

Water, irrigation and their connection to state power in Egypt

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1. Introduction

Water is perhaps the single most important resource in world economic history, that fact being reinforced by many of the papers that will be presented at this conference. It is perhaps fitting, then, that I begin the conference by examining water and state power in one of the earliest and longest lasting civilizations in world history. In a recent working paper¹, Eric Chaney argues that Nile flood shocks increased the political power of religious leaders in Islamic Egypt. The arguments are complex, but what is perhaps the most interesting aspect of the paper is this political economic claim that runs counter to most scholars views of the relationship between Nile flooding and political power in Egypt. The political institutions of Islamic and pre-Islamic Egypt are quite different, nevertheless Chaney's papers forced me to go back and re-consider my views of the relationship between Nile flooding, the control of resources (principally grain) and political power in ancient Egypt.

In the economic history of Egypt, there has long been posited a direct causal link between the physical geography of Egypt and state power. That causal connection runs in two directions: (1) from irrigation to despotic highly centralized control of the economy

¹ "Revolt on the Nile:Economic shocks, religion and political power," revised (August 2011) as "Sultans, the Shari'a and seven empty ears:Economic catastrophes, Church and state," at http://www.economics.harvard.edu/faculty/chaney/papers_chaney

and (2) from a highly centralized system dependent on irrigation control to state collapse caused by insufficient or excessive river flooding. To be sure the origins of the ancient Egyptian state can be attributed to what Michael Mann (1986) has called the "social cage" created by Nile river and its narrow, cultivable flood plain flowing northward through a harsh desert environment. That social cage allowed a ruler to control a population, tax surplus grain production and monopolize communication along the river corridor. The basic "immobility" of primary agricultural producers caged in the environment was the prime mover of state expansion, the more extensive development of agriculture and the organization of labor.²

Ancient Egypt would appear to be among the first and best examples of the resource curse. Egypt's irrigated landscape, its highly productive soil, the royal monuments built from the extraction of surpluses from a docile population, even cruelly extracted-an image already known in ancient texts- all suggest that Egypt suffered from, perhaps even invented, the idea of a state being cursed by its natural endowment. Abundant grain harvest centrally controlled by a despotic ruler. The theory that irrigated landscapes led to despotic governance was most famously developed by Karl Wittfogel and published at Yale University Press in 1957, although the image of a static, unchanging Egypt, a wealth of grain controlled by a highly centralized regime dominated by a despotic ruler goes back to antiquity, to the Ionian geographers and to Herodotus' account of Egypt. But this model is, in a sense, a closed system that disregards socio-economic and political processes. The history of Egypt in the long run shows us in fact that economic and political history was a great deal more complex, and I must concur

² For the basic "labor exploitation" model of state formation, see Allen (1997).

with Butzer's recent study (1997) that stresses the openness of ecosystems, "liable to both external inputs and internal change."

2. The Nile river and its flood

The Nile river is the longest river in the world, flowing south to north 4,132 miles from equatorial Africa to the Mediterranean, and draining some 1,293,000 square miles, approximately 10% of the African landmass. The river provided three main resources: (1) Water from the flood surge that began each June, and spread water and silt onto irrigation basins in which grain crops were grown on some of the most productive soil in the world. (2) fish, and (3) a superb "communication corridor." The flood surge was caused primarily by monsoonal winter rain in the Ethiopian highlands. 83% of the flood surge in the Egyptian Nile is attributed to water coming from Ethiopia, 13.8 % from the Atbara river, and 13.3 % from the Subat river. 16.5 % of the water derives from the Lake region, half of which is evaporated by the Sudd in modern Sudan (Butzer 1999:570). Even in recent times, the unique features of the Nile river behavior dictate agricultural production: 95 % of production is on irrigated land, and the sources of the water lie entirely beyond Egypt's borders (Hvidt 1998:2)

It is no accident, then, that an early, socially stratified, state emerged in Egypt around 3000 BC. Many early civilizations (Egypt, the Indus river valley, Mesopotamia, and China) were all civilizations based on flood recession agriculture.³ The rise of early states in river valleys, of course, must be explained by other factors as well. These important river valleys allowed the possibility of the centralization of political and economic power because of the caging effects of the river valley (the starkest example of

³ Park 1992.

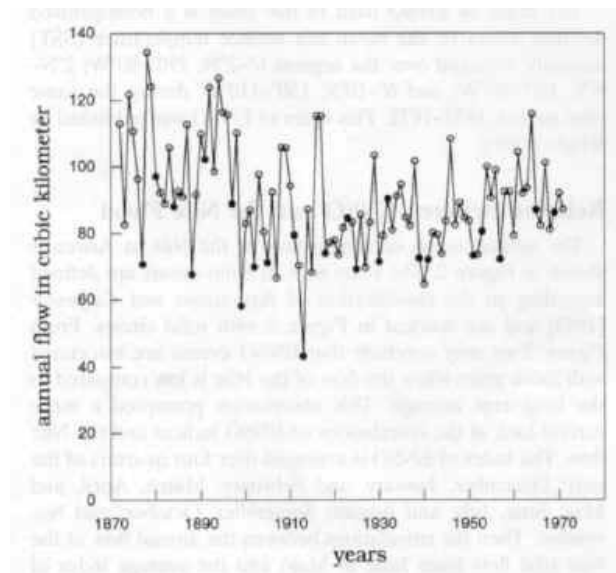
a “social cage” being Egypt) that “captured” a population within a circumscribed territory. The absence of political opposition at the local level in Egypt allowed the king to assert monopoly power over communications along the river as well as over raw materials (principally stone and metals used for tools), and the productivity of Egyptian soil produced large surpluses and allowed for “durable methods of taxation.”⁴

⁴ Totman 1993:15.

3. Inter-annual variability of the flood

The study of inter-annual variability in ancient Egypt is fairly well established (Butzer 1976, 1984; Seidlmayer 2001). Although the flood of the river was generally predictable and gentle, there was considerable historical variability in the volume of the flood surge. Indeed political and economic adjustments to this variability was one of the major features of Egyptian history; poor flood volume was certainly one, but hardly the only, factor in the decline of centralized political control and concomitant economic and demographic decline (Butzer 1984; Hassan 1994, Seidlmayer 2001, Eyre 2004).

Inter-annual variability was the result of two natural features. The first is ENSO (The *El-Niño Southern Oscillation*), responsible for 25% of the variability.⁵ The second feature is known as the Hurst phenomenon: temporal fluctuations in flood volume are non-random, but the long-term flood pattern is chaotic in Mandelbrotian terms.



⁵ Wang and Eltahir 1999.

Fig. 1 Annual Fluctuations of the "natural" flow in the Nile at Aswan for the years 1872-1972 (Eltahir 1996).

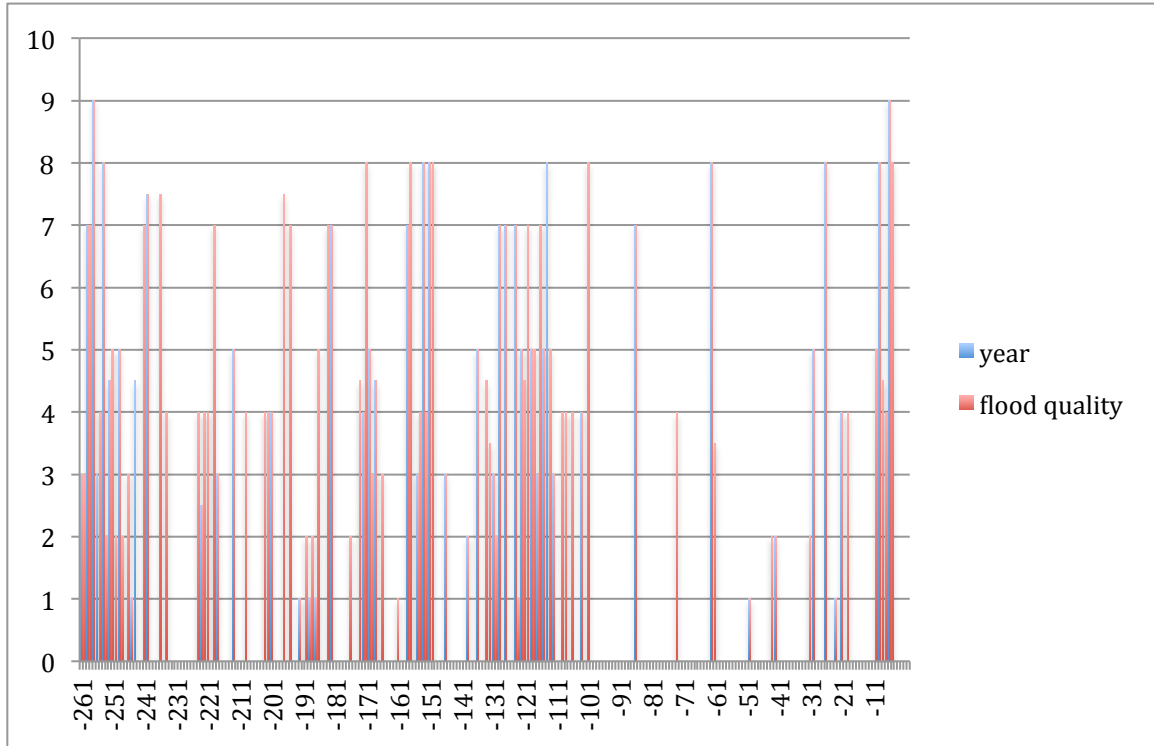


Fig. 2 Qualitative Nile flood records from the Ptolemaic period, 300 BC- 1 BC. (Data taken from Bonneau 1971)

Flood levels recorded at Nilometers in ancient times, while far from complete, are sufficient to show the variability. Fig. 2 illustrates the variability in the quality of the flood reported indirectly in Greek papyri from the Ptolemaic period. Variability in the flood dictated settlement patterns throughout Egyptian history. That appears to be the case, for example in Middle Egypt where the flood plain is wide but more susceptible to

flood shocks. The area shows an historic pattern of settlement and de-population (Eyre 2004:161-62).

4. Irrigation

Two types of irrigation of land must be distinguished. The first, natural or “paleotechnic” irrigation, was characterized by the simple social response to the annual rhythm of flood and recession of the Nile by sowing land in the low-lying flood basins along the convex river valley. The annual flood replenished nutrients in the soil and, in good years, generated very high average yields.

Careful attention to the timing of the water flowing into and out of the basins was required. This was a matter of local organization but it was of course a concern to the king, and we see officials being instructed on such matters throughout Egyptian history. Improvement in this natural system led to the second type of irrigation, artificial irrigation. Improvements came in the building of feeder and drainage canals, and the building of transverse dikes to divide the natural basins of land into smaller production units. Such artificial irrigation of the fields is attested at the every beginning of unified Egyptian history (The so-called “Scorpion Macehead” depicting the king clearing a canal ca. 3100 BC), and the clearly documented artificial canals used to build the pyramids in the Old Kingdom militates against the proposed “irrigation revolution” (Schenkel 1978) in Egypt during the so-called First Intermediate Period (2160-2055 BC).

Butzer (2001) has posited two, not mutually exclusive, models of the development of artificial irrigation. The first suggests that improvements in the natural flooding and recession of the river came as a response to environmental stress. Low flood water prompted local farmers to cut sluices in the levees to allow for more water to come

into the basins. This in turn may have led to more permanent structures of floodwater control, and the division of the land into small units. A second model is linked to the social stratification that is well documented from the early history of Egypt on. The hierarchic social organization of Egypt led to the working of land within family and other social groups and split holding of land to reduce localized risk of crop failure. This method of exploitation in turn led to increased productivity and a concomitant rise in population. The forced demand of a rising population produced greater pressure on the land that led to the need to expand the arable base, a need that also brought further development of irrigation networks. Both models presuppose a diffused, locally controlled response to the inter-annual variability of the river, and only limited intervention by the central state.

Technological improvements in irrigation methods were minimal, and were introduced from outside of Egypt. The first improvement, the *shaduf*, a counter-weighted pole and bucket mechanism introduced from the Near East during the New Kingdom (ca. 1350 BC), allowed some lifting of water onto fields and gardens. Like the animal driven waterwheel known as the *saqiya* that is first documented in Egypt in the mid-Ptolemaic period, these mechanical lifting devices did not expand the arable land significantly until the Roman period but were used instead in the intensive agrarian settings of orchards and vineyards.⁶

Central state intervention, experimentation, expansion of the arable land, was limited, but is documented for all historical periods; it was not until the nineteenth century, however, that the combination of a mercantilist government, massive new deep

⁶ Cf. Butzer 1976:41-51; Eyre 1994.

canal dredging, new cash crops like cotton and sugar cane, and barrage and weir technology allowed for large-scale perennial irrigation.⁷ The building of barrages and the High Dam at Aswan added the necessity for centralized control, directed by the Ministry of Public Works and Water Resources, a government bureau dating back to 1836 during the rule of Mohammed Ali. In fact, this organization really only dates back to 1964 when the maintenance of the water supply became its sole portfolio, in what has become a very complex hydrologic system (Hvidt 1998:10-12). Water management by the state did not approach this level of complexity in antiquity. Nor was the competition for access to water a serious issue in ancient times (Butzer 1984).

5. Irrigation and social structure

The connection between irrigation agriculture and the structure of the state is a subject that has generated fierce debate about the organization and concentration of power in irrigation societies. Earlier scholarship on Asia and the Near East has often noted causal links between “hydraulic” agriculture and centralized power. But Egypt in fact is an excellent case study in how irrigation societies create intensive, cooperative, local irrigation ecologies. In an important article Chris Eyre (2004) sketches the intricate connections between irrigation and local society in Egyptian history, producing a composite image of Egypt from the Old Kingdom to the Ptolemaic period.

Throughout Egyptian history, the central state, stressed order in images, ritual and bureaucratic command. Emphasis was placed on measuring the Nile flood, carefully monitored at Nilometers that had a mark for the sign of life at the optimum flood level, an indication that sufficient flood-waters would be attained that year. Such bureaucratic

⁷ Marsot 1984:137-61.

orderliness, however, disguised the local complexities and variabilities of the irrigated landscape (Eyre 2004). Unlike irrigation after 1820 when a much larger system of interconnected basins was created, the ancient system was highly local and small scale in its operation. It required no management or coordination, and indeed very little coerced labor to maintain the system (emphasized well by Eyre 2004). Even in the Ptolemaic period, a time in which it has been supposed there was a strong central state that intervened heavily in local economies, land management and so on, there was a balance between state economic interest and local management. In the Fayyum (Thompson 1999), a region that had the most direct state presence, where the arable was trebled and settled in the early Ptolemaic period, the local character of irrigation and agricultural production still prevailed.

Local irrigation and production of crops in irrigation basins required a good deal of cooperation to maintain the irrigation canals, to manage the timing of water let onto fields, drainage, sowing and so on. Here is a great contrast to places like ancient Attica in Greece where individual family farms were the norm.⁸ As Eyre rightly stresses, such individual family farms were impossible in the Egyptian environment. It is the solidarity of the irrigation basin, of the village that was the key to agriculture in Egypt. Such a system is documented also in other places. Park's (1992) analysis of the Middle Senegal river flood recession agricultural system in West Africa, for example, provides a useful

⁸ The situation on the Greek mainland is in fact more complicated. Large estates were worked by dependent labor in Sparta, in Crete and Thessaly large private estates were worked by slaves, and small family farms were found, most commonly in Attica. See the important analysis of Greek agricultural labor in Jameson 1992.

model for the manner in which kinship groups hold land, and provided access to family land to others by contract. Family groups managed land portfolios, held individually in inherited “shares” dispersed geographically to reduce risk.

Decisions regarding planting and working the land is made each year depending on local water and soil conditions. It was a flexible response to a chaotic environment but one that produced impressive returns per unit of labor (Park 1992:93). Park’s model is generally a good one for ancient Egypt. Gradually, temples and the king asserted managerial control over a good amount of land in periods of centralized control. Such control over the flood basin land was very often held with temple estates, large tracts of land that were nominally with the temple domain but held privately or leased out or worked by temple dependents in a complex local agricultural system. The system of property is complex. Individualized private property in the basins did not exist because it was not practicable in such a system. Rather, later legal documents describe a system of a “spectrum of rights” in land that was often held in families but could be privately leased or sold. The Egyptian system, rather like that discussed by Park (1992: 96), was also one that can be described in Hohfeldian terms as a bundle of rights and obligations that connected the king and the temples (collecting taxes and rents) to local family/status groups responding to the flood. The common holding of property, essentially conveyable usufructuary rights, rather than individualized private property, in kinship/status groups, as Park suggests for the Senegal basin, was not a matter of the cost of enclosure but, rather due to the fact that a hierarchical social system in a chaotic environment made reallocation of resources annually an efficient solution. Such a system would have been reinforced by the necessity of group cooperation in maintaining the irrigation canals, the

timing of water into the basins and so on. In certain parts of Egypt with a higher density population, stronger private property rights, which are documented for Upper Egypt between Thebes and Aswan for example, may have prevailed (Monson 2012). The bridge to the central state was the local temple, at least in many areas which coordinated land tenure in its region, and into which the king played a ritual role of chief priest in the local cult.⁹

Temples (I speak here about the major state temples as opposed to local shrines and smaller regional temples) held portfolios of land distributed throughout a large area and served as administrative and management (including the management of risk) centers. Temples provided employment, were the location of local festivals, the center of cult, symbolically the guarantor of stability and the social order, and conduit through which the king ruled. The hierarchical social system that evolved around flood recession agriculture and common property holdings, thus, would have created a major barrier to the formation of Athenian style democracy. But the important point is that the Egyptian system of governance created an equilibrium often lasting many centuries.

6. Irrigation and the political economy

The highly centralized, despotic understanding of the Egyptian political economy, and observations from other Asian states, beginning with Herodotus and Aristotle down to French political theory, Marx and Weber, led directly to the development of the theory of Oriental Despotism by Karl Wittfogel, a general theory that linked water resources to

⁹ The system I describe is based largely on documents from Upper Egypt. Other areas of Egypt are less well documented, but we would be wrong to conclude that tenure arrangements were uniform throughout.

social structure and governance (further below). Despite this very ancient image of a state cursed by its resources--passive, never-changing, sterile and long used to despotic rulers—and the strong connection between physical geography, climate and governance, there was no causal link between the control of irrigation and authoritarian rule. Mann (1986:110) suggests that once Egypt became a territorially centralized state the state was “well-nigh continuous.” If by “state” we mean that a single king controlled the Delta and the river valley up to Aswan that is not quite true. Indeed one of the most characteristic features of Egyptian history are the dynastic cycles, centralized states alternating with phases of smaller polities. The so-called “Intermediate periods” between two centralized dynastic cycles is associated with demographic decline, a lack of central institutions and thus political fragmentation and little monumental building. Mann’s emphasis (1986:161ff) on the weakness of kings and their consequent reliance on elites is correct. We must also note that the Egyptian Nile valley and Delta was hardly uniformly settled. An important feature of settlement patterns in Egypt, especially in the middle of the river valley, is the alternation between new settlement and abandonment of sites because of the failure of the ability to control and sustain irrigation networks.

The organization of Egyptian history into ruling families or “dynasties” derives from the Ptolemaic Egyptian priest Manetho whose account of Egyptian history written in Greek ca. 270 BC survives in fragments. There were three main centralized phases in Egyptian history: The Old Kingdom, comprising four dynasties, lasted 526 years, the Middle Kingdom, three dynasties, lasted 405 years, the New Kingdom, three dynasties

lasted 481 years. Each centralized political phase controlled a larger territorial base. Each new cycle brought with it important changes to state institutions.¹⁰

The failure to democratize, of course, is not an issue in Egypt although it is an important part of the modern theory. What is, in fact, in need of explanation is the persistence of the pharaonic or authoritarian rule from 3100 BC down to the Ptolemaic regimes (305-30 BC). The irrigated landscape did not generate authoritarian rule. Rather, it was the inter-annual variability of the flood that made the institution of kingship the key to establishing an equilibrium in a territorial state. Egyptologists have usually focused on the images and rituals of kinship, but kingship was primarily a fiscal institution that solved the problem of taxation in a chaotic and variable environment.

We owe to the fifth century BC Greek historian Herodotus, in Book 2 of his *Histories*, the first sustained narrative of ancient Egyptian society and history. It is also, along with the Joseph narrative in the *Genesis* (37-50), the earliest narrative of an Egypt cursed by its environment. In this text, written sometime in the middle of the fifth century BC, the physical geography of Egypt is described at great length. Famously, of course, Herodotus spends a good amount of time on the Nile, its sources and the annual flood of river, which came, remarkably from the Greek point of view, at the height of Summer's heat. Indeed the first four books of Herodotus are in search of the answer to why it is that a ramshackle bunch of poor Greeks were able to defeat the mighty Persian empire when ancient and highly sophisticated civilizations such as Egypt were incorporated into the empire almost without a fight. The answer in part was a good Ionian one: geography and

¹⁰ Peter Perdue's (2005:6-7) comments on dynastic cycles, together with human agency, are appropriate for Egypt as well.

climate. Egypt, Herodotus tells his readers, was “the gift of the river.” In this famous passage (2.5), Herodotus was referring to the alluvial nature of the Delta, Be that as it may, the idea that Egypt was the gift of the river is incontrovertible. Agricultural production is entirely dependent of the Nile. Egypt was enormously rich because of the fertility of its soil. It had a deep and impressive history, learned priests, and possessed more marvels than other places, including the huge monuments of countless kings. But as a result of this richness, Egypt was weak and static. It was doomed to be invaded and possessed by Persia.

The Wittfogel model, as Karl Butzer (1996) has mused, is like Elvis-- it refuses to die. The model, to summarize, posits a causal connection between irrigation, managerial bureaucracy, and total power of the ruler. Many observers, and not only of Asian states, have noted that in places that had irrigated landscapes, there were massive building projects and large, coerced labor forces. Karl Marx’s “Asiatic mode of production,” and Max Weber’s “hydraulic bureaucracy” posited a strong correlation between irrigation societies, social complexity and centralized political power (1938, 1957).

Wittfogel’s monumental treatise (1957) summarized much 19th century historical thinking about the political economy of early states, particularly Asian states, which were associated with irrigation agriculture. His argument is complex, and his attempt to link water management to levels of technology, property rights, the structure of the state and social power was impressive. At its most basic level, the despotic model in Egypt was a “linear causality model,” (Butzer 1976) that linked environmental stress to irrigation, the need to control irrigation networks in turn led to the formation of a hydraulic bureaucracy, which led to centralized control of economic resources. The theory, while

very interesting, is over-generalized and overextended. While highlighting the differences between East and West, it oversimplified the complexities of irrigated societies both from the point of view in comparison--Egypt, Mesopotamia, China were all pretty much the same—and from the point of view of a particular society like Egypt, whose local social structure in relation to production was more complex and developed more over time than the model suggested. Wittfogel's theory also emphasized scale: despotic states were the result of large-scale irrigation works, and large managerial bureaucracies to maintain irrigation. Both of these are inaccurate for ancient Egypt.

Everywhere there was irrigation, according to the theory, there would follow highly centralized states, even in areas of rainfall: ancient Rome or Hawaii for example.¹¹ Irrigation was the *cause* of centralization and political immobility. As Butzer has cogently argued (1999), such a theory overestimates vertical power structures, and underestimates horizontal ones. “The hang-up,” Butzer concluded, “seems to be the tenacious assumption that early forms of intensification were a result of socio-hierarchical demands (Steward 1955, reflecting Wittfogel's influence), rather than cumulative, small-scale, local decision-making.” The emphasis in Egypt was on the small scale Ancient Egypt was not the Egypt of Mohammed Ali or the post High Dam era.

The control of water was always managed at the local level, and was centered around the natural flood basins because local conditions of land and water varied, and irrigation networks, and the labor requisition required to maintain them, had to be managed locally. Unlike Mesopotamia, the gradient of the Nile river did not allow more extensive radial canalization except in the Fayyum, and therefore the basin irrigation

¹¹ For Hawaii, the classic critique is Earle 1978.

system was essentially locally managed.¹² The lack of a central bureaucracy for irrigation, with no official titles linked to such centralized control shows that control of water had always been decentralized:

Its management defied centralization and was handled on a community basis. Unlike in the Karl Wittfogel model, irrigation never involved a managerial bureaucracy, nor did it become an instrument of authoritarian control.¹³

7. For whom the Bell tolls

The correlation between long term inter-annual variability of the flood of the Nile river (discussed below) and centralized governance has been summarized by Barbara Bell (1971, 1975) and Karl Butzer (1984): previous work has suggested that decline in Nile flood volume occurred between Dynasties 1 and 2 (roughly estimated at -30%); Dynasty 7-8 and the First Intermediate period, Dynasty 13 and the Second Intermediate Period, and Dynasty 20 and the early Third Intermediate Period. That has been, in other words, correlated with the collapse of the Old, Middle and New Kingdom centralized states. Bell's studies forcefully advanced the idea that Nile failure at the end of Dynasty 6 led to the complete collapse of the state.

More recently, however, the Nile Flood/state collapse thesis has been called into serious question. Centralized state collapse is now viewed in a wider regional framework

¹² Rathbone 1994:35. The average gradient of the Nile river in Egypt proper is virtually flat, at 1m in 10km.

¹³ Butzer 1999:382. The essential local control, centered on officials in the villages, is well documented in Ptolemaic times and later. See Bonneau 1993.

and in the context of developing internal political and economic shifts in Egypt.

Furthermore, detailed Nile flood history taken from analysis of core sequences at Lake Turkand, the Nile Delta and Qasr el-Sagha produce the following scenario laid out in Fig. 3.

High Nile flooding	3100-2900 BC
Lower flooding, brief minimum flood	c. 2200 BC
Exceptionally high flooding common	2150-1900 BC
“”	1840-1770, 1600-1500 BC

Fig. 3 Historical Nile flood behavior (Butzer 1997)

The implications of the data of Fig. 3 suggest that the collapse of the Old Kingdom, in other words, *preceded* the low Nile anomaly. Butzer (1997) proposes a more sophisticated network model to explain state collapse at the end of the Old Kingdom unrelated to Nile flood history. The model has the following components. The Old Kingdom state expanded into the Near East, establishing trading colonies along the coast. In particular, Byblos became an essential entrepot for the king to control the important of luxury goods, important in administering the royal court and the elite circle around the king. The near eastern trading network collapsed, in part due to environmental stress and increased militarism. This collapse is noted in the Aegean as well as the Near East, between 2300 and 2200 BC, the terminus for the Early Bronze Age in the Mediterranean. Clearly eco-system shock (Catastrophic regional volcanic event) was a part of this story. The collapse of Near Eastern states had a knock on effect in Egypt. Within Egypt, there developed, from Dynasty 5 onward, an increasingly powerful regional elite that captured

resources. It seems clear, then, that state collapse was complicated, but unrelated to Nile flooding history.

8. The ruler and the persistence of authoritarianism in Egypt

If irrigation is unrelated to despotic governance, and Nile flood history is not correlated to central authority or its collapse, why then does authoritarian governance persist? Once the Egyptian state was formed the pharaoh was at the center of state ideology and political power for as long as a central state existed. Egyptian governance has been categorized as “Authoritarian.” But this is too simplistic. The despotic nature of state ideology was probably a result of the local character of the Egyptian system, and the requirement of the king to be elevated above the diffuse, socially stratified local power structures.¹⁴ Even the Ptolemies, whose intervention in Egypt in the late fourth century BC has unique characteristics, maintained this pharaonic ideology. While much scholarship on Egyptian kingship has focused on this ideology. And the images and rituals of kingship, the function of Egyptian kingship was primarily fiscal.¹⁵

The case of Egypt, with its ancient tradition of powerful kings and a hierarchic bureaucracy, would appear to be an exception to Ernst Gellner’s social model, the natural tendency of political fragmentation and high costs alleviated by the strong “caging effect” (Mann 1986:112-14) of the river valley that achieved nearly a “unitary social system” (Mann 1986:114). But the bureaucracy was limited in its effectiveness, and the pharaoh relied on fostering the loyalty of the local elite through a political system that sanctioned rent-seeking in exchange for loyalty to the center, and the requirement of mustering local

¹⁴ Cf. Mann 1986:97-98.

¹⁵ On Egyptian kingship, see O’Connor and Silverman 1995.

labor when required. In fact the key to central power in Egypt was the ability of the king, through the local elite, to control local labor—for military campaigns (before a standing army was organized during the New Kingdom), canal clearance, expeditions to quarry stone—and, of course, to tax and redistribute agricultural production through the local temples. In periods of poor Nile flooding, however, the political structure linking villages, to district (nome) capitals, to the political center, in an “internested hierarchy” of population centers (Skinner quoted in Wilkinson: 2000:5), was often severed. There was in Egypt, to be sure, a “centralising principal” strengthened by the near monopoly of the king on image and text. Phrases such as the “water of pharaoh” (i.e. “public canal”) show the extent of royal ideology, but it does not measure royal intervention into local economies. The assignment of rights to land, especially new land, would also have been a royal prerogative, the normal mechanism of which was the gift of land to officials and to soldiers. Inter-village and regional cooperation could also be strengthened by the common practice of split holdings of land and the religious rituals of the temple estates, but there were no central state institutions that can be associated with control of the irrigation network (Eyre 2000; Bonneau 1993).

This political response, as in other irrigation societies, created a bottom heavy or “feudal” social organization. The irrigation of fields was organized around the flood basins. The cleaning of canals, the protection of the dikes, the measurement of the flood, the lending of seed, the survey of the fields, and the payment of rent and tax from the land, were all organized at the local level through local institutions (temples) yet with obvious great concern of the king and the organs of the central state. The “social cage” of the river did allow the central state to dominate the economy, in distribution and in trade,

and the elites were synonymous with the “state.” The state faced no internal rivals, there were no powerful city-states as in Mesopotamia to serve as counterweight to royal power (Ekholm and Friedman 1979).

If the political relationships were subtler and more complex, one overriding factor that created major differences in rural production and social structure between the classical world and Egypt remained. That factor is the Nile itself. But the influence goes in the opposite direction. Irrigation did not lead to authoritarian rule, as per Wittfogel. Rather, the environmental constraint caused by the Nile river corridor that flowed through a desert captured a population that created the means of centralized political control and taxation. In the final analysis, it was the Nile flood that acted as the real despot, the real power of which was the “social cage” created by the rich soil of the flood plain juxtaposed to the harsh desert environment on either side of it. The state, its institutions, and individual farmers had to respond and to adjust to the basic forces of the annual inundation and its recession. The flood could not be altered, only contained, and the population was quite effectively “caged” in the river corridor (Mann 1986). The rural population itself was organized around a hierarchical village structure, complex social networks around land tenure and tax obligations and a cohesive group solidarity focused on production in an irrigated environment.¹⁶ The need to control a *diffused* irrigated landscape led not to despotic kings who claimed ownership of the entire state and its apparatus, but to the development of bureaucracy and a “centralizing principal” (Chaudhuri 1990:261). There never was any connection between irrigation and

¹⁶ For ancient Egypt, see Eyre 2004. Lansing’s studies (1991, 2006) of Bali’s social organization around irrigation is instructive.

centralized state power outside of the concern for revenue.¹⁷ The king could be a director, but it was the actors-- the local elites and the growing bureaucracy-- who were the players on the stage of a dynamic and variable ecosystem. The outcome could be rather different than the script. We come to a subtler understanding of political power in Egypt.¹⁸

There was no despotic centralized state power as a consequence of irrigation, there was no state bureaucracy in charge of managing the irrigation system in ancient Egypt or under the Ptolemies. The environment led to a flexible state response, not to centralized planning of the economy (or anything else for that matter). The king could set the tone, send signals about expectations, display aspects of the divine, but the bureaucracy was set apart.

The resource curse predicts that the reliance on a resource by the state inhibits political development. In modern theory, the reliance on mineral or oil resources prevents democratic development or the transition to democracy produces a rentier state that can rely on a resource to generate revenue without the need for taxation. That situation was never possible in ancient Egypt. The question with respect to Egyptian history is: why did new phases of centralization, even states formed from the outside and/or by foreigners keep re-establishing a pharaoh-centered state? The Egyptian king functioned, as the ancient texts precisely say, as the center of order, of cosmos, political stability in a chaotic world. The pharaoh was the center of the state equilibrium (note the extensive semiotics of order associated with Egyptian kingship), and that equilibrium in large part

¹⁷ O'Leary 1989:252. Cf. Butzer 1976:110.

¹⁸ Eyre (forthcoming).

was dictated by the Nile river. The king, thus, served as the link between centers of production, as the coordinator of the state system. This is often neglected in discussions of Egyptian kingship, but it is the most important aspects of the institution, for pharaoh stood as the main institution linking local irrigation basins and agricultural production to the central state apparatus.

9. Conclusion

This paper has argued against this despotic model linking irrigation to centralized economic control of resources, and advances a more complex social model. Flood recession agriculture yields high output per unit of labor, but no direct royal involvement in the administration of water. It was always the control of labor that was decisive in Egyptian economic history.¹⁹ Egypt was not cursed. States are not static, closed systems, but rather open, dynamic ones subject to external and internal forces. A stable state equilibrium, often achieved over an extended period of time in Egypt, struck a balance between local society and central state institutions. This required political processes between the king and local, temple-centered society. The result created some of the most impressive monuments, literature and a material culture in world history. The persistence of authoritarian rule in more recent history in part can be explained by path dependence, but there are no doubt other factors as well. But that is the subject for another day.

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¹⁹ See for example Allen (1997), Moreno-Garcia (2007).

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