief title of a district official.<sup>65</sup>

The Ptolemaic *oikonomos* received concise instructions regarding his duties about the supervision of irrigation in the late third century papyrus *P. Tebt.* 703, probably dated to after 209 BCE, closely resembled those of the New Kingdom vizier Rekhmirē. (c.1570–1070 BCE).<sup>66</sup> In *Duties R25*, the vizier instructs the district councilors to carry out irrigation work throughout the entire area:

...it is he who sends out the councilors of the nome to make irrigation canals throughout the entire land.<sup>67</sup>

The Ptolemaic Papyrus *P. Tebt.* III.1 703 also provides a better understanding of the *oikonomos*' duties regarding the supervision of irrigation, which was added to his responsibilities by the second century BCE (*P. Paris* 66).<sup>68</sup> This is clear through the forwarded instructions from a *dioikétes* to the subordinate *oikonomos* in Tebtynis (Arsinoite nome):

[You must inspect]... and the water-conduits (ὕδραγωγούς) which run through the fields and from which the peasants are accustomed to lead water on the land cultivated by each of them, and see whether the water-intakes

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<sup>63</sup> Bonneau 1993: 253.

<sup>64</sup> A papyrus (of 272-273 CE?) was titled as Glossary of Administrative terms concerning land survey and taxation.

<sup>65</sup> *The duties of the vizier R24*; states that all the kinds of works related to water were entrusted to the Vizier who came in power after the king. Therefore, the water control was one of the several important factors that contributed to the emergence of the ruling class and bureaucracy. See Van de Boorn 1988.

<sup>66</sup> Rekhmirē was an ancient Egyptian noble and official of the Eighteenth Dynasty who served as 'Governor of the Town' (Thebes) and Vizier during the reigns of Thutmose III and Amenhotep II. See Lichtheim 1978: 21ff; Breasted 1906: §§ 666ff.

<sup>67</sup> Thompson and Crawford 1971: 108; Van de Boorn 1988: 234: R25 *nw w r irt ' m t3 rd.f; ntf sbb h3tyw-' hk 3w- h wwt r sk3 r šmw.*

<sup>68</sup> Bonneau 1993: 248.

(ἐπιρύσεις) into them have the prescribed depth and whether there is sufficient room in them; and similarly the said cuttings/canals (διώρυγες) from which the intakes pass into the above-mentioned conduit, whether they have been made strong and the entries into them from the river are thoroughly cleaned and whether in general they are in a sound state (*P. Tebt.* III 703, 29-40).<sup>69</sup>

The mentioned lines assign the responsibility of monitoring the condition of the hydraulic network to the *oikonomos*. The revision was carried out to comply with local requirements and a specific program. These points require the *oikonomos*' attention, which was part of his overall responsibility for public works (*PSI* 5.488, 17).<sup>70</sup>

While the monitoring of water flows into the canals was one of the *oikonomos*' priorities (*PSI* 5.488, 17), the decision to open the canals was not in his hands, as the *oikonomos* could not know all the accurate technical conditions. One such case was the need to estimate the optimal height of 12 cubits for water flooding the canals. These technical calculations were made by the engineers and the financier of the irrigation administration, who followed the management of the *basilikogrammatos*.<sup>71</sup> This issue is mentioned in *P. Petrie* II 42 a (250 – 249 BCE), a papyrus that is about the appointment of a deputy architect in the Arsinoite nome. The responsibilities of new appointed *Theodoros* sporadically appeared as follows:

[...] andros to economos, nomarchs, basilikogrammates, guards, tenants of 10,000 aroures co-marks,<sup>72</sup> co-grammates, greetings. We have appointed Theodoros, deputy architect, to guard the dykes and gates (θύρα), having given him in addition (to take care of) the raising of the dykes (in the nome)].

<sup>69</sup> Bagnall and Derow 2004: 165-166:

γ[- ca.9 -]μα, τούς τε διὰ τ[ῶν πε]δίων  
ἡγμέν[ους ὑδρ]αγωγούς, εἰ τὰ συν[τ]αχ[θ]έντα  
βάθη ἔχου[σιν] αἰ εἰς αὐτοὺς ἐπιρύσεις(\*) τοῦ ὕδα-  
τος καὶ ἐκ[τ]οιοῦ]σα ὑποδοχὴ ἐν αὐτοῖς ὑπάρ-  
χει ἀφ' ὧν ἐ[ἰ]σάγει]ν εἰώθασιν οἱ γεωργοὶ τὸ ὕδωρ  
εἰς ἡν γῆν ἐ[κ]α[σ]τος κατασπείρει· ὁμώως(\*)  
35δὲ καὶ τὰς [δηλ]οιμένας διώρυγας ἀφ' ὧν  
εἰς τοὺς προγεγραμμένους ὑδραγωγούς  
αἰ ἐπιρρύσεις γίνονται, εἰ αὐταὶ τε ὠχύρων-  
ται καὶ εἰ ἀπὸ τοῦ βελτίστου αἰ ἐμβολαὶ  
ἀπὸ τοῦ ποταμ[οῦ καθ]αριῶνται <καὶ> εἰ ἄλλως  
πῶς ἐν ἀσφαλεία[ι] εἰσ[ί]ν. ἅμα δὲ ἐν τῷ ἐφο-  
δεύειν πειρῶ περιερχ]όμενος ἕκαστον.

<sup>70</sup> Bonneau 1993: 248.

<sup>71</sup> Bonneau 1993: 249.

<sup>72</sup> Aroures: a unit of surface used for measuring land in ancient Egypt.

It was Kleon who took the responsibility of water distribution, and Zenon asked him to open the gates of the water intakes to be able to irrigate the lands. Therefore it is important knowing the official title of the men who played a major role especially from the administrative and technical aspects, and whom were placed at the head of the nome (*P.Petrie* II 42).<sup>73</sup>

The execution of administrative acts and commands by the vizier was rigorously overseen by a number of subordinate authorities. One of these authorities was the *nomarchos*, νομάρχης, a provincial governor who was firmly placed under the authority of the treasurer during the Ptolemaic Period. The *nomarchos* had several responsibilities related to water management. These included monitoring the arrival of water to his sector, ensuring that people had access to water, and providing necessary workhorses for transporting water over land (*P.Petrie* II 37, 18).<sup>74</sup>

The *nomarchos* was also responsible for assigning maintenance work and distributing tasks. However, written records indicate that the *basilikogrammatos* also played a role in overseeing and carrying out these same tasks (SB 8243, 4(BL IV 83)).<sup>75</sup> It seems that the overall supervision of the construction and maintenance works of the irrigation system was the major responsibility of the councilors of the district vizier. The local officials came under the administration of the vizier to oversee receiving the vizier's instructions and guidance, and to report their activities back to the vizier. This was the case as the ancient Egyptian stela Abydos CG 20531 dated to the Middle kingdom states that saw that the local officials were involved in overseeing the channels since the titles of the chamberlain Kheperkare included 'the foremost of the Two lands to control for him (the king) the channel(s) in the Thinite nome (the Eighth Upper Egyptian nome)'.<sup>76</sup> It appears that transposition within the administration was a common practice in ancient Egypt, which continued into the Ptolemaic period.

The position next to the *nomarchos* was the strategist, or στρατηγός/*strategos*, and the interaction between *strategos* and administration of irrigation is characterised by two

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<sup>73</sup> Bonneau 1993: 198, for original text in Greek, see, <https://www.trismegistos.org/text/7448>.

<sup>74</sup> P title: Reports about irrigation, mentioning the name of nomarch 'Aristarchos'.

<sup>75</sup> Bonneau 1993: 239.

<sup>76</sup> Van de Boorn 1988: 240; Kheperkare states that he was: *ḥnt (y) T3wy r ḥrp n.f' m t3-wr*.

interrelated aspects: information and control. According to Bonneau, the *strategos* must be notified of instructions from superior authority received via his office, τό λογιστήριον/the *logistêrion* which was the central administrative edifice of the nome (SB 9925, 5). The *strategos* served as an informative liaison between the higher administration and provincial officials. For instance, the *strategos* was kept informed of the level of the rising water when the result of the observations at the nilometers was taken (*P.Brem.* 14, 4-5 (to the Strategist Apollonios)), to be recorded in his register, and to be sent later to the superior authority in the state:

the strategi and decemprimi, both to urge all to devote themselves to this most necessary labour, and to see that the overseers usually elected for the purpose are chosen from magistrates or private persons, who will compel everyone to perform his proper work by personal service, according to the rule given in the constitution of the appointment, with no malice or favour, so that the dykes are raised to the ordained height and breadth and the breaches are filled up, in order that they may be able to withstand the flood of the most sacred Nile auspiciously approaching, and that the canals are cleansed up to the so-called standards and the usual width, in order that they may easily contain the coming influx of water for the irrigation of the fields, this being for the common weal, and that absolutely no money is exacted from any one in place of work. If anyone dares to attempt exactions or neglect these orders, let him know that not only his property but his life will be at stake for injuring measures designed for the safety of the whole of Egypt (*P.Oxy.*1409).<sup>77</sup>

Moreover, there were supervisors known by the title of ἐπιμελητής/*epimeletes*, who were guarantors of the public order, and were delegated by *strategos* (*P.Oxy.* 1403 13-14). The presence of the strategist was essential at the opening of the gates -ή θύρα/*thyra* of the important canals, and to attend the work repairs made to the dykes in the company of the *basilikogrammatos* who was responsible for the execution work. The overseer of dykes carried the title χωματεπιμελητής/*chomatepimeletes* whose responsibility was to decide the technical modalities. There is an example of the given information to the strategist, a letter from Theon who was the guard of the shore; to Claudius Erasmus; the *strategos* of the division of Themistos (Arsinoites nome):

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<sup>77</sup> Johnson 1936: S. 24-25, Nr. 10, for original text in Greek, see <https://www.trismegistos.org/text/21819>.

... The gates of the sluices (?), as you know, were lifted when you were present, as much as the inspectors of sowing wished, and they are nearly all out of the water, as you know; for I gave the inspectors of sowing the conduct of the whole matter, instructing them through you to draw off as much water as they need, and I urged you through the centurion Iulius... (*P.Ryl.* II 81).<sup>78</sup>

A technical Staff was required to follow the orders and regulations issued by the general water administration in case of any sort of technical failure. The majority of the operations did not require any particular technical competence but were primarily reliant on the workforce's field expertise. These workers without qualifications ἐργάτης/*ergates* were mainly to work in the dykes (*P.Oxy.* 6. 971). As soon as a worker was assigned to more essential activities or to operate on a particular instrument, his post would take a particular designation as a technician who was supervised by a chief engineer, ἀρχιτέκτων.

The archive of Zenon comprises several correspondences linked to the estate management,<sup>79</sup> and one of Zenon's key jobs, during his work for Apollonios, the Minister of Finance, was to supervise the irrigation of almost 2,750 hectares of land.<sup>80</sup> Among the Zenon's administrative correspondences, a letter was sent from Zenon (*P. Zen. Pestm.* B, 266 BCE), to Kleon (the chief engineer of Fayoum province), regarding a technical problem.<sup>81</sup> In this letter, Zenon expressed concern that the water level in the canal did not rise sufficiently to irrigate the surrounding land and requested that the sluice gates at the Fayoum's entry be opened to solve this issue. This document revealed that the engineer Kleon (originally from Alexandria and worked in Arsinoite nome) was directly supervised by a higher official named Zenon, and the engineer's technical expertise was to guard and control the water network.<sup>82</sup>

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<sup>78</sup> Trans. Johnson 1936: S. 20, Nr. 3; for original text in Greek: Papyri Info, <https://papyri.info/ddbdp/p.ryl:2:81>.

<sup>79</sup> The Archive of Zenon was discovered in 1889 during excavation work in a Ptolemaic cemetery at Gurob near the southeastern entrance of Fayoum. Flinders Petrie found coffins were made of cartonnage consisting of discarded papyri, which were later transported to Oxford for storage. Publication of the papyri was entrusted to Mahaffy, and two volumes of P.Petrie appeared in 1891 and 1895. This archive contains 121 texts, both private and official which gives a useful insight into a Ptolemaic administration resulting from the many responsibilities of the engineers. See, Van Beek 2012: ArchID 122.

<sup>80</sup> Vandorpe 2013: ArchID 256.

<sup>81</sup> Van Beek 2005:119–128, for original text in Greek: <https://papyri.info/ddbdp/p.zen.pestm::B> = HGV P.Petr. Kleon 19 = Trismegistos 2491.

<sup>82</sup> Lewis 1986: 37-45.

Despite the scarcity of papyri in Alexandria, which were not as common as they are in Fayoum, these types of administrative correspondences still provide a general picture of the mutual business interests between two major cities in some cases, such as hiring a qualified water engineer to oversee the canal network in Arsinoite nome. It demonstrates how the water system and food production centres were successfully handled from the beginning of the Ptolemaic Period, and how this positively impacted the capital's economy. Among the responsibilities of the engineer Kleon was to instruct and organise work among different workmen, papyrus *SB XVIII* 13881 entitled 'Hard and Soft stone for irrigation works'; dating to 256 BCE, written by *dekatarchoi/δεκατάρχοι* who were the foremen of different groups of stone-cutters:

To Kleon the architect, greetings from the dekatarchoi of the quarry-men from the landing place. We are being wronged by Apollonios the superintendent, who has set us to work on the hard stone, not dividing it between us and the others, while he has assigned his own men the soft stone. As it is, we are being ruined by wearing out the edges of our tools. We beg you, so that we may obtain our rights, to measure out how much extra hard stone we have cut, so that it may be imposed in addition on the 140 quarry-men and we may not be oppressed. Farewell. (Address) To Kleon. (Docket), the dekatarchoi from the landing-place.<sup>83</sup>

This petition concludes that enormous operations to regulate the inflow of water into a city, including its distribution and drainage, requires more than just digging canals and heaping dykes. It was necessary to establish major control points with stone buildings. It also clarifies the specialisation and division of labour would be as one group was assigned to work just on hard stone, while the other group was assigned to cut all soft stone.

The system surely faced some sort of difficulty or bureaucracy as the papyrus (*P.Köln VIII* 342) from the Arsinoite (232 BCE) indicates a delay from the bureaucrat to open a sluice gate. The correspondents were Dionysodoros (a subordinate of the *oikonomos*) and Sokmenis, writing to Inaros (an official in charge of the desert canal),<sup>84</sup> to open one of the sluices due to the need for water for the irrigation process. It seems that Inaros

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<sup>83</sup> Bagnall and Derow 2004:169, Nr. 104, for original text in Greek, see <https://papyri.info/ddbdp/sb:18:13881>.

<sup>84</sup> Desert canal was a canal runs along the edge between the cultivated land and the desert.

declined to act without obtaining approval from Theodoros whose position was not mentioned, though probably the chief engineer of Fayoum. The text was bilingual (Greek and Demotic), as follows:

Sokmenis (and) Dionysodoros to Inaros, greetings. As soon as you receive this letter, open the second sluice of the desert canal. Farewell. Year 15, Mesore 18. (In Demotic) Written by Sokmenis to Inaros.

(Reply on the reverse)

Inarous to Dionysodoros (and) Sokmenis, greetings. Please write to Theodoros to write to me to follow your instructions. For I cannot open anything without his permission. Farewell. (Address) To Inaros (*P.Köln 8 342 V*).<sup>85</sup>

The complaint about the sluggish reaction to work obligations may escalate into a threat because it came from a man of power called Panakestor, the first manager of the Apollonios estate in Philadelphia. Panakestor wrote to Kleon, expressing his disappointment that Kleon did not respond to his request to send men to carry out certain work.

The letter outlined some of Kleon's obligations, such as sending men to construct the bends of the small canal, providing instructions on how the water should be diverted into side channels, and maintaining the sluice gate in case of breakage. Panakestor also threatened to report the conditions to Apollonios, blaming Kleon for a lack of irrigation in Apollonios' land.<sup>86</sup>

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<sup>85</sup> Bagnall 2004: 154-155, no. 93:

Ἰναροῦς Διονυσιο-  
δώρωι Σοκμηῆνι  
χαίρειν. καλῶς  
ποιήσετε γρά-  
15ψαντες Θεωδῶ-  
θωι γράψαι μοι  
ὑμῶν ἐπακού-  
ειν. οὐ δύνομαι(\*)  
γὰρ οὐθὲν ἄνευ  
20αὐτοῦ ἀνῆξαι(\*).  
ἔρρωσο.  
Ἰναρῶι.

<sup>86</sup> Mackay 2016: 83-84.

## Conclusion

Graeco-Roman records provide an overview of the adaptation of the pre-existing administrative structure, as well as how it was later re-established to ensure appropriate development as the period progressed. The irrigation and agriculture history during the Greco-Roman period is more documented through paperwork, including tax receipts, petitions, and official correspondence.

The administration's institutions were under the control of Hellenistic officials who had complete authority, with some members from Egyptian families who worked within the administration and became part of the privileged integrated group and some Jews who were counted as Hellenes and appointed to administrative positions. The Ptolemaic administration inherited some pre-existing Egyptian institutions and allowed the Egyptian legal system to coexist with a newer Greek legal system. The Greeks divided Egypt into 30 administrative provinces called nomes, and introduced a new administrative system called *strategos* in the central administrative edifice of the nome.

The *strategos* acted as a liaison between the provincial officials and the higher administration. Alexandria became the new administrative capital, taking this privilege away from Thebes and Memphis, which no longer served as the primary centres of politics. Moreover, new terminology was added to the administrative system that can be noted in new term *dioikisis*, διοίκησις τῶν ὑδάτων, the water administration, which was mainly centred in Alexandria, with local representatives in every nome.

The legalisation of taxation policy witnessed a gradual change from the earlier Egyptian rules towards new rules that suited the new urban Greek. New tax categories were created for new services, such as bath taxes. This coincided with the Ptolemies and Romans arriving in Egypt and establishing public baths. The public baths were massive and numerous, necessitating a consistent and substantial expense for operation and maintenance.

The continuity of the pre-existing system was evident in these local irrigation techniques, which remained largely unchanged, and the full reliance was on local officials to

coordinate and manage the operations that force labourers or local farmers were expected to carry out as part of their water management obligations.

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