Environment, Engineering and Authority; British Irrigation Engineers in Egypt 1882-1922

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Introduction

This paper is about how the British built the apparatus through which Egypt was incorporated into its empire beginning in 1882. The apparatus, which is known as the colonial state, had as its largest appendage a network of engineers who came to manage the functioning of the country’s irrigation system as well as facilitate its expansion through the construction of large works, such as dams and canals. It is the contention of this paper that this appendage of the colonial state was one of the most important tools for securing the British dominion over Egypt. The colonial state ascribed total control over the irrigation system to a small group engineers.

Of course, the power of the British was never as absolute as many of the documents that reach us would like to present it. From the perspective of the archive, it appears that these engineers and other officials were able to impose their will without having to negotiate a complex of preexisting interests or accommodate themselves to the balance of power in any given town or village. Contrary to this, the international interests that the British were forced to reconcile with was a struggle, in the archives as well as in the secondary literature on British Egypt. There are numerous examples of the Ministry of Public Works (MPW) curtailing its projects due to international pressure. These episodes were preserved in the historical record due to the appraisal that great power politics are of more significance than local, small-scale politics. Instances of resistance of Egyptian cultivators to the actions of the British irrigation officials appear only sporadically in the
archive, but these instances are an important reminder that power was never nor remains absolute.

In irrigation matters, the stakes were exponentially higher for the Egyptian cultivators than they were for the engineers. For the vast majority of Egyptians, access to water or lack thereof determined the difference between a successful harvest or destitution. This manifested itself in the peasants’ resistance to those diktats of British officials that affected their access to irrigation water. At points, this paper presents instances of power responding to resistance. But the response of power to resistance is as close as this paper can come to capturing the voice of the peasant. This paper is about power.

The argument of this paper is that the British secured their rule in Egypt through monopolization of natural resources, which was connected to the making of the state. While this may seem banal, the making of Egypt’s colonial state merits critical attention. Interrogating the state is relevant in an examination of natural resource management because of the interrelation between the environmental program of the British colonialist and the state building project they engaged in. The state, in changing the environment, also made itself.

The British engineers and administrators I study begin this critical assessment of the state. They introduce themes in the study of the state that have continued with contemporary political scientists. The statements and decisions of these engineers and
bureaucrats beg the questions this paper will try to answer. I will not leave the state as a concept with an assured understanding, a natural phenomenon or one that is what it claims to be. The way individuals articulate their understanding of the state, explicitly or implicitly, is essential to my thesis. Since the monopolization of natural resources was essential for the state to secure its authority, changes in the way the environment was managed or the way the state functioned are coeval phenomena. In the process of controlling the natural environment, the state was itself affected by that environment.

The paper begins with a description of the invasion of Egypt by the British army. During the campaign, the both armies, in attempting to control a natural resource, were themselves affected by the resource. Examining the movements of two armies within Egypt during the summer months of 1882 demonstrates the centrality of artificial water works in the campaign. The canals traversed by the forces were not merely objects to control; they also affected that very process. The canals imposed themselves on the tactics of each army. After reading the events of these battles, I describe the process by which the British began building their state. Public works projects were central to the reason for the existence of that state: which was to make Egypt more productive and further its incorporation into the capitalist world economy. But the methods the state deployed to manage these works were different from the way it organized other areas under its management, such as the ministry of interior. Whereas disciplinary practices such as precise specification are most emphasized in the current social-scientific thought on the modern state, the British engineers who built the largest appendage of the Egyptian colonial state were not
subjected to these strictures. Their conspicuously free hand in building and administering a system of perennial irrigation stands in stark contrast to the discipline and punish model emphasized in the social science literature. Furthermore, by demonstrating that environmental policies develop outside of individual contexts, this demonstrates that nothing about the Nile equaled despotism, as the famous hydraulic empire hypothesis of Karl August Wittfogel suggests. This paper searches for despotism in other sources.

Turning next to the most influential British engineer on the Egyptian ministry of public works, Colin Scott-Moncrieff, demonstrates the influence of engineering on governance. The state did not merely deploy the technical expertise of engineers but also their ideas about how to govern the systems they built. Control over the irrigation system is tantamount to control governing its users, the Egyptian cultivator. After which, we see how the policies Moncrieff and others initiated played out during and after the 1919 revolution.
Invasion

On the night of July 11th, 1882, fifteen British ships were positioned in the western harbor of Alexandria, Egypt. The eight Ironclads, three gun-vessels, a torpedo-vessel and a dispatch boat kept their lights extinguished. The 5,728 men aboard these ships maintained almost perfect silence. On shore, thousands of residents began to flee the impending destruction, passing on their way reinforcements joining the Egyptian Army already positioned in the city under the nationalist command of Ahmad Arabi.

The sea around Alexandria was calm and the weather was clear when at 7am the following morning, the British fleet opened fire on the city of nearly a quarter of a million residents. After two days of bombardment, 160 British marines and 250 blue-jackets disembarked their ships and quickly took control of the city as the Egyptian forces regrouped to the north at Kafr Dowar.¹ Over the next five days British troops continued to pour into Alexandria in preparation for an offensive against the Egyptian forces.

Engineers followed rapidly on the heels of British soldiers. Immediately after British marines and bluejackets brandishing Gatling guns secured the main arteries into the city, work began on repairing drawbridges.² Beyond enabling the movement of the army through repairing infrastructure, engineering concerns quickly shifted to supplying the city with drinking water.

² Charles Royle, *The Egyptian Campaigns* (London, Hurst and Blackett, 1899)
Since 1815, the Mahmoudieh canal, which stretches 50 miles from the Rosetta branch of the Nile to the Mediterranean Sea, supplied Alexandria with drinking water. As the war made its way from sea to land, this artificial body of water became the first objective in ground campaign, and gave a frame of reference to both sides of the battle. The canal, being a central object of control, affected how the British officers understood the geography of the battle. Arabi, in his retreat did not simply move north, he moved upstream. Throughout the campaign, canals and the flow of water would determine the course of the battle.

In the days before the bombardment, the large foreign population of Alexandria began to flee. J.E. Cornish, the European manager of the pumping station, which fed the water to the city from the Mahmoudieh canal, stayed behind. Mr. Cornish was one of the many Europeans employed by the Egyptian government, a practice that had begun in and greatly expanded throughout the 19th century. Even without an explicit military function of his position, Cornish deployed an elaborate defense system for his pumping station. The steam used to power the engine for pumping water into the city was converted into a deadly weapon for defending the works. Jets were constructed to blast fatally scalding

3 United States Department of State, *Canals and Irrigation in Foreign Countries: Report from the Consuls of the United States in Answer to Circulars from the Department of State* (Washington 1890) p.269 Alan Mikhail argues that the overhaul of the canal, formerly the Ashrafiyya Canal renamed Mahmudiyya after the Ottoman sultan Mahmoud II, represents a pivotal moment in the transformation from small-scale local irrigation projects requiring tens to under one hundred workers to large public works projects. These ambitious projects were enabled by and saw the emergence of numerical technologies, which is a key indicator of a new form of governance. Alan Mikhail, *Nature and Empire in Ottoman Egypt; an environmental history* (New York: Cambridge University Press, 2012) 242-296
steam at anyone who Cornish deemed a threat. In addition he set up a line of explosives able to be detonated by electricity. The pumping station included a manager’s residence, the upper floor of which Mr. Cornish converted into an arsenal where rifles and ammunition were stockpiled. This crow’s nest also doubled as an observatory of destruction. Cornish and his nine subordinates (also European) ‘watched the progress of the bombardment, until the shot and shell which whistled overhead from the vessels firing at Port Pharos compelled them to descend.’ Mr. Cornish’s preparations were unnecessary, however, as no attempts were made to enter either the pumping station or the manager’s residence, even as thousands of ‘rioters’ and ‘natives’ passed by in their flight from the carnage.

After capturing the city and disposing of corpses, the next objective for the British—and Arabi, as well—was control of the canal. Soldiers from the retreating Egyptian army had stopped the steam engines that pumped water to Alexandria and prevented the engineers working at the station from restarting the engines. Later, Arabi constructed a dam near his base at Kafr Dowar and the water level reaching Alexandria began dropping rapidly. In response, the British appointed a commission to develop a solution to solve the looming water shortage. The commission forbade the unauthorized use of steam pumps and water wheels and the Royal Engineers organized the clearing out of ancient Roman

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4 A few days later Granville suggested that if Arabi wanted to negotiate a surrender, cutting his dam would be interpreted as a act of good faith as J.E. Cornish reported that the water level in the canal was so low, Alexandria would be without water in a fortnight. Correspondence respecting the affairs of Egypt n. 17 1882 P. 186 no. 357 and P. 213 no.428
water cisterns. The British could also rely on the distilling technology aboard their ships such as the H.M.S Supply stationed at Malta. But these proved insufficient as the water collected in the cisterns was brackish, and the distillers on British ships could only condense enough water to supply the army of occupation. Thus, the first objective of the ground campaign became ejecting Arabi from his position on the canal and clearing the obstruction. The British consul telegraphed Lord Granville for a mandate for this purpose:

if Arabi’s plan succeeds the rest of the population of Alexandria will be obliged to go further inland, or to take refuge again on board ship. The only means of preventing Arabi pasha from carrying out his scheme is to drive him from his present position, and this cannot be attempted under present orders and with the small force hitherto landed [emphasis added]

The British advanced along the route the Mahmoudieh canal, which shaped the tactics of both armies. On the 21st, troops began moving east to Ramleh. At the same time, the water crisis in Alexandria was exacerbated when Arabi diverted the brackish water of lake Mariout into the Mahmoudieh canal downstream from the dam he built a few days prior. The army took up defensives position near a water-works building positioned on

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5 Royle, *The Egyptian Campaigns* (London, Hurst and Blackett, 1899) 17
6 Correspondence respecting the affairs of Egypt n. 17 1882 p. 180 no. 341
7 It is questionable weather Arabi had diverted water from the Mariout lake. A constant problem with this canal was that sea water would constantly seep through the thin delta. Mikhail...
the Mahmoudieh. For the next few days attacks would descend on the British position and retreated via this waterway.\(^8\)

After two-weeks, the first major engagement occurred at Millaha a few miles east of Ramleh. The British conducted a scouting operation, but the contingent was forced to straddle the canal thus dividing the force between the east and west banks of the canal. This was of no minor concern to commanders. Concentration of force was a central tenant of military strategy and there was concern that an Egyptian force could easily outflank them.\(^9\)

Even up to the closing days of the campaign, canals continued to play a crucial role in structuring warfare. In August, the British secured the Suez Canal and occupied Ismailia. As happened earlier in Alexandria, after landing troops, the British were driven further inland as a result of dammed waterways. Ismailia, a major city midway on the Suez Canal was the staging area for the second theater of the campaign. The Fresh Water Canal, which connects with the Nile just south of Cairo, supplied Ismailia with drinking water. And as in Alexandria, the retreating Egyptian army moved upstream to the west in the direction of Tel Al-Kabir and constructed dams to deprive the city of its water supply. And on August 24\(^{th}\), the British advanced with the objective of reopening the canal.

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\(^8\) For example, on August 31\(^{st}\) Bedouins attacked the Ramleh position and forced a contingent of British soldiers to retreat. When they regrouped and counter attacked, the Bedouins retreated along the banks of the canal. Royle, *The Egyptian Campaign* (1886) 217

\(^9\)ibid
The first dam, at a village named Tel al-mahuta nine miles to the west of Ismailia, was a simple earthwork and was cleared when a disabled dredge was repaired and operated on that section of the canal.\textsuperscript{10} On the 25\textsuperscript{th} of August, upon occupying an area a few miles further west at al-Magfar, the British encountered a more formidable obstruction that was constructed of layers of sand and bundles of reeds lashed together with telegraph wires. According to Charles Royle “The events of the day may be shortly described as a successful attempt to seize the dam.” British engineers had difficulties in clearing the obstruction. The dam proved impossible to cut by hand. Explosives were then used but even after blowing a hole through the dam, sand would filled in the gap, at which point the engineers set to clearing the sand with shovels and pickaxes. Only after three days the dam was cleared. If dam construction had to be abandoned, water could be rendered as a weapon of war in other ways. The British found corpses of men and horses heaped into the Canal. Royle attests to the importance of the canal in driving the battle forward: “To secure the water supply it had become necessary to push forward... the men weakened by prolonged exertion under terrible sun, were forced to live for two or three days on biscuits and muddy water, flavoured only with the dead bodies of Egyptian men and horses.”

Meanwhile, the British pushed further upstream to secure a canal lock at the village of Kassassin, which was occupied on the 26\textsuperscript{th}.\textsuperscript{11} As was the case with the first major

\textsuperscript{10} Goodrich, \textit{Report of the British Naval Operations} 251
\textsuperscript{11} Royle, \textit{The Egyptian Campaign} (1886) 291
engagement at Millaha, the canal divided the British force. While a bridge connected the
two banks at Kassassin, if the force had to advance or retreat, the forces would be
completely separated from each other, greatly hindering the ability of army to outflank an
attack.\textsuperscript{12}

While the canals presented challenges to the British, their vastly superior material
resources and manpower assured their success. From their position at Kassassin, the
British controlled a major lock on the Fresh Water canal, ensuring the water supply to
Ismailia. With this major city on the Suez Canal secured of potable water, it would become a
major staging port through which British forces and supplies could be unloaded and moved
to the front. After a few weeks, nearly 100 transport ships were docked at Ismailia. The
security of the canal thus allowed an amassing of troops and supplies necessary for a final
assault.\textsuperscript{13} On September 13\textsuperscript{th}, 1883 the British moved from their base at Kassassin to
attack the Egyptian army stronghold at Tel al-Kabir. The army under general Arabi was
dispersed and the British moved to take Cairo. Even after the majority of his army deserted,
Arabi commanded his officers to cut dykes along various canals and inundate land to slow
the advance of enemy to Cairo.\textsuperscript{14}

These few examples show that at nearly every turn during the invasion, control of a
canal is cited as the reason to carry the battle forward. From the perspective of Arabi and
the Egyptian army, canals proved a vulnerable site at which to deprive the invading army of

\begin{footnotes}
\item[12] Royle, \textit{The Egyptian Campaigns} (1886)
\item[13] ibid 304
\item[14] ibid 339
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resources and hinder its movement and we can assume Arabi understood the advantage of canals in dividing invading forces in two. Canals, such as the Fresh Water and the Mahmudiyya, propelled the conflict forward, determined the movement of troops and imposed themselves on the tactics of each army. After the Egyptian army was defeated and the British army was uncontested, control of water would continue to be of the utmost importance.

**Solidification**

These few months in the summer of 1882 were the beginnings of an occupation that would last more than 70 years. Certainly, the British presence in Egypt was much more than a military endeavor. Politics precedes and directs violence. Charles Royle tells us that the military action was directed toward a particular goal.

‘Sir Garnet Wolseley’s instructions were to take command of the army ordered for service in Egypt *in support of the authority of the Khedive* to suppress a military revolt in that country. He was told that his majesty's Government did not wish to fetter his discretion as to the particularly military operations which might be necessary, but that *the main object of the expedition was to re-establish the power of the Khedive.*’[Emphases added]

Military violence was essential — and even normative objects, such as a J.E. Cornish’s steam engine, could be refitted for violence. But even from the earliest days of the occupation,

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15 I have not mentioned the Suez Canal, which might fit this model, because concerns over the world’s most important canal centered around movement, not water resources. and 16 Royle, *The Egyptian Campaigns* 110
power and authority were intimately bound up with the monopolization of much more than violence. The measures taken to control the flow of water were equally central to asserting authority—this becomes more explicit in discussing the policies of the British after the cessation of hostilities in the text below. Just as the war was waged along artificial waterways and hinged on these structures, the British project in Egypt would rely on these very same canals. Colonialism begins at this moment when explicit violence comes to an end, on the canals that carried battles forward. This water speaks to a form of violence other than warfare. In order to examine the way control of water was rearticulated under the new order initiated by the British invasion, we will need to turn our attention to the state they built.

The particularities of the Egyptian state at this time are well known. But what goes unexamined in the literature are the actual thoughts of the administrators themselves on what this governing apparatus was. Their definitions oscillate between two poles: between the humanistic and schematic or mechanistic aspects of governance and the state. The dichotomy these administrators erect is of remarkable resemblance to scholarly literature on the state up even to our present time. This dichotomy is important because it intersects with natural resource management in interesting and pronounced ways. How the Nile’s waters were to be captured and distributed was a question that involved this tension in the state. Was it the person, or the manner in which he (and these persons were only males) was a part of the organization of the state? We receive different answers to this question depending on the time of the statement or the particular official making it. But this tension is always central to the endeavors of the Ministry of public works.
As Royle told us above, the goal of the expedition was to reassert the authority of the Khedive. The Khedive remained, and the Sultan, too. But then Egypt was incorporated into the British Empire. So while the power was with the British, the authority was with the Khedive. The King ruled, but he did not govern. The British sought to rule invisibly.

The British home government accomplished this by appointing ‘advisors’—all of whom were British nationals—to the various ministries of the Egyptian state; most notably the ministries of interior, finance and public works. But British nationals also occupied the provincial posts of these ministries. These officials, known as inspectors and subinspectors, were responsible for monitoring the work of native subordinates in carrying out the orders emanating from the ministries head quarters in Cairo. The British governed Egypt through this arrangement of staffing the Egyptian state with British nationals.

The particular 19th century European rationality, familiar to students of imperialism, diagnosed the problem of non-west as the arbitrary rule of despots. Under capricious government, disorder reigned. So in a contradictory logic, absolute authority amounted to disorder and disorder caused a breakdown of authority. Regardless of the contradiction, if the mission of the British was in support of Khedival authority, this meant

17 As is well known, technically, on paper, that is, Egypt was still an eyalet of the ottoman empire until 1914.
18 Even after 23 years of the occupation this situation remained. 1906 a request was made by the Khedive to the British government for permission of irrigation officials to wear ottoman medals (Order of Osmanieh and Order of the Medjidie) TNA: FO 372/8
19 “Egyptian and Sudanese Civil Service: Information to Candidates” p.3, TNA: FO 371/67
the British mission could be nothing other than establishing order. According to a 19th century European, restoring order meant nothing other than building and/or strengthening the state. The essential means of accomplishing this goal was through public works projects. The contradictions between the structural and humanistic/racist aspects of the British understanding of order came to heightened contrast in the MPW. In the ways in which the ministry was organized internally and relative to the state writ large

So on the one hand the problem was the arbitrariness of rule associated with the unrestricted rule of an individual, but on the other hand we see the importance of individuals, particularity the race of those individuals. However, we always encounter the individual as juxtaposed to his place in the machine. We will see attempts by officials in the Ministry of public works to reconcile ideas about the structural versus the humanistic elements of the state, but for now it may be helpful to turn to the most notorious of all British officials in Egypt, Consul-general Evelyn Baring, better known as Lord Cromer, to see the general outline of what I have been talking about in the words of an official himself.

In the first four chapters of the second volume of his Modern Egypt, Cromer describes the works and reforms of each ministry since the British occupation. He describes what he has written so far in the work as a description of "the machinery of Government in Egypt in so far as the different parts of the machine can be described by

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20 Cited in Hibba Abugideiri, Gender and the Making of Modern Medicine in Colonial Egypt (Burlington: Ashgate, 2010) p.76
reference to the documents setting forth the official functions which are assigned to the various individuals and corporations who collectively make, or, at one time, made up the governing body." He goes on to tell us however that “this description is, however, incomplete; indeed, in some respects it is almost misleading; for allusion has so far only been made to those portions of the State machinery whose functions can be described with some degree of precision. There are, however, other portions of that machinery whose functions are incapable of exact definition, but whose existence is nonetheless real.” We see the potency of the structural view of the state. Aspects of the state not inscribed on paper must be affirmed to exist. These are positions within the machinery of the state no doubt, but the state cannot quite codify their responsibilities. Cromer goes on to tell us that these ambivalent positions are in no way ancillary either and in doing so again reaffirms the understanding of the state as organized atoms. He says: “Whether, in fact, the whole machine works well or ill depends in no small degree upon the action of those parts of the machinery, which, to a superficial observer, might appear unnecessary, if not detrimental to its efficient working.” The superficial observer in this statement can stand in for us as the rationality of Cromer’s contemporaries. This self-consciousness, the fact that he must defend his arbitrary power, demonstrates that it was assumed that the state, all of its functionaries and their functions, should be represented in writing, and any divergence amounts to disorder: defects in this system of government are obvious. Its only justification is that, under the existing condition of the affairs in Egypt, it is impossible to substitute

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22 ibid 322
anything better in its place.”23 We will read nearly identical statements written by engineers in the MPW.

Our discussion of Cromer has set up a dichotomy we encounter in literature of various genres, scholarly and other, whether thinking critically or not, about something called the state. On one side is placed mechanicalness, precision and specificity, all of which must be specified on paper, all of which ‘can be described by reference to the documents.’ Juxtaposed to this precision is an ambivalent figure, ‘whose functions are incapable of definition,’ a charisma. In two words, people versus institutions.

In the 1980s and 90s political scientists began to debate the concept of the state. Dubbed the ‘neo-statists,’ scholars such as Theda Skocpol, attempted to demonstrate the analytical usefulness of viewing the state as independent of society, as ‘a structure with a logic and interests of its own not necessarily equivalent to, or fused with, the interests of a dominant class in society or the full set of member groups in society.’24 Gabriel Almond published a harsh critique of the ‘neo-statists,’ including Skocpol, accusing her of turning a blind eye to the large body of political science literature on the state that spanned most of

23 Cromer, Modern Egypt Vol. II 321-322
24 Theda Skocpol States and Social Revolutions (New York: Cambridge UP, 1980), p.27
the twentieth century.  

Almond asserts that the literature has consistently problematized the state-society boundary since at least the 1930s.

Timothy Mitchell offers an original answer to this debate. He takes the modern state to be produced through the routine discipline, the origins of which Foucault traces to emergence of the modern prison, army barracks and school. To Mitchell, the state does not merely discipline, but is also produced through those forms of confinement and regulation:

‘The precise specification of space and functions into hierarchical arrangements, the organization of supervision and surveillance, and the making out of time into schedules and programs all contribute to constructing a world that appears to consist not of a complex of social practices but of a binary order: on the one hand individuals and their activities, on the other an inert structure that somehow stands apart from individuals, precedes them and contains and gives a framework to their lives. Indeed the very notion of an institution, as an abstract framework separate from the particular practices it frames, can be seen as the product of these techniques.’

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25 Gabriel Almond “The Return to The State” *The American Political Science Review* 82:3 (Sep., 1988)
26 Timothy Mitchell, “The Limits of The State: Beyond Statist Approaches and Their Critics” *The American Political Science Review* 85:1 (March 1991) p.94 It seems Mitchell’s definition is highly influenced by Foucault’s 1978 and 1979 at the Collège de France. In these lectures we receive two seemingly contradictory statements. Foucault says, on the one hand, that he avoided a theory of the state “in the sense that one abstains from an indigestible meal.” And on the other, “maybe what is really important for our modernity—that is, for our present — is not so much the étatisation of society but the “governmentalization” of the state.” He locates the state within particular and historically contingent rationalities of governance. Here, the word governance is deployed outside of strictly political overtones, which the word acquired only in the eighteenth century. Before the more narrow and explicit association of the word with the state, governance simply referred to management
But this concern with, and preference for a particular kind of, order was only one aspect of governance. The Anglo-Egyptian state was created and affected by a rationality that was not limited to formal statecraft. Engineering projects were a cornerstone of the colonial project. Through these projects, the state reached into the lives of more Egyptians than it had ever before. This was accomplished by an exorbitant scheme of perennial irrigation. A handful of engineers directed the creation of canals and dams. But more importantly for examination of statehood, these few engineers held total control of the administration of the system they built. The Egyptian cultivators encountered the state not just through a built system, but through that system as administered by these engineers.

The way this system was administered is diametrically opposed to the kind of disciplinary practices that are applied to the state. The engineers were not oblivious to their ambiguous authority either. They understood that the unrestricted authority they exercised over the irrigation system was anachronistic. Just as we saw with Cromer in the quote above, the engineers felt compelled to justify their ambiguous and arbitrary authority. In the next section, we will see arguments in support of the engineers’ unfettered authority. These arguments were based on a rationality, which developed in India decades earlier — where many of these engineers were previously employed — and was intimately concerned with administering the systems they built.

or regulating conduct. It is only with the modern age that the state becomes an object to be regulated. See Gordon, The Foucault Effect (Chicago: University of Chicago Press, 1991) p. 103. Thomas Lemke, “Foucault, Governmentality, and Critique” Rethinking Marxism: a Journal of Economics, Culture and Society 14, 3 (Fall 2002) 50-51. Gordon, Governmental Rationality: an introduction p. 27
How were state policies actually enacted? And, perhaps more importantly, in what ways did action of state functionaries transgress or diverge from the ordering of the state, as it existed on paper? The state specified Cornish’s function, but in militarizing his pumping station, Cornish stepped outside of that function. It was not only steam that diverted from its usual function; Cornish also diverged from his normative duties of pumping water in a canal. Throughout the history of British occupation of Egypt, the boundaries that were meant to order the tasks of engineers like Cornish and other state functionaries—from cartographers to policemen, from tax assessors to agricultural scientists—were never secure in giving order to actions of state functionaries. This everyday practice of the British engineers had a rationality of their own. The state could be seen to exist through distinctions, but the way it exercised its authority rarely conformed to such divisions. For this we need to look at individuals who identified with the state and examine their particular understanding and exercise of authority.

To summarize briefly: the British secured their authority through a state that took as its largest endeavor public works projects. Within this state generally and explicitly within the MPW, a tension is detectable between governance as the quality of individuals and governance as a particular order encompassing individuals. These ideas had real consequences in how the Egyptian peasant encountered the state.

In addition to the state on paper and the practices of its people, there remains another figure to reckon with: the ecosystem of the Nile valley. The engineers believed they could assume full control of this environment to increase its agricultural productivity
exponentially. However, the British could never assume full control of the Nile or the Egyptian cultivators. Their efforts, while initially successful, continuously provoked environmental crises. When the British were confronted with the unintended consequences that their project produced, the administrators often sought to solve the problems by changing how the state was ordered. For them, the problem was not the basis on which their project rested—incorporating Egypt into the exploitative relationships of the capitalist world market— but was a problem in the machinery of the state.

**Egyptian Agriculture and Engineering Methodology**

In February 1883, Frederick Hamilton-Temple-Blackwood, the Earl of Dufferin, had been in Egypt for less than three months when he submitted his inaugural report to foreign secretary Earl Granville. The report identifies what Dufferin saw as the ailments afflicting Egyptian society and recommended appropriate cures. The substance of Dufferin’s report would remain the paradigm for British interventions into the Egyptian natural environment for more than 40 years. The fundamental assumptions on which Granville’s assessments and proposals rested would go unchallenged in the minds of British administrators until the establishment of the Egyptian constitutional monarchy in 1922, following the spectacular nationalist uprising of 1919.

For the British officials, agricultural output was the direct outgrowth of irrigation.

The wealth of Egypt springs from its soil, whose fertility is entirely dependent upon irrigation. Year after year the Nile conveys in its affluent
waters richer treasures than did ever the fabled Pactolus. A proportion—but only a small proportion—of these have in all times been intercepted and spread by artificial means over the level lands which subtend its course, while the remainder are engulfed by the sea. There can be no doubt that if a complete and scientific scheme of canalization and irrigation were adopted, not only could Egypt be rendered independent of the caprices of her river, but its fertilizing forces, which are inexhaustible, might be carried into districts which, though now desert, only require the presence of water to blossom like a garden.27

This small passage iterates three assumptions on which 40 years of British agricultural policy in Egypt would be based.

First, that the ‘fertilizing force’ of the Nile was inexhaustible. The British comprehended the river in literally mythic dimensions. The Pactolus River of eastern Anatolia, which in Greek mythology endowed King Midas with his golden touch, paled in comparison to the wealth contained in Nile’s productive forces. Second, that the water, which flowed into the sea, was wasted. The entirety of the River’s waters should be put to productive use. Only a small portion of the river was used at the time Dufferin was writing. The rest ‘are engulfed by the sea.’

Third, that water alone was necessary for agricultural production. It had the power to make a desert ‘blossom like a garden.’ In this conception, the immense complexity of biologic propagation is reduced to a calculation in which dry land plus fresh water equals life. Factors such as soil quality, temperature and even human labor are irrelevant in this

27 TNA: FO 141
understanding of the social and environmental factors at play in the practice of agriculture.\textsuperscript{28}

This understanding of the Nile is developed by a particular frame of reference. This becomes evident when we consider that the above statement is included in Dufferin’s report under the title ‘Irrigation and Canalization [emphasis added].’ The assumptions of the British administrators about the natural environment—and, as we shall see, the social environment as well—were only formulated with an understanding that they were objects of a verb, the passive recipients of colonial intervention. Dufferin further places limits on our field of vision with respect to what should be considered when initiating such a project. Readers of the report are to conceptualize the massive project that canalization of the world’s largest river entailed as comprising three clearly defined aspects: construction of new works, repair of existing works and control and distribution of water.

For the topics of infrastructure, Dufferin restricts his reporting the impediments to canalization. He does not advocate a course of action. The plan was explicit in the framing of his study: canalization. For a British colonial administrator, this was an easy assumption to arrive at. It was an axiom that became implicit to their way thinking by way of over a half-century of experience in India and thus did not require explicit statement or

\textsuperscript{28} This type of simplicity is what James Scott describes in \textit{Seeing Like a State} Irrigation was the only legible aspect of agriculture. Thus it was the only aspect of agriculture the state attempted to manipulate. James Scott, \textit{Seeing Like a State; how certain schemes to improve the human condition have failed} (New Haven: Yale University Press, 1991)
justification. What was in need explanation was how to deal with a preexisting bureaucratic structure regulating the distribution of water, something the British had not encountered before.

The first two sections, dealing with physical infrastructure, are quite concise relative to his treatment of control and distribution of water. Here, Dufferin concerns himself with describing the obstacles in the way of enacting public works. International rivalry and the wealthy Egyptians, who owned steam engines and earned substantial profit from pumping water unto fields, stood as obstacles to the construction of new canals. In terms of the existing infrastructure, the main issue was that the task of repairs outstripped the labor capacity of the country and that the principle organizing the labor was the corvée. Of course, the solutions are implied by what the report choose to describe. Thus, in bearing witness to the corvée, international meddling and upper class interests, they are scheduled into the playbook for adjudication. Dufferin does not give specifics of how this would be accomplished. But we can discern how the authority to reform would be distributed.

With the subject of the control and distribution of water, the intervention comes into the fore along with the agent charged with its implementation: the British irrigation engineer.

The solution was a reflection of the problem Dufferin describes. ‘They arise chiefly from the arbitrary powers with which the engineers are entrusted who regulate the
construction of dams and sluices and the erection of pumps to suit the convenience of rich proprietors or of the influential inhabitants of large villages.'

But the report then suggests an Indian trained British engineer ‘should be given entire charge of the irrigation service, with full power and regards the care and repair of old works, the distribution of water and the employment of labor, the erection of pumps, the dismissal of incompetent and untrustworthy employés.' While Dufferin thought this would be a single position in the central administration, it was expanded to seven engineers in their own province.

Dufferin’s characterization of Egyptian irrigation reads much like a body of antecedents, which commented on that developed since the mid-nineteenth century. England’s environmental policy for Egypt was determined well before the British marines landed in Alexandria. As we saw, an observer like Dufferin constructed broad topics such as Egyptian agriculture or ‘the fellahin,’ selecting particular aspects for discussion. What features of rural life receive attention and the ways in which these were represented as problematic reflected a particular rationality of government. While it had a great deal in common with that of the former regime of Khedives, this particular rationality developed outside of Egypt. Thus, the descriptions offered and the policies adopted by the colonial administrators tell us less about Egyptian society than they reflect a particular understanding of how to govern, an understanding that emerged out of the historical circumstances of the colonial power. In this way, we can foresee the policies adopted by the
colonial state after 1882 in academic texts, memoirs and institutions created earlier in the century.

Over the course of the 19th century, a substantial body of literature commenting on Egyptian rural life and agricultural production are evidence of the knowledge held by the British administrators. We can also read in these texts a coherent liberal critique of the non-European society. Much of this material follows a trajectory whereby scientific and technological advances occurring in Western Europe and North America are used to justify imperialist policies of the governments of these regions. This attitude is manifested in these texts in that the observations of their authors begin with a perception of their objects of study as problematic. The state of irrigation infrastructure increasingly receives attention in the literature beginning just prior to mid-nineteenth century. For example, a report delivered to parliament in 1840 begins:

The desert is annually encroaching on those lands that are waste, and these encroachments proceed from want of sufficient labor, capital and security, to cultivate the ground even on the banks of the Nile


30 Michael Addas, Machines as the Measure of Men; science technology and ideologies of western dominance (Ithaca: Cornell University Press, 1990) passim.
31 John Bowring, Report on Egypt and Candia (London: W. Glowes and Sons, 1840), 200
Later scholarship has demonstrated that, because of the policies of Muhammad Ali, many Fellahin began to desert their land rather than serving as forced labor on state projects far away from their families for months at a time.\footnote{32} Despite the recognition of the labor shortage, which scholars confirm,\footnote{33} the report goes on to articulate a strong belief that proper management of the irrigation should be the focus on any effort to improve the country.

The most important branch of agriculture of Egypt, and that which requires the utmost consideration, is irrigation...There is no branch of industry capable of more extended economy and improvement than the irrigation of this country. For the good management of which there ought to be appointed permanent competent surveyors and engineers\footnote{34}

It seems quite strange that while there was not enough ‘sufficient labor... to cultivate the ground even on the banks of the Nile,’ irrigation could be the ‘most important branch of agriculture of Egypt.’ It is clear that these observations were made with a particular form of irrigation in mind. An elaborate system of basin irrigation, whereby a chain of shallow pools were dug to capture the Nile flood along with its valuable silt, was prevalent throughout Egypt and could be observed at most places along the Nile. But perhaps it was exactly this locally organized system that the anonymous author of the appendix to John Bowrin’s report thought should be subjected to ‘extended economy.’\footnote{35} Only the

\footnote{32} Roger Owen, \textit{The Middle East and the World Economy 1800-1914} (New York: Methuen, 1981) 140-141
\footnote{33} ibid
\footnote{34} Report on Egypt and Candia, 202
\footnote{35} The author’s use of the word ‘economy’ is different from our contemporary understanding. Not the abstract entity that emerged in the 1930s, his usage reflects a more
technocratic management of uniform system of irrigation would represent ‘good management.’

In a later work, travel author Bayle St. John offers a common perspective on the relationship between the government, the Fellah as a subject of interest, agricultural production and technological innovation. This perspective seems to stand in contradiction to the justifications of technological superiority as a justification for colonial rule.

Meanwhile the Barrage, which, even if good in principle—a doubtful matter—was ludicrously disproportionate to the finances and state of civilization in Egypt, has for years interfered with the navigation of the Nile and seems not likely, for some time at least, to be put to the test. A prodigious system of canals, as yet traced out only upon paper, is a necessary part of the project; and it is difficult to say where the army of navigators required for their excavation can be levied, without inflicting almost irreparable mischief on the country.36

So by mid-century, irrigation becomes more specifically articulated as canalization. The canals, by remaining only on paper, prevented the Barrage from being productive. The classical understanding. Giorgio Agamben offers an illuminating etymology of the classical Greek ‘oikonomia’ literally ‘house management.’ Students of Foucault also discuss oikos in the context of early modern economic sovereignty of early modern governmentality that understood the state and society a relationship analogous to entrepreneur and enterprise. The government constructs an economic organization as well as regulates it. The mind set Foucault detects and Agamben expands its implications back to the church fathers into our contemporary word, setting apart every praxis creates a subjectivity, ‘as Foucault observes, it is possible that never before or since has the activity of government been perceived as so essentially interdependent with the government of the self, on the part of ruler and ruled alike. Giorgio Agamben Trans. Lorenzo Chiesa The Kingdom and the Glory; for a theological genealogy of economy and government (Stanford: Stanford University Press, 2011)

cultivators were equally responsible for productivity. They could accelerate agricultural growth as much as they could prevent it. And the state played a role in the peasants’ willingness to produce:

At once the instrument and victim of these mighty improvements, the Fellah lives on in unshaken belief in his shattered shadoofs, crazy sakias, and well-muscled arms. These Pharaonic works neither interest nor enlighten him. He sees in them only a powerful engine of oppression, would he be equally insensible to a model water wheel or an improved plough? Possibly: but the experiment has not been tried; at least with this necessary condition—freedom to use the acquired knowledge for immediate and personal advantage. I can perfectly sympathize with the Fellah who opposes impenetrable stupidity to instruction which is intended only to make him a more useful serf, and render him liable to greater oppression. The poor fellow wants money for himself not for you; and is an implacable struggle for wealth is the bane of civilized communities, it is only by giving it free play that barbarism can be educated. Man must be very vicious and contemptible animal, for he makes no progress unless spurred by his evil, or, at any rate, his least respectable passions. Ambition, cupidity, love of ease and pleasure—all these are the great motives to civilization, when the incoherent result so called is produced, it is time enough to appeal to nobler instincts; for such appeals made in vain would only generate disgust and discouragement, it is not necessary for young societies to know that the very principles which make their success, followed too long in spite of the preachings of amiable theorists, must inevitably bring ruin on the splendid fabric which at first they contrived to create.  

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37 ibid 63-64
So the problem with Egypt was its cultivators. The fellahin apparently lack the desire to be wealthy. This is because the state has placed a burden on them either through extraction of the surplus directly or by supporting an oppressive system of land tenure. The fellah was not considered what in classical liberalism is known as an economic subject of interest. This understanding of the Egyptian cultivator as incompatible with a market mechanism will have important implications for the way British engineers would manage Egypt’s irrigation system. For now, it will suffice to demonstrate that a particular diagnosis had developed for Egypt well before the British Marines landed in Alexandria. A common understanding of the ills of Egypt existed amongst even those Britons outside of government circles. This view would influence colonial policy.

In many respects the main contours of the British environmental policy had already been the guiding logic of the state created under the dynasty of Muhammad Ali, since his rise to power at the dawn of the 19th century.38 A significant difference between the Khedives and the British was one of disproportionate technical knowledge and financial resources. The high-level bureaucrats and statesmen in the British government who crafted the Egyptian policy could turn to a cadre of engineers trained in the British India.

38 Alan Mikhail demonstrates that the dynasty of Muhammad Ali was distinct from other Egyptian power formations operating within the Ottoman imperial system in the state’s centralization of irrigation repairs and commodification of labor. Alan Mikhail Nature and Empire in Ottoman Egypt (New York: Cambridge University Press, 2012) 4-5 and 170-172 Timothy Mitchell also describes the Muhammad Ali dynasty in similar way but emphasizing the representational and metaphysical dimensions of this shift. Timothy Mitchell Colonizing Egypt
And this had implications beyond merely access to a professional engineering class.

These men were trained in a particular methodology that had developed in the British military. This methodology emerged out of specific historical circumstances but soon spread to the rest of the world with the Empire as its vector for transmission. In specifying a set of values, the methodology of the British engineers also determined a particular way of seeing. I will trace the emergence of this methodology and demonstrate how it determined a particular vision turning then to its implications for the Egyptian environment as well as the colonial state.

Most of the men who directed the Egyptian ministry of public works were officers in the Royal Engineers.\textsuperscript{39} Officers of Royal Engineering Corps staffed the Indian public works department and the school of the Royal Engineers was also responsible for training civilian irrigation engineers in India. The scientific method of the Royal Engineers and the one taught in its institutions was one that stressed observation and praxis over hydraulic theory and calculations. A passage by a prominent lecturer at the Royal Engineers’ School of Military Engineering and Civil Engineering College at Roorkee offers an excellent summary of this methodology:

There are so many disturbing elements occurring in actual practice, especially where Nature works on such a gigantic scale, obliging the Engineer to follow in her wake, that the formulae which are based on the most careful

\textsuperscript{39} Scott Moncief
experiments carried out on a small scale in which the distributing elements are altogether wanting, are often quite inapplicable.\textsuperscript{40}

The emphasis on actual practice of designing and building structures implied that the engineer must be present at the site of construction.

The second aspect of the Royal Engineers methodology was an emphasis that it was economy that justified the utility of a work. The work, whether it be a dam, canal, weir or lock had to be estimated to increase agricultural production. All works were required to be monetarily remunerative.

Noting these aspects of the Royal Engineer's methodology, we can read how an actual engineer accommodated these principles in practice and the implications they held for the practice of colonial engineering. How does an individual, at once an engineer and an administrator, articulate his actions and responsibilities? The early writings of Colin Scott-Moncrieff provide insights into how the engineering precepts he would have learned in the institutions of the Royal Engineers were implemented, articulated in, and served to justify, a particular administrative ideology he articulated.

Moncrieff was born in 1836\textsuperscript{41}, in a small town south of Edinburgh and was educated at the School of Military Engineering in Chatham.\textsuperscript{42} Before completing his studies,

\textsuperscript{40} Col. F.H. Rundall, Lectures on the Irrigation works in India (Chatham: School of Military Engineering, 1876). quoted in Cookson-hills p.70-71

\textsuperscript{41} "Moncrieff, Sir Colin Campbell Scott-" British Biographical Archive, fiche location I 777,268-269;II 1662,21-27;III 403,137

\textsuperscript{42} Claire Jean Cookson-Hills “Engineering The Nile: Irrigation And The British Empire In Egypt, 1882-1914” (PhD Diss.,Queen’s University, 2013) 112
Moncrieff was shipped off to fight in the Sepoy War in 1858, where he participated in a minor campaign in Oudh. 43 After the war, Moncrieff worked under the Indian Public Works Department on the Eastern and Western Juma Canal and the Great Ganges Canal.44 From 1861 to 1864, he was on staff at the Thomason Civil Engineering College at Roorkee before assuming the position of Executive engineer on the Eastern Jumna Canal and finally in 1869 as superintending engineer of the northern division of the Ganges Canal, a post he retained for ten years. In 1881 he became Chief Engineer in Burma, retiring from Public Works Department January 23rd, 1883. 45

In his earlier employment in the government of India, Moncrieff was commissioned to examine the irrigation works of southern Europe. It is in this work that we see the development of this thought.

From the first few pages in his introduction Moncrieff highlights the relationship between Irrigation works and its connection to governance:

On most points (not on all, however) our engineering is quite as good as any on the canals of Europe. Our distribution of water in India is effected with at least equal economy; and if our system fails woefully in calling forth self-government on the part of the irrigators, most people qualified to judge will probably say that this is inevitable. 46

43 Lieut.-Colonel E. W. C. Sandes The royal Engineers in Egypt and the Sudan (Chatham: institute of the Royal Engineers, 1937) p. 371
44 Mary Albright Hollings, The life of Sir Colin Scott-Moncrieff (London: John Murray, 1917) p.54
45 Sandes The royal Engineers (Chatham) p. 370
46 Colin Scott-Moncrieff Irrigation in Southern Europe iv-v
So Moncrieff admits that engineers were not bound to any outside authority concerning how the irrigation system in India was developed and operated. Neither were they bound to a regularized or codified code specifying how water was to be distributed. As far as the state was concerned, the engineers who designed the works, supervised the labor and monitored and policed the use of the waters were the sole dispensers of justice in irrigation matters. What is interesting is that the author offers a self-conscious defense of this authoritarian engineering. Justice equaled economic distribution. His words also imply justice would also include ‘calling forth self-government on the part of the irrigators,’ but then those ‘qualified to judge’ would absolve the engineers of injustice as this authoritarianism is inevitable. No doubt this justice was arbitrary, which is admitted in other accounts, which we will return to later.

Later in the work Moncrieff has more to say about the engineer’s responsibility to manage the system he has constructed, his relationship to the cultivators who use those systems and why engineers in India should not concern themselves with ‘calling forth self-government on the part of the irrigators:’

It is true there are some engineers pure and simple, whose interests are centered on their works, to the exclusion of every other idea, and who are contented to look on these works as an end, and not as only a means to an end; and it is unwise to employ men of this character on the direction of running canals. There ought to be always ample scope for their abilities in those under construction of new works. But most of the canal engineers find their chief interest in watching the spread of the irrigation under their charge, and in arranging that each cubic foot of water shall be made to do its utmost duty. They feel their professional credit depends on this, and so can
surely be trusted to distribute the water with care and economy. From them half the interest of their work would be at once removed if they were told that they were responsible for nothing beyond the state of masonry works and channels. Even these very works they would be unable to do as well as at present, for all those who are acquainted with the Hundustani character must know how much influence they would lose were they deprived of the entire control of the waters, and how very useful this influence is in enabling and officer to carry on works in India.

Clearly economy is the crux of the engineer’s enterprise. But efficient distribution of water relied more on activities other than construction of works. We are not told what these measures might include. But then this is up to the engineer’s discretion. This is what authority means, the ability to do as one wishes and this can be nothing other than ambivalent. To Moncrieff, entire control of water, influence—or we might say authority—and the expansion of irrigation are co-constituted. Without the ability to exercise complete discretion over every aspect of the system, not only will the engineer himself lose heart in his enterprise, but the character of the subject-race will become an obstacle.

We thus see how Irrigation came to be associated as the central factor governing the agricultural health of Egypt. Other factors such as labor power and ownership patterns became subordinate aspects. Governance would thus place a heavy emphasis on expansion of irrigation. The manner in which the state went about this expansion as well as the way the system would be operated was also determined outside of Egypt. We now turn to the implementation of these policies in Egypt.

47ibid 192-193
Colin Scott-Moncrieff and Foundations of the Ministry of Public Works

The British takeover of the Irrigation system began late at night on March 26th, 1883, with a telegraph sent by Lord Dufferin to Royal Engineer Colin Scott-Moncrieff. Moncrieff was staying at the Suez Hotel on his journey home, retiring from a lengthy service in British India and Burma.

On May 31st, Moncrieff met Lord Dufferin who offered him an appointment as inspector-general of Irrigation with a salary of 2,000 pounds. The importance of the position was recognized from the very beginning. In Moncrieff’s words, ‘as he [Dufferin] picturesquely expressed it, he handed me keys to the whole Nile.’ 48 Moncrieff was encouraged to continue his trip home and think it over. 49 In April, he accepted and on May 3rd, he returned to Egypt. Moncrieff insisted on a lengthy six-month inspection of the country before he would give any orders. In a letter dated July 8th, 1883 we are told:

... so far, I am only learning Egypt. Before assuming any responsibilities, I determined to spy out the land for myself, and I’ve been doing that since May 23rd, during which time I have gone over a large part of Lower Egypt, living in

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48 Hollings, *The life of Scott* 151

Statements like this prompt us to question scholarship which tells us that the idea of ‘total-Nile control’ only emerged with discussions about a reservoir scheme and the building of the Aswan dam at the turn of the century. Dufferin

49 Sandes, *The royal Engineers* (Chatham: institute of the Royal Engineers, 1937) p. 371
Arab villages, a rough kind of existence (much rougher than in India), and keeping a comfortable boat on the Nile as my head quarters.50

The purpose of the excursion was to observe the existing Irrigation system. But Moncrieff was an administrator. He was not a ‘great constructional engineer[,] he could not point to any special aqueduct, bridge, or regulating weir, as one that he individually toiled over, a triumph of mind over matter[,]’ but who’s specialty ‘was the actual working of the great machine.’51 Millions of Egyptians were a part of this great machine, a few as administrators, but mostly as cultivators using the water it carried and laborers maintaining it. Because of this, the way the irrigation system functioned, as ‘a great machine’ involved much more than just the canals. It involved people. Thus, Moncrieff’s inaugural inspection was not strictly about engineering matters. For him irrigation was not a feat of engineering, but a humanistic endeavor. His mission was more political than it was mechanical. In their efforts to dig and dredge canals or install weirs and locks, the British came up against opposition. And Moncrieff was aware of this during his tour:

Well, so far I've only been inspecting and noting and making small suggestions, and I don't intend to take the reins fairly in hand until after my return home. And so have met with no opposition as yet. But I am fully prepared for great opposition. I have finished to-day a long report giving my ideas of what should be done, and it starts with some recommendations

50 Hollings, *The life of Sir Colin Scott-Moncrieff* p.159
51 ibid 55
absolutely opposed to the views of the P.W. minister Ali pasha and his under secretary Rousseau.  

So it was recognized from the beginning that the British take over of the Egyptian MPW entailed a disruption of established interests in the machinery of government. For Moncrieff this meant opposition from the highest ranks of the Egyptian state. But the British subordinates in the MPW also disrupted established power relationships at more local levels.

During his journey, Moncrieff negotiated the transfer of his former colleagues still employed by the Indian government to Egypt. Justin Ross arrived November 1883 and William Willcocks in December. It was assumed that Ross and Willcocks would be stationed in Cairo and would travel to villages only on official mission. Moncrieff’s pseudo superior, Public Works Minister Rushdi Pasha, initially objected then ceded to Moncrieff’s demand.  

‘My inspectors were constantly travelling. They learned Arabic very quickly and very soon had inspired such confidence in the natives, that the latter used to beg to have cases in dispute referred to them, rather than to their ‘Mudirs” to whom they would naturally be referred.  

The British irrigation inspector replaced the Mudir as a source of authority on irrigation matters, just as the ‘advisors’ replaced the power of actual ministers of the Egyptian

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52 ibid 161
53 ibid 177
54 ibid 178
government. The importance of this phenomenon in the entire scheme of the British occupation cannot be overemphasized. In securing these positions, the new order that the British were trying to establish gained a major foothold in the country. As I have emphasized above, the entire economy of Egypt was based on agriculture, which was only possible with water delivered via irrigation infrastructure. Thus, these inspectors became the sole authorities over a system which determined the prosperity of millions of people; a system which would encompass the majority of the Egyptian population. Without a doubt, in taking responsibility for this system, the British made significant strides in cementing their domination of Egypt.

At this early stage, the irrigation officials were tasked with overseeing distribution and organizing forced labor maintenance of the existing system of canals. To increase the acreage under perennial irrigation, and for the MPW to become a truly essential appendage of the colonial state, funds were needed. Monies would come to PDW, but it would take a demonstration of efficacy. Funding would follow engineering feats.

During the following year, Scott-Moncrieff and Willcocks set themselves to the task of repairing the Delta Barrage, which sat at the intersection of the Rosetta and Damietta branches of the Nile south of Cairo. Muhammad Ali commissioned the barrage in 1848 under the direction of Mougel Bey, a French engineer. The Barrage was completed in 1862 under the reign of Ismail Pasha. Consisting of a series of arches, which contained sluices that could be closed, the Barrage was intended to hold up the flow of the river and thus
raise the level of the Nile upstream. By raising the level of the river, water could flow more abundantly through canals originating at this point and carried throughout the delta. But the masonry work was weak and the foundation too soft to hold up to the pressure of the river so the sluices were left open.\textsuperscript{55}

In 1871 a French engineer Maurice de Bellefonds made a proposal for steam pumping as an alternative to the failed Barrage, but was not adopted. A similar scheme had been implemented in the province of Beheira in the western delta, but only at a cost of £50,000 per annum.\textsuperscript{56} Director-general of public works Rousseau pasha revived the plan to irrigate the entire Delta by steam-pump in 1883 but Moncrieff demanded to make an inspection of the barrage before such a costly solution would be adopted.

Improvements were made under the British to strengthen the Barrage and eventually it was strong enough to raise the level of the Nile by a few feet. The first repair in the spring of 1884 enabled the Barrage to raise the Nile 7 feet, which gushed water into the irrigation canals. The cotton harvest of 1884 was the best on record and the Produce Association of Alexandria publicly thanked Willcocks and Moncrieff:

> The export trade, the interests of which are closely bound up with prosperity of agriculture, has followed with the greatest interest, and with sincere admiration, the great efforts you have constantly made to improve the irrigation resources of the country. The cotton crop—the richest that Egypt has ever produced—being now complete, it is possible for commerce to

\textsuperscript{55} Public Works Ministry, \textit{Note on The Nile Barrage} (Cairo: National Printing Office, 1890) p. 3-4

\textsuperscript{56} Sandes \textit{The royal Engineers} (Chatham: institute of the Royal Engineers, 1937) p.373
measure the full extent of results obtained by your efforts. This conviction found expression in our committee meeting of April 7th. The proposal to testify to you “our great admiration and lively gratitude’ was carried by acclamation. We have, therefore, the honor to be the interpreters of the export trade in bringing to your notice the above resolution, and reiterating our warm thanks for the immense services you have rendered to agriculture and consequently to commerce. 57

The massive increase in the cotton crop enabled by the repair of the Nile Barrage demonstrated the revenue generating potential of publicly funded irrigation projects. It was this spectacular demonstration that prompted officials at the highest levels of not just the Egyptian state but also the British home government as well as other Great Powers to shower unprecedented amounts of money on the Egyptian MPW.

Following the success of the barrage, one million of a nine million pound loan was secured at the conference of London in 1885. When these funds were exhausted, another loan, this time for 800,000, was issued to the Ministry. 58 Moncrieff also felt confident enough to send a dispatch to Nubar Pasha in April of 1885, requesting to hire six other

57 Public Works Ministry, Note on The Nile Barrage (Cairo: National Printing Office, 1890) p. 5


A section of Moncrieff’s reply to the letter of gratitude is worth quoting here: “...For it is not by attending office in Cairo (which is all that I have done) that good irrigation is produced, but by daily inspections and perpetual traveling, by constant watchfulness over a large staff of subordinates, by total indifference to exposure to the sun, by disregard of all personal comfort. This is the life that my officers have led, and it is no little satisfaction for me to know that the merchants of Alexandria appreciate their work.”

Increases in the cotton crop from the period of 1880-1884 (2,750,171 kantars) to the period of 1884-1889 (3,084,064 kantars) were interpreted as the results of the increase of supply of irrigation water enabled by the Barrage.

engineers, all of who were employed in India. These engineers were each assigned to one of five territorial demarcations. These spaces were defined as ‘circles,’ an administrative territorial unit which originated in the administrative system developed by the Irrigation Brach of the Indian Public Works Department. Ideally, a circle was meant to enclose a single canal system. In the Indian context from which this scheme emerged, a circle included 60-120 miles of canals and irrigated 1,500 square miles of land of which 200,000 acres would be irrigated annually.

A particular episode in the village of Desouk near the Rosetta branch of the Nile demonstrates the relationship between these officers and the territory they were charged with. In August of 1886, William Willcocks ordered the closing of a major canal for construction project downstream. This canal, known as the Bahr Saidi, was responsible for supplying 15,000 acres in the village. August being the height of the flood season and the critical watering period for the rice crop, the closing of this canal would cause immense hardship for these cultivators. The villagers sent a petition to the Khedive and Ministry of Interior appealing for an intervention, but to no avail. Eventually a large group of villagers attempted to occupy and cut the dyke blocking the Bahr Saidi. Police and eventually cavalry was called in to eject the villagers. While the leaders of the action were arrested, the Ministry of Interior recognized the legitimacy of the villagers demands and cut the dyke. Regardless of the fact that the villagers succeeded in their demands, albeit without official

59“d’irrigation, ministère des travaux publiques ” The British Library: L/mil/7/660
60 Ian Stone Canal Irrigation in British India; perspectives on technological change in a peasant economy (New York: Cambridge University Press, 1984), 207.
judgment in their favor, ministers and diplomats in Cairo celebrated the action of the police and military forces. In the words of one such figure:

> These measures had the desired effect, and since then the district of Dessouk, which, like all the tract of country known as the Berari, is notorious for its lawlessness and independence from authority, has been perfectly quite.\(^{61}\)

By the beginning of 1889, the canal system had been extended by over 580 kilometers and over 470 kilometers of preexisting canals had been widened and deepened.\(^{62}\) The repairs to the Nile Barrage and their spectacular effect on the agricultural output gave an impetus to the MPW and the British engineers who staffed the upper echelons and directed its policies. With a massive investment to the MPW, the British engineers were able to consolidate their control over the Nile’s water. Large-scale engineering feats such as the Nile Barrage were required to control the water, but it was through distribution at the village level that the British held power over people. The engineers keeping a close watch over their circles had the power to decide which villages were watered or not, organize labor for the construction or maintenance of canals and also call up large portions of the population for service in emergency situations, such as during the flood season.

For example, in late summer and early fall of 1887, the level of the Nile was enough to fill all the canals in the country but the level of the river at Aswan continued to rise. The situation was so worrisome that the French press picked up on the story and were suspected of using the uneasiness to spread panic and destabilize Egypt. Nevertheless, the

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\(^{61}\) Mr. Portal to the Earl of Iddesleigh Egypt no.2 (1887) Further Correspondence respecting the Affairs of Egypt p.98 no.109
\(^{62}\) TNA:FO/633/ 59
irrigation officers mobilized the rural population to keep watch over the riverbanks. Thousands of Egyptians lined the Nile at audible distances from each other and the majority of the villages escaped destructive flooding.63

The system of perennial irrigation, and the forms of British control associated with it, would continue to expand at an accelerating rate. These early episodes can be seen as a prelude to the expansion witnessed by the turn of the century with the construction of the Aswan Dam. But the rate of expansion of perennial irrigation is not the only change we observe in the post-Aswan Dam era. In the early years of the occupation, engineers and interested observers were able to present in triumphalist discourse this system as a panacea for Egypt. But it was not long before the system encountered crises.

The Aswan Dam and 1919 Revolution

In the early 1890’s, engineers and bureaucrats began to discuss the building of a storage reservoir that would hold a portion of the Nile flood, thus preventing both excess flooding as well as water shortages64. After much debate and an international commission, Aswan was chosen as the location for reservoir. The irrigation system of Egypt underwent a revolution with the completion of the Aswan Dam in 1902. The seasonal rhythm of the Nile flood which basin irrigation relied upon was no more. The dam created a reservoir of 5

63 TNA: FO 633/58 Egypt [No. 2] Further Correspondence Respecting The Affairs of Egypt p.77
64 William Willcocks Report on Perennial Irrigation and Flood Protection for Egypt (Cairo: National Printing Office, 1894) passim
billion cubic meters of water upon its second heightening.65 The dam at Aswan, along with the Zifta and Asyuit Barrages completed in 1902, and the Esna Barrage completed in 1906, formed a system that regulated the entire flow of the Nile.66 These structures had to function in conjunction. The amount of water discharged at Aswan determined the amount of water the other barrages could let through.

In permanently altering the flow of the Nile, the irrigation service was itself altered. The service was now not only responsible for digging canals, ensuring their maintenance and distributing water; the engineers were now accountable for the functioning of the Nile. As such, the British secured for themselves unprecedented power over the environment. But this power now became visible on a wide scale. In assuming this amount of control over the Nile, the engineers were to be held accountable for forces outside of their control. Engineering matters were politicized to an extent unknown before. If water was scarce, the MPW could be blamed. When agriculture production declined even after continued investment in public works, new solutions that sought to move British environmental policy past irrigation began to be discussed. But the British just could not seem to move beyond irrigation and develop their environmental policy to move from agriculture qua irrigation to center on agriculture in its many other facets, such as how and which crops were planted and land was cared for, etc. This would require that the state reach further into the lives of the peasants, seeking to control more and more aspects of its subjects’ crops and lives. To accomplish these increasingly invasive reforms required that the state

65 Cookson-Hills “Engineering The Nile” (Queen’s University) p.14
66 ibid 391
maintain and increase its influence and power over the rural population. But it would be exactly this need that bolstered the centrality of the irrigation inspector, who high-level bureaucrats and ministers cited as a symbol of authority.

These tensions come to the fore during the 1919 revolution. As the Egyptian countryside rose up against their British overlords and violently tore down the most visible symbols of the imperialist’s reach into the countryside: the telegraph and the railroad. The British were then forced to turn to their irrigation canals. With the normal means of communication and transportation disrupted, the British opened the sluices in the Aswan dam and filled canals for emergency transportation. Many villages began reporting a shortage of water, which served as propaganda for the nationalist movement who claimed the British were intentionally depriving Egypt of the Nile’s water. There are conflicting accounts in the archive surrounding the shortage of water and this suggests it is more than likely that the British actions caused a shortfall in irrigation water.67

The uprising was eventually crushed by British troops and a commission was established to investigate the causes of the revolution and propose solutions. Dubbed the Milner Mission, after its chairman Alfred Milner, the commission was hampered by a widespread boycott.

Of the Egyptians who offered to break the boycott, their terms were centered on demands heaved on the ministry of public works. On January 10th 1920, an anonymous writer suggested that the irrigation department should give licenses for sakias and distribute water with greater justice. If the Milner mission saw to this the writer suggests it

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67 TNA: FO 141/745
would gain popularity. Another message that arrived two days later, by an author who only gave “The Mansura fellahin of Aga” as a name, petitioned Lord Milner to ‘follow in Lord Kitchener’s footsteps and win popularity by ordering that a drain should be dug at Aga to save land from floods, and thereby win the good will of the fellahin of that district.’

The politicization of irrigation to such intensity is represented on a broader scale in the Nile Projects Commission, an ad hoc committee assembled to investigate the effectiveness of works constructed and proposed since the Aswan dam. After a sharp increase in the yield per Feddan in the first 14 years of the occupation, soil productivity began falling at a significant rate since 1897 despite this period seeing the largest expansion of the perennial irrigation. The Nile Projects Commission suggested that irrigation was not subservient to the needs of agriculture, meaning that it could not be proven that the extra water provided by public works projects was absolutely necessary to agricultural growth. It was suggested that more efficient use of water or agricultural planning and education might be better methods of increasing agricultural output.

These two instances of crisis, the 1919 revolution and the controversy surrounding the Nile Projects Commission, rearticulate the dichotomy we encounter every time we begin to speak of the state. The discussion surrounding the Nile Projects commission talks about the state as a machine, a specified set of processes, procedures and hierarchies. The analysis of the 1919 revolution, submitted by Europeans resident in Egypt or produced by the mission’s staff, emphasize the humanistic elements of the state. These diagnoses highlight the individual British official and his relationship to those he supervised and

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68 TNA: FO 848/12
69 TNA: FO 141/510
governed. In nearly all of these documents we read the refrain “friendship with the fellahin.” These papers cite the loss of this friendship as problematic.
Conclusion

In 1922, C.E. Dupuis submitted a report addressing a tension within the Egyptian state. It had been two decades since the constructing of the Aswan Dam. Its completion inaugurated an era of hyper acceleration of the expansion and intensification of perennial irrigation. It was not long after that the British came to the disturbing realization that while the cultivable land was expanding, overall agricultural output was declining. Administrators began to debate weather the efforts of the irrigation department had resulted in providing water in dangerously excessive amounts to the Egyptian soil, resulting in its waterlogging and soil salination. Wealthy landowners seeking more coercive means to instruct peasants on more efficient methods of farming lobbied for a ministry of agriculture. Even after its late formation in 1911, the ministry of agriculture was subordinate to the irrigation department and a tension was felt amongst many administrators that while the irrigation department was incapable of preventing crop losses, its entrenched position within the government owing to its long carrier and massive budget within the colonial government would allow it to continue its inefficient and harmful policies.70 This tension was given official recognition in an inquiry conducted by C.E. Dupuis.

Weather the irrigation service remains as now a branch of the public works ministry or forms a branch of the re-constituted ministry of agriculture and irrigation, it must always remain preeminently an important branch of any Egyptian government, and the form of its constitution and organization is of vital interest to the country.71

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70 Cookson-Hills Engineering the Nile 410-413
We can see from the last section of this paper that as the Ministry of public works became involved in increasing controversy the British influence within Egypt began to wane, further demonstrating the main argument of this paper: that the British colonized Egypt through monopolizing the management of the country’s natural resources. The articulations surrounding this process — which can be read in documents from earlier in the 19th century until the beginning of the occupation — demonstrate the intersection between governance and environment. But there is an underlying tension any time we talk about the state between the individual and the organization and between specificity and ambiguity.

When the system began to break down we see this tension rearticulated in a heightened fashion. While some officials articulated the crisis as an issue with the structure of the state, others made arguments about the character of the average British official. This crisis was brought about by an attempt to render the Nile valley more productive, which was a project doomed from the start. The British engineers were extremely confident in their abilities and overestimated the potential of the modernist project as much as they overestimated the much acclaimed ‘fertilizing force of the Nile.’

When their project failed, the state was seen as failing. And when the state failed, the ways individuals described that process reflect a common dualism that reappears even in the scholarship of today.

Colonial public works projects in the Middle East have only just begun to receive serious attention by scholars. Timothy Mitchell's *Rule of Experts* (2002) and James Scott's
*Seeing like a State* (1999) were important in offering revisionist examinations of modernist historical analysis. This critical treatment of colonial modernization regimes was pioneered in South Asian historiography in the 1980s and 1990s but not until the 21st century did scholars readdress the colonial history of the Middle East in similar terms. With Jennifer Derr’s 2009 dissertation, *Cultivating the state: cash crop agriculture, irrigation, and the geography of authority in colonial southern Egypt, 1868-1931*, the role of construction and management of irrigation by the colonial state began to receive a critical examination. In 2010, Toby Jones’s *Desert Kingdom* demonstrated how the role of development projects was essential to the formation of a modern state in Saudi Arabia. Alan Mikhail’s much praised 2011 *Nature and Empire in Ottoman Egypt: An Environmental History* has proven the concepts of the environment and the intervention of the modern state into, and management of, the environment as an extremely productive methodology. And in our age, when the most daunting challenge facing humanity is the environmental crisis caused by the modernist projects like the British project in Egypt, treating these projects critically is of the utmost importance.