



VOLCANIC ERUPTIONS, RESILIENCE AND VULNERABILITY:

THE IMPACT OF NILE FLOOD VARIABILITY ON
PTOLEMAIC EGYPT (261-30 BC)

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Introduction

Environmental agency, especially the impact of the Nile river, has mainly been ignored in the study of Graeco-Roman Egypt. Whenever the Nile in ancient Egypt is discussed, the introduction usually starts with Herodotus' popular statement that 'Egypt is a gift of the Nile'.¹ Both modern and ancient authors often qualify the Nile as life-giving or gold flowing and claim that Egypt was traditionally blessed by nature with an abundant source of food.² Research on Graeco-Roman Egypt and the Nile often only highlight the Nile as the source of wealth and agricultural surplus in Egypt, from a cultural and religious perspective or a geophysical perspective.³ Historical research tends to regard the Nile as a geographical entity, part of the Egyptian landscape and not as an important factor of agency in the history of Egypt. Alongside the positive impact of the Nile on Egypt, it could also pose a great threat. Nile flood variability could significantly affect the Egyptian population, as this research will show in a case study of Ptolemaic Egypt.

Recent research, led by Joseph Manning and Francis Ludlow, identified a correlation between global volcanic eruptions, the Nile flood failures, and domestic revolts within Ptolemaic Egypt. Large volcanic eruptions can affect the global climate by reducing incoming sunlight and precipitation, significantly reducing the rains which feed the summer flood of the Nile. By examining the period from 245 until 84 BC, they identified that 12 of the 26 years in which internal revolts have begun occurred within two years after a global volcanic eruption. In an agrarian economy dependent on the summer Nile flood, the considerable level of volcanic activity is likely to have played an important role in weakening the Ptolemaic state. Ludlow and Manning do not present the eruptions, Nile failures and social unrest as a simple causal model but hypothesize that the volcanic climate forcing is likely to have played upon and increased already existing struggles.⁴

¹ Herodotus, *The histories*, 2.5

² J.G. Griffiths, 'Hecataeus and Herodotus on "A gift of the river"', *Journal of near eastern studies* 25 (1966) 1, 57

³ A few examples in this vast amount of literature are: A. Amenta, M.N. Sordi and M.M. Luiselli (eds.), *L'acqua nell'antico Egitto: vita, rigenerazione, incantesimo, medicamento: proceedings of the first International conference for young egyptologists: Italy, Chianciano Terme, October 15-18, 2003* (Rome, 2005); P. Vasunia, *The gift of the Nile: Hellenizing Egypt from Aeschylus to Alexander* (Berkeley, 2001); R.A. Wild, *Water in the Cultic worship of Isis and Sarapis* (Leiden, 1981); H. Willems and J.M. Dahms (eds.), *The Nile: Natural and cultural landscape in Egypt* (Bielefeld, 2017)

⁴ F. Ludlow and J.G. Manning, 'Revolts under the Ptolemies: A paleoclimatological perspective', in: J.J. Collins and J.G. Manning (eds.), *Revolt and resistance in the ancient classical world and the near east* (Leiden, 2016), 154-174; J.G. Manning et al., 'Volcanic suppression of Nile summer flooding triggers revolt and constrains interstate conflict in Ancient Egypt', *Nature communications* 8 (2017) 900, 1-7

The impact of climate and Nile inundations through history

The Ptolemies definitely were not the first or last rulers who had to overcome the environmental challenge of the variable Nile floods and water supply. Multiple historic examples before the Ptolemies have shown how Egyptian dynasties had been vulnerable to (significant) adjustments to climate change and the following droughts caused by low Nile inundations or could flourish due to the change towards a favourable climate. A few of these examples include the end of the New Kingdom during 1069 BC. The last century of the New Kingdom was characterised by political turmoil and instability, which coincided with environmental stresses, influencing the grain prices during that period.⁵ However, on the other hand, the change towards a more humid climate in the Levant during the 6th century BC might coincide with the construction and formation of the Saïte state in Egypt.⁶ The impact of the environment on Egypt is an important theme throughout Egypt's history. The different Pharaonic dynasties often had to be ready to confront the different challenges posed by the variable water supply.⁷ Different empires that occupied Egypt during later periods in history struggled with climate change and its effects on the Nile floods and Egyptian agriculture, for example, the Roman and the Ottoman empires.⁸ However, the relationship between climate and state is very complex and is not as linear as these examples mentioned above might suppose, as this research will also flow.

Research aims

The impact of climate variability and consequential low Nile inundations was much broader than only instigating domestic unrest and uprisings. Within this research, I will argue that low Nile floods have an enormous impact on both the Ptolemaic dynasty and the population, which prompted various responses from both. This research will further investigate why domestic uprisings occurred after the low Nile floods and how the population in Ptolemaic Egypt responded to the pressures. I will apply the concepts of resilience and vulnerability to the impact of failed Nile inundations in Ptolemaic Egypt. By applying these concepts, this research studies how the vulnerability and resilience in Ptolemaic Egypt regarding climate variability and low Nile floods changed during the three centuries of Ptolemaic rule and the responsive capacities of both the Ptolemaic dynasty and the population

⁵ J. Janssen, *Commodity prices from the Ramessid period: An economic study of the village of Necropolis workmen at Thebes* (Leiden, 1975), 13-15

⁶ N.A. Bokonvenko, 'Migrations of early nomads of the Eurasian steppe in a context of climatic changes', in: E.M. Scott, A.Y. Alekseev and G. Zaitseva (eds.), *Impact of the Environment on Human Migration in Eurasia. NATO science series: IV: Earth and environmental sciences 42* (Dordrecht, 2004), 28-31; A.S. Issar, *Climate changes during the Holocene and their impact on hydrological systems* (Cambridge, 2003), 24-25

⁷ K.W. Butzer, *Early hydraulic civilization in Egypt. A study in cultural ecology*, (Chicago, 1976), 1-3

⁸ K. Harper, *The fate of Rome: Climate, disease and the end of an empire* (Princeton, 2017), 132-136; A. Mikhail, 'Ottoman Iceland: A climate history', *Environmental history* 20 (2015), 262-284

were. Furthermore, I will try to identify which groups in Ptolemaic society were the most vulnerable to failed Nile inundations and how this is shown.

During this research, I have developed a new perspective on the concept of ἀναχώρησις. In previous research, ἀναχώρησις has been defined as the unregistered flight of individuals from their homes and villages, often due to intensive exploitation, financial pressure or tax avoidance. However, in this study, I argue that ἀναχώρησις must not only be understood from a socio-economic perspective but also from an environmental perspective as it is very often connected to low Nile floods.

This research adopts a chronological structure to show how Egypt's resilience and vulnerability changed during the three-century rule of the Ptolemaic dynasty. Before discussing these chapters, I will first introduce the concepts of resilience and vulnerability in chapter one and how I will apply these concepts within this research. This is followed by chapter two on volcanic eruptions, climate change and Nile variability, which describes the relationship between the climatic impact of global volcanic eruptions and the variability of Nile floods. Furthermore, this section shortly discusses another climatic phenomenon, namely ENSO, and asks the extent to which the effects of volcanic eruptions could also be witnessed in the Hellenistic world.

Within the third chapter, I will discuss how Ptolemaic Egypt responded towards the first instances of Nile failure. This chapter intends to show how, during the wealthy and prosperous reigns of Ptolemy II Philopater and Ptolemy III Euergetes, low Nile inundations already made underlying weaknesses and vulnerabilities within Ptolemaic society visible, despite numerous initiatives that seemingly increase Ptolemaic resilience. The fourth chapter will discuss how the impact of ed within the Syrian Wars, the loss of external territories, the weakening of the Ptolemaic economy, the growing power of the temples weakened Ptolemaic resilience with regard to low Nile inundations. During this period these developments in combination with volcanic eruptions and low Nile floods cause domestic unrest, rebellions and the concept of ἀναχώρησις. As a result this, Ptolemaic resilience deteriorated while the population's vulnerability increased.

Chapter five will discuss how the increasingly vulnerable Ptolemaic population faced multiple series of volcanic eruptions and low Nile inundations during the second century BC. It will do so by centralizing the Potter's Oracle, a second century BC prophetic text which connects the environmental Nile shocks with the social unrest and vulnerability of the population. The sixth and final chapter discussed the last century of Ptolemaic rule, which saw both enormous instances of ἀναχώρησις as remarkable instances of resilience during the last decades.

Disaster studies and the new *Longue Durée*

This research takes place within the interdisciplinary academic field of disaster studies. Natural disasters should not be simply seen as natural events but social, cultural and political processes that test the capacity of a society to respond adequately. Recently it has been argued that the field of disaster studies should include an approach and perspective from historians, a gap which this research aims to fill. History not only offers a helicopter view but also enables researchers to test hypotheses, recognize the impact of historical path dependency on contemporary developments, and study long-term reconstructions of social, economic and cultural consequences of hazards and shocks. Therefore, it is of importance that historians should be more included within disaster studies and that historians more closely align themselves with other (social) sciences, theories, and methodologies in order to deepen our understanding of nature-induced disasters and their long-term consequences.⁹

To identify how resilience and vulnerability change over an extended period of time, this research uses a new *longue durée* approach, combining environmental data and Ptolemaic documentary sources. This approach differs from Fernand Braudel's *longue durée* by integrating large sets of big environmental data into the historical narrative.¹⁰ The use of big data in the *longue durée* offers new possibilities to solve old questions and pose new ones.¹¹ By adopting this approach, this research hopes to contribute to the academic debate in two ways. First, it will offer a new environmental perspective on social, economic and political developments within Ptolemaic Egypt. This study will especially challenge the debate on the origins of the domestic uprisings and the occurrence of ἀναχώρησις, arguing that the environmental agency within these developments plays an important part.

Secondly, this research contributes to the study of the impact of nature-induced disasters on society on a longer timescale. This research will challenge the commonly held assumption that environmental disasters do not bring significant societal or political change in themselves. Instead, nature-induced disasters can contribute to social and political changes when they occur in a time of already more significant societal changes, such as war or political developments.¹² Environmental shocks such as failed Nile floods primarily highlight underlying vulnerabilities in a society, which are already present but remain invisible during prosperous times. During nature-induced disasters, these

⁹ B. van Bavel and D.R. Curtis, 'Better understanding disasters by better using history', *International journal of mass emergencies and disasters* 34 (2016) 1, 143-169

¹⁰ J. Guldi and D. Armitage, *The history manifesto* (Cambridge, 2014), 11

¹¹ Idem, 88

¹² T. Soens, 'Resilient societies, vulnerable people: coping with North Sea floods before 1800', *Past and present* 241 (2018) 1, 145-147

vulnerabilities and inequalities come to light. Researching these recurrent nature-induced disasters allows us to study the changing vulnerability and inequality over a larger time period.

Sources

This research project will use various sources, which could broadly be divided into two categories: environmental and historical. The first set of sources, the environmental sources, will be used to identify the years of volcanic eruptions, the climate forcing of the eruptions, and their effect on temperature and precipitation. These data sets are mainly collected in Michael Sigl et al.'s (2015) research *Timing and climate forcing of volcanic eruptions for the past 2500 years*.¹³ Their data of the volcanic eruptions has been gathered from new records of atmospheric aerosol loading developed from measurements taken from an array of ice cores located in Greenland and the Antarctic, while the data measuring temperatures and precipitation have been reconstructed at regional, continental and global scales using proxy information from natural archives, primarily tree-ring-based proxies.

To understand the impact this temporary climate change has on Ptolemaic society a second set of sources will be used. This research paper will draw upon the extensive set of papyri written during the Ptolemaic dynasty that have survived. The dryness of the Egyptian climate made it possible for an enormous number of literary and documentary papyri to survive over the centuries. Their survival gives modern scholars a rather unique, reliable and rhetorically unbiased source, documenting the history of Egypt both during the Ptolemaic dynasty and under Roman control in great detail.¹⁴ The scope of this research is limited by the unavailability sources during the first fifty years of Ptolemaic dominion over Egypt. The reign of Ptolemy I Soter is therefore omitted from this study as there are no sources referencing to the Nile flood variability before 261 BC. Additionally the paleoclimatic records present very limited volcanic forcing during this period.

Especially important for establishing the link between volcanic eruptions, Nile flood quality and the impact on Ptolemaic Egypt is Danielle Bonneau's compilation of Greek papyri providing precise measurements of Nile floods and covering intermittent 96 years of the Ptolemaic period. While most of these sources often only describe a particular village, region or nome, we can safely assume in most cases that the effects of a low inundation were experienced throughout the entire country.¹⁵ Furthermore this project will use epigraphic evidence such as the OGIS 194 inscription,

¹³ M. Sigl et al., 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', *Nature* 523 (2015), 543-563

¹⁴ L. Capponi, *Augustan Egypt: the creation of a Roman province* (New York, 2005), 1

¹⁵ D. Bonneau, *Le fisc et le Nil: Incidences des irrégularités de la crue du Nil sur la fiscalité foncière dans l'Égypte Grecque et Romaine* (Paris, 1971)

which describes local solutions to the famines of 43-42 BC in Thebes, or royal decrees that were issued by the Ptolemaic rulers, involving state responses towards famines.

Chapter 1: Resilience and vulnerability

In order to answer what the impact of low Nile floods on Ptolemaic Egypt was and how resilience and vulnerability changed during the three centuries of Ptolemaic rule, this chapter will elaborate on resilience and vulnerability theories. First, I will discuss the developments of both concepts.

Secondly, I will argue that it is necessary to study nature-induced disasters from a combination of resilience and vulnerability perspectives.

Nature-induced disasters

I classify low Nile inundations as a slow-onset nature-induced disaster. As a result of this, I prefer using the term nature-induced disaster instead of natural disaster, which is a somewhat misleading term. The concept of nature-induced disasters incorporates the societal aspect of a disaster. A natural hazard could have an enormous force, but it will not be classified as a disaster when it has no impact on human society. Therefore, the impact of a nature-induced hazard is the result of the relationship between the natural hazard and the individual, community, or society that experiences the hazard. The agency of the impact of the disaster is thus not only limited to the force of the natural hazard but also to the way human coping mechanisms and their responses towards the natural hazard. The term nature-induced disasters includes this relationship, whereas natural disasters imply that the hazard itself is solely responsible for the impact of the disaster.¹⁶

Furthermore, a distinction must be made between rapid-onset disasters and slow-onset disasters. The term rapid-onset hazards refers to hazards that have a sudden destructive impact on human affairs, such as frosts, floods, storms, volcanic eruptions et cetera. Their unpredictability magnifies the impact of these nature-induced disasters. Slow-onset hazards are environmental processes that often precipitate long-term social crises such as droughts, epidemics and famines.¹⁷ For example, the failure of the Nile to flood does not bring a destructive force in itself and could be classified as slow-onset since the consequences of a low inundation could bring forth harvest failures and famines. I will study these consequences through the framework of resilience and vulnerability, which will be discussed in the following paragraphs.

¹⁶ B. van Bavel et al., *Disasters and history: The vulnerability and resilience of past societies* (Cambridge, 2020), 30

¹⁷ C. Pfister, 'Learning from Nature-Induced Disasters: Theoretical Considerations and Case Studies from Western Europe', in: C. Mauch and C. Pfister (eds.), *Natural disasters, cultural responses: Case studies toward a global environmental history*, (New York, 2009), 18

The development of vulnerability

Vulnerability emerged as a scientific discourse to study natural disasters during the 1970s in the historical context of the Cold War.¹⁸ According to Gregg Bankoff, this discourse was developed by practitioners and scholars motivated by the plight of citizens in the newly denominated Third World countries. By demonstrating that natural disasters were not natural at all but that people were put at risk by the political and social structures of the society they lived in as much as by the hazards themselves, these scholars started to criticize the development policies of Western countries in the Third World.¹⁹ This argument was best put forward by Pierce Blaikie et al. (1994), stating that people already have to be vulnerable to hazards for a disaster to arise, meaning that all vulnerability is social vulnerability.²⁰ Robert Chamber most popularly defined vulnerability in 1989 as the following:

*the exposure to contingencies and stress, and difficulty coping with them. Vulnerability has thus two sides: external side of risks, shocks and stress to which and individual or household is subject; and an internal side which is defencelessness, meaning a lack of means to cope without damaging loss.*²¹

This definition of vulnerability has been further developed by Michael Watts and Hans Bohle. Within their research they have dissected this definition and identified three components of this definition: 1) the risk of exposure to crises, stress and shocks; 2) the risk of inadequate capacities to cope with stress crises and shocks; and 3) the risk of severe consequences of crises, risk and shocks. In the context of nature-induced disasters, this definition, in combination with the three basic assumptions, will identify the most vulnerable individuals and groups as those who are most exposed to hazards, who suffer most from the impact of hazards, who possess the least coping capacity and who have the least capacity for recovery. Expanding this theory, Watts and Bohle created a triangle of causal structure of vulnerability, in which they try to define the space of vulnerability. This space is divided into three causal powers: vulnerability by lack of potential, exposure, and capacity (Fig. 1). The intersections between these three spaces create the concepts of economic capacity, property relations and class power.²²

¹⁸ In this section I will refer to natural disasters when they are discussed as such in the literature, and apply the concept of nature-induced disasters when referring to my own research or when the concept is also adopted in the literature itself

¹⁹ G. Bankoff, 'Remaking the world in our own Image: vulnerability, resilience and adaptation as historical discourses', *Disasters* 43 (2019), 222-225

²⁰ P. Blaikie et al., *At risk: Natural hazards, people's vulnerability and disasters* (London, 1994), 7-9

²¹ R. Chambers, 'Editorial introduction: Vulnerability, coping and policy', *IDS Bulletin* 20 (1989) 2, 1

²² M.J. Watts and H.G. Bohle, 'The space of vulnerability: The causal structure of hunger and famine', *Progress in Human Geography* 17 (1993) 1, 45-47

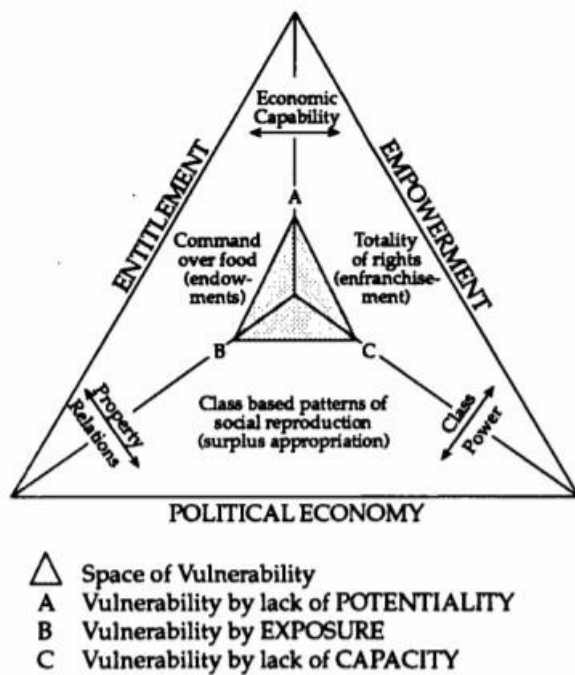


Figure 1: Watts' and Bohle's Space of Vulnerability.²³

Vulnerability, especially when researched in the context of food insecurity, has often been linked to poverty and the concept of entitlement. Although it is closely related to poverty and shares some of its indicators, it is important to distinguish both concepts. Failing to distinguish vulnerability from poverty could have adverse effects and obscure the individual indicators of vulnerability. Poverty, in the sense of low income can be reduced by borrowing and investing, however at the same time making households more vulnerable. Poverty is often defined in terms of income or consumption, whereas vulnerability is not defined by terms of want but defencelessness, insecurity and exposure.²⁴

Although vulnerability has been a popular concept, its popularity waned since the 1990s and was gradually replaced by the concept of resilience. This change was driven by increasing insights into climate change and its human components, through which systemic approaches became increasingly popular. Much of the focus shifted from different and diverse social groups to systems either on a societal or individual level, as attention on social relations, the application of power and causality moved to the response to hazards and disaster narratives. During this shift, the social aspects of disasters became increasingly obscured, as did the structural inequalities in wealth, resources and power.²⁵ Bankoff linked this conceptual shift to the end of the Cold War in 1991 and the demise of the Third World as a concept. He argues that the emphasis of how societies should be

²³ Idem, 47

²⁴ Chambers, 'Editorial introduction: Vulnerability, coping and policy', 1

²⁵ Van Bavel et al., *Disasters and history: The vulnerability and resilience of past societies*, 34-35

viewed changed towards a more positive viewpoint. Societies were not simply vulnerable but were regarded as primarily resilient. Within the new post-Cold War neoliberal political climate, it was stressed what made people resilient rather than vulnerable.²⁶

The development of resilience theory

Whereas vulnerability deals with identifying the casualties and damage of a particular exogenous shock, resilience is concerned with the buffer capacity of a specific system. Resilience was first defined by Buzz Holling in 1973 when he referred to it as the buffer capacity of an ecosystem or the time it takes to recover from a disturbance.²⁷ Later this concept was transferred to the social sciences, wherein the place of the ecosystem was replaced by society or community.²⁸ Since the 1990s, resilience theory has become the dominant concept in academic discourse and international disaster relief and prevention programs.²⁹ Resilience developed as a measure of the ability of ecosystems to absorb changes of state variables, driving variables and parameters, and still persists.³⁰ Resilience could also be defined as the capacity of a given system to absorb energy and redirect or convert it without losing the fundamental features and shape of the system as a whole.³¹

In the current state of research, two more dimensions have been added to resilience theory: adaptation and transformation. These additions were created from the realisation that change following a shock did not necessarily constitute a negative outcome but could also be seen as a positive response. A post-shock or disaster society that adapted or transformed on a systematic level was thus incorporated within resilience theory.³² The inclusion of adaptation into resilience theory was developed from the early 2000s, first within the natural sciences and later also within the social sciences. Societal adaptation to hazards was not only known to have a positive outcome but also to have potentially adverse outcomes, known as maladaptation. Historians have argued that hazards could create new incentives for adaptation since risks and hazards function as innovation triggers. However, adaption does not always happen after a hazard and could also constitute adverse outcomes by creating asymmetries in power and equality.³³ An adaptive capacity could decrease, increase or shift vulnerability within a society.

²⁶ Bankoff, 'Remaking the world in our own image: vulnerability, resilience and adaptation as historical discourses', 225-226

²⁷ C.S. Holling, 'Resilience and stability of ecological systems', *Annual review of ecology and systematics* 4 (1973) 1, 1-23

²⁸ W.N. Adger, 'Vulnerability', *Global environmental change* 16 (2006) 3, 269-273

²⁹ Van Bavel et al., *Disasters and History: The Vulnerability and Resilience of Past Societies*, 35

³⁰ C. Béné et al., 'Is resilience a useful concept in the context of food security and nutrition programmes? Some conceptual and practical considerations', *Food Security* 8 (2016), 124

³¹ C. Folke, 'Resilience', *Oxford Research Encyclopedia of Environmental Science*, (2016), 1-7

³² Van Bavel et al., *Disasters and History: The Vulnerability and Resilience of Past Societies*, 36

³³ Idem, 37-38

Although resilience has replaced vulnerability in popular discourse, scholars argue to shift back to vulnerability as a core organising concept.³⁴ The main criticism on the recent discourse of resilience theory, which also incorporates adaptation and transformation, is that if adaptation and transformation could be seen as resilience rather than vulnerability, only total disintegration or collapse of a society would remain as vulnerability on a systemic level.³⁵ However, systems are more likely to survive repeated hazards or even unexpected shocks than to collapse under their influence. Moreover, the stronger specific hazards or shocks have been ingrained in a system, reflected by widespread acceptance of the nature-induced disasters within a certain culture and the evidence of the reproduction of this system, the more likely it is that the system will be able to sustain itself. In recent publications, several scholars like Walter Scheidel and Guido Alfani, known for arguing that epidemics are drivers of social change, have even stressed that it would take a very specific set of circumstances for such systems to collapse.³⁶

Furthermore, the focus on systemic survival or collapse has often obscured research on the representation and understanding of coping practices and vulnerability of individuals.³⁷ In histories of natural disasters, victimhood and vulnerability are often less prominent themes than reconstruction, blame or innovation.³⁸ This is also visible within ancient studies, where for example, Kyle Harper has recently adopted this focus on resilience and collapse of the Roman Empire from an environmental perspective.³⁹ His book *The Fate of Rome* is primarily focussed on the greater systemic developments of the empire and not on the developments on the fates and vulnerabilities of individual people.⁴⁰

Research approach

Resilience theory, often in combination with the concepts of risk and sustainability, still occupies a prominent place within the current research fields of environmental history and the history of natural disasters, both in premodern and modern history disciplines. Research on the victims of nature-induced disasters in the ancient and premodern past has been scarce, except for the study of plagues and human epidemics. To understand the impact of nature-induced disasters, the victims must be brought back into the spotlight. Nature-induced disasters have very rarely caused a societal breakdown or collapse, as societies have historically been able to overcome periodic episodes of

³⁴ Idem, 39

³⁵ Soens, 'Resilient societies, vulnerable people: coping with North Sea floods before 1800', 146

³⁶ B. Hilkens, B. van Besouw and D.R. Curtis, 'A modern rendition of a pre-modern Scenario', *Journal for the History of Environment and Society* 5 (2020), 211-221

³⁷ Idem, 147-148

³⁸ G. Clancey, 'The changing character of disaster victimhood: Evidence from Japan's "Great earthquakes"', *Critical Asian Studies* 48 (2016) 3, 357

³⁹ Harper, *The fate of Rome: Climate, disease, and the end of an empire*

⁴⁰ J. Haldon et al., 'Plagues, climate change and the end of an empire: A response to Kyle Harper's *The fate of Rome* (3): Disease, agency and collapse', *History Compass* 16 (2018) 12

nature-induced disasters, primarily through absorption and to a lesser extent through adaptation.⁴¹ In contrast, societal breakdown, structural changes and growth in inequality is much more impacted and caused by warfare and conflict than by natural phenomena.⁴² This however does not mean that the impact of nature-induced disasters on a society is limited.

Although societies rarely break down due to nature-induced disasters, these disasters could still inflict a tremendous amount of suffering and damage to large groups of people. Specific and often marginalised groups within a society could be impacted far more severely than other groups. In unequal societies, the vulnerability of these marginalised groups could expose them to physical harm from natural hazards. At the same time, the more wealthy elite groups within society could protect themselves from the same nature-induced disaster. This would result in both a quick recovery of society but also in a significant death toll.⁴³

In order to analyse the impact of volcanic activity and low Nile inundations on Ptolemaic Egypt I will apply both resilience and vulnerability theory. I will combine the vulnerability theory with an adapted model of responsive capacity developed within resilience theory by C. Béné et al. (2016). Herein resilience capacity is divided into three different capacities: absorptive, adaptive and transformative. The absorptive capacity concerns itself with the response with the mentioned premise above of resistance to change, whereas the adaptive capacity entails the capacity to learn and adjust response and structures to changing external drivers and internal processes. Finally, the transformative capacity is the ability to create a fundamentally new system that proves resilient to the shock or change when the former structure was untenable.⁴⁴

⁴¹ Soens, 'Resilient societies, vulnerable people: coping with North Sea floods before 1800', 145-146

⁴² Idem, 174-175

⁴³ Ibidem

⁴⁴ Béné et al., 'Is resilience a useful concept in the context of food security and nutrition programmes? Some conceptual and practical considerations', 125-126

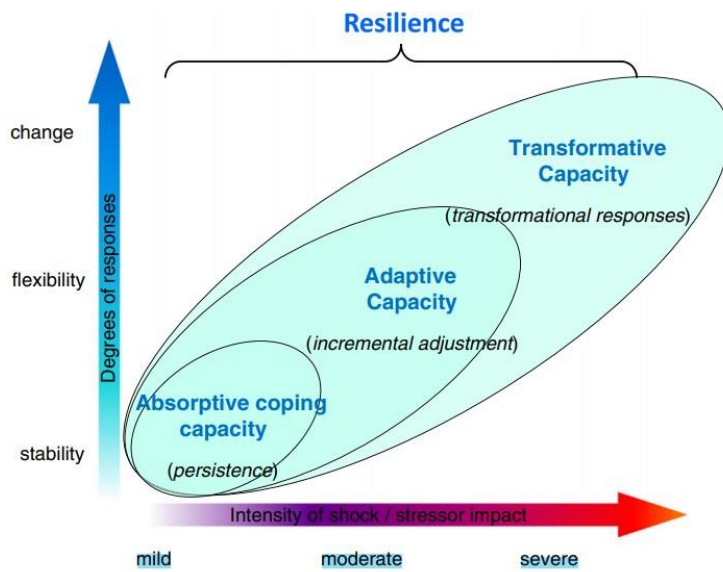


Fig. 2 Béné et al.'s Resilience Model.⁴⁵

However, this study will not use these different forms of responsive capacities to research their effects on the resilience of the Ptolemaic kingdom but to study how the responses (or lack of them) impacted the overall vulnerability of the Ptolemaic dynasty and the population. By analysing both these resilience responsive capacities and the vulnerability, this research creates a complete picture of the impact of Nile flood variability on Ptolemaic Egypt. Furthermore I will analyse how the responsive capacities of both the dynasty and population changed over time. The response capacity on a systemic level could very well impact the vulnerability of specific individuals and groups and vice versa, increasing, decreasing or shifting vulnerability within certain groups of a society could impact response and development on a systemic level.

The lack of focus on the vulnerability of the societal groups in the wake of nature-induced disasters is partly caused by the scarcity of sources illuminating daily life, especially of marginalised groups. It is challenging to research the impact of nature-induced disasters on these societal groups and identify which factors influenced their vulnerability and how this vulnerability changed over time. This study hopes to offer some insights on climate variability and its impact on vulnerability within society. Through the documentary papyri combined with climatological data, researchers have already established a link between volcanic eruptions and their effects on Egyptian society. The following chapter will discuss how volcanic eruptions and climate variability impact Nile inundations.

⁴⁵ Idem, 125

Chapter 2: Volcanic eruptions, climate change and Nile variability

To understand how the resilience and vulnerability in Ptolemaic Egypt were impacted by global volcanic eruptions and low Nile inundations, it is necessary to establish the climatic relationship between Nile variability and volcanic activity. Firstly, this section will therefore elaborate on Nile variability itself. Secondly, I will discuss how volcanic eruptions could affect global climate and how this affects the flooding of the Nile. Finally, this section will shortly discuss another climatic phenomenon, namely ENSO and ask the question to what extent the effects of volcanic eruptions could also be witnessed in the Hellenistic world.

Measuring Nile inundations and variability

The following description of the Nile flood applies to the period before the construction of the Aswan Dam in southern Egypt in the early 20th century. Every year in which the Nile flooded without any irregularities, the river begins to emerge from its banks around the 20th of July and spreads into the Egyptian countryside. At the end of August, the flood reaches its peak in Aswan (southern Egypt) and Memphis at the beginning of September. The average increase of the Nile water amounts to fifteen times more than the normal level, with a total volume of approximately 712 million cubic metres per day. After the height of the flood water remains stationary for ten days, the recession of the water slowly begins.⁴⁶

To correctly measure the height of the flood, the ancient Egyptians used a system of nilometers. These nilometers could be any device that identifies the process of the rise of the Nile inundations, often operated by temples and priests. For example, the various forms of the nilometer could be pillars placed in the river, inscribed with intervals indicating the exact depth of the water in cubits. Other examples of nilometers were buildings resembling a staircase descending into the water. All served the same purpose of determining the Nile's height which could be forwarded to the king and regional authorities.⁴⁷ As a unit of measurement, the nilometers used the cubit, which dates back to predynastic times. Approximately a cubit is 0.525 metres long, but its measurements vary between different nilometers, as each temple had its own standard.⁴⁸

The height of the flood also differed from the location in Egypt as an inundation of 18 cubits in Memphis was an exceptionally high flood, the same flood would measure 28 to 30 cubits at Elephantine. The figure below shows the various heights in cubits throughout the Egyptian

⁴⁶ D. Bonneau, *La crue de Nil: Divinité Egyptienne à travers mille ans d'histoire (332 av.-641 ap. J.-C.) d'après les auteurs Grecs et Latins, et les documents des époques Ptolémaïque, Romaine et Byzantine* (Paris, 1964), 24

⁴⁷ S.L.D. Katary, 'Nilometer', in: R.S. Bagnall et al., *The encyclopedia of Ancient History* (Oxford, 2013), 4794-4795

⁴⁸ Bonneau, *Le fisc et le Nil*, 24

countryside from Upper Egypt to the Delta. Danielle Bonneau centred her study on the Memphis region, as the official nilometer of the Greco-Roman period was located here.⁴⁹ In the figure below, Bonneau shows how the level of cubits throughout the different locations in Egypt relate to the quality of the flood.

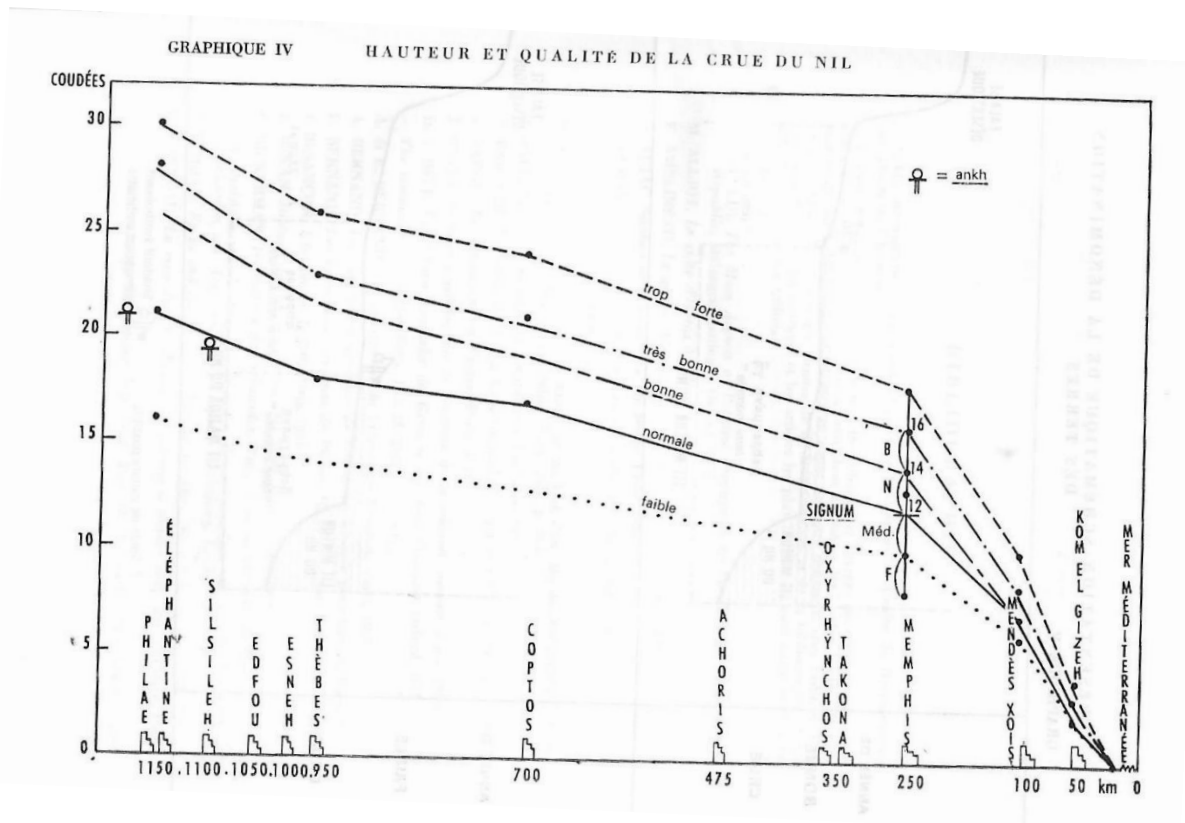


Fig. 3: Illustration made by Bonneau of the height of the inundations throughout Ptolemaic Egypt.⁵⁰

For the Greco-Roman period, the measurements of the nilometers have mostly been lost. Complete records of the Nile floods date from 622, coinciding with the Arab invasion of Egypt.⁵¹ To examine the height of the Nile flood during the Ptolemaic period, we must rely on papyrological sources, which often contain references or indications to the quality of the flood of specific years. Most of these papyri must be interpreted to gain a sense of this. In her book *Le fisc et le Nil*, Bonneau has collected a list with papyrological sources indicating the quality of the Nile inundations from 261 BC until 299 CE. I have used this list as a starting point for identifying low Nile floods.

As the figure above shows, Bonneau categorizes the different heights of the flood from too forceful to low. These categories are based on the (indicated) height of the inundations and the

⁴⁹ Bonneau, *Le fisc et le Nil*, 49

⁵⁰ Bonneau, *Le fisc et le Nil*, 263

⁵¹ D. Kondrashov, Y. Feliks and M. Ghil, 'Oscillatory modes of extended Nile river records (A.D. 622-1922)', *Geophysical Research Letters* 32 (2005) 10, 1-4

measurements of the nilometer from the Memphis region. These categories are classified as the following: An incredibly good inundation is measured above 16 cubits, whereas a good inundation amounts between 14 and 16 cubits. Furthermore, an average inundation is identified between 12 and 14 cubits. However, the inundations that fail to rise higher than 12 cubits (approximately 6,3 metres) are of interest for this study. These are also divided into three categories by Bonneau. She indicates an inundation between 10 and 12 cubits as insufficient, between 8 and 10 as low and everything below 8 cubits as bad or a failed flood.⁵² Throughout this study, the categories of insufficient, low, bad and failed will also be adopted to describe the (interpreted) quality of the flood.

The variation in Nile inundations could seriously impact the total amount of cultivatable land. This study will show there are repeated sources in which farmers claim that only a part of their land had flooded, rendering them unable to cultivate the rest of the land. For example, in papyrus BGU VIII 1842, a farmer describes that he was only able to cultivate 3 arouras out of the 10.⁵³ In classifying the different types of land in connection to the Nile flood, three important categories had been made (also visible in the Bonneau's figure below): βεβρηγμένη, ἄβροχος and χέρσος. χέρσος means land that is no longer inundated and thus land that remains dry and is not used for agriculture. Usually, this land is situated next to the βεβρηγμένη, the land that is normally flooded. In instances of a low Nile flood, this land becomes ἄβροχος, non-flooded.⁵⁴

⁵² Bonneau, *Le fisc et le Nil*, 219

⁵³ BGU VIII 1842

⁵⁴ Bonneau, *Le fisc et le Nil*, 66

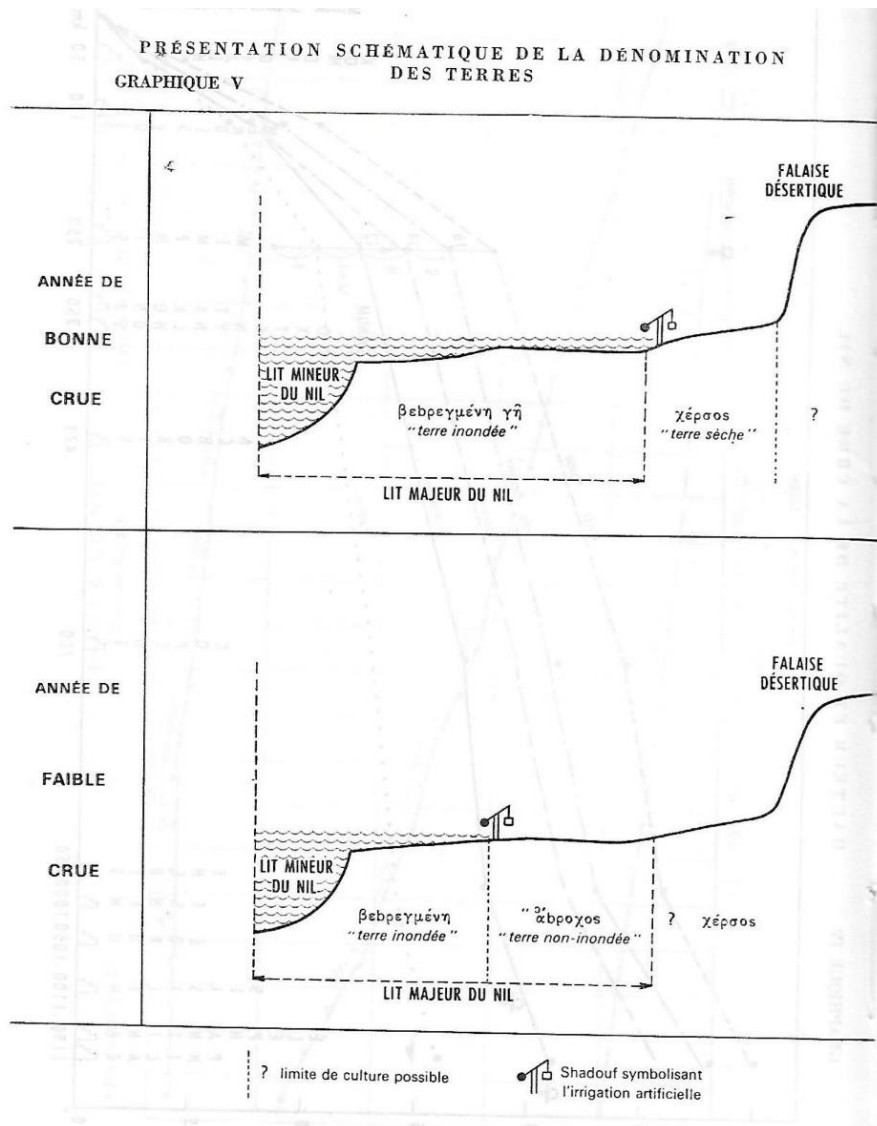


Fig. 4: Bonneau's illustration of the different types of land with regard to Nile inundation.⁵⁵

Climate impact of volcanic eruptions

Research over the last two decades has illuminated how volcanic eruptions often significantly impact global weather and climate in the following years. Two of the most common and impactful consequences of such a large volcanic eruption are the widespread and often severe cooling of temperature, especially during the summer months, and the decrease in precipitation rates and summer monsoons. The cooling down of the temperature in summer, paired with more variable winter cooling, is primarily caused by the blocking and reflecting of solar radiation by sulphate aerosols in the stratosphere. These sulphate aerosols are created by the sulphurous gasses ejected

⁵⁵ Idem, 264

into the stratosphere by explosive volcanic eruptions.⁵⁶ Additionally, the reflection of sunlight by the aerosols reduces the evaporation of water and the cooling of the earth's surface reduces the water-holding capacity.⁵⁷ The aerosols that are formed after an eruption are responsible for the atmosphere's radiative forcing. Radiative forcing can either be positive, which keeps longwave radiation in the atmosphere and therefore warming the Earth's temperature, or negative, which keeps the short wave radiation out and therefore cools the Earth's temperature. The larger the negative global forcing of a volcanic eruption, the greater global temperature and precipitation drop. The global forcing is measured in watts per square metre.⁵⁸

The combined effects of the variability and change in precipitation rates and temperature brought by the aerosol distribution of volcanic eruptions significantly impact the Nile flood variability. The Nile inundations are already variable due to the variations in summer rainfall in the Ethiopian highlands. The Atbara rivers and the Blue Nile basin at lake Tana are situated in the Ethiopian highlands. The Blue Nile flows from modern Ethiopia through Sudan, where it meets the White Nile, originating from the Great Lakes region in central Africa. From there, the Nile flow through Sudan and Egypt towards the Mediterranean sea. The summer rainfall in Ethiopia from the East African Monsoon supplies approximately 85% of summer floodwaters and is therefore immensely important for sufficient Nile floods.⁵⁹ The East African Monsoon, being a northern hemisphere monsoon, is mainly affected by high latitude eruptions in the northern hemisphere volcanic eruptions. Therefore, these northern hemisphere eruptions impact the Nile flood variation most.⁶⁰ However, the Nile floodwaters are also sensitive to the impact of tropical eruptions, albeit in a lesser sense compared to northern hemisphere eruptions.⁶¹ This is because the distributed sulphate aerosols from tropical eruptions are known to stay within the stratosphere for a longer time.⁶²

⁵⁶ A. Robock, 'Volcanic eruptions and climate', *Reviews of geophysics* 38 (2000) 2, 191-219; J. Cole-Dai, 'Volcanoes and climate', *WIREs climate change* 1 (2010) 6, 824-839

⁵⁷ C.E. Iles, and G.C. Hegerl, 'The global precipitation response to volcanic eruptions in the CMIP5 models', *Environmental research letters* 9 (2014), 104012

⁵⁸ J. Wolf, 'Volcanoes and Climate Change', (<https://earthdata.nasa.gov/learn/sensing-our-planet/volcanoes-and-climate-change>)

⁵⁹ A.M. Melesse, S. Bekele and P. McCornick, 'Introduction: Hydrology of the Niles in the face of climate and land-use dynamics', in: A.M. Melesse (ed.), *Nile river basin* (Dordrecht, 2011), viii-x

⁶⁰ L. Oman et al., 'High-latitude eruptions cast shadow over the African monsoon and the flow of the Nile', *Geophysical research letters* 33 (2006) 18, L18711

⁶¹ Iles and Hegerl, 'The global precipitation response to volcanic eruptions in the CMIP5 models'; C.E. Iles, and G.C. Hegerl, 'Systematic change in global patterns of streamflow following volcanic eruptions', *Nature geoscience* 8 (2015), 838-842

⁶² B. Kravitz and A. Robock, 'The climate effects of high latitude volcanic eruptions: The role of the time of year', *Journal of geophysical research* 116 (2011), D011105

The impact of volcanic eruptions on Nile flood variability

Ludlow and Manning have discovered a strong possibility that a link exists between volcanic eruptions on one hand and internal revolts, the issuing of priestly synodal decrees, the termination of Syrian wars and land sales during the Ptolemaic period (see Fig. 5). Their research has shown that within the first two years following a volcanic eruption, Nile inundation has been significantly lower, and the number of internal revolts and priestly decrees is significantly higher. Furthermore, the data show a high percentage of coincidence with volcanic eruptions and the termination of the Syrian Wars. All these datasets have reached a 95% confidence threshold using Barnard's exact tests, implying that there indeed exists a causal connection between volcanic eruptions, low Nile inundations and domestic unrest. In their analysis of the impact of volcanic eruptions on Nile flood variation, they estimate that eruption year summer flooding averaged 22 centimetres lower than during non-eruption years.⁶³

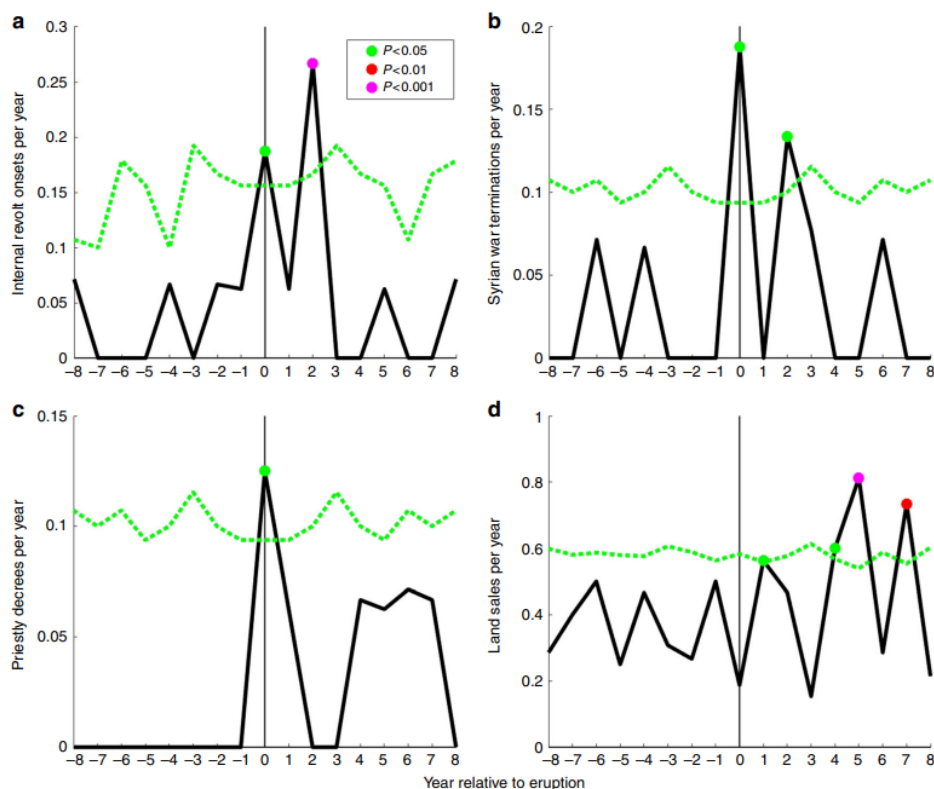


Fig. 5: These graphs have been created by Manning et al. and show the responses in Egyptian social indexes of a) starts of internal revolts, b) the termination of Syrian wars, c) the issuing of synodal decrees and 4) land sales in the first years following volcanic eruptions.⁶⁴

⁶³ Manning et al., 'Volcanic suppression of Nile summer flooding triggers revolt and constrains interstate conflict in ancient Egypt', 1-7

⁶⁴ Idem, 5

This research will build upon the causal relation that has been discovered by Ludlow and Manning. Discovering the causal relation between volcanic eruptions, Nile failure and social unrest in Ptolemaic Egypt is only the first step. I will take this research a step further by analysing and explaining how Nile failures contribute to the social indexes of domestic unrest and how these fit into the larger developments within Ptolemaic history. Additionally I will add the concept of ἀναχώρησις as one of the most important aspects to indicate the impact of Nile failures. Furthermore the research from Ludlow and Manning also largely obscure the vulnerability of individuals and communities.

In a previous research, Ludlow and Manning already discovered that during the Ptolemaic period 12 of the 26 documented domestic uprisings occurred within a period of a maximum of two years after a volcanic eruption. Furthermore, after conducting a permutation t-test, they showed that the probability of a causal relationship between the revolts and the volcanic eruptions is 97.8%, which strongly supports their theory.⁶⁵ They visualised this in figure 6 below.

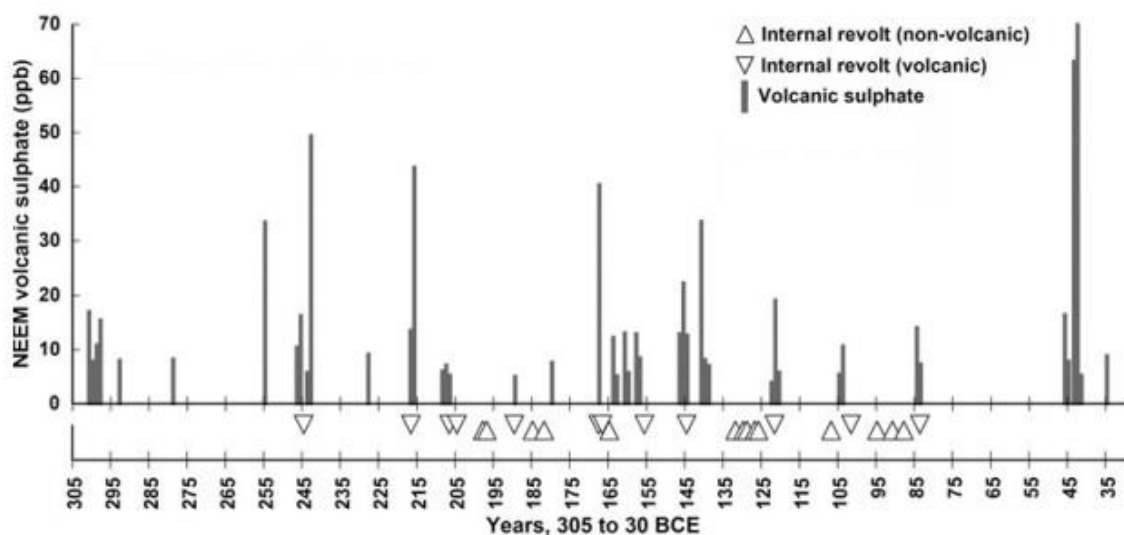


Figure 6: This figure has been created by Ludlow and Manning. It represents the NEEM volcanic sulphate in annual layers of Greenland Ice, measured in parts per billion (ppb). The triangles signify the years in which an internal revolt is reported, with the triangles pointing down being associated with volcanic origins and the triangles pointing up not being associated with volcanic eruptions. The 44 BC eruptions amounts to 100.6 ppb, but was truncated for graphical purposes. This figure was created with data from Sigl et al. 2015.⁶⁶

Additionally to the graphs provided by Ludlow and Manning, I have used the data provided by Sigl et al. to create an extra graph (figure 7), showcasing the global climatic forcing created by the volcanic eruptions. The volcanic eruptions mentioned within Sigl et al. (2015) have been categorised into

⁶⁵ Ludlow and Manning: 'Revolts under the Ptolemies: A paleoclimatological perspective', 166-167

⁶⁶ Idem, 167; Sigl et al., 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', 543-563

three groups: Tropical eruptions, Northern Hemisphere eruptions and Southern Hemisphere eruptions. For this research, I have omitted the Southern Hemisphere eruptions as it is improbable that they impacted the East African Monsoons and therefore the Nile flood variation. To keep the graph visually clear, the 43 BC eruption has been truncated, as the total climatic forcing was -23.3 and significantly higher than the others.

Furthermore I have created a similar graph (figure 8) to the graph from Ludlow and Manning to better highlight the different origins of the volcanic eruptions so that a better distinction could be made for the relative impact that the eruptions could have had on the global climate. Furthermore I have chosen to include the total amount of sulphate distributed within the year of eruption to better show the total height and full impact of the eruptions.

These two figures below show the global forcing (figure 7) and the sulphate depositions (figure 8) of the volcanic eruptions between 305 and 30 BC. The sulphate deposition of Northern Hemisphere eruptions is measured by ice core analysis in Greenland, while the sulphate of tropical eruptions is a combination of Greenland and Antarctica ice core proxies. Within figure 8, I have combined the amount of the Greenland and Antarctica proxies to show the entire amount of erupted sulphate for tropical eruptions. It is interesting to notice the relative difference in the severity of the estimated global forcing and the sulphate deposition between northern hemisphere and tropical eruptions. The difference in the impact of an eruption on global climate (in which tropical eruptions thus have a more significant relative impact) is due to the latitude of the volcano. High latitude eruptions have less impact than eruptions at lower latitudes since circulation at lower latitudes is greater. Therefore the dispersal of the dust cloud and the newly formed aerosols is more expansive, creating a more global effect on the climate.⁶⁷ Nonetheless, it seems that Northern Hemisphere eruptions have a greater impact on the Nile flood variability.

⁶⁷ J. Wolf, 'Volcanoes and Climate Change', (<https://earthdata.nasa.gov/learn/sensing-our-planet/volcanoes-and-climate-change>)

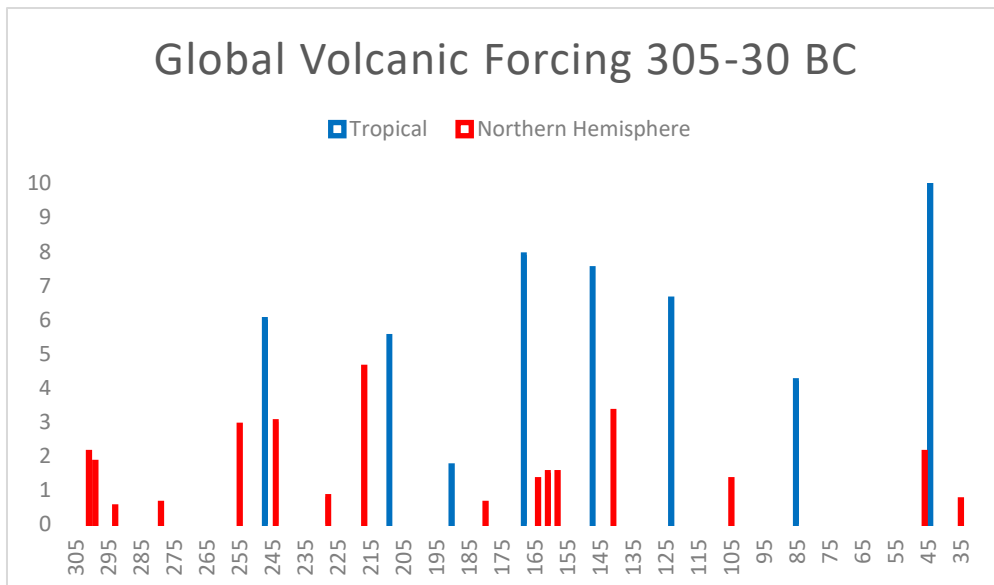


Fig. 7: The global volcanic forcing between 305 and 30 BC.

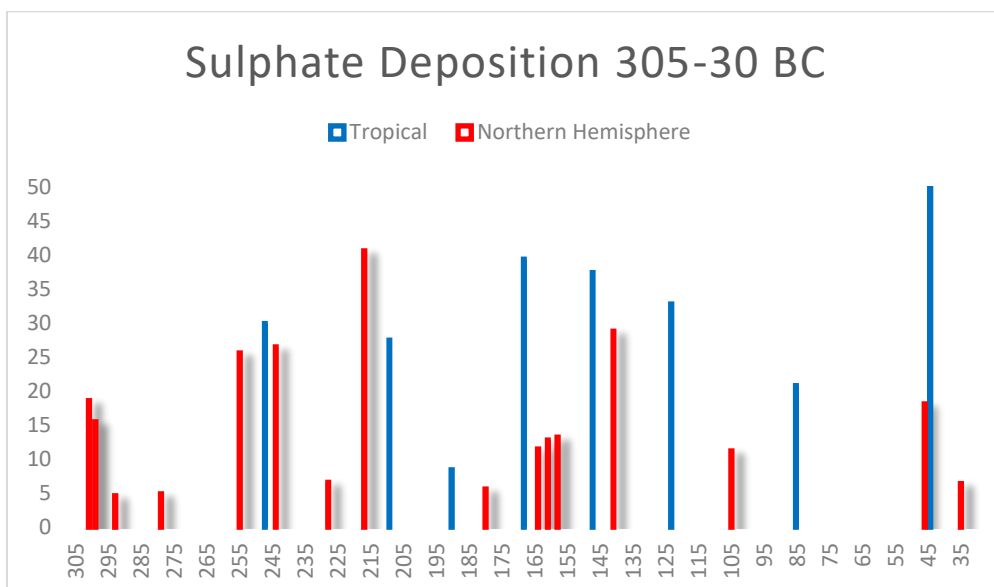


Fig. 8: The total sulphate deposition between 305 and 30 BC.

ENSO activity

Volcanic activity is not the only global climate phenomenon that impacts Nile flood variability. Scientific studies in the 1990s have indicated that El Niño-Southern Oscillations (ENSO) are related to interannual fluctuations of rainfall and river flow in several regions of the world. An ENSO is an irregular periodic variation in winds and sea surface temperatures over the eastern Pacific Ocean.⁶⁸ Elfatih Eltahir even argues that the 25% of the variance in the annual flow of Nile floods could be

⁶⁸ W.H. Quinn, 'A study of southern oscillation-related climatic activity for A.D. 622-1990 incorporating Nile river flood data', in: H.F. Diaz and V. Markgraf, *El Niño: Historical and paleoclimatic aspects of the southern oscillation* (Cambridge, 1992), 119-150

connected to ENSO activity. In ENSO years, the waters of the eastern Pacific are warmed and the monsoon rains are suppressed. ENSO activity can be divided into three categories based on temperature: cold, normal and warm. Especially during a warm year, the probability of a high inundation is only 8%, whereas the probability of a low inundation is 58%.⁶⁹ Unfortunately, the current state of environmental science cannot precisely identify and date ENSO activity in the past. A study from Christopher Moy et al. based on a sedimentation record from Ecuador, however, suggests that during the Ptolemaic dynasty in Egypt, ENSO activity was present approximately 4-6 times per century, which equals to one El Niño event every 17-25 years. This is significantly lower than contemporary times, where every 3-5 years El Niño events occur.⁷⁰ So far, we cannot connect particular variations in Nile floods, but it is useful to understand that the Nile flood could also be influenced by these ENSO events, especially in years of repeated Nile failure without the correlation of volcanic activity.

Eye-witness reports

It is fair to say that the inhabitants of Egypt were not aware that the Nile cycle was influenced through volcanic eruptions in a different part of the world, nor that they were aware that these volcanoes were erupting at all. However, it is possible, in some cases even very probable, that the Hellenistic world also experienced different, primarily visual consequences of the global eruptions. Large volcanic eruptions often create a dust veil, also known as volcanic dry fog, as fine particles of ash, dust and sulphur dioxide are thrown into the stratosphere.⁷¹ This is the same process that creates sulphate aerosols in the stratosphere responsible for the negative change in radiative forcing, as discussed earlier. The blocking of the sunlight, which impacts the negative change of forcing, also has a visual component, which has often been observed through history. These visible atmospheric effects are: a reddening and dimming of the light of the sun and other stars, red or purple twilight glows, reddish haloes (also known as Bishop's Rings) around the sun, and total eclipses of the moon.⁷²

It is striking how the reports on the visual effects of the volcanic dry fog primarily correspond with volcanic eruptions with a global sulphate disposition of at least 20. Figure 9 shows an overview of the distribution of sulphate, where the yellow circles are added to indicate years during which

⁶⁹ E.A.B. Eltahir, 'El Niño and the natural variability in the flow of the Nile river', *Water resources research* 32 (1996) 1, 131-137

⁷⁰ C.M. Moy et al., 'Variability of El Niño/Southern oscillation activity at millennial timescales during the Holocene epoch', *Nature* 420 (2002), 162-165

⁷¹ C. Park, 'Dust veil', in: C. Park and M. Allaby (eds.), *A dictionary of environment and conservation* (Oxford, 2017)

⁷² R.B. Stothers, 'Cloudy and clear stratospheres before A.D. 1000 inferred from written sources', *Journal of geophysical research* 107 (2002) D23, 1

written sources describe the possible or probable effects of volcanic dry fog. The volcanic eruptions with the most significant sulphate disposition also created a global volcanic dry fog, or at least visible in the Hellenistic (Mediterranean and Babylonian) world. This list has been compiled by Sigl et al. through multiple pieces of research on volcanic dry fog. Most notable are the works from Richard Stothers, who collected evidence of volcanic dry fog in the Mediterranean from Roman historians and authors, and Abraham Sachs & Hermann Hunger, who collected evidence from Babylonian astronomical diaries.⁷³

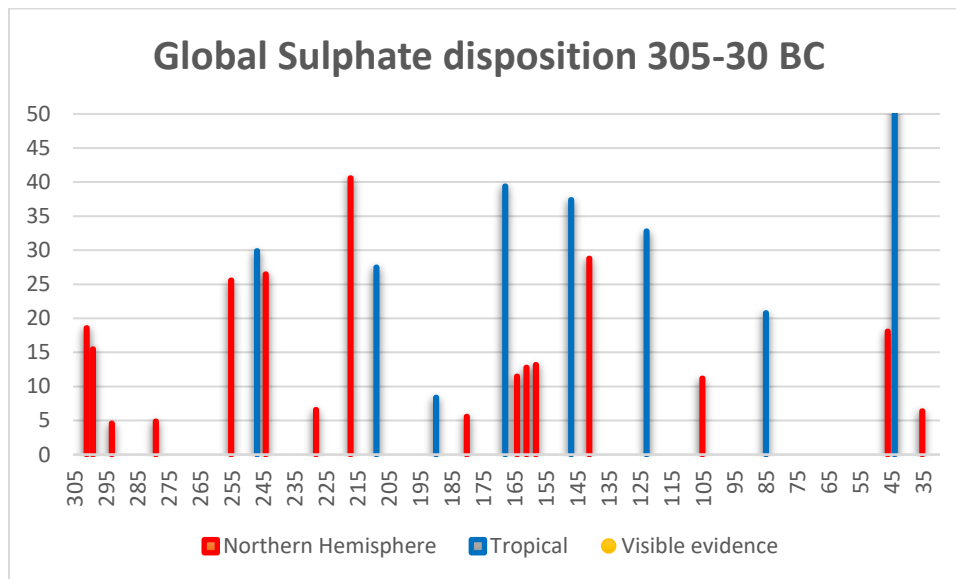


Fig. 9: References to volcanic dry fog in Babylonian and Mediterranean sources.

The third century BC already offers two good examples. First of all, in 247 BC, Babylonian astronomers described the disk of the sun as resembling the moon, indicating a diminished light and a discoloured solar disk:

*The 19th, in the morning, much mist [...] covered the sky, the people of the land were covered with red dust. Night of the 20th, very overcast, much mist, haze and clouds [...] the sky very much, mud swept over the land [...] red [...] were spread on the street and the people of the land; around noon, the disk of the sun [looked] like that of the moon.*⁷⁴

These can be considered as probable indications of high-altitude dust or aerosol layers. Additionally, the red sand falling from the sky also indicates the effects of a volcanic eruption. These effects are probably the consequences of the 247 BC volcanic eruption with a global forcing of -6,0 and a

⁷³ Idem; A.J. Sachs and H. Hungers (eds.), *Astronomical diaries and related texts from Babylonia. Volume 2: Diaries from 261 B.C. to 165 B.C.* (Vienna, 1989); A.J. Sachs and H. Hungers (eds.), *Astronomical diaries and related texts from Babylonia. Volume 3: Diaries from 164 B.C. to 61 B.C.* (Vienna, 1996)

⁷⁴ BM 32889 Obv. 17-18; Translation: A.J. Sachs and H. Hungers (eds.), *Astronomical diaries and related texts from Babylonia. Volume 2: Diaries from 261 B.C. to 165 B.C.* (Vienna, 1989), No. -246, 60-61

sulphate deposition of 29,9. Another good example is of 217 BC, an impactful volcanic eruption which has been discussed previously, which Livy describes as:

*The sun's orb appeared to have grown smaller and at Praeneste burning stones had fallen from the sky; at Arpi shields had been seen in the sky and the sun seemed to be fighting with the moon.*⁷⁵

Especially the two parts about the diminishing of the size of the sun and the sun appeared to be struggling with the moon allude to the appearance of volcanic dry fog. These visual effects can be connected to the 217 volcanic eruption with a global forcing of -4,6 and a sulphate distribution of 40,6. As will be discussed in the third and fourth chapter, the volcanic eruptions of 247 and 217 have had a significant impact on Nile inundation and, consequently, on Ptolemaic Egypt. Therefore, it is most likely that the Egyptian population was able to connect the sun's dimming, the low Nile inundation and consequential domestic unrest and was able to comprehend that all happened in the same period and could be related.

⁷⁵ Livy, *Ad urbe condita*, XXII.1.9-10; translated by J.C. Yardley (ed.), *Livy, History of Rome: books 21-22. Loeb Classical Libraries 233* (London, 2019), 195

Chapter 3: A gold-flowing Nile?

*What monarchy, fellow-banqueters, has ever been so rich in gold?... for it is only the Nile, the river truly called 'gold-flowing', that with its boundless crops of food actually washes down unadulterated gold which is harvested with no risk, so that it can supply all men sufficiently.*⁷⁶

The quote above, coming from Athenaeus' work *Deipnosophistae*, describes the vast wealth the early Ptolemies were able to gather during the first century of Ptolemaic rule in Egypt. In this passage Athenaeus, whose *Deipnosophistae* date to the early third century AD, gives a literary impression of the wealth of Ptolemy I Soter and Ptolemy II Philadelphus and attributes the reason of this wealth to the 'gold-flowing' Nile.⁷⁷ Indeed as long as the Nile inundation levels reached their expectancy, Ptolemaic Egypt appeared to be both the most stable and the most wealthy Hellenistic kingdom.⁷⁸ Nevertheless, already in the third century BC, Nile flood variation and low inundations already impacted Egypt's stability and highlighted vulnerability in various ways.

This chapter discusses the impact of volcanic eruptions and low Nile inundation during the so-called golden century of Ptolemaic rule in Egypt and how the Ptolemaic monarchy and society responded to these environmental shocks. It will focus on the various developments and innovations instigated by the Ptolemies, which focused on increasing the Ptolemaic wealth and agricultural output, such as new tax policies and the Fayyum reclamation project. These initiatives will be analysed to ask the extent to which they contributed to a stronger resilience against failed Nile inundations and how this impacted the population's vulnerability. Furthermore, this chapter assesses the first known instances of low Nile floods starting at the reign of Ptolemy II Philopater and the responsive capacities from both the monarchy and society. Ultimately this chapter intends to show how, during the wealthy and prosperous reigns of Ptolemy II Philopater and Ptolemy III Euergetes, low Nile inundations already made underlying weaknesses and vulnerabilities within Ptolemaic society visible. Thus the question arises whether the Nile really was gold-flowing or more specifically, for whom the Nile was gold-flowing.

The Fayyum reclamation project

During the first century, the Ptolemaic monarchy initially successfully established an equilibrium and achieved its primary aim: revenue capture. Despite environmental, institutional and military

⁷⁶ Athenaeus, *Deipnosophistae*, 5.203c

⁷⁷ Ibidem

⁷⁸ J.G. Manning, *Land and Power in Ptolemaic Egypt: The structure of land tenure* (New York, 2003), 27-28

constraints, the Ptolemies created one of the wealthiest kingdoms in the Hellenistic world.⁷⁹ In Egypt, wealth always came from the Nile.⁸⁰ In the first century following Alexander the Great's conquest of Egypt, the Ptolemies realised a massive transformation of the country, all favouring increasing royal revenue. During this first century, they reclaimed significant quantities of land in the Fayyum depression, improved the irrigation systems and brought in new and better species of crops.⁸¹ The Fayyum reclamation project was an essential factor in increasing the country's agricultural output, wealth, and resilience against low Nile inundations. In addition, the reclamation project of the Fayyum enabled the Ptolemies to reward and settle their soldiers and would increase the long-term yield of his kingdom. The land units in Ptolemaic Egypt were in arouras (one aroura is approximately 0.27 hectare) and the plots divided in the Fayyum were 10.000 aroura plots.⁸²



Fig. 10: Map of the Arsinoïte Nome (Fayyum).⁸³

The Fayyum is a natural depression located southwest of the ancient Egyptian city Memphis. Before Ptolemaic land reclamation, it was an undeveloped region of land, full of papyrus thickets and swamps.⁸⁴ During the early Ptolemaic period, the Fayyum underwent a significant expansion in

⁷⁹ J.G. Manning, *The Last Pharaohs: Egypt under the Ptolemies, 305-30 BC* (Princeton, 2010), xv

⁸⁰ D.J. Thompson, 'Irrigation and Drainage in the early Ptolemaic Fayyum', *Proceedings of the British Academy* 96 (1999), 107

⁸¹ M.I. Finley, 'Technological innovation and economic progress in the ancient world', *Economic History Review* 18 (1965), 36

⁸² Thompson, 'Irrigation and drainage in the early Ptolemaic Fayyum', 111

⁸³ Idem, xxvii

⁸⁴ Manning, *Land and Power in Ptolemaic Egypt*, 99-100

arable land and settlements. Through the reclamation project, the Ptolemies were able to create a somewhat atypical region from the rest of Egypt. The region was atypical because of the intensification of agricultural activity, the number of Greek soldiers (*cleruchs*) and the royal involvement in agriculture. Between 259 and 255 BC, the region was first made an official nome, named Arsinoite, after Arsinoë, the sister and wife of Ptolemy II Philadelphos.⁸⁵ The reclamation of the Fayyum was one of the most impressive agricultural expansions in the history of the ancient world. This expansion was probably already underway under Ptolemy I. Due to a lack of sources from this period, this cannot be stated for sure.⁸⁶ The documentary evidence is extensive for the reign of Ptolemy II.⁸⁷ The project was massive and was probably accomplished by restricting the flow of water into the Fayyum, lowering Lake Moeris. Additionally, new canals were also dug.⁸⁸

The reclamation resulted in new land for settlement by Greek *cleruchs*, Egyptians and others. The project was both a symbolic statement of royal power and a source of revenue. In this way, the Fayyum became a special zone of Ptolemaic economic power.⁸⁹ Under the first two Ptolemies, the cultivable land was nearly trebled to an area estimated between 1200 and 1600 square kilometres. This would amount to between 5 and 7 per cent of the total arable land in Egypt, signifying the enormous increase in potential agricultural output.⁹⁰ The vast majority of those who worked the land, including the important grain crops, were Egyptians. The development of the Fayyum, spurred on by the region's demographic change and administrative organization, brought about significant and long-lasting changes. The entire process facilitated centralized control in the Fayyum through the medium of state officials given direct responsibility over land and people, at the same time as it allowed for more rapid economic development of the land. The opening up of new land, and the subsequent attraction of new populations to the area, created a new rural socio-economic order and a new revenue base for the state, at least temporarily.⁹¹

The Fayyum reclamation project initially enabled the Ptolemies to increase state revenue by trebling the region's arable land. Along with significantly increased taxation and Egypt's already generous agricultural output, these factors played an important role in making Ptolemy II Philadelphos one of the wealthiest men in the world. Claire Préaux estimated that during this period, the Ptolemaic state revenues would be approximately 8 million artabas (one artaba is approximately 40 litre) of wheat per year. That would mean that the state income in wheat could sustain over 1

⁸⁵ Idem, 102

⁸⁶ D.J. Crawford, *Kerkeosiris: An Egyptian village in the Ptolemaic period*, (Cambridge, 1971), 55

⁸⁷ Thompson, 'Irrigation and drainage in the early Ptolemaic Fayyum', 108

⁸⁸ Butzer, *Early hydraulic civilization in Egypt*, 36-38

⁸⁹ Manning, *Land and Power in Ptolemaic Egypt*, 107

⁹⁰ D.W. Rathbone, 'Villages, land and population in Graeco-Roman Egypt', *The Cambridge Classical Journal* 36 (1990), 109-111

⁹¹ Manning, *Land and Power in Ptolemaic Egypt*, 125

million people per year. Additionally, the cash revenue would purchase roughly 500,000 to 750,000 man-years of labour.⁹² However, Préaux also stressed that, although the Ptolemaic revenues were extremely high, this does not necessarily represent an enormous percentage of the country's total wealth. She estimated an average tax rate of 16 per cent of the overall GDP.⁹³ Manning arrives within a similar heavy taxation pressure as he estimates a percentage between 14 and 21.⁹⁴ In contrast, the Roman taxation levels are estimated to be only half of the Ptolemaic levels.⁹⁵

Although these are mere estimates, which are very difficult to verify, this shows how the Ptolemies are among the most impressive taxing powers and mobilizers of resources in antiquity.⁹⁶ Whereas the high state revenues and resources might create a strong resilience and enable a country to respond adequately against environmental shocks, the incredibly high taxation rate could at the same time be an important factor in decreasing the populations ability to respond against Nile failure and impeding famine and thus increase their vulnerability.

First instances of low Nile inundations

To examine the relationship between low Nile inundation and the resilience and vulnerability of the early Ptolemaic state, this paragraph examines the first known instances of low Nile floods, the responses towards its impact and the influential changes the Ptolemies made in Egypt during this period. However, this research is limited by the unavailability of sources, especially regarding Nile inundation and its effects, during the first decades of the third century BC. The reign of Ptolemy I Soter is therefore obscured as there are no sources referencing to the Nile flood variability or its impact. Additionally, the climatic records also present very limited volcanic forcing during this period.⁹⁷ Therefore, this period is omitted from this study in the hope that later research might recover some sources or indications of Nile inundation of these years. The oldest documentary papyrus, which discusses a low inundation, dates from 261 BC.⁹⁸ From 261 until 248 BC, a few sources exist that indicate, at least in certain parts of Egypt, a low Nile flood during the years 261, 260, 256, 253, 250 and 248. All these sources were found in the Arsinoïte nome in the Fayyum.⁹⁹

This small sample of eye-witness sources describe the initial impact of low Nile variability on farmers and offer a glimpse of an early chronology of the quality of the Nile floods. Especially the

⁹² C. Préaux, *Le monde Hellénistique: La Grèce et l'Orient de la mort d'Alexandre à la conquête romaine de la Grèce (323-146 av. J.C.)*, (Paris, 1978), 364-366

⁹³ Ibid

⁹⁴ Manning, *Land and Power in Ptolemaic Egypt*, 135 n21

⁹⁵ K. Hopkins, 'Rome, taxes, rents and trade', in W. Scheidel and S. von Reden (eds), *The ancient economy* (New York, 2002), 216

⁹⁶ Manning, *The last Pharaohs*, 40

⁹⁷ Sigl et al., 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', 545

⁹⁸ Bonneau, *Le fisc et le Nil*, 120-121

⁹⁹ Idem, 221-223

inundations of 253, 250 and 248 BC seem to have been very low, with large amounts of non-flooded land. In 255 BC, there was a Northern Hemisphere volcanic eruption with a global forcing of -2.9 and a sulphate distribution of 25,6. The effects of this volcanic eruption were felt in Egypt in 253 when the flood was extremely low, with indications of large pieces of land being measured as unproductive saline land.¹⁰⁰ Following the bad harvest, the farmer Nikanor complains to Zenon that everybody is selling for money and not for wheat.¹⁰¹ The possibility to pay monetary transactions in wheat was seen as a vital condition for Ptolemaic taxation principles.¹⁰² Nikanor's complaint that everybody was paying with money thus indicates a wheat scarcity. The year 250 BC again experienced an extremely bad inundation, with the water already receding on the 22nd of July. A letter from farmers says that although the land is sown, they question whether they will be able to produce wheat or barley.¹⁰³ Two years later, in 248, another failed inundation ensued, with a farmer claiming that 120 arouras of his land were not flooded.¹⁰⁴ Although these sources present some first instances of hardships experienced by farmers regarding the insufficient floods, they do not present a clear overview of the impact of low Nile inundation. The vulnerability of the farmers during this period is rather limited as during the following years the Nile again, enabling the farmers to quickly overcome the pressures of a low Nile flood without long-term problems.

New tax policy

In combination with other sources, as Bonneau argues, these first examples of insufficient Nile inundations present an interesting aspect about a new tax policy of the Ptolemies. Although no legal texts explaining the tax system regarding Nile flood irregularities have survived, Bonneau has identified a legalized custom in the papyri from this period. As it was common in Egyptian tradition, agricultural land not flooded by the Nile due to a bad inundation was exempt from taxes. This land was classified as ἄβροχος, which translates to non-flooded and is often accompanied by the adjective ἄφορος, meaning without production or fiscal income.¹⁰⁵ The papyrus P. Hibeh 85 from 261 BC describes the agreement of the Egyptian Pasis to pay the rent of his loan back in full to the royal granaries without any deduction for potential insufficient flooding.¹⁰⁶ While in the demotic tradition, the deductions for the non-flooded land seem to be taken for granted, in the Greek documents they were still subject of a special request. However, from the fragmentary evidence, it seems that the

¹⁰⁰ PSI VI 639

¹⁰¹ PSI IV 356

¹⁰² S. von Reden, 'Money and Prices in the Papyri, Ptolemaic Period', *Oxford handbooks online* (Oxford, 2016), 10

¹⁰³ SB V 7644; P. Lille 49

¹⁰⁴ PSI VI 577

¹⁰⁵ Bonneau, *Le fisc et le Nil*, 121 & 124-125

¹⁰⁶ P. Hib. I 85

Greeks contested this deduction in taxes from non-flooded land between 258 and 246 BC.¹⁰⁷ This is seen in a request made to Zenon by Eudemos to intervene on his behalf to request a reduction in taxes due to a bad harvest.

Furthermore, there is evidence of farmers fleeing towards the sanctuary of Isis in Memphis to escape the pursuit and tax pressure from the Greeks.¹⁰⁸ During this period, the Ptolemies introduced a synoptic method of taxes, which calculated a tax on the average production established over several years. Although this seems practical and efficient to deal with irregularities in Nile flooding, it also proved to provide many difficulties for farmers. For example, if the average production was established over a greater period of years which seems constant, the taxation burden could be extremely heavy in consecutive years of low Nile inundation.¹⁰⁹

The new taxing system introduced somewhere after 260 BC should have created greater resilience for the Ptolemaic monarchy against the variable Nile flooding, as it was supposed to compensate bad harvests in years of large amounts of non-flooded lands with good harvests in the years the Nile flooded as it was supposed to. This system was probably also introduced to secure a more stable tax income for the state.¹¹⁰ Whether this tax system was favourable in years of average or even good Nile floods is unknown, but this new taxation method was a heavy burden for farmers in consecutive years of low Nile flooding. This synoptic taxation system in which the traditional exemption of non-flooded land was no longer applicable thus increased the farmers' vulnerability of dealing with the already extremely high taxation burden. Until 246 BC, there is some evidence of this system's impact on the farmers, seen in Eudemos request to Zenon P. Cair. Zen. III 59433, the flight of the royal farmers to the sanctuary of Isis in Memphis in P. Mich. Zen. 40 and the letter of Apollonius claiming the local *cleruchs* will not be able to claim their wheat until they have paid their debts to the royal treasury in PSI IV 344. The untenability of this system, along with other existing vulnerabilities, truly comes to light after the respectively insufficient and bad floods of 246 and 245 BC, coinciding with the first regnal years of Ptolemy III Euergetes.

The 247 BC volcanic eruption

In 247 BC, there was a large tropical volcanic eruption, ranking within the top 40 volcanic eruptions of the last 2500 years, with a climatic forcing of -6.0 and a global sulphate distribution of 29.9.¹¹¹ The climatic effects of this volcanic eruption are immediately visible in the Nile inundations. In a draft

¹⁰⁷ Bonneau, *Le fisc et le Nil*, 123

¹⁰⁸ P. Mich. Zen. 40

¹⁰⁹ Bonneau, *Le fisc et le Nil*, 124

¹¹⁰ *Ibidem*

¹¹¹ Sigl et al, 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', source data figures 2 & 3

letter, Eukles describes the small harvest in the Arsinoite nome in 245 due to insufficient flooding during 246. A proposal is made to pay a portion of taxes with the harvest of the following year.¹¹² However, as the inundation of 246 already was insufficient, the inundation of 245 was terribly low, causing a series of bad harvests and contributing to the growing social unrest in Egypt.

During this period Ptolemy III Euergetes, who had become king in 246, led a campaign through Syria during the Third Syrian war. Ancient sources quote this campaign to be one of the most successful campaigns in Ptolemaic history and Ptolemy III ensured multiple victories, bringing him far into Seleucid territory.¹¹³ However, due to local unrest, Ptolemy III was forced to return to Egypt to restore order and stability in 245 BC. The true nature and extent of the unrest and uprisings throughout Egypt are unknown. For a long time, the knowledge of this event has been conveyed through the texts of the two late antique historians, Justin and Saint Jerome. According to Justin, Ptolemy III could have conquered the entire kingdom of Seleukos if he had not been recalled to Egypt due to domestic sedition (*domestica seditio*).¹¹⁴ Saint Jerome describes how Ptolemy III had conquered Syria, Sicily and large parts of Asia when an uprising arose in Egypt.¹¹⁵ Whether this unrest indeed had happened has long been (and still is) a point of debate among historians. However, according to Veïsse, the return of Ptolemy III due to local unrest has been confirmed by the recovery of the papyrus fragment P.Haun I 6. This fragment from the second century AD features an abstract of a historical work describing the history of the Ptolemaic empire during the third century BC.¹¹⁶

Applying an environmental perspective yields new insights in the possible origins of these uprisings as the slow-onset nature-induced disaster of Nile failure could cause a higher economic pressure on the farmers. The underlying reasons for the origin of the uprisings had already been present during the previous decades. Ptolemy II Philadelphos had forced high pressure on the Egyptian population to acquire as much of the land's resources as possible to fund the Second Syrian War (260-253 BC). During the first years of Ptolemy III's reign, the further injustices imposed on the Egyptian population through the economic and administrative system and the demands of the Third Syrian War all contributed to the growing unrest in the country.¹¹⁷ The two consecutive years of failed Nile floods could explain why this growing unrest waited to express itself in a domestic uprising in 245. While this unrest had been growing, the failure of the Nile to flood further increased the already existing pressure on the Egyptian population, creating an untenable situation for the

¹¹² P. Col. Zen. II 87

¹¹³ G. Hölbl, *A history of the Ptolemaic empire*, translated by T. Saavedra (Abingdon, 2001), 49

¹¹⁴ Justin, *Historia Philipicae*, XXVII 1.9

¹¹⁵ F Gr. Hist. II 260 F 43

¹¹⁶ A.E. Veïsse, *Les révoltes Égyptiennes: Recherches sur les troubles intérieurs en Égypte du Règne de Ptolémée III à la conquête Romaine* (Leuven, 2004), 3-4

¹¹⁷ Hölbl, *A history of the Ptolemaic empire*, 49

population. Although two years of repeated Nile failure of this scale would always present hardship for the Egyptian population, their vulnerability had increased through the high costs of war and taxation. This vulnerability was already present under Ptolemy II, visible in the fragmentary evidence discussed above. The two repeated years of failed Nile inundation pushed the Egyptian farmers in the *chora* to the edge of their coping capacity. These two consecutive years of low inundations and bad harvests shows the first instance in which the underlying vulnerabilities are highlighted and exposed by the environmental shock, despite being an era of incredible Ptolemaic wealth.

The Canopus Decree

Although the exact nature the uprisings are unknown, as they are only known as domestic seditions, they were influential enough to prompt Ptolemy III's return. Euergetes' response towards the unrest and problems appears to be effective. In the famous Canopus Decree of 238 BC issued by the Egyptian temples, Ptolemy and his wife Berenice II are portrayed as having saved Egypt from a great famine:

*And when on one occasion the rise of the river was insufficient and all the inhabitants of the country were terrified at what had happened and remembered the disaster that occurred under some of the previous kings, under whom it happened that all the people living in the land suffered from a drought, they showed their care for the residents in the temples and the other inhabitants of the country, and showed much foresight and sacrificed a large part of their revenues for the salvation of the population, and by importing corn into the country from Syrian, Phoenicia and Cyprus and many other places at great expense, they save the inhabitants of Egypt.*¹¹⁸

An eloquent testimony of their benefactions towards the local population suffering from famine has been recorded in the Canopus decree. First of all, the decree mentions a lower Nile flood than average, which frightened the local population since they recalled the disaster that had occurred under similar conditions under previous kings. Whether 'previous kings' relate to Ptolemy I Soter and Ptolemy II Philadelphus or the Persians (or perhaps even earlier) remains unknown. Whereas Bonneau argues that it would be unlikely that these events took place during Ptolemaic rule, Buraselis argues that it would be probable that similar famines or troubles had already occurred since Alexander's arrival in Egypt.¹¹⁹ While this period is largely obscured from our sources, the

¹¹⁸ OGIS 56; Translation: M.M. Austin, *The Hellenistic world from Alexander to the Roman Conquest: A selection of ancient sources in translation* (Cambridge, 2006), 471

¹¹⁹ Bonneau, *Le fisc et le Nil*, 127; K. Buraselis, 'Ptolemaic grain, seaways and power', in: K. Buraselis, M. Stefanou and D. J. Thompson (eds.), *The Ptolemies, the Sea and the Nile*, (Cambridge, 2013), 101

paleoclimatic evidence would support Bonneau's theory that these famines come from a period before the conquest of Alexander the Great. The first half of the third century BC was a relative quiet period concerning volcanic eruptions. Furthermore, there is no surviving evidence of a similar famine and Nile failure during previous Ptolemaic times. It could be possible that the referenced period is the aftermath of the tropical volcanic eruption of 426 BC during Persian rule in Egypt. This volcanic eruption had a global volcanic forcing of -35,6 which is the highest forcing of the last 2500 years.¹²⁰ This enormous eruption must have had an significant impact on global climate and Nile flood variability. However, that remains the topic on another research as it falls outside the scope of this study.

Ptolemy III Euergetes and Berenike II are commemorated for standing up to their role as caring masters by importing grain from neighbouring countries, often at high prices, and saving the people from famine.¹²¹ It is interesting to note that the neighbouring countries mentioned: Syria, Phoenicia and Cyprus, were all three under Ptolemaic dominion. This royal action closely corresponds to the Greek concept of εὐεργεσία (benefaction), especially regarding securing food for the people at a reasonable cost or for free.¹²² Ptolemy III's epitaph of Euergetes thus seems to derive from this. In this role, Ptolemy III appears as a Mediterranean crises manager in the interest also of his subjects. Therefore, it was vital for the Ptolemaic king to have access to these friendly alternative areas of grain production, which were less dependent on the climate variation that influenced the Nile cycle.¹²³

The ability of Ptolemy III and Berenice II to provide, import and distribute such an enormous amount of grain is an example of both their vast amount of wealth and their control over a large territory. Because of this and their willingness to spend a tremendous amount of their resources to save the country from famine, Egypt proved quite resilient against the environmental shock of Nile failure. It is difficult to establish whether Ptolemy III ensured the import and donation of these enormous grain quantities from his own initiative to combat the famine or whether he was forced to re-establish his control of Egypt and to put down the domestic uprisings. The chaos in Egypt did not immediately abide with Ptolemy's return to Egypt and the import and distribution of grain throughout the country, although the Canopus Decree portrays this image. It appears that until at least 240 BC, economic, political and economic struggles were still present in Egypt. One text, dated somewhere after 243/242 BC, describes the problem of runaway sailors (probably slaves) who were

¹²⁰ Sigl et al., 'Timing and climate forcing of volcanic eruptions for the past 2,500 years', supplementary data 3

¹²¹ OGIS 56

¹²² S. Pfeiffer, *Das Dekret von Kanopos (238 v Chr.) Kommentar und historische Auswertung eines dreisprachigen Synodaldekretes der ägyptischen Priester zu Ehren Ptolemaios' III* (München, 2004), 97

¹²³ Buraselis, 'Ptolemaic grain, seaways and power', 101

to be treated as brigands and the importance of their capture.¹²⁴ At the same time, the cleruchic system was in great chaos, according to Eric Turner.¹²⁵ Another text describes the difficulty of the efforts to restore the bureaucratic control of Egypt, together with the importance of the transport of grain to the capital Alexandria.¹²⁶ Therefore it would perhaps not be coincidental that Ptolemy Euergetes' acts of benefaction after the Nile failures of 246/245 were commemorated after control of the country had been re-established in 238 BC. Interestingly, the impending famine is also not portrayed as a consequence of the system of rule but as a whim of nature.¹²⁷

The Canopus Decree does not mention the social unrest residing in the country, nor does the Decree of Alexandria, another synodal decree issued in 243 BC. Most issued synodal decrees seem to have been motivated by environmental and political crises and describe events as military success, royals birthdays or royal benefaction to propagate a picture of state strength and stability, this will be elaborated further in chapter four. While not all decrees are expected to be created in reaction to a crisis, according to Werner Huß, it is striking that many of these decrees correspond to war or social unrest.¹²⁸ In these instances, the Ptolemaic rulers were also depended upon the support of the priests and temples to re-establish control of the country, often spurred by privileges made to the priests and large donations made by the Ptolemies to the temples.¹²⁹ Therefore, it is interesting to note that two decrees had been issued in a short time, relating to the Nile failure and the social unrest in Egypt, without mentioning the social unrest in either.

Another important measure taken by Ptolemy III during this period was reinstating the exemption of non-flooded land within the taxing of the land. The inclusion of this clause in contracts, as they will continue to appear during the following centuries, significantly reduced the population's vulnerability. The official inclusion of the ἄβροχος and ἄφορος in Greek land rental clauses supposedly brought more stability and security for the farmers, at least a reduced pressure from taxes, and therefore was a measure aimed to decrease the vulnerability of the population in case of another potential Nile failure.¹³⁰ This measure was probably prompted to re-establish control of the

¹²⁴ P. Hib. II 198

¹²⁵ E.G. Turner, 'Ptolemaic Egypt' in: F.W. Walbank, *The Cambridge ancient history: Volume 7.1* (Cambridge, 1984), 156

¹²⁶ P. Tebt. 703

¹²⁷ H. Heinen, 'Hunger, Not und Macht: Bemerkungen zur herrschenden Gesellschaft im Ptolemäischen Ägypten' *Ancient Society* 36 (2006), 18

¹²⁸ W. Huß, 'Die in ptolemäischer Zeit verfaßten Synodal-Dekrete der Ägyptischen Priester', *Zeitschrift für Papyrologie und Epigraphik* 88 (1991), 203-204

¹²⁹ D.J. Crawford, 'Ptolemy, Ptah and Apis on Hellenistic Memphis', in: D.J. Crawford, J. Quaegebeur and W. Clarysse (eds.), *Studies on Ptolemaic Memphis. Studica Hellenistica 24*, (Leuven, 1980), 35

¹³⁰ Bonneau, *Le fisc et le Nil*, 127

population, who had responded towards the combination of the bad harvest and the high taxation pressures by local uprisings.

Technological innovation

Other measures to combat bad harvest were sought in technological advances. In an undated petition to one of the Ptolemies, an unknown Philotas suggests that he has the solution to low Nile inundations and consequential famines. Although the text is not explicitly dated, on paleological grounds, it is generally thought to be third century BC and fitting of the circumstances in Egypt from 246 until 238 BC.¹³¹ Philotas wrote about three years of consequential Nile failure and proposed a certain machine that was supposed to save the country and provide a plentiful harvest.¹³² Although the exact specifics of this certain machine are unknown, the introduction of a water-lifting device called the saqiya is generally dated around 240 BC. According to Michael Lewis, many new water lifting and rotary machines were invented in Alexandria between 260 and 230 BC.¹³³ Whether Philotas invented the saqiya or suggested improvements on its design is unclear. It also remains unclear if the invention of the saqiya was prompted due to specific years of insufficient Nile flooding.¹³⁴ However, the invention of this water lifting device would seem to have a positive effect on building greater resilience against Nile failures. As Philotas already writes to Ptolemy: “but if you wish, this will be a year of good flow”¹³⁵, implying that the machines would give the Ptolemies a greater control of the Nile floods and the ability to prevent famine by technological advancements.

Beside the introduction of the saqiya, another water lifting device had made its entrance into the Egyptian world: the Archimedean screw-pump. Although this man-powered machine could only lift water over a small vertical interval, it was an effective device for the irrigation of agricultural land in Egypt. These technological advances in irrigation devices, along with the great land reclamation of the Fayyum and the introduction of new and better species of crops, would imply that Ptolemaic Egypt was significantly reinforcing their resilience against Nile failures and consequential famines. These developments and innovations would significantly improve Ptolemaic agricultural output as they would be less dependent on a proper Nile flood, by being able to transfer water to non-flooded parts of the land in times of low inundations.

However, Ptolemaic innovation on an agricultural level proved to be very limited. Despite the Hellenistic advances and the scientific output of Alexandria, productivity was only marginally

¹³¹ Ludlow & Manning, ‘Revolts under the Ptolemies: A palaeoclimatological perspective’, 158

¹³² P. Edfou 8

¹³³ M.J.T. Lewis, *Millstone and hammer: The origins of water power* (Hull, 1997) 20-21

¹³⁴ Ludlow & Manning, ‘Revolts under the Ptolemies: A palaeoclimatological perspective’, 159

¹³⁵ P. Edfou 8

improved by technological innovations.¹³⁶ Only the saqiya and the Archimedean screw-pump seem to have been genuine innovations, yet their use throughout the country was very limited.¹³⁷ Their integration into the countryside was minimal and it was not until the Roman occupation of Egypt that these agricultural advances were widely disseminated.¹³⁸ It remains interesting as to why there had been so little focus on agricultural innovations, especially in a place that was so dependent on Nile flood variation and at the same time housed the main western centre of scientific research and invention: The Alexandrian Museum.¹³⁹ Within the Alexandrian Museum and Library, some of the greatest minds in antiquity came together and advanced research in several fields, including medicine, geography, astronomy and military studies.¹⁴⁰

The taxation of land was more important for the economy than technological improvements when Ptolemaic productivity was considered.¹⁴¹ Additionally, after the impressive Fayyum reclamation project, the expansion of cultivable land was also halted and in the centuries to follow, the amount of cultivated land declined.¹⁴² In conclusion, according to both Préaux and later Samuel, the absence of technological innovation or improvement in irrigation demonstrates the thesis that the Ptolemies did not seize the opportunity to make significant strides in agricultural technology. The few potential machines that could improve the agricultural output were not widespread, so that the basic goals of stability were ingrained into the agricultural practice. When a greater harvest was desired, the solution was sought to increase cultivatable land instead of greater intensification of use.¹⁴³

Although the Ptolemies had a vast amount of wealth, partly increased through the Fayyum reclamation project, this did not necessarily constitute greater technological innovation and creating greater resilience against the variable Nile floods. For the greater part of the third century BC, Ptolemaic Egypt appeared to be rather resilient against repeated Nile failure and consequential famine. The Ptolemaic responsive capacity after the famine of 245 BC was quick and effective and after the bureaucratic order had been restored around 240 BC, Egypt was again the prosperous, wealthy and powerful country it propagated to be. The lack of innovation meant in the long-term

¹³⁶ Manning, *The last Pharaohs*, 137

¹³⁷ J. Rowlandson, *Landowners and tenants in Roman Egypt: The social relations of agriculture in the Oxyrhynchite nome*, (Oxford, 1996), 20

¹³⁸ Manning, *The last Pharaohs*, 137

¹³⁹ Finley, 'Technological innovation and economic progress in the ancient world', 36-37

¹⁴⁰ Préaux, *Le monde Hellénistique*, 329-332

¹⁴¹ Manning, *The last Pharaohs*, 137

¹⁴² A.E. Samuel, *From Athens to Alexandria: Hellenism and social goals in Ptolemaic Egypt. Studia Hellenistica 26* (Leuven, 1983), 46

¹⁴³ Idem, 50; C.F. Préaux, 'Epoque Hellenistique', in: D.E.C. Eversley (ed.), *Troisième conférence internationale d'histoire économique*, (Paris, 1969), 56-57

that Ptolemaic resilience was even declining. These developments will be discussed in the following chapter.

Panhellenic sentiments

Ptolemaic resilience during the third century BC did not solely rely on the food production within their own empire. In the third century BC, before the Roman Republic became a dominating factor in the eastern Mediterranean, the successor kingdoms after Alexander the Great's empire held close connections and relations with each other. These relations could be classified as Panhellenic sentiments.¹⁴⁴ In 227/226 BC, Ptolemy III was able to gift an enormous amount of grain to Rhodes after an earthquake hit the island. The gift amounted to one of the largest shipments known from the ancient world and existed of around 30 million litres of grain.¹⁴⁵ These gifts of grain were not uncommon during this century. Before Rome's dominance over the Mediterranean, there were many instances in which Greek states made effective appeals to Panhellenic sentiments, with the idea that Greeks should help each other and cooperate, which interestingly did not mean that this Panhellenic ideal prevented war.¹⁴⁶ For example, Ptolemy I Soter already sent repeated grain transports to Rhodes during its siege by Demetrius I, as had Ptolemy II had sent grain to Rhodes in later instances. Similarly Ptolemy II had sent grain donations towards Cos, Byzantium, Heraclea Pontica and Sinope.¹⁴⁷ Additionally, Athens had repeatedly depended on imports and donations of Ptolemaic grain. Likewise, the Ptolemaic empire had benefited from a large grain donation from Hieron II, presumably shortly after the famine of 245.¹⁴⁸

Conclusion

This chapter has discussed a variety of factors that impacted the resilience and vulnerability of Ptolemaic Egypt concerning Nile induced environmental shocks. Between 261 and 248 BC, there were multiple instances in which a low Nile flood impacted the Ptolemaic population. In these instances, the first signs of the underlying vulnerabilities of the farmers are highlighted as they struggled with bad harvests. This period also shows that the Ptolemaic population proved to be quite resilient against low inundations that only occurred during one year, followed by sufficient or good

¹⁴⁴ A.M. Eckstein, *Mediterranean Anarchy, Interstate War, and the Rise of Rome*, (Berkeley, 2006), 80

¹⁴⁵ Polybius, *Historiae*, V.89.1-5; V. Gabrielsen, 'Rhodes and the Ptolemaic kingdom: The commercial infrastructure', in: K. Buraselis, M. Stefanou and D. J. Thompson (eds.), *The Ptolemies, the Sea and the Nile*, (Cambridge, 2013), 66

¹⁴⁶ Eckstein, *Mediterranean Anarchy, Interstate War, and the Rise of Rome*, 80

¹⁴⁷ W. Ameling et al., *Schenkungen hellenistischer Herrscher an griechische Städte und Heiligtümer, vol 1: Zeugnisse und Kommentare*, (Berlin, 1995), no. 203, 205, 224, 243 & 244

¹⁴⁸ Buraselis, 'Ptolemaic grain, seaways and power', 105; Ludlow and Manning, 'Revolts under the Ptolemies: A palaeoclimatological perspective', 158

floods the next year. When the Nile failed to flood for two consecutive years, this changes as the pressures put on the population became too high, visible in the period of Nile fails to flood sufficiently for multiple years in 246-245 BC.

It is important to stress again that an increase in a country's resilience does not automatically constitute a decrease of a population's vulnerability, and in some instances, could even increase the vulnerability as well. This chapter has explored a great example in discussing the famine resulting from the insufficient Nile floods of 246/245 BC. On the one hand, the Ptolemaic state proved to be resourceful and efficient in importing high quantities of grain from neighbouring countries and donating this to the population. Ptolemy III and Berenice II were able to do so due to a collection of reasons. First of all, the Ptolemaic state was extremely wealthy. This wealth had been gathered through successes in war together with the capture of neighbouring countries, the high taxation rates imposed on the population and the increase in arable crown land through the Fayyum reclamation project. However, the first two of these factors significantly contributed to an increase in the population's vulnerability, especially in the *chora*. The heavy burden placed upon them from war expenses and the overall taxation left them vulnerable to environmental shocks. That is not to say that famine resulting from two years of insufficient Nile flooding could have been prevented or would not have happened if these pressures on the population were lower, but these factors definitely increased the impact of the shock and the population's vulnerability. As a response from the population, local uprisings were instigated.

Euergetes' response towards the Nile failures and the domestic uprisings can be divided into short-term solutions and long term policy. In the first instance, he responded with a short-term solution by donating grain. By re-integrating the ἄβροχος-clause in land tenure contracts, Ptolemy III took a step to decrease the population's vulnerability towards Nile failure. Furthermore, Ptolemy III eventually succeeded in re-establishing control of the country after 240 BC. The state's ability to recover from the environmental shock and consequential uprisings should be seen as highly resilient, which is also visible in Euergetes' ability to donate the largest shipment of grain known from the antique world in 227 BC.

Egypt's resilience during this period was not only dependent on Ptolemaic wealth. The panhellenic network existing within the eastern Mediterranean world provided the Hellenistic kingdoms with acts of εὐεργεσία, often resulting in grain donations. In times of proper Nile flooding, Ptolemaic Egypt was often the wealthy benefactor of other Greek states in need, which was already happening during the reign of Ptolemy I Soter. During the 246/245 BC famine, they received a large grain donation, proving that the network within the Eastern Mediterranean increased Egypt's resilience. Another important factor was the ease with which Ptolemy III was able to import grain

from neighbouring countries, as these countries were under Ptolemaic dominion as well. Though the financial costs would still have been high, the ability to import these quantities of grain significantly increased Euergetes' responsive capacity against famine.

Many of these factors contributing to Egypt's resilience changed or deteriorated at the end of the third century BC. During the next chapter, I will argue how the loss of external territory, the disappearance of the Panhellenic sentiments, the loss of arable land and growing domestic unrest and rebellions severely impacted Ptolemaic responsive capacities and the resilience and vulnerability of the country during the end of the third century and throughout the second century BC.

Chapter 4: Revolts and ἀναχώρησις at the turn of the century

The reign of Ptolemy III Euergetes had established the largest expansion of the Ptolemaic empire and had secured Ptolemaic supremacy in the eastern Mediterranean sea. The drive and possibilities to expand had come to an end with Ptolemy IV Philopater and is often regarded, primarily thanks to the narrative of Polybius, as a period of change and the start of the decline of the Ptolemaic empire.¹⁴⁹ As the last chapter discussed, minor uprisings and social unrest were already prevalent during the reign of Ptolemy II and III. After Ptolemy IV Philopator's ascension to the throne in 221 BC, foreign wars and domestic crises ensured greater difficulties for the Ptolemaic state than in the century before.

At the same time, the last decades of the third century witnessed two volcanic eruptions with the second and third most severe global forcing of that century. Interestingly these two eruptions are dated within two years before domestic revolts in Ptolemaic Egypt. This chapter will discuss how these eruptions influenced and impacted the developments within Ptolemaic Egypt during this period and the impact of non-volcano related low Nile inundations. Among these developments discussed within this chapter are the impact of the Syrian Wars, the loss of external territories, the weakening of the Ptolemaic economy, the growing power of the temples, the domestic unrest and rebellions and the concept of ἀναχώρησις. As a result of these developments, Ptolemaic resilience deteriorated while the population's vulnerability increased.

The battle of Raphia and the revolt of 217 BC

In Philopator's third regnal year in 219 BC, the Fourth Syrian War with the Seleucid empire started. The newly ascended Seleucid king Antiochos III aimed to restore the Seleucid empire to its size under Seleukos I and thus prioritised reclaiming Ptolemaic possession. His first military action against the Ptolemaic empire was capturing the naval stronghold in Seleucia in Pieria in 219, which had been conquered by Ptolemy III Euergetes 27 years earlier, thereby starting the fourth Syrian War.¹⁵⁰ Ptolemy IV's preparations for the Fourth Syrian War were impressive as he gathered soldiers from all foreign territories and recruited many from places like Crete and Greece. With the outbreak of the Second Punic War and the Social War in Greece, prices for mercenaries had undoubtedly gone up.¹⁵¹ Nevertheless, in 217 BC, Ptolemy IV became victorious in a decisive battle at Raphia on June 22, 217 BC. Afterwards, Ptolemy IV returned to Egypt and rewarded the victorious army with 300,000 pieces of gold. However, it is quite well established that the Fourth Syrian War had put tremendous pressure on the Egyptian population. Besides the enormous expenses that the war had brought,

¹⁴⁹ Polybius, *Historiae*, V.34

¹⁵⁰ Idem, V.59-V.61

¹⁵¹ Grainger, *The Syrian Wars*, 198

about twenty thousand Egyptians had been required to undergo military training.¹⁵²

After Ptolemy IV Philopater's return to Memphis in October 217, a priestly decree was issued in November to celebrate Philopater's successes in the Fourth Syrian War. The Raphia Decree, also known as the Pithom Stele, compares Ptolemy IV with Horus, son of Isis, who had cut down his enemies and was reciprocated with honours.¹⁵³ Foreign military successes were quickly exchanged for domestic unrest. Our best and only ancient source for the domestic revolt and the fourth Syrian War as a whole is Polybius, who provides a detailed account of the developments. Although this provides modern historians with valuable information, simultaneously the disadvantage is that all competing accounts have disappeared. Nonetheless, the advantages of using Polybius outweigh the disadvantages by far, albeit realizing its limitations.¹⁵⁴ Polybius describes the origins of the insurrection:

*As for Ptolemy, his war against the Egyptians followed immediately on these events. This king, by arming the Egyptians for his war against Antiochus, took a step which was of great service for the time, but which was a mistake as regards the future. For they, highly proud of their victory at Raphia, were no longer disposed to obey orders, but were on the lookout for a leader and figurehead, thinking themselves well able to maintain themselves as an independent power, an attempt in which they finally succeeded not long afterward.*¹⁵⁵

However, there is much discussion on how Polybius characterises the origin of these insurrections. Polybius sees the rebellion in Egypt in 217 BC as a change in the balance of power between the monarchy and the Egyptian subjects. Polybius never mentions any social or economic causes.¹⁵⁶ Additionally, there is also debate whether how reforming the recruitment of the twenty thousand native Egyptians into the army actually was. According to Christelle Fisher-Bovet, Egyptian soldiers had been a part of the Ptolemaic army throughout the whole third century BC.¹⁵⁷ Therefore, it is also questionable whether the causes for the insurrection originate from the recruitment of the Egyptians. Anne-Emmanuelle Veisse questions the existence of the rebellion since most of its evidence derives from Polybius. She argues that no well-dated document exists that explicitly mentions disturbances in the decade following the battle of Raphia. Especially since the papyrus BGU VI 1215, which belongs to the end of the third century BC according to its paleological grounds, is

¹⁵² Polybius, *Historiae*, V.65

¹⁵³ Crawford, 'Ptolemy, Ptah and Apis on Hellenistic Memphis', 31-32

¹⁵⁴ Grainger, *The Syrian Wars*, 195

¹⁵⁵ Polybius, *Historiae*, V.107

¹⁵⁶ C. Pr aux, 'Esquisse d'une histoire des r volutions  gyptiennes sous les Lagides', *Chronique d'Egypte* 11 (1936) 22, 528

¹⁵⁷ C. Fisher-Bovet, *Army and society in Ptolemaic Egypt*, (Cambridge, 2014), 161-162

often cited as an example of the domestic violence of which Polybius speaks, cannot be used to clarify the chronology and its exact date is unknown.¹⁵⁸

Nonetheless, this papyrus is very interesting as a police report is written on it, describing an attack on a military post and a temple precinct. The attackers came from an area outside of the village.¹⁵⁹ This connects to the concept of ἀναχώρησις. This concept translates roughly as withdrawal and applies to the unregistered flight of individuals from their homes and villages, often due to intensive exploitation, financial pressure or tax avoidance.¹⁶⁰ Within this research, I argue that the pressure of environmental shocks like low Nile inundations also played a large part in this. Although ἀναχώρησις also applies to individuals who have fled to escape the consequences of the law, in this instance, the concept is heavily connected with an increased vulnerability of the population. Brian McGing argues that it was also not uncommon for people who fled their villages through ἀναχώρησις to fall into banditry.¹⁶¹ This can be seen in BGU VI 1215, where these outsider bandits attack the village. As papyrus P. Mich. Zen. 40 also briefly showed in the previous chapter, people also often fled towards religious sanctuaries, where they were safeguarded from pursuit and responsibilities.¹⁶²

The combination of the abovementioned pressures would have enormously worsened the already harsh living conditions of the local population. Hölbl identifies the attackers of the village in BGU VI 1215 as those who had sought refuge in the deserts and Delta marshes. Therefore he connects the civil unrest not as a nationalistic rising against the Greek monarchy or as a shift in the balance of power but as a rebellion of the lower classes inspired by social injustice.¹⁶³ This shows that ἀναχώρησις, revolt and rebellion are recurring responses of the population when financial, military and environmental pressures become too harsh. Due to the uncertainty of the date of the papyrus, it could also be possible that the troubles described in the report are connected to the great revolt in Upper Egypt or during the intermediate period.

The Raphia Decree

Another fragment of evidence of social unrest is the existence of the Raphia Decree from Memphis. As with decrees previously discussed, Crawford identifies the period following the Battle of Raphia as one of intensification on concessions made by the Ptolemies to the established temples. Similar to the Canopus decree of 238 BC and the Alexandrian decree of 243 BC, there is no mention of social

¹⁵⁸ Veisse, *Les révoltes Égyptiennes*, 7

¹⁵⁹ BGU VI 1215

¹⁶⁰ B.C. McGing, 'Bandits, real and imagined, in Greco-Roman Egypt', *The bulletin of the American society of Papyrologists* 35 (1998) 3/4, 174; D. Rathbone, 'Poverty and population in Roman Egypt', in: M. Atkins and R. Osborne, *Poverty in the Roman world* (New York, 2006), 108

¹⁶¹ McGing, 'Bandits, real and imagined, in Greco-Roman Egypt', 108

¹⁶² P. Mich. Zen. 40

¹⁶³ Hölbl, *A history of the Ptolemaic empire*, 154

unrest. Again it would seem that the Ptolemies extensively relied on the support of the temples, both during and after the Fourth Syrian War. An important difference between the Raphia decree and the earlier decrees under Ptolemy III Euergetes is that the temples seem to have more agency in what is discussed in the Raphia Decree, whereas in the earlier decrees, the Ptolemies are able to dictate their will to the temples.¹⁶⁴ This change in the relationship between the monarchy and the temples, where the temples' power and the monarchy's dependence on the temples grew further even during the second century, will be discussed later in this research.

Although the evidence and information about the domestic rebellions following the battle of Raphia are scarce, the environmental data might shed some extra light on the situation in Egypt of that time. From the paleoclimatic sources, Sigl et al. have identified a Northern hemisphere volcanic eruption with a forcing of -4.6 and a sulphate distribution of 40,6 in 217 BC. The third-highest global forcing from a volcanic eruption in the 3rd century BC. Eruptions with such global forcing often heavily affect the height of the Nile floods in the following years. No sources exist which can verify a low Nile flood between 217 and 215. Bonneau's list of sources provides information about an insufficient flood in 218 and leaves a gap until a sufficient inundation in 213 BC.¹⁶⁵

For now, we have to rely on Polybius assessment of the outbreak of the rebellions, although his given motive for the rebellions remains questionable as he did not discuss any socio-economic origins of the revolt. When considering the extra information from the paleoclimatic evidence and by comparing it to the effects of other large eruptions, it could be possible to connect the high pressure put on the Egyptian population from the Fourth Syrian War with a possible low or bad Nile flood caused by the volcanic eruption and thus the ensuing domestic unrest. Hopefully, future research, especially about the height of the Nile floods between 217 and 215 BC, will shed more light on the domestic situation during this period.

The great Theban revolt

Contrary to the revolts following the Fourth Syrian War, there are numerous sources about the great revolt in Upper Egypt, following a decade later. This great revolt is perhaps the largest and most impactful revolt during the Ptolemaic dynasty, starting around 207/6 BC. This uprising, which probably started in the area around Edfu in Upper Egypt, led to a period of approximately 20 years during which southern Egypt had separated itself from Ptolemaic control and proclaimed Thebes as their new pharaonic capital.¹⁶⁶ The earliest date in which the revolt in the south is mentioned is at a hieroglyphic building inscription on the temple of Edfu. Herein is stated that ignorant rebels in the

¹⁶⁴ Crawford, 'Ptolemy, Ptah and Apis on Hellenistic Memphis', 31-32

¹⁶⁵ Bonneau, *Le fisc et le Nil*, 224

¹⁶⁶ Hölbl, *A history of the Ptolemaic empire*, 153

South interrupted the works on the temple during the 16th year of Ptolemy IV (207/6 BC) and the rebellion raged until the 19th year of Ptolemy V Epiphanes (187/186 BC).¹⁶⁷ The rebel forces had elevated their leader Herwennefer to pharaoh. He ruled from 206 to 200 and was succeeded by Ankhwennefer (also known as Chaonnophris in Greek) until Ptolemy V fully reconquered Upper Egypt and Thebes in 186.¹⁶⁸

Various historians dispute the origins of this revolt. Polybius, again our most important ancient source on this period in Ptolemaic history, links the origins of the revolt to the militarisation of the native Egyptians who were armed and trained in order to fight in the Macedonian phalanx, similar to the uprising following the battle of Raphia. However, they became self-confident and started a rebellion when they found a leader. Furthermore, Polybius attributes the unrest in the Ptolemaic kingdom to the extravagant way of life of Ptolemy IV Philopater and his disinterest in the countries affairs.¹⁶⁹ However, this argument has often been debunked as the morality of the king and its court has no direct influence on the well-being of the state.¹⁷⁰

During the 20th century, modern historians argued that the revolt primarily came from economic reasons. The devaluation of the Egyptian silver coinage during this period, combined with the high costs of the Fourth Syrian War, brought rising taxation and monetary problems.¹⁷¹ Additionally, there are references during this period that the market prices of wheat had increased significantly.¹⁷² A different explanation for the origins of the revolts opposes the socio-economic motives and argues that the native uprisings were inspired by nationalistic and anti-colonial feelings among the Egyptians against the Greek supremacy. Social unrest and revolts in Egypt have had many explanations through time. Several explanations have been put forward for these revolts: one the one hand, they have been seen as religious, ethnic or nationalistic on the other hand socio-economic or some combination of both.¹⁷³

¹⁶⁷ W. Clarysse, 'The great revolt of the Egyptians (205-186 BCE)', *The center for the Tebtunis papyri lecture series of University of California* 16 (2004), 2

¹⁶⁸ Hölbl, *A history of the Ptolemaic empire*, 154-157

¹⁶⁹ Polybius, *Historiae*, V.107

¹⁷⁰ Clarysse, 'The great revolt of the Egyptians (205-186 BCE)', 10

¹⁷¹ Fisher-Bovet, *Army and society in Ptolemaic Egypt*, 71-77; Von Reden, *Money and Prices in the Papyri, Ptolemaic Period*, 6-7

¹⁷² K. Maresch, *Bronze und Silber: Papyrologische beitrage zur Geschichte der Währung im Ptolemäischen und Römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Wiesbaden, 1996), 181

¹⁷³ Most notably the origins are discussed in the following works: U. Wilcken, *Grundzüge und Chrestomathie der Papyrskunde, vol 1: Grundzüge* (Leipzig, 1912), 20-23; Préaux, 'Esquisse d'une histoire des révolutions Égyptiennes sous les Lagides', W. Peremans, 'Les révolutions Égyptiennes sous les Lagides', in: H. Maehler and V.M. Strocka (eds.), *Das ptolemäische Ägypten: Akten des internationalen Symposions, 27-29. September 1976 in Berlin* (Mainz am Rhein, 1978), 33-50; B.C. McGing, 'Revolt Egyptian style: Internal opposition to Ptolemaic rule', *Archiv für Papyrusforschung und verwandte Gebiete* 43 (1997) 2, 273-314; P.W. Pestman, 'Haronnophris and Chaonnophris, two indigenous pharaohs in Ptolemaic Egypt (206-186 B.C.)', in: S.P. Vlemming (ed.),

Again this revolt can be connected to a global volcanic eruption two years prior to uprisings in the south. In 209 BC, a tropical volcano erupted with a global forcing of -5.5 and sulphate distribution of 27,5, making it the second-largest eruption of the third century BC (after the tropical eruption of 247 BC with a global forcing of -6.0). Unfortunately, the information about the Nile floods is obscured by a lack of papyrological sources. From Bonneau's overview, we know that in 209 BC itself, the Nile inundation reached an average level.¹⁷⁴ Manning and Ludlow have convincingly shown that revolts connected to a global volcanic activity often sprout one or two years after the eruption.¹⁷⁵ Given the effects of a low Nile flood, we could conclude that the socio-economic reasons are most convincing for the origins of the great revolt. The economic pressure was intensely high during this period. However, apart from the alleged revolt shortly following the battle of Raphia, a large rebellion did not occur until ten years later in 207/6 BC. The question arises why the tension in the country did not reach a boiling point sooner after the Fourth Syrian War? The answer is probably because it came in accordance with a low Nile flood, which pushed the Egyptian population over the brink. It is possible that these insufficient floods gave the last push to an already vulnerable society.

An extensive set of sources supporting this theory for this particular period is lacking. However, it is supported by data gathered by Ludlow and Manning about the responses to volcanic eruptions. This data has been treated extensively in the chapter 2. Their research has shown that within the first two years following a volcanic eruption, Nile inundation has been significantly lower and the number of internal revolts and priestly decrees significantly higher. Furthermore they implying that there indeed exists a causal connection between volcanic eruptions, low Nile inundations and domestic unrest.

Therefore, it seems plausible that these volcanic eruptions have played a part in the affairs of 217 and 207/6 BC. At the same time, the impact of these eruptions should not be overestimated. As comparative research about the impact of nature-induced disasters on societies has proven, a nature-induced disaster does not cause change or any significant developments within a society by itself. When a society adapts or transforms after such events, it is always combined with other events and underlying problems within society. In the two aforementioned instances, these events and underlying problems can be identified as the Syrian Wars and the heavy burden placed on the population in combination with social injustice and the militarisation of native Egyptians. The

Hundred-gated Thebes: acts of a colloquium on Thebes and the Theban area in the Graeco-Roman period (Leiden, 1995), 101-137; Huß, 'Die in ptolemäischer Zeit verfaßten Synodal-Dekrete der Ägyptischen Priester'

¹⁷⁴ Bonneau, *Le fisc et le Nil*, 224, P Tebt III 774

¹⁷⁵ Manning et al., 'Volcanic suppression of Nile summer flooding triggers revolt and constrains interstate conflict in ancient Egypt', 4-5

following passages will expand on the increasing difficulties for the Ptolemaic monarchy that developed during the second century BC.

Decrease of Ptolemaic resilience and responsive capacity

The battle of Raphia is often identified as the last great victory of the Ptolemies, marking the end of Ptolemaic international power and their dominance in the Eastern Mediterranean. Shortly after the revolt in Upper Egypt, Ptolemy IV Philopater died in 204 BC. He was succeeded by his son Ptolemy V Epiphanes, who was only six years old. Trouble started quickly when Antiochos III started the Fifth Syrian War in 202. Without much difficulty, Antiochos conquered large parts of Palestine and eventually, after some Ptolemaic resistance, also Gaza.¹⁷⁶ The Alexandrian government sent out an embassy to Rome asking for support, alas to no avail. Antiochos III continued his campaign and by 197 BC, he had conquered Syria, Anatolia and Thrace from Ptolemaic dominion.¹⁷⁷ At this time, the Ptolemaic kingdom struggled on three fronts. Firstly, Chaonnophris had reconquered Thebes after initial Ptolemaic success in 199 BC. Secondly, they had lost most of their foreign territories in Asia and Europe to the Seleucid empire, and finally, revolts started to break out in the Delta and Alexandria.

The revolts in the Delta shall be discussed later in this chapter. The strength and size of the Ptolemaic empire had been reduced incredibly as they only retained Cyprus, Cyrenaica and the Aegean bases of Itanos, Thera and Methana. Furthermore, they had lost control of Upper Egypt, of which they did not receive tax income for more than 20 years.¹⁷⁸ It is evident that the Ptolemaic economy and military strength had decreased enormously, especially since the death of Ptolemy IV Philopater. Among the most critical losses was the province of Coele Syria, as it functioned as an enormous grain base that was not subject to the variability of the Nile floods.

These developments severely impacted Ptolemaic responsive capacity against low Nile inundations. Ptolemy III Euergetes was able to import grain from external territories including Syria, Phoenicia and Cyprus, to combat the famines resulting after the bad floods of 246 and 245 BC. However, Ptolemy V Epiphanes had lost Syria and Phoenicia, significantly reducing their capacity to absorb and cope with future disappointing harvests by important grain from external territories. This also heavily impacted Ptolemaic revenue income together with the loss of tax income for twenty years from Upper Egypt.

¹⁷⁶ Grainger, *The Syrian Wars*, 245-248

¹⁷⁷ Polybius, *Historiae*, XVIII.39; Livy, *Ab urbe condita*, XXXIII.19

¹⁷⁸ Clarysse, 'The great revolt of the Egyptians (205-186 BCE)', 6

Land that has gone dry

Interestingly, there is one source that connects the rebellion with ‘land that has gone dry’. The papyrus SB XXIV 15972 is a report on problems with the tax collections on agricultural land around 186 BC, shortly after the revolt. The revolt nonetheless plays an integral part in the report. It mentions plots of land cultivated by farmers who are not officially registered as its owners and therefore do not pay taxes to the Ptolemaic administration. Our interest here goes to the reason how these individuals could have taken up these plots of ownerless land. The report says: *From the time of the revolt of Chaonnophris, it happened that most of the farmers were killed and the land has gone dry.*¹⁷⁹ The papyrus was found in the Busirite nome at the city of Lycopolis. Therefore the reference to the revolt of Chaonnophris instead of Herwennefer makes sense, as the rebellion reached Lycopolis around 200/199 BC, shortly after Chaonnophris was made pharaoh.¹⁸⁰

Aside from the death of the farmers, which have probably died during a battle at their village, the land that has gone dry alludes to a poor Nile inundation. The original Greek reads: τὴν γῆν χερ[σ]ωθῆναι. The use of the verb χερσώω (translation: gone dry, made barren) is very interesting in this instance. It is related to the word χέρσος, which translates to dry or barren. In the terminology regarding the different types of agricultural land, χέρσος means land that is no longer inundated and thus land that remains dry and is not used for agriculture. Usually, this land is situated next to the βεβρημένη, the land that is normally flooded. In instances of a low Nile flood, this land becomes ἄβροχος, non-flooded.¹⁸¹ Due to the strong agricultural denotation of the word χέρσος we can gather that the fact that the land has become χέρσος implies that due to lack of cultivation (death or flight of the farmers) and water (poor Nile inundation) for multiple years, a large portion of cultivable land had been downgraded to uncultivable land.

With the loss of arable land, the region around Lyconopolis had become less resilient. Additionally, the farmers in this region and period had become increasingly vulnerable for a combination of reasons. First, the arable land had significantly decreased and turned into barren land. Furthermore, they had to deal with Nile failures and consequential food shortages, and the domestic unrest significantly reduced their safety within their villages. As both papyri BGU VI 1215 (discussed following the battle of Raphia) and SB XXIV 15972 show, villages were under attack, which posed a great threat to the villagers and farmers.

¹⁷⁹ SB XXIV 15972

¹⁸⁰ Pestman, ‘Haronnophris and Chaonnophris, two indigenous pharaohs in Ptolemaic Egypt (206-186 B.C.)’, 113

¹⁸¹ Bonneau, *Le fisc et le Nil*, 66

Synodal decrees

Despite these accumulative losses, the Ptolemaic monarchy turned the tide in 197 BC after defeating the rebels occupying Lycopolis and suppressing a rebellion in Alexandria. Soon after, priests from all over Egypt were gathered in Memphis, where Ptolemy V Epiphanes was crowned and on 27 March 196 BC, another priestly decree was published: the Memphis Decree. This decree is more famously known as the Rosetta Stone. These kinds of priestly synodal decrees are often connected to domestic unrest and the reassurance and reestablishment of Ptolemaic power. The synodal decrees under Ptolemy V Epiphanes marked an interesting power shift, as it seems likely that the gathered priests in Memphis were the ones who dictated the policy.¹⁸² The titulature and language of the decree are heavily influenced by the Egyptian Demotic and the first draft is likely to have been in the Egyptian language.¹⁸³

During Epiphanes' reign, the temples and priests had gained power and Epiphanes needed them to restore his control over the country. Among multiple decrees, including the Alexandrian decree of 186, celebrating the defeat of Chaonnophris and the recapture of Upper Egypt, the decree of Philae of 185 and a decree in 182. Dorothy Crawford argues that Epiphanes reign coincides with the Egyptianisation of the central control. The decrees should not be understood as simply the offer of gratitude from the priests to the Ptolemies, but as a situation in which Epiphanes had made considerable concessions to the priests.¹⁸⁴ Crawford writes:

*The concessions which Epiphanes made were very also very real. Large sums were spent on the temples; the privileges made to the priests also affected their land and must have involved the royal treasury in a loss of revenue. The priestly decrees of thanks were presumably accompanied by royal prostagmata. Epiphanes would not in the first place seem to be acting from a position of strength. These concessions include large sums spent on the temples and privileges granted to the priests affecting their land. Epiphanes would probably not be acting from a position of strength.*¹⁸⁵

Epiphanes military successes in reconquering Upper Egypt were realised despite multiple years of Nile failures during the late 190s and early 180s BC. We have evidence of low or even completely failed Nile floods in 192, 190, 189, 188 and 187 BC.¹⁸⁶ For 192 BC, the inclusion of a clause of not

¹⁸² Crawford, 'Ptolemy, Ptah and Apis on Hellenistic Memphis', 33

¹⁸³ F. Dumas, *Les moyens d'expression du Grec et de l'Égyptien comparés dans les décrets de Canope et de Memphis* (Cairo, 1952), 9

¹⁸⁴ Crawford, 'Ptolemy, Ptah and Apis on Hellenistic Memphis', 35

¹⁸⁵ *Ibidem*

¹⁸⁶ Bonneau, *Le fisc et le Nil*, 225

flooded land in a contract indicates a bad flood during that year.¹⁸⁷ A papyrus from 190 describes the planning of canals to bring water to the land, indicating that the flood of that year was not sufficient to bring the water there itself.¹⁸⁸ For the following years, there is an interesting report on the life of Ammonius, a sitologist situated in Tebtynis. He first arrived there in 209 BC as an assistant sitologist. However, consecutive low inundations brought problems to Ammonius as in 189 BC, he is known for bringing in very little wheat and in 188, after not being able to increase his agricultural production, he fled.¹⁸⁹ His story is a textbook example of ἀναχώρησις by the pressures of low Nile floods and taxation.

The Famine Stele

These multiple years of bad inundations are also supported by another form of evidence: the Famine Stele, an inscription in Upper Egypt. Although this hieroglyphic inscription alludes to the period of King Djoser of the Third Dynasty, Egyptologists are certain that the stela is a work made during the Ptolemaic period, most probably dated at 187 BC.¹⁹⁰ The first paragraph of the Stele mentions: *Because Hapi had failed to come in time in a period of seven years.*¹⁹¹ In Egyptian religious terms, Hapi was the deification of the Nile inundation.¹⁹² Following Bonneau's argument, it is very plausible that this reference of failed Nile floods for seven years is directly connected to the contemporary situation in Egypt from 193 until 187, as we have evidence for a low or bad Nile flood for at least five of those seven years.¹⁹³ The environmental origins of these consecutive years of bad floods are not tied to global volcanic phenomena, as no large eruption has been identified during this period. It could be possible that a strong variation of ENSO activity impacted these years, but that is not verifiable. Although the origin of these consecutive years of low Nile inundation is unknown we can most certainly argue that climate and precipitation rates were definitely heavily impacted during this period.

The consequences of previous failed Nile inundations seemed to have created difficult or even disastrous situations for the Ptolemaic government in terms of domestic unrest. Nevertheless, during this period until 187 BC, with multiple years of low floods, the Ptolemies seemed to regain control of the country, defeating Chaonnophris and the rebels, and re-establish their rule in Upper Egypt. While these developments might seem contradictory, it might make sense when taking a

¹⁸⁷ BGU VI 1270

¹⁸⁸ P Tebt. III 826

¹⁸⁹ P Tebt. III 744

¹⁹⁰ M. Lichtheim, *Ancient Egyptian Literature. Volume III: The late period* (Berkeley, 1980), 94-95

¹⁹¹ Idem, 95

¹⁹² S. Quirke, *Exploring religion in ancient Egypt* (Hoboken, 2014), 13

¹⁹³ Bonneau, *Le fisc et le Nil*, 133

closer look at the administrative organisation of the south during the rebellion, or better said, the lack thereof.

Between 205 and 186 BC, no tax receipts have been found in Upper Egypt, neither in Greek nor Demotic. Furthermore, there are no indications that the Egyptian pharaohs had set up a working administration and tax system, implying that their rule was never established long and secure enough to organise properly.¹⁹⁴ The lack of administration is confirmed by the abovementioned report SB XXIV 15972, which mentions that large parts of the village's land are cultivated by unknown farmers who are not officially registered as owners.¹⁹⁵ Chaonnophris and his supporters would be increasingly vulnerable against the consecutive years of low Nile inundations without such administration and reliable tax income. The years of low inundations were certainly not the primary reason why the tide turned for the Southern rebels and the Ptolemaic monarchy, since Ptolemaic (military) successes already started in 197, however it is certainly more than coincidental that these developments occur at the same time.

So the Ptolemaic monarchy, even when vulnerable to low Nile floods, remained more resilient than the new pharaohs in the south. Regarding the priestly synods, the support of the temples and priests played an important factor in this. Additionally, it would seem that the Ptolemaic army had better grain reserves, which could be used in years of bad harvests. Papyrus SB VI 9367, along with twenty similar papyri, describes the provisioning of Ptolemaic troops in 187 during the end of the revolt. Large amounts of grain were shipped down the Nile to support the troops, with estimates of 500,000 litres of grain shipped within three months.¹⁹⁶ This supports the idea that Ptolemaic responsive capacity was indeed greater, as they could still gather enough food and finances to defeat the more vulnerable rebels.

After Ptolemy V Epiphanes had finally fully re-established control throughout the whole of Egypt, the loss of important foreign territories like Coele Syria, the concessions to the temples, the high costs of war and domestic unrest, paired with multiple years of low tax incomes and low Nile floods meant that the Ptolemaic treasury was incredibly empty. This lack of finances is most visible in the story surrounding Epiphanes death in 180 BC. While the Ptolemaic empire strived to reconquer Coele Syria from the Seleucid empire, the empty treasure led Ptolemy V to intimidate his friends and generals to claim their incomes. As a reaction to this, he was poisoned.¹⁹⁷ The lack of Ptolemaic resources and revenue would greatly increase the vulnerability in the rest of the second century BC, which will be discussed in the next chapter.

¹⁹⁴ Clarysse, 'The great revolt of the Egyptians (205-186 BCE)', 6

¹⁹⁵ SB XXIV 15972

¹⁹⁶ SB VI 9367

¹⁹⁷ Diodorus, *Bibliotheca historica*, XXIX.29

Conclusion

This chapter has described an important shift in Ptolemaic resilience against Nile induced shocks. The low inundations of the Nile in combination with the wars fought against the Seleucid empire and the growing social unrest presented the Ptolemaic monarchy with more significant difficulties to adequately respond. The decades before the turn of the third century witnessed two uprisings within Egypt closely following large global volcanic eruptions. The environmental approach taken within this research favours the explanation of these rebellions and domestic uprisings from a socio-economic standpoint. Considering that the revolt after the battle of Raphia and the great Theban revolt were connected with these global eruptions and consequential Nile failure, would imply the extra financial hardship and pressure this brought on the population often proved as a breaking point of their vulnerability resulting in their response towards either revolt or ἀναχώρησις.

The Ptolemaic losses of important territories such as Coele Syria and Phoenicia meant a loss of revenue, manpower and perhaps most importantly, an alternative for grain import when dealing with insufficient Nile flooding. Additionally, the Syrian wars brought enormous costs and put an enormous pressure on the population financially. Furthermore, the twenty years of independence in Upper Egypt during the Great Theban revolt prevented the Ptolemaic monarchy from collecting taxes during this period. Although these developments impacted Ptolemaic responsive capabilities, Ptolemy V Epiphanes was still able to defeat Chaonnophris and put down the rebellion in the south. Even though Ptolemaic responsive capacities had deteriorated, they proved rather resilient by being able to ship 500,000 litres of grain towards Upper Egypt in 187 BC to support Ptolemaic troops stationed there. At this time, the Ptolemaic monarchy was still able to build grain reserves and reconquer Upper Egypt despite a period of seven years during which at least five years the Nile flooded insufficiently. At the same time, the new pharaohs of the Theban revolt had failed to set up a proper administrative and taxation system, leaving them much more vulnerable to the long period of bad inundations.

During both the unrest after the battle of Raphia and the reconquest of Upper Egypt, the Ptolemies were supported by the Egyptian temples. This resulted in numerous synodal decrees like the Raphia decree and the Memphis decree. These decrees depict an interesting shift in power relations between the monarchy and the temples. The series of decrees during the 180s BC depict a slow Egyptianisation of control, where the priests gained more power and Epiphanes had to make considerable concessions to the priest. These concessions consisted of large sums of money and privileges. Ptolemaic resilience also came at a price of concessions made to the temples.

This chapter further highlighted a critical difference in analysing the environmental pressure brought by low Nile inundations between a resilience or a vulnerability framework. Whereas the

Ptolemaic monarchy proved resilient against the low Nile floods, especially between 192 and 187, this view obscures the situation and vulnerability of particular groups within Ptolemaic Egypt. The loss of external territories and the financial pressure of the Syrian wars was felt by the population through the weakening of the economy and the devaluation of Ptolemaic money, the rising wheat prices and strict taxation policies. This vulnerability becomes visible through the responses of the population through uprisings and ἀναχώρησις. The occurrences of ἀναχώρησις have increased during the late third century and early second century BC. So while the Ptolemaic state as a whole would seem to be able to successfully survive the environmental shocks without transforming or collapsing, especially the villagers and farmers within the *chora* are the victims and most vulnerable to the pressures from taxation, the Syrian wars, domestic uprisings and environmental shocks. Therefore it is important to regard the pressure brought by the Nile failures as an enhancing factor of these already existing pressures in the Egyptian society.

The next chapter will explore how these vulnerabilities will increase even more during the second century BC. The 160s experienced a decade of multiple volcanic eruptions, greatly influencing the Nile inundations and the situation within Ptolemaic Egypt. During this period, the Egyptian population was at its most vulnerable. Other factors such as the increasing influence of the Roman empire and the inclusion of native Egyptians within the Ptolemaic court also start to play an important role within these developments.

Chapter 5: Decades of vulnerability and the Potter's Oracle

So far, this research has primarily discussed how volcanic eruptions, climate variability and diminished Nile floods have impacted Ptolemaic Egypt and how both the Ptolemaic monarchy and society have responded to these environmental shocks. This chapter will discuss how the increasingly vulnerable Ptolemaic population faced multiple series of volcanic eruptions and low Nile inundations, a Seleucid invasion during the sixth Syrian war, domestic unrest and internal strife between the Ptolemaic ruling siblings. Two specific periods stand out during the second century BC. First of all, the 160s BC will be discussed, which witnessed the effects of four global volcanic eruptions shortly after the sixth Syrian war. Secondly, the period around 130 BC experienced three consecutive years of low Nile floods or Nile failure, coinciding with internal conflict among the Ptolemaic rulers. This chapter highlights the population's vulnerability during this century. It will do so by centralizing the Potter's Oracle, a second century BC prophetic text which connects the environmental Nile shocks with the social unrest and vulnerability of the population.

A decade of volcanic eruptions

The combination of low Nile floods, bad harvests, heavy taxation, domestic unrest, and civil war characterizes the 160s BC in Ptolemaic Egypt. During the sixth Syrian war, Antiochus IV had been able to capture large parts of Egypt, including Memphis and large parts of the Delta. For a short while, Antiochus IV was even accepted as Egyptian pharaoh by some Egyptian priests in Memphis and issued at least one official document as Egyptian king.¹⁹⁸ When the Ptolemaic government did not respond to Antiochus IV's terms, he allowed his army to loot the countryside. The Ptolemaic monarchy rather saw the *chora* being wrecked than accepting the Seleucid demands.¹⁹⁹ Only through the interference of Rome, by forcing an ultimatum on Antiochus IV, Ptolemaic rule in Egypt was secured and the Seleucid invaders were forced out of Egypt.²⁰⁰ Rome's influence and power in the eastern Mediterranean steadily grew and expanded. Although the Ptolemaic kings went on to rule as independently as prior to the Sixth Syrian War, Rome's influence had become so strong that their help was sought in external and internal conflicts and future dynastic disputes.²⁰¹

The end of the Sixth Syrian War in 168 BC was only the start of a decade of domestic difficulties for the Ptolemaic rulers. In 168 BC, there was also a tropical volcanic eruption with a

¹⁹⁸ FGrH 260 F 49a-b; L. Mooren, J. Bingenand and G. Nachtergaele, 'Antiochos IV Epiphanes und das Ptolemäische Königtum', in: J.C. Bingen and G. Nachtergaele (eds.), *Actes du XVe Congrès international de Papyrologie IV. Papyrologie documentaire, Papyrologica Bruxellensia 19* (Brussels, 1978), 78-84

¹⁹⁹ Grainger, *The Syrian wars*, 306-308

²⁰⁰ Polybius, *Historiae*, IX.27

²⁰¹ Hölbl, *A history of the Ptolemaic empire*, 146-148

global forcing of -7.9, the highest forcing of the third and second century BC, and a sulphate distribution of 39,4. This eruption was followed by three smaller Northern Hemisphere eruptions in 164, 161 and 158 with a forcing between -1.3 and -1.5 and sulphate distributions between 11,5 and 13,5. Additionally, in 168 BC, the wheat prices in Memphis were incredibly high.²⁰² Whether the increase in prices was due to the recently ended Sixth Syrian War, low Nile inundation or the combination of both is not clear. Nonetheless, the high prices meant an incredible pressure and increased vulnerability on the Egyptian population.

In the following years at least in 166 BC, there was an insufficient Nile flood.²⁰³ In 161 BC, the Nile flood even seemed to be severely low, showcased in a private letter where someone warns his brothers to store provisions because of the low flood.²⁰⁴ Furthermore, a farmer who sowed for the harvest of 161 had trouble cultivating his land due to the lack of water.²⁰⁵

While Nile irregularities occurred throughout the whole history of Ptolemaic Egypt, the effects on the population and the Ptolemaic government could be very disproportionate in different periods. Although there is variation in the insufficient flooding and the consecutive years in which these low inundations occurred, the socio-economic situation determines the severity of the effects of these nature-induced disasters. Similar insufficient or bad Nile floods have occurred during the third and early second century BC. However, their impact on the population was not as severe as during the 160s BC. During the second century BC the vulnerability and absorptive capacity of the Ptolemaic population had seriously deteriorated, despite the Ptolemaic efforts made to improve the economic and agricultural situation.

Fight or flight responses

Besides being a decade characterized by volcanic eruptions, it was also a decade of domestic revolts and unrest. After the Sixth Syrian War, Egypt was ruled by the three Ptolemaic siblings Ptolemy VI, Cleopatra II and Ptolemy VIII, whereby the relationship, especially between the brothers was challenging. Around 165 BC, a certain Dionysios Petosarapis tried to use the troubles between the brothers to his own advantage. While he was unsuccessful and forced to flee to Eleusis, he incited the soldiers stationed at Eleusis, amassing around 4000 men, to a revolt. Petosarapis was defeated by the Ptolemaic army, leading to his retreat in the Chora, where he again acquired a large following among the native population.²⁰⁶ While his final fate remains unknown, it is no coincidence that he could amass so many people behind his cause and revolt so quickly.

²⁰² Préaux, 'Esquisse d'une histoire des révolutions Égyptiennes sous les Lagides', 540

²⁰³ P Tebt I 61

²⁰⁴ UPZ 61

²⁰⁵ P. Tebt. III 955

²⁰⁶ Diodorus, *Bibliotheca historica*, XXXI.15

During this period, multiple clashes on account of social and economic conditions rose throughout Egypt, indicating that for many people, their breaking point was reached. In 164 BC, multiple clashes were documented in the Fayyum, where even the Egyptian priests suffered in the conflicts. For instance, the Ammonion of Myeris near Krokodopolis, a sanctuary for *cleruchs*, was attacked and heavily damaged by Egyptian rebels.²⁰⁷ The sanctuary was targeted as a direct attack against the Ptolemaic dynasty as the *cleruchs* and the local priests collaborated with the monarchy.²⁰⁸ Furthermore, Egyptian rebels are also mentioned as burning the property of a priest in a papyrus dating between 169 and 164 BC.²⁰⁹ Trouble did not end there for the Ptolemaic dynasty as shortly after the revolt of Petosarapis, an uprising broke out in the Thebaid. This revolt was eventually put down by Ptolemy VI Philometor.²¹⁰

Social unrest had spread throughout Egypt, with revolts and domestic uprisings being reported from Alexandria to the Thebaïd. The aftermath of the Sixth Syrian War, the internal strife and disconcert between the Ptolemaic siblings, the continued taxation and the high prices of wheat evoked strong responses from the Egyptian population, who are now seen to not only direct their attacks against the dynasty but also against its collaborators of settled *cleruchs* and local priests. The repeated instances of Nile failures further deteriorated or even sparked the unrest.

These series of revolts throughout the whole country were not only a response to the events of the 160s BC but were also a result of the continuously deteriorating situation in Egypt. The accumulation of stresses on the population had come in a time when the society's vulnerability was already at a very low point and its responsive capacity against social and economic hardship had become even more desperate. Compared to other periods of low Nile floods and economic hardship for the population, the 160s BC marked a disproportionate high number of revolts and ἀναχώρησις, which must be interpreted as a response against these high pressures.

The high amount of ἀναχώρησις is shown a vast collection of more than one-hundred papyri dating between 169 and 152 BC mentions these refugees who became *katochoi*.²¹¹ Many people had sought refuge in religious sanctuaries, protected from the law and taxation. Here they were tasked with various jobs within the sanctuary and were referred to as *katochoi*, meaning recluses of the god. The number of these *katochoi* was a considerable amount, shown through the administration of the Serapeum of Memphis. A famous example of one of these individuals who sought his refuge in the

²⁰⁷ P. Tebt 781; W.J. Rübsam, *Götter und Kulte in Faijum während der Griechisch-Römisch-Byzantinischen Zeit*, (Marburg, 1974), 123

²⁰⁸ Préaux, 'Esquisse d'une histoire des révolutions Égyptiennes sous les Lagides', 540

²⁰⁹ K. Goudriaan, *Ethnicity in Ptolemaic Egypt* (Amsterdam, 1988), 144

²¹⁰ Diodorus, *Bibliotheca historica*, XXXI.17; SB VIII 9681

²¹¹ UPZ I 2-105. Not all of these papyri are separate individuals. Often multiple papyri concern the same individuals.

Serapeum of Memphis was Hephaestion, who probably was a soldier during the Sixth Syrian War. While his fellow soldiers returned home, he decided, to the despair of his wife, to remain in the Serapeum and abandon his responsibilities at home.²¹²

The Nile floods did not create these harsh circumstances for the population in the *chora*. They did push an already vulnerable society to its limits. Therefore, it is not coincidental that this tumultuous decade coincided with repeated Nile failures. Moreover, the low inundations of 166 and especially 161 BC happened during crucial times when the absorptive capacity of the farmers and villagers throughout Egypt was extremely low.

The royal *prostagma* On Agriculture

These numerous instances of domestic unrest and ἀναχώρησις not only showcase the vulnerability of the population but also presented a pressing matter for the Ptolemaic monarchy. The ruling siblings were confronted with an enormous amount of uncultivated land since the land had become barren, the owners had died during the uprisings and Syrian Wars, or had fled the villages due to heavy taxation and disappointing harvests. The Ptolemaic dynasty responded with more than just military action this time to tackle these problems. In the summer of 165 BC, they issued a royal *prostagma* called 'On Agriculture'. This *prostagma*, written in Greek and Demotic, addressed the devastation of the land and the water shortage resulting from insufficient Nile flooding. The new laws mentioned in the *prostagma* compelled farmers to lease abandoned plots of land at a reduced price and those owning livestock would have to make them available for the cultivation of royal land.²¹³

The *prostagma* received many complaints about the rigorous execution of the new law and a collective petition was drawn up, aimed at the *dioikêtês* (head of the Ptolemaic financial administration), by several groups of *machimoi*. Although the exact nature of these *machimoi* is attested, generally speaking, they consisted of primarily Egyptian soldiers with a lower status within the Ptolemaic army, for example, when compared with Greek cavalry *cleruchs*, but with a higher socio-economic status than the average farmer.²¹⁴ These *machimoi* complained about the new law as they could not comply financially and that their families back home were forced to cultivate these extra plots of land. They even needed to borrow money during the winter to ensure that their own plots could be sown.²¹⁵ In 164 BC, a rectification of the *prostagma* was issued in which it was stated

²¹² UPZ I 59-60

²¹³ SB XVI 12821

²¹⁴ On a discussion and overview of the social role, status and ethnicity of the *machimoi* see: C. Fischer-Bovet, 'Egyptian warriors: The machimoi of Herodotus and the Ptolemaic army', *Classical quarterly* 63 (2013) 1, 209-236

²¹⁵ UPZ I 110

that the plots of land would only be given to each in accordance with their capacity. The *dioikêtês* explained that the decree did not apply to tax farmers handling the royal lands, poor villagers, mercenaries and the *machimoi*.²¹⁶ Additionally, a new financial administration called the Idios Logos was set up whose responsibility it was to make a profit from estates that were without an owner or had been confiscated.²¹⁷

The *prostagma* represents the first example of forced cultivation of ownerless land on a large scale and is significant in the Ptolemaic response to the troubles of the 160s BC. Though it is unknown what the exact consequences of these new measures taken by the Ptolemies were and to what extent they improved the agricultural situation, it is significant to notice that this was the greatest attempt to influence the agricultural output from the Ptolemies was since the land reclamation project of the Fayyum. This was aimed to improve state revenue and restore Egypt's resilience against the low Nile floods and bad harvests. It would have taken at least a few years to improve the situation as there remains evidence of domestic troubles until at least 161 BC, discussed in the paragraphs above. On the other hand, the population's vulnerability was also not further worsened by the rectification of the *prostagma*, which exempted the farmers who were not financially able to cope with the forced leasing of the plots of land.

Volcanic dry fog in the Potter's Oracle

To further comprehend the vulnerability of the Ptolemaic population regarding Nile failure, this section will zoom in on an important Ptolemaic text called the Potter's Oracle, also known as the Apology of the Potter. By analysing and discussing this text, I will argue that the Ptolemaic population themselves were also aware of their own vulnerability during the second century BC concerning Nile failure and consequential domestic unrest.

As has been discussed in the second chapter, it would be fair to state that the inhabitants of Egypt were unaware that the Nile cycle was influenced through volcanic eruptions in a different part of the world or that they were aware that these volcanoes were erupting at all. However, it is possible, and in some cases even very probable, that the Hellenistic world also experienced different, primarily visual consequences of the global eruptions. To recap, these visible atmospheric effects are: 1) a reddening and dimming of the light of the sun and other stars, 2) red or purple twilight glows, 3) reddish haloes (also known as Bishop's Rings) around the sun, and 4) total eclipses of the moon.²¹⁸ The examples from the Babylonian astronomical diaries and Livy discussed within that section also show the high probability that the Mediterranean world could witness volcanic dry fog.

²¹⁶ C. Ord. Ptol 39

²¹⁷ Hölbl, *A history of the Ptolemaic empire*, 182

²¹⁸ Stothers, 'Cloudy and clear stratospheres before A.D. 1000 inferred from written sources', 1

No datable eye-witness reports of the effects of volcanic dry fog have been found from Ptolemaic Egypt. Nonetheless, it is highly probable that the effects of the volcanic eruptions as described by Babylonian astronomers and Roman authors must have been seen throughout Egypt as well. The best description of this is found in the Potter's Oracle. This well-known prophetic text is dated to the second century BC and describes an apocalyptic worldview. The text has survived on five different papyri. However, the texts differ slightly within these five different fragments, suggesting that the text has evolved over the years and has adjusted to the social and political circumstances of the second century BC.²¹⁹ In short, the oracle prophesizes natural disorder, civil war and eventually the destruction of Alexandria and the Greeks, with eventually a new Egyptian king arising from the sun god Re.²²⁰

This popular prophetic text is written *ex-eventu*, meaning that while the text appears to offer a prophecy, the actual events that it prophesizes have already occurred.²²¹ While this is primarily applicable to the political developments of the second century BC, it is important to keep in mind that this also applies to the description of the natural phenomena in this text. The prophecy opens with the description of these phenomena:

ὁ δὲ ποταμός ἐλεύσεται οὐκ ἔχων ἰκανόν ὕδατιου, ἀλλ' ὀλίγον, ὥστε πυρεύθαι τήν γῆν (...), ἀλλά παρά φύσιν.

ὁ δὲ ἥλιος ἀμαυρωθήσεται οὐ θέλων βλέπειν τὰ ἐν Αἴγυπτῳ κακά, ἡ γῆ οὐ συμφωνήσῃ τοῖς σπόροις ἔσται ταῦτα εἰς τὰ αὐτῆς ἀνεμόφθορα. καὶ ὁ γεωργός ὑπὲρ ὄσων οὐκ ἔσπειρεν, φόρους ἀπαιτηθήσεται. Μάχονται ἐν Αἴγυπτῳ διὰ τό ἐν ἐνδεεῖς αὐτούς εἶναι τροφῶν.

ἐν γάρ τῶ τῶν Τυφωνίων καιρῶ ὁ ἥλιος ἡμαυρώ.

And the river will come not having adequate water, but a little, so that the land will be scorched (...) but unnaturally.

And the sun will become dim because it does not want to see the evils in Egypt, and the land will not harmonize with the seeds. These things will cause its things to be destroyed by the wind. And the farmer did not sow on account of this, but tribute will be required of him. They are fighting in Egypt because of the lack of nourishment.

²¹⁹ S. Beyerle, 'Authority and propaganda – The case of the Potter's Oracle', in: J. Baden, H. Najman and E.J.C. Tigchelaar (eds.), *Sibyls, scriptures and scrolls: John Collins at seventy* (Leiden, 2016), 174-176

²²⁰ L. Koenen, 'Die Prophezeiungen des "Töpfers"', *Zeitschrift für Papyrologie und Epigraphik* 2 (1968), 178-182

²²¹ Beyerle, 'Authority and propaganda – The case of the Potter's Oracle', 170-172

*For in the time of the Typhonians the sun was darkened.*²²²

The fragments above describe the dimming and darkening of the sun, a sight often associated with the volcanic dust veils, in combination with an insufficient Nile inundation and dried up land. Ludlow and Manning suggest that this text can be read not only as a response to the political and socioeconomic but more importantly in this context also with the climatic and environmental conditions of the second century BC.²²³ Not only the darkening and dimming of the sun are associated with the natural conditions that Ptolemaic Egypt was dealing with. The first disorder of nature is described as the failure of the Nile to flood, which causes the land to become dry, an occurrence which could bring devastating consequences with it, as previous chapters have discussed. While Giovanni Bazzana comments on the occurrence of insufficient floods of the Nile as an example of alterations in the regular course of natural phenomena, I would stress that the insufficient flood of the Nile would be one of the, if not *the*, most important alterations of natural phenomena that an inhabitant of Egypt could imagine.²²⁴

This fear for a low or failed Nile inundation is also visible in Ptolemaic texts like the Canopus decree and the Famine stele, which have been discussed in the previous chapters, but also in earlier Egyptian texts like the ‘Hymn to Hapi’ from the Middle Kingdom. Within this hymn, the three different sorts of inundation are also described, along with the consequences for the Egyptian population: the sluggish insufficient rise which brings hunger, the excessive flood which brings destruction and chaos, and the flood in the right measure, which creates abundance and joy.²²⁵ Even the Jewish community in Egypt quickly recognized and reproduced the symbology and stories about the Nile, both positive and negative. For example, in the Jewish Hebrew Bible in Isaiah 19, a reference to the destructive power of the Nile inundation is made both in terms of drying up of the river as in an abundant flood.²²⁶ These examples signify the anchored fear and dependence upon a proper Nile Inundation. It should not be considered a coincidence that the drying up of the river and the failure of the Nile flood are embroiled in the memory of the Egyptian population and are connected to views of the end and destruction of Egypt. In the end, the Potter’s Oracle describes the

²²² P. Rainer 19.813, 2-8, 47, Translation: A. Kerkeslager, ‘The Apology of the Potter: A Translation of the Potter’s Oracle’, in: I. Shirun-Grumach (ed.) *Jerusalem Studies in Egyptology*, (Wiesbaden, 1998), 69-71

²²³ Ludlow and Manning, *Revolts under the Ptolemies: A palaeoclimatological perspective*, 164

²²⁴ G.B. Bazzana, ‘The Oracle of the Potter and the “apocalyptic worldview” in Egypt’, *Ephemerides Theologicae Lovanienses* 94 (2018) 2, 214

²²⁵ M. Lichtheim, *Ancient Egyptian literature, Volume I: The old and middle kingdoms*, (Berkeley, 1973), 209

²²⁶ N. LaCoste, ‘Along the banks of the Egyptian river: Representations of the Nile in early Jewish literature’, in: A. Salvesen, S. Pearce and M. Frenkel (eds.), *Israel in Egypt: The land of Egypt as concept and reality for Jews in antiquity and the early medieval period* (Leiden, 2020), 211

restoration of the natural order, with proper Nile flooding and the seasons following its normal course:

ἐπί τέλει δέ τούτων φυλλοφορήσει. καί ὁ λειφθεῖς ὕδασι Νεῖλος πληρωθήσεται καί ὁ μετημφισμένος ἀσυμφώνως χειμῶν ἰδίῳ δραμεῖται κύκλῳ. καί τότε τό θέρος ἴδιον λήμφεται κύκλον δρόμον, εὐτακτοί δέ ἀνέμων πνοιαί ἔσσονται αἱ προ ἀπαλῶς ἐλαττούμεναι

At the end of these things trees will bear leaves and the forsaken Nile will be filled with water, and the winter having been stripped of its natural dress, will run its own cycle. And then the summer will take its own course, and the winds shall be well-ordered and gently diminished.²²⁷

Volcanic eruptions and the Potter's Oracle

Not only the political events described in the text should be regarded as ex-eventu, but also the disturbances of the natural disorder and its consequences. As the failed Nile inundation and the darkening of the sun could be caused by major volcanic eruptions, it is very likely that both were the simultaneous effects of one of these eruptions. In order to identify which volcanic eruptions could be linked to these passages in the Potter's Oracle, it is important to date the different versions of the Oracle securely. Doing so could provide insights on both the dating of the visual appearances of the volcanic eruptions in Egypt and the connection between these eruptions, a lower Nile inundation and domestic unrest.

The Potter's Oracle consists of multiple papyrological fragments which could be dated to different periods in the second century BC. The figure below shortly demonstrates the two different branches of dating and the sentiments of the message of the oracle. The earlier version is identified as pro-Heliopolitan or anti-Jewish and is dated somewhere around the middle of the second century. This version of the text is aimed primarily against the Jews due to the following political developments. Onias IV, son of a Jewish High Priest, had fled to Egypt in 174 BC. In 162 BC, he was granted the right to establish a Jewish Temple near Heliopolis, which caused agitation with the Egyptian priests of Heliopolis. The second version, known as the anti-Alexandrian recension, could be dated to the last third of the second century BC. From this recension, two different dates could also be given to the two different versions P2 and P3. P2 refers to Harsiese, who invaded southern Egypt in 131 BC and claimed himself Pharaoh for two years during the reign of Ptolemy VIII, after being driven out again. P3 adds to this passage a reference to the death and 54 years of rule of Ptolemy

²²⁷ P. Rainer 19.813, 43-46, Translation: Kerkeslager, "The Apology of the Potter: A Translation of the Potter's Oracle", 71

VIII, which occurred in 116 BC. Therefore both recensions are mostly likely to have been made some time after respectively 130 and 116.²²⁸

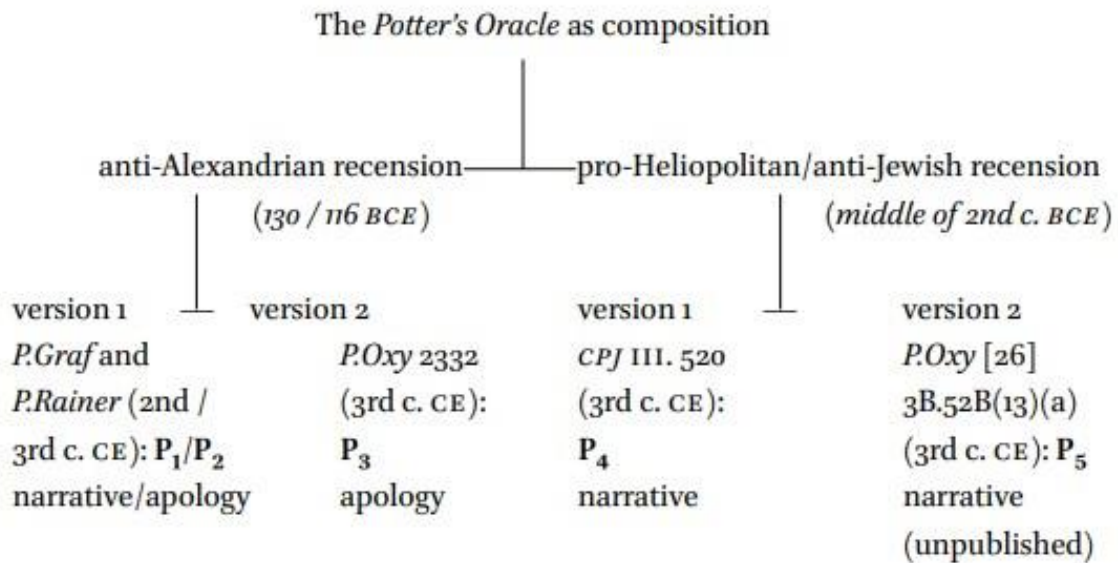


Fig 11: S. Beyerle's chart of the different versions and recensions of the Potter's Oracle.²²⁹

The interesting part about this dating is the occurrence of significant volcanic eruptions, which could have been interpreted as the beginning of these ex-eventu prophecies. The Hellenistic world had witnessed the visual effects of a volcanic dry fog and it would be highly probable that the Egyptian population had made a connection between the diminishing of the sun and other phenomena in the sky and the low floods of the Nile occurring in a relatively short period. This has already been described in the above-mentioned examples of 247 and 217 BC but also appeared during the second century BC, the period from which the Potter's Oracle originates. From the decade of volcanic eruptions in the 160s BC, two Babylonian reports claim that the disk of the sun resembles the moon, both in 164 and 161. Additionally, in 164 BC, multiple halos around the sun have been observed.²³⁰ These sightings coincide with the 164 and 161 BC tropical eruptions, which had a respective global forcing of -1,3 and -1,5 and sulphate dispositions of 11,5 and 12,8. Within the decade papyrological evidence exists of failed Nile inundations. Most notably, P. Tebt III 955 mentions a farmer who encounters great difficulty cultivating due to a bad flood in 161 BC.²³¹ It is thus very probable that the prophecy references not only the political but also the natural events of the 160s BC.

²²⁸ Beyerle, 'Authority and propaganda – The case of the Potter's Oracle', 174-183

²²⁹ Idem, 174

²³⁰ BM 41462, B. Obv. 29; BM 41628, C2. Obv. 7; BM 45879, B. Obv. 10

²³¹ P. Tebt III 955

During the 140s BC, a period between the two different recensions of the Potter's oracle, there are multiple reports of representations of volcanic dry fog. In 147 BC, coloured rings around the sun were reported in the Mediterranean.²³² From 145 to 144 BC, redness in the sky together with haloes are reported in astronomical diaries in Babylonia, and in 141 BC, the Babylonian astronomical diaries again report multiple observations of the disk of the sun resembling the moon.²³³ These coincide with the northern hemisphere volcanic eruption of 147 BC with a global forcing of -7,5 and a sulphate deposition of 37,4 and the tropical volcanic eruption of 141 BC with a global forcing of -3,3 and a sulphate deposition of 28,8. Additionally, we know from papyrological sources that the Nile flooded inadequately in the years following these eruptions. In 146 BC, the land had become saline and in 139 BC, the crown tenants of Oxyrhyncha sent a petition to the strategos complaining that they could not supply the additional harvest requested by a certain Apollonios due to a lack of water supply.²³⁴

Vulnerability in the Potter's Oracle

It is very likely that during the third century and especially the second century BC, Ptolemaic society experienced the visual effects of the volcanic dry fog and lower Nile inundations both in a short time span and connecting the two phenomena, albeit not knowing that these were caused by major volcanic eruptions. The probability that the visual effects of the volcanic dry fog reported in the Babylonian astronomical diaries and Livy also reached Egypt during this period is very high. Therefore the description of the distortion of the natural phenomena in the Potter's Oracle might not be so much apocalyptic as a reference to actual events and hardship in Egypt. Through this, the Egyptians might not only have recognized the co-occurrence of the darkening of the sun with low Nile floods but additionally also recognised their own vulnerability in the wake of these nature-induced disasters.

Within the opening lines of the prophecy, the natural phenomena are explicitly linked to the inability to sow seeds, the heavy taxation burden of the farmers and violent unrest due to a lack of food, a connection which is often made within this research as well. The Oracle continues after the disruption of the natural disorder with the prophecy of the invasion of Antiochus IV in Egypt and civil war between the Ptolemies.²³⁵ It is interesting to see that the first version of this text originates somewhere after the 160s BC, connecting the text to a decade of great vulnerability and social unrest throughout Egypt. I would therefore argue that this text demonstrates not only the same

²³² Obsequens, *Ab anno urbis conditae du prodigiorum liber*, 20

²³³ BM 34609 Obv. 33-34; BM 34045 A. 21; BM 34050 C. Obv. 23

²³⁴ P. Tebt I 61b; P. Tebt III 787

²³⁵ For a further discussion on the apocalyptic nature and contents of the Potter's Oracle see:

vulnerability in the wake of volcanic eruptions and consequential Nile failure that I have shown and argued throughout this research as well, but also a form of awareness among the Ptolemaic population of their own vulnerability during this period. This new perspective sheds a new light on how the Potter's Oracle portrayed contemporary natural phenomena and further helps our understanding of the meaning of the text. By analysing the disruption of nature as *ex-eventu*, the Potter's Oracle allows a small insight into the thoughts and fear of the population during the second century Ptolemaic Egypt.

A period of relative resilience

After the 160s BC, a relatively quiet period seems to have returned to Egypt, at least until the year 131/130 BC. According to Veisse, only some tensions and minor uprisings can be identified between the end of the reign of Ptolemy VI and the beginning of the reign of Ptolemy VIII. Ptolemy VI Philometer died in 145 during a campaign in Syria, after which Ptolemy VIII Euergetes II returned from Cyprus to become the new ruler. The social tensions in the *chora* and Alexandria are mostly connected to the change in rulers as Ptolemy VIII began his rule with a brutal policy against those who opposed his ascension to the throne.²³⁶ The years between the 160s and 131 BC only witnessed one major volcanic eruption in 147, which has also shortly been discussed above. From P. Tebt. I 61, we know that the flood of the following year was low again, yet there is no evidence that the social unrest of 145 is connected to the low Nile flood. Although it might have deteriorated the situation, it would seem that the tensions are primarily connected to the change in rule and not the low Nile flood. There are only two other instances during these years in which a low Nile inundation seems to have occurred; in 155 and 139 BC.²³⁷ There is no evidence of particular hardship in the country during these years.

The period between the 160s and 130 BC is a perfect example of how resilient Ptolemaic Egypt could be. The period is characterized as relatively quiet and as a period without a war with the Seleucid empire, a major civil war, or a domestic uprising. Especially during Ptolemy VI Philometers reign, Egypt showcased remarkable resilience. In years without repeated Nile failure and without excessive costs of war, Ptolemaic Egypt was still able to thrive and expand. Shortly after the uprisings in the Thebaid of the 160s, the Ptolemaic government was able to reassert their control in Nubia again.²³⁸ Philometer was able to turn his attention towards the Seleucid kingdom again and directed an attempt to regain the former Ptolemaic territory of Coele Syria at the end of his reign. He even managed to capture Coele Syria but died during his campaign, causing the Ptolemaic army to return

²³⁶ Veisse, *Les révoltes Égyptiennes*, 45-47; Hölbl, *A history of the Ptolemaic empire*, 194-195

²³⁷ P. Tebt. I 61b; P. Tebt. III 787

²³⁸ Hölbl, *A history of the Ptolemaic empire*, 189

home while Coele Syria remained Seleukid.²³⁹

This period highlights two important aspects of the resilience and vulnerability of Ptolemaic Egypt. Even though Egyptian vulnerability had hit its low point during the 160s, the following years, characterized by proper floods, Egypt was able to reassert itself. When Egypt was not pressured by low Nile floods or the high costs of war, it remained a wealthy country with an abundance of natural resources, especially when governed by a strong ruler, without too much internal strife. Additionally, the 147 BC eruption, with the second-largest global forcing of the third and second century BC, seems to have had a minor impact on the Egyptian population. It is noticeable that the years prior to the 147 eruptions were exempt from domestic unrest, civil war or the aftermath of one of the Syrian Wars. Unlike Ptolemy III, who was forced to return to Egypt during his Syrian campaign in 245 BC, the eruption and consequent failed Nile inundation does not seem to have led to enough domestic unrest for Ptolemy VI to return to Egypt.

This period of relative prosperity was also confirmed by a visiting Roman embassy, led by Scipio Africanus in 139 BC. While they were not as much interested in the public display of wealth of Ptolemy VIII, they busied themselves with the strength of Alexandria and, perhaps even more importantly, 'the quality of the land and the blessings brought to it by the Nile', concluding that the country offered the natural advantages to build a great power, yet that the Ptolemaic rulers were incapable of governing it.²⁴⁰ However, this Roman embassy also came investigating with the intention to find new food supplies at their own demand, showing great interest in the agricultural output of Egypt.²⁴¹

Vulnerability during the 130s BC

While Ptolemaic Egypt proved resilient during this time, this did not mean that the population's vulnerability had improved. While they enjoyed relatively quiet decades, the period around 130 BC showed that when Egypt was faced with repeated years of Nile failure and internal unrest, the population immediately suffered greatly again, comparable to the circumstances of the 160s.

From 132 until 130 BC, the Nile flood was either insufficient or low, with multiple sources indicating that the land had become saline or dry or that only parts of the land had been cultivated.²⁴² These low Nile floods are not connected to a major volcanic eruption. At the same period, Cleopatra II and Ptolemy VIII Euergetes II conflicted and a new civil war broke out between them. While Cleopatra II initially successfully banned Euergetes II from Alexandria, Euergetes II

²³⁹ Grainger, *The Syrian wars*, 348-350

²⁴⁰ Diodorus, *Bibliotheca historica*, XXXIII.28b

²⁴¹ Bonneau, *Le fisc et le Nil*, 137-138

²⁴² P. Tebt. I 85; P. Tebt I 60; P. Tebt. I 61b; P. Tebt I 74; P. Tebt. I 75; P. Tebt. III 828

quickly controlled the rest of Egypt and laid siege to Alexandria from 130 BC. The siege took multiple years and Euergetes only recaptured Alexandria in 127/126 BC.²⁴³ At the same time, another revolt broke out in Upper Egypt with the Egyptian Harsiese, who is also referred to in the Potter's Oracle, claiming the title of pharaoh in 131 BC. However, his reign was quite short-lived as he was quickly by the Egyptian governor-general of the Thebaid named Paos.²⁴⁴

In 123 BC, a large tropical volcanic eruption with a global forcing of -6,6 and a sulphate distribution of 32,8 caused a failed Nile inundation in the same year, leaving a large portion of the land dry.²⁴⁵ This particular eruption does not seem to have significantly impacted Ptolemaic Egypt as the following years were quickly followed by average or even good floods. During these following years, land could be cultivated that had previously been dry.²⁴⁶

During this period from 132 BC, the conditions of the lower classes seriously deteriorated again showcased by multiple instances of ἀναχώρησις.²⁴⁷ Additionally, the amount of cultivatable royal land had decreased terribly. Tenants could exchange arable land for unproductive land, yet at the same time, were required to take charge of an equal amount of dry land. Between 170 and 118 BC, almost half of the cultivatable royal land had become barren and unproductive.²⁴⁸

The Amnesty decree of 118 BC

In order to get a grip on the domestic situation, Ptolemy VIII published an Amnesty decree in 118. Within this amnesty decree, all crimes committed before 28 April 118 BC were pardoned, with the exception of murder and temple theft, inviting people who had fled their land to return. Furthermore, specific taxes on arrears were waived and the duty on goods arriving in the Alexandrian harbour was reduced.²⁴⁹ Overall, the Amnesty decree sought to improve the economic situation of the working population, particularly the farmers of royal land.²⁵⁰ Additionally, the higher and lower priesthoods again received greater advantages, in the same trend as the synodal decrees from the beginning of the second century BC.²⁵¹

Another important change from Ptolemy VIII Euergetes II during his reign was the inclusion of Egyptians in the Ptolemaic elite. Throughout his reign, Ptolemy VIII favoured the native Egyptian population, which eventually proved especially useful for him both in defeating Harsiese in the

²⁴³ Grainger, *The Syrian wars*, 365-367

²⁴⁴ Veisse, *Les révoltes Égyptiennes*, 48-52

²⁴⁵ P. Tebt. I 61b

²⁴⁶ Ibidem, P. Tebt I 77

²⁴⁷ Hölbl, *A history of the Ptolemaic empire*, 201

²⁴⁸ Bonneau, *Le fisc et le Nil*, 139-140

²⁴⁹ C. Ord. Ptol. 53

²⁵⁰ Hölbl, *A history of the Ptolemaic empire*, 202

²⁵¹ Ibidem

Thebaid and re-establishing his power in the *chora* after he was banned by Cleopatra II. An excellent example of this is the Egyptian Paos, who served as *epistrategos* of the *chora* under Ptolemy VIII and was responsible for defeating the rebellion of Harsiese and eventually received the court title of *syngenes*.²⁵²

The title of *syngenes*, also known as 'kinsmen' of the king, was first used during the reign of Ptolemy VI Philometor as part of a system of court titles created by Ptolemy V Epiphanes. The introduction of this title and function and the elaboration of a new hierarchy in these titles were part of an internal political reform to respond to crises in the Ptolemy kingdom during this period. These titles were introduced to extend the court's reach in the *chora* and add to the prestige and authority of those who carried out the king's business. During the reign of Ptolemy VIII, local indigenous elites regularly held the position of governor of the Thebaid and played crucial roles in the extension of Ptolemaic power in Upper Egypt.²⁵³

Especially the inclusion of the local Egyptian elite in the Thebaid within the Ptolemaic administration and court strengthened Ptolemaic resilience against domestic unrest.²⁵⁴ The Egyptian *epistrategos* Paos demonstrated in his own person the alternative to a native rebellion, at least for the Egyptians of wealth and education.²⁵⁵ Through the title of *syngenes* and the inclusion of the Egyptian elite, Ptolemaic resilience was able to endure once more by including other parties within the Ptolemaic sphere of power and influence. Similar to including the Egyptian priests and temples, Ptolemy VIII Euergetes II favoured the Egyptian elite to re-establish his control over the *chora*, especially the Thebaid. The following chapter will discuss how during the first century BC the promotion of the Egyptian elites into the court and important positions throughout the *chora* had a significant impact on the responsibility taken for dealing with Nile failure and famine.

Conclusion

The second century BC saw an enormous increase in the population's vulnerability, especially during the 160s BC. This decade has put enormous pressure on the Ptolemaic population through multiple factors. First of all, the sixth Syrian war not only brought the financial pressure of war with it, but the looting of the *chora* during Antiochus IV's invasion also heavily impacted the Egyptian countryside. Furthermore, the end of the war with the Seleucid empire was immediately followed by multiple volcanic eruptions, with the 168 BC tropical eruption being the largest eruption of the third and second century BC combined, followed by three smaller eruptions in 164, 161 and 158 BC. At the

²⁵² Grainger, *The Syrian wars*, 365

²⁵³ I.S. Moyer, 'Court, Chora and Culture in Late Ptolemaic Egypt', *American Journal of Philology* 132 (2011) 1, 37-38

²⁵⁴ *Idem*, 38

²⁵⁵ Grainger, *The Syrian wars*, 365

same time, wheat prices had significantly increased and repeated low Nile floods occurred.

At this period, the coinciding of the end of one of the Syrian wars with insufficient Nile floods and pressure on the population was nothing new for Ptolemaic Egypt, as we have seen in previous chapters. However, the impact of the low inundations during the second century BC was disproportionately severe. Due to the deteriorating economic circumstances of the population and the inability of the Ptolemaic monarchy to deal with the increasing vulnerability in the *chora*, multiple revolts and instances of ἀναχώρησις spread through Egypt. These uprisings and flights from their land from the farmers and villagers throughout the *chora* could be characterized as their last resort in dealing with the enormous pressure, showcasing their vulnerability and their inability to longer cope with the high pressures in combination with failed Nile inundations.

Next to the domestic uprisings and examples of ἀναχώρησις, the vulnerability of the Ptolemaic population is also characterized in the Potter's Oracle. I have argued that this prophetic text not only described political events ex-eventu but that the distortion of the natural phenomena should also be regarded as ex-eventu. By comparing other accounts of volcanic dry fog with the description of the dimming of the sun in combination with a low Nile flood, I argue that the disorder of the natural phenomena is a reflection of actual events that could be connected with the volcanic eruptions of the 160s BC. Some of the political events described ex-eventu, such as the invasion from Antiochus IV, fall within this same period.

This text also shows that the authors were aware of their own vulnerability in the wake of the disruption of the natural phenomena, most notably the failed Nile inundations. When this disruption is regarded as the reflection of actual natural events, the consequences of taxation, unrest, war and famine are linked with the low Nile inundations. In a way, this text draws the same connection that this research argues: the natural phenomena are explicitly linked to the inability to sow seeds, the farmers' heavy taxation burden, and violent unrest due to a lack of food.

The relatively quiet period between the 160s and 130 BC showcased that without the pressure of war or domestic uprisings in combination with repeated Nile failures, Ptolemaic Egypt proved to remain resilient. However, this did not mean that the vulnerability of both the monarchy and the population did not further deteriorate during this period. Most notably, this is shown in the land survey report, which identified that half of the royal land had become barren between 170 and 118 BC. Furthermore, when internal strife between the Ptolemaic rulers coincided with three years of insufficient or low Nile inundations, the *chora* was again faced with many cases of ἀναχώρησις and a rebellion in Upper Egypt, with Harsiese laying claim to the title of pharaoh.

However, the Ptolemaic monarchy showcased a certain willingness to improve the economic and agricultural situation. During the troubles in the 160s BC, Ptolemy VI Philometer published the

royal *prostagma* 'On Agriculture', attempting to increase the cultivation of abandoned plots of land. Although its impact is unclear, the land survey claiming that royal land had halved during the second century implies that the *prostagma* was not as successful as hoped. Furthermore, Ptolemy VIII Euergetes II attempted to improve the economic situation of the working population and to combat ἀναχώρησις through the Amnesty decree of 118 BC.

Finally, the reign of Ptolemy V Epiphanes saw an increase in synodal decrees and the power and privileges of the Egyptian temples, the rest of the second century also saw the increase of influence and power of two other entities. First of all, the process of Egyptianisation continued through the inclusion of Egyptian elites as *strategoï* and *syngenes* into the Ptolemaic sphere of influence and as an extension of Ptolemaic power in the *chora*. Additionally, Roman influence grew and Rome was now included in all dynastic disputes and served as a peace broker in the eastern Mediterranean. Moreover, the Roman interest in the natural riches and food production of Egypt and the Nile started to increase. These concessions to these three different entities were all made with the same intentions, to keep the Ptolemaic dynasty in power of Egypt, despite losing power and control and thus also limiting their responsive capacities. These factors will play an important role during first century BC, which will be discussed in the next chapters.

Chapter 6: The final century of Ptolemaic rule

The turn of the first century BC was again characterized, as much of Ptolemaic history, by dynastic power struggles between the Ptolemies. Furthermore, throughout the first century BC, the interest and power of Rome in Egypt grew more and more, until the point where Ptolemaic Egypt and their last ruler Cleopatra VII had become participants in the civil war of Mark Antony and Octavian. At the same time, the Alexandrian elite played an important part in the dynastic struggles as they often meddled with the succession by installing a certain Ptolemy on the throne or by ousting the other. Who this Alexandrian mob exactly was is uncertain, as the sources remain rather vague about them, but it is generally agreed that this Alexandrian mob had a significant impact on the politics of the Ptolemaic dynasty.²⁵⁶ While the Ptolemies were thus primarily focussed on these two fronts, the Alexandrians and the Romans, the rest of Egypt suffered under an incredible burden of high taxations and insufficient Nile floods with the ἀναχώρησις of entire villages as a result. However, except at the beginning of the century, revolts and domestic uprisings largely stayed away. On the contrary, there is evidence that the Thebaid had taken matters into their own hand, especially concerning the responsive capacity against failed Nile inundations and the consequential famine.

The first half of the first century BC has remarkably few sources presenting a gap within this research. The main sources of large papyri dumps found in Middle and Upper Egypt, which represents the majority of the evidence that has been used in this study, dry up after the turn of the first century BC. This obscures our view of the quality of the Nile flood during this century and the hardship and responsive capacities of the farmers and villagers throughout the *chora*. However, one major source of papyrus texts has been retrieved from crocodile mummies found in the Herakleopolite nome. These papyri are dated between 83 and 36 BC and can shed some light on the economic hardship, domestic unrest and ἀναχώρησις in Egypt. Although these sources only represent the Herakleopolite nome, we may assume that these issues were more widespread throughout the *chora* than solely in this nome.²⁵⁷

Revolt and ἀναχώρησις in the early first century BC

The last period of the second century and the beginning of the first century BC were relatively quiet regarding volcanic eruptions. A small Northern Hemisphere eruption in 105 BC with a global forcing of -1,3 and a sulphate distribution of 11,2 did not seem to have any impact on the Nile flood. For the

²⁵⁶ W.D. Barry, 'The crowd of Ptolemaic Alexandria and the riot of 203 B.C.' *Echos du monde Classique: Classical views* 37 (1993) 3, 415-416

²⁵⁷ H. Maehler, 'In memory of Sir Eric Turner: Egypt under the last Ptolemies', *Bulletin Institute of Classical Studies* 30 (1983), 5-6

first half of the first century BC, only one tropical eruption with a global forcing of -4,2 and sulphate distribution of 20,8 has occurred in 85 BC. This period is also obscured by an enormous gap in our papyrological sources. In this half of the first century, only four papyri provide information on the Nile flood during this period.²⁵⁸ However, social unrest and hardship still resided in the country.

In 91 BC, another uprising broke out in southern Egypt. In the two neighbouring nomes, Latopolites and Pathyrites, followers of an unknown rebel had attacked landholdings.²⁵⁹ Interestingly enough, the resistance of the city of Pathyris to this insurrection in the Thebaid was led by an Egyptian and supported by Egyptian priests.²⁶⁰ Ptolemy IX Soter II quickly and severely suppressed the uprising when he was called back to Alexandria in 88 BC.

Despite the relatively quiet period, the Egyptian countryside was still ravaged and unable to recover from the large abandonment of land and villages in most places. A papyrus from 83/82 BC even reports that most of the inhabitants from the village of Alilaïs in the Herakleopolite nome had abandoned their land because of economic difficulties and oppressive taxation. The report mentions that the inhabitants had been weakened by the disruption (ἀμειξία) which has seized the nome.²⁶¹ The papyrus directly links the ἀναχώρησις of the villagers to the economic depression and names the ἀμειξία (disruption) as its primary cause. Herwig Maehler argues that this disruption might be a native uprising or a robbery, which would not be surprising in the aftermath of the rebellion in southern Egypt.²⁶² However, I think that this disruption and the collective ἀναχώρησις of a large part of a village could also be connected to the volcanic eruption of 85 BC, probably followed by a low Nile flood in 85 or 84 BC. Whatever the origin of the disruption was, this document nonetheless shows the extreme vulnerability of the population in the *chora*.

In 80 BC, the Alexandrians installed Ptolemy XII Neos Dionysus as the new Ptolemaic ruler, while his brother became the independent king of Cyprus.²⁶³ During his reign, Ptolemy XII Neos Dionysus, the father of Cleopatra VII Philopator and Ptolemy XIII Theos Philopator, had spent enormous resources to gain support and recognition of his kingship from Rome, especially to Pompey.²⁶⁴ The Roman Senate recognized Egypt as a unique location with its economic organization and potentially plentiful financial backing. In 65 BC, Crassus, one of the Roman consuls of that year, had been calling for the annexation of Egypt.²⁶⁵ This prompted Ptolemy XII to spend numerous

²⁵⁸ Bonneau, *Le fisc et le Nil*, 230-231

²⁵⁹ W. Spielberg, 'Eine neue Erwähnung eines Aufstandes in Oberägypten in der Ptolemäerzeit', *Zeitschrift für Ägyptische Sprache und Altertumskunde* 65 (1930), 53-57

²⁶⁰ Préaux, 'Esquisse d'une histoire des révolutions Égyptiennes sous les Lagides', 549

²⁶¹ BGU XIV 2370

²⁶² Maehler, 'In memory of Sir Eric Turner: Egypt under the last Ptolemies', 6

²⁶³ Hölbl, *A history of the Ptolemaic empire*, 222

²⁶⁴ E. Bloedow, *Beiträge zur Geschichte des Ptolemaios XII*, (Würzburg, 1963), 32

²⁶⁵ Idem, 36

generous bribes to Roman officials, which eventually led to a treaty of friendship between Ptolemy and Rome, concluded in 59 BC. However, the Romans annexed Cyprus in the following year, while Ptolemy XII did nothing to help his brother, Ptolemy the king of Cyprus, who then committed suicide.²⁶⁶ To finance the high costs of his bribing policies, Ptolemy XII had to cut back on administrative costs and raise taxes, which further deteriorated the situation of the Egyptian population.²⁶⁷

The vulnerability of the population in the *chora* was once again highlighted in 61 BC following an insufficient or even low inundation. Due to the high taxation pressures, many of the royal tenants organised a strike in the village Machor in the Herakleopolite nome.²⁶⁸ Edmund Bloedow estimates that more than half of the royal tenants had left their land, abandoning 120 arouras of land.²⁶⁹ This strike showcases the high vulnerability of the population in the wake of low Nile floods. The monetary problems and debts of Ptolemy XII were retrieved by increased taxation. As soon as the Nile flood did not reach its intended height, the economic pressures on these villages and the royal tenants immediately pushed them over their limit. Especially during these years, there was only a thin line left between coping with these pressures and not being able to. Insufficient Nile inundations easily and repeatedly crossed this line.

The royal *prostagma* of 50 BC

The last ten years of Ptolemy XII and the first five years of Cleopatra VII Philopator's reign must have been extremely tough for the peasants in the Herakleopolites nome (and as Maehler also expects in the rest of the country). During this period, Maehler has identified at least two additional types of taxes: *στατηρισμός* and *παλαντισμός*. They appear to be supplementary levies that had not been attested before.²⁷⁰

During the first decade of Cleopatra VII Philopator's reign, Egypt was heavily affected by multiple Nile failures, resulting in failed harvest and consequential famine. In 50 BC, Cleopatra VII and her brother and co-regent Ptolemy XIII had to deal with an incredible low Nile inundation and, consequently, drought and famine.²⁷¹ Two papyri from this year document the struggles of tenants of royal land. In BGU VIII 1842, a farmer living in the Heracleopolis nome complains that due to the drought, he was only able to sow three arouras of his land instead of the ten arouras that he

²⁶⁶ Maehler, 'In memory of Sir Eric Turner: Egypt under the last Ptolemies', 3

²⁶⁷ Hölbl, *A history of the Ptolemaic empire*, 224

²⁶⁸ BGU VIII 1815

²⁶⁹ Bloedow, *Beiträge zur Geschichte des Ptolemaios XII*, 30

²⁷⁰ Maehler, 'In memory of Sir Eric Turner: Egypt under the last Ptolemies', 7

²⁷¹ Bonneau, *Le fisc et le nil*, 146-148

possessed.²⁷² In BGU VIII 1843, another farmer living in the same nome is asking for a reduction in taxes because of the insufficient Nile flood of that year. He adds that all the strangers who normally live in their village had left and returned to their own villages to pay their *στατηρισμός* there, leaving the village unable to pay the expected taxes.²⁷³ During the final years of the reign of Ptolemy XII Neos Dionysus and the first five years of the reign of Cleopatra VII, the economic hardship of the heavy taxation continued and presented a heavy burden for the Egyptian population. Complaints against the taxation burden in 52-50 BC are numerous.²⁷⁴ Once again, there is evidence of the *ἀναχώρησις* of an entire village in the Herakleopolite nome. The priests of this village complained about a theft in their temple. The theft had occurred because the entire population had fled the village because of 'their weakness and their lack of men'. Only the priests stayed behind.²⁷⁵

As a response to the poor Nile inundation of that year and the impending famine, Cleopatra VII and Ptolemy XIII issued a *prostagma* in 50 BC that strictly prohibited anybody beyond the province of Memphis from moving or trading grain towards any other parts of Egypt that were not Alexandria, on the penalty of death.²⁷⁶

*By order of the King and Queen. No-one who buys grain or pulses in the districts beyond Memphis may under any pretext ship it to the Delta nor may he bring it upstream to Thebes. But everyone shall, without giving reason for suspicion, transport his grain to Alexandria, but if anyone is caught he shall be punished by death.*²⁷⁷

This *prostagma* either responds or anticipates to protect the Ptolemaic capital from widespread famine. It is unknown for how long this royal decree was in effect, especially since *prostagma* were meant to solve immediate problems and remedy shortcomings in existing situations.²⁷⁸ However, what is most interesting is the deliberate decision to prioritise providing grain to Alexandria and thereby depleting the *chora*. That the Ptolemies chose the safety and welfare of Alexandria above the *chora* is not new. For instance, this is visible during the sixth Syrian war, where Philometer stood idle by when Antiochos IV allowed his troops to raid the villages in the *chora*. However, such an explicit Ptolemaic command to prioritise feeding Alexandria shows another layer of the population's vulnerability in the *chora*. It answers the question of entitlement: who is entitled to food? This question ties in with the question of who has the power over food distribution. The royal *prostagma*

²⁷² BGU VIII 1842

²⁷³ BGU VIII 1843

²⁷⁴ See for instance: BGU VIII 1760, 1779, 1828, 1836, 1846 and BGU XIV 2375

²⁷⁵ BGU VIII 1835

²⁷⁶ C. Ord. Ptol. 73

²⁷⁷ Idem; Translation: F. Meijer and O. van Nijf, *Trade, transport and society in the ancient world: A sourcebook* (London, 1992), 64-65

²⁷⁸ U. Yiftach, 'Law in Ptolemaic and Roman Egypt', *The Oxford Handbook of Ancient Greek Law* (2015), 20

answered both questions as it clearly favoured the citizens of Alexandria. Furthermore, this shows that halfway through the first century BC, a failed Nile flood immediately meant famine throughout the entire country. This also implies that Ptolemaic resilience against such Nile failures was incredibly low, as it would seem that grain reserves were mostly depleted, prompting the Ptolemaic monarchy to move grain from the rest of the county towards the capital, being unable to import food from outside Egypt.

Failed Nile inundations during the 40s BC

Most of what is known about low Nile inundations in the second half of the first century BC comes from Roman sources. In 48 BC, the flooding of the Nile was very poor, as attested by Plinius the Elder, who wrote that the height of the Nile flood was only five cubits.²⁷⁹ According to Seneca, during 43 and 42 BC, the Nile failed to flood at all.²⁸⁰ Also, Appian described the occurrence of famine and plague in Egypt during the second half of the 40s BC, claiming that Egypt was exhausted.²⁸¹ The failed Nile floods of 43 and 42 BC can be attributed to the effects of one of the largest volcanic eruptions of the past 2500 years, which erupted at the beginning of 43 BC, significantly impacting the global climate for two years.

A recent study by Joseph McConnell et al. has identified the Okmok II volcano in Alaska as the origin of the massive eruption in early 43 BC. With a global forcing of -23,2 and a sulphate distribution of 116 BC, this eruption ranks as the third-largest eruption of the past 2500 years. The two years global cooling effect was among the most significant recorded in the temperature proxies with 43 and 42 BC ranking as the second and eighth coldest years of the past 2500 years with a temporary decrease of 2 to 3 Celsius in summer temperatures.²⁸² This eruption had enormous consequences for Ptolemaic Egypt and the whole Mediterranean world, as multiple sources refer to famines in Northern Italy, Greece, and Egypt.²⁸³ When in October 42 BC Octavian and Antony tried to obtain grain supplies from Egypt, Cleopatra declined, claiming that Egypt was exhausted by famine already.²⁸⁴

²⁷⁹ Pliny, *Naturalis Historia*, III.V.10

²⁸⁰ Seneca, *Quaestiones naturales*, IV.16.

²⁸¹ Appian, *Bellum Civile*, IV.61

²⁸² J.R. McConnell et al., 'Extreme climate after massive eruption of Alaska's Okmok volcano in 43 BCE and effects on the late Roman Republic and Ptolemaic Kingdom', *PNAS* 117 (2020) 27, 15445

²⁸³ P. Garnsey, *Famine and food supply in the Greaco-Roman world: Responses to risk and crisis* (Cambridge, 1988), 170-181

²⁸⁴ Appian, *Bellum Civile*, IV.108

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Exhausted is perhaps the best word to describe Ptolemaic resilience against Nile failures during the first century BC, especially during the second half. A low Nile inundation now showed the depleted grain resources and caused widespread famine and the ἀναχώρησις of entire villages in the *chora*. However, despite this and although the priority of Cleopatra VII and Ptolemy XIII (and after 47 BC, only Cleopatra) was focussed entirely on Alexandria, this did not necessarily mean that the people in the Egyptian *chora* were utterly vulnerable during this decade. An inscription set up by priests in Thebes around 39 BC praises the actions of a local *strategos* named Kallimachos. During the famines of some years prior to the inscription, most probably during 43 and 42 BC, he saved Thebes from terrible famines, which had brought the citizens to utter despair:

*(...) when a terrible famine [was caused] by unparalleled paucity, and [neediness] almost destroyed the city, he magnanimously devoted himself, without being asked, to preserving each of the local residents. Labouring [like a father over] his fatherland and his own children, with the favour of the gods he continually kept almost all of them supplied with all kinds of [food], although they did not realise from what circumstances he was providing the abundance. When the famine continued and in the current year became even worse and unending, [and] at the same time the river failed to flood, misery far worse than before gripped the whole [land]; the city was completely despondent, and no-one retained any [hope] of surviving. When all were reduced by want to feebleness, and almost everyone was begging for everything, [but not] obtaining it, he, imploring the assistance of Amonrasothes, relieved by his generosity all this distress, and shone out like a star and good daimon for everyone.*²⁸⁵

Kallimachos exercised not only incredible generosity but also great piety, as he restored the local feasts and festivals of the gods according to the inscription. For all this, Kallimachos received several honours, among which the honorary title 'Saviour of the City', three statues and a special festival on his birthday every year.²⁸⁶ Through the honours that were given to Kallimachos, he received the same status as a beneficent king in the minds of the people.²⁸⁷ Furthermore, Kallimachos guaranteed a longer-lasting peace and stability so that the food production and distribution in the Thebaid could recover after the suppression of the uprising from 88 BC.²⁸⁸ The inscription honouring Kallimachos

²⁸⁵ OGIS 194; Translation: S.M. Burstein (ed.), *The Hellenistic Age from the battle of Ipsos to the death of Kleopatra VII* (Cambridge, 1985), 144-145

²⁸⁶ OGIS 194

²⁸⁷ Hölbl, *A History of the Ptolemaic Empire*, 240.

²⁸⁸ A. Blasius, 'Army and Society in Ptolemaic Egypt: A question of loyalty', *Archiv für Papyrusforschung* 47 (2001) 1, 95

also becomes extremely interesting compared to the Canopus decree issued under Ptolemy III Euergetes. In the Canopus decree (discussed in chapter one), Ptolemy III Euergetes and Berenike II are thanked for saving the country from famine at their own expense and are given sacred honours by the priests and temples. Two centuries later, Kallimachos had replaced the position of the Ptolemaic rulers in a very similar decree, also issued by an Egyptian temple and priests.

During this period, the Egyptian *chora* had to be self-reliant to cope with the hardship and famines of the 40s. While the vulnerability increased, especially in smaller villages that were reliant on a good harvest, some parts of Egypt also proved resilient in their own way. Besides showing how Cleopatra VII was either unable or willing to save Upper Egypt from famine, the inscription also shows how wealthy local Egyptians took responsibility for the vulnerability and resilience of the population. This signifies an important shift in previous responses towards low Nile inundations, especially in Upper Egypt. Instead of another domestic uprising or instances of ἀναχώρησις, the responsive capacity of the local Egyptian Kallimachos provided another means of the resilience of the *chora* and saved the region from Thebes from a worse famine.

Kallimachos was one of the native Egyptians who served as *strategos* and held the court title of *syngenes* and was part of the rise in the number of native Egyptians who were appointed *strategoï* of *nomes*, especially in Upper Egypt, a process instigated by Ptolemy VIII Euergetes II.²⁸⁹ The lack of involvement from the court and Alexandria signifies a move towards decentralisation in these parts. Even though this shift could be regarded as a shift towards more decentralisation, the famines ultimately did not evolve into another Theban revolt, as previous famines and hydrologic shocks had increased internal unrest and struggles.²⁹⁰ It could be argued that the introduction of *syngenes* in Upper Egypt was critical for maintaining Ptolemaic power in these regions remains valid, although the inscription does show that this power did weaken during the 40s BC.²⁹¹

²⁸⁹ Moyer, 'Court, Chora and Culture in Late Ptolemaic Egypt', 37-38

²⁹⁰ Ludlow and Manning, 'Revolts under the Ptolemies: A Paleoclimatological Perspective', 154–174.

²⁹¹ Moyer, 'Court, Chora and Culture in Late Ptolemaic Egypt', 37-38

Conclusion

In the roughly two centuries that separated Ptolemy III and Cleopatra VII, the responsive abilities of the Ptolemies against Nile failure and famine greatly diminished. The loss of external territories increased Egypt's dependence on the Nile variability instead of other agricultural pastures relying on local rainfall. Furthermore, local uprisings and the growing dominance of Rome in the Mediterranean both played a role in this diminished responsive power of the Ptolemaic state. Also the (financial) focus of the later Ptolemaic rulers on Alexandria, Rome and Roman generals and officials increased the vulnerability of the local population concerning failed Nile inundations and famines.

Although the Ptolemaic kingdom had grown more vulnerable to these exogenous shocks, these factors did not steer towards the ultimate end of the Ptolemaic dynasty. Quite the contrary, when the Nile returned to a prosperous flood after 42 BC, life and resources in Egypt flourished, although Ptolemaic agriculture had seriously deteriorated.²⁹² Even though natural production might have seriously fluctuated, Egypt had not entirely run out of resources and could still be economically prosperous with a few proper Nile floods and harvests. Especially after the first turbulent years of Cleopatra VII's reign, peace and prosperity seemed to return to Egypt.²⁹³ The failed Nile floods, the domestic unrest and the famines of the 160s, 130s and 40s BC did not cause the Ptolemaic kingdom to collapse as the kingdom remained resilient to some extent. Although this resilience and responsive capacity had seriously deteriorated between the reign of Ptolemy III Euergetes and the reign of Cleopatra VII Philopator, the kingdom in some form, still persevered. An important factor in this perseverance is the gradual shift in control and power over the centuries towards the Egyptian priests, temples and local elites on the one hand, especially in Upper Egypt, and towards Rome and Roman generals in the Mediterranean on the other hand.

However, it would be mistaken to assume that the Ptolemaic kingdom ended because of these exogenous shocks of Nile failure, especially the shocks of the 40s BC, as the article from McConnell et al. suggests. They suggest that the impact of the Okmok volcano of 43 BC must have played a role at the end of both the Ptolemaic Kingdom and the Roman Republic and claim that:

Natural disasters are known historically to create a "state of exception" in which business as usual becomes unfeasible and political and cultural norms are suspended, thereby providing room for rapid social and political change. While it is difficult to establish direct causal linkages, we thus postulate that this extreme climate shock—

²⁹² Buraselis, 'Ptolemaic grain, seaways and power', 106–107.

²⁹³ Maehler, 'In memory of Sir Eric Turner: Egypt under the last Ptolemies', 8.

*among the most severe of the past 2,500 y—contributed to reported social unrest and facilitated political change at this important juncture of Western civilization.*²⁹⁴

This research has shown that although nature-induced disasters could have an enormous impact on the Ptolemaic monarchy and the *chora*, the impact of the low Nile floods was dictated by the political and economic situations and policies. The responsive capacities of both the population and the monarchy determined the consequences of the slow-onset disaster. As the socio-economic circumstances and the responsive capacities deteriorated throughout the three centuries of Ptolemaic rule, so did the impact of the low Nile inundations, characterized by the increase of revolts, ἀναχώρησις and the famines that swept through Egypt. However, throughout these three centuries, the impact of the low Nile floods did not constitute any significant transformative changes in Ptolemaic Egypt.

Ptolemaic Egypt even flourished during the last 15 years of Ptolemaic rule. Cleopatra had received back the territories of Cyprus back from Caesar and later also parts of Syria and Cyrene from Antony, almost restoring the Ptolemaic empire to its original historical stature.²⁹⁵ Furthermore, during this period, peace and prosperity were partly restored and Cleopatra was able to continue numerous building programs of prominent temples. There is also evidence of prosperity in the Fayyum as multiple restoration projects of houses within two villages during the reign of Cleopatra were found.²⁹⁶ Interestingly these first years of returning prosperity coincide with the low Nile floods and famines of 43 and 42 BC, showing how resilience and vulnerability coexist next to each, where the kingdom as a whole might prove resilient while the population in the *chora* was still vulnerable and suffered from food shortages.

Eventually, it was the political situation of Rome and the Ptolemaic involvement in their civil war that ended Ptolemaic rule in Egypt. The volcanic eruptions and the failed Nile floods in themselves did not bring the end of the Ptolemaic kingdom, but they primarily highlighted the decline of Ptolemaic responsive capacity and power through the increased vulnerability of the *chora*

The papyrological sources allow us to gain more insight into the vulnerable groups concerning Nile flood variability: the farmer and villagers in the *chora*. By adopting the *longue durée* approach, this research has shown how the vulnerability of most of these farmers and villagers steadily increased over the course of the three centuries of Ptolemaic rule. On the one hand this is shown by the responses from the population, especially in the Thebaid to revolt against the Ptolemaic monarchy.

²⁹⁴ McConnell et al., 'Extreme climate after massive eruption of Alaska's Okmok volcano in 43 BCE and effects on the late Roman Republic and Ptolemaic Kingdom', 15447

²⁹⁵ Hölbl, *A history of the Ptolemaic empire*, 242

²⁹⁶ Maehler, 'In memory of Sir Eric Turner: Egypt under the last Ptolemies', 7-8

Especially the period during the 160s, which was pestered by multiple low Nile inundations, saw multiple domestic uprisings throughout the entire country. However, the extent of the vulnerability, as well as the vulnerable groups could best be analysed through the occurrence of ἀναχώρησις.

The severity and the amount of instances of ἀναχώρησις steadily grow throughout Ptolemaic history, peaking following years of low Nile floods. During the third, there are only a few individuals who flee their house or land due to the economic pressures. However, especially during the 160s and 130s BC there are numerous examples of people fleeing their house and land because of the high pressures and deplorable state of the *chora*. During the first century there is even evidence of the ἀναχώρησις of entire villages, greatly highlighting how immense the pressures on this part of the population had become. It is therefore important to understand that the environmental factor plays a large part in the concept of ἀναχώρησις.

The final century BC also shows that the vulnerability of the population could vary through different parts in Egypt outside Alexandria. Whereas the papyri in the Herakleopolite nome point to large scale ἀναχώρησις and economic hardship, the Thebaid was saved from famine through the responsive capacity of the local Egyptian elite. The role of the ruler to improve the population's vulnerability had been taken over by Kallimachos, both in action and in the received honours.

To conclude the slow-onset nature-induced disasters of failed Nile inundations played an important role throughout Ptolemaic history. This research has shown that environmental agents such as volcanic eruptions and climate variability can enormously impact the lives of individuals and communities, offering new insights into Ptolemaic history. At the same time it has shown that nature-induced disasters do not provide room for rapid social and political change. Only when social and political change is already happening, these developments could be sped up or influenced by nature-induced disasters. Therefore, it is important to employ a long durée approach on these topics, combined with big data, to determine how the environment and nature-induced disaster impact a society in the long term and to what extent they can contribute to social and political change.

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