Water Security Mercantilism?

Transnational State-Capital Alliances & Multi-level Hydropolitics of Land-Water Investments in Egypt and the Nile Basin

A Thesis Presented to University of Sussex in accordance with the requirements for the Degree of Doctor of Philosophy in Development Studies

Institute of Development Studies (IDS)

UNIVERSITY OF SUSSEX

Ramy W. Lotfy Hanna

June 2018

Bringer of food rich in provisions,
creator of all goodness,
lord of reverence, sweet of scent,
the one whose coming makes peace,
creator of plants for the herds,
provider of butchery for every god.
While he is in the underworld,
sky and earth are in his charge.
Filler of storerooms, enlarger of granaries,
the one who gives plenty to the orphan.

Hymn of the Nile circa 2100 BC

UNIVERSITY OF SUSSEX

Ramy W. Lotfy Hanna

Institute of Development Studies (IDS) - PhD. Development Studies

Water Security Mercantilism? **Transnational State-Capital Alliances and Multi-level Hydropolitics of Land-Water Investments in Egypt and the Nile Basin**

SUMMARY OF THESIS

Conventionally, the question of Egyptian water security focused on state-centric transboundary hydropolitics within the larger context of the Nile basin. The presented research explores 'water security' beyond this 'state-centric epistemology', typically focusing on a singular scale of hydropolitical analysis. This dissertation examines the water (hydro) politics of transnational land-water investments (LWI) within Egypt and the larger context of the Nile river basin. Adopting a multi-site case study methodology, it critically examines the changing role of the state and the engagement of non-state actors in the silent appropriation of land-water resources through investments in farmlands abroad.

The research methodology contextualizes how land acquisitions take several shapes and forms within Egypt (Old-New Lands and New Lands/Mega Projects), as well as in other Nile basin countries (e.g. Sudan). They also manifest land-water-food nexus interdependencies for both; profit and larger strategic objectives, through the formation of 'State-Capital alliances'. Deploying a case study of an international Emirati investor in Egypt, it shows how land-water investments are rooted in a larger socio-political project as part of the state's vision of horizontal expansion and land reclamation, to address its ecological-demographic narrative of crisis. The research also draws linkages between Egyptian water security and transnational investments in other Nile basin countries with a particular focus on the case of Sudan as part of its larger vision

of the ‘breadbasket of the Arab World’. However, while these State-Capital alliances are rooted in narratives of state modernization, security, and profit, they entail various tensions and trade-offs amongst different resources nexi and actors, thus masking larger questions of social justice and equity. These tensions often reflect the manufacture of abundance and translate into water grabs transcending multiple hydropolitical scales.

The thesis argues that the changing role of the “entrepreneurial state” and the engagement of non-state actors in transnational land-water investments manifest a transition from the hydraulic mission towards water security mercantilism. I argue that “water security mercantilism” denotes water grabbing, which overrides the conventional understanding of the hydraulic mission (water control by the state); towards a broader understanding of the role of non-state actors and international investors in accessing water, thus creating their own private resources security nexus. Hence, drawing on development studies, hydropolitics, and political economy scholarship, this dissertation broadens out the analysis of Egyptian water security beyond singular-scale state-centric hydropolitical debates; towards a multi-level polycentric analysis of water security, central to which are the farmers, the investors, and the state itself. This implies that transnational land-water investments not only influence small farmers through the reproduction of scarcity on the local level, but also influence the hydraulic mission of the state on the national level, and the larger Nile basin transboundary hydropolitics.

TABLE OF CONTENTS

SUMMARY OF THESIS	**4**
TABLE OF CONTENTS	**6**
LIST OF TABLES, MAPS & FIGURES	**9**
ACKNOWLEDGEMENTS	**10**
Chapter 1: Introduction	**13**
1.1. Background, Objectives, and Research Questions	13
1.2. Water Security, Hydropolitics, and Transnational Investments: Theoretical Debates, and Empirical Gaps	17
1.3. A Multi-Site Case Study Methodology of Egyptian Water Security & Transnational Land-Water Investments	25
1.4. Dissertation Thesis & Arguments	37
1.5. Structure of Dissertation	41
Chapter 2: Conceptual Framework	**45**
Introduction	45
2.1. Critique of State-centric Transboundary Hydropolitics	47
2.2. A changing Role of the State in Land-Water Investments	51
2.3. Non-state Actors & Transnational Land-Water Investments:	58
Bridging Nexus and Water Grabs Debates	58
2.4. The Governance Dimensions of Water Security	62
2.5. From the hydraulic mission to water security mercantilism	65
Chapter 3: State Modernization, Horizontal Expansion, and Egypt's 'Ecological-Demographic Narrative of Crisis'	**67**
Introduction	67
3.1. State Modernity and the Hydraulic Mission under Mohamed Ali and Nasser	70
3.2. The Role of the State in Horizontal Expansion and Land Reclamation Schemes: A historical overview	74
3.3. Land-Water Resources in Egypt and the Feddan Game	79
3.4. Shades of Scarcity and Egypt's Narrative of Crisis	87
Conclusion	102

Chapter 4: The Hydraulic Mission of the Entrepreneurial State & the Manufacture of Abundance **103**

Introduction 103

4.1. National Determinants of the Entrepreneurial State 107

4.2. The Entrepreneurial State and the Land-Water-Food Nexus: Frontier Making by De-risking Land-Water Investments 113

4.3. Mega Projects Criticism & the Manufacture of Abundance 119

4.4. State-Capital Alliances in Mega Projects 123

4.5. Hydraulic Mission 3.0 and Egypt 2030 Strategy: The 1.5 Million Feddan Mega Project 127

4.6. Conclusion 132

Chapter 5: Transnational State-Capital Alliances and the Gulf-Nile Connection: Al Dahra Agricultural Company **135**

Introduction 135

5.1. The State-Capital Alliance: Gulf-Nile Connection 138

5.2. Land-Water-Food Nexus in the Nile Basin: Investors' 142

Perspective 142

5.3. GCC Non-State Actors' Investments in the Nile Basin 147

5.4. Al Dahra Large-scale Land Acquisitions (LSLA) in Egypt 156

5.5. CONCLUSION 166

Chapter 6: The Reproduction of Scarcity & Local Scale Hydropolitics in Old-New Lands: Al Dahra Case Study in Al Salheya and Al Nubareya **168**

Introduction **168**

6.1. Land Reclamation & Inherent Water User Challenges in Old-New Lands 171

6.2. Water Grabs? Technology, Capital, and Corporate Water Security in *Al Dahra Farmland – Al Salheya* (East Nile Delta) 181

6.3. The Paradox of Surface and Underground Water in Al Dahra farmlands in Al Nubareya 195

6.4. Nexus Tensions in Old-New Lands (Salheya and Nubareya) 202

6.5. Conclusion: The Reproduction of Water Scarcity 215

Chapter 7: Egyptian Water Security and Transnational Land-Water Investments in the Nile Basin: The Case of Sudan **217**

Introduction 217

7.1. Transnational Investments and Land-Water Resources 220

Potential in Sudan 220

7.2. Transnational Investments in Sudan by the Egyptian State: 225

The Land-Water-Food Nexus as an Unachieved Opportunity 225

7.3. Transnational Investments by Egyptian and International Non-State Actors in Sudan 230

7.4. Conclusion 243

Chapter 8: Synthesis & Conclusion **246**

8.1. A broadened view of Egyptian Water Security & Transnational Investments in the Nile Basin 246

8.2. The Gulf-Nile Connection: State-Capital Alliances and the Land-Water Nexus as a Political-Economic Commodity 249

8.3. Manufacture of Abundance: Nexus Opportunities, and Tensions in Egypt 256

8.4.Water Grabs & the Hydropolitics of Land Investments: A multilevel Analysis of Egyptian Water Security 266

8.5. From the hydraulic mission to water security mercantilism 275

LIST OF TABLES, MAPS & FIGURES

List of Tables

Table 1.1 Size of Land Acquisitions in Different Nile Basin Countries....19
Table 3.1. Land Reclamation Projects in Egypt 1950s-2000s....78
Table 3.2. Mapping of Different Actors in Land Reclamation Schemes in Egypt....82
Table 3.3. Demographic Distribution in Agro-ecological Zones in Egypt....89
Table 3.4. Population Density in Egypt's Nile Valley and Delta Governorates....90
Table 3.5. Egypt Quantity of Water Resources by Source (2010-2015)....95
Table 3.6. Water Uses by Sector 2010-2015....96
Table 3.7. Cereal Imports in selected countries 1960-2005 (000 metric tons)....97
Table 3.8. Egypt Wheat and Rice Imports (2008-2011)....98
Table 4.1. Share of agriculture and irrigation sector of total investment in socio-economic plans and the private sector proportion....109
Table 4.2. International Investments in agriculture & irrigation sector Egypt & Sudan 2000- 2008 (US million)....124
Table 4.3. Land Size and Arab Agricultural Investments in Toshka....125
Table 5.1: Summary Al Dahra Land-Water Investments in Egypt....161
Table 7.2. International investments in Sudan by country of origin 2000-2008 (% of total FDI)....241

List of Maps

Map 3.1. Old Lands and Land Reclamation in Egypt (1960-1986)....71
Map 4.1. The system of canals in Toshka project....114
Map 5.1 (a) Al Dahra's land and water acquisitions across Egypt....158
Map 5.1 (b) Al Dahra Farmlands in Toshka and Oweinat....158
Map 5.2. Satellite view of Sharq Al Oweinat farmlands in South Western Desert....162
Map 6.1. Al Ismailia and Al Nubaria Canals located East and West Nile Delta....170
Map 6.2. Al Dahra Farmland in Al Salheya....183

List of Figures

Figure 3.1. Per Capita Share of Water Resources and Agricultural Land....89
Figure 3.2. Egypt Virtual Water Imports in crops and livestock 1998-2004....99
Figure 4.1. Share of agriculture and irrigation sector of total investment in socio-economic plans and the private sector proportion....109
Figure 4.2. International Investments in agriculture & irrigation Egypt 2000-2008....124
Figure 4.3. Percentage of Equipped Areas in 1.5 Million Feddan Project....130
Figure 6.1. Irrigation System from the Nile....178
Figure 6.2. Farm gate Al Dahra Agricultural Development Company Egypt – Al Salheya....181
Figure 6.3. Water Intake from Al-Kassara Tertiary Canal directly to Al Dahra farm in Al Salheya....184
Figure 6.4 Pumps Intakes from tertiary canal feeding in the main station Salheya farmland....187
Figure 6.5. Industrial scale piping system &' automated irrigation system....187
Figure 6.6. Water Drainage back to Al Kassara canal from Al Dahra Farm....193
Figure 6.7. Gate of Al Dahra Farmland in Al Nubareya (photo by author)....190
Figure 6.8. Branch Irrigation Canal (4) feeding Al Dahra Farm in Al Nubareya....199
Figure 6.9: Expanding irrigation canal in Al Nubareya as on farm reservoirs....201

Annexes

Annex 1 List of Interviews
Annex 2 Infrastructure Investments by the Entrepreneurial State
Annex 3 GCC Investments in Nile Basin (Egypt-Ethiopia-Sudan)

ACKNOWLEDGEMENTS

Working on the topic of Nile water in Egypt has been an enriching learning experience. I am indebted to different people for their ongoing support throughout this journey, which started in Brighton since January 2014.

First and foremost I would like to thank my supervisors at the Institute of Development Studies (IDS) at the University of Sussex. This work would not have been possible without their guidance. Lyla Mehta and Jeremy Allouche, no words can express how thankful I am. Not only for your kindness, patience, and continuous engagement; but also for teaching me how to broaden out my academic horizons and approach academic debates in a simple, yet deep perspective. I have enjoyed working with you throughout the different milestones of this PhD starting with the research outline seminar, the work in progress, and reaching this stage of submission. Thank you.

My fellow PhD researchers at IDS have shown me what it means to have a collective conscious and to share a similar experience through different pathways. In particular SungKyu Kim and Syed Abbas, thank you for the companionship, and for your help in making this submission possible. I would also like to thank Shilpi Srivastava who is working on water issues in India for her ongoing encouragement and intellectual engagement throughout the PhD process.

My dear friend, the brilliant Mina Michel Samaan (PhD – TU Braunschweig Germany), who is blind, yet has insight and vision better than most of us. Words would not describe how much I value and appreciate your continuous encouragement. Thank you for taking the time to provide critical feedback, and for sharing ideas. I have enjoyed our academic debates and look forward to many more to come.

Fieldwork in Egypt has benefited from different planned and unplanned encounters. I would like to thank everyone who agreed to be interviewed and to share their insights and their valuable experience. I have learned something from everyone. Special thanks go to colleagues at the Research Institute for Sustainable Environment (RISE) at the American University in Cairo, the FAO Cairo office, especially the team working on the Water Scarcity Initiative (WSI), as well as different friends and colleagues working with NGOs in the field of water and agriculture. The Centre for Environment and Development in the Arab Region and Europe (CEDARE) has been also extremely helpful in engaging me in different working groups notably Water, Agriculture, and Energy, as part of Egypt's Sustainable Consumption and Production Action Plan (SCP-SDG). This engagement has provided access, and extremely useful insights concerning policy makers and policy making in these sectors.

I would like to thank Dr. Ayman Abdel Wahab from Al Ahram Centre for Strategic Studies for his initial guidance and enthusiasm for the topic and for inviting me to present my work in Cairo. I would also like to express my appreciation to the young generation of Egyptian diplomats at the Ministry of Foreign Affairs for sharing their insights on Sudan and Ethiopia. This work has also benefited from interactions with the Minister of Water Resources Irrigation in Egypt, as well as other senior officials at the Planning sector through the Enhanced Water Resources Management Project (EWRMP).

Special thanks to Al Dahra Agricultural Company South African management based in Cairo, for providing the chance to be interviewed, and for allowing me to visit two of their farmlands in Al Salheya and Al Nubareya and interview farm managers and staff on the ground. This research would not have been possible without this case study. Equally, I would like to thank present and previous staff working with Citadel Capital and other investors for agreeing to be interviewed and share insights from a private equity and private sector perspectives, notably as it relates to Egyptian investments in Sudan and South Sudan.

Special thanks to Anders Jägerskog and the Nordic Africa Institute for engaging me in the book project on ‘Land Investments in the Nile’ published in 2016. This project also provided the opportunity to attend the World Water Week in Stockholm during August-September 2016, and to present my work to expert audience. I would also like to thank SIWI for their invitation to attend and present my work during another workshop in Khartoum in December 2016, allowing the opportunity to engage with other researchers, academics and policy makers working on the topic of land-water investments in the Nile basin. Both events allowed me to conduct interviews with different stakeholders and investors, especially within Sudan.

I would also like to thank the Nile Basin Initiative (NBI) for inviting me twice to present during the Nile Development Forums in Nairobi during October 2014, and in Kigali during November 2017. These events also provided the opportunity to meet and interview different water experts.

Special thanks to Bart Hillhorst as one of the few independent consultants working on this issue for sharing data and insights on GCC investments in Sudan. This exchange also allowed validating some of my data given the opaque nature of the topic. Similarly, the LandMatrix staff has been instrumental at the initial stage of this research to construct the investments database, which paved the way for fieldwork.

Finally I would like to thank my wife for her unconditional support and love. During this journey we were blessed with Alexander, who kept me company during the writing process of this thesis. I am also grateful for family and friends across different continents, which have been continuously supportive and encouraging, thank you all.

LIST OF ABBREVIATIONS AND ACRONYMS

AAAD	Arab Authority for Agricultural Development
ADB	African Development Bank
ADFCA	Abu Dhabi Food Control Authority
CFA	Cooperative Framework Agreement
FAO	Food and Agriculture Organization
GAFI	General Authority for Investment
GARPAD	General Authority for Reconstruction Projects and Agricultural Development
GERD	Grand Ethiopian Renaissance Dam
GCC	Gulf Cooperation Council
IIP	Irrigation Improvement Program
IWRM	Integrated Water Resources Management
LSLA	Large-scale land acquisitions
LWI	Land-Water Investments
MALR	Ministry of Agriculture and Land Reclamation
MENA	Middle East and North Africa
MWRI	Ministry of Water Resources and Irrigation
NBI	Nile Basin Initiative
O&M	Operation and Maintenance
SIWI	Swedish International Water Institute
SRI	System of Rice Intensification
QNFSP	Qatar National Food Security Program
TWM	Transboundary Water Management
UAE	United Arab Emirates
USAID	United State Agency for International Development

Chapter 1

Introduction

> *"Twenty-eight years' experience in reclaiming desert and growing olives …has developed the saying: 'Knowledge and knowhow encompass science; but science does not encompass knowledge and knowhow'," say the farmers.* (The Left-behind: Democratic Transitions and the Mediterranean Agricultural Communities)

1.1. Background, Objectives, and Research Questions

1.1.1. Egyptian Water Security and the Nile River

The natural connection between land and water for agriculture and food has been long acknowledged in Egypt. While Ancient Egyptians did not label these linkages as the 'nexus', they have attributed great importance to the Nile River as the main source of life in their desert lands. Ancient Egyptians referred to their territory as *kemet*, the black or arable land, thus distinguishing the cultivable portion of their area from the desert, which they called *deshret*, or the red soil (Tignor 2010). The English name *Egypt* is derived from the Ancient Greek Aígyptos (Αἴγυπτος), which signified the waters whose annual flooding ensured the fertility of an earth (Kalin 2006). The story of Egypt and the Nile is an eternal one, rooted in history, evolving across times, yet still being shaped by modern day politics.

As widely acknowledged, the peculiar mystique of the Egyptian environment has historically informed the creation of its own sociological category; the hydraulic civilization (Kalin 2006; Wittfogel 1953). The view that Egypt has always been and therefore should again become a society with a bureaucratic irrigation grid emerged within Napoleon's (1798-1801) milieu of French engineers as depicted in "La Description De L' Egypte". During the times of Mohamed Ali (1805-1840) and Nasser (1952-1970), both labeled as founders of modern Egypt – the *securitization* of the 'Nile water' has been often synonymous with the larger project of modernity and advancing the hydraulic mission of the state. That is; the control and manipulation of water resources so that its constituents may meet their domestic, industrial and agricultural needs (Allan 2005; Allouche 2010). Throughout the nineteenth and twentieth centuries, a key element of the state's hydraulic mission was to expand agriculture beyond the margins of the Nile watershed into desert lands. This included hydraulic structures, irrigation canals, large-scale land reclamation schemes, as well as Mega projects, amongst other state interventions in the water and agriculture sectors.

For the state, the land-water nexus is a key constituent of a larger socio-political project towards modernity. The Nile water flow represents Egypt's foundation to achieve its hydraulic mission and state modernization as stipulated in the Nile's 1929 Colonial era Treaty. Accordingly, water security has been traditionally associated with the annual water share based on instruments of international law, as further emphasized in the 1959 treaty granting the downstream nation 55.5 billion cubic meters. Hence, Egypt's water security debates focused on state-centric transboundary hydropolitics and contestations amongst upstream and downstream Nile countries. These debates further intensified over the last decade notably with the signing of the cooperative framework agreement (CFA) in 2010, as well as the erection of Ethiopia's Grand Renaissance Dam (GERD) in 2010-2011 following the Egyptian revolution. Yet, much of these debates rooted in the disciplines of international relations and international law addressed water security and Nile hydropolitics from a state-centric, water-focused and deterministic perspectives, typically situated within a singular level of analysis at the transboundary level.

Few studies however addressed Egyptian water security beyond this state-centric epistemology. In this respect, the topic of land acquisition and trans-boundary water management is unchartered territory whereby the effect that 'transnational land-water investments' will have on transboundary water resources has not yet been analyzed (Jägerskog 2012). In particular, over the last decade, as the food and fuel crisis of 2007/08 and 2010/11 unfolded, coupled with growing concerns over water scarcity as well as food security and sovereignty, global-demand for large-scale land acquisitions (LSLA) witnessed unprecedented levels. Non-state actors and transnational investors with different profiles and motivations, especially from the Middle East and North Africa (MENA), as well as Gulf Cooperation Council (GCC) countries, targeted investments in different Nile basin countries, notably Egypt, Sudan, and Ethiopia amongst others (Annex 3). According to Mehta et al. (2012, p.198) "while control over water resources has been traditionally associated with state control and domination by national rulers (Wittfogel 1953; Worster 1983), the term water grabbing draws attention to the involvement of new capitalist players and actors in water resources management and the rise of new political and economic power relations through diverse trajectories of neo-liberalism" (Mehta et al. 2012, p.198). This process led the formation of "state-capital alliances" (Mehta et al. 2013), towards a larger political economic project, for maximum use of land and water resources for both; profit as well as larger strategic objectives such as food security and food sovereignty.

State-capital alliances reflect the growing role of capital and non-state actors' investments in resources acquisition. They also reflect the changing role of the state in land deals (Wolford 2013), and consequently water resources use to achieve its hydraulic mission. However, the resource politics associated with these investments and their political economy processes amongst different state and non-state actors are often hidden or silent. Whether these 'transnational state-capital alliances' contribute to the hydraulic mission of the state remains an unanswered question. Furthermore, from an Egyptian water security perspective, the water politics and hydropolitical implications of transnational investments for state and non-state actors as well as different water users across local, national, and transboundary levels of hydropolitical analysis largely remain unclear.

The originality of this thesis therefore stems from exploring these questions, thus broadening out the analysis of Egyptian water security beyond state-centric hydropolitical debates. Drawing on development studies, political economy, and hydropolitics scholarship, this research inquiry sheds light on the water (hydro) politics associated with transnational state-capital alliances and land-water investments (LWI) within Egypt and other Nile basin countries (e.g. Sudan). Particular attention in directed towards the changing role of the state, and the growing engagement of non-state actors in farmland investments amidst a changing hydropolitical landscape in the Nile basin. These emerging political economy dynamics of transnational resources acquisitions have received little attention in the study of hydropolitics, and will be explored in this dissertation, notably from an Egyptian water security perspective, central to which are the farmers, the investors, and the state itself.

1.1.2. Objectives, and Research Questions

In light of this background, the objective of this research is *to explore the politics of 'transnational state-capital alliances' and the implications of land-water investments by non-state actors vis-à-vis Egyptian water security across multiple hydropolitical landscapes, on local, national and transboundary levels*.

In this respect, the <u>*principal research question*</u> investigated throughout this dissertation is; *to what extent "transnational state-capital alliances" affect Egyptian water security across multiple hydropolitical scales and landscapes?*

<u>*The corresponding Sub-questions are:*</u>

(i) What are the origins, discourses, and policies of transnational state-capital alliances in Egyptian hydropolitics? [Chapters 3 and 4]

(ii) How are transnational "state-capital alliances" practices affecting Egyptian water security on national and local levels? [Chapter 4, 5 and 6]

(iii) To what extent transnational "state-capital alliances" are affecting Nile hydropolitics? [Chapter 7]

1.2. Water Security, Hydropolitics, and Transnational Investments: Theoretical Debates, and Empirical Gaps

1.2.1. Water Security beyond State-Centric Narratives: Non-state actors and Hydropolitics of LSLA

Water security is a highly contested concept reflecting a "battle of ideas" (Zeitoun et al. 2013, p.2). The classical understanding of water security in the context of the modern Egyptian state has been traditionally attributed to the Nile basin hydropolitics, often portrayed as a matter of national security (Bakker & Morinville 2013; Abdel Wahab 2011). In most analysis on Egyptian hydropolitics, debates have been typically founded on a state-centric epistemology, and upstream-downstream transboundary relations, deeply rooted in the disciplines of international relations (IR) and international law.

Critical review of transboundary water resources literature identifies LSLA and investments in farmlands abroad by non-state actors as an emerging element in the study of hydropolitics (Jägerskog 2012). Hydro-politics here is understood as "the systematic investigation of the interaction between states, non-state actors and a host of other participants, like individuals within and outside the state, regarding the authoritative allocation and/or use of international and national water resources" (Elhance 1997). Indeed, by emphasizing the issue of international water allocation and state-centric hydropolitics within the larger context of international river basins, few studies have taken into consideration the changing role of state and non-state actors in transnational LWI.

Furthermore, previous work in the area of international political economy identified the concept of virtual water trade, through the contribution of Tony Allan linking water, food, and trade (Allan 1997; Allan 2001; Allan 2003). This concept attempted to explain how water scarce economies of the Middle East overcame their water deficit via global economic processes and trade in agricultural commodities, through "embedded water" (Allan 2001; Hoekstra 2002; Allan 2002b). However, as the 2007/08 and 2011 global crisis led commodity prices to reach their highest levels since 1845 (Berger & Weber 2011), international investors and non-state actors showed an appetite for LSLA and investments in farmlands abroad. Drivers of this crisis included temporary export restrictions by food exporters such as Argentina, Russia, India, and Vietnam, imposed on rice and other exports to ensure domestic supply, and to avoid further food price inflation (Woertz 2013b). A second stimulus was the global financial crash in 2008 that caused hedge funds and other large institutional investors to look for 'safe' places to put their money (Anseeuw *et al.* 2012; Cotula 2012; Fairbairn 2014). These emerging dynamics were further exacerbated given the growing (water) scarcity and security narratives within Egypt, the Nile basin, and MENA/GCC regions at large. Consequently, throughout the last decade, these political-economic dynamics led to what was labeled as 'land rush' (Allan 2013; Zetland & Möller-Gulland 2012), thus stirring exaggerated debates about land grabs notably in Africa (see the Politics of Evidence - Scoones et al. 2013). However, these debates provided evidence for a growing role of international investors in the appropriation of land-water resources abroad and reflect the changing role of the state towards land deals (Wolford 2013). Yet, little is known about the water (hydro) politics of transnational state-capital alliances, as well as the water security implications associated with LWI, notably in international river basins with already contested hydropolitics such as the Nile.

Hence, an often forgotten dimension in the study of hydropolitics from an Egyptian water security perspective is the emerging role of non-state actors and investors (e.g. sovereign wealth funds, international private sector, private equity, financial intermediaries) in the appropriation of farmlands abroad and their associated land-water politics within the wider context of the Nile basin.

1.2.2. Non-State Actors and Transnational Investments in Egypt and the Nile Basin

Water, land, and food resources are increasingly manifesting different trade-offs and interdependencies in the global political economy (Allan 2013). While the land-water-food nexus presents a form of non-traditional security on the one hand; it is also a venue for capital accumulation and large-scale agricultural production on the other. Evidence indicates that available fertile 'land-water' resources in trans-boundary river basins such as the Nile in Africa have become prime destinations for LSLA and transnational investments. Egypt, Ethiopia, and Sudan are particularly attractive destinations, due to their available land and water resources as shown in table 1.1.

Table.1.1 Size of Land Acquisitions in Different Nile Basin Countries

Target country	Intended deals (hectare)	Closed deals (hectare)	Number of closed deals	Major crops	Major investor country
Egypt	53,752	119,552	6	Rice, wheat & fodder crops	United Arab Emirates, Saudi Arabia
Ethiopia	2, 304,446	1,237,396	69	Cotton, sugar cane, jatropha & various cereals	Saudi Arabia, India, Ethiopia, US
South Sudan	2,629,000	1,642,584	11	Various cereals & teak	US, Egypt
Sudan	2,198,842	1,297,529	19	Wheat, maize, sunflower & sugar cane	Egypt, South Korea, Qatar
Uganda	940,363	38,415	6	Wheat & sugar cane	Egypt
Total	8,126,403	4,335,476	111		

Source: (Sandstrom et al. 2016). Presentation at the World Water Week 2016, Stockholm, Sweden. Nordiska Afrikainstitutet. (based on data from Land Matrix, 2014; Deng, 2011; Bossio, 2012; Lavers 2012a, 2012b; Olanya, 2014; Hanna, 2016 (chapter 7); Wondwosen, 2016 (chapter 9).

While international and Arab investors are present in Egypt, Egyptian (state and non-state), Arab, and other international investors are also present in Nile basin countries such as Sudan, South Sudan, Ethiopia, and Uganda. In this respect, the engagement of international investors and non-state actors *silently* targeting the appropriation of land and water resources through farmlands abroad, marks the rise of new actors and players, which may influence Egypt's water security debates, as well as larger Nile basin hydropolitics. For the state and the investors, profit, as well as other strategic interests, are the main motivations behind these investments. Yet, these framings of the land-water nexus by state-capital alliances often overlook the largest water users; the farmers, although the nexus is the foundation of their livelihoods as further discussed in the following section.

1.2.3. A changing Role of the State: Linking Water Security, Nexus, & Water Grabs across multiple scales

Land-water investments entail various interdependencies and tensions between different (water-energy-food-land-climate) resources elements, technically labelled as "nexus" (from the Latin 'nectare' to bind together). For the state, despite pre-occupation with traditional (national) security, the (land-water-food) nexus presents a form of non-traditional security taking into consideration the linkages between different resources elements (Allouche et al. 2014).

In Egypt, during the second half of the twentieth century, the state played the larger role in horizontal expansion and land reclamation to achieve the 'green desert dreams' in order to address its "ecological-demographic narrative of crisis" (see Sims 2015). From the state's standpoint, the Nile waters represent a matter of 'national security' (Abdel Wahab 2011) to address this narrative of crisis founded on the twin challenges of demographic growth/population density in the narrow valley and overcrowded delta best known as 'too many people on too little land' (Mitchell 2002), as well as the unreachable goal of self-sufficiency to feed a growing population. In addition, with the liberalization of the economy since the late 1970s, the state aimed at achieving the paradoxical policy objective of growing the agricultural sector for both domestic food security as well as expansion to export market through high value crops generating foreign currency.

Large-scale land reclamation projects ranged from state sponsored schemes adopting the Soviet model (1950s-60s), to a US farm type depending on domestic private sector (70s-90s) mostly in Old-New Lands. Furthermore, during the last two decades, the state launched Mega national projects *(mashroua'at kawmeya 3emlaka)* such as South Valley (Toshka), Al Salam Canal, and '1.5 million feddan project'. These Mega projects mark the state's approach towards its hydraulic mission in the new millennia, an essential element of which is to invest heavily in infrastructure to attract international investors and to explore surface Nile water as well as groundwater resources. These evolving approaches towards a larger socio-political and economic project of horizontal expansion and greening the desert reflect the changing role of the state towards its hydraulic mission.

As Hillhorst and Zoomers (2011) indicate, the contemporary processes of LSLA differ from earlier times where major actors, such as host governments, international agribusiness companies, and agro-investors, have changed positions. Host governments are now actively promoting foreign investment in the water and agriculture sectors through land acquisitions. This policy contrasts with the post-independence period, when foreign control of land was opposed, and in some cases led to its nationalization, while today, host countries emphasize the opportunity for investments, employment and innovation (Hilhorst & Zoomers 2011, p.7).

In today's global economy, host governments often perceive foreign investors as a source of capital and high-level technology, implying modernity, connection to international markets and integration within the larger global economy. While these perceptions are often taken at face value, there is little questioning in Egypt or other Nile basin countries about the other side of the coin, or the (environmental, socio-economic, and political) risks associated with FDI and transnational investments, especially in areas related to natural resources appropriation, notably land and water.

State-capital alliances and the engagement of non-state actors in the appropriation of land-water resources reflect the changing role of the state in land deals (Wolford 2013) denoting an alternative approach to achieve the ‘national’ hydraulic mission (notably horizontal expansion and Mega projects). These alliances take place in two different political domains; the first is in the home country between the government (e.g. Abu Dhabi Food Control Authority) and domestic private sector capable of investing in farmlands abroad, to address questions of physical water scarcity, as well as food security and sovereignty (e.g. Gulf countries). The second domain lies within the host country (typically endowed with land and water resources e.g. Nile basin, other locations), whereby transnational state-capital alliances take place through the development of large-scale agricultural investments by foreign investors. However, the two domains are not mutually exclusive.

Overall, there is a perceived general pattern that investors do not seek lands that do not have water for production in the first place. So, land in itself is meaningless for their purpose without water (Mehta et al. 2012). In this respect, the engagement of global players and non-state actors in LSLA, to address the so-called ‘global crisis’ narrative also stirs debates about resources (land/water) grabs (Srivastava & Mehta 2014). Despite the growing interdependencies between different elements of [a] nexus for different actors, Allouche et al. (2015) indicate that the nexus “masks a bigger debate on resource inequality and access, contributing to social instability”. While the research recognizes the importance of land-water-food interdependencies as a way to ensure water and food security, it also critically explores how these interdependencies may result in water grabs across multiple hydropolitical landscapes. ‘Water grabs’ as a concept has been typically addressed from the lenses of social justice, livelihoods and equity on local level, but rarely if ever from a hydro-political standpoint.

In this respect, 'water grabs' literature is a useful 'hook' for drawing out the complex power relationships and geopolitics behind international water interdependencies (Warner et al. 2013; Sebastian & Warner 2013, p.2). This concept will be deployed to examine the water (hydro) politics of land deals not only on the local level, but also across national, and transboundary levels of hydropolitical analysis. Central to these hydropolitical interactions across these different levels are the state, the investors, and the farmers. As such, from an Egyptian water security standpoint, it is argued that water grabs not only affect small farmers and natural capital on the local level, but also have implications on the hydraulic mission at the national level including surface and groundwater, as well as Nile hydropolitics on the transboundary level.

1.2.4. A Multi-level Water Security Analysis

To examine the water politics of transnational LWI from an Egyptian water security perspective (within Egypt on local, national levels, and in Sudan on the transboundary level) a multi-level water security framework is proposed. In this respect, Pahl-wostl et al. (2008) draw attention to the importance of adopting a global perspective on water governance by recognizing that "local, national, and basin-level water issues are interlinked within a global water system" (Pahl-wostl et al. 2008, p.421). This is especially true given that most analysis on water security focused on different levels (the local, or the national, or the river) reflecting a scalar mismatch (Bakker, 2012). This mismatch overlooks the interconnection between different actors and multiple levels of hydropolitical analysis. As such, this global perspective calls for adopting a 'multilevel polycentric' (Bakker et al. 2013) approach to do justice to the complexity of current water security processes and challenges, and to address the scalar mismatch in state-centric water security analysis. A multilevel water security approach is particularly relevant to understand how LSLA reflect the growing interdependencies and trade-offs between land-water-food resources for the state, the investors, and the farmers. This analytical approach towards water security is also useful to understand the water politics associated with transnational land-water investments across multiple hydropolitical landscapes on the local, national, and transboundary levels. This also means that this thesis will broaden out the analysis of insights on hydropolitics to multiple and interconnected scales by deploying a multi-level water security approach to understand the interrelation between domestic politics and international relations (Menga 2016).

In light of these theoretical debates, the rationale and raison d'être of this research is twofold; (i) to critically examine water security debates beyond narrow state-centric water focused deterministic perspectives (Jägerskog 2012) in order to put water into its relevant place in the broader political economy. The thesis will address this research gap by examining the role of non-state actors, and international investors engaged in LSLA and the implications of transnational state-capital alliances on Egyptian water (hydro) politics; and (ii) to examine the relationship between LWI and their corresponding transnational state-capital alliances vis-à-vis Egyptian water security across multiple scales of hydropolitical analysis. By doing so, the research aims not only to identify the water security implications of land investments and water grabs locally, but also on national and transboundary levels.

Therefore, this dissertation attempts to explore changing notions of Egyptian water security beyond the rhetoric of state-centric hydropolitics and narratives of conflict, cooperation, or hegemony within the larger context of the Nile basin. First, as it relates to the concept of water security, the thesis suggests that focus should not be just on upstream-downstream state relations; rather it should take into consideration the role of non-state actors and financial investors, engaged in the appropriation of land-water resources in international river basins through land-scale investments. Second, water security is not subject to a singular level of analysis. In the context of Egypt, water security was traditionally framed as an issue of national security connected to the international level of transboundary hydropolitical analysis. However, water security analysis needs to reflect the connection between local, national, and international levels, especially as it relates to the implications of land-water investments across multiple hydropolitical landscapes of Egyptian water politics.

1.3. A Multi-Site Case Study Methodology of Egyptian Water Security & Transnational Land-Water Investments

This section explains the methodology, research design, and research methods deployed across the thesis to answer the research questions. Methodology is a branch of knowledge that deals with method and its application in a particular field of study (Evans et al. 2011, p.127). To answer the research question(s), a Multi-Site Case Study Methodology was deployed to overcome the limitations of the 'state-centric epistemology' associated with hydropolitics analysis. A case study is defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin 1984, p.23).

Multisite Case studies are characterized by their multilevel, multidimensional characteristics. This methodology was selected to address the multi-level water security implications of transnational land-water investments on local and national levels within Egypt, as well as their transboundary aspects in Nile basin, notably in Sudan. The criteria for selecting a multi-site case study is based on its potential to elicit common findings from across different settings (Bishop et al. 2012). Another criteria to select the multi-site case study is its flexibility as a method and strategy, whereby it "can become the overarching framework of research that consists of several related investigations" (Bishop et al. 2012, p.588). This approach is also useful given that hydropolitics are complex, with multiple interrelated levels. As argued earlier, hydropolitics are also multi actor including different users such as states, farmers, investors, and citizens, in addition to other stakeholders such as technocrats from hydrocracies, policy makers, NGOs, as well as researchers.

Hence, a Multi-Site Case Study Methodology explores ‘transnational state-capital alliances’ and the associated ‘water politics’ on different levels to capture the full perspectives from different state, non-state actors, and key players in Egypt and in the Nile basin. Accordingly, a number of qualitative research methods have been deployed to collect data on these three scales of analysis. The following sections outline the deployed research methods, triangulation, reflexivity, and challenges for conducting research in Egypt.

1.3.1. Case Study Background, Field Work and Limitations

Initially, my research objective was to examine transnational land-water investments by foreign investors and non-state actors upstream in the Nile (e.g. in Sudan and Ethiopia) and their hydropolitical implications on Egyptian water security (downstream). However, due to security and access challenges, extended fieldwork in Sudan was not possible. For this reason, and for practicality, the research focus has been directed to examine transnational land-water investments by non-state actors and investors primarily within Egypt. Furthermore, the research also encompassed investments by Egyptian (state and non-state actors) as well as other international investors in the Nile basin, with a particular focus on Sudan. Therefore, the research design focused on the implications of transnational state-capital alliances and their corresponding land-water investments as an emerging element in the study of Egyptian water security across local, national, and transboundary levels of hydropolitical analysis.

The research was conducted primarily in Egypt during the period between January 2015 and December 2016. My findings are the result of fieldwork carried out adopting a multisite case study approach to understand the emerging role of non-state actors and address the multilevel aspects of transnational LWI on local, national, and transboundary levels of Egyptian water security analysis. To understand the water security implications of transnational investments across multiple hydropolitical landscapes, the research employed a combination of research methods. These ranged from participant observation (including farmers, investors and policy makers), semi-structured interviews with a range of actors within and outside of Egypt, discourse analysis, archival research mostly of Arabic material, historical analysis, as well as analysis of national (Egypt) and regional (Sudan/Nile basin) data on water resources, demographic, and agriculture/irrigation investments. A total number of 72 interviews were held throughout the fieldwork process (See Annex 1). Out of these, 56 semi-structured interviews were held with investors, experts, policy makers, government officials, and NGOs primarily within Egypt, but also in Sudan. In addition a total number of 24 unstructured interviews were conducted within Egypt with farmers and water users where the selected case study company operates, out of which 16 interviews were used.

An essential element of the research, and actually the most challenging, was to identify an international investor in Egypt for the purpose of the Case Study. In this respect, Al Dahra Agricultural Company from Abu Dhabi in the United Arab Emirates (UAE) was identified as a main investor with presence in Egypt across four different farmland areas [with plans to expand to Sudan]. *Al-Dahra Egypt* was founded in 2007 and started operations in 2008 "as a result of a collaborative effort between the governments of the United Arab Emirates (UAE) and Egypt" (Interview #19), reflecting a form of 'transnational state-capital alliance' as discussed earlier. Al-Dahra Egypt specializes in land reclamation and infrastructure set up, considered as core competencies of the company. The primary purpose of the company's investments in Egypt was to develop agricultural projects for cultivation, production and export of food products and animal feed. The company's strategy is based on acquiring large-scale agricultural farmland (or desert reclamation land) in different locations in Egypt, motivated by the availability of water resources from both the Nile and groundwater resources (Interview #19). Worth noting that Egypt is a special case since there is very little rainwater, and therefore supplementary irrigation is not possible, making it a unique place for irrigation and agriculture (Interviews #4 & #19).

The selection of the case study (Al Dahra) was not an easy task. Transnational LWI are relatively a recent phenomenon. Many of these land deals are not announced, and even when announced little information is provided about them. Access to Al Dahra Company took place as part of my interviews with an irrigation expert who had been employed by the company. From here I was able to contact the company, and interview its South African CEO in Egypt and the MENA region, as well as the farm managers and staff in the company's farmlands in Egypt.

The case study was designed based on fieldwork in 2 out of the 4 farmlands investments within Egypt's Nile watershed where the company operates. Fieldwork was undertaken in Al Salheya located east of Nile Delta reachable through a two and half hour ride from Cairo, as well as Al Nubareya located west of Nile delta on the road to Alexandria, also reachable via an hour and a half ride from Cairo. In both these sites, multiple visits were undertaken to conduct interviews with smallholders and water users depending on the same irrigation canals as the investors in each location often leading to competition over water resources. Worth noting, that the company had two additional sites of farmland investments in Toshka and East Oweinat, significantly larger than the selected ones, however fieldwork was not also possible there for two reasons. The first is related to security, as at the time of the fieldwork (2015 and 2016) the political environment in Egypt was still in turmoil following the events of 2011 and 2013, thus imposing limitations on researchers' mobility within the country. This challenging environment had also affected most international organizations, or foreign affiliated researchers or experts engaged in different projects and initiatives in Egypt. The second reason why fieldwork was not undertaken in the remote sites is the sheer fact that both farmlands were still at the early stage of their development (notably Toshka) and the company was not necessarily willing to invite researchers to visit the sites. Reaching there on my own without the company was therefore risky and entailed safety issues for me as a researcher working on such as a sensitive topic. Furthermore, as it relates to the conceptual scope of the research, the presence of the farmers in these location is almost rare, and therefore testing the water grabs implications on other water users would not have been applicable in this context. Nevertheless, issues related to land-water politics and nexus tensions have been addressed (see chapter 5) through primary interviews and secondary data material, which was also a challenging task, yet an interesting one.

To capture the views of water users under the category of Old-New Lands, field interviews were undertaken in both locations where the company operates. Interviews with the farmers depending on Al Kassara canal in Al Salheya, and those depending on Al Nasr canal in Nubareya have been conducted separately. In Al Nubareya, 10 interviews were conducted while in Al Salheya 14 interviews were conducted with a total of 24 unstructured interviews and group discussions in total with smallholders and water users in both areas over a span of 3 months from January to March 2016. Out of these 16 interviews were used in the actual analysis, while the remaining provided useful background insights. Data collected from different smallholders and water users in Al Salheya and Al Nubareya focused on identifying common patterns and challenges related to the land-water-food and land-water-energy nexus in both locations under the category of Old-New Lands. In addition to fieldwork in both sites, semi-structured interviews were conducted with NGOs active in these areas and familiar with smallholder challenges in land reclamation schemes in Old-New Lands. In addition, a wide range of experts, policy elites, donor and specialized UN agencies, government representatives, domestic investors, academic researchers, and stakeholders engaged in the water-agriculture sectors, as well as land-water investments, in Egypt, Sudan, and the Nile basin at large.

In this respect, key limitations associated with collection of primary data for the case study is the sheer opaque nature of the topic, whereby most of these deals are low profile. Furthermore, accessing water users and different landholders around the company's sites was not an easy task that affected the sample size of small farmers in the researched areas, and can be considered as a limitation of this study. Nevertheless, the findings addressed common patterns, historical challenges and chronic tensions associated with small holders and land-water resources in Old-New Lands, with a particular focus on Al Salheya and Al Nubareya East and West of Nile Delta. Furthermore, farmers' views were triangulated with primary interviews data from three different specialized NGOs and research centers who have worked extensively with different water users in Old-New lands and desert reclamation projects. These views were also supported and triangulated with secondary sources and literature depicting challenges with small farmers and water users in Egypt's land reclamation projects. Hence different primary and secondary data sources added a perspective to the scarcity narratives and confirmed existing patterns and challenges associated with smallholders and land-water resources in the studied areas under the category of 'Old-New Lands'.

As for the data on Toshka and Oweinat, this mainly relied on primary interviews with company executives, policy makers, and technical experts with intensive experience in these two locations. Additional secondary data was collected using audio-visual material and other official government reports in Arabic. Overall, the presented data offers a comprehensive account for the views of multiple stakeholders based on alternative data collection strategies as outlined above. Primary data on farmers and small investors interviews were triangulated with expert views, government statements, as well as official documents and reports to capture the divergence of difference discourses amongst different actors.

Insights from the case study and fieldwork on local and national levels within Egypt were complemented by an analysis of land-water investments on the transboundary level by portraying Sudan as a case study. Data collection for this component of the research was based on interviews with key Sudanese policy makers and investors, as well as Egyptian investors operating in Sudan. Additional insights were gained from conducting semi-structured interviews with different actors and stakeholders including NGOs, Nile Basin Initiative (NBI) staff, and other Nile basin experts. Interviews with Egyptian investors in Sudan took place in Cairo. Access to additional interviews took place during a short visit to Sudan where I was invited to present at a SIWI-IWMI workshop during December 2016. During this visit to Sudan I had the chance to hold a number of interviews including Sudanese investors, policy makers, and academics. For example, a key interview and site visit to a farmland area was held with the largest Sudanese agricultural investor (Dal Corporation). No farmers' interviews were held in Sudan. Additional data was collected during my participation in international conferences such as the World Water Week in Stockholm during August 2016 where I presented my research at a high level panel attended by Ministers of water resources and irrigation from Egypt, Ethiopia, and Sudan. Furthermore, access to a number of experts, academics, and African civil society entities working on water issues took place during my participation at the Nile Basin Development forums during October 2014 in Nairobi, Kenya and October 2017 in Kigali, Rwanda.

The combination of these insights from different actors allowed further understanding of the politics associated with LWI, primarily from an investor perspective. The changing role of the state, the dynamics of state-capital alliances and the challenges faced by small farmers were also explored as an essential element in the study of Egyptian water security across multiple levels. Most analysis in this dissertation ends in 2016, however insights and findings remain relevant to contemporary debates on Egyptian water security within the larger context of Nile basin hydropolitics.

1.3.2. Research Methods

A wide range of data collection methods was undertaken across multiple sites to gain wider perspectives on the politics of land-water investments and state-capital alliances at different scales of analysis. To collect data in line with a multi-site case study methodology, research methods included both primary and secondary sources of data. Primary data and first hand insights were collected from various interviews with a range of respondents and stakeholders, within Egypt, as well as in Sudan. Given the nature of the topic, most interviews were anonymous. This issue has also limited to a large extent the pool of respondents notably within Egypt, as many had perceived the topic as a sensitive issue. During the initial stage of the fieldwork, actor mapping was undertaken to identify different state and non-state actors, their institutional affiliations as well as their ongoing and planned agricultural investments in Egypt and Sudan, as well as other Nile basin countries. For this purpose the research process has also benefited from the interaction with the Land Matrix (www.landmatrix.com) and its committed staff in charge of capturing land deals and corresponding water resources in different parts of Africa and the Nile basin including both Egypt and Sudan. The interaction with LandMatrix took place via skype interviews and access to their primary databases which were triangulated with other primary sources mostly from consultants and experts working on the topic, as well as secondary sources. The research also relied on state-of-the-art studies undertaken by senior consultants addressing land deals in Africa, most notably a commissioned study by the Dutch government which was made public and I was able to receive a copy of courtesy of an interviewed expert.

To capture perspectives on land-water issues at the national and local levels within Egypt, the research adopted a case study approach combined with semi-structured interviews. Primary data from the different interviews targeted different stakeholders involved in water and agriculture sectors such as government entities, donor agencies, small and large private sector investors, think tanks, as well as civil society organizations. Key informant interviews were held with company executives in Egypt who had also provided me with access to visit two out of their four farmlands, notably in al Salheya and Al Nubareya located east and west of the Nile Delta respectively. Interviews were undertaken with the company's South African CEO in Egypt, as well as Egyptian and South African farm managers in both locations. Fieldwork in these sites also entailed interviews with company staff, and technicians in each farmland, in addition to labour and contractors who have periodically worked in some of the studied regions (not necessarily in Al Dahra projects). In addition to interviews with farm managers and company staff during my fieldwork at these sites, unstructured random interviews were conducted with different water users operating in the same locations as the company including small farmers and domestic investors, mostly depending on the same irrigation canals in both sites.

To complement the case study research, additional interviews entailed a range of respondents engaged in Egypt's water and agriculture sectors including financial investors, private sector agricultural companies, irrigation and agricultural specialists, water policy experts, senior government officials as well as academics, think tanks and NGOs in Egypt, Sudan, and internationally. Interviews were also held with a number of international experts from the Food and Agriculture Organization (FAO) notably the Water Scarcity Initiative (WSI), the Common Market for Eastern and Southern Africa (COMESA) and the NBI.

To capture the views of the state about the relevance of the company's investments in relation to the larger hydraulic mission, primary interviews were conducted with a wide range of respondents as shown in Annex 1. Key informant interviews, elite interviews, and informal discussions included the present Minister of Water Resources and Irrigation in Egypt, as well as previous ministers. Previous consulting assignments with donor-funded and development projects with the Ministry of Water Resources and Irrigation (MWRI) with both the planning sector and the Nile Water Sector have also provided insight on key technical issues related to water resources in Egypt. However, I had kept my distance and integrity as an independent researcher during these interactions.

For the analysis of land-water investments on the transboundary level, the research portrays Sudan as a case study. Research methods for this element of the research included different interviews with some international and domestic investors in Sudan, key policy makers, NGOs, and experts on Egyptian-Sudanese relations. Key Informants Interviews with both domestic as well as international agricultural companies operating in Egypt, and Sudan were targeted. Some of these included a long series of interviews with key informant portrayed as Egyptian private equity investors (Citadel Capital) investing in both Sudan and

South Sudan mostly undertaken in Egypt. Additional interviews were held with Nile Basin Initiative officials and secretariat members to understand how land-water investments in the Nile basin are being addressed, and how they can influence transboundary hydropolitics.

These views were triangulated by field observations as well as secondary resources mostly comprised of official policy documents (in Arabic), literature, as well as official statistics. My personal notes and observations throughout the research process benefited greatly from an iterative learning approach, based on several interactions and encounters with a wide range of stakeholders and different actors within Egypt, and to some extent in Sudan, but also in different international venues. Throughout the course of my research, I had also the opportunity to participate in a number of meetings as well as seminars, and conferences, addressing issues of Nile basin water resources, the nexus, sustainability and environmental issues, amongst other issues.

An example of the meetings included the Water-Energy-Food Nexus experts meeting in the League of Arab States (LAS) in coordination with GIZ technical office in Cairo in April 2015. In addition, I had the chance to be part of the experts roundtables on Green Economy Strategy in Egypt and the Sustainable Consumption and Production National Action Plans which included water, agriculture, energy, and waste as key sectors during May-June 2016. Other events included the UNECE meeting (May 2014) in UN in Geneva to discuss the Convention on Water Resources, as well as the Hydro Hegemony (HH7) Workshop convened by the University of East Anglia in London also during May 2014. During these meetings, I had the opportunity to follow the discussions and make observations about the discussed topics. Additional observations and encounters took place in international venues, where I had the chance to present my research to different specialist audiences including; the World Water Forum in Stockholm in August 2016, the SIWI-IWMI Workshop on Land Investments in Sudan in December 2016, as well as the NBI conferences in Kenya in October 2014, and in Rwanda in October 2017. These events have positively contributed to the research, both in terms of engaging with the wider epistemic community, as well as testing the relevance and validation of the research framework in contemporary policy debates. During all these events and interactions, I had the chance to develop research notes and key observations, which were crucial in complementing my understanding about the politics of water resources from the different state and non-state actors perspectives'. Key moments of change noted throughout this process was the acknowledgement by policy makers within most Nile basin countries of the importance of the topic, and the rising momentum to better understand the role of non-state actors and corporate investments in the Nile's land-water resources. This changing discourse allows shedding further light on the topic of transnational investments and water security, whereas this thesis attempts to further explore the topic and contribute to this rising debate.

The research methodology also relied on secondary data in in Arabic, English, and French languages. Research methods included archival research, review of official documents, as well as audiovisual material notably youtube and other social media outlets. Data sources included reports, newspaper, published and unpublished official reports in Arabic and other languages, hydro resource experts and academics reports, non-government organizations and business reports, donor technical documents, government documents and press releases. Worth noting for this type of academic inquiry research data is usually hard to get and entails a high degree of sensitivity due to the political nature of the topic. In addition, I relied on the archive of Library of Alexandria where I spent different periods of research in Arabic, English, and French languages documents, particularly addressing contemporary statistics as well as historical archives, both of which were available there.

1.3.3. Ethical Considerations and Reflexivity

Reflexivity can be partly understood as the recognition of the social conditions within which the researcher constructs knowledge accounts (Dunne et al. 2005). I view my cultural linkages with Egypt, notably through my knowledge of Arabic language as an element that has facilitated my research process. The absence of the language barrier and my familiarity with Egypt based on my previous work experience and engagement with some donor funded projects addressing socio-economic and environmental issues in Nile basin (Assessment of Nile Basin Discourse in 2011; Evaluation of the Environmental and Social Frameworks of the Lake Nasser/Nubia Project with the Nile Water Sector at MWRI funded by World Bank 2012-2014; Direct involvement in UNEP project to formulate Egypt's Sustainable Consumption and Production Action Plan notably in the water and agriculture sectors 2016) have assisted me in accessing research material and personnel that I can interview. Given my practical and professional background is more associated with providing advisory services, research, and consulting assignments, this may have influenced my approach during fieldwork, notably in accessing interviewees working at the policy/practical levels as opposed to farmers. Nevertheless, engagement with policy makers, government entities, investors, and other stakeholders in both Egypt and Sudan was not an easy task, and entailed several failed attempts to conduct interviews given the political nature of the topic as discussed in section 1.3.4 depicting challenges and limitations for conducting research in Egypt.

An important part of an academic study is the ethical concerns relevant to the research and data collection process. During fieldwork, respondents and interviewees participated voluntarily and were informed about the objectives of the research and my affiliation as a researcher with the University of Sussex and the Institute of Development Studies (IDS). The views and concerns of all involved parties in the research were addressed professionally within the given data collection context. Before the interview, I explained the nature of my research and its objective and the ethical aspects including confidentiality and anonymity. In some cases respondents allowed me to voice record the interview, in other occasions it was not possible. All photos taken on site were done under the permission of the farmland managers. All interviews were coded based on position, location and dates of interview. This applies to semi-structured interviews with investors, policy makers, NGOs, and farmers amongst other research participants. This was necessary, as otherwise many participants would have refused to be interviewed. Worth noting however that despite promising anonymity several approached potential respondents refused to be interviewed. All interview material was treated with confidentiality according to the Guidelines on Good Practice in Academic Research.

1.3.4. Research Challenges in Egypt and Study Limitations

Since the onset of this PhD research, the study design took into consideration the methodological challenges in identifying and quantifying land investments and water grabs, and their corresponding implications. It took a long time to identify transnational investors in Egypt, and even more time to access them. A key limitation in this respect was to capture views of the most powerful player within the state, that is the army. This is mostly related to the sensitivities around this actor and the security concerns associated with handling data of sensitive nature. To address this limitation, the thesis relied on secondary data portraying official interviews and statements by representatives of this key player relying on 'official statements' in newspaper articles and official public reports. Overall, views of this key player were represented as part of the state's narrative towards water security within and outside of Egypt. For the interviewed company, it was hard to visit remote sites due to security concerns. Interviews with several potential respondents were not undertaken given their unwillingness to address the topic. Most surprisingly, several non-Egyptian experts and expat workers in international organizations refused to be interviewed also due to the nature of the topic. For this reason, research extended for two years, with periods of bottlenecks and slow progress.

1.4. Dissertation Thesis & Arguments

The thesis of this dissertation argues that the engagement of non-state actors in transnational land-water investments denotes the changing role of the state from the 'hydraulic mission' towards '*water security mercantilism*'. Transnational land-water investments by non-state actors in Egypt and the Nile basin at large are facilitated by 'state-capital alliances' and reflect the changing notion of state-centric hydropolitics. I argue that "water security mercantilism" denotes water grabbing, which overrides the traditional role of the state and its hydraulic mission, towards a broader understanding of water security based on the role of non-state actors and international investors in accessing water, thus creating their own private land-water-food security nexus. From an Egyptian water security standpoint, the hydropolitical implications of state-capital alliances and transnational land-water investments by non-state actors transcend multiple landscapes, beyond singular-scale state-centric hydropolitical views, towards a multi-level polycentric analysis of water security.

In relation to the emerging role of non-state actors in transnational land-water investments and their implications on Egyptian water security, the thesis puts forward three key arguments;

First, LWI taking place in the Nile basin as well as other locations globally reflect the changing role of state and non-state actors towards water security and the formation of (trans)-national 'State-Capital Alliances'. In this respect the land-water-food nexus is framed as a political-economic commodity. This is especially manifested in the Gulf-Nile connection. The engagement of non-state actors and international investors in the appropriation of land-water resources is facilitated by state-capital alliances taking place on two different fronts; (i) the first is 'national state-capital alliances' which occur between home governments (typically water scarce e.g. Gulf states) and non-state actors/national investors capable of investing in farmlands abroad for profit as well as larger strategic objectives of water/food security (supply of strategic crops). (ii) The second front consists of 'transnational state-capital alliances' between host governments and international investors/non-state actors aiming to appropriate land-water resources through large-scale investments. Across different Nile basin countries, transnational state-capital alliances take several shapes and forms, including; Arab investments in Egypt; Egyptian investments in Sudan; Arab investments in Sudan; International investments in Egypt and Sudan. As such each of these transnational state-capital alliances are rooted in domestic politics and international relations serving larger socio-political and economic objectives for both state and non-state actors in home and host countries. In particular, Arab and Gulf investments driven by a regional water scarcity narrative in the Middle East and North Africa, target Egypt (with its advanced infrastructure and Mega projects) and Sudan as the "breadbasket of the Arab world" (Woertz 2013a). In this respect the land-water resources of the Nile nations represents an opportunity for "joint" economic development and food security in the Arab World. They may also represent multiple forms of water grabs taking place across multiple hydropolitical scales (local, national, transboundary). These alliances and emerging actors represent a new variable in the Nile basin hydropolitics and consequently Egyptian water security.

The second argument discusses how transnational investments are founded on the manufacture of abundance. It addresses the land-water-food nexus as both an opportunity and [a] risk for different state and non-state actors. The manufacture of abundance across the thesis implies that the state is trying to do too much with too little. With a limited water budget, increased competition for irrigation (either for profit, food security, or for sustaining livelihoods) may lead to creating tensions between the different nexus elements (e.g. land, water, energy, food, etc..) and different actors including the investors and other water users. These tensions may also entail water grabs and often result a reproduction of scarcity narratives notably in areas with inherent water stress situations, thus masking larger social justice and equity challenges for small farmers. These tensions also reflect the absent role of the state on the ground.

On the one hand, the nexus presents a form of non-traditional security, while on the other hand it is a venue for capital accumulation and large-scale agricultural production through foreign investments. Land-Water resources interdependencies highlight how transnational LWI take several shapes and forms within Egypt or other Nile basin countries. Different actors perceive land and water resources differently. For the state, LSLA and international investments in Mega schemes are perceived as a key element to address the nation's persistent ecological-demographic narrative of crisis, but also to maximize economic return from FDI to modernize the agricultural sector. For the investors, land and water resources are essential economic inputs to achieve two key objectives; profit, as well as larger strategic objectives often related to food security and food sovereignty. For the farmers land and water resources are often a synonym of livelihoods and the larger struggle to survive given today's market economy.

However, nexus framings rooted in larger narratives of security and profit, often overlook the largest water users; the farmers. Although the [land-water] nexus is the foundation of farmers' livelihoods, investment processes often result in water grabs, thus masking larger questions of social justice and equity. As such, these transnational state-capital alliances embracing larger business and strategic goals often mask Nexus tensions, thus creating frustrations for both the farmers and the investors. These tensions reflect the absent role of the state on the ground often manifested in water quality, water quantity, access to electricity, or other challenges related to production. Furthermore, where international investments are present in locations of existing water stress, this may create tensions between investors and different water users. On the local level, nexus opportunities and risks shed light on larger questions of social justice notably as it relates to LSLA and water grabs.

Consequently, the third argument addresses the hydropolitical implications of transnational state-capital alliances across multiple landscapes of water security governance. From an Egyptian water security standpoint, the hydropolitics of state-capital alliances and transnational land-water investments transcend multiple landscapes, beyond singular-scale state-centric water security views, towards a multi-level polycentric analysis of water security. In this respect, water grabs not only affect small farmers and natural capital on the local level, but also have implications on the national and transboundary levels of hydropolitical analysis.

On the local level, the different resources (nexus) tensions shed light on water grabs by powerful actors endowed with technology and capital. These practices often result in the reproduction of scarcity, thus adding another dimension to water (hydro) politics on the local level. On the national level transnational investments and state-capital alliances reflect the manufacture of abundance manifested in water tensions and competition over an already stressed resource, further aggravated by Mega projects for horizontal expansion on the one hand, and the virtual water grabs of corporate investors (both domestic and transnational) on the other. On the transboundary level, investments in upstream countries such as Sudan entail risks, opportunities, and uncertainties in relation to Nile hydropolitics. As such, transnational land-water investments influence Egyptian water politics on the local, national, and international levels, central to which are the farmers, the investors, and the state itself.

1.5. Structure of Dissertation

Following this introduction, Chapter 2 presents the conceptual framework. The presented framework discusses the changing role of the state and the growing role of non-state actors and investors' engagement in LWI. The chapter highlights how transnational state-capital alliances are an emerging element in the study of Egyptian water politics with potential implications on water security across multiple hydropolitical landscapes, thus necessitating a 'multi-level polycentric' water security analytical framework. The chapter concludes that transnational state-capital alliances and land-water-food nexus interdependencies may mask a form of water grabs with hydropolitical implications on local level for farmers, national level for the state, and transboundary hydropolitics.

Chapter 3 adopts a historical lens and a discourse analysis approach to trace how land reclamation schemes in Egypt yielded mixed results throughout the second half of the twentieth century. This chapter highlights the challenges associated with state-sponsored land reclamation schemes for different water users including small farmers and graduates. It also sheds light on the creation of a parallel water economy through the engagement of private investors in the water and agriculture sector–mostly depending on fast depleting groundwater, thus deepening the state's water (in)-security and scarcity narratives. The chapter discusses how despite the massive investments by the state and domestic private sector in land reclamation and agricultural projects, Egypt's ecological-demographic narrative of crisis still prevails with a growing population adding further stress to existing land-water resources. The chapter concludes by highlighting that this narrative of crisis is rooted in, narrative of physical water scarcity, coupled with state bottlenecks and historical challenges to develop sustainable land reclamation projects to address this narrative of crisis.

Chapter 4 explains how the state's approach towards land reclamation and horizontal expansion evolved towards the end of the twentieth century, into the new millennia. The chapter highlights the Mega projects in the desert lands including the second generation (South Valley project) launched in 1996-97 as well as the most recent version of the 1.5 million feddan launched in 2015, which I label as hydraulic mission 3.0. Deploying the concept of the entrepreneurial state the chapter explains how the state's hydraulic mission has evolved by establishing 'transnational state-capital alliances'. This concept allows to understand how the state's infrastructure investments in the desert lands aimed to de-risk LWI to attract international investors to contribute to Egypt's hydraulic mission and land-reclamation schemes.

Chapter 5, moves to map the different types of non-state actors engaged in transnational state-capital alliances and their affiliations, with a particular focus on GCC actors engaged in transnational LWI in Egypt and Sudan. While the first part of the chapter presents the institutional arrangements between different state and non-state actors, the second part of the chapter introduces Al Dahra Agricultural Company as a major investor in Egypt, and explains its motivations based on the larger mandate of Abu Dhabi Food Control Authority. The chapter also outlines the company's different investments in Egypt across four different farmlands, highlighting the similarities and differences in each site. The politics associated with farmlands in New Lands are also analyzed, reflecting how little progress has been achieved over the last decade especially in light of Egypt's 2011 events and larger domestic debates associated with land deals within Egypt.

Chapter 6 portrays the case study of Al Dahra's investments in two different sites in Old-New Lands, notably in Al Nubareya and Al Salheya. Based on fieldwork, the chapter provides in depth empirical analysis about politics of existing investments for the farmers, the investors, and the state by focusing on nexus tensions and actors' interactions on local level. The case study shows that land acquisitions and water grabs take several shapes and forms. Surface water as well as underground aquifers, play complementary roles in most investments. The chapter argues that water security for private investors may come at the expense of small farmers, who are as important given their contribution to food production locally, and most importantly sustaining their livelihoods. A key message is that the corporate investors may be *reproducing scarcity on the local scale*, which affects both the farmers and small investors who already suffer from physical water scarcity and political scarcity.

Chapter 7 extends the analysis of transnational investments and Egyptian water security beyond local and national scales. This chapter discusses state-capital alliances and Nile transboundary hydropolitics, notably in Sudan. It highlights how over the last decade, Sudan has been an attractive destination for transnational LWI in search of fulfilling its own 'hydraulic mission' as the 'breadbasket of the Arab world'. To examine state-capital alliances and Nile hydropolitics, the chapter situates transnational investments within the larger context of Sudanese-Egyptian relations. Particular emphasis is directed to examine transnational investments by the Egyptian state, as well as Egyptian and international (GCC) non-state actors in Sudan. Accordingly, the chapter highlights the water politics of transnational LWI, and their associated risks, challenges, as well as the unachieved potential in Sudan, all of which represent new and emerging elements influencing Egypt's water security.

Chapter 8 presents a synthesis of the research findings and concludes the thesis. It presents a broadened view of Egyptian water security and transnational investments across multiple scales. Findings are presented across three different categories. The first category examines the political economy aspects of state-capital alliances and the diverse modalities of LWI within Egypt as well as other Nile basin countries. It highlights how state-capital alliances frame the nexus as a political-economic commodity. The second category of findings discusses how state-capital alliances are founded on the manufacture of abundance, often resulting in nexus tensions for both farmers and investors. It also shows how these tensions reflect the absent role of the state thus raising questions of social justice and equity amongst different actors. The third category presents a multilevel Water Security Analysis of LWI and Water Grabs across multiple hydropolitical landscapes. The chapter concludes by questioning whether these findings mark the shift from the age of the hydraulic mission towards a new approach of 'water security mercantilism'?

Chapter 2

Conceptual Framework

A Multi-level Water Security Analysis of Transnational State Capital Alliances & the Hydropolitics of Land Investments

Introduction

This chapter presents a conceptual framework that argues for a multi-level water security analysis drawing on hydropolitics, development studies and political economy scholarship. While water security is already a contested concept, the appropriation of land and water resources by non-state actors through transnational investments in farmlands abroad adds a new dimension to the debate. As discussed earlier, critical review of literature identifies LSLA and as an understudied area of hydropolitics (Jägerskog et al. 2012). Furthermore, little is known about the hydropolitical implications and water security dimensions of transnational land-water investments, central to which are the state, the farmers, and the investors. In this research, I examine the changing role of the state and the increased engagement of non-state actors in transnational investments as an emerging element in the study of hydropolitics. This research scope is particularly relevant to state-centric debates addressing Egyptian water security, within the larger context of Nile basin hydropolitics.

I argue that the engagement of non-state actors in transnational investments is facilitated by state-capital alliances and denotes a transition from the hydraulic mission towards *water security mercantilism*. Transnational land-water investments reflect a changing role of the state and the rise of state-capital alliances towards the appropriation of land-water resources. To advance its hydraulic mission in the 21st century, the changing role of the state towards frontier making reflects variations between a "developmental/predatory" mode and an “entrepreneurial” role. By establishing Mega projects and *de-risking* land reclamation and horizontal expansion in remote desert areas, the hydraulic mission of the entrepreneurial state depends on infrastructure investments to attract international investors endowed with technology and capital to develop large-scale agricultural schemes. This process is facilitated by state-capital alliances, which take place in both home (e.g. GCC) and host countries (e.g. Nile basin). It is also founded on land-water-food nexus interdependencies often framed in larger narratives of regional cooperation and economic integration.

A nexus approach allows understanding the opportunities and tensions associated with different actor-resources interactions and the multiple nexi (e.g. land-water-food; water-food-energy; food-trade; etc.). Thus the’ land-water-food’ nexus is about understanding the linkages between different actors and resources, given competing interests over land and more importantly water resources. These resources linkages also draw attention to potential conflicts between users, sectors, and nation-states (Bakker & Morinville 2013). As such, transnational state-capital alliances and their corresponding security and profit ‘nexus’ framings often entail trade-offs and tensions, and may result in different forms of water grabs, which transcend multiple levels of water security analysis. In this respect, the concepts of nexus and water grabs are deployed as analytical lenses to understand the water security dimensions associated with transnational state-capital alliances and land-investments across multiple hydropolitical landscapes.

In light of these debates bridging water grabs and nexus literature to understand the water politics of transnational investments, the conceptual framework adopts a multi-level polycentric analysis of water security (Pahl-Wostl 2009). This analytical approach towards water security is based on a framework recognizing the presence of different actors (polycentric) that interact across different scales (multi-level) (Bakker et al. 2013). This also means that a multi-level water security framework aims to understand the interrelation between local dynamics, domestic politics and international relations related to transnational land-water investments, thus broadening out the analysis and insights on hydropolitics to multiple and interconnected scales (Menga 2016).

The chapter is divided into five sections. The first section presents a critique of state-centric hydropolitics literature and identifies the engagement of non-state actors in LSLA as a gap in the literature. The second section discusses the evolution of the hydraulic mission of the "state" and conceptualizes the changing role of the entrepreneurial state. It also identifies the rise of transnational state-capital alliances given the engagement of non-state actors in the appropriation of land-water resources. Section three bridges the debates on water grabs and the nexus opportunities and tensions associated with transnational state-capital alliances and land-water investments across different levels. Section 4 identifies the governance dimensions of water security and develops a multi-level framework to analyze the implications of land-water investments across multiple hydropolitical scales. Section five concludes the chapter.

2.1. Critique of State-centric Transboundary Hydropolitics

Historically, the relevance of transboundary waters in today's global political economy can be traced back to the 1977 United Nations Water Conference in Mar del Plata in Argentina, which gave rise to one of the first 'Register of International Rivers' (United Nations 1978; Turton 2008). This event initiated a process by which the existing structure, function and core assumptions underpinning the way we manage water resources have been systematically examined and critiqued over time (Turton et al. 2007; Turton 2008). Literature also refers to the fact that most studies addressing international watercourses received more attention during the post cold war era over the last three decades (1990-2018). Two ground-breaking studies took place in the 1970's by LeMarquand (1977)[1] through his book "International Rivers: The Politics of Cooperation" and John Waterbury (1979) through his book "Hydropolitics of the Nile Valley". Schmeier (Schmeier 2010) further indicates that more

[1] It should be noted however that before publishing his book, LeMarquand, D. published in (1976) an article with the title of 'Politics of International River Basin Cooperation and Management'

comprehensive studies started to emerge since the early 1990s referring to scholars such as (Gleick 1993; Lowi 1993; Biswas 1993; ; Dinar & Wolf 1994; Dinar 2002; Kliot 1994).

Traditionally pivoted around state-centric hydro-political debates, notions and narratives of conflict (Gleick 1993; Homer-Dixon 1995; 1996; Dinar 2002) and cooperation (Waterbury 1997; Wolf 1998; 1999) have dominated international relations (IR) and trans-boundary water resources management (TWM) literature. Hydropolitics literature explored the two terms in an exhaustive manner whereby Julien (2012) refers to these two discourses within the rationalist paradigm of IR[2] as the "water security discourse" and the "water rationality discourse" (Julien 2012, p.46).

The debates have clearly shifted from this dichotomous understanding. Hydro-politics and water security literature addressing TWM also covered a multitude of issues such as water nationalism (Allouche 2005), hegemony (Zeitoun & Warner 2006), counter-hegemony (Cascão 2008), power asymmetry (Cascão 2009), and unilateral vs. cooperative action (Earle et al. 2010, p.2). The London Water Group has shown how conflict and cooperation can coexist in any given international river basin (Mirumachi & Allan 2007) and focused their analysis on how power, hegemony and power asymmetries can influence transboundary water politics (Zeitoun & Warner 2006). The co-existence of conflict and cooperation amongst upstream and downstream riparian countries in a river basin remains an appealing framework to explain and understand hydro-political relations and behavior (coercive, cooperative, veiled consent, etc…) towards trans-boundary water resources (Mirumachi 2015). Warner (2012) refers to the exiting discourse on hydropolitics as "the three compelling stories", that is "water war, water peace and water hegemony". Others have taken a broader analysis. Selby (2003) for instance has taken a historical materialist view by looking at

[2] Realism and Liberalism are cited as two main rationalists paradigms in IR (Katzestein et al, 1998 in Julien 2012).

water conflicts through the lens of a political economic problem rooted in patterns of capitalist development.

Complementing views are found in the studies of international political economy based on the concepts of virtual water and virtual water trade developed by Tony Allan in 1992, linking water, food, and trade (Allan 2003). These concepts succeeded in explaining transboundary water relations of the 1970s and 1980s (Earle et al. 2010, p.24) by analyzing the invisible process of trade and its role in regional security in the Middle East. The concept is founded on the premise that "communities and nations that live in river basins (watersheds) operate in "open" economic systems (problemsheds) where resource shortages can be compensated" (Allan 2001). Through virtual water trade, weaker riparians can promote their different preferred principles- sovereignty, integrity, and reasonable and equitable use – because the problem of water security is being invisibly addressed (Allan & Mirumachi 2010, p.19).

Nevertheless, the global food and energy crises of 2007/08 and 2010/11, along with climate change uncertainties have brought back scarcity narratives in global earth system and water debates (Allouche 2011). This persisting idea of linking water scarcity to conflict and war has been well explained by Katz (2011), what he has termed the Hydro-Political Hyperbole. Media images and declarations by journalists, politicians, and think tanks reinforce these popular geopolitical discourses and imaginaries (Hanna & Allouche, forthcoming).

In this respect, the science of politics that characterizes IR related hydropolitical theories might be too rigid to understand the various historical trajectories, diversity and pathways of water-related inter and intra state relations around the world. Many of these concepts of the trans-boundary water resources and hydropolitics literature as well as their corresponding water security discourses and narratives remain state-centric, focusing on inter-state relations at the international level, whereby nation-states are the central unit of analysis. Furthermore, John Agnew's (1994) criticism of what Smith (1979, p.191) calls 'methodological nationalism' shows how the idea of the territorial state as the container of (modern) society has been reproduced in the main currents of international relations (Agnew 1994). This tradition reflects a more entrenched worldview and a ‘state-centric epistemology’, which hardly leaves any chance for the ‘domestic’ to surface as a scale, as expression of power and conflicting interests (Brenner 1999; Zain 2007). In this respect, reference to local and regional settings, or to 'global' processes, “was largely closed off by the 'nationalizing' of social science and its subservience to the territorial state” (Agnew 1989, p.69).

Subsequently, beyond the upstream-downstream contestations of historical water shares and state-centric conflict, cooperation, and hegemony narratives, and drawing on the evidence that non-state actors are playing an increasing role in controlling natural resources in trans-boundary river basins as discussed in chapter 1, the topic of land acquisition and hydropolitics is unchartered territory (Jägerskog et al. 2012). In this respect, the effect that LSLA - by both foreign governments and by national and international companies-_will have on trans-boundary river basins has not yet been analyzed.

As such, there is a need to look beyond these state-centric hydropolitical and water security narratives to put water into its relevant place in the broader political economy perspective and the evolving research agenda on trans-boundary water management (TWM) (Jägerskog et al. 2012). This is especially the case given the increasing interdependencies between land-water-food-energy-climate which are multiple in their nature. Furthermore, the implications of LSLA or “land and water grabs” by both foreign governments and by national and international companies, as well as their policy implications on trans-boundary water resources in complex river basins remain unclear. For instance, some unanswered questions raised by other researchers included; Will the host countries where the investments are being made become less powerful than some of their riparian neighbors, or will this instead lead to an increase of their bargaining power? (Zeitoun & Jagerskog 2009); will the small farmers be squeezed between a strong riparian protecting its own interest and a strong foreign government (e.g. India, China, GCC) seeking to safeguard its food security? These debates are increasingly gaining relevance given the rising security and scarcity narratives in light of the contemporary hydropolitical context in international river basins such as the Nile. In particular, these debates are notably relevant to Egypt, Ethiopia and Sudan for instance where the influence of non-state actors is growing via massive land acquisition deals as discussed in chapter 1. In the context of this research, I question the implications of LSLA and transnational investments on Egyptian water security, by examining their water (hydro) political interactions1 within Egypt on the local and national levels, but also across the borders in Sudan on the transboundary level.

But where would we situate the "state" beyond state-centric hydropolitical theories? And how do we conceptualize the state-society interaction within the larger hydropolitical debates in light of the growing scarcity and security narratives on local, national, and international levels? To address these questions, the following sections discuss the changing role of the state and the engagement of non-state actors in the appropriation of land and water resources, within the larger debates on water security, the hydraulic mission, and large-scale land-water investments.

2.2. A changing Role of the State in Land-Water Investments

2.2.1. Modernity, and the hydraulic mission: From a developmental to a predatory state

The impact of modernization theory on water resources management has been well documented (Allouche 2010). Different scholars have attributed the larger question of state modernization throughout the nineteenth and twentieth centuries to the idea of the "hydraulic mission", defined as mastering nature and controlling the flow of water (Allan 2002b; Allouche 2010). Modern water sciences, hydrology, and landscape engineering technologies have been therefore portrayed as crucial ingredients of state power and control, thus facilitating large-scale structural interventions to regulate water flows and the modification of waterscapes over large parcels of geographical land (Benedikter 2014). Scott's (1998) conceptualization of high modernism reflects how the state's management capacity contributed to national hydraulic projects and structures such as dams, as well as large-scale irrigation schemes, often portrayed as a sign of might, development and modernity.

In this respect, Molle et al. (2009), indicate that water resources development by the state was an emergent and, at times, intentional, political strategy for controlling space, water and people and an important part of everyday forms of state formation (see Worster 1985; Wehr 2004; Swyngedouw 2007). In Egypt, similar to other countries, hydraulic bureaucracies are, first and foremost, the creation of nation states and reflect a number of their concerns and objectives. As indicated by Molle et al. (2009), "If, as stressed by Wittfogel, centralized despotic states have emerged from the need of large- scale investments in water control, these needs have also been sometimes concomitantly used by states to strengthen their legitimacy". Bakker (2003, p.40) further indicates that throughout much of the twentieth century, water management and investment in the water sector were mechanisms of 'social legitimization' of the state whereby "water was understood to be a strategic resource for societies undergoing modernization (and hence industrialization and urbanization), and a factor of production" (Ibid).

Mitchell (1991) indicates that the state has been always hard to define. In his views, "a definition of the state always depends on distinguishing it from society, and the line between the two is always difficult to draw in practice" (Mitchell 1991, p.77). In order to understand the changing role of the state in relation to land-water investments and the larger debates about water security, I refer to the larger body of literature on the developmental state. Peter Evans (1995; 1989) distinguished three forms of state (Farah 2009); the first is the predatory state controlled by a political elite prioritizing the fulfillment of its own interest even at the expense of society, with the help of an inefficient state bureaucracy. The second is the intermediate state, built on a certain administrative capacity, yet with fragmented structures penetrated by different interest groups. The third is the developmental state, with a well-developed bureaucracy, relatively autonomous from interest groups, however maintaining close ties with large private corporations, usually embedded in selected social networks, particularly industrial ones. Yet, a state can demonstrate aspects of both, a developmental state and a predatory one, as *the two types are not mutually exclusive* (Farah 2009; *emphasis added)*.

However, Chang (2010) indicates that different forms of developmental states exist. Chang (2010, p.82) criticized the narrow, fundamentalist definition of a developmental state, that is "one that derives political legitimacy from its record in economic development; which it tries to achieve mainly by means of selective industrial policy". He argues that while the developmental state literature has been widely applied to the East Asian 'miracle' economies such as Japan and South Korea during the 1950s-80s, other experiences need to be taken into consideration. According to Chang, we should look at other experiences, "if only because they shake us out of our usual assumptions regarding what is possible; for reality is often 'stranger than fiction'" (2010, p.82). As such, further attention is needed to explore different models of the developmental state, one that can address the wider picture of developmental success and failure around the world (Regeni & Auktor 2017). Accordingly, there is a need to broaden the definition of the developmental state "to include any state that deliberately intervenes to promote development" (Chang 2010, p.84). In this respect, Farah (2009) indicates that the history of modern Egypt reveals different periods of state intervention in the economy. State intervention ranged from total control during the reign of Mohamed Ali to relative autonomy under Nasser, whereby she characterizes the Egyptian state during both those periods as a "developmental state" (Farah 2009). However, this developmental state is far from the experience of East Asia (where the state invited the creation of a separate capitalist class to carry out the work of development under its guidance). Under Mohamed Ali and

Nasser the state did not target economic growth but aimed at a complete restructuring of the Egyptian economy and society (by eliminating previous dominant elites and changing dominant power relations). Interestingly enough, it is also during these periods that a central element of state intervention for modernization was the advancement of Egypt's hydraulic mission. The main point of this discussion is that developmental success or failure can take many forms as has happened at different times in history (Regeni & Auktor 2017).

As such I argue that the role of the developmental/predatory state has evolved into an entrepreneurial role marking the state's new approach towards frontier making, land reclamation and horizontal expansion in the 21st century as discussed in the following section.

2.2.2. The Hydraulic Mission of the Entrepreneurial State & Transnational State-Capital Alliances

As indicated by Regeni & Auktor (2017), a growing number of scholars argue that changing global conditions have renewed the call to revise the debates on the changing role of the state in social and economic transformation in the 21st century (see Evans 2014; Evans & Heller 2015; Altenburg & Lütkenhorst 2015). These debates also denote the rise of non-state actors engagement in the appropriation of natural resources. A good example relevant to the current research is sovereign wealth funds (SWFs). SWFs are becoming key investors in the market and are being used by some emerging powers to secure commodities abroad, not just driven by profit seeking motives but also by public goals which may have negative environmental and social consequences (Clapp & Helleiner 2012, p.493).

In a special issue about the rush for global land deals, Windy Wolford at al. (2013) put forward four key arguments in relation to the role of the state in land deals; (i) states are not simply passive victims in these deals, nor coerced into accessing foreign capital by selling off pieces of their national territory to more powerful economic or political players; "Instead, many states are active, calculating partners in land deals, negotiating the costs and benefits of the contemporary moment in order to maximize returns on what are considered marginal lands or marginal communities"; (ii) states do not divide neatly into those acquiring land and those being acquired, rather a range of actor within the states (e.g. government agencies, elites, etc) may "draw on different kinds of authority to provide assistance or obstacles to would-be buyer"; (iii) governments around the world have had very different responses to land deals ranging from embracing large-scale land deals to resisting them; and (iv) land deals can lead to the articulation of different kinds of power within the state.

Contributing to these debates about the changing role of the state in land deals, I argue that the engagement of non-state actors and international investors marks a new approach towards the hydraulic mission and larger water security objectives. Building on the idea of state modernization and the hydraulic mission drawing on the literature of the developmental state, this section explores the changing role of the developmental/predatory state, and the rise of the "entrepreneurial state" and transnational "state-capital alliances" towards water security and land-water investments.

In her book "The Entrepreneurial State" Mazuccato essentially questions the role of the State in the economy" (Mazzucato 2013b; Mazzucato 2015). This concept aims to change how we talk about the state as 'the most effective way to defend its existence, and size, in a proactive way'. Mazzucato makes the distinction between the developmental state and the entrepreneurial state. She refers to the developmental state literature, which "understood the state's role in 'developing' countries, both in terms of Keynesian demand management and in leading the industrial process". On the other hand, she explains the importance of the entrepreneurial state in terms of its "centrality in the innovation process and in the struggle for global competition".

Combining Schumpeter[3] and Keynes[4], Mazzucato argues for the centrality of government intervention in innovation systems and debates the idea that "the state is cast as inertial –necessary for the 'basics', but too large and heavy to be the dynamic engine" (Mazzucato 2015). She observes that "in most parts of the world we are witnessing a massive withdrawal of the State, one that has been justified in terms of debt reduction and – perhaps more systematically – in terms of rendering the economy more 'dynamic', 'competitive' and 'innovative'". In this respect, the role of government is being limited to simply "facilitating" and "de-risking" the private sector; fixing market failures, rather than having a direct role in creating and shaping markets, determining the direction of change, with the adequate budgets and governmental structures to do so (Mazzucato 2015, pp.3–4);

> Thus, to dismantle that false image, a proper defense of the State should argue that it not only 'crowds in' private investment (by increasing GDP through the multiplier effect) – a correct but limited point made by Keynesians – it does something more. It is necessary to build a theory of the State's role in shaping and creating markets – more in line with the work of Karl Polanyi (2001 [1944]) who emphasized how the capitalist 'market' has from the start been heavily shaped by State actions.

According to Mazzucato (2011a) a state is entrepreneurial when it is able and willing to invest in areas of extreme uncertainty, courageously envisioning the direction of change across public agencies and departments. She indicates further "an entrepreneurial state does not yet know what the details of the innovation are, but it knows a general area that is ripe for development, or where pushing the boundaries of knowledge are desirable" (2011a, pp.70–71).

Most importantly, an entrepreneurial state must "think big" (Mazzucato 2013b; Mazzucato 2011b). In this respect, most of the radical, revolutionary innovations that have fuelled the dynamics of capitalism – from railroads to the internet, to modern-day nanotechnology and pharmaceuticals – trace the most courageous,

---

[3] Schumpeterian economists emphasized the importance of economic systems in stimulating innovation

[4] A British economist widely considered as one of the most influential during the 20th century and the founder of modern macroeconomics theory. His ideas fundamentally changed the theory and practice of macroeconomics and the economic policies of governments as he built on and refined earlier work on the causes of business cycles

early and capital-intensive ‘entrepreneurial’ investments back to the ‘visible hand’ of the State (Mazzucato 2013a; Mazzucato 2015). It was such mission-oriented investments that coordinated public and private initiatives, built new networks, and drove the entire techno-economic process, which resulted in the creation of new markets (Ibid). To illustrate the concept, she provides the example of green transformations and their corresponding investments in solar and wind energy, indicating that these investments are not just about start-ups and venture capital, rather “it is about the willingness and ability of economic agents to take on risk and uncertainty: what is genuinely unknown” (Mazzucato et al. 2015).

In the case of Egypt, in pursuit of a modern vision of horizontal expansion, and land reclamation, the state adopted a new entrepreneurial model to achieve its desert dreams. This new approach was mostly confined to government investments aiming at developing the necessary infrastructure for new Mega projects in remote desert lands as part of frontier making. In this respect, the entrepreneurial state has made tremendous investments in infrastructure to de-risk land-water investments, primarily to attract foreign and domestic investors. Infrastructure investments included a sophisticated network of irrigation canals, the largest pumping station in the world (Mubarak station in Toshka), access to electricity, (air)-ports, investment climate and tax breaks, amongst other measures to encourage foreign direct investment (FDI) in the agriculture sector – as well as other sectors of the economy. This shifting role of the state along the dynamics of the global economy marks the rise of the ‘hydraulic mission of the entrepreneurial state’ through high-risk infrastructure investments in the desert with the main objective of attracting technology and capital primarily from international investors to develop large-scale agricultural lands as part of horizontal expansion plans.

This process led the formation of transnational “state-capital alliances” (Mehta et al. 2013), towards a larger political economic project, for maximum use of land and water resources. Land-water investments in farmlands abroad can be therefore viewed as an outcome of the 20th century processes of economic globalization and the corresponding restructuring of state function (Falkner 2003). They also reflect the changing role of the state towards its hydraulic mission and horizontal expansion plans, by engaging international investors and non-state actors in land-water investments.

2.3. Non-state Actors & Transnational Land-Water Investments: Bridging Nexus and Water Grabs Debates

While there is a degree of repackaging involved from the 'old' concepts of integrated water resources management (IWRM) (limited to the water domain/ community level) and sustainable development (as a too broad concept to narrow down to specific issues), the nexus offers the opportunity to focus on sectors of energy, land, food, and water (Srivastava & Mehta 2014). In this respect, Allan et al. (2015, p.304) indicate that the Water-Energy-Food linkages can be conceptualized as a "grand nexus" that embraces two sub-nexi; the water-food-trade sub-nexus, and the energy-climate change sub-nexus. Therefore, nexus debates reflect the growing recognition about these inter-linkages, which were typically forgotten "because of bureaucratic silos and the vested organizational and institutional interests" (Srivastava & Mehta 2014).

In light of the changing role of the "entrepreneurial state" towards transnational land-water investments, evidence shows increasing interdependencies between 'financial capital' on the one hand, and 'land-water-energy-food' resources on the other. In this respect, the "nexus" is framed for powerful global players to think about water and growth prospects "interlinking water security, economic development and GDP growth, building investment and regulatory models for the flow of innovative water funds" (World Economic Forum 2009). However, nexus linkages can be also framed as a Global Risk (World Economic Forum, 2011b), thus representing resources tensions (e.g. energy access; water quality and quantity; export and regulatory fees, etc.). While these framings adopted the nexus as a 'resource governance' lens, the Bonn Conference in 2011 stressed the importance of prioritizing a 'human security' lens (Allouche et al. 2015).

Furthermore, narratives of scarcity and uncertainty have driven the language of nexus to be increasingly framed in the language of (non-traditional) security (Allouche et al. 2015). Given market volatility, land appears to be a more stable source of investment and a platform for energy, food and water security during the era of climate change (Srivastava & Mehta 2014). These interdependencies reflect how [the] nexus also indicates a convergence of actors, which is particularly visible in land acquisitions in Africa (Ibid). In this respect, "the nexus has become a strong policy metaphor to address the 'world in crises' and has also brought in new players such as global corporations, who are now taking a keen interest in addressing land, water, climate change and energy risks" (Ibid).

Thus, the 'nexus' allows drawing linkages between different actors and resources. Accordingly, different actors including new and old civil societies, the private sector, IFIs, International Organizations and academics "all understand and frame sustainability and security differently" (Allouche et al. 2014, p.12). This is especially true given that powerful hydrocracies tend to view water and ecosystems as static systems, which in turn shapes an illusory view of food, water and energy security as static too (Allouche et al. 2014). Consequently, both the state and the investors have internalized this environmental security narrative in a particular way, which is leading to capital intensification. Furthermore, Keulertz & Woertz (2015) indicate that the contemporary multipolar order represents a new phase of 'inverse globalization' by which new actors in the global political order, such as the GCC countries, BRICS, and China, start to become investors instead of being the beneficiaries of investment (Allan 2013; Sojamo & Larson 2012). Accordingly, increasing economic connectedness also externalizes resource extraction to other regions and exposes countries to volatility in the global market (Hoff 2011).

While it is recognized that multiple nexi exist, the conceptual framework highlights the strong connection between 'land-water-food' nexus as an emerging element of political economy and resource politics. In this research, [land-water-food] resources are particularly addressed given the larger environmental and hydropolitical context in arid areas such as the Middle East and North Africa. These resources linkages are reinforced by (water scarcity) risks perceived by the state and investors, thus leading them to pay particular attention to the uncertainties associated with water security, population growth, and food security/ sovereignty. The land-water-food nexus is also of particular relevance to questions of water security, financial power, and larger political objectives such as the hydraulic mission. This link is used across this dissertation to highlight the importance of studying the growing land-water-food interdependencies for the state [host countries notably in Nile basin (e.g. Egypt-Sudan-others)], the investors (seeking profit as well as other strategic objectives based on land-water access for food production), as well as the farmers whereby this nexus represents their livelihood.

However, it is important to note that while land-water-food interdependencies for the state and investors are of particular relevance to questions of security, they also entail environmental, social, and political risks for different actors. Accordingly, land acquisitions and appropriation of water resources through farmlands abroad denote different forms of nexus tensions. In this respect, literature indicates that the silent appropriation of water resources through land deals and LSLA represents a form of water grabs. In this context, water grabs are understood as the capturing of control not just of the water itself, but also of the power to decide how this will be used—by whom, when, for how long and for what purposes—in order to control the benefits of use (Mehta et al. 2013).

Consequently, investments addressing one aspect of insecurity can exacerbate other insecurities (Jobbins et al. 2015), not only in terms of resources grab (e.g. water withdrawal requires more energy), but also in terms of actors' interests. The politics of transnational land-water investments often reflect the manufacture of scarcity, or rather the [manufacture of abundance], and draws linkages between international political economy and geopolitics. *As such,* while transnational investments and state-capital alliances manifest the convergence of state and non-state actors to address larger (water-food) security and scarcity narratives and risks, 'the land-water-food' nexus shows (hydro)-political and socio-economic trade-offs, and hence draws attention to water grabs. Therefore the market-technical framing of the nexus by the World Economic Forum, located in international business imperatives and global economy "mask a bigger debate on resource inequality and access, contributing to social instability" (Allouche et al. 2014). Thus, the nexus literature and its multiple framings hide contested issues of resources politics and sustainability pathways.

Water grabs as a concept has been typically used to question the social dimensions of land deals, but rarely if ever from a hydro-political standpoint. I extend the use of the concept to examine water (hydro) politics of transnational investments across multiple landscapes. In this respect, I argue that the engagement of non-state actors through the formation of transnational state-capital alliances results in hydropolitical implications across multiple levels; on a local level for farmers, on the national level with the states, and on the transboundary level of Nile river basin hydropolitics. This also implies the presence of a myriad of interactions amongst different actors across the different scales. For example while investments by large corporate actors are often framed by state-capital alliances as an important element of the hydraulic mission, sector modernization, and economic opportunity, they can increase water tensions on the local level with negative impacts on the livelihoods of small farmers. Yet, they can also represent a form of virtual water grabs on the national level if investments lead to export of high water consuming crops such as alfalfa. Transnational investments can also represent a form of water grabs on the transboundary level potentially leading to increased hydropolitical tensions between upstream and downstream countries within the larger context of a river basin.

To address the scalar mismatch about the hydropolitical dimensions of transnational investments, the conceptual framework recognizes the governance dimensions of water security. Hence, deploying the analytical lenses of nexus water grabs, the research explores the resources politics and hydropolitical implications of transnational state-capital alliances and land-water investments on the local, national and transboundary scales of hydropolitical analysis. To unpack the water politics associated with these investments across different landscapes, the following section proposes a 'multi-level water security' framework, adopting a 'global perspective' to link different scales and actors.

2.4. The Governance Dimensions of Water Security

A common definition of water security is "an acceptable level of water-related risks to humans and ecosystems, coupled with the availability of water of sufficient quantity and quality to support livelihoods, national security, human health and ecosystem services" (Bakker 2012; Cook & Bakker 2012). Water security perspectives emphasize the inherent uncertainty in the management of complex socio-ecological systems. However, water governance literature indicates a scalar mismatch in analyzing water security (Norman et al. 2012; Bakker & Morinville 2013; Bakker 2012). For example Egypt has indicated that water security is a matter of national security; while Australia indicated that water security is an issue of water availability on a watershed basis (Cook & Bakker 2012; Bakker & Morinville 2013). Furthermore, in the Middle East and North Africa region, discussions are generally focused on regional-based sharing of scarce resources in the face of increasing demand and geopolitical tensions (Bakker & Morinville 2013, p.7). These views however are based on state-centric positions, sometimes linking the national to international, yet often overlooking the local. They also overlook the role of non-state actors/market players, since by definition they focus on nation-state as the central unit of analysis.

According to Pahl-wostl et al. (2008), there are four different schools to understand water resources governance as part of global resources governance; The first emphasizes local level issues typically associated with anthropologists, arguing the need to understand local rights, needs, and stakeholders. The second school of thought emphasizes the importance of water as a national resource for

the benefit of the national economy and society (e.g. domestic interests come first). The third school of thought towards water governance adopts a basin level/watershed approach, combining efficiency and hydrological systems (e.g. equitable management of transboundary and international waters). The fourth and relatively new school takes a 'global perspective' on water governance by recognizing that "local, national, and basin-level water issues are interlinked within a global water system" (Pahl-wostl et al. 2008, p.421).
Given the nature of transnational land-water investments and their corresponding state-capital alliances, the conceptual framework adopts the fourth proposed approach for a 'global perspective' linking different levels of water resources governance. The existence of a multitude of actors and interests in the water security debates underscores the need for robust frameworks to ensure social and environmental externalities are accounted for or 'internalized' whereby resources are shared equitably and natural capital maintained (Hoff 2011). Therefore, a global perspective reflects the necessity of a multi-level water security analytical framework to address the emerging role of non-state actors, in relation to international land-water investments and their hydropolitical implications transcending multiple landscapes. This approach is especially relevant to issues of scalar mismatch often stressed within water security literature (Bakker 2012; Cook & Bakker 2012; Bakker & Morinville 2013).

A multi-level water security framework recognizes the nature of transnational state-capital alliances denoting the presence of different actors (polycentric; e.g. state, farmers, investors) that interact across different local, national, and transboundary scales (multi-level). This is especially true in the case of the hydropolitics of transnational land-water investments vis-à-vis Egyptian water security on local and national levels, as well as the larger question of Nile basin transboundary hydropolitics.

According to Bakker et al. (2013, p.7) multi-level governance is viewed as an alternative to singular scale perspectives and particularly state-centric analyses, thus assuming a priori the importance of addressing scalar interdependencies and cross-scale policy externalities (Bakker & Morinville 2013). Multilevel water security approach often entails a process of rescaling along one or more of three axes: 'up' from nation states, 'down' to local levels of government (e.g. the delegation of responsibility to municipalities), and 'out' from geopolitical units (e.g. the nation-state, the province, the state, the parish) to new scales (e.g. watersheds) (Bulkeley 2005; Reed & Bruyneel 2010; Bakker & Morinville 2013). Bakker et al. (2013, p.5) draw further attention to these scalar interdependencies by linking polycentrism and a multilevel water governance approach whereby;

> Polycentrism implies the involvement of multiple actors at multiple scales; hence, an innovative aspect of a water security approach is the emphasis on multi-level governance...with increased emphasis on watershed-based and integrated management of environmental issues, awareness of the multi-level causes and impacts of water-related threats (particularly, although not uniquely, with regard to the water–energy–food nexus), and concern over the implications of climate change for water resources—the study and mitigation of which is necessarily multi-scalar. This provides a distinct contrast to the watershed-focused emphasis of IWRM.

However, as indicated by Bakker et al. (2013) while rescaling processes and multi-level governance approaches offer important avenues to pursue water security analysis (at multiple levels), several limitations remain. These are summarized in three main critiques (Bakker & Morinville 2013); the first is the importance to acknowledge the utility and limitations of any particular scale of governance. The second is the tendency of multi-level governance to adopt a watershed-focused approach, which may be insufficient to address complex water security challenges and trade-offs occurring at spatial and temporal scales. For example the issue of virtual water trade or trade-offs between water-energy-food (nexus) are not necessarily addressed through a watershed approach. The third criticism is related to the notion of polycentric governance, whereby even if local issues are taken into consideration, the power of decision-making often remains at the national level within the state; a phenomenon referred to by Ribot (2004) as the "Charade" whereby even if a multilevel governance approach aims at improving efficiency, access and sustainability, it may not necessarily address the concerns and power relations associated with local population and small farmers (Bakker & Morinville 2013).

Nevertheless, despite these limitations, a multi-level governance approach can be useful to address the emerging hydro-politics of transnational LWI between different (state and non-state) actors interacting across different scales. Hence, deploying the concepts of the nexus and water grabs within a multi-level water security framework reveals three key issues (Bakker & Morinville 2013); (i) water security is not only subject to state-centric analysis (neither the sole nor the primary unit of analysis), rather it is the outcome of different types of interactions between state, non-state actors (e.g. market), and society (e.g. farmers) within the same level or across multiple levels of hydropolitical analysis; (ii) the existence of 'land-water-food' linkages and water grabs across different hydropolitical levels, thus expanding the classical perception of water (security) from a singular element of the political economy to multi-scalar polycentric approach; (iii) water security emphasizes the centrality of social justice in negotiating conflicts generated by tensions of [a] particular nexus manifested in a variety of modalities (both legal and illegal) and scales (from local to supranational).

2.5. From the hydraulic mission to water security mercantilism

As discussed in this chapter, the changing role of the state and the engagement of non-state actors in LWI mark a new episode in the hydraulic mission of the entrepreneurial state to advance the larger 'modernization' project. It also led to the establishment of transnational state-capital alliances towards water security to serve national horizontal expansion plans and land reclamation schemes. These alliances associated with transnational investments show how the nexus is viewed and framed differently by different actors. These alliances also show the growing interdependence and tensions between the different elements of [land-water-food] production on the one hand, and financial profit on the other.

In other words, transnational state-capital alliances mark the transition from the state-led hydraulic mission to water security mercantilism. This term was originally introduced by (McMichael 2013) to explain how land grabs represent a form of security mercantilism in international relations, whereby; "land grabbing overrides the multilateral trading system substituting direct access to productive land for food and fuel supplies rather than relying on market access, whereby evolving governance mechanisms simultaneously deepen the privatization of states and land-use" (2013, p.48).

Inspired by this definition, I argue that "water security mercantilism" denotes water grabbing, which overrides the traditional role of the state and its hydraulic mission, towards a new understanding of water security based on the role of private/non-state actors in accessing water resources, thus creating their own private [land-water-food] security and profit nexus. While for the state, investments represent opportunities for sector modernization based on the introduction of industrial agricultural production modes; transnational LWI primarily serve private interest and profit. They also re-shape our understanding of water security, primarily to serve financial goals, instead of larger public goals, through a particular understanding of land-water-food interdependencies depending on industrial agricultural production modes. As such, instead of advancing the hydraulic mission of the entrepreneurial state, transnational LWI by non-state actors mostly address their primary goal of financial profit. Hence, these political economy dynamics founded on state-capital alliances left the hydraulic mission of the state unachieved, and shifted land-water resources use towards private interests and larger strategic objectives of transnational investors. Consequently, through water security mercantilism, private actors override the existing hydraulic mission of the state, and existing water governance mechanisms (Conca 2006). These processes represent an emerging element in hydropolitical debates, beyond singular-scale state-centric views, towards a multi-level view of water security. Given land-water nexus politics associated with transnational investments, the understanding of Egyptian water security can be claimed to witness profound changes with implications on the state's hydraulic mission, food security, as well as agricultural and virtual water trade within and outside the Nile basin.

Chapter 3

State Modernization, Horizontal Expansion, and Egypt's 'Ecological-Demographic Narrative of Crisis'

Chapter Overview and Key Message

This background chapter discusses the evolution of Egypt's hydraulic mission from a historical perspective, with a particular focus on horizontal expansion and land reclamation schemes during the post-colonial era of Nasser (1952) onwards. It shows how water security and controlling the flow of water have been consistently an essential element of the national discourses on state modernization, and greening the desert. It sheds light on Egypt's unresolved ecological-demographic narrative of crisis known as 'too many people on too little land', despite the many land-reclamation projects undertaken during the second half of the twentieth century (1952-1980s). The chapter argues that this persistent narrative of crisis is a product of both physical and political water scarcity. This narrative of crisis deepened further given the shifting role of the 'developmental' state to a 'predatory' one with increased private sector participation in the water and agriculture sector as further discussed in chapter 4.

Introduction

Egypt's hydraulic mission towards modernization has evolved over time, driven over the last half a century by what David Sims labels as an "ecological-demographic narrative of crisis" (Sims 2015). In the post-colonial era since 1952 the new national *imaginaire* perceived land reclamation schemes as inseparable from the Nile Valley and Delta. The post colonial hydraulic mission of the Egyptian state has been driven by a twin legitimating discourse of too many people in too little land in the Nile Valley and Delta, and of remaking citizens in the *tabula rasa* of the desert (Sowers 2011). The desert was proposed to be carved out as a *terra nullius*, an undeveloped space to be developed, it became a tool of frontier making, where new citizens would build modern farms in the blank landscape of the desert (Sowers 2011). For the state, a key determinant of *Egyptian water security* is its framed vision to achieve its 'desert development dreams' (see Sims, 2015), which also represents a main element of national security for social, economic, and political reasons mostly driven by security and scarcity narratives.

Perhaps the classical understanding of water security in the context of Egyptian hydropolitics has been traditionally attributed to the Nile basin historical water allocation treaties of 1929 and 1959. These treaties have granted Egypt 55.5 billion cubic meters upon which the state has depended for its different economic activities throughout the twentieth century, including the agricultural, municipal, and industrial sectors. Egypt's total *renewable* water resources are equivalent to 60 billion cubic meters (bcm) annually, out of which 55.5 bcm (92.5%) flows from the Nile Transboundary River extending over 11 countries in Africa. The source of 16% of Egypt's Nile waters flows from the White Nile countries of the Great Lakes (Uganda, Tanzania, Burundi, Rwanda, Kenya, Congo (DRC), and South Sudan). The remaining 84% of the Nile water flows from the Blue Nile countries in East Africa mainly comprised of Ethiopia, and Sudan.

Nevertheless, water -security- for the Egyptian state and the Egyptian people means more than this narrow view of fixed water share and its multiple uses. In fact the notion of "water security" has evolved over time for the Egyptian state, thus denoting multiple framings, interrelated across different historical periods, geographical scales, as well as socio-economic and political economy phases. Indeed, by emphasizing the issue of international water shares within the context of the Nile transboundary river basin, few studies have taken into consideration the multiple framings of "national" water security in Egypt's context, and therefore the linkages between transboundary, domestic and local scales of water politics (Menga 2016).

In other words, water security in Egypt is deeply rooted in the state's quest for modernization and its corresponding hydraulic mission founded on the idea of mastering nature and controlling the flow of water. This quest has been mainly driven over the last 70 years by an ecological demographic narrative of crisis

(Sims 2015), given Egypt's unique geography, demography, and the state failures associated with these factors. This narrative of crisis has been mostly propelled by two key drivers; the first is the sheer fact that 96% of Egypt's population only lives on 7% of its total land area, often labeled as 'too many people on too little land' (Mitchell 2002). The second is the state's economic growth and food production (security)[5] objectives aiming at expanding the country's agricultural economy and crop production for both domestic and export markets. As such, amidst consistent patterns of demographic growth in the 'Old Lands' of the Nile valley and delta, coupled with a diminishing per capita water share, 'water security' and its corresponding discourse of horizontal expansion, land reclamation and greening the desert have been consistently viewed as key elements of national security to address its narrative of crisis and corresponding scarcity discourses.

The key message of the chapter highlights that despite massive investments in land reclamation schemes during the period between 1952-1970's, Egypt's ecological demographic narrative of crisis still prevails, which I argue is a combination of physical and political (water) scarcity. The chapter poses that between the state's national discourse on modernization and horizontal expansion on the one hand, and the challenges faced on the ground by land reclamation schemes on the other, different actors have framed the land-water-food 'nexus' differently. The chapter provides a critique of land reclamation projects, indicating that from the state's perspective the narrative of crisis necessitated a new approach towards frontier making, as will be further discussed in chapter 4.

The chapter is divided into 5 sections. The first section provides a historical background for the role of water in state modernization in Egypt especially in the postcolonial era (post 1952). Section 3.2 highlights the importance of water in frontier making and horizontal expansion, and discusses the state's vision of

[5] Food Security (*al amn al gheza2i*) is often the synonym of food production, self-sufficiency and food sovereignty

'greening the desert' and the corresponding policies of land reclamation. Section 3.3 discusses the 'feddan game' and implementation in land reclamation schemes, as well as the challenges of early settlers and smallholders. Section 3.4 discusses shades of physical and political water scarcity in Egypt, emphasizing the persistence of the country's scarcity and security narratives, and the shift from development to allocation policies. Section 3.5 concludes the chapter by highlighting that despite state investments in large-scale projects to establish new communities in the desert, Egypt's ecological-demographic narrative of crisis still prevails.

3.1. State Modernity and the Hydraulic Mission under Mohamed Ali and Nasser

In Egypt, the use of the Nile River waters dates back to early dynasties and kingdoms of Egyptian civilization. As perhaps the most famous irrigated agricultural society in world history, the Egyptian civilization has conceived the Nile's water as an essential element of its geography reflecting cultural, social, and economic importance, linking state modernization to the river. Both Hecataeus and Herodotus referred to Egypt as 'a gift of the river' in their ancient writings (Griffiths 1966, p.57). Since ancient times, the river has been connecting the people of Egypt through 'Habi' god of Nile as featured on the temples' walls from Abu Simbel to downstream Rosetta, depicting it as a religious symbol. It is estimated that early agricultural activities were established since 3000 B.C. and perhaps before then even. Controlling the Nile's water perhaps dates back to the 12th Dynasty with the intervention of Amenemhet III, known to the classical world as King Moeris. Amenemhet III attempted to connect Bahr Yusef branch of the Nile river with the Fayum, thus restoring the connection between the Nile river and Lake Moeris which formed naturally during the late Pleistocene epoch when melting African glacial sheets caused the Nile's water level to be about 18 meters higher than today (Bell 1975). Yet, "the necessary technology for large-scale perennial irrigation was unavailable until the nineteenth century A.D. when the traditional, basin or paleotechnic system...began to come to an end"(Kalin 2006). From here we can trace the early steps of mastering nature and controlling the flow of water to serve the hydraulic mission for state modernization. A 'hydraulic mission' that has evolved across the last 200 years reflecting the political and economic importance of water resources domestically for the modern state building and nation making project in Egypt (see Hanna and Allouche, forthcoming).

During the nineteenth and twentieth centuries, the founders of modern Egypt such as Mohamed Ali and Nasser have relied on the Nile water to advance the hydraulic mission of the state, as an essential element of modernity. State modernity and its hydraulic mission were founded on the vision to expand the irrigation network and canals across Egypt's landscape led by the Department of public works established in 1836 (now known as Ministry of Water Resources and Irrigation MWRI). During Mohamed Ali's reign, Egypt was transformed into a society with new forms of communal association suited to systematically recasting the environment for the efficient operation of a perennially irrigated commercial agriculture. Where perennial irrigation was introduced, two, even three, crops could be grown per year, instead of the single crop that had been traditional for millennia. According to Tignor (2010) Mohamed Ali's 'hydraulic mission' expanded further to develop several large-scale irrigation projects, and established a system of state monopolies for almost all agricultural commodities traded domestically and internationally. His strategy was to buy agricultural outputs like wheat, barley, cotton, and sugar at low prices and selling these commodities at high prices either to local Egyptian consumers or, in the case of cotton, to foreign textile owners to swell the state coffers. The result was a large increase in government revenues, which, then, supported the enlarged army, the educational missions, the hydraulic improvements, and much else (Tignor 2010). Perhaps an early form of water security mercantilism!

The second half of the nineteenth century was a period when local communities led by colonial engineers transformed millions of hectares of the northwest Indian sub-continent from single season cropping to double season cropping with irrigation systems (Allan 1999). Engineers with this Indian experience arrived in Egypt in the last two decades of the nineteenth century (Willcocks & Craig 1913) with the objective to control the Nile waters available to Egypt and later those of the Sudan. The hydraulic mission (Swyngedouw 1999) inspired engineers and the governments, which employed them from the late nineteenth century during what sociologists have termed industrial modernity (Beck 1992; 1995).

On the international front, to secure Egypt's Nile water, Mohamed Ali issued his orders to send a campaign to Sudan under the leadership of Ismail Pacha in 1820-1821. The historical accounts about the importance of the Blue Nile waters to Egypt were also sought with the increased British influence in Egypt and Sudan in 1882 and 1897 respectively, to ensure that no one would tamper with the Nile (Shapland 1997b). The *securitization* process of the Nile water resources can be claimed to have started by the 1891 protocol "with the colonial powers of Britain and Italy, negotiated the demarcation of the respective spheres of influence in Eastern Africa laying the foundation for securing unhindered access to the Nile waters (Haftendorn 2000; Shapland 1997b; Turton 2000). In later historical periods, several events have led to the first Nile treaty of 1929 to secure the flow of water to Egypt. These include the 1902 Addis Ababa agreement between Ethiopia and Britain on behalf of Egypt marking the "principle of non-interference with the flow of Blue Nile" to seek prior consent before initiating any works that might affect the flow of the Blue Nile or Sobat (Shapland 1997b, p.70). This agreement was confirmed later on by the tripartite agreement of 1906 amongst the colonial powers Britain, France and Italy confirming their interests in Ethiopia (Ibid). Based on this latter agreement, an exchange of notes took place in 1925 whereby Italy recognized the "prior hydraulic rights" of Egypt and Sudan and agreed not to construct any works likely to modify the flow of the Ethiopian tributaries of the Nile. Through the 1929 agreement, Egypt received 48 billion m3 of the flow and full access to the spring flood, while the Sudan only claimed 4 billion m3 (Haftendorn 2000, p.58). Sudan eventually gained its independence in 1956 and signed the 1959 Nile Treaty between Colonel Abboud and Nasser, which granted Egypt and Sudan full rights for the utilization of the

Nile waters with annual shares of 55.5 and 18.5 billion cubic meters (bcm), respectively. With British assistance during the colonial period and by its own efforts afterwards, Egypt was able to establish relative water independence comparatively early by way of ‘resource capture’ (Zeitoun & Warner 2006, p.449). This development contrasts with the subsequent ‘hydraulic missions’ of upstream riparian states, which were traditionally impeded by their relatively weaker financial positions (Cascão 2009; Parkes 2013).

Nasser attempted to advance further Egypt’s hydraulic mission based on the 1959 agreement. Under his rule, state modernization marked key nationalist milestones including agrarian reform, expanding irrigation networks, Aswan High Dam[6] for irrigation and hydropower, as well as the launch of large-scale state-sponsored agricultural projects and land reclamation[7] schemes. Between 1964 and 1975, Egypt’s post-colonial ‘hydraulic mission’ extended, often described as the "Early High Dam Period" (Turton 2000). It spans the time from the first closure of the Nile to the first filling of Lake Nasser reservoir's capacity to carry 164 billion cubic meters of water. The construction of the High Dam has brought significant increases in the nation’s welfare due to the reliable supply of adequate water for irrigation, as well as municipal and industrial use (Smith 1986; Postel 1996). These national projects manifest the importance of water to Egypt’s horizontal expansion plans and frontier making processes.

The following section traces the evolution of Egypt’s hydraulic mission in particular as it relates to the state’s land reclamation schemes and horizontal expansion plans in post-colonial times.

---

[6] Egypt’s High Dam – 3,803 m. in width and 111 m in height. Construction began in 1960 – opening date 1970.

[7] For the Non-Egyptian reader there is a need to clarify the meaning of reclamation as it is used in Egypt. Reclamation is, in fact, an incorrect English term for most of this land, unless one goes back to pre-historic times. Only lands lost through poor drainage, salinity and other water management related practices are truly reclaimed. Almost all such areas are located in or near the Old Valley. Most were reclaimed before 1982 (Zalla et al., 2000).

3.2. The Role of the State in Horizontal Expansion and Land Reclamation Schemes: A historical overview

Before and after the 1952 Nasser era, agriculture has always been central to Egypt's economy and its politics, and the state has been at the center of it (Saad 2002). Land reform was the first act in a radical reshaping of post revolution Egypt. Nasser confiscated a large number of private enterprises, and redistributed nationalized and sequestrated land among landless farmers. Perhaps the land reform discourse started in 1950 by the minister of Social Affairs Ahmed Hussein[8], who suggested a plan labeled the 'Five Feddan[9] Scheme' aiming at distributing reclaimed desert land to landless peasants (Johnson 2004), as well as reforming the Egyptian countryside including a minimum agricultural wage and limited land distribution (Adriansen 2009). This program was an extension to early efforts since 1948 when the government announced a plan to distribute reclaimed desert land to small-scale farmers, who were to be given small plots of land and 'hygienic houses' (Mitchell 2002, p.40).

Following 1952, land redistribution was an important goal, but land reclamation was also on the agenda. The hydraulic mission was driven by Nasser's postcolonial modernization vision and the agenda of the developmental state, fueled by nationalism, associated socialist policies, and state-led large-scale projects. Accordingly, a key element of Egypt's *national* hydraulic mission is symbolized in large-scale land reclamation projects to conquer the desert and establish new communities away from the overpopulated Nile valley and its delta. For the developmental state, this national objective of greening the desert has been consistently part of modernization, manifested in different generational projects founded on the premise of water security.

Land reclamation in Egypt was traditionally a state function. The history of reclamation in post colonial Egypt has been characterized by the development of

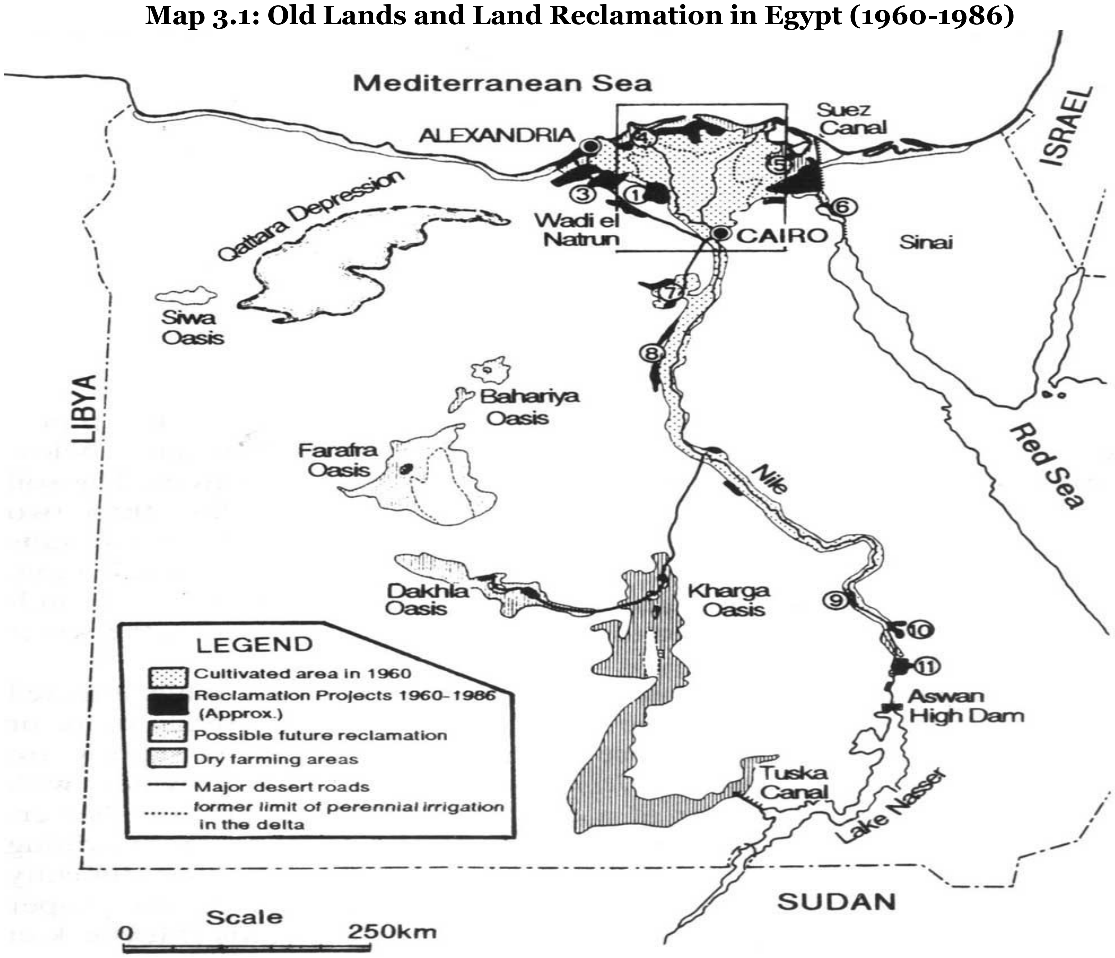
---

[8] Ahmed Hussein's work gained eventually international recognition especially as it relates to the 'Rural Social Centres'

[9] Measurement Unit – 1 feddan equivalent to 0.42 hectares

large state farms with thousands of workers especially in the 1960s, inspired and partly financed by the Soviet Union (Springborg 1979a; Adriansen 2009). The government launched a large-scale land reclamation program that was a continuation of an initiative of the colonial-era rural social improvement program (Mitchell 2002) in the face of endemic disease and hunger after more than a century of intensified production of raw materials and food commodities for export to Europe (Dixon 2013). State-sponsored projects had two key objectives; to settle large numbers of people in the desert lands[10], as well as gaining political capital by establishing large-scale developmental projects.

Map 3.1: Old Lands and Land Reclamation in Egypt (1960-1986)



Egypt's agricultural potential. Irrigation schemes: (1) Tahrir, (2) Maryut, (3) Nubariya desert, (4) northern delta, (5) south of Lake Manzala, (6) western Sinai, (7) Faiyum depression, (8) El-Minya, (9) Kena, (10) Radesia Wadi Abbady, (11) Kom Ombo (**Source:** Beaumont et al. 1988)

10 Desert Lands across the thesis refer to both Old-New Lands on the fringes on the Nile Delta, as well as New-New Lands in the Oasis

For example, the Tahrir Province (*Modireyet Al Tahrir*) land reclamation scheme located in the desert West of Nile Delta dates back to 1952. It was originally supported by Magdi Hassanein -a free army officer- based on a discovery of clay strata suggesting that the Romans had farmed in the area (Springborg 1979a). The project was officially launched in 1954 to create a collective farm model. Ever since, there have been several debates whether this land reclamation scheme as well as other ones should be state-owned or should be distributed to individual holders. A few years later, specifically in 1958 Sayed Marei, the minister of Agrarian Reform under Nasser, announced that 400 peasants would receive small parcels of the land. By 1961 he announced that all of Tahrir would be converted from collective (i.e. state) to private holdings (Springborg 1979a; Springborg 1979b). These plans however were largely opposed by other free officers based on the foundation that future water planned to be allocated from the Aswan High Dam can only support farming on one fifth of the total area of 40,000 feddan he had proposed. Water has been, and still is a key factor of debate for the state's modernization plans.

During the period between 1961-1967 the scheme witnessed interesting developments adopting a Soviet Model. As Springborg indicates, "the sheer quantity of reclaimed land began to mount up very quickly after 1960/61, in which year 28,300 feddan had been reclaimed, compared to 89,300 feddans in 1961 /62, 122,300 feddan in 1962/63 and 159,400 feddans in 1963/64" (Springborg 1979a, p.58). During 1964, Kruschev visited the scheme and announced that Soviet Union would assist in the reclamation of 10,000 additional feddan to create a "state farm model". During this period, once more debates intensified about whether land reclamation schemes should remain under state control or should be distributed to individual farmers. Two points of view opposed each other; the first arguing for a socialist model of state-sponsored land development and avoiding land fragmentation, while the second advocated for a move from state bureaucracy, to avoid costly and inefficient schemes by applying agrarian reform co-operative model and distributing 5 feddan to small holders and landless peasants.

The importance of land reclamation to Egypt was best described by Mohamed Hassanein Heikal (one of Egypt's prominent journalists and political scientists), as follows (Springborg 1979a, p.59 based on Al Ahram Newspaper issue of January 8th 1965);

> The answer to the country's immediate agricultural difficulties lies in the one and one half million feddan that will be cultivated after the High Dam is built. In order to make best use of this land, there must be enough capital, technical knowledge, social planning, and direct contact with the international market. Because of this, the new land should not be divided up and distributed in patches of five or ten feddan. It should be used for modern cultivation on a large scale so as to achieve the highest level of production possible, while exporting the produce should be the most important goal. This necessitates that the land remain public property. Socialism will be achieved since the land will belong to the people and since it will offer great chances for employment because the workers on the new land will take part in the councils of direction.

Nevertheless, under austerity measures for a nation under war, in 1971 Sadat announced that Egypt's 300,000 feddan under the General Organization for the Utilization and Development of Reclaimed Land, would be divided amongst 11 companies; a proposal that never saw the light due to political reasons (Springborg 1979a). By the end of Sadat's presidency in 1981 the debate was still ongoing whether reclamation plans to be distributed to different individuals and agro-businesses, public and private, foreign and domestic. This view was based on arguments favoring efficiency and on the rationalization of production and marketing, in conjunction with the attractiveness of foreign capital and expertise (Springborg 1979a). The state however remained in control of much of land reclamation schemes.

In addition to Modireyet Al Tahrir, and as shown in table 3.1, other state-sponsored schemes included Al Nubareya, Al Salheya, and the Mubarak Project for Developing and Serving the Land Allocated to Youth Graduates initiated in 1987. Other donor funded development projects included the World Bank New Land Development Project (1980-1991) targeting to reclaim 24,000 feddan west of the delta (Barnes 2012), and the West Delta Irrigation Improvement Project in

2005. Most of these land reclamation projects, reverted to a "top-down" bureaucratic approach where applicants would be assigned land parcels randomly with the loss of any community dynamics (Sims 2015, p.95).

Table 3.1. Land Reclamation Projects in Egypt 1950s-2000s

1950s	1953-67	*Egyptian-American Rural Improvement Services Project*	Reclaimed 37,100 feddan in Abis (near Alexandria) and in Kom Oshim and Quta in Fayoum.	• Reclaimed land distributed to landless farmers.
	1953-	*Tahrir Project*	Planned to reclaim 600,000 feddan west of the delta. By 1980 had reclaimed 122,000 feddan.	
	1956	Suez crisis – stalled progress.		
1960s	1960-65	*First Five Year Plan*	Government reclaimed 306,500 feddan along borders of valley and delta and 83,500 feddan in New Valley.	• Private land reclamation companies nationalized. • Creation of state farms in the reclamation areas. • Cooperatives as the principal mode of production.
	1966-70	*Second Five Year Plan*	Reclaimed around 300,000 feddan (only a third of the planned area).	
	1967	1967 war hampered progress		
1970s	1970-78	Low rates of growth	Less than 50,000 feddan reclaimed.	• Progress slow due to other budgetary priorities.
	1971	Completion of the Aswan High Dam	Increased the amount of water available in the Nile Valley and Delta, facilitating further reclamation.	
	1978	President Anwar al-Sadat launched a "Green Revolution" with the goal of developing 2.9 million feddan of agricultural land before the end of the century.		
1980s	1980-91	*New Land Development Project*	World Bank funded project reclaimed 24,000 feddan west of the delta.	• Shift towards the private sector. • Sale of state land to private investors for reclamation. • Privatization of the state farms. • Increasing donor skepticism about the economic viability of reclamation after studies suggested that the productivity of the reclaimed land is too low to warrant the large investment.
	1981	Public Law No. 143	Removed public sector's legal monopoly on reclamation, opening up reclamation to the private sector.	
	1983-88	*Third Five Year Plan*	Reclaimed 189,000 feddan (half in the west delta).	
	1987	*Mubarak Project for Developing and Serving the Land Allocated to Youth Graduates*	Started to distribute land in five feddan parcels to graduates (*kharigin*) (of high-school or college) and beneficiaries (*muntaf in*) (those who lost land through 1992 tenure reform, veterans etc).	
	1988-92	*Fourth Five Year Plan*	Reclaimed 656,000 feddan.	
1990s	1993-97	*Fifth Five Year Plan*	Reclaimed 469,000 feddan.	• Increasing private sector involvement (from one third of the reclaimed area in 1987-1992 to more than two thirds of the total reclaimed area in 1993-97). • Government started to sell land in mega projects to large investors and companies. • Government encouraged Arab and other foreign investors.
	1997- 17	*30 Year Strategy*	3.4 million feddan to be reclaimed by 2017.	
2000s	2009	*Agricultural Strategy towards 2030*	1.25 million feddan to be reclaimed by 2017 and 3.1 million feddan by 2030.	• Continuing private sector involvement. • Private-public partnerships in the new lands

Source: (Barnes 2010, p.221) based on data from (Springborg 1979a; Meyer 1998; Zalla et al. 2000)

3.3. Land-Water Resources in Egypt and the Feddan Game

3.3.1. Classification of Land-Water Resources in Egypt

As a result of the different land reclamation schemes throughout most of the second half of the twentieth century, Egypt's land resources can be classified into two broad categories and three types of 'Lands' according to the 'Ministry of Water Resources and Irrigation' (MWRI), these include (Karajeh et al. 2011); the classical category of 'Old Lands' located within the Nile Valley where farming took place for thousands of years; and the second category of 'New Lands' which includes the two other types of 'Old-New Lands' typically including lands at the margins of the Nile delta mostly developed under the different projects discussed in the previous section; and 'New-New Lands' mostly desert lands scattered across Egypt's deserts.

The 'Old Lands' represent the largest irrigated area in Egypt and are found in the Nile Valley and Delta. These include lands, which have been intensively cultivated generations ago, mostly using water from the Nile. 'Old Lands' are characterized by alluvial soils spreading over 5.36 million feddan (2.25 million ha), typically irrigated by traditional surface irrigation systems, which, compared to modern and improved irrigation systems, have a very low field water application efficiency of around 50% (Karajeh et al. 2011). Most of this land suffers from four important problems; continued encroachment by non-agricultural uses at a rate of 20,000 feddan/year (8400 ha/year), land fragmentation, salinity and degradation of soil fertility, and on farm-water management (Karajeh et al. 2011).

Beyond the 'Old Lands', situated within the natural boundaries of the Nile watershed within Egypt, new desert 'frontiers' included two broad categories; Old-New Lands and New-New lands (also referred to across this thesis as New Lands). These land reclamation schemes cover 2.5 million feddan (1.05 million ha) and were reclaimed relatively recently particularly since the construction of the Aswan High Dam. The Nile is the main source of irrigation water, but in some desert areas, underground water is also used. In 2000, the USAID Agricultural Policy Reform Program (APRP) issued a report (Impact Assessment Report No. 12) to “examine the types, quality and completeness of data as it pertains to New Lands” (Zalla et al. 2000). The report indicated that until 1982 land reclamation and development in Egypt was concentrated on waterlogged and saline soils located mainly in the Nile Delta. Further development efforts have concentrated on desert lands [Old-New Lands] on the edge of the already existing cultivated [Old Lands], utilizing a combination of Nile water delivered through irrigation canals and development of underground water. Therefore, 1982 provides a logical dividing point between a first and second phase of reclamation activities (Zalla et al. 2000).

The ‘Old-New Lands’ are located mainly on the east and west sides of the Delta and are scattered over various areas of the country. This is the most heterogeneous class of Land reclamation outside of the old lands, but relatively close to the Nile valley and the delta. This generation of lands may or may not be located within a Nile valley governorate. Most have been reclaimed by various users as shown in table 3.2 during the last three decades and much, but not all, of the area is now above marginality, i.e., many have achieved the maximum potential they can expect from reclamation activities alone. This phase of Old-New Lands has a cropping pattern that is different from that of Old Lands in that they include more high value crops (fruits and vegetables) and less traditional field crops (cereals and cotton). Examples of such lands include the West of Noubaria Agricultural Intensification project covering about 900,000 feddans; North and South Tahrir region and El-Khatatba south-west of the delta; and El-Salheya east of the delta.

The ‘New Lands’ include the most recent areas in remote desert locations. They both depend on a mix of Nile and underground water resources as a main source of irrigation. This phase of ‘New-New Lands’ is located far away from the Nile delta in remote desert areas. These are lands in the process of reclamation since the late 1990s and 2000s, and distributed to big companies that are capable of managing production of high value crops, mainly fruits and vegetables for the export market. They depend on high cost, high levels of technology in reclamation, cultivation and marketing. Examples of these lands include the Mega projects in Toshka, East of Oweinat in western desert, and the area around the El-Salam canal in Sinai, as well as the recently launched 1.5 million feddan (see Chapter 4). These lands depend on highly corporate engagement based on capital-technology endowments for mechanized agriculture and farming activities. Water in Toshka mainly depends on the lake Nasser reserve channeled through al Sheikh Zayed Canal, characterized by high water quality, while in Oweinat water resources mainly depend on underground reserves from the trans-boundary Great Nubian Sand Aquifer, shared between Egypt, Sudan, Libya and Tchad.

As shown in table 3.2, various types of agricultural producers operate on these lands: big investors, small investors, beneficiaries, graduates and squatters. Irrigation water varies between surface and underground water resources. Worth noting however, mostly small and large investors operated their farms utilizing more efficient and more expensive systems of irrigation like drip irrigation or sprinkler irrigation. Other beneficiaries however used other traditional methods or irrigation flooding their lands, either from surface water or underground wells.

Many of the land reclamation projects involved the relocation and resettlement of farmers, farm families and agricultural workers from the old land to these newly reclaimed areas. Therefore, the state made tremendous investments to provide agriculture and social infrastructure, much of which remained incomplete or needed maintenance according to a USAID report issued in 2000 evaluating the Agricultural Programs in New Lands (Zalla et al. 2000). As such, despite the different land reclamation projects led by the state, slow progress was achieved under the smallholder land distribution schemes during the mid to late seventies. Also, worth noting, many of the young graduates who had been allocated land parcels have left them and were replaced by the private sector as they could not afford the cost of farming in the desert (Interview #1).

Table 3.2. Mapping of Different Actors in Land Reclamation Schemes in Egypt

Graduates are encouraged by government to settle and invest in new lands and are given major support through the Mubarak Young Graduates Project of MALR for that purpose. The support includes preparation of secondary and tertiary canals, resettlement support and long-term financing to purchase their land over a thirty-year period.
Beneficiaries are individuals that the government wishes to aid in a special way by subsidizing their acquisition of agricultural land, invariably in newly reclaimed areas. This group includes landless laborers, persons displaced from state farms that have been dismantled, veterans and other similar groups. Both graduates and beneficiaries receive settlement and operational support from the Graduates Project. They hold approximately 30% of the total area of new lands reclaimed since 1987.
Small investors are individuals who purchase plots of land in the newly reclaimed areas, usually about 20 feddan, directly from the government. In some areas those with less than seven feddan also receive support from the Graduates Project, but this does not appear to be uniformly true.
Large investors are major stakeholders in policy decisions relating to production, cropping and marketing, due to their ownership of large areas of new lands. There is no official dividing line between large and small investors, but many observers use 20-30 feddan. There is also a group with more than 200 feddan that can be characterized as competitive entrepreneurs who are able to mitigate risk and bear interim losses on their own. They usually provide for themselves more of the basic irrigation infrastructure, such as wells, secondary and tertiary canals and roads, pumping facilities and system maintenance, unlike most graduates, beneficiaries and small investors. They frequently provide their own marketing and processing infrastructure as well. The term infrastructure is used differently than for graduates and beneficiaries, for whom it may also include housing, electricity, financing, schools and other social amenities.
Squatters are a group that is not discussed much, but which appears to be quite substantial in numbers and area cultivated. They simply occupy land that appears suitable and dig wells or pump lift water from nearby canals; eventually their property rights are recognized and they can get title to the land for a relatively modest payment if the government owns it. Estimates of the size of this group vary widely, but squatters could occupy as much as 15% of lands reclaimed since 1982.

Source: (Zalla et al. 2000)

3.3.2. Irrigation Technology and Smallholders Challenges

Despite the announced results of land reclamation during 1952-1997, different types of beneficiaries and actors engaged in land reclamation projects, and faced a number of challenges, which goes hand in hand with the little progress achieved on the ground. This is especially true for the small farmers who benefited from these land reform programs. As described by Mouna Mourshed in her award winning MIT paper published in 1995;

> To the casual observer, the Egyptian experience with irrigation technology adoption is a story about the failure of the public sector and the success of the private sector. The government installed a technology that was inappropriate to farmer crop preferences and provided farmers with little technical assistance in equipment use. In short, although reclamation officials intended to promote the use of water saving technology in the desert, they did not ground their policy in an understanding of the daily practices and realities of desert farming. In contrast private farmers adopted irrigation technology because they obtained intensive assistance from exporters and large investor farm employees who possessed the knowledge required to produce high-yields and superior quality crops. Furthermore, unlike public-sector farmers, private farmers were able to select the technology suitable to their cropping practices rather than having the equipment pre-installed on their plots (Mourshed 1995).

This has been confirmed by (Interview #2) indicating that over the last decades smallholders who started to use drip irrigation have been called "investors" even though they only owned 5 feddan or more. Worth noting however that many public sector farmers did not want to install drip irrigation system as they were just looking for the cheapest way to irrigate (Interviews # 1, 4 & 17). As a result of the difficulties faced by smallholders including farmers, youth and other beneficiaries from the state-sponsored programs, irrigation practices in these lands shifted from the state-installed water saving irrigation equipment to flooding methods, known as '*ray bel ghamr*'. Other reasons for this shift are the sheer fact that small farmers who came from the Delta were mainly used to flood irrigation in the Old Lands and were not willing to take the risk nor the time to experiment with new technology that may affect his yield (Interviews # 21; # 3). These practices and agricultural traditions were transferred to the reclamation schemes (Old-New lands) especially those depending on surface irrigation. As such there has been a lot of resistance from many small farmers to adopt water saving practices, partly due to cost and economic implications, but also due to inherently cultural elements and the way agriculture has been happening in Egypt for thousands of years. Since water is free, farmers do not think they need to save water (Interviews # 1,2,4, &9).

Furthermore, this problem also occurred in the 'New Lands' of the western desert Oasis, whereby non-renewable underground water is often the only source of irrigation. Yet, small farmers used it to flood their fields, despite both the sandy soils of the desert and the relatively higher temperatures in the desert ultimately leading to higher levels of evaporation. A prime example in this respect based on my observations from my personal engagement in a project in the New Valley governorate was the situation of families in Abu Minqar village in Farafra Oasis who were allocated land plots for reclamation in western desert in New Lands (400 km southwest of Cairo). In this location, small farmers who inhabited a village of 1,300 inhabitants mostly depended on flooding their fields from underground water from artisan wells *Be'er wahed* (Arabic meaning for Well#1) for alfa-alfa cultivation. This example and other ones too reflect the farmers' use of non-renewable water resources and the lack of regulations on behalf of the government to address this issue. During a later visit to the village a couple of years later, the water from the artisan well was no longer free flowing, and the farmers had to bear the extra cost of diesel fuel to pump water out of the well into their fields reflecting one of the tensions about the water-energy-food nexus in desert locations for stallholders. To address these challenges, a donor funded small grants program had set up 20 feddan of drip irrigation pilot field, implemented as a demonstration pilot for the rest of the farmers to replicate the model (Field notes). Collectively the farmers needed to set up an NGO for the collective use and development of their resources and grants support, which was a whole different challenge on its own that goes beyond the scope of this research. Worth noting however, aside from irrigation technology, and WEF nexus challenges, other difficulties facing the farmers were related to high cost of inputs, a policy failure-ignoring farmers' socio-economic needs and day-to-day challenges on the ground, and the sheer absence of basic social services such as hospitals, schools, and basic infrastructure (Field notes).

In other locations where farming depended on surface water for irrigation, graduates who have been allocated a piece of land as government beneficiaries, assumed infrastructure to be the government responsibility. Nevertheless, water does not reach the farms, and the young farmers do not know what to do in light of the absence of alternatives. Small farmers cannot extract water from deep wells – their pumps are small and can only extract water at 350 meter of depth. On the other hand, private investors and large-scale farms are not heavily regulated, whereby government interference is minimal compared to small farmers (Interviews #1; #2; #13). For example private investors expand the canals in their lands (as will be shown in chapter 6), whereas small farmers are not allowed to do so (Interview #1).

As such, what Mourshed refers to in terms of the success of the private sector compared to the public sector water and irrigation activities reflects the signs of the decline of the developmental state (of Nasser) and the rise of the predatory state during market liberalization. According to (Interview # 16), this neglect of the farmers on the one hand and the growing participation of the private sector (see chapter 4) on the other led to "the creation of two parallel water economies in Egypt". The first is the government's surface water irrigation network mostly covering the 'Old Lands', and early reclamation schemes in 'Old-New Lands' depending on both surface and/or underground water. The second is the private water economy in Old-New lands and New Lands which mainly depend on underground water representing a small share of 9.03% of Egypt's annual water resources consumption estimated to be 6.9 billion cubic meters of its total annual water uses.

3.3.3. The Feddan Game and the Implementation Gap

With all the state efforts to advance its horizontal expansion plans, it should be noted that land reclamation does not necessarily mean that this land is productive. In this respect, David Sims draws attention to the idea of the "feddan game". That is while the state announced positive results in land reclamation, the line is unclear between what is 'reclaimed' land, and what is 'productive' land, whereby "even critical observers and foreign academics fall in this trap" (Sims 2015, p.104).

The ‘Feddan Game’ reflects the clear disconnect between the state’s “macro” objectives and national strategies, and the micro practices, or in other words what is actually happening on the ground. There are two main issues to observe; the first is the inconsistency in the figures of reclaimed lands issued from different government agencies (Ministry of Agriculture, GARPAD, MWRI, donors). The second issue is the challenges faced by users who are not from the private sector and do not have the financial means to *adopt or maintain* precision irrigation.

In terms of the inconsistency in the figures, MWRI data indicated that by 1997 only 1.6 million feddan were reclaimed out of which only 815,000 feddan were under production, while on the other hand, GARPAD statistics indicate that between 1950 and 1997, 2.6 million feddan were reclaimed, thus portraying a “rosy picture” (Sims, 2015: 105). Statements from different policy makers, who also announced different results of land reclamation schemes during Egypt’s post-colonial era, further confirm this discrepancy in figures. For instance, Sayed Marei (Nasser’s Agriculture Minister) announced in 1970 that a total of 868,700 feddan were reclaimed between 1952-1969, while Youssef Wali (Mubarak’s longest agriculture minister) announced in 1985 that a total of 905,100 feddan were reclaimed during the period between 1952-1985. As such for the period between 1952-1997 little accuracy is understood in terms of both; the actual amount of reclaimed land, and the actual productive land out of the reclaimed lands. Worth noting here that 1997 is a dividing line in land reclamation schemes given whereby a new horizontal plan was issued during 1996-1997 as will be discussed in detail in chapter 4.

Despite the massive investments by the state and a wide portfolio of donor-funded projects for the modernization of the water and agriculture sectors, there has been inefficient management of state-owned large reclamation schemes and constant neglect of small farmers. Furthermore, these investments did not address Egypt’s two key challenges, which are the foundation of its ecological-demographic narrative of crisis, that is; (i) demographic redistribution away from the overcrowded Nile valley and its Delta, and (ii) food security (*amn gheza2y*) often used in the policy discourse interchangeably with self-sufficiency (*iktifa' zaty*). These issues are further highlighted in the following sections as core issues related to Egypt's physical water scarcity, as well as political scarcity.

3.4. Shades of Scarcity and Egypt's Narrative of Crisis

So where do we go from here given this historical background? As indicated earlier, despite the massive investments in desert land reclamation, and despite different attempts to improve agricultural productivity during the last few decades, Egypt's narrative of crisis still prevails. In this section, I attempt to address the origins of the discourses, and policies associated with Egypt's (water) scarcity and security narratives.

According to the Food and Agriculture Organization of the United Nations (FAO), between 1980 and 2007 several factors of progress have been achieved in Egypt's agricultural sector. These include "implementing various economic reforms, such as in trade liberalization and prices; and technological development and improving productive relations, particularly, those prevailing between the owners and the renters of the agricultural lands" (Elamin & Tanyeri-Abur 2011).

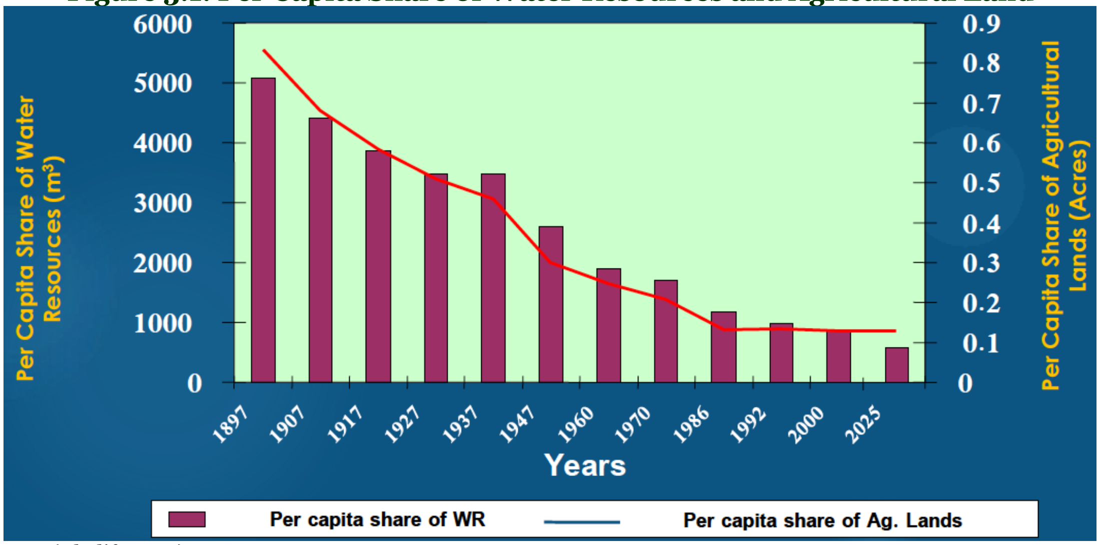
However, it is widely argued that population growth offsets most of these gains. In particular, two key concerns are central to Egypt's water scarcity and security risks on the national level, often argued to represent the foundation of its "narrative of crisis" based on; (i) demographic re-distribution outside of the overcrowded Nile Valley and its Delta, and (ii) ensuring food security for a growing population. These concerns are often attributed to the country's unique geography combined with its rates of population growth and resulting demographic pressure in the Nile Valley and its Delta, which have shaped much of Egypt's ecological-demographic narrative of crisis and the corresponding physical water scarcity narratives. In particular, I address two forms of scarcities in Egyptian water politics, mutually reinforcing each other, often leading to a vicious circle and narrative of crisis, those are; physical water scarcity, and political scarcity.

3.4.1. The Land-Water-Demography Nexus and Political Scarcity

3.4.1.1. The Malthusian View: Physical Water Scarcity and Demography

In terms of physical water scarcity, from the state's standpoint, Egypt's ecological-demographic narrative of crisis is primarily founded on Malthusian-style assumptions about the "limits to growth" (Meadows, 1972; Bakker, 2003). In terms of the relationship between demographic growth and water resources, in 1952 Egypt's total population was 21 million inhabitants. Today, in 2018 Egypt's total population is 104 million, out of which 94 million live in Egypt according to CAPMAS 2017 census. As shown in Figure 3.1, per capita share of both land and water resources in Egypt has significantly declined between 1897 to present days. In 1897 water resources per capita represented around 5000 cubic meters annually, with an average agricultural land holding of 0.9 acres. In 1952, this share decreased to more than half reaching 2000 cubic meter per capita annually, with an average land holding of 0.4 acres, whereby the country exported wheat and other crops. Today, per capita water share in Egypt is 600 cubic meters annually and an average of 0.2 acres. By 2025, per capita share of both land and renewable water resources is forecasted to further decline reaching less than 0.1 acres and 500-300 cubic meters per capita respectively as shown in figure 3.1 below. As the international benchmark for water poverty globally is 1,000 cubic meters per person per year, Egypt may have reached this limit since 1998. Egypt is therefore in the phase of physical water scarcity due to its annual population growth rate of 2.7%. By dividing the amount of available renewable water resources (which is fixed 55.5 bcm) by the growing population, water poverty rates are expected to get worse –with some estimates pointing at the figure of 250 cubic meter by 2030.

Figure 3.1. Per Capita Share of Water Resources and Agricultural Land



Source: (Khalifa 2015)

The classical description of Egypt's demographic distribution is 85.2% of the population lives on 5.36 % of the total land area of 1 million square km as shown in table 3.3. Another portion of the population (12.4%) is mostly around the Mediterranean such as Alexandria and other coastal cities representing 6.7% of the country's total area. As such, for the remaining lands in Egypt representing 90% of the country size in only inhabited by 2.4 % of the total population. This is the foundation of Egypt's ecological-demographic narrative of crisis.

Table 3.3. Demographic Distribution in Agro-ecological Zones in Egypt

Agro-Ecological Zones	Area Km2	Area %	Population %
Northern Coast	56200	6.73%	12.4%
Nile Valley & Delta	53100	5.36%	85.2%
Western Desert	681,000	64.84%	0.2%
Eastern Desert & Sinai	281,100	25.06%	2.2%

Source: (Al Hakim 2015) based on MWRI data 2004

Furthermore, according to CAPMAS (2017) the average population density in the total inhabited area reached 1,612 persons per square km. These densities are even much higher in several areas in the Nile valley and Delta, reaching 49,952 in Cairo, 14,154 in Aswan, and ranging between 4,907 and 2000 inhabitants per square km in the Nile Delta as shown in Table 3.4. These figures mark some of the highest densities in the world often surpassing China and India or even the population of a single Gulf country (Interview #4).

Table 3.4: Population Density in Egypt's Nile Valley and Delta Governorates

Governorate	Population Density Pop/km2	Governorate	Population Density Pop/km2	Governorate	Population Density Pop/km2
Cairo	49,952.1	Alexandria	2,947.8	Sharqia	1,408.4
Aswan	14,154.6	Gharbia	2,521.2	Kafr El Sheikh	947.3
Giza	6,586.1	Damietta	2,053.4	Behera	849.8
Luxor	5,232.9	Beni Suef	2,179.1	New Valley	215.3
Kalyoubia	4,907	Qena	1,820.1		
Suhag	3,009.2	Fayoum	1,784.8	**National Average: 1,162 inhabitant/km2**	
Asyout	2,806.3	Dakahlia	1,732.4		
El Menia	2,230.7	Menoufia	1,673.6		

Source: CAPMAS, 2017. Based on National census data for 2014 by the Egyptian Survey Authority

While these different figures represent the foundation of Egypt's ecological-demographic narrative of crisis, the state's water security and scarcity narratives are expected to deepen in light of the growing patterns of demographic growth, coupled with decreasing per capita water shares on the one hand, and higher water consumption and competition between different sectors on the other.

These observations lead to the first conclusion. Despite several land reclamation schemes throughout the second half of the twentieth century, the large-scale state sponsored projects did not influence the demographic distribution of the population. Egypt's growing population denotes decreasing land and water shares per capita. This observation is further confirmed by the high population densities as shown in table 3.3, which still preside over a small fraction of the total land area within the country whereby 97.5% of the population lives on 7% of the land, or 85% lives on 5.3% of the land.

3.4.1.2. Smallholder Challenges

As discussed earlier, the state had deployed tremendous amounts of investments in land reclamation schemes post 1952 and throughout most of the second half of the twentieth century. Yet, Egypt's narrative of crisis remains unresolved. While physical water scarcity in indeed a risk for the Egyptian economy and society, driven by consistent patterns of demographic growth, there are also other hindering factors, which negatively influence Egypt's security and scarcity narratives. Though it is important to understand the quantitative dimensions of physical water scarcity as part of the wider official (national) narratives, it is important to draw attention to other forms of scarcity beyond those founded on the classical Malthusian assumptions. These are often related to questions of state's policies and the neglect of small farmers – those who are the largest water users, and those who supply the nation with its food needs (Interview #3) whether in the old lands or the newly reclaimed lands.

There is a wide consensus that land reclamation schemes, started as an alternative route to fight youth unemployment and divert the traditional mindset of expecting a government job upon graduation. They also served the larger government vision of greening the desert, which was a big slogan back in the 1980s. Despite the state's national narrative of crisis, Timothy Mitchell contested the notion of "too many people on too little land". For Mitchell (2002), it is important to link the issue of agricultural lands to questions of inequality and distribution, thus criticising USAID for bringing in technical solutions that do not address the real issues relevant to small peasants. Mitchell amongst others also criticized how USAID has been pushing for mechanization, privatization and neo liberal practices (see chapter 4). Others such as (Bush & Ayeb 2012; Bush 2011) indicate that Law No 96/1992[11] issued to liberalize agricultural land has had negative impacts in old lands and raises questions of injustice for small farmers as it omitted the two main advantages granted to small farmers by Nasser's agrarian reform under law 157/1952; fixed rental value (seven times the tax), and the inability to evict tenants from their rented lands. Furthermore, Mitchell (1995) and Bush (2002; 2007) have contested this dominant discourse of state-led development, and view these land reclamation schemes as a way to avoid the reform and redistribution of the old Nile Valley and Delta lands. They argue that

[11] Law 96/ 1992, was issued to liberalize agricultural land, by determining a 5 year transitional period (ending in 1997) after which tenants had to return the arable land to its original owners (Saber 2006)

these policies should be understood as part of the wider political maneuvering of both the Egyptian Government and its influential international partners such as USAID. In this respect, a critical issue often overlooked is the country's increased reliance on animal production, and hence expanding cultivation of animal feed at the expense of plant production, which in turn has led to increased imports of wheat from the US (Mitchell 1995; Adriansen 2009). A view often interpreted by the state as a result of rising incomes and changing patterns of consumption in the society as indicated by former Minister of water resources and irrigation Hossam Moghazi during a recent workshop conducted by the FAO water scarcity initiative (Interview #30; field notes).

According to Tutwiler et al. (2013), problems of water availability and distribution have been reported in the Egyptian scientific research literature for decades. Many commentators see the problem as one of poor distribution more than a lack of supply (Ibid). For experts, Egyptian farmers still overwhelmingly practice flood irrigation, which results in evaporative loss and over-irrigation, causing soil damage and rises in groundwater tables (Interviews # 2; #4;; #7; #13). For example, in 2005, only 6% of Egypt's cultivated area was equipped with modern pressurized irrigation systems (Tutwiler et al. 2013). In this respect, where farmers dominantly use flooding irrigation techniques, water-use efficiency at the field level is often said to be low (Ghazouani et al. 2014; El-Agha et al. 2011; Tutwiler et al. 2013). Furthermore, inadequate agricultural drainage coupled with the Nile Delta's particularly flat slope contribute to salinization of soil and water resources (Tutwiler et al. 2013). Problems of head and tail at the level of an irrigation canal have been also widely documented (Ghazouani et al. 2014; Rap et al. 2015). These farmer challenges at the local level result in major production problems, inefficiencies and dislocations at the national level.

However, smallholders do not always view these scarcity narratives by experts and policy makers the same way. While a common scarcity narrative blames small farmers for the inefficient use of water resources, alternative views argue otherwise. Foe example, Molle et al. (2010) indicate that this view is often both incorrect and unfair as farmers operating under conditions of water scarcity are unlikely to waste water. Overall, Egyptian farmers put up with a lot of challenges, however they always find a way to access water whereby "the constrained environment in which farmers operate and make choices is frequently not well understood and documented" (Molle et al. 2010). To keep up with water stress, "farmers adapt by relying on three main strategies; digging illegal wells to withdraw water, using illegal pumps especially during night time, and illegal/informal access to drainage and sewage water, all of which are against Egyptian law" (Interview # 2). For example, a case study by IWMI (Ghazouani et al. 2014) highlights that farmers in West Nile Delta use several methods to adapt to water scarcity including – but not limited to: changing cropping patterns, crafting collective irrigation rules, reusing agricultural drainage water, practicing deficit and night irrigation, and over-irrigating whenever water is available (Ibid). These practices reflect the actual scarcity challenges faced by smallholders and their adaptation approaches to support their livelihoods in water stress situations.

In light of these criticisms concerning questions of inequality and distribution, Mehta (2003, p.2), indicates "shades of scarcity are found in theories of modernization which promote un-linear paths from 'underdevelopment' to 'development'. According to Xenos (1989, p.36) "these models continue to be evoked by those taking refuge in the hope of an abundant future to assuage their sense of the injustices of present-day scarcity" (in Mehta 2003). In the context of Egypt's horizontal expansion and land reclamation schemes, scarcity has different meanings for different actors. For instance, a main paradox occurs whereby despite horizontal expansion having been a developmental priority, there is an ongoing loss of the fertile lands of the Nile delta and valley due to illegal construction" (Interview # 1). Consequently, with the urbanization of the countryside, "another main problem facing Egypt's water and agriculture sector is the fact that the primary canals are losing space *(zemam)"* (Interview # 4). This transformation in agricultural land use is due to several socio-economic challenges and lack of profitability from agricultural activities for small farmers

(Interview # 20). As a result, between 1984 and 2010, an average of 37 thousand feddan have been lost annually due to illegal construction on agricultural land with a total lost agricultural land equivalent to 1 million feddan. During the period of the Egyptian revolution in 2011 an estimated 70,000 feddan were lost for illegal construction (Interview # 4). Paradoxically, despite the loss of agricultural land, Egypt's water needs are increasing and not the opposite. This is mainly attributed to two reasons; (i) expansion in cultivation of high water consuming crops such as sugar cane and rice, (ii) inefficiency of water use especially in the old lands (Interviews #13; #36).

In terms of the expansion in cultivation of high water consuming crops, a common challenge is the famous case of rice cultivations mostly spread over 3 regions. In January 2018, the MWRI in coordination with ministry of agriculture announced that the total areas of rice cultivations in Egypt will be decreased to reach 734,000 feddan only in 9 governorates instead of 1.076 million feddan decided during the previous year, thus this decision decreased rice cultivations by 300,000 feddan (AL Ahram 2018). This figure is consistent with what was originally decided during the High Dam early studies not to exceed 700,000 feddan. In addition to official figures of total rice cultivations, it is estimated that an additional 800,000 feddan of illegal rice cultivations take place on an annual basis. It is worth noting however that rice cultivations are good for climate change adaptation and mitigating soil salinity and seawater intrusion in agricultural lands near coastal zones (Meetings Notes #2; #5). the question of rice water consumption is a contentious issue which reflects the shades of scarcity between the state's policy to save water, and the farmers livelihoods. Attempts to address the issue of rice cultivation were also subject to a recent World Bank funded project to support system of rice intensification (SRI), albeit on a limited pilot scale (field notes; Interview #10).

3.4.2. The Land-Water-Food Nexus: Self-Sufficiency vs. Virtual Water Trade

The second issue relevant to Egypt's hydraulic mission and horizontal expansion schemes throughout the second half of the twentieth century relates to the larger question of food security and the myth of self-sufficiency. In terms of Egypt's water resources budget, table 3.4 below shows the quantity of water resources by source between 2010/2011 and 2014/2015. Official government data shows an average growth in demand for water of 3.5% annually, from 73.8 bcm in 2010 to 76.4 bcm in 2015 (CAPMAS 2017). In this respect, the country's annual share from the Nile's water (55.5 bcm) represents 72.64% of its total annual demand for different water uses. The difference between total water use and available Nile water is an amount equivalent to 20.9 billion cubic meters. This amount represents Egypt's water budget deficit mainly covered from other sources as shown in table 3.5. These include; underground water resources (6.9 billion cubic meters – 9.03% of its total annual water uses), recycling and reuse of agricultural drainage water supplied 11.7 billion cubic meter equivalent to 15.3% of total water use, in addition to wastewater recycling (1.3 bcm, 1.7%), rainfall (0.9 bcm 1.8%), and desalination (0.1 bcm, 0.13%).

Table 3.5. Egypt Quantity of Water Resources by Source (2010-2015)

Source	2015/14	2014/13	2013/12	2012/11	2011/10
Share of River Nile water	55.50	55.50	55.50	55.50	55.50
Underground water in Valley & Delta	6.90	6.70	6.70	6.60	6.50
Agricultural sewage water recycling	11.70	11.50	11.07	11.12	9.09
Sewage water recycling	1.30	1.30	1.24	1.30	1.30
Rains & Floods	0.90	0.90	0.93	0.92	1.30
Sea water desaltination	0.10	0.10	0.06	0.06	0.06
Total	**76.4**	**76.0**	**75.5**	**75.5**	**73.8**

Source: CAPMAS, 2017

In terms of the competing uses between different sectors, the agriculture sector is the main water user in Egypt's water economy. As shown in table 3.6 agriculture consumes 62.5 bcm of water annually equivalent to 81.6% of Egypt's total water resources in 2014/2015 (CAPMAS 2017). Drinking water requirements are equivalent to 10.35 billion cubic meters representing 13.55% of the total use, while industry consumes 1.2 billion cubic meters equivalent to 1.57%, and finally, an amount of 2.5 bcm is lost to evaporation equivalent to 3.27% of Egypt's total water use (Ibid). These figures are expected to further increase given the new urban and industrial cities currently under development, as well as the newly established '1.5 million feddan' Mega project (see chapter 4).

Table 3.6. Water Uses by Sector 2010-2015

Uses \ Years	2015/14	2014/13	2013/12	2012/11	2011/10
	الكمية	الكمية	الكمية	الكمية	الكمية
Agriculture	62.35	62.35	62.00	62.10	60.90
Loss by Evaporation from The Nile &Canals	2.50	2.50	2.50	2.50	2.10
Water for drinking	10.35	9.95	9.80	9.70	9.55
Industry	1.20	1.20	1.20	1.20	1.20
Total	**76.4**	**76.0**	**75.5**	**75.5**	**73.8**

Source: (CAPMAS 2017)

Agriculture is the largest water-consuming sector in Egypt. Farmers are the largest users of agricultural water. Egypt has 8 million feddan of irrigated agricultural land, out of which (5.5-6 million feddan) 75 % represent the "old lands" in the Nile Valley and Delta and (2-2.5 million feddan), and the remaining 25% are newly reclaimed desert lands. In addition, about 229,000 ha are rain fed cultivation along the Mediterranean coast (Eid et al. 2007). The intersection between land-water-food nexus is portrayed in Egypt's official policy discourse as a matter of national priority "to feed a growing population" (Interviews #5 & #7; Meeting Notes #1, #2, #5). In terms of self-sufficiency, often discursively synonym to 'national food security', any production gains achieved at the farm level have been largely offset by population growth (Elamin & Tanyeri-Abur 2011). There is consensus amongst domestic and international experts that despite higher water productivity and use efficiency; demographic growth offsets these results (Interviews #5 & #7).

As such, along horizontal expansion plans to farm the desert throughout the second half of the twentieth century, Egypt's reliance on food imports has been growing and not the opposite. Professor Tony Allan addressed this issue during the 1990s, referring to the concept of 'virtual water' (the water embedded in agricultural production). He explored the concept by observing Egypt's on-going water management including both agricultural and political practices, while having access to national data about food imports (Cascão 2017). In this respect, 'Virtual water' explains how Egypt in practice accesses food supply with less water, whereby physical water scarcity and failing to provide 'real' irrigation water was made possible by an ever greater reliance on embedded water in food imports (Allan 2001; Warner 2013; Wichelns 2001). As such, for the past 4 decades, Egypt's water security has been achieved through virtual water imports, through an invisible and silent process allowing the perception and illusion that Egypt is water self-sufficient (Allan 2001).

Table 3.7. Cereal Imports in selected countries 1960-2005 (000 metric tons)

Countries	1961 - 63	1980 - 82	2003 - 05	Ratio of 2003 -2005 to 1963- 65
Egypt	1,837	1,842	8,609	4.7
Morocco	423	557	4,174	9.9
Sudan	107	219	1,551	14.5
Saudi Arabia	323	427	6,282	19.4
United Arab Emirates	21	69	2,255	109.5
Developing Countries	31,950	42,493	173,616	5.4
Developed Countries	53,055	80,164	122,624	2.3
World	85,006	122,657	296,240	3.5

Source: (Elamin & Tanyeri-Abur 2011) based on FAOSTAT data

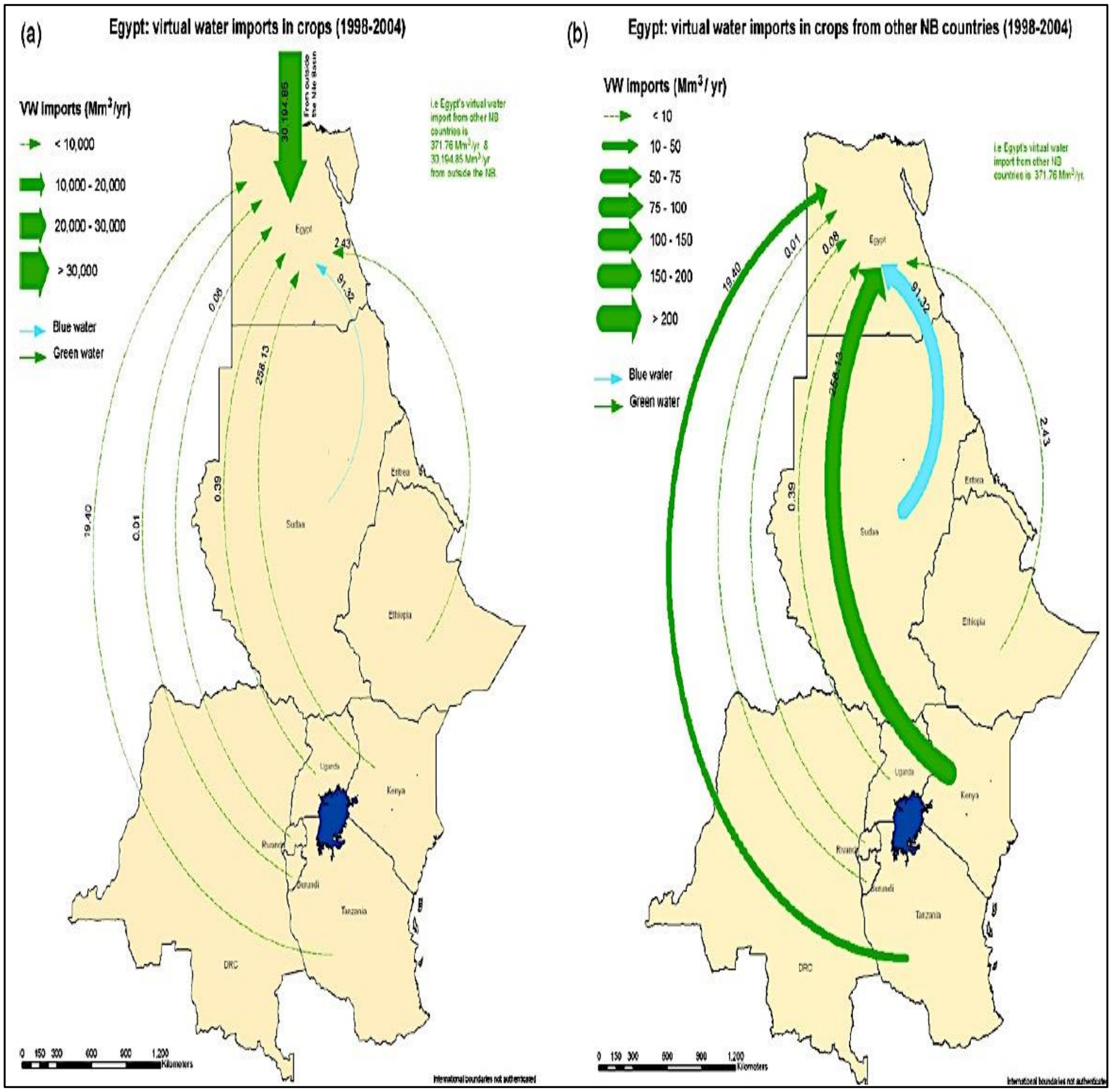
Virtual water trade includes three key elements; food crops, fodder crops, and livestock. Food crops include wheat and maize. In the 1990s and 2000s, virtual water imports increased, including soybeans (a fodder crop) and maize as main imported crops, followed by wheat. Main suppliers included the US, Argentina, Brazil, Australia, France and Russia. Fodder crops include soybean and other types of animal feed. Main livestock imports include beef, cattle and sheep from Australia and Brazil (and to smaller extent Sudan). As shown in figure 3.2 and table 3.7, during the period of 1961 to 2005, Egypt was the largest food importer in the region. Since the 1970s, and throughout the 1980s, Egypt depended on low-cost imports -mostly of wheat from the US (Cascão 2017). Despite growing its agricultural land base to 8.4 million feddan, estimates indicate that as of 2010, Egypt imported between 40% and 50% of its food needs. Egypt is also the largest wheat consumer in the world as shown in table 3.8.

Table 3.8. Egypt Wheat and Rice Imports (2008-2011)

Year	Country	Crop	Water Content (cubic meters/ton)	Quantity Imported (tons)	Virtual Water Import (cubic meters)
2008	Egypt	Wheat	1277	4,077,543	5,207,022,411
2009	Egypt	Wheat	1277	4,059,927	5,184,526,779
2010	Egypt	Wheat	1277	9,926,578	12,676,240,106
2011	Egypt	Wheat	1277	10,516,045	13,428,989,465
2008	Egypt	Rice	1146	11,605	13,299,330
2009	Egypt	Rice	1146	16,257	18,630,522
2010	Egypt	Rice	1146	17,649	20,225,754
2011	Egypt	Rice	1146	53,238	61,010,748

(Source: Timmerman 2013)

Figure 3.2. Egypt Virtual Water Imports in crops and livestock 1998-2004
Source: (Zeitoun et al. 2010)



So what does this amount translate into, equivalent to water resources? Experts in the field of water resources indicate that in terms of figures, different studies estimate Egypt's reliance on an average of 20 to 30 billion cubic meters of virtual water during the periods of 1990s and early 2000s. Tony Allan indicated the figure of 33 billion cubic meters in 2011 (Cascão 2017), and most recently the Egyptian Minister estimated a figure of 34 billion cubic meter of water in 2017

(Interview #7; Research Notes). The Minister of Water Resources and Irrigation further confirmed these figures in different international venues and official meetings, indicating that Egypt's water needs are equivalent to 114 billion cubic meter annually. This figure includes 80 billion cubic meter used internally (59 bcm from Nile + 14 billion recycling + 3.5 billion underground + 0.6 bcm rainwater), in addition to the 34 bcm from virtual water trade (Interview #7; Field Notes based on unpublished MWRI data). In other words according to the state's view, Egypt can afford 59 bcm of its budget, while it has a deficit of 55 bcm which it compensates from water recycling (20 bcm), and the largest portion from virtual water trade (34 bcm). Worth noting however, some of these figures do not necessarily match with the official data presented earlier in this section. While it is important to highlight this discrepancy, different sources indicate the same conclusion. In other words, what saved Egypt over the last few decades was not an increase in its production based on horizontal expansion rather it was its reliance on virtual water trade. But this is a conclusion that Tony Allan had reached a while ago.

What I would like to highlight here is that Egypt's land reclamation schemes throughout the second half of the twentieth century did not solve issues of self-sufficiency and food security, which constitutes a key element of its narrative of crisis. Massive quantities of American aid in the form of wheat and large-scale (commercial) cereal imports from across the world are the flip side of failed agricultural policies that ended up subsidizing urban consumption rather than strengthening rural livelihoods (Verhoeven 2015a). Furthermore horizontal expansion did not address Egypt's demographic problematic, consequently leading to higher food consumption. The political correlate of this exclusionary growth model was mounting social unrest and violent protests in the countryside that pre-dated the 2011 Egyptian Revolution (Verhoeven 2015a; Bush 2011). These issues were particularly manifested as a political challenge notably following the 2011 events in Egypt.

It is estimated that “agriculture production has to increase by 70% by 2050 in order to keep pace with population growth and changing diets” (El-Ramady et al. 2013). (Interview # 4) estimated that “Egypt needs an additional 10 million feddan to cover its food gap which necessitates an additional 60 billion cubic meters on top of its existing water share from the Nile”. Furthermore, while Egypt addressed its food needs through virtual water trade, there is a rising conscience about the risks associated with virtual water import. According to MWRI, Egypt’s food gap reached 3.5 billion USD per year (Interview #7), whereby the purchase of large amounts of food imports can drain vital fiscal reserves, a problem further deepened by the burden imposed on food subsidies (James 2013). Secondly, high dependence on virtual water import implies that a country’s economy is subject to price fluctuations in global food market (Ibid). As such, while virtual water may have represented a solution during the last three or four decades for Egypt’s food gap, it entails a great amount of (social, political, economic) risks, given the need to feed its growing population.

<u>Conclusion 2:</u> the amount of water allocated to agriculture exceeds the country’s total annual share of renewable water resources. In figures, this means that agriculture demand alone represents 62.35 billion cubic meters annually as per 2014/2015 figures, whereas Egypt’s renewable water resources are only 55.5 billion cubic meters. Furthermore, water allocation to agriculture is expected to compete with Egypt’s urban expansion and the establishment of new urban communities. Overall, land reclamation schemes did not improve Egypt’s food security situation, largely dependent on virtual water trade and food imports.

Conclusion

Deploying a historical lens and a discourse analysis method, this background chapter situated the importance of water security as a key element of state modernization in Egypt especially during the postcolonial era. The chapter discussed the role of the developmental state during Mohamed Ali and Nasser - as founders of modern Egypt (Farah 2009), especially as it relates to the idea of the hydraulic mission –defined as mastering nature and controlling the flow of water. Particular reference was made to large-scale land reclamation schemes as a socio-political project of the developmental state throughout the second half of the twentieth century post 1952. In this respect, state-sponsored schemes in 'Old-New Lands' reflect how horizontal expansion represented the larger vision to achieve the 'desert development dreams' (see Sims 2015), driven by a persistent "ecological demographic narrative of crisis" with its two challenges of demographic redistribution and growing the agricultural economy for both domestic and export markets.

Yet, despite massive investments by the state in the agriculture sector and land reclamation schemes, by the end of the 20th century, Egypt's ecological demographic narrative of crisis still prevailed. The chapter identified the state's scarcity and security narratives, which I argue are a combination of physical and political (water) scarcity, given Egypt's unique geography, demography, and the state failures associated with these chronic challenges. From the state's perspective this narrative of crisis necessitated a new approach towards frontier making, as further discussed in chapter 4.

Chapter 4

The Hydraulic Mission of the Entrepreneurial State & the Manufacture of Abundance

Chapter Overview and Key Message

Building on the historical background of state-sponsored land reclamation schemes presented in chapter 3, this chapter argues that by the late 1990s a new approach towards horizontal expansion was adopted by the “entrepreneurial state”. This entrepreneurial role was manifested in establishing desert Mega projects with a primary investment focus on infrastructure development. The role of the state was limited to *de-risk* land-water investments to attract international investors endowed with technology and capital to establish large-scale state-of-the-art farmlands in Mega projects. This changing role of the state towards water security and the engagement of international investors in the appropriation of land-water resources mark the formation of transnational state-capital alliances. However, it is argued that these alliances relied on the *Manufacture of Abundance* reflecting increasing interdependencies and tensions between land-water-food production nexus and capital accumulation. Furthermore, the land-water-food interdependencies driving transnational state-capital alliances mark a new approach towards water security -as discussed in chapter 5, and draw attention to equity and social justice dimensions of water security, as further discussed in chapter 6.

Introduction

As discussed in chapter 3, throughout most of the second half of the twentieth century, state-sponsored schemes yielded mixed results (Sims 2015; Interviews # 1 & 9). This was clearly manifested in the challenges faced by small holders and young graduates in land reclamation schemes (Interviews # 1 & 9), as well as the implementation gap associated with the ‘feddan game’. As such, despite the massive investments by the state, the nation’s ecological-demographic narrative of crisis has not been resolved amidst rising (water) security and scarcity risks. Furthermore, under the economic liberalization program during the late 1970s-onwards the agriculture sector witnessed a greater participation by the domestic private sector thus shifting the role of the developmental state to a predatory one (Farah 2009; Evans 1997). Private sector participation in the ‘water and agriculture’ sector also resulted in creating a parallel water economy mostly dependent on underground water resources to export high value crops to European markets.

However, with insufficient levels of (domestic) private investments in the agriculture sector, and with the persistent policy objective to pursue horizontal expansion to ‘green the desert’, by the end of the twentieth century the state changed its approach towards its hydraulic mission. In 1996, the state announced the launch of new Mega projects (*mashru’at kawmeya 3emlaka*) including Toshka, Sharq Al-Owainat, and El Salam Canal marking the birth of a new generation of large-scale land reclamation schemes in ‘New-New Lands’. These National Mega projects adopted a more innovative approach towards frontier making and reflect an extension of the state’s modernization attempt beyond the earlier generations of state-sponsored schemes.

According to an interview in 2012 with former minister of water resources and irrigation, also honorary president of World Water Council, Dr. Mahmoud Abou Zeid (currently President of the Arab Water Council) "from the beginning Toshka was designed to develop a new community, not only as an agricultural project… the fact remains that we cannot sustain ourselves in a narrow valley, with all the social and economic problems of overcrowding. We have to go to the desert and we have to build. Or the country will collapse" (The National 2012). This statement clearly reflects the foundation of Egypt’s ecological-demographic narrative of crisis at the national level and reflects the state’s logic and larger vision towards its desert development plans in the new millennia through National Mega projects.

The chapter argues that the new generation of horizontal expansion schemes and Mega projects in ‘New-New Lands’ represents an evolution of the hydraulic mission by the “entrepreneurial state” (Mazzucato 2015; Mazzucato 2013a). Under the new entrepreneurial model, the role of the state is mostly confined to *de-risking* land-water investments in the desert by developing the necessary infrastructure for new Mega projects in New-New Lands. State entrepreneurship is manifested in infrastructure investments such as irrigation canals, largest pumping station in the world, access to electricity, roads, and airports with the objective of attracting foreign and domestic investors to develop large-scale fully mechanized agricultural projects. The evolution of the 'entrepreneurial' state's twenty first century hydraulic mission aimed to attract domestic and foreign investors capable of developing capital and technology intensive large-scale agricultural production projects in the new Mega schemes, but also in the existing Old-New Lands.

This process reflects the changing role of the state to achieve its horizontal expansion plans, and the engagement of new players and non-state actors in the appropriation of land-water resources. Transnational investments in farmlands abroad highlight the growing interdependencies between 'land-water-food' resources as essential inputs for a successful large-scale agricultural operation, for both host countries as well as investors. While in most countries corporate engagement and foreign direct investment FDI in land and water resources are often a source of revenue for the government, in Egypt it is also perceived as a crucial element for the state to address its ecological-demographic narrative of crisis, and to achieve its hydraulic mission. In this respect, the land-water-food nexus can be perceived as a political commodity to achieve larger strategic objectives, and to advance the state's 21st century hydraulic mission. On the other hand, for the corporate actors, land acquisitions are a silent approach to appropriate or "grab" water resources for food production; either to achieve maximum profit, or other strategic objectives such as food security (especially relevant to water scarce countries in Gulf and MENA regions). Nevertheless, despite the presence of land-water resources, infrastructure, and business facilitations as key stimulating factors for the investors to take the risk by investing in the desert, evidence indicates that tensions may exist with other element of the water-energy-food nexus or food-trade nexus. These will be explored in this chapter and the following one.

These political economy dynamics have resulted in two issues; (i) the formation of transnational state-capital alliances to advance the hydraulic mission of the entrepreneurial on the one hand, and address the land-water-food security nexus; and (ii) the manufacture of abundance by the entrepreneurial state, given the existing water scarcity narratives in Egypt as discussed in chapter 3. While transnational state-capital alliances may indeed establish large-scale agricultural projects in the desert, they do not necessarily address the nation's narrative of crisis. Capital-intensive highly mechanized projects are not labor intensive by nature [e.g. 50 feddan may only require 1 technician (not farmer), while 1 feddan in old lands may require a family of 10 farmers (Interviews # 2,3 & 21]. As such, while foreign investments may green the desert, they are far from achieving horizontal expansion or demographic redistribution given their sheer nature. Furthermore, empirical evidence indicates that large-scale foreign investments in the agriculture sector may represent a form of "virtual water grabs" on the national level. This is primarily due to the sheer fact that some corporate farms target the cultivation of alfalfa to send back home, or grapes for winemaking in Europe. Exporting citrus to Europe is also a common practice to many investors similar to many domestic investors engaged in trade with the northern continent. As such, driven by profit or strategic objectives, transnational investments did not resolve Egypt's ecological-demographic narrative of crisis, with its two cornerstones of demographic redistribution and closing the food imports gap.

The chapter is divided into six Sections. The first section identifies the national determinants of the entrepreneurial state by tracing the changing role of the developmental/predatory state in the water and agriculture sectors. Section two discusses the role of the entrepreneurial state in de-risking land-water nexus as the foundation 'National Mega Projects' for frontier making through corporate desert farming. Section three presents the different criticisms associated with Mega projects and identifies Mega projects as the manufacture of abundance. Section four discusses the formation of transnational state-capital alliances and the engagement of non-state actors in Mega projects as a key element of the hydraulic mission of the entrepreneurial state. This section also provides examples of Arab investors engaged in land-water investments in Egypt. Section five highlights the rise of the third generation of Mega projects in Egypt and presents the '1.5 million feddan' project. This section also presents a few examples of different planned international investments in this project. Section six concludes the chapter.

4.1. National Determinants of the Entrepreneurial State

As indicated by Bush (2007), the Egyptian government and IFIs blame the Nasser era for the underperforming agricultural sector. State intervention, the controls placed on farmers in relation to pricing, cropping and marketing, are seen to have restricted agricultural production and frustrated market efficiency (Bush 2007, p.1604). These issues were also highlighted during a USAID congressional presentation (USAID 1992) indicating that due to state intervention, agricultural sector growth during the early to mid 80s was very poor with the value of production growing at less than 1 per cent per year (Bush 2007). Consequently, in light of the challenges associated with state-sponsored schemes, several proposals emerged calling for the "modernization" of the agriculture sector. Accordingly, the sale of state land to private investors for reclamation only started in the mid 1980s. This orientation was in line with Public Law no 143 adopted in 1981, which removed the public sector's legal monopoly on reclamation, thus opening it for domestic private sector.

By 1987 Egypt's economic transformation towards the liberalization of the agricultural sector was supported by the Minister of Agriculture Yusuf Wali as well as USAID advisors and funding. The key strategy for this liberalization process was primarily to remove the state from production, support export-led growth of the agricultural sector, and promote a US farm-type model adopting a capital-intensive mode of agriculture production. As such, an essential element of the liberalization of the agriculture sector was to allow commercial companies farming in desert lands to compensate for the loss of agricultural land in the Delta, and to provide opportunities to generate new jobs, increase production, and widen the development base (Interviews # 4; 5; & 6). In this respect, for commercial farming, the economics of water resources were measured through two key parameters; "how many jobs each cubic meter of water created, and how much USD each cubic meter of exported water yielded" (Interview # 4).

Yet, despite the investments and considerable financial resources devoted by the government, domestic private sector, and foreign aid agencies for agricultural expansion, the share of agricultural land per capita continued to fall (Verhoeven 2015a; Karajeh et al. 2011). Furthermore, Egypt was classified as the 3rd highest recipient of aid for water-related projects – between 1990-2004 receiving an average of USD 168 million a year in water aid – constituting 7% of the annual average development assistance over this period (Interview # 51). Verhoeven (2015a, p.368) best described the situation of the agriculture sector as follows;

> Despite endless development assistance missions to repair agricultural productivity, despite the decreed switch from cotton to cereal production, and despite the billions spent on land reclamation by Nasser, Sadat and Mubarak, the import bill keeps mounting, rural poverty is deepening, and environmental problems refuse to disappear. Throughout the 1970s and 1980s, total factor productivity in agriculture was probably lower than it was in 1900, and agriculture's contribution to growth was minimal (Hansen 1991). Today no country in the world imports more wheat and, indirectly, more water than Egypt (Allan 2011).

According to Elamin & Tanyeri-Abur (2011) the rate of agricultural development during the period between 2002-2012 has decreased by almost 50% as shown in table 4.1, reflecting lower levels of investment in the sector. In this respect, there are two aspects to observe in relation to investments in the 'agriculture and irrigation' sector; the first is the share (% GDP) of the sector in total national investments, and the second is the private sector share from the total investments.

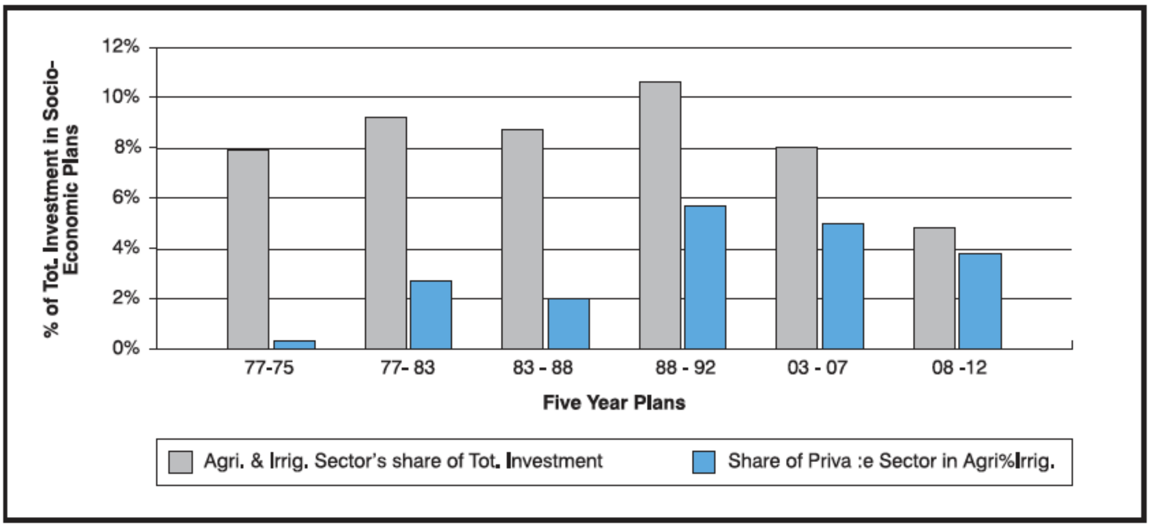
In terms of the share of the 'agriculture and irrigation' sector in the national economy (GDP), evidence suggests that during the period between 1970-2002 agricultural investments reached an average of 9% of total national investments. During the fifth five year plan (2002/03–2006/07) national targets aimed to increase the share of investments allocated to agriculture, nevertheless, actual investments levels did not exceed 8% as shown in table 4.1 below. In fact, the ratio of total investments in the sector declined during the sixth five-year plan (2006/07-2011/12) reaching 4.8% (Elamin & Tanyeri-Abur 2011). This level of investment is less than half what it used to be throughout the past half-century.

Table 4.1. Share of agriculture and irrigation sector of total investment in socio-economic plans and the private sector proportion

Five Year Plans	Total Investment (L.E billions)	Share of Agric. & Irrig. Sector		Private Sector Investment Share in Agric. & Irrig. Sector (%)
		Value	%	
1971 / 72 - 1975 / 76	4.33	4.33	7.9	4.0
1976 / 77 – 1981 / 82	18.04	18.04	9.2	29.4
1982 / 83 – 1986 / 87	39.54	39.54	8.7	23.3
1987 / 88 – 1991 / 92	46.50	46.50	10.6	53.7
2002 / 03 – 2006 / 07*	503.40	503.40	8.0	63.0
2007 / 08 – 2011 / 12	1295.00	1295.00	4.8	78.6**

Source: (Elamin & Tanyeri-Abur 2011) (based on data from **Institute of National Planning, 1994. The role of State in Agriculture Sector Within the Economic Reform era, December 1994; National Economic Plan for year 2007/08-2011/12)**
* Data not Available for the Years 1992 / 93 – 2001 / 02.
** Included Holding Companies and Business Sector.

Figure 4.1. Share of agriculture and irrigation sector of total investment in socio-economic plans and the private sector proportion



Source: (Elamin & Tanyeri-Abur 2011)

In terms of the private sector share from total investments in irrigation and agriculture sector, figures reveal an upward trend reflecting the shrinking role of the “developmental state”. As shown in table 4.1 the private sector share in total agricultural investments increased from 4% in 1971-76 to 53.7% during 1987-92, reaching 78.6% of total investments between 2006/07 and 2011/12, clearly reflecting the state’s diminishing investment allocations to the sector (Elamin & Tanyeri-Abur 2011). This growing private sector involvement in agriculture comes in line with structural adjustments in the Egyptian economy during the 1990s. This increased engagement in the sector was also coupled with a shrinking share of the state throughout different Five Year Plans during 1988-1993 (Fourth Five Year Plan), 1993-1997 (Fifth Five Year Plan), and 1997-2017 (Twenty Year Strategy) as shown in figure 4.1. Worth noting however, despite this growing private sector investments, by 2005 total agricultural exports only reached 3.9% of the value of Egypt's total exports (Borras et al. 2013) .

According to the African Development Bank (ADB) significant progress has been achieved during twenty years (circa 1987-2007) in liberalizing the agricultural sector, including the removal of a range of quotas, price controls and input subsidies, and the privatization of various agricultural production projects and new state-owned lands (African Development Bank 2009a). However, this strategy of agricultural modernization, with increased private sector involvement in the sector resulted in two issues. The first is the preoccupation with capital-intensive export agriculture. In this respect, the growing private sector participation in agriculture and the liberalization of land rental markets are believed to have stimulated productivity increases, through the establishment of private farmlands depending on underground water to export high value crops to European markets. The second issue is the neglect of small farmers that followed from the contemporary drive to promote investment in the new lands rather than resolve issues of land and market access and rural development in the old lands (Borras et al. 2013; Bush 2007; Mitchell 2002).

The creation of a parallel water market by the private sector in 'Old-New Lands' diverted attention from the land-water challenges associated with the Nile River and the farmers in the 'Old Lands' and early reclamation schemes. The Nile waters serve millions of small farmers, "those who truly feed Egypt and provide fresh food supply to the local market" (Interview # 3). Yet, they are also those who have been truly neglected despite representing the majority of water users (Interview # 1). Farmers in Old Lands have depended on Nile water and have taken it for granted over 7000 years. The same practices were transferred to the early reclamation schemes in Old-New lands as discussed in chapter 3. Flood irrigation has been the traditional method for farming and livelihood. From the investors' and government perspectives, these practices are perceived as inefficient and deepen Egypt's water crisis. From a policy maker perspective, in addition to traditional flood irrigation methods by small farmers, there are other challenges associated with the Old Lands the Nile basin's narrow valley and its overcrowded delta such as agricultural land fragmentation, water quality, water quantity, and overall weak water use efficiency (Interviews #1, 2, and 4). Worth noting however, the soil and type of crops in the Old Lands may not necessarily allow for the use of modern irrigation techniques (Interviews # 13 & 32). For this reason, the state had launched the Irrigation Improvement Program (IIP) supported by the World Bank to increase water use efficiency in Egypt's old lands. Yet, the IIP came at a time when the government started to move away from its former development strategy, based on centralized ownership and planning, towards a decentralized, market-based and outward-oriented economy (African Development Bank 2009a).

Hence, while small (public sector) farmers faced several difficulties associated with land reclamation schemes, private sector engagement in agriculture grew steadily during the 1980s and 1990s as shown in figure 4.1. As one of the largest fruit exporters in MENA region, most exports depend on underground water resources in private desert farms. The dependence of exports on underground water is not only due to issues of surface water scarcity, rather "it is more relevant to the question of water quality and the agricultural product standards and requirements imposed by importing European countries" (Interview # 16). For this reason, most exporters and commercially oriented agricultural companies rely on underground water adopting an economic logic and financial equation (e.g. how much foreign currency can be generated from each cubic meter of water; and how many jobs can be created) (Interview #4).

As indicated by some of interviewed investors and practitioners, private agricultural investments in desert lands can be categorized historically as two generations (Interview # 16; 22); The 1st generation in West of Nile Delta notably Wadi El Natroun and Cairo-Alex Road (e.g. west delta) where land

and underground water resources have been exhausted. The 2nd generation mainly investing in the Oasis carrying on the lessons learned from the 1st generation related to over abstraction and withdrawal of water resources from underground wells. Worth noting that as a result of the salinization of underground water from the 1st generation of lands, the main crops now are pomegranate and olive trees, which match the salinity level of water and the soil. The salinization of water was mainly caused by the concentration of salts in the wells as a result of over withdrawal. The easiest solution to overcome this issue has been to dig a new well to avoid the salinity of the exhausted well. This is a practice undertaken by many small and large investors under the radar of the MWRI, hence creating an informal water market. Worth noting, the private sector is the main consumer of underground water in Egypt and functions in isolation from the government (Interview # 16; Interview # 2; Interview # 1). As a result, "we are not sure how much water each user consumes to irrigate their lands". This applies to different types of users making the size of the water economy unknown. "We can't manage what we can't measure" (Interview # 16)!

The market dynamics stimulating private sector growth reflect the clear disconnect between the financial profit of the water and agriculture economy on the one hand, and the state's horizontal expansion vision on the other. Domestic private sector investments mark the shifting role of the state (hydraulic mission) from a developmental one (during Mohamed Ali and Nasser), to a predatory mode, mixing public interests with private sector profit. On the one hand, large-scale state-sponsored schemes relied on technical top-down solutions based on GDP measures and expert agencies, often manifesting signs of political scarcity. Typical top-down approaches from public agencies usually overlooked the real problems associated with the largest water users (e.g. farmers) leading to a vicious circle of physical water scarcity and narratives of crisis. On the other hand, the creation of a parallel water economy by the private sector based on financial, technical and managerial solutions, led to the neglect of the actual challenges faced by different types of settlers and small investors in Egypt's land reclamation projects (Mitchell 2002). As such, despite a growing participation of the private sector in the agriculture sector, Egypt's ecological-demographic narrative of crisis remained unresolved. Both issues of demographic re-distribution and closing the food gap had not been addressed by domestic private sector investments. These factors combined, fuelled by an alarming narrative of crisis, led to an alternative mode of frontier making and horizontal expansion, what I label; the hydraulic mission of the entrepreneurial state.

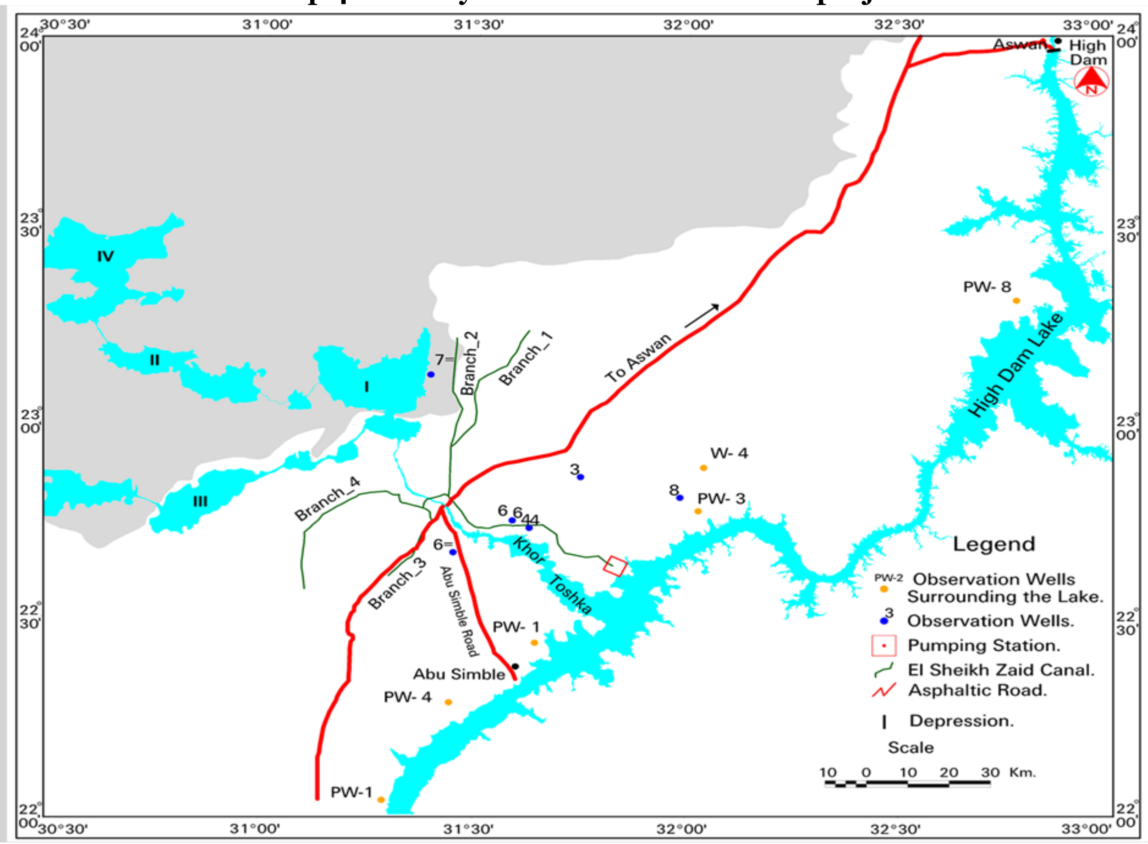
4.2. The Entrepreneurial State and the Land-Water-Food Nexus: Frontier Making by De-risking Land-Water Investments

From the state's standpoint, despite the liberalization of the agricultural sector during the late 1980s and early 1990s, investments were still considered below the sufficient levels that would fulfill sector growth requirements (Elamin & Tanyeri-Abur 2011). This view is also shared by technical agencies such as the FAO, indicating that 'additional investments are needed' in order to enhance the agricultural sector and to allow its dormant development capacities to grow (Interview # 6; Meeting Notes #2). This policy orientation was consistently part of the state's development discourse to tackle the strategic objectives of realizing food security to address the needs of a growing population, and to improve the sector's contribution to GDP (Elamin & Tanyeri-Abur 2011).

To address the nation's persistent narrative of crisis, in 1996 the Egyptian cabinet of ministers discussed a new 'national investment map' that called for "expanding the utilized percentage of Egypt's land area fivefold (from 4% to 20%) by 2017. This national strategy aimed to reclaim an amount of 2 million feddan notably in 3 areas; Toshka, East Oweinat, and El Salam Canal with the initial intention to allow 6 million people to live there by 2017 while generating 450,000 new employment opportunities. In January 1997, the Southern Egypt Development Project" or "South Valley Project" was launched, whereby the "Toshka" scheme started with the objective of reclaiming 540,000 feddan for agriculture depending on water resources from Lake Nasser, supplemented by underground water from the Great Nubian

Sand Aquifer – shared with Sudan, Libya, and Tchad. Toshka was therefore conceived to create a new valley for Egypt, situated in the western desert, about 900 km south of Cairo, and 100 km from the southern borders with Sudan.

Map 4.1. The system of canals in Toshka project



Source: (Moneim et al. 2014)

Accordingly, horizontal expansion witnessed an innovative approach by the “entrepreneurial state” to achieve its 21st century hydraulic mission. An essential element of this strategy depended on investing in infrastructure to attract international investors, foreign capital, and advanced irrigation technology for large-scale farming. The idea of the entrepreneurial state may appear as a contradiction in terms. For neoliberals like Friedman (2009), grand visions and innovations typically came from “pioneers, hackers, inventors, and entrepreneurs,” not from the lumbering actions of the bureaucratic state (see Isaacson 2014; Swedberg 2015). This idea has been increasingly called into question. Mazzucato (2011a; 2013a) in her book ‘The Entrepreneurial State’ argues that the state plays a pivotal role in shaping the modern economy, by supporting the private sector in a myriad of ways (from publicly funded research activities, small business start-up grants, and tax credits, amongst other measures). The modern state does not only nudge the economy, it actually pushes it forward through bold and innovative measures (Mazzucato 2015). This idea of the State's role in shaping and creating markets is more in line with the work of Karl Polanyi (2001 [1944]) who emphasized how the capitalist 'market' has from the start been heavily shaped by State actions.

To advance horizontal expansion, the state has acted as a force for change, not only 'de-risking' the economic landscape for risk-averse private actors, but also leading the way, with an ambitious project (Mazzucato 2015). Investing in establishing sustainable communities outside of the Nile valley has been usually considered a risky task for small holders, agricultural cooperatives, and private investors. In this respect, state entrepreneurship was manifested in a risk-oriented approach to expand land reclamation in uninhabited remote desert locations, by investing in infrastructure and exploring alternative approaches to develop Mega projects in 'New Lands'. As shown in Annex 2, the state invested in establishing irrigation canals, largest pumps in the world, digging wells, roads, electricity, land planning and the creation of urban nucleus for these desert communities. By doing so, the state shifted from being the actual developer, operator, and manager of large-scale agricultural schemes to being merely an infrastructure developer and an investment promoter. This strategy depended on *de-risking* desert investments through advanced infrastructure and a business climate to attract both local and international investors to mega projects, by; hence its entrepreneurial role.

This state-led vision was estimated to cost 86 billion USD over 20 years, with the government expected to finance 20-25% of the infrastructure costs, while local and foreign private capital would finance the rest (Sims, 2015:49). The new 'Mega projects' were similar in concept to older land reclamation models and large-scale state sponsored schemes, however they were different in three main aspects; (i) the mega scale of infrastructure (i.e. largest pump in the world), (ii) the investment philosophy behind the mega projects which depends on LSLA and private sector capital/technology intensive agricultural projects, and (iii) attracting foreign investors with experience in similar projects elsewhere.

The Land-Water-Food Nexus in Mega Projects

The hydraulic mission of the 'entrepreneurial state' can be therefore seen as part of "frontier making or the expansion of socio-ecological spaces for capital accumulation" (Dixon, 2013). Frontiers, as many scholars have noted, are artifacts of technology and imagination. As Gavin Bridge argues, "frontiers are imagined (and constructed) as sites of 'bountiful emptiness'. They are 'fecund' spaces, 'empty but full' " (Bridge 2001, p.2154; in Li 2014). That is, they are empty of people, histories and claims, but full of potential for new and improved use (Li 2014). *Specifically in the case of Egypt, for the entrepreneurial state, land reclamation has been a venue for frontier making, whereby* "land identified as a resource available for global investment is classified as 'underutilized' or frontier land, or sometimes as marginal, idle or waste land" (Li 2014, p.592).

Mega projects depended on the key inputs of land (abundant), water (security), and infrastructure (development) to encourage food production in remote desert areas with the participation of the private sector and international investors. As such, 'land-water-food' interdependencies represent the foundation of this new expansion and have been a central condition of heightened capital accumulation in Egypt's agriculture sector (Dixon 2013). This approach can be also viewed as an extension of the 1990s economic liberalization program and the growing corporate engagement in the 'water and agriculture' sector. Given the connectedness of today's global economy the entrepreneurial state depended on both; state investments and private capital to develop its 21st century Mega projects as a key avenue for "frontier making" within the borders of what is presently modern day Egypt. In this respect, 'national frontier making' is connected to frontiers regionally, thus leading to the formation of transnational state-capital alliances especially as it relates to key strategic issues such as land, water and food resources.

Therefore, transnational state-capital alliances are argued to reflect the changing role of state and non-state actors towards water security.

Mega projects and the 21st century entrepreneurial approach towards horizontal expansion reflect the changing role of the state towards land-water resources use for a larger political-economic project. In this respect, water control, state power, and achieving the hydraulic mission towards modernization are manifested in the formation of 'transnational state-capital alliances'. As such, while post 1952, the state was the main sponsor of large-scale desert development schemes, today, land reclamation and water use are not confined to state actors, small farmers, young graduates, or domestic investors. Rather, new international investors have been also encouraged to participate as key players in large-scale agricultural projects. Different state and non-state actors included financial investors, transnational corporations, and specialized agricultural private sector. Also worth noting that the participation of different investors in large-scale agricultural projects, not only in Egypt, but also across the Nile basin countries as well as other destinations globally was further motivated by the food crisis of 2007/08 and 2010/11.

As such, the process of the "expansion of socio-ecological spaces for capital accumulation" (Ibid) depended on de-risking land reclamation projects and establishing transnational state-capital alliances manifested in foreign investments in state-of-the-art large-scale agricultural projects. On the one hand, the state took the risk to invest in the desert by injecting immense resources from the state-budget typically for financing national projects' infrastructure (e.g. Toshka). On the other hand, the state depends on private investors to inject the necessary capital and know-how to develop large-scale agricultural projects using water saving modern irrigation techniques - typically center pivot technology (Interviews # 5 & 6).

In terms of water resources, the estimated water needs for the project were estimated to be 5 billion cubic meters, roughly 10% of Egypt's annual Nile water share. As indicated by Collins (2006) to manage excess water from Lake Nasser, between 1966 and 1978 the state excavated a 14 miles overflow canal on western shore of the lake to link it with Toshka depression. The canal was not used for 18 years until 1996 given the dry years of the Nile flooding (Warner 2013). To use this excess water during the 1996 flood period, the Toshka project involved excavating the Sheikh Zayed Canal of 44 miles to carry about 380 billion cubic feet of water on a yearly basis from Lake Nasser to the Toshka depression south west of Aswan, and then branches into 4 sub-canals with a total length of 160 miles. The canal was designed to receive the excess water from Lake Nasser and pump it into Sheikh Zayed station using the giant Mubarak pumping station housing 24 pumps– developed by a European-Egyptian-Japanese consortium (Wahby, 2004; Warner, 2013), which then was the largest pumping station in the world- elevating the water about 175 feet. Water is conveyed through a long intake channel of 3 Miles from Lake Nasser to the Suction basin of the pumping station. These plans have come under serious criticisms both internally and externally as discussed in the following section.

The Ministry of Investment represented in the 'Promotion & External Offices Sector' of the 'General Authority For Investment & Free Zones' (GAFI) in collaboration with the Ministry of Agriculture have the mandate to promote investment opportunities in Mega projects and to attract international investors. In each Mega project, the state specifies the cost and availability of infrastructure categories under different projects as shown in Annex 2, including; source of water supply, cost of irrigation infrastructure, electricity, roads, cost of land. The promotion pamphlet estimated a 15% return on investment for different crops including citrus, grapes, vegetables, amongst others!

The responsibility for preparing the land for agricultural uses and urban development was mandated to a newly created government entity; the 'Southern Regional Development Authority'. It planned to distribute large segments of the arable land to private development companies, who in turn divided up the estates into large holdings for big agro-businesses and smaller holdings for individual families. While some of these lands are allocated to small farmers and domestic agricultural investors, it is private capital that plays a larger role in developing land and water resources through large-scale commercial agricultural projects (Interviews # 4,5, & 6).

4.3. Mega Projects Criticism & the Manufacture of Abundance

Similar to earlier reclamation schemes, Mega projects were introduced and marketed as the hope for future generations to escape the overcrowded Nile delta and the narrow valley of the River Nile. Accordingly, over the last two decades, the state has changed, not its vision, but the means by which to achieve it. To overcome the challenges associated with the early reclamation schemes, the state sought to explore an alternative pathway of frontier making to advance its hydraulic mission by establishing Mega projects in uninhabited remote desert locations. From the state's standpoint, Mega projects represent a potential solution to the ecological-demographic crisis narrative; firstly, as a venue for 'frontier making' to address the population density and demographic re-distribution issue in Egypt, and second; as a national symbol of Egyptian modernity and economic development, that will ensure the growth of agricultural sector for both domestic and export markets, in addition to 'food security' as a key element of national security. Other motivations behind this new generation of horizontal expansion projects was to overcome the traditional challenges of the 'Old Lands' (e.g. land fragmentation), as well as the reclamation challenges in 'Old-New Lands' (Interviews # 4 & 6). Others however argue that political objectives have also motivated these national mega projects. Warner (2013) for instance argues that "water, science, and technology do play a key role in legitimizing overall state control in a 'state with a major legitimacy deficit' (Dorman 2007) … the Toshka project serves state hegemonic goals in a two-chessboard game, at the domestic and international scale" (Warner 2013, p.103).

In this respect, the notion of the manufacture of abundance reflects how the state is advancing new initiatives for land reclamation, depending on a seriously constrained water budget. This approach deepens the deficit of the water budget and would ultimately reproduce scarcity in areas of water stress mostly associated with small water users, or alternatively tap into non-renewable ground water, which then can raise uncertainty about the sustainability of non-renewable ground water aquifers.

During the last two decades, Toshka attracted a fair amount of criticism both on domestic and international levels. Perhaps the expertise of Dr. Roushdy Said[12] -named as the founder of Egyptian Geology, with advanced degrees in Sciences from Zurich in 1951 and then Harvard - represent an insightful constructive criticism. In 1997 during one of his lectures at the American University in Cairo, Dr. Said described Toshka as "a mega project that consumes 10% of Egypt's total annual share with a modest economic return" (Al Masry Al Youm 2007b). According to him, "Toshka should be converted into an industrial project where by the economic return of each cubic meter of water will be much higher from industry compared to agriculture" (Ibid). When asked about the chronic demographic crisis in Egypt within the Nile valley and its delta he stated "population density is indeed an impediment for development within the Nile boundaries. There needs to be a national plan to re-distribute the population into the desert, however this should not be attached to greening the desert. Perhaps a more realistic approach is to encourage industrial activity in desert lands where labor is intensive" (Al Masry Al Youm 2007a). From his views, farming in the desert land does not have a positive economic return on the national economy as it is does not create many job opportunities given that it is not labor intensive since it depends on mechanization and technology. On the other hand, establishing industrial complexes can attract more labor and therefore increase the desert population and contribute to establishing more socio-economically viable community concentrations in the desert.

He explained further that 'desert development' and the 'protection of old agricultural lands' of the Nile valley are two complementary objectives. By creating spaces for populations to move into the desert and engage in economic activities and income generating opportunities –especially in the industrial sector, this leads to less pressure on the agricultural land and water

[12] Rushdi Said (May 12, 1920 – February 8, 2013) was an Egyptian scientist, educated at Cairo, Zurich, and Harvard Universities. A professor of geology, he was the chairman of the board of the Egyptian Mining and Geological Research Organization (1968–1977). (Source: Wikipedia https://en.wikipedia.org/wiki/Rushdi_Said)

resources from the river. And he was indeed right, as discussed in chapter 3, a key risk for Egypt's best quality land-water resources is illegal construction on agricultural land to absorb the population densities, as well as convert the use to a more economically rewarding activity, construction in this case. These issues as identified in chapter 3 represent signs of political scarcity as it relates to the management of Egypt's land-water resources and more importantly addressing the socil-economic needs of the largest water users, that is small farmers. As such, Dr. Roushdy Said called for supporting farmers and those engaged in agriculture sector to be provided with state of the art research that can support their production and improve the economic return of their crops. This view was further emphasized by several experts during the interviews emphasizing that "it does not make sense to invest in the desert and horizontal expansion, while at the same time the country is losing some of its best and most fertile agricultural land in the old valley (Interviews # 1 & 4). "The priority should be given to resolving the problems of the small farmers in the Old lands, especially as it relates to water resources in order to ensure the sustainability of their agricultural activities, thus avoid the conversion of the fertile land to constructed property" (Interviews # 1,2,3, &9). These views were also publically shared by other Egyptian academics such as Dr. Nader Nour El Din (a professor of Agriculture at Cairo University) as well as Dr. Mohamed Emara (a famous writer and journalist), questioning the socio-economic benefits of land reclamation and farming in the desert (field notes).

Globally renowned and influential international Nile experts have also voiced criticism to Mega projects since their inception. John Waterbury, for example, doubted the project's sustainability even for the short run, claiming 'the Toshka canal spillway will probably never be used again' (Waterbury 1997, pp.297–298). Stockholm Water Prize laureate Tony Allan called the project 'preposterous, a national fantasy. . .[for Egypt] is going to have less water, not more' (Gladman 1997 in Warner 2013). Hence, the pumping and distribution technologies are falsely predicated on *water abundance*, which will need to be pumped away from somewhere else – or perhaps was never really intended to be used (Warner 2013; Barnes 2012).

It can be also argued that Mega projects have deepened issues of political scarcity in relation to socio-environmental dimensions of land-water resources. Egypt's reform strategy was to more fully integrate the agricultural sector into international trade and to do so by promoting capital-intensive export agriculture. This led to the neglect of Egypt's small farmers, those farming less than 5 feddan and who account for 90 per cent of the country's landholders. Medium to larger holders, cultivating between 5 and 20 feddan, account for 20 per cent of landowners after the land reforms of 1961, were also marginalized in the agrarian strategy after the early 1990s (Bush 2011).

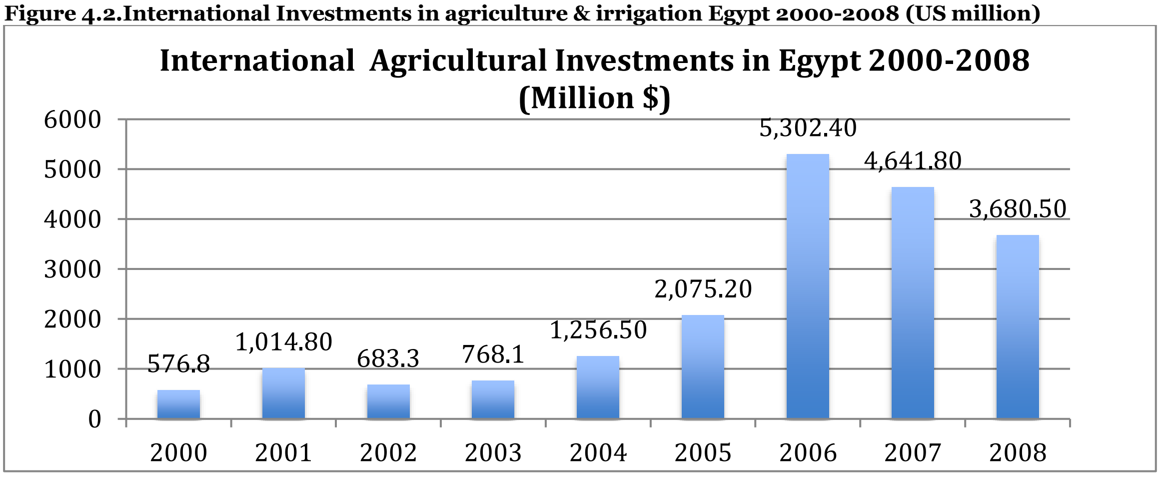
As such, the hydraulic mission of the entrepreneurial state and Mega projects depended on the *manufacture of abundance*. As discussed in chapter 3, the country's water resources budget has been under constraints during the last three decades. While attracting international investors and non-state actors endowed with capital and technology seemed to be a modern approach to green the desert using economies of scale, the question of water budget given the existing scarcity and security narratives remains unanswered. Worth noting however, that up until 2009, progress of these investments was insignificant. As discussed in the next section, Saudi KADCO the first international investor in Tohska had only cultivated 1% of the total land allocated for the company (100,000 feddan). These thousand feddan were mainly cultivated by high quality grapes (from California), targeting European export markets, a deal that was met with massive criticism domestically "as a way of wasting water resources" (Al Masry Al Youm 2009).

But this is not necessarily the view of project proponents. In an informal discussion with a senior policy maker, he indicated that Toshka was only planned to consume 10% of Egypt's annual share of the Nile, using a small fraction of the state budget, which compared to the foreseen benefits could have positive impacts on the utilization of Egypt's water resources (Interview #6; field notes). From the state's standpoint, corporate engagement allows for the use of water saving technologies, greater food production, with potential future growth for both domestic and international markets. The participation of transnational investors is therefore viewed by the state as a way to avoid the traditional challenges associated with inefficient practices in Old Lands, and the typical medium size investments of the domestic private sector depending on surface and underground water resources in Old-New lands and New Lands. Furthermore, for the state, corporate engagement in large-scale agricultural projects is a means by which economies of scale due to capital, technology, and the sheer size of land-water investments. In this sense, transnational investors endowed with capital and technologies are perceived as a new player, which can advance the process of “industrial modernity” (Beck, 1992) in the agriculture sector. This vision adopted by the state has been further revived more recently in 2015 the state launched ‘1.5 million feddan’, what I label as hydraulic mission 3.0 as discussed in section 4.5. Accordingly, over the last two decades, LSLA have taken different shapes and forms, adopting a corporate approach towards water security for maximum financial return and food security. This new version of the Mega projects reflects the increasing role of capital in the acquisition of land and water resources, thus shaping multiple nexi, for both the state and the investors.

4.4. State-Capital Alliances in Mega Projects

In terms of patterns of growth of international agricultural investments in Egypt, based on General Authority for Investment and Free Zones (GAFI) unpublished data sets for ‘non-petroleum greenfield FDI’ between 1972–2009, the agriculture sector received very little FDI (4%) (Hanafy 2015). Nevertheless, despite the relatively small share in total FDI inflows, international investments in the agriculture sector have been increasingly growing. As shown in Table 4.2 and Figure 4.2 total foreign agricultural investments in Egypt were estimated to be 576.8 million USD in 2000, and have increased four (4) folds reaching 2,075.2 million USD in 2005. The total international investments during this period (2000-2005) totaled 6,372.7 million USD. Worth noting however that the value of these agricultural investments doubled between 2006-2008 reaching 13,624.7 million USD, whereby in 2006 investments reached 5,302 million USD, in 2007 4,641 million USD and in 2008 3,680.5 million USD. These figures are significantly higher than investments in other Nile basin countries such as Sudan as shown in table 4.2.

Figure 4.2.International Investments in agriculture & irrigation Egypt 2000-2008 (US million)



Source: Author, based on FAO data in (Elamin & Tanyeri-Abur 2011)

Table 4.2. International Investments in agriculture&irrigation sector Egypt&Sudan 2000-2008 (US million)

(Investment Million $)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Egypt	576.8	1,014.8	683.3	768.1	1,256.5	2,075.2	5,302.40	4,641.8	3,680.5
Sudan	10	9.1	43.1	284.6	5.1	18.5	216.9	278.1	77.8

Source: Egyptian General Authority for Investments (GAFI) Data in (Elamin & Tanyeri-Abur 2011)

In terms of the share of land reclamation activities in international agricultural investments in Egypt, in 2002 it reached 278 million USD, representing around 41% of the total FDI flow to the sector (Elamin & Tanyeri-Abur 2011). During the period of 2000-2008 total investments in land reclamation reached 1.6 billion USD representing around 38.34%. of total FDI flow to the sector. Worth noting, the ratio of reclamation projects in total FDI reached about 68% in 2007, and then increased up to 84% in 2008, when the value of FDI in these projects reached around three billion dollars (Ibid: 41-42). These figures are quite consistent with the global land rush phenomena, and also represent a boost to the hydraulic mission of the entrepreneurial state.

The main Arab investors in Mega projects include a number of Gulf companies such as the wealthiest non-royals Saudi family business and the largest WAQF 'Al Rajhi International Investment Company'. As shown in table 4.3 other investors included the Emirati companies Jenaan and Al Dahra supported by Abu Dhabi Food Control Authority as discussed in detail in chapter 5. Many of these investors are also engaged in Sudan as well as other destinations with the Nile basin, or outside of it such as California, Ukraine, and Portugal, amongst other locations. Worth noting that some of these investors may engage in more than one agricultural scheme in Mega projects and other location in Old-New lands as shown in Chapter 6 through the case study of Al Dahra Agricultural Company.

Table 4.3: Land Size and Arab Agricultural Investments in Toshka

Company	Land Size	Reclaimed Land	Land under production
Kingdom Agricultural Development Company (KADCO) (Branch no. 1)	25	10	2
Al Rajhi International	100	30	1.360
South Valley Development (Branch No. 2)	120	7	2.3
Savola	50	20	-
Al Dahra	100	10	
Ministry of Housing	10 New Toshka City		

Source: author calculations (Land size in thousands of feddans)

Kingdom Holding: Lessons from a Divestment story?

Kingdom Holding is the investment platform for Saudi Prince Al Waleed Bin Talal labeled by Forbes magazine as the richest man in the Arab World. In 1998, Kingdom Holding established Kingdom Agricultural Development Company (KADCO) with a capital of 30 million Egyptian Pounds to invest in land reclamation of 100,000 feddan in Toshka. Up to January 2011, reclamation started for 10,000 feddan of the total 100 thousands, with only 2,000 feddan cultivated. Agricultural produce included Alfa alfa as fodder for cattle and dairy production, as well as Table Grape exploitation – for exports, and palm dates.

The agricultural investments of Kingdom Holdings' Farm in Toshka depended on Nile water withdrawal to cultivate orphan crops such Alfa alfa as a fodder for cattle and dairy production. In addition, table grape exploitation was also a priority targeting exports markets in Europe. According to (Interview Phd Researcher University of Carlton CY), investors use the water to cultivate high value horticulture for exports, questioning the impact on raising farmers' income, and definitely not a contributor to food security; "no one benefits locally, and the economic opportunities are typically low wage jobs" (Interview Phd Researcher University of Carlton CY). "Companies are not interested to support the economy but to achieve the maximum profits" … Water is not the problem– the question rather is "is this a sustainable practice?" Key issues pertaining to the sustainable use of water resources range between basic issues such as the leakage from the canal into the desert due to quality of irrigation network, concrete lining of the canal causing a lot of seepage. On the other hand, most investors use center pivot irrigation systems leading to the highest water productivity in Egypt.

Following the January 2011 revolution, large-scale land deals were massively investigated in Egypt in search for corruption incidences with KADCO being the most famous case. Since 2011, Egyptian media perceived the Toshka land deal with the Saudi company during the Mubarak era was 'illegal' (Warner 2013). In the sequence of events, Egypt's public prosecutor's office froze the land and KADCO. As part of the political implications of the January 25th revolution, the Egyptian government concluded a new agreement to approach Toshka in a "more serious way". The government of Dr. Essam Sharaf forced KADCO to forego 90,000 feddans of its original land allocation in Toshka worth 4.5 million EGP (at the time of purchase 13 years earlier), with an estimated land price of 50 L.E. per feddan. As a result the company was to give up 75,000 feddans, retain 10,000 and be entitled to use 15,000 in the following five years whereby the original payment of 4.5 million would be considered as a down payment, conditional of reclaiming the allocated land within 3 years of the agreement. The forgone land was to be distributed to young Egyptians.

Since then, the company raised its issued capital reaching 55 million USD divided into 55,000 stocks each for $1000 USD. The holding company had also borrowed an amount of 34 billion USD from its shareholders during the last years as reported by Al Mal newspaper (Al Mal News, 2017). The company had also investment in irrigation infrastructure and water pumping stations, and its associated energy costs, amongst others. Yet, in April 2017 the company decided to sell its investments to a government owned company after claims of loss reaching 89 million USD. The company was sold for 1.25 million EGP, equivalent to 70,000 USD (after the devaluation of the EGP in

November 2016) including the 10,000 reclaimed land for which full cost was already paid, in addition to the 15,000 feddans for which 4.5 million were deposited. Worth noting, that a few months earlier, another Saudi investor "Al Rajhi" was offered to buy the land at a price of 17 million USD, but the offer was withdrawn for non obvious reasons.

4.5. Hydraulic Mission 3.0 and Egypt 2030 Strategy: The 1.5 Million Feddan Mega Project

Following the political events of 2011 and the January 25th uprising in Egypt notably under the slogan of "Bread, freedom, and social justice" (*3eesh, 7oreya, 3adala egtema3eya*), Egypt's political economy witnessed interesting developments. In addition to investigating land deals with foreign/Arab investors such as Kingdom Holding as discussed earlier, the Egyptian state as the largest importer of wheat globally struggled with securing enough supplies to feed its growing population, amidst shrinking foreign currency reserves. As Bloomberg commented on Egypt's outsized influence on the global wheat market it indicated, "in a world awash with wheat, the biggest importing nation is struggling to buy the grain," whereby "Egypt's government was among those overthrown in 2011 in the so-called Arab Spring as high food prices fired up unrest (Bloomberg 2016). Dependence on wheat imports and other essential commodities during both 2011 and 2013 uprisings have severely affected the central bank foreign reserves from 36 billion in 2010 to nearly 15 billion post-2011 onto 2014 (Interview #4).

Furthermore, following the change in leadership in Egypt since 2014, a number of Mega projects have been launched mostly state-sponsored to achieve Egypt's 2030 Sustainable Development vision. Amongst these is the 1.5 million feddan project targeting to attract both foreign and domestic investments to reclaim the desert and modernize Egypt's agricultural sector to enhance the nation's food security, notably from strategic crops such as wheat. This was perhaps manifested in the launch of the first ten thousand feddan to cultivate wheat in Farfra Oasis in the New Valley governorate by the army, marking the first milestone in this mega project. Worth noting here, Gulf nations such as Saudi Arabia and the UAE have voiced their support to

Egypt's Mega project, thus projecting their political support to Egypt's new regime, to help the nation overcome the turbulence it witnessed since the 2011 events of the Arab Spring.

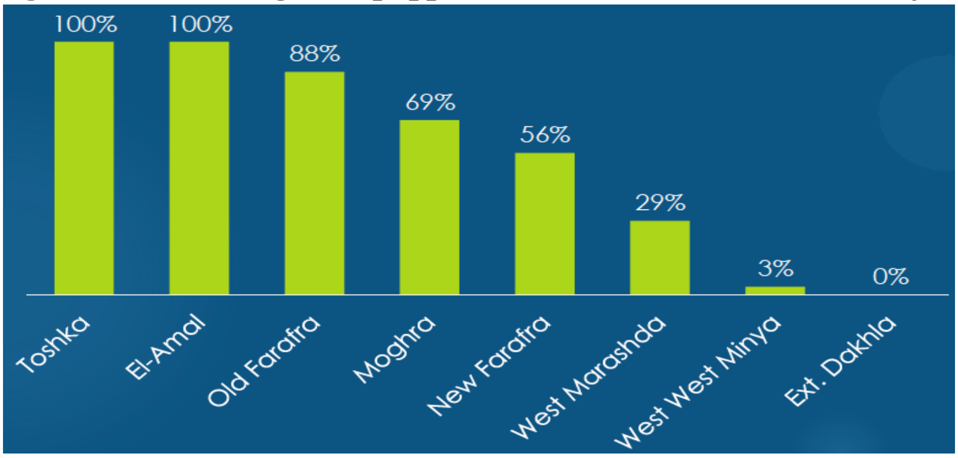
As such, despite the limited success achieved in the mega projects launched in 1997, a new "National Mega Project" was launched on December 30th 2015 to reclaim and cultivate 1.5 million feddan, what I label *'hydraulic mission 3.0'*. Once more boosted by the ecological-demographic *imaginaire*, the new 'national' Mega project represents the latest version of state entrepreneurship. The project is the first phase of "National Reclamation Program of 4 million feddan" which aims at expanding agriculture land, and establishing modern communities dependent on agriculture" (Official Sources). In an official press statement issued on December 14th 2015, Prime Minster Sherif Ismail declared, "This project will expand Egypt's prospective agricultural land 20 percent, from 8 million to 9.5 million feddan," (AL Ahram 2015). The main project philosophy is to establish a new countryside in Egypt with "model villages that avoid the problems of the past and explores the opportunities of the present" (Official statement) (Al Masry Al Youm 2016).

According to 'Egypt's 2030 Sustainable Development Strategy' issued by the Ministry of Planning in 2015, the 1.5 million feddan national project addresses the key strategic priority to develop the agriculture sector, in line with policy directives for Land and Water resources use (Ministry of Planning, 2015). The project is marketed as an integrated unit including land reclamation, Infrastructure, groundwater wells and Housing utilities as basic requirements to attract youth, small farmers, local investors, and international corporate investments. The new national project does encompass land reclamation schemes in 7 different areas, including the incomplete Toshka project originally planned to reclaim 540,000 feddan, out of which only 20,000 feddan have been developed since 1997 to date (Source). The required funding by the entrepreneurial state to start financing the first phase of infrastructure for the project is 20 Billion EGP (2.5 Billion USD) including four key components; (i) reclamation of desert lands, (ii) establishing the "New Rural Egypt" company (*sherqet al reef al masry*) to manage the project, (iii) establish new underground water wells for land reclamation, (iv) land development in south of Egypt (Official Statements; Al Masry Al Youm, 2016). The new national project represents the latest version of state modernization strategy and agricultural development to address Egypt's ecological-demographic narrative of crisis, and its classical challenges of population growth, redistribution, and horizontal expansion (Interviews; Official Statements).

In terms of the needed water resources, the Mega Project mainly relies on underground water resources. The planned mega project aims to apply water accounting and advanced water technologies depending on solar energy (Minister statement; Interview #30). Out of the total project size, 172,000 feddan or 11.5 % of the total targeted land area depend on surface irrigation from the Nile, while the remaining 1.328 million feddan representing 88.5% of the total size of the project, depend on underground water resources (Khalifa 2015). According to the MWRI, the project entails digging over five thousand water wells for a total cost of LE6 billion ($766 million), with 600 wells to be drilled in different areas of Egypt's Western Desert, including Wadi Moghra in Al-Qattara depression, the Toshka region, and Farafra Oasis. The main policy for the sustainable use of underground water resources in this project is that "wells are run alternately aiming at aquifer's recovery" (Official Statements). Water use in the project is primarily the responsibility of MWRI in charge of designing the proposed wells according to specific technical criteria taking into consideration; number of wells in each area, well spacing, well depth, maximum allowable discharge, pump setting depth, and the source of energy. The property of the wells shall be transferred to users while the MWRI retains the right to monitor and evaluate the aquifer and withdrawal rates from the wells to ensure the sustainability of aquifers (Official Statements).

The government has also set some guidelines to mitigate any unexpected "risks" related to the unsustainable use of water resources in the new national project. First amongst these is to amend the existing legislations of groundwater exploitation in order to avoid aquifer deterioration –both quantitative and qualitative. Other guidelines include determining the type of crops according to the daily allowable rate of withdrawal, prohibiting the use of pesticides and fertilizers, application of modern irrigation systems, and prohibition of high crop water consumption (i.e: banana - rice- alfalfa…) (Khalifa, 2015; official sources). Other approaches relevant to the 1.5 million feddan are to cultivate strategic crops or their alternatives to decrease the country's dependence on food imports. For example given that the country cannot expand sugar cane cultivations in the Old Lands due to water limitations, the new mega project will target the cultivation of sugar beet as a substitute and will also process it to increase sugar production and decrease the country's imports of this state subsidized strategic commodity which costs the state budget million of USD.

Figure 4.3. Percentage of Equipped Areas in 1.5 Million Feddan Project



Source: Khalifa, 2015

The new national mega project targets lands with existing infrastructure, developed under earlier schemes but never materialized. Figure 4.3 shows the percentage of equipped areas under the '1.5 million feddan' project. Some areas are already 100% equipped and ready for cultivation (from earlier investments by the entrepreneurial state), while other lands still require much work to prepare the infrastructure primarily related to digging wells, roads, electricity, and housing. A key problem in this respect is the fact that all center pivot irrigation equipment is imported from abroad costing the entrepreneurial state a large amount of foreign currency to import them (Interview# 7; official statements). Other project implementation challenges communicated in different technical meetings included; shortage in number of available drillers (Rigs), lack of trained labor, long periods for sites preparation, transfer of equipment, and poor roads status in different remote desert areas (Khalifa 2015).

Transnational Investments in the '1.5 million feddan' project

Promoting investments in the 1.5 million project by the entrepreneurial state had started even before its official launch. In April 2014, during a meeting hosted by the Arab Authority for Agriculture Investment and Development (AAAID) in Tunisia, the minister of agriculture Ayman Abu Hadid made an announcement that "Egypt plans to lease 25,000 hectares (59,500 feddan) of agricultural land to Arab investors as part of a plan to attract foreign investment in sustainably developing the country's agriculture sector" (Farmlandgrab 2014a).

Furthermore, during the 'Egypt Economic Development Conference' (EEDC) held in Sharm El Sheikh during March 2015, the Ministry of Agriculture announced signing different agreements to develop more than 282,000 feddan of agricultural land, in addition to an Egyptian Emirati feasibility study to reclaim 84,000 feddan of land in Kom Ombo (Khalifa 2015). In addition, ten Arab and international firms announced investments to develop 197,000 feddan of desert lands, while 16 firms will invest in projects across 84,600 feddan. This was further confirmed by Fahd Al Hammadi, a member of Egyptian-Saudi Business council who announced that 9 Saudi companies would be reclaiming 300,000 feddan in the newly launched project, with total investments of 20 billion EGP. These Saudi companies included Al Marai, Savola, Capital Community, DDF, Al Rajhi, Egyptian Saudi Farming Company, Nadek, AlKhozeim, and Al Gazae'. During this same conference, a Japanese financed initiative of USD 49 million was announced to improve irrigation systems in Upper Egypt by building new regulators for the Dairut canal, which channels 17% of irrigation water from the Nile. In addition, in September 2015, India's Embee International announced that it is in the process of acquiring 33,000 acres of land for farming in Egypt, with an estimated investment of Rs50 billion (Dh276.35 million) to grow pulses and vegetables (Gulf News 2015). The company, which has been into textile business in Egypt for the last 28 years, confirmed through its Director Sanjay

Khushalani that “Embee International is participating in the One Million Feddan land reclamation project. We have booked around 33,000 acres. The land is being given on lease for 50 years” (Ibid). The investment is one of the largest by any Indian company in Egypt and the first foray by an Indian firm in the country’s agriculture sector.

However, very little is known about the progress of the new Mega project from the investors’ side. Yet, by May 5th 2016 the state announced the cultivation of the first pilot area of 10,000 feddan of wheat and barley in Farafra was announced. While this may not be indicative of any success of the project, it is important to realize that it is too early to evaluate the outcomes of this slowly developing national project. Yet, two issues in particular are subject to critical thinking; *the first is how land distribution differed from earlier mechanisms of misallocation? And second, how is this national project utilizing the lessons learned from earlier land reclamation and desert farming schemes, notably those launched in 1997?*

4.6. Conclusion

The chapter discussed how the hydraulic mission of the state in Egypt shifted from a developmental/predatory role to an entrepreneurial role. This role is founded on the manufacture of abundance implying that the state is trying to do too much with too little given its limited water budget, and the inherent water stress in Egypt, aggravated by the ecological-demographic narrative of crisis. The chapter started by discussing how with the liberalization of the economy during the late 1970s and early 1980s, domestic private sector investments marked the shifting role of the state from a developmental role (as understood during Mohamed Ali and Nasser), to a predatory one, mixing public and national interests with private sector profit (Evans 1989). This shift reflected the gradual withdrawal of the state from land reclamation, and the growing engagement of the domestic private sector in agriculture mostly for export of high value crops depending on underground water. However the market dynamics stimulating private sector growth reflected the clear disconnect between financial profit in the water and agriculture economy on the one hand, and the state’s horizontal expansion vision on the other. They also created an unsustainable parallel water economy depending on underground water resources to meet the specifications of export markets. These factors combined, fuelled by an alarming narrative of crisis, led the state to realize the need for an alternative mode of frontier making and horizontal expansion, what I label; the hydraulic mission of the entrepreneurial state.

Hence, to achieve its hydraulic mission, and quest for modernization at the dawn of the 21st century, the entrepreneurial state launched several national' Mega projects (*Mashrou'at Kawmeya 3emlaka*) marking an evolving approach towards horizontal expansion and water security. This entrepreneurial approach towards horizontal expansion and greening the desert focused primarily on *de-risking* LSLA to promote FDI in Mega projects. The entrepreneurial state took the risk of investing in infrastructure in remote desert schemes -through roads, access to electricity, largest pump in the world, irrigation canals, as well as business facilitations and exemptions- to attract investors endowed with technology and capital, capable of developing large-scale *state-of-the-art* farmlands. As such, the changing role of the state shifted from being the actual developer, operator, and manager of large-scale state-sponsored projects to being an investor in infrastructure for Mega desert development schemes. South Valley Development Project including both Toshka and Oweinat, in addition to Al Salam Canal project, as well as the recently launched '1.5 million-feddan project' are all examples of Mega projects in remote desert locations sponsored by the entrepreneurial state. By doing so, the state attempted to overcome three key issues; the traditional challenges associated with the Old Lands, the mixed results of earlier desert land reclamation schemes in 'Old-New' Lands, and the limitations associated with the domestic private sector in agriculture.

As such, the changing role of the state aimed at promoting a greater participation of the international agricultural investors, and led to the establishment of transnational state-capital alliances. These alliances reflect how both the state and the investors frame the land-water-food nexus as a political-economic commodity. For the investors, 'land and water' are merely production inputs for a profitable commercial production operation. For the state, non-state actors' engagement in land-water investments has become synonym to sector modernization over the last 20 years, with economic benefits such as FDI inflow in the agriculture sector, foreign currency from land leasing, food production, employment, and, ultimately fulfilling its hydraulic mission of establishing sustainable communities in the desert. The role of capital and non-state actors in land-water investments can be therefore considered as a new emerging element of the state's hydraulic mission and water politics on the national level.

Yet, whether transnational state-capital alliances and large-scale land-water investments have achieved these national goals and visions is still questionable. It is argued that these projects are largely founded on the manufacture of abundance given the state's inherent scarcity narratives and stressed water resources budget. In fact while these investments contribute to the modernization of the agricultural sector, they have not necessarily addressed the state's ecological-demographic narrative of crisis, given their dependence on little labor requirements, and have not developed any sense of community dynamics. Furthermore, these investments may imply a form of virtual water grabs since some investors notably from GCC target the cultivation of high water consuming crops such as alfa alfa to send back home, or serve other export markets. This manufacture of abundance reproduces physical and political scarcity given the inherent challenges associated with the state's water budget at the national level.

CHAPTER 5

Transnational State-Capital Alliances and the Gulf-Nile Connection: Al Dahra Agricultural Company

Chapter Overview and Key Message

Despite the numerous controversies associated with Mega projects and limited success of early international investors (e.g. KADCO) as discussed in chapter 4, Arab investments still target Egypt in search of land and water resources for food production. Given the regional narrative of water crisis in MENA, land deals denote the growing role of international investors/non-state actors in farmlands abroad in search of water and food security. The chapter discusses different investment modalities, range of actors, and institutional arrangements reflecting the changing role of state and non-state actors in home (e.g. Saudi Arabia and UAE) and host countries (e.g. Egypt and Sudan). To illustrate state-capital alliances the chapter introduces the case study of Al Dahra Agricultural Company -an Emirati investor, through its diverse land-water investment modalities in Egypt. While this chapter sheds light on the politics of the company's LSLA in 'New-New Lands' and Mega projects (Toshka and Oweinat), chapter 6 will portray a case study of its investments in Old-New Lands.

Introduction

Transnational state-capital alliances are often shaped by scarcity and security narratives in both home countries (supporting non-state-actors' investments in farmlands abroad), as well as host countries (aiming to utilize natural resources through the most financially rewarding deal). Given their land-water resources endowments, Egypt amongst other Nile basin countries, have been popular destinations for transnational land-water investments over the last decade. Despite being a downstream country, Egypt in particular is an attractive destination for different investors compared to other African economies due to its advanced infrastructure, experienced labor, and investment climate (Interviews#4 & #29). This is especially reflected in the growing interest of Arab investments in Egypt's national mega projects as discussed in chapter 4. Sudan is also an attractive destination for agricultural investments, historically labeled as the "breadbasket of the Arab world", notably within the framework of Arab Joint Food Security Strategy as will be discussed in further detail in chapter 7.

With growing populations and physical water scarcity challenges, water and food security are critical concerns in the MENA region, notably for Gulf Cooperation Council (GCC) countries. As indicated by Tony Allan (2002a) Arab countries are the most food-trade dependent globally. This dependence on food imports, coupled with water scarcity concerns, further aggravated by the food price spikes over the last decade "have been perceived as a strategic vulnerability by Arab governments ever since" (Keulertz & Woertz 2015). As the food and fuel crisis of 2007/08 and 2011 unfolded, several Arab nations realized the risks of relying on global markets for food imports (Mulligan et al. 2017). As the largest net importers of grains in the world (Sadler & Magnan 2011), this realization led GCC countries to shift their strategy towards acquisition of farmlands abroad as a way to achieve food and water security. It should be noted however that if world commodity prices remain stable, it is much cheaper to continue to import food than investing in regional agriculture (Keulertz & Woertz 2015). Yet, given the unclear trends of global food trade and in light of growing uncertainties associated with population growth, water scarcity, and food sovereignty, a multitude of state and non-state actors have engaged in the appropriation of land and water resources to undertake agricultural investments abroad. LSLA are particularly a popular strategy by state and non-state actors, notably from Gulf Cooperation Council (GCC), Arab countries, but also other global corporate players. These global drivers also came at a time when Saudi Arabia for instance phased out domestic wheat production as its underground water resources dwindled (Hillhorst 2015b).

In Egypt, while early land deals in Toshka such as the famous Saudi Kingdom Agricultural Development Company (KADCO) in 1998 remained for a long period controversial, both domestically and regionally, the global food and fuel crisis provided a boost to transnational investments. As discussed in chapter 4, most desert reclamation projects during the last twenty years in Egypt relied on domestic and foreign investors and corporate modes of farming, exceeding 75% of all reclaimed land on average (Sims 2015, p.111). This percentage is increasing, especially at a time when desert land allocations for smallholders dwindle, and when the extra budgetary allocations necessary to support smallholder farms shrink (Ibid). As a result, the government has become ever more beholden to private capital (especially foreign i.e. Gulf Arab capital) to provide the sectorial investments it needs (Sims 2015; Interviews #34; #46). This orientation is further justified by the state on the premise that the level of domestic investments in the agriculture sector is insufficient. Foreign investments are therefore perceived as a key element of agriculture sector modernization, and also an alternative strategy for horizontal expansion by the entrepreneurial state, relying on both; foreign capital and technology. As such, this changing role of the state towards land deals paved the way for corporate engagement in land-water resources acquisitions and marks the foundation of transnational state-capital alliances.

Alliances between state and non-state actors take place on two levels; within home countries (domestic state-capital alliances), and between host countries and non-state actors/international investors (transnational state-capital alliances). Domestic state-capital alliances take place between home governments (e.g. Abu Dhabi Food Control Authority (ADCFA)) typically water scarce with food security and food sovereignty concerns, and their domestic private sector capable of investing in farmlands abroad. In this respect, these alliances take different institutional arrangements with the main objective of supplying their home governments with strategic crops such as alfalfa or wheat for domestic markets. Transnational state-capital alliances on the other hand take place between host governments endowed with land-water resources (e.g. Egypt, Sudan, Ethiopia, others), and non-state actors as well as international investors typically from water scarce GCC countries but also other international financial investors from within and outside the Nile basin (e.g. Egyptian private equity funds; Korean international private sector; GCC SWF; etc..).

The objective of this chapter is to highlight the Gulf-Nile connection by identifying different state and non-state actors engaged in transnational state-capital alliances through investments within Egypt, but also in other Nile basin countries such as Sudan. To showcase these variations the chapter discusses GCC investments in the Nile countries with a particular focus on Saudi and Emirati investments. The chapter introduces the case study Al Dahra Agricultural Company as an Emirati non-state actor investing in Egypt with plans to expand to Sudan. Al Dahra case study shows that LSLA take several shapes and forms in Mega desert schemes (New-New Lands) as discussed in this chapter, as well as other existing land reclamation projects in Old-New Lands (see chapter 6).

The chapter is divided into four main sections. The first part discusses how state-capital alliances take place on two levels; 'domestically' within investors' 'home countries', but also 'transnational' between the 'host country' and international investors. It also analyzes how land-water-food interdependencies shaped state-capital alliances and the growing engagement of non-state actors in transnational investments, notably between the Gulf water scarce region and Nile basin countries. The second part explores the institutional arrangements between home government and non-state actors with a particular focus on Saudi and Emirati investors in both Egypt and Sudan. The third section introduces Al Dahra Agricultural Company, an Emirati investor engaged in land-water investments in Egypt. Al Dahra's land-water investments modalities across different farmlands in Egypt show how LSLA take several shapes and forms. While this chapter identifies the company's land deals in Toshka and East Oweinat (New Lands), chapter 6 will focus on the company's investments in two other sites, notably in Al Salheya and Al Nubarya (Old-New Lands). Section four concludes the chapter.

5.1. The State-Capital Alliance: Gulf-Nile Connection

International investors involved in large-scale agricultural schemes have different profiles and motivations. Investors include sovereign wealth funds (SWFs), state-owned companies, financial institutions (FIs), or the private sector. On the one hand, corporate and institutional investors engage in transnational land-water investments in search for a business opportunity and a profitable agricultural operation. For instance private equity funds and private sector investments can have a business plan to serve local or export markets to render the investment more profitable. Other investments have wider strategic mandates associated with food security and sovereignty objectives related to commodity markets. In this case, home governments encourage agricultural investments in farmlands aboard, often by subsidizing companies or securing medium term contracts such as the case between Al Dahra and the Abu Dhabi Food Control Authority (ADFCA) as discussed in detail in this chapter. Quite often however, investors can have both objectives; that is to ensure a profitable agricultural investment operation, while also contributing to strategic objectives of their home governments.

In this respect, different investors are interested in the Nile Basin's land and water resources, not only from the water-scarce Arab and Gulf Cooperation Council (GCC), but also from other Asian as well as BRIC countries (Brazil, Russia, India and China). While investors from GCC are primarily concerned with food security, private-sector companies from China and Brazil are exploring opportunities in infrastructure development and biofuels as part of the increased BRIC ties with African countries.

"Agricultural practices are very old. This is especially true for countries and societies endowed with land and water resources such as Egypt and Sudan". This is how my interview started with one of the prominent private equity fund managers based in Cairo with a diverse investments portfolio in Africa. He continued "however, financial investments in large-scale agricultural projects received more attention over the last decade. During the period between 2007-2015, mergers and acquisitions in the field of agriculture roughly represented a value of 50 billion USD globally. This figure is expected to increase in the future, perhaps ten folds and could reach 500 billion USD" (Interview #23). These figures come in line with FAO estimates indicating that an average net investment of $83 billion a year will be necessary to raise agricultural production by 60% and feed the global population of more than 9 billion expected by 2050 (FAO 2014).

From an investor's standpoint, "we are in a time where private investments in agriculture are expected to grow. The private sector is doing now what the governments used to do (and were never supposed to do); that is the engagement in the agri-food systems. This is originally the responsibility of the private sector and not the government" (Interview #23). Overall, factors related to demand, market size, and control of market prices are the main drivers behind private sector and financial investments in agricultural food commodities. The logic of land deals for agriculture from an investment perspective is typically evaluated based on the assumption that demand is much larger than the company's ability to produce and supply (Interview #26). In African markets, investors often think that by producing large-scale maize for example, they can control the market price almost creating a monopoly, especially in economies where there is no competition and no commodity exchange trading. In addition to market opportunities, there are also off-take agreements (crops are sold before cultivation) with entities such as WFP, UN and human agencies as well as international NGOs.

On the one hand, host governments perceive international investments as an essential contributor towards the development of the agriculture sector. This is largely justified by the perception that foreign investments adopting state-of-the-art technology stimulate agricultural modernization and FDI economic gains (Interview #4). On the other hand, non-state actors adopting capital and technology intensive approaches in agriculture perceive resources rich countries such as Egypt and Sudan, as opportunities to secure land and water as key inputs for food production. In this respect, the Nile basin's land-water-food nexus represents opportunity for transnational investments, where capital, technology, and politics play a big role.

For example, the "Gulf Nile Economic Cooperation" discourse represents one of the venues for the state-capital alliances to take place under the umbrella of regional collaboration and Gulf Capital-Nile Resources exchange. The Gulf/Nile space is a manifestation of how transnational investments in land-water resources materialize in policy and commercial circles, facilitated by a number of actors such as the Arab Water Council. On

May 28th 2016, the “Gulf Nile Economic Cooperation” Conference took place in Cairo’s International Conference Center. The event –labeled as ‘Gulf/Nile 1’- was organized by a private company “Comesa[13]” to facilitate trade and investment opportunities between Nile countries and Gulf Cooperation Council. The conference was chaired by the president of the Arab Water Council (Dr. Mahmoud Abou Zeid), and included key regional figures such as Al Sadek Al Mahdi from Sudan, as well as key Gulf investors from Saudi Arabia, UAE, and Kuwait amongst others. As I attended the conference proceedings, it was noticeable that they key message was that Nile countries are eager to facilitate Gulf investments, notably in the agriculture sector “to achieve the potential of land-water resources in the Nile countries, and contribute to developing the agro-industry value chain in African nations” (Meeting Notes #8).

Transnational state-capital alliances are founded on commitments from the government side. These include; a concession agreement, the security of land and surroundings, as well as a water license (typically not specifying the amount of water to be withdrawn). Investors on the other hand promise the state that their investments will create jobs, and provide food in the domestic market. However, as investors perceive themselves taking up risks by engaging in a financially demanding investment, they request guarantees and incentives from the government including; tax exemptions, CAPEX (land is almost for free (1$/feddan)), a water license, and guarantees by host governments to investors to minimize political and investments risks. Nevertheless, problems between the private investors and the host government can possibly happen as “contracts are not treaties”, and are subject to “weak commitments and high chances for conflicts”; “in this case it is unclear who is responsible to solve the problem between the private investors and the state?” (Interview #23). This remains a major factor of risk and uncertainty of transnational investments. The situation is even more complicated when investments are not executed due to issues related to community grievance, political instability, and other externalities outside of the control of the state or the investors.

[13] Similar name but different entity than COMESA the regional trade platform in east Africa

Others however contest these investor-centric perspectives by questioning whether investments and political stability are a two-way relationship. In this respect, it is still unclear whether land-water investments promote political (in)-stability in host countries, or whether political instability can result in kicking out the investors and investments. These political and contextual risks to foreign investments and LSLA remain largely unclear (Interviews #28b & #29). In this respect, tensions can exist between a profitable and efficient agricultural investment on the one hand, and sharing the wealth generated from natural resources. While investments and transnational state-capital alliances are framed as a way of creating win-win situations, they may often lead to tensions with local communities and small farmers due to increased competition over land and water resources. A critical issue that represents grave social and environmental risks, often overlooked by ‘transnational state-capital alliances’.

5.2. Land-Water-Food Nexus in the Nile Basin: Investors’ Perspective

According to (Keulertz & Woertz 2015) the role of the state is crucial in preparing water scarce MENA region for nexus challenges and spur-related investment especially in the water and agriculture sectors. Investments in the agricultural sectors of core nexus economies such as Egypt and Sudan could substantially increase regional food security, which requires increased investment in the energy and water sectors to provide growing populations with increased access to water, food (Keulertz & Woertz 2015). However, the changing role of the state towards land-water investments and the establishment of state-capital alliances may reflect a “partial” understanding of these issues.

Many investors adopt the strategy of establishing an integrated farm through vertical value chains to add value, but also avoid high costs of logistics and its associated challenges especially in Africa (see chapter 7 Citadel Capital in South Sudan). For example, in the case of sugar cane, if an investor plants it without processing it in a mill, it will be very expensive to transport and export. On the other hand, having a sugar mill alone without having the crop will lead to high cost of inputs (sugar cane for processing). For this reason, vertically integrated value chains are an important element in some large-scale agricultural projects, however depending on the type of cultivated crop.

In terms of the process of resources acquisitions, large-scale agricultural investments can vary in type. There are broadly two categories of investments; (i) Green Field Investments, where investors start from scratch, or (ii) Acquisitions, which can take place through either Growth Capital Funds (providing funding and equity to businesses that have the potential to grow), or Turn Around Funds. In terms of financial investments in large-scale agricultural corporate investments, these depend on the strategy of the private equity fund/FIs whether it is targeting a greenfield investment, or whether it is acquiring an existing farm. In this respect, the financing mechanism can be pure equity (which translates in fully financing the project by the fund), or financing could depend on leverage, that is a portion of the finance is arranged through debt by borrowing from banks or financial institutions, while the other portion is arranged from equity.

However, from an investor's perspective, not all land-water investment destinations are the same. For instance, investments in Egypt can depend on surface water from the Nile, or underground water resources in the desert, however no investments can be developed in Egypt based on rainwater. On the other hand, farmland investments in North Sudan may depend on irrigation water from the Nile River, as well as *other* surface, or underground water resources, supplemented in some locations by rain fed irrigation. In South Sudan LSLA and agricultural investments can depend on rainwater with supplementary irrigation. Accordingly, the appropriation of water resources also takes place in a variety of ways, depending on surface or underground water resources, or both.

There are 2 types of agricultural investments; rain-fed and irrigated agriculture. For a Greenfield investment, it is critical to understand the difference between both types, as well as the advantages and disadvantages associated with each. Rain-fed agriculture investments are much cheaper as they are not capital intensive, and a low cost of labor. However, rain-fed agriculture has 2 major disadvantages: a) risks of water variations and droughts which will automatically result in a loss of cash flow, b) crop yields are much lower than irrigated agriculture. For example, crop productivity (depending on the crop) can be 1.5 tons/feddan in rain-fed but can be double that in irrigated projects. On the other hand, irrigated agriculture is much more expensive mainly to the cost of pumps which can reach 50 million USD per pump. Advantages of irrigated agriculture include: 1- higher yields; 2- investments are less vulnerable to climate variations and rain water volumes; 3- Development Financial Institutions (DFIs) support irrigated agriculture because it is capital intensive with major infrastructure undertakings (Interviews #18 & #22).

In terms of water resources use, investors typically receive a 'Water License', which does not indicate a specific amount of water withdrawal. Paradoxically, the water license can be withdrawn if investments are not taking place on the ground. Water is used in all stages of large-scale agricultural production for the different purposes including land development (reclamation), irrigation and farming (yield improvement vs. rain fed), and harvesting. As such, for the investor *"You value water based on what it does and not what it is"* (Interview #23). The closer the land is to the source of water, the cheaper it is to make the Land-Water connection for irrigation, which also has the advantage of using smaller and cheaper water pumps. The further the land plots from the main source of water, the higher the cost of irrigation, which eventually translates to a higher cost of production. Similarly, for underground water, digging wells in remote desert areas can reach up to 600 meters, implying a high investment cost, only affordable by financially capable corporate investors (Interview # 2). To calculate the cost of water use, investors examine four main aspects; (i) cost of extraction (pumps) x price of goods and added value of water to produce (compared to rainfed for instance), (ii) the availability of water license, (iii) water use efficiency and water quality (e.g. how much is wasted water), and (iv) opportunity cost of water (how was water used and whether other uses can yield higher profits) (Interview #23).

According to corporate investors, private equity firms and non-state actors are interested in LSLA due to “the hidden value of land and water resources today, which are seemingly reflected in very high profitability figures and return on investment in the agriculture and food sectors” (Interview #23). For investors, Africa is considered as the final frontier in private equity development and financial investments. Over the last decades, financial investors and private equity funds in the international market were fully developed in the west, with a large degree of advancement in Asia due to China’s role, while Africa is still behind as the industry is still underdeveloped. However, the barriers for the development of financial investments in Africa are several, including; the need for economic and political (structural) reforms in order to establish partnerships. For instance, there are only a few relatively established markets in the region such as Kenya, Mozambique, Rwanda, and South Africa, as well as Egypt (notably before 2011). This implies that other economies still have the potential to be developed from a private finance standpoint, but still lack the basic pre-conditions to attract international financial investors. For this reason, international monetary institutions requested structural reforms in order to ensure adequate assessment of political risk in several African countries with potential to attract investments. This orientation also comes in line with the World Bank Group orientation to “create new markets” in fragile country states (FCS) by de-risking governance, social, and environmental risks.

In particular, for the investors, these reforms can positively influence the agriculture sector given its increasing importance to the continent itself, as well as the global market. As such, transnational land-water investments in Africa are growing in importance due to the sheer fact that 60 % of remaining arable land in the world in Africa. A second factor is the continent’s reliance on food imports and aid despite its natural resources. However, a key weakness in the development of the agriculture sector in Africa is logistics, preventing the flow of natural resources to competitive international markets. Logistics represent a barrier for investments due to a number of interrelated issues such as cost, market accessibility, and lack of developed infrastructure. For example, Maize has an international price of 300$/ton in the international market, whereas in Juba traders sells it at 1000$/ton with 700$ markup. Why is Maize so expensive in South Sudan and Juba in particular? This is due to the high cost of logistics, absence of ports and roads as well as high transportation costs, high cost of petroleum products and fuel, and finally customs challenges (Interview #25). All these factors combined add a markup to the original cost of the product, reflected in the market price. Applying this example to other economies in Africa explains why food prices are often very expensive, leading several countries to depend on food and nutrition aid. By supporting food production locally African economies can avoid logistical costs associated with food imports. This in turn can result in providing food at affordable prices to the local population. Therefore from an investor's standpoint, large-scale agricultural investments can help Africa surpass its reliance on external food aid and can address many of these issues related to agriculture and food production in the continent.

Reflecting on these "investor" perspectives, one can critically think about the paradox between an investor's contribution to address issues of food production locally, and the sheer mandate of generating maximum profit and foreign currency. Investors typically aim to achieve the highest rates of return by exporting agricultural products to international markets with a stronger purchasing power. This thought led me to ask the financial investors about how they determine the ratio or percentage of production for local markets as opposed to exports? The answer I got was largely vague, but clearly indicates that these decisions are based on the basic economic issue of "opportunity cost". For example, a crop such as alfa-alfa, highly demanded in the Gulf, will probably be 100 % exported. On the other hand maize or wheat could be supplied locally and partially exported" It really depends on the type of crop, type of business, and market dynamics" (Interview #23)! In all cases, once investors secure land and water, they can decide the destination of their food production for the highest financial (and sometimes political) return. A form of water security mercantilism!

5.3. GCC Non-State Actors' Investments in the Nile Basin

State-Capital Alliances established in home countries are primarily founded on supporting investments in farmlands abroad. The land-water nexus is the primary commodity pursued by this alliance in order to secure food as well as profit. Arab investors in particular have shown an appetite for investment in natural resources adopting diverse modalities in Africa and elsewhere globally. Qatar and Saudi Arabia have the most institutionalized approach through the Qatar National Food Security Program (QNFSP) and the King Abdullah Initiative for Saudi Agricultural Investment Abroad (KAISAIA). Kuwait adopts a top-down approach with the involvement of the ministries of finance and agriculture led by portfolio investors such as the Kuwait Investment Authority tasked with direct investments despite their limited experience in the sector (Woertz 2013b, p.91). In addition existing development funds such as the Arab Fund for Economic and Social Development (AFESD), as well as the Arab Association for Agricultural Development (AAAD) support some investments. Also worth noting that Saudi Arabia is the largest shareholder of the AAAD[14] contributing over 22% of organizational capital. The research identified several Arab investments in Egypt and Sudan, covering different categories of land-water investments including (Hanna 2016):

- Investments by corporate actors from Arab water scarce countries (Saudi Arabia, Emirates, Qatar, and Kuwait) in Egypt and Sudan.
- Investments by Egyptian private equity funds and private agricultural companies in Sudan and South Sudan (e.g. Citadel Capital)
- Investments by global investors and international private sector agricultural companies in Egypt, Sudan, and other Nile basin countries (Japan and India in Egypt; South Korea and China in Sudan).

The following section provides examples of institutional arrangements and domestic state-capital alliances between non-state actors from GCC and their home governments notably in Saudi Arabia and UAE, targeting investments in farmlands abroad in both Egypt and Sudan.

[14] AAAD is comprised of 20 Arab and African member states seeking food security for their populations. Contributions include Kuwait with 19.5%, and the United Emirates, Sudan and Iraq each with a 15% share. Egypt contributes only 3%.

5.3.1. The King Abdullah Initiative for Saudi Agricultural Investment Abroad (KAISAIA) and Investments in Egypt and Sudan

Several political economy drivers abroad motivate Saudi investments in farmlands abroad. The establishment of modern large-scale dairy production in the Kingdom dates back to the 1970s[15]. However, the water-intensive nature of the operations had been questioned over its long-term sustainability. As such, aside from the food price shocks in the international commodity market, the kingdom issued a decision to stop wheat cultivation in the desert effective 2016. This decision was largely based on the depletion of the underground water resources reserve on which Saudi Arabia depended for the non-economic production of wheat in the desert over the last 30 years or so (Interview #4, Interview #28). To address this issue, local dairy firms have been moving towards full (100%) reliance on imported feed, with some companies investing directly in establishing their own feed production facilities abroad as part of a wider government initiative to encourage the acquisition of foreign farmland (Oxford Business Group 2013).

In 2008, Saudi Arabia launched the King Abdullah Initiative for Saudi Agricultural Investment Abroad (KAISAIA) to provide government credit and diplomatic support for Saudi companies investing in foreign agricultural projects. Providing insurance for KAISAIA overseas farm projects was also planned in coordination with the Agricultural Development Fund, the Islamic Development Bank (IDB) and the Arab Authority for Agricultural Investment & Development. According to Abdullah Al-Awain, director general of the fund "the fund seeks to serve the initiative by safeguarding the investments, minimizing the risks that these investments may face and maintain the rights of the fund itself, while maximizing projected revenues" (Farmlandgrab 2013). In 2012, a report by the Land Matrix project indicated that Saudi Arabia purchased about 5.5 million acres, the largest being 675,000 acres in the Philippines by Eastern Renewable Fuels Corporation for agriculture (Farmlandgrab 2014a). Other examples of international agricultural

[15] When the McGuckian family of Ireland helped to establish an indoor dairy farm in Al Kharj. The facility went on to become the main farm of Almarai, the largest dairy company in the Middle East; the firm is also the world's biggest integrated dairy group, with total revenues of SR11.22bn ($2.99bn) in 2013.

investments involving the direct acquisition of land and water resources included the United Farmers Holding Company (UFHC) deal to gain control of 2700 ha of prime wheat land in Poland and 33,000 ha in Ukraine, either through direct ownership or long-term lease (Oxford Business Group 2013). UFHC is a Saudi consortium made up of several key Saudi companies in agriculture sector including Saudi Agricultural and Livestock Investment Company, Saudi Grains and Fodder Holding, the Almarai Company, entering the Irish market by offering $77m for Irish-based agribusiness Continental Farmers Group (CFG).

Saudi Investors targeted Ethiopia, Sudan, and Egypt, amongst other countries in Africa and elsewhere. For example, in Ethiopia, Melis Zenawi the late prime minister welcomed Saudi investments by stating "we want to develop our land to feed ourselves, rather than admire the beauty of fallow fields while we starve" (Pearce 2012). In Egypt, despite the interruptions associated the political events in Egypt during 2011, a revival of land deals took place during the 2015 Economic Development Conference. It is estimated than more than nine deals took place during this event with a total amount of 20 billion EGP targeting 300,000 feddan for land reclamation. Involved Saudi investors included Al Rajhi, Al Marai, Savola, Egyptian Saudi Farming Company, Capital Community, DDF, Nadec, Al Khozeim, Al Gaze3. Only few signs show the materialization of these land deals. For instance, in 2016, the Egyptian Holding Company for Land Reclamation was contracted by the Saudi Savola Company[16] to reclaim 20,000 feddan (out of its 50,000 feddans in Moghara, Northern Western Desert) at an investment cost of 1.3 billion EGP (Al-Borsa News 2015).

“In most deals, Saudi investors have generous access to water and the right to export at least 50 percent of the harvest back to Saudi Arabia” (Interview # 4). This was further confirmed by (Interview # 18) indicating that Saudi investors seek the maximum financial return and as such “treat the land as a cow”. For this reason, a 2012 report from one of Africa's biggest banks, Standard Bank

---

[16] Savola’s existing investments in Egypt amount up to 8 billion EGP in the agri-food sector including sugar processing, vegetable oils and gee, and pasta.

based in South Africa, suggested it had mistaken during its initial assessment and that Saudi investments may be bad value for the continent by stating; "For African countries courted by Saudi agribusiness firms, a clear appreciation of the value of the asset on which they rest is necessary...Under-selling of agricultural assets (both land and, perhaps more critically, water) remains a profound threat" (Standard Bank 2012).

Al Rajhi

Al Rajhi[17] International Investment (RAII) is an interesting example of a Saudi Investor engaged in Egypt and Sudan. RAII lines of business include investments, agricultural infrastructure development, farm management services, production, and trading undertaken by 3 subsidiaries; Al Rajhi Agricultural Management Services Company (responsible for the production, maintenance and operations on the farms, and expand infrastructure for irrigation in new farms); Saudi Grain & Fodders Holding LLC established in 2008 (branches out to 5 different subsidiary companies); Al Rajhi Agricultural Infrastructure Co. established in 2015 specialized in engineering, procurement and construction services for agricultural projects development for RAII as well as third parties.

Since 2008, Al Rajhi played a leading role as part of KAISAIA. In 2009, Al Rajhi Group brought together major Saudi agribusiness companies including Al Marai, Aljouf Agricultural Development Company to form *Jannat*, a joint venture company to acquire farmland overseas. Based in Riyadh, Jannat Agricultural Investment Company (limited liability) includes six Saudi companies with a capital of 63 million riyals to undertake large investments in agricultural farming overseas. In 2009, Jenat acquired 10,000 hectares in Egypt to cultivate wheat, barley, and alfaalfa for a deal estimated at 70 million USD. Jannat currently owns 77.73% of the capital of the agricultural investment company in Egypt, and produces wheat, alfalfa, corn and pulp on a land area of 4,000 hectares East Port area. In 2013, the Board of Directors

[17] Owned by a Saudi family business and the largest WAQF Al Rajhi family is considered to be the wealthiest non-royals in Saudi Arabia.

agreed to enter into a partnership with Marina Agricultural Development Company (Egyptian company) to establish a production and marketing of feed silage in Tabuk, Saudi Arabia Company (Jazan 2015).

Al Rajhi's agricultural investment portfolio also includes projects in Sudan, Egypt, Ukraine and Poland amongst others. Its operations are presently at Kafa'a and Al Ghaba (Sudan) and Toshka (Egypt). In Egypt, the Saudi company acquired 100,000 feddan (62,500 feddan) in Toshka in 2007 out of which 20,000 feddan located on branch 1. By 2009 Al Rajhi started with the reclamation of 10,000 feddan, out of which only 400 feddan were cultivated during the initial phase to produce wheat and alfa alfa for export to Saudi Arabia (Grain 2010). The second phase was planned for the remaining 52,000 feddan and was scheduled to start in 2010 but was delayed as a result of the January 2011 revolution. A recent study by a Dutch consultant commissioned by the Ministry of Economic Affairs of the Netherlands in 2015 estimated that the size Al Rajhi's farm in Egypt is 42,000 ha with a production size of 6,300 ha (Hillhorst 2015a). The production on the farms in Sudan and Egypt consist mainly of Alfalfa, Wheat (grain and seed), Corn, Barley, Date and banana seedlings.

In Sudan, Al-Rajhi's Al Kafa2a project established near Barbar city in the state of the Nile River in the Northern region. Al Kafa2a project is planned on 12,000 feddan (5,000 hectares) relying on a main canal 5 km from the Nile to the external periphery of the project, which branch out to smaller canals totaling 35 km. Currently, 75 axis of the 100 planned are already cultivated including wheat, corn, alfalfa using modern technology and agricultural mechanization (Vimeo 2014). Plans for expansion include additional two areas of 50,000 and 30,000 feddan to the eastern and southern parts of the project respectively. In its reports, the company identifies its initial challenges to be the choice of the irrigation system taking into consideration the soil and temperature characteristics.

5.3.2. Abu Dhabi Food Control Authority (ADFCA) and UAE Investments in Egypt and Sudan

ADFCA supports and subsidizes its own private sector companies to invest abroad as part of the UAE's food security strategy to satisfy the country's needs of basic agricultural commodities, notably animal feed. The reason why ADFCA is interested in cultivating fodder abroad is to replace the locally produced 'Rhodes grass' which was halted by the government since 2010 as it consumed 3 of every 5 liters produced in agriculture in UAE. In 2009, ADFCA signed contracts with two key Emirati investors *Jenaan Investments* and *Al Dahra Agricultural Company* to supply large quantities of animal feed (Interview #18). Both companies undertook investments in Egypt and Sudan, as well as other countries globally "to supply ADFCA a variety of fodder items that have been scarce in the market, but having best nutrients that ensure productivity and quality of the livestock" (ADFCA 2015).

In January 2015, ADFCA renewed the supply contract for different Emirati companies investing in farmlands abroad. This renewal indicates UAE's ongoing strategy "to continue ensuring adequate supply of high quality fodder to the agricultural sector for five years until 2020" (ADFCA, 2016). According to HE Dr. Mugheer Al Khaili, ADFCA Board Member and Managing Director; "the decision of the signing of contracts comes in line with directives and decisions of Abu Dhabi Executive Council pertaining to fodder support to livestock farms as well as a complimentary to the strategic objectives set in the area of food security in fodder supplies, by recognizing it as a strategic commodity and by systematically managing the stock in the emirate" (ADFCA, 2016).

Jenaan Investment

Jenaan Investment - a private company established in Abu Dhabi in 2005- is an example of an Emirati investor engaged in Egypt and Sudan to invest in farmlands abroad. In 2007, the company acquired 160,000 feddan[18] of land in

---

[18] A feddan is the equivalent of 0.42 hectare

Egypt to grow 60,000 tons of corn, barley, silage and alfalfa grass. To start, the company invested USD 25 million to acquire 6000 feddan in Toshka and establish an animal feed plant for fodder export to the UAE. In 2009 the company also signed a deal to invest US$ 251.8 million (Dh925 million) to grow wheat on an additional 100,000 feddan (42,000 hectares) in East Oweinat. Project implementation was planned over five years, expected to be complete by 2015, whereby production was "strictly for Egyptian consumption". The plan was to start out by cultivating 8,400ha and expand operations by the same amount each year. After five years, the land was expected to yield 350,000 tons of wheat annually. However, inevitable delays and disruptions occurred on the ground due to the political situation in Egypt in 2011.

According to Jenaan, by 2012, the company was growing 60,000 tons of corn, barley, silage and alfalfa grass in Egypt. Half of that was sent to the Abu Dhabi Food Control Authority and half was sold to private Egyptian companies (The National 2012). Prior to 2013, Jenaan was producing forage to feed livestock in Abu Dhabi but was losing money, partly due to an export tax of 300 Egyptian pounds ($43.56) a ton on the crops it exported back home (Interview #18). In 2013 Jenaan changed its policy partly because of its financial loss and partly due to advice from the government of Abu Dhabi to contribute to Egypt's food security in support to its political transition during 2013-2014. Jenaan started cultivating 10,000 feddan of wheat in Egypt and is looking to plant 30,000 feddan more next year. Worth noting that Egypt is among the world's biggest importers of wheat consuming 14 million tons a year.

In Sudan, Jenaan investment signed a deal with the government in 2010 to establish a joint venture (60% Jenaan, 40% Sudan) under the name of "Amtaar" considered as the country's largest scale agricultural investment. The deal entailed 30-year renewable lease for 230,000 feddan (100,000 hectares) in Sudan. In April 2012, the first phase started with 12,000 feddan (5,000 hectares) expanded into 12,000 four months later. Using a floppy irrigation system to irrigate using the Nile's water, this operation is expected to generate between 50,000 and 70,000 tons of feed on a yearly basis. According to Khalil Al-Shamry, General Manager of Jenaan Investment "our vision has been to help achieve food security for the UAE and the Gulf countries ... we started with 137,000 acres and now we have finished infrastructure for 30,000 acres. As this is only our pilot project, we believe that within the next ten years we will be able to cultivate a minimum of one million hectares, but first we wanted to check Sudan's conditions, and our technology" (The Worldflio 2015). In 2016, Jennan Investments signed a Memorandum of Understanding with the Sudanese Finance Ministry to establish the biggest date palm farm in the world, with a total of 221 million trees to be planted over a 13-year period (ADFCA 2016). Other plans for expansion included an investment of 500 million USD to buy farmland in Tanzania, and another one in Ethiopia of 163 million USD, in addition to the Far East, the US where it produces about 150,000 tons of grass from farmers, and Spain with 300,000 tons of feed.

Al Dahra Agriculture

Another example of an international Emirati investor in Egypt is the Abu Dhabi based Al Dahra Agricultural Company, one of the main suppliers of animal feed in the UAE. Al Dahra Agriculture is affiliated to Al Ain Holding (Formerly Al Ain International Group) founded in 1996. The Economic giant is named after Al Ain city (Arabic: The Water Spring), the birthplace of the late Sheikh Zayed Bin Sultan Al Nahyan, the founder of the United Arab Emirates (UAE) and the Ruler's Representative in the Western Region of Abu Dhabi. Al Ain Holding[19] has a group of leading companies headquartered in Abu Dhabi that includes its subsidiaries; Al Ain Properties, Al Ain Capital, Al Ain Hospitality Investments and Al Ain Educational Investments, as well as its affiliate; Al Dahra Holding -established in 1995- mainly working in agriculture. With a diversified local and international investment portfolio, Al-Dahra Holding specializes in the agriculture industry with a global portfolio and

[19] Khadim Abdulla Aldarei is the Managing Director of Al Ain Holding, and the Vice Chairman of Al Dahra Holding. He is also the chairman of Al Dahra Agriculture Company in Egypt.

presence across four continents and trading activity in more than 25 countries.

Al-Dahra Agriculture is a subsidiary of Al-Dahra Holding. According to their website*, Al Dahra Agricultural Company* is "a prominent leader in agribusiness; specializing in the cultivation, production and trading of animal feed and essential human food commodities such as rice, flour, fruits and vegetables" (Al Dahra Agriculture 2018). Al Dahra's strategic orientation is based on strategic needs in the UAE market, often guided by ADFCA driven by a larger goal to ensure the sustainability of key commodities supply by investing in creating a full-fledged portfolio of essential commodities available for import into the UAE from own foreign agricultural investments (Al Dahra Agriculture 2018). An essential element of the company's mandate is to supply the UAE and ADFCA with animal feed and forage "that have been scarce in the market, yet having best nutrients that ensure productivity and quality of the livestock" (Al Dahra Agriculture 2018).

Accordingly, over the last decade, Al Dahra has positioned itself in the global market as a leader in the forage and roughage cultivation, and processing industry, offering a spectrum of forage products. Al Dahra cultivates in farmlands across Europe, US, South Asia and North Africa. On an annual basis, the company's owned and leased farmlands globally produce more than 2 million metric tons of forage with an annual forage cultivation capacity of 390,000 metric tons as follows; Al Dahra ACX Global (USA): 60,000MT; Al Dahra Fagavi (Spain): 160,000MT; Al Dahra Egypt: 120,000MT; Al Dahra Pakistan: 50,000MT.

Al Dahra adopts an active foreign investment strategy, establishing various acquisitions and joint ventures with specialized feed and food producers worldwide driven by profit as well as strategic orientations. According to the company, investments cover various geographies which "contribute to the host countries long-term food security and farming sustainability…by dedicating a share of Al Dahra's agricultural production for local consumption and upgrading the local infrastructure which is essential for the country's agricultural sector development, while also contributing to the country's economic development through the generation of new employment opportunities" (Ibid).

The group owns and operates a large asset base including a land bank of 200 thousand acres, 8 forage pressing and production plants, 4 rice milling plants and 2 flour milling plants in India and Pakistan" (Al Dahra Agriculture 2018). Egypt is one of the locations where Al Dahra is advancing its food (and water) security strategies. Al Dahra also acquired land in Sudan, however initial reports indicate that this operation has been delayed (Hillhorst 2015a). In Egypt, the company's landholdings are estimated to be 119,560 feddan producing around 120,000 metric tons of alfa alfa (cultivation, production, and processing capacity) which represents 31% of the company's annual forage cultivation capacity globally, and 10% of its annual production and processing capacity. Also, it engages in commercial production for export of high value crops in the international market as presented in the following section. Al Dahra's strategy is based on acquiring large-scale agricultural farmland (or desert reclamation land) in different locations in Egypt, motivated by the availability of water resources from both the Nile and underground water resources (Interview #19). Worth noting that Egypt is a special case since there is no rainwater, and therefore supplementary irrigation is not possible, making it a unique place for irrigation and agriculture, as well as the politics associated with them (Interviews #19; #4).

5.4. Al Dahra Large-scale Land Acquisitions (LSLA) in Egypt

5.4.1. Al Dahra Egypt: Diverse Modalities of Land-Water Investments

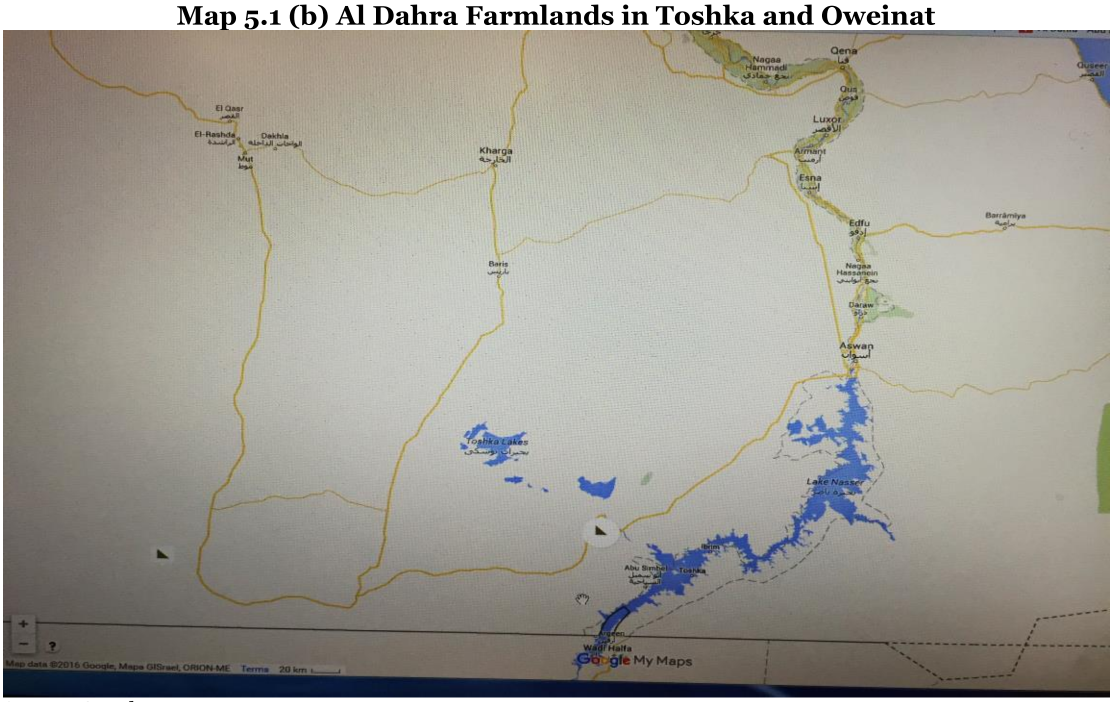
Al-Dahra Egypt was founded in 2007 and started operations in 2008 as a result of a collaborative effort between the governments of the United Arab Emirates (UAE) and Egypt (Interview #19). Al-Dahra Egypt specializes in land reclamation and infrastructure set up, considered as core competencies of the company. The primary purpose of the company's investments is to develop agricultural projects for cultivation, production and export of food products and animal feed. The total work force of Al-Dahra Egypt is around 500 employees on fixed contracts, excluding seasonal labour and those working in the Toshka and Oweinat project, which is considered a separate operation on its own (Interview #19) as discussed in the next section. In Egypt, the company invested heavily in building on-farm production infrastructure comprising wells, drip and pivot irrigation systems, pumping stations, filtration units, processing plants, sorting and packing units, including owning and operating a forage processing and baling facility. In addition, it has developed advanced logistics capabilities for domestic and overseas distribution and has invested in the latest agricultural equipment and logistics machinery (Interview #19).

The company's investments in Egypt comprise two main categories; Old-New Lands (east and west of Nile delta), and New Lands in remote desert areas allocated for Mega projects as shown on Map 5.1. In total Al-Dahra Egypt operates four large agricultural projects with a total size of 119,560 Feddan of land as shown in Table 5.1. These farmlands in Egypt represent approximately 10% of its global land bank investments, out of which only 20,000 are cultivated (Interview #19). The farms are situated in (i) Salyeha (East of Delta (Site #1: 3,200 Feddan)), (ii) Nubareya (West of Delta (Site #2: 360 feddans)), (iii) Sharq Al Oweinat (16,000 Feddans), and (iv) Toshka (100,000 feddan). In light of this diversity of land and water resources acquisitions, each of these has its own characteristics, including the land size, the source of water, and the scale of agricultural production as shown in table 5.2. Al Dahra's land acquisitions in Egypt started in 2008 in Al Nubareya and Al Salheya situated West and East of Delta (as will be discussed in detail in the case study presented in Chapter 6), and then moved to acquiring 15,000 feddans in Sharq Al-Owainat to the extreme South West of the country. In addition to these 3 farmlands, Al Dahra acquired a fourth site in Toshka to reclaim 100,000 feddans of farmland situated 60 km from the border with Sudan, through a 25 years land lease deal, for which Al Dahra pays an annual leasing fee. Production however only started on one fifth of this total land cultivating nearly 20,000 feddan starting 2015.

Map 5.1. Al Dahra's land and water acquisitions across Egypt cover different sites including; Al Nubareya in Western Nile Delta, Toshka, and Sharq Al-Owainat in South Western Desert.

Source: Google Maps

Map 5.1 (b) Al Dahra Farmlands in Toshka and Oweinat



Source: Google Maps

One of the interviewed farm managers witnessed the cultivation of Al-Dahra's first season in May 2008. He explained with enthusiasm "our aim in Al Dahra is to manage our farms according to international standards, we have quickly gained a strong reputation in the Egyptian and international markets despite the fact that we only started our operations in 2008". For private investors, the investment decision about crops choice is purely based on economic considerations (Interview #19), prioritizing the highest economic return from the high value crops. For the company, an agricultural operation should mainly translate into financial return in foreign currency, function of demand and prices in the European export markets (Interview#18). The local market is of secondary importance, and mainly serves to sell the rejects (Grade B and C) of the export market. As proudly explained by the farm manager “Al Dahra received an award from the Netherlands in 2015, as Egypt’s top exporter of high quality oranges to the European market. Al Dahra’s agricultural produce is Global Gap certified, and we are currently working to be TESCO certified”. In terms of the operational relationship between Al Dahra and ADFCA, (Interview #18) explains that Al Dahra Egypt sells its agricultural produce to Al Dahra Abu Dhabi, who in turn sells it to ADFCA. This transaction is subject to taxation from Egypt’s side, whereas the financial transaction ends up in the company’s account in Egypt. The company is subject to supervision by the Egyptian Import Export Authority (*hay2at al saderat wal waredat*), and each fiscal year has to be settled separately.

In each different geographic contexts of its four farmland, Al Dahra had to manage, adapt, resolve, and secure the necessary resources to ensure return on its agricultural investments. For example, in Al Nubareya farmland, Al Dahra acquires water from underground aquifers in the western desert, as well as the Nile through its complex irrigation network stretching downstream across the West of Delta agricultural area. In Toshka, Nile water is directly provided from Lake Nasser, supplemented by underground water from the great Nubian sand aquifer. In Sharq Al- Owainat, access to water for irrigation primarily depends on the great Nubian Sand aquifer, “by digging wells, literally in the middle of the desert close to the Southern border with Sudan” (Interview #19).

In terms of land size, Al Nubareya and Al Salheya (Old-New Lands) are relatively much older, and much smaller in size compared to Toshka and Oweinat (New Lands) which are recently established land reclamation schemes remotely located south west of Egypt near Lake Nasser and closer to the borders with Sudan (Interview #18). While farms in Old-New Lands are limited in size, the location of Al Salheya and Al Nubareya provide several comparative advantages compared to remote desert lands. This includes easier access to electricity, better services, ease of transportation, and access to export ports from the Mediterranean or Red sea. These advantages contrast with remote sites in New Lands where distance to export ports implies additional time and cost.

In terms of water resources, a major distinction between Egypt and other Nile basin countries, or elsewhere globally is that agriculture depends 100% on irrigation with no supplementary rainwater. It is crucial to understand this factor, given that securing water is a key element for a successful agricultural operation, and is therefore a major investment cost for farmland irrigation to achieve the corporate objective of maximizing agricultural productivity, and hence profit (Interview #19). For Al Dahra, a mix of Nile and underground water was adopted to develop large-scale land reclamation projects. In each of Al Dahra's agricultural sites across the country both elements (land and water) share some similarities, but often-different characteristics. Al Salheya farmland eastern of Nile Delta depends on Nile water from Al Ismailia Canal. Irrigation in Al Nubareya farmland west of Nile delta depends on a mix of water sources, originally from underground water, supplemented by Nile water, which only started to flow to Al Dahra's farms in 2014, conveyed through Al Nasr Canal, one of two major branch canals from Al Nubareya Canal. Al Dahra's large-scale schemes in Toshka depend on the Nile water from Lake Nasser channeled through al Sheikh Zayed Canal, mainly characterized by high water quality. While Al Dahra's investments in Sharq Al Oweinat 60 km from the border with Sudan solely depend on underground reserves from the trans-boundary Great Nubian Sand Aquifer, shared between Egypt, Sudan, Libya and Tchad.

However According to the company's management, "despite the land-water resources potential, do not make profit due to the high level of transaction costs associated with this operation from cultivation to export" (Interview #18). As such, between the Nile surface water and its complex irrigation network on the one hand, and underground water resources in Egypt's desert on the other, investors face several paradoxes pertaining to issues such as – but not limited to- water quality and quantity, access to electricity, and logistics amongst other factors. In this respect, different modalities of agricultural investments in both Old-New Lands and New Lands enrich our perspective about the company's practices and challenges, especially as it relates to its diverse land and water acquisitions across the country and the Nile's watershed.

Table 5.1: SUMMARY AL DAHRA LAND-WATER INVESTMENTS in Egypt

	Al Nubareya (West of Delta)	**Al Salheya (East of Delta)**	**Toshka**	**Sharq Al Owainat**
Land Size	360 Feddans	3,200 Feddans 40 years lease	100,000 Feddans / Only 20,000 cultivated 500 million USD	16,000 Feddans
Crops	Citrus – Oranges, grapes, mango, and other fruits for export markets	1,475 Feddan Citrus (Orange Naval 130 feddan & Orange Valencia 1175 feddan) + 1,725 feddan cultivated out of which 1,200 feddan of wheat and the remaining 525 divided amongst sweet corn for silage, potatoes, and winter weed.	Wheat /alfa alfa	Wheat/alfa alfa
Source of Water	Underground Water – Nile water only started in 2014 Al Nubareya/Al Nasr Canal –Al Khereegen Secondary Canal – Branch Canal 4	Nile Water Al Ismailia Canal Primary – Tarouty Secondary Canal – Al Kassara Tertiary Canal + 17 unused wells	Nile Water – Directly from Lake Nasser via Al Sheikh Zayed Canal Supplemented by Underground water	Underground Water – Great Nubian Sand Aquifer
Water Pump	30 horsepower pump	28 pumps - Station 1: 11 pumps – Station 2: 9 pumps – Station 3: 8 pumps 100 horsepower pump / 2008 Grundfos German Technology		
Source of Electricity	Grid	Grid	Grid – inconsistent – Plans to expand to solar	Grid Inconsistent
Irrigation System	Double Drip	Centre Pivot, Double Drip, Sprinkler/ Upgraded in 2012 2015	Centre Pivot	Centre Pivot
Types of Crops	Fruits/Citrus	Fruits/Citrus, Alfa Alfa, Wheat,	Alfa Alfa, Wheat	Alfa Alfa, Wheat
Destination	European Market	Depends on the product :Europe/UAE/Egypt/	Egypt, UAE, other	Egypt, UAE, other
Labor	12 (fixed) +outsource labor via external contractor for cultivation season / average 2 per feddan of citrus	82 – 130		

(Source: Author)

5.4.2. Challenges of Land Deals in New Lands

Al Dahra's largest investments under the category of New Lands are located in Toshka, and East Oweinat, Both farmlands -150 km from each other- are remotely located in the western desert where there are no land holdings for small farmers. In East Oweinat, the 15,000-feddan farmland was directly leased from the Ministry of Agriculture who had failed to develop the land on its own (Interview #18). In this farmland, the company produces about 50,000 tons of forage and silage per annum, in addition to owning and operating a forage processing and baling facility. In addition, the company cultivates wheat solely depending on underground water, with a target production of 100,000 tons per year (Interview #19).

Map 5.2: Satellite view of Sharq Al Oweinat farmlands in South Western Desert

Source: Google Maps

However, "Al Dahra's operations in Sharq Al-Owainat are at a critical intersection due to several challenges including access to water and electricity, infrastructure, and labor problems" (Interview #19). For the company, a key problem in Oweinat and similar desert schemes is the absence of supplementary irrigation – unlike other parts of the world. For the company's managers, the critical issue of water resources in such remote areas is a main concern, as "the natural environment and mother nature do not provide water for agriculture in these desert locations". For the company, it is a significant investment to dig wells, with all the equipment and machinery needed to cover the massive land areas. Adding to this are issues of electricity, and the site's remote location, which impose limitations on production, significantly increasing the cost of production and transportation resulting in major financial implications for the company.

On the other hand, Al Dahra's Toshka farmland targeted to cultivate 100,000 feddan with an investment of $500 million (Dh1.83bn). The agreement signed in July 2008 marked Al Dahra's latest and fourth land deal with the government represented by the Egyptian General Authority for Agricultural Development (GAAD) in coordination with the General Authority For Investment (GAFI). The agreement was signed in the presence of Amin Othman Abaza[20], and Ahmed al Zaabi, the UAE ambassador to Egypt, and was announced amid a string of deals by UAE companies to acquire farmlands abroad, as the Emirati Government looked to secure the country's supply of imported food (The National 2011). Al Dahra's project in Toshka was to be cultivated in four stages of almost 25,000 feddan each, by pumping water from the Aswan High Dam reservoir (Lake Nasser), to be delivered via a 50-kilometre canal. Additional underground water resources in Toshka include the Great Nubian Sand Aquifer.

However, the operation had not started until 2013 despite the contract being signed in 2008. This delay was primarily due to a ruling by an administrative court that had cancelled the contract following the 2011 revolution as part of major legal procedures undertaken by the Egyptian public prosecutors and judges who opened dozens of investigations into land deals that took place under the former president Mubarak. In this respect, the state council (*magles al dawla*), an administrative court that provides legal expertise to Egyptian government ministries and rules on disputes between the public and the government, announced on February 21st 2011 that the government had broken the law in 2008 when it transferred the Toshka land to Al Dahra without holding an open bidding process. The decision immediately set off a number of investigations into whether other land contracts awarded through similar processes under a "direct order" had also violated the law – similar to Saudi KADCO discussed in chapter 4. Following this legal procedure, Osama Abdul Lotif, the chief executive in Egypt, said the company would challenge the state council's ruling against Al Dahra's deal, arguing the contract "was signed with a full [Egyptian] ministerial commitment".

In early April 2011 a cabinet-level committee reversed the ruling by the administrative court that had cancelled the contract. The reversal of the

[20] Last Minister of Agriculture during Mubarak

original ruling came under the condition that the company provides an expedited plan for developing the land, according to Hussein Ghunima, the head of ministerial affairs at the ministry of agriculture. Al Dahra had to submit a detailed plan for what crops it will grow and how it will develop the land, otherwise it would risk cancellation of the deal. From the government's point of view "the state is eager to demonstrate that foreign investors are still welcomed in a new Egypt", stated Mr. Hussein Ghunima, a senior official and the head of ministerial affairs at the Ministry of Agriculture (The National 2011). "We must encourage any person coming to [Egypt] to continue. We need to develop our country... We need to invest more and more. We've got the resources, we have got the land, we have got the water, and we have the sun. All of these provide a good way to develop our country" (Ibid). For Mr. Ghunima, the decision to uphold Al Dahra's contract was not connected to the question of whether the "direct order" process was legal, and other factors were included. According to him, "Al Dahra has been given a second chance to make significant progress in the Toshka project...this gives them a good opportunity to put them on the right way. There is water, and they have got financial resources, so they can continue with the good work". Worth noting however, little is known about the details of water consumption by these projects, nor the guidelines for water planning and management in these large-scale irrigation schemes!

In the summer of 2013, following the June 30th events in Egypt, Minister Ayman Fareed Abou Hadeed visited Al Dahra Farms with the Ambassador of the UAE in Egypt Mohamed Ben Nokhera. The visit included al Dahra Farms in Toshka, as an essential initiative of the Arab Agricultural investments in Egypt in support of the June 30th revolution. The Egyptian minister stressed the fact that the efforts of attracting Gulf Agricultural investments come as part of the government's plan to develop new agricultural areas totaling 340,000 feddan in 5 main areas including; south east of Qattara depression, Old Farafra, East of Siwa Oasis, Toshka, and Sinai. Specifically in Toshka land the plan included cultivating between 75,000-100,000 feddan of sugar beet, oil seeds, as well as essential crops for the "dual & triple agricultural cycles" للدورة الزراعية الثنائية أو الثلاثية , including wheat, corn, alfalfa, and other secondary crops. The project also entailed developing agro-processing industries, however no evidence is present about any progress on this front (field notes).

In 2014, Al Dahra CEO Mr. Darei indicated that the investment had initially run into logistical difficulties but that Egypt's new regime was keen on paving the way for more foreign direct investment in the sector stating "the government was not used to such large-scale foreign investments in agriculture but now with the new regime there is a big initiative of support and they are moving in the right direction," (Farmlandgrab 2014e). Only in October 2015, did Khadim al-Darei, the vice Chariman of Al Dahra inform Reuters on the sidelines of an agricultural conference in Abu Dhabi that "Work on the Toshka project is complete and we are set for cultivation by October 2015, we have plans to get around 300,000 tons of wheat from there" (Farmlandgrab 2014e). He expected the first harvest from Toshka in May-June 2016 and that all of the company's wheat production would be sold in Egypt. To date, Al Dahra only succeeded in cultivating 20,000 feddans in Toshka out of its 100,000 feddans land acquisition due to the politics of new lands and deals which resulted in several delays in developing the Toshka farmland (Interview #18).

Overall, in both large-scale farmlands remotely located in the desert, competition to access water is not with other users. Rather, the main challenge relies with “Mother Nature”. The location of the farms, and the harsh environment of the desert, distance from markets, and challenges associated with access to labor and energy resources are the key obstacles for a financially viable operation. Worth noting however, in September 2017, A new 20MW solar plant in the Toshka area in Aswan governorate has started operations, with $25 million in investment, according to Complete Energy Solutions company, the project’s developer. For Al Dahra it is expected to to save 10 million liters of gasoline and reduce CO_2 emissions by 25,000 tons (ArabFinance 2017). But whether this new development will result in a sustainable operation for Al Dahra’s 1.5 billion project in the desert is to be seen.

Even if the company ends up with a profitable operation, the fact that it plants alfa alfa and export it back to the UAE is a form of virtual water grab. Planting wheat and selling it to the Egyptian government may be positively contributing to the country's food security and its heavy reliance on imports to feed its growing population. However, under all scenarios, the company's large-scale investments in desert farmlands raise larger questions about Egypt's ecological-demographic narrative of crisis! These land-schemes have not addressed the question of population redistribution and do not contribute to establishing sustainable agricultural communities in the desert due to the sheer nature of their operations. An investment of this size is highly mechanized, is not labor intensive, and above all, does not create any community dynamics through which population can flourish in Egypt's desert lands.

5.5. CONCLUSION

'State-capital alliances' are shaped by scarcity and security narratives, in both home countries (e.g. GCC), and host countries (e.g. Nile basin). Over the last decade, the food and fuel crisis renewed interests in investments in farmlands abroad. To ensure their food sovereignty, water scarce GCC countries such as Saudi Arabia and the UAE established domestic state-capital alliances through different institutional arrangements (ADFCA; KAISAIA) to support private sector investments in farmlands abroad. This approach aimed to find an alternative option to achieve land-water-food 'security' nexus, by bi-passing the global (virtual water) trade market to meet their needs of certain strategic crops (wheat; fodder; rice, etc.). Transnational investments by non-state actors from GCC countries targeted different destinations globally, notably in Nile basin countries such as Egypt and Sudan.

State-capital alliances also manifest how both the state and the investors understand 'land-water-food' interdependencies, often framed as a 'political-economic commodity'. In this respect, the Gulf-Nile connection manifests an essential element to achieve a joint Arab food security strategy. Home governments (e.g. KAISAIA; ADFCA) support non-state actors and investors engaged in farmland investments in the Nile basin to achieve food security.

Host countries such as Egypt perceive transnational investments as a sign of modernization of their agricultural sector and an important element of its hydraulic mission and Mega schemes. For Sudan, transnational investments are an attempt to achieve the larger vision of the “breadbasket of the Arab World”. While non-state actors (financial investors and international private sector companies) are often driven by larger strategic concerns related to water security and food sovereignty in home countries, many of these investments are also motivated by profit.

The chapter highlighted in particular the example of Al Dahra Agricultural Company. The case study shows how LSLA take several shapes and forms. The company’s investments in Egypt span across four different sites, spanning two generations of land reclamation schemes broadly classified as Old-New Lands and New Lands. Each farmland has different characteristics in terms of land size, source of water, types of crops, and size of operation. The chapter focused on the politics of land deals in ‘New Lands’ notably in Toshka and Oweinat, showing how the 2011 political events in Egypt resulted in political risks and legal battles that delayed implementation of these investments. Now that the investments are operational, little is known about actual water use and the sheer amount of virtual water grabs associated with them. Even if production of alfalfa was halted and replaced by wheat for local market, non-state actors sell their produce to the state, which in turn sells it to the people; those who truly own and deserve to benefit from the Nile’s land-water for their livelihoods. Accordingly, the understanding of the land-water-food nexus by both state and non-state actors manifests an evolving approach towards water security based on state-capital framings either for corporate profit, or larger strategic and political-economic objectives. This framing reflects the changing role of both state and non-state actors, and often overlooks the interests and – social, environmental, and hydropolitical- risks for smallholders, who are in fact the largest water users. While investments in New Lands remotely located in the desert are of large-size and do not entail competition over land-water resources with other users, chapter 6 presents the case study of Al Dahra’s farmlands, notably in Al Salheya and Al Nubareya and explores the water politics associated with transnational investments in Egypt’s ‘Old-New Lands’.

Chapter 6

The Reproduction of Scarcity & Local Scale Hydropolitics in Old-New Lands:

Al Dahra Case Study in Al Salheya and Al Nubareya

Introduction

Al Dahra case study demonstrates the Gulf-Nile connection. Al Dahra is an example of a transnational 'state-capital alliance' founded on a win-win situation at the national level. This type of alliances is also situated within the wider Arab Food Security Strategy and regional economic cooperation discourse in MENA region. However, while non-state actors' investments endowed with technology and capital may be perceived as a positive contributor to the hydraulic mission of the entrepreneurial state and its Mega projects, it is also important to examine the water politics and hydropolitical implications associated with these 'state-capital' alliances on the local level for different actors in light of the inherent water scarcity and security narratives.

Al Dahra case study also shows that LSLA take several shapes and forms depending on both the Nile and underground water. As discussed in chapter 5, despite targeting LSLA in New Lands and Mega projects, the case of Al Dahra Agricultural Company shows that investments in Egypt also exist in other land categories. The 'Old-New Lands' located east and west of the Nile Delta are known for high development potential due to climatic conditions, central location between Africa and Asia, Europe and the Middle East; advanced transportation facilities (roads, sea ports, airports, etc.), fertile land, and water resources (African Development Bank 2009b). Irrigation and agriculture are crucial for the economies of these two regions depending on water resources from the Nile and underground aquifers. The cropping pattern of this generation of land reclamation is different from the traditional Nile valley/Delta 'Old Lands'. It includes more high value crops (fruits and vegetables) and less traditional field crops (cereals and cotton).

Old-New Lands differ from Mega projects in New-New Lands in two key aspects; the first is the proximity to export ports and domestic market hence having direct implications on transportation cost and ease of access to energy and markets -viewed as a comparative advantage of Old-New Lands (Interview #18). The second aspect is the existence of farmers and smallholders in Old-New lands who already suffer from water stress with ample of inherent water quality and quantity challenges, unlike in remote desert farmlands in Toshka and Oweinat. In this respect, the resource politics of transnational investments in Old-New lands entail different land-water-energy-food interdependencies for different actors, as well as tensions amongst them.

Accordingly, this chapter examines the hydropolitical implications of state-capital alliances and their corresponding nexus interdependencies, tensions, and water grabbing practices in Old-New Lands. Adopting a case study methodology, the chapter examines water politics associated with two of Al Dahra's farmlands in Al Salheya (east Nile delta) and Al Nubareya (west Nile delta) depending on Al Isamilia and Al Nubareya Irrigation Canals respectively (map 6.1), as well as ground water resources.

The key message of this chapter is that state-capital alliances taking place on the national level are often framed as a win-win situation for both the state and the investors, and tend to overlook the livelihoods of the largest and most vulnerable water users; smallholders and farmers. They also entail several land-water-energy-food nexus tensions not only for local water users but also for the investors themselves. These nexus tensions denote the absent role of the state at the local level, which influences different water users. These dynamics also have hydropolitical implications; often resulting in water grabbing practices on the local level.

The resource (hydro) politics of transnational state-capital alliances are also of particular importance in light of an inherent water stress situation in Old-New lands and the wider state approach of the manufacture of abundance. The case study of Al Dahra in Al Salheya shows the fierce competition over a scarce resource whereby technology and capital often result in water grabs, and hence raise the question of equity and livelihoods vs. profit and modernity. Al Dahra's farmland in Al Nubareya shows that investors and other water users face a paradox between unavailable surface water from the Nile and exhausted underground water resources. As such, the hydropolitics amongst non-state actors and existing water users in both sites shed light on questions of water grabs and equity due to the inherent physical and political water scarcity.

Map 6.1. Al Ismailia and Al Nubaria Canals located East and West Nile Delta

Source: (African Development Bank 2016) based on Comprehensive Study and Project Preparation for the Rehabilitation of the Nubaria and Ismailia Canals

A key finding is that transnational investments manifest a paradox of the entrepreneurial state and the manufacture of abundance ultimately leading to the *reproduction of scarcity*. This reproduction of scarcity shows how each actor adapts to scarcity to achieve water security; for company security translates to higher profits while for smallholders security is often synonymous with livelihood security under constrained socio-economic challenges. For one actor it is fewer financial gains despite a challenging business operation with only 40% of the water available, while for another it is a loss of livelihood and a downward spiral of rural poverty. A paradoxical perspective reflecting what "securing" water translates into on the ground. As for the state, while these investments may be endowed with capital and technology, they may not be necessarily address its ecological-demographic narrative of crisis, or its hydraulic mission. In fact they often represent a form of virtual water grabs.

The chapter is divided into five main sections. It starts by discussing the inherent land-water resources challenges in Old-New Lands for different water users. Particular focus is directed to inherent water user challenges and irrigation infrastructure east of Nile Delta, notably in Al Salheya. Section 6.2 presents the case study of Al Dahra farmland in Al Salheya depending mainly on Nile water for irrigation from Al Kassara Canal, a branch canal depending on Al Ismailiya main irrigation canal. This section questions the role of technology and capital in water grabs and highlights how water shortages affect corporate investors and smallholders. It highlights how water politics are influenced by the role of technology, financial, and political capital associated with international investors, thus favouring their access to water, at the expense of other users. Section 6.3 presents the case study of Al Dahra farmland in Al Nubareya highlighting the paradox between underground water quality and unavailable surface water, forcing the company to depend on a mix of ground and surface water resources to irrigate their high-value crop farmland. Section 6.4 discusses the common nexus challenges for different water users in Old-New lands, notably smallholders and investors reflecting the absent role of the state on the local level. It also discusses how power asymmetry, financial and political capital facilitate the process of water grabs in an inherent context of physical scarcity and smallholders challenges. Section 6.5 concludes the chapter by highlighting how transnational investments in Old-New lands contribute to the *reproduction of scarcity*.

6.1. Land Reclamation & Inherent Water User Challenges in Old-New Lands

6.1.1. Desert Development in Al Salheya (East of Nile Delta): A Historical Overview

In the Eastern Nile Delta region, early attempts at desert development date back to 1973, following the war, in an attempt to rebuild the area around the Suez Canal zone. In the eyes of the state, Al Salheya located east of the Nile Delta had the basic endowments to expand life beyond the narrow Nile valley and its overcrowded delta. Old Salheya is one of Al Sharqia’s main cities, historically named after the thirteenth century Ayubid King al-Saleh Negmeddin, who built it in 1246 as a precaution against invasion by the Crusaders. As one of the early reclamation projects in Old-New lands, Al Salheya agricultural scheme depended on Al-Ismailia canal, one of the downstream branches of the Nile River as shown on Map 6.1. The multi-purpose Canal is one of the most important irrigation and drinking water resources in Egypt established between 1858 and 1863, to supply drinking water to the villages on the Suez Canal zones and to the workers during digging the Suez Canal Navigation Route (Geriesh et al. 2008; Goher et al. 2014). The 128 km long canal supplies water for irrigation, and drinking water for large cities serving about 12 million inhabitants (El-Haddad 2005; Stahl & Ramadan 2008). Its inlet starts from the Nile at Cairo branching to the East Nile Delta region towards Al Ismailia governorate passing across 4 different governorates including Cairo[21], Kalioubeya, Sharkeya -where Al Salheya is located (Ibid). Today, 4,869,573 inhabitants live in the area irrigated the Ismailia Canal which serves 725,000 *feddan* of irrigated agricultural land, which is about 9% of Egypt‘s cultivated area, whereby 518,468 *feddan* are managed under surface irrigation and 206,211 *feddan* under modern irrigation, with an average loss of 1,339 million m3/year (African Development Bank 2016).

Al Salheya el Gedida or New Salheya is a newly planned city established during the late 1970s and early 1980s during president Sadat’s rule as part of the first generation of the new Egyptian cities. Although the new city was originally planned during the Nasser era, its development had been postponed due to the 1967 and 1973 wars. As discussed in chapters 3 and 4, given the limitations of the state-sponsored farms approach, “para-statal high-tech commercial farming” was adopted in Old-New Lands at a time of transitioning between Nasser’s socialist system and Sadat’s open door policy of economic liberalism during the 1970s. For example, in 1979, Osman Ahmed Osman

[21] Including those living in the northern part of Great Cairo, Shubra El-Kheima, El Amira, Mattaria, Musturod, Abu-Zaabal, Inchas, Belbeis, Abbasa, Abu-Hammad, Zagazig and El-Tal El-Kabeer, before entering the Suez Canal area. The first source is the upstream portion of the Ismailia Canal (from Cairo to Abu Zaabal, western side) including the largest industrial zones in the region (Shupra El-Kheima, Musturod, Abu Zaabal industrial zones), which include the activities of petroleum, petro gas, iron and steel, Abu Zaabal Fertilizers Company, Alum (Aluminum Sulfate) Company, detergent industries and electric power station (Goher et al. 2014; Geriesh et al. 2008) .

formed a joint venture company called the "Middle East Company for Land Reclamation" which turned out to become "Al Salheya Agricultural Project". With the majority of shares owned by Osman's Arab Contractors Company, and minority shares taken by the American firms Pepsico, Arizona Farmers, and Gifford Hill (Sims, 2015: 95). The first phase of the project aimed to cultivate 23,000 feddan mainly applying center pivot irrigation (Meyer 1998) depending on water from Al Ismailia Canal. This deal marks the rise of early signs of corporate engagement in land reclamation ambitiously targeting the reclamation of 150,000 feddan. It also reflects how the state's hydraulic mission shifted from a developmental role to a predatory one.

In a confidential report by the World Bank, issued on May 20th 1983 under the title of "Selected Issues in Agriculture, Irrigation, and Land Reclamation", the feasibility study for 'Al Salheya' project was highlighted as an example of reclamation experience in 'Old-New Lands'. The study proposed "the transfer of responsibility for technical and commercial management of the irrigation system to the private sector even though it was envisaged that small farmers might be involved in the actual growing of crops. Public sector inputs would be restricted to the provision of infrastructure, roads, electricity and main irrigation supplies" (World Bank 1983, p.31). Furthermore, the report had recognized that the experience gained from land reclamation in other locations suggested that "yields from small farms are now considerably higher than those obtained by the public sector companies and the transfer of the existing large public sector farms on the Old-New lands to settlement as in the West Beheira project is to be encouraged." (Ibid: 38). The report also encouraged the government to rethink its desert development policy in Old-New Lands based on three key factors (World Bank 1983);

> (i) The limited supply of additional water and the need to use it sparingly on the generally light desert soils after lifting it some 50 meters;
> (ii) The extremely limited effect that agricultural land settlement can have on Egypt's population problem;
> (iii) The technical and managerial problems of obtaining high yields on newly reclaimed desert lands in West Nubariya and Salheya, where even the small farms yields are well below those obtained by small farmers on the Old Lands.

The report concluded its observations on Al Salheya project stating that "the level of technical and managerial supervision and control needed to obtain high productivity on these soils will necessitate commercial private farming, oriented towards those high value export crops in which Egypt has a comparative advantage such as fruits, vegetables, groundnuts, onions and potatoes" (World Bank 1983, pp.38–39). The report went on by highlighting that the ministry of agriculture and land reclamation (MALR) "is already moving in this direction in proposing to include sale of land to middle class land owners on 10 feddan lots in addition to landless farmers and college graduates" (ibid: 39). By 1988, five animal and dairy production farms had to be closed in Al Salheya, and 14 greenhouses were left with no operations as a result of the lack of spare parts and chronic electrical failures. Following these initial failures, 23 chicken breeding farms, a fodder factory and a fish farm were also out of production. By 1990, almost all aspects of the project had come to a standstill, the foreign companies had long bailed out, and the losses of both Arab Contractors and the government were colossal (Sims 2015, p.96). Given the financial pressure on the state-owned project, Salheya was placed for auction to the private sector in 1991. Only 2 offers were received, however their price was far short than the asking price. Major challenges included the project's excess labor force of 2,500 employees, which pushed away potential investors (Meyer 1998). To overcome this challenge, two options were put forward to reduce labor force; (i) compensate laid off workers with cash, or (ii) giving workers part of the land. None of these two options were deemed feasible as the first was too expensive and the second was rejected by most employees who feared that this large-scale project with sophisticated technology would not be manageable if the land would be split into tiny private farms (Meyer 1998). Finally, in 1992 under a staggering debt of more than 250 million L.E., the project was no longer placed under the supervision of the MALR. Instead, it was restructured into a joint venture agricultural company owned by 4 main creditors; 3 public banks, and the Arab Contractors Company under the name of Al Salheya Investment and Development Company (Meyer 1998). By 2001, Al Salheya Agricultural Project was slowly being rehabilitated, but in 2013 it appeared that less than half of the 120 central pivots (each irrigating 150 feddans) were being operated (Sims 2015, p.96). On the ground, Al Salyeha largely remains a mix of different users whereby agricultural lands in the area vary in size and landholder. New Salheya is today a nucleus for the reclamation of 118,000 feddan situated between "Old Salheya" and Ismailia governorate. Small farmers largely dominate with small landholdings average 1 feddan in size, but also middle-class private agricultural investors with land holdings between 20 and 500 feddans (Sims 2015). While these are the dominant average size of landholdings, Al Dahra case study shows a different modality for land acquisition and agricultural development using its technological, financial, and political capital.

6.1.2. Inherent Land-Water Nexus Tensions for Water Users in Al Salheya

As discussed in chapter 3, land reclamation projects such as Al Salheya and Al Nubareya involved the relocation and resettlement of farmers, farm families and agricultural workers from the 'old land' to newly reclaimed areas (Zalla et al. 2000). Many of the graduates, small farmers, and beneficiaries came to these lands seeking a new opportunity following the dream of starting a new life away from fragmented land parcels and overcrowded villages in the Old valley. Nevertheless, starting their own communities was not easy due to the challenges they often encountered in the desert (Field Notes; Interview #1). While tremendous investments were made to provide agriculture and social infrastructure, much of which is still incomplete (Zalla et al. 2000; Interview #36). A common trait is the lack of access to basic services such as health care facilities, schools, or even bakeries. Access to both electricity and water is not granted, in both households and agricultural fields (Interviews #54; 56; 57). These factors combined have also contributed to abandoning these lands and communities by different smallholders, hence resulting in greater involvement of domestic private investors *(mostathmereen)* who had the financial means to develop these lands (Interview #1).

As one of the early reclamation projects, Al Salheya agricultural scheme did not depend on underground water for its development, unlike other projects in the Western desert. As part of the main system that is fed from Aswan and as a feeder canal, the Ismailia canal operates essentially under a system of upstream control (FAO 2005). Based on MWRI data it receives a seasonally varied supply of 3.5 billion cubic meter of water annually (MWRI 2005). These allocations are determined centrally by “technocrats” in accordance with the expected cropping pattern, whereby officials making such decision are typically based in the Irrigation Sector of the Ministry of Water Resources and Irrigation (MWRI) (Barnes 2012; Interview #10).

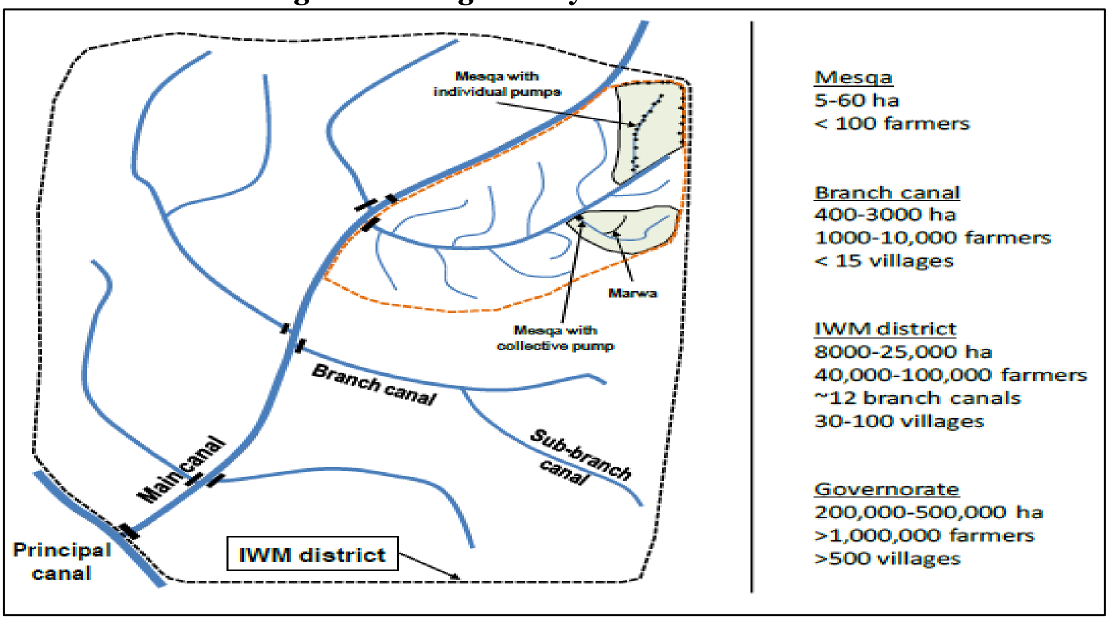
The Irrigation Advisory Services Unit -under the irrigation department of the MWRI- has the mandate to provide support to farmers for managing and operating the irrigation system. Law 213/1994 enables farmer participation in water management on improved irrigation systems at *mesqa* level and provides a legal basis for the establishment of water user associations and water boards on new lands (African Development Bank 2016). In the traditional irrigation setting (Figure 6.1), for farmers, small agriculture producers, and investors in Al Salheya, water flows from Al Ismailia main canal into primary, secondary, and tertiary irrigation canals. Control of discharges[22] in the feeder canals occur at the main head regulators and at cross regulators located at the boundaries between irrigation directorates (FAO 2005). Branch canal head regulators are equipped with lifting gates, whereby the regulation of flow, in practice is largely determined by accumulated experience. In the absence of explicit measurement of discharge, District Engineers, and to some extent the gate operators who have day-to-day control of the regulator gates, exercise a certain amount of flexibility and discretion in allocating water supplies (Wolters et al. 2016; FAO 2005). In effect, the District Engineers responsible for arranging water deliveries to individual branch canals try to distribute the water allocated to them (Ghazouani et al. 2014). The gate operator (or bahhar) is responsible for opening and closing the gates of the secondary canals, and adjusting the water level according to the schedule provided by the district engineer (Ibid). Sometimes, gate openings and rotation schedules may be adjusted in response to representations and complaints from farmers, or to observed conditions, in

[22] Discharge control depends on rating curves either for the gates or for the downstream channel; these ratings are confirmed by periodic current metering. The operation method emphasizes regulation to achieve specified levels downstream of the regulators (as a proxy for discharge), rather than to maintain particular upstream water levels, which may vary considerably depending both on the season and on which branch canals are being fed from the upstream reach at any particular time under the rotation schedule.

order to achieve the greatest possible degree of user satisfaction (Wolters et al. 2016; FAO 2005). On the branch canals, low-level tertiary canals called *mesqas* (open earthen tertiary canals) are run by farmers and provide water to the fields through quaternary channels called *marwas*. Farmers withdraw water from the *mesqas* that provide water to individual pumps feeding quaternary field ditches known as marwas (ditches). The area served by a *mesqa* is in the range of 50 to 200 *feddans*, while the *marwa* typically serves around 10 to 20 *feddans* (FAO 2005). Downstream of branch canal offtakes, there is usually only limited hydraulic regulation. Except where they are needed for internal rotation or to control steps in water level, gates on cross regulators and sub-branch canal offtakes are often not functional or have been removed (Wolters et al. 2016). Water levels depend primarily on abstraction of water by farmers (Ibid). As indicated by Wolters et al. (2016) given that the irrigation system is supply-oriented at the upstream side, and demand-oriented at the downstream side this system creates management issues. Different water users including the interviewed company have confirmed these issues, indicating that this system opens the door for corruption and favouritism, depending on each irrigation context (Interviews # 16; 19; Meeting Notes #2). The drainage system in the Ismailia canal command area is comprised of open and tile drains. There are 89 agricultural drains, which directly flow into the river Nile, most of them collect volumes of wastewater either municipal or industrial (MWRI & HCWW 2011; FAO 2005). Drainage water collected from the fields by subsurface drains flows into secondary open drains (Ibid). In addition, unofficial direct pumping from the drain by farmers uses large volume of drainage water, however is difficult to measure but estimated to be about 2 700 million m^3 in 2010 (Karajeh et al. 2011). Unofficial reuse is practiced along Bahr Baqar, Bahr Hadus, Gharbia, Edko and Umoum drains (FAO 2005).

With the presence of the rotational irrigation system, farmers accuse the MWRI for being unable to deliver water to their lands through the network of existing irrigation canals (Field Notes; Interviews # 54-61). Despite several government programs prioritizing irrigation improvement and water use efficiency (under the donor funded Irrigation Improvement Program IIP), farmers still face the same problem of water shortages (Interviews #9; 13; 36), best described by smallholders as "our land is thirsty, and no one is helping us" (Interviews #54; 56; 57). Ironically, this has been confirmed by both; the farmers and by the large company Al Dahra, as it is pretty common in Al Salheya farmland that the irrigation rotation *(monawba)* can reach up to 15-20 days without water reaching the canals (as opposed to 4 days) which negatively affects the crops. For the farmers, the land-water-food nexus is the source of their livelihood. For the investors it is an equation that ensures a profitable agricultural operation for maximum financial return (Field Notes). Furthermore, in Old-New Lands, irrigation techniques commonly employed– such as drip and sprinkler irrigation- are the ones more suitable for the scarce water resources and the sandy and calcareous sandy soils typical of the reclaimed desert lands (Zalla et al. 2000). However, for most smallholders, very few used drip or sprinkler irrigation. For them large water quantities are needed for their flood irrigation practices. The further you are as a water user along the canal, the more you need water especially during the summer, but given that water does not flow in the canal, smallholders and farmers have to illegally draw water from the wells they had to dig (Interview #1). Alternatively, with no other options, they resort to water in the agricultural drains containing a high level of toxins and heavily polluted (Interviews # 1; 2; 36; Field Notes).

Figure 6.1 Irrigation System from the Nile



Source: (Rap et al. 2015)

As such, throughout the last 20 years MWRI designed a program consisting of three stages to develop both Al Ismailia and Al Nubareya canals, both requiring rehabilitation. This infrastructure improvement plan included the rehabilitation of hydraulic structures to increase capacity and improve regulation in the long term. In November 2006, the Government of Egypt (GoE) requested funding from the African Water Facility (AWF) for the financing of the proposed "Comprehensive Study for the Rehabilitation of the Ismailia and Nubaria Canals". An appraisal mission was conducted to Egypt between 17th April and 2nd May 2007 to undertake the study appraisal and visited both the Nubaria and Ismailia canal areas. The report further described the situation in both areas stating (African Development Bank 2009b, p.vi);

> "In this context of *water scarcity*, efficiency in water allocation and distribution is of great importance and this implies that the hydraulic control structures which include dams, barrages, regulators, weirs and navigation locks have to be in a good operational condition to achieve the desired efficiency. Given the age (over 100 years for some), the state of deterioration and the large number of these structures (over 200), and in order to ensure an efficient planning of future interventions, the GoE has identified the need for a Master Plan which will set the priorities and facilitate the mobilization of resources for capital investments".

The conclusions of the appraisal mission clearly stated that both these canals are experiencing serious problems such as decaying and poorly functioning infrastructure, seepage and water logging adversely affecting valuable agricultural land, insufficient water conveyance capacity, unauthorized abstractions, environmental degradation from pollution.
Consequently, the MWRI contracted the French company Artelia between 2010-2013 to undertake the pre-feasibility and feasibility studies for both Al Nubareya and Al Ismailia canals including semi detailed design and tender documents. Given that the implementation of all the desired physical and hydraulic improvements would require major capital investment, the aim of the study was to select and prioritize among interventions. The expected benefits of canal improvements included the enhancement service provision in terms of distribution uniformity; quantity; quality; equity; and timeliness of water delivery to the water users / beneficiaries, including: agriculture

(irrigation and drainage), domestic (water supply and sanitation), industrial, as well as for navigation.

Yet, despite these investments by the state to advance its hydraulic mission, Al Dahra and other water users have voiced serious concerns regarding both, including the decreasing levels and quality of ground water in Old-New Lands, notably in Al Salheya and Al Nubareya. The investors regard the issue of water scarcity, or rather the inconsistent availability of Nile water, as a major risk factor negatively affecting the operation of several agricultural farms in the area during the past 5 years of operation (Interview # 17). These factors also negatively influence different water users and smallholders often resulting in illegal abstraction of water and competition over the main input for agriculture as shown in the following sections.

6.2. Water Grabs? Technology, Capital, and Corporate Water Security in *Al Dahra Farmland – Al Salheya* (East Nile Delta)

6.2.1. Al Dahra Farmland in Al Salheya

Al-Dahra's project in Salheya east of the Nile Delta consists of a farm size with a total area -also known as *7eyaza*[23]- of 3,200 Feddan. The land deal between GARPAD and the company stipulates a 40 years lease, however it was hard to get an accurate figure for the value, deemed as "expensive" by the company's executives. Also worth noting, the farmland was adjacent to a brick factory, which was bought by the company, and was annexed to the originally bought land. At the time of the fieldwork, the newly acquired piece of land was under reclamation, expected to join production in the season of 2017/2018.

Figure 6.2. Farm gate Al Dahra Agricultural Development Company Egypt – Al Salheya

Source: Photo by author

Al-Dahra's Al Salheya farmland started agricultural production in 2008. Cultivated crops include; 1,475 Feddan Citrus (Orange Naval 130 feddan & Orange Valencia 1175 feddan), while the remaining 1,725 feddan are divided amongst cultivating wheat (1,200 feddan) and sweet corn for silage and winter weed (525 feddans). Crops from Al Salheya farm have three different destinations or markets, mostly exported abroad; fruits are exported to the European markets, silage is exported back home to the UAE, wheat is sold locally in Egypt, in addition to the rejected fruits (Grade B) which were not exported as they do not qualify with European market specifications (either

[23] Literal translation for 'possession'

due to sugar content, or inconsistency in the fruit itself). For this reason, Al Salheya farm's location has a comparative advantage due to its vicinity to the existing infrastructure especially the roads and the ports near the Mediterranean, the Suez Canal ports, and Cairo. This is one of the main characteristics of this farmland compared to other remote sites in the Mega projects southwest desert of Egypt as discussed in chapter 5.

For Al Dahra's technical and operational staff, there are four key variables that need to be taken into consideration in order to secure water and ensure the efficient use of their irrigation system, including; (i) water supply, (ii) water quality, (iii) soil type, and (iv) the application of the system to yield the highest level of agricultural productivity and irrigation water use efficiency (field notes). In Al Dahra's farm, water flows by gravity from Al Ismailia Canal towards the Tarouty secondary Canal whereby government pumps lift the water towards Al-Kassara sub-branch (tertiary) Canal, constructed by Sheikh Zayed. Also interestingly enough, the road parallel to this canal is named after Sheikh Zayed.

During my interview with the company's South African executive, he pointed at a map lying down on his desk situated in one of the few concrete structures on the farm close to the farm's gate. He started by explaining that Al Ismailia Canal is located to the South of the company's farm, feeding Al Tarouty secondary Canal which in turn pumps water to Al Kassara Canal depending on government pumps. Al Kassara tertiary Canal contours the farm from the northern, eastern and southern borders as shown on map 6.2. Hence, the perimeter of the farmland is embraced by the irrigation canal which provides water access directly to three out of the four sides (Field Notes).

Map 6.2. Al Dahra Farmland in Al Salheya

Al Dahra Agriculture/AlSalhya - Google Maps 3/2/18, 11:45 PM

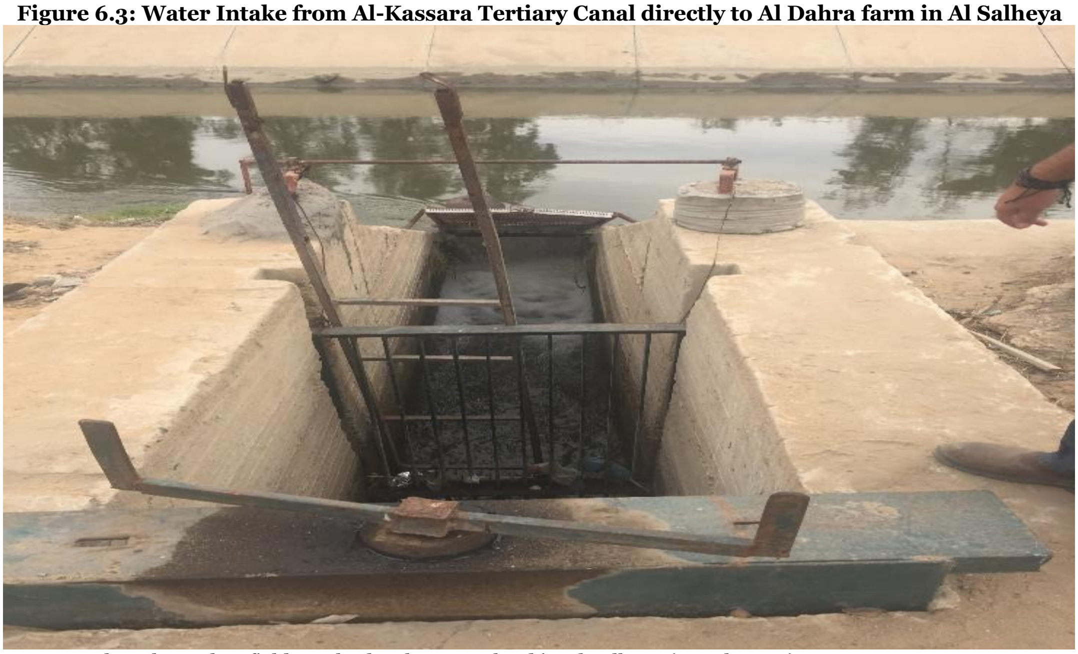
Google Maps Al Dahra Agriculture/AlSalhya

Imagery ©2018 DigitalGlobe, Map data ©2018 Google, ORION-ME 500 m

Source: (Google Maps 2018)

Al Dahra's primary interest in Al Salheya's farm is water access and availability. Al Salheya agricultural operation is a big capital investment (Interview #20). Cost elements include; filtrating and pumping water, adding fertilizers, and continuously ensuring a maintenance cost. For the company, conveying water from where it is extracted to the delivery point on the farm is a continuous cost. Using its Gulf based financial capital, the Emirati company had installed three additional pumps on the canal contouring the farm, thus supplying water to the farm's 3 main zones. The logic of the 3 pumps is straightforward. The industrial scale farm is mainly divided into 3 main zones, each pump supplies water to a different part of the land. The abstracted water is channeled through an inlet to a reservoir and from the reservoir the company uses 8 pumps to distribute water to the rest of the farm via an automated high tech system.

Figure 6.3: Water Intake from Al-Kassara Tertiary Canal directly to Al Dahra farm in Al Salheya



Source: photo by author field Work Al Dahra Farmland in Al Salheya (March 2016)

There are three main precision irrigation systems used in Al Dahra's Salheya farm; centre pivot, drip, and sprinkler systems. Each irrigation system has pros and cons, depending on lateral movement of water in soil, the soil type, the climate, among other factors, which directly and indirectly affect crop cultivation in a given location. Centre Pivots are used to cultivate wheat. Al Dahra uses 14 Center Pivots –depending on 7 out of the 8 pumps on site to channel the water received from the secondary canal to the different zones of the farm. An additional pump is left on standby for emergency cases. On average, center pivots consume 250 cubic meter/hour (i.e. 2500 liter of water / hour). The irrigation schedule is 12 hours per day in the winter and 18 to 20 hours per day in the summer. At full speed, the pivots can make a full revolution in approximately 12 hours and apply around 3,000 cubic meters (792,500 gallons) of water. At 60 % speed, which is closer to the average, a pivot will take 20 hours per revolution and apply about 5,000 cubic meters (1.3 million gallons) of water (Interview #18). When cultivating using center pivot, at the start when the plant is still small the center pivot rotates at 100% speed for a full circle for a duration of 9.5 hours. When the crop grows the centre pivot runs at 70% of its speed (it stops/stands still for 30 seconds every minute to provide more water for the growing plants). The more crops grow, the more they need water. The farming cycle takes place in rotation, 3 months wheat, 3 months maize, 3 months wheat, 3 months maize – so there are 4 cycles of income in centre pivot irrigation. To plant wheat during one cycle of production (3 months) yields an average productivity of 3 – 3.5 tons/feddan.

For sprinklers, micro sprinklers cover an area of 3 meters of diameter by wetting a larger are of the root zone using an average of 45 litres per hour with an estimated 30-35% evaporation rate, based on which there is a need to irrigate for longer periods. For drip irrigation, each tree needs 4 drippers which cover a smaller area compared to sprinklers, however there is more concentration and less evaporation – consumption is approximately 16 litres / hour and 1 % evaporation. For citrus, double drip lines are used, which is the most effective and economic way of irrigation. Double drip lines deliver a certain amount of water to a certain tree at a “precise” location. A Citrus tree needs on average 600 litres of water per week during summer and 250 litres of water per week during winter. Citrus – 550 trees/hectare – 50 trees / square meter – generates income once a year – productivity is 20 tons / feddan.

Yet, with the presence of advanced irrigation technologies, farming practices can differ between one manager and the other, given the same land-water resources. Before the South African farm manager arrived to Al Salheya farm "water was wasted by irrigating for long durations throughout many hours". Irrigation used to take place over 6 hours with an average consumption of 16 liters/hour, whereas trees only needed 1-2 liters of water /hour. According to him, any farm is not supposed to use 96 liters of water in 6 hours. Given the nature of the sandy soil, the water used during the first 4 hours is wasted and only the water used during the last 2 hours remain, mainly due to the porous nature of the sandy soil. To remediate this situation, he started to use shorter cycles of irrigation with more frequency. The irrigation cycle was split for shorter periods (2-3 hours), with a period of one hour as a break, before starting again. This way, water use is more effective, and water loss is avoided given the nature of the soil, taking into consideration that for the fruit trees there are 7 centimeters of moisture available for a tree amidst 30 cm roots, and 50 cm root zones (Interview #20).

According to (Interview #21), Al Dahra's practices reflect the adoption of "state of the art technologies and scientific principles of agricultural production ... The Company's priority is the sustainability of profit, which can be achieved by ensuring the sustainable use of –scarce- water resources". According to management views, Al Dahra's large-scale agricultural farms represent a prime example of agricultural productivity, and water use efficiency, all of which are key inputs for a "world class agricultural production model" (Interview #21). For him al Dahra is adopting a modern, technological, scientific approach for agriculture, which should be replicated across Egypt.

But even with Al Dahra's prime farm location and advanced technology, the company still complains about the lack of sufficient water resources to maintain a consistent water supply for its ongoing industrial agricultural operation. The farm manager explained to me that it is quite common that water levels in the tertiary canal are too low, thus not allowing the pumps to work, and resulting in long periods of water absence sometimes reaching over 20 days, which consequently negatively affects the crops, and more importantly the *profitability* of the industrial agricultural operation (Interview #19). This aspect of the operation was a surprise for the company's chief executives, initially not anticipated at the high level "state-capital alliance" for the land deal. Thus, the question of access to water in the company's farmlands in Al Salheya adds another investment challenge in addition to those discussed in chapter 5 concerning New Lands.

Figure 6.4 Pumps Intakes from tertiary canal feeding in the main station Salheya farmland

Source: photo by author field Work Al Dahra Farmland in Al Salheya (March 2016)

Figure 6.5. Industrial scale piping system feeding into the farms' automated irrigation system

Source: photo by author field Work Al Dahra Farmland in Al Salheya (March 2016)

While the question of water availability in Al Salheya farmland may been a surprise to the company, it comes in line with the idea of the manufacture of abundance and the *inherent* water quality and quantity challenges downstream of Nile delta. In a context of inherent physical and political water scarcity, these factors combined denote new water (hydro) politics amongst different water users around Al Kassara canal in New Salheya as discussed in the next section.

6.2.2. Water Politics in Al Kassara Branch Canal (Al Salheya): Corporate Profit vs. Flood Irrigation

For the Al Dahra, while the company may have received the advantage of a good location, issues of water quantity and quality are ample around Al Kassara canal (Interview # 19). As an essential production input, the company needs to ensure the availability of water for its continuous agricultural cycle. "Water shortages, which are common- represent a serious risk to the farm's productivity and the health of its produce" (Interviews # 19; 20).

According to Al Dahra's management, the government pump is a main problem and a key "factor of uncertainty" facing the company. "Government pumps constantly need maintenance and consequently result in inadequate volumes of water channelled in the main irrigation canals. As a result there is no constant flow of water reaching the farm" (Interviews #18; #20). Furthermore, due the fact that the irrigation infrastructure is largely an old one dating back to over 40 years ago, there are a number of uncertainties related to water flow including; seepage, erosion, canal embankment instability, water deficiency resulting from the deterioration of the irrigation systems in the region, in turn imposing threats to the arable lands, causing water losses and water logging (African Development Bank 2016). This in turn limits the canals' ability to convey flows and to maintain water levels at desired levels. Thus adding another element of *inherent uncertainty* in Al Salheya farmland.

For the South African farm manager, there is "too much competition over the use of water resources" around Al Kassara tertiary canal. According to him, the “tertiary canal does not always have enough water and sometimes there is no enough water to pump from the secondary canal too”. The challenges related to water supply are a “blame game, and everyone blames the other”. By saying so he implied that the farmers blame the company and the state, the company blames the state and the farmers, and the state blames the farmers who represent the largest water users (Interview # 20).

As discussed earlier, in Old-New Lands such as Al Salheya, irrigation mainly depends on water flow from al Ismailia canal towards secondary (Al Tarouty) and tertiary (Al Kassara) irrigation canals. An inherent challenge of access to surface water irrigation is the classical issue of head and tail. According to different experts, officials, and investors; farmers and water users at the head of the irrigation canal tend to over-irrigate their thirsty lands once water is available due to the lack of awareness! (Field Notes; Interviews #4; #10; #13; #17). When asked about this practice, farmers indicate that flooding their lands is the only guarantee their crops will get the needed water, since they have no confidence in the timing of the next rotation (monawba) (field notes; Interviews #57-61). This practice leads to an over consumption of large amounts of water, more than the actual crops’ needs, consequently leading to water shortages at the tail of the irrigation canal. As such, water losses in the lands at the head of the canals affect irrigation at the tail. (Interviews #1, #4, #9, #10; Meeting notes#2; #5).

According to the farm manager, in comparison to other places where he worked, there are wasteful agricultural water practices; “the logic is simple, small farmers cannot afford the cost of precision irrigation, that’s why they primarily rely on flood irrigation techniques, which is an unsustainable practice” (Interview #20). He asked me in a serious tone “when using flood irrigation techniques, where does the excess water go? It gets wasted in the desert,” he answered confidently. From Al Dahra’s point of view, its practices and the high level technology it uses help to avoid all these types of challenges related to wasting the already scarce water resources.

Nevertheless, and despite this logic, it is important to question whether using capital intensive technological actually contributes to saving water, or not. As discussed in the previous section, industrial agricultural operations tend to work around the clock with a continuous need to access water and energy resources for food production, and ultimately profit. Hence, despite using state-of-the-art technology, corporate investors are not necessarily using less water!

For the farmers, the narrative on accessing water resources is quite different. For farmers, water is a "gift from god" and a "granted right" on which their livelihoods depend. For farmers and smallholders "Water rights are tied to the 'land', and water is also a constitutional right" (Interviews #54; #56; #63). Water is supposed to be distributed according to a defined time schedule among different land parcels within a certain location whereby conveyance depends on the land's location and its proximity to the main source of water. Yet, according to water users depending on el Kassara Canal for irrigation, "the water flow in the canal (monawba) is inconsistent" (Ibid). For smallholders the issue of insufficient water quantities to irrigate their lands is a major source of frustration due to its direct impact on farm income, and the associated impacts on their livelihoods, given their limited capital and technological resources.

During fieldwork and interviews with different water users and smallholders around Al Kassara canal, the following problems were unanimously mentioned as key risks affecting their livelihoods, including; insufficient water flow in the irrigation canals, especially for water users located at the tail; complaints from different water users (including the large company), about the government not respecting the irrigation schedule, whereby water is so often not available on a consistent rotational basis, which destroys their crops, especially during the summer.

Reasons driving the scarcity narratives by smallholders indicated preferential treatment to some locations over others (e.g. preferential allocation and granting access to water for locations such as Giza, Cairo and Alexandria as opposed to remote agricultural areas). Others highlighted the expansion of irrigation canals to expand agriculture in certain areas, which eventually results in providing areas with water at the expense of other areas already under water stress such as in Salheya . As a matter of fact, this can be viewed as a form of the manufacture of abundance leading to the reproduction of scarcity for smallholders already facing water stress to irrigate their lands. Additional issues related to water scarcity narratives by smallholders in Al Salheya are associated with the polluted irrigation canals by human waste or blocked by grass and other vegetation not allowing the water to flow, affecting everyone. Farmers blame water pollution and scarcity on the failure of the government to undertake the annual maintenance work on irrigation channels (Interviews #56; #59). This often results in the farmers having to pay themselves for the cleaning and maintenance of the irrigation canals "although these should be covered by the annual irrigation tax" (Interview #60). These views and narratives were further confirmed by (Interview # 3) indicating that "water quality is a hindering issue for small farmers they do not have the necessary financial and technological capital to treat low quality water. As such, a farmer withdraws water from the irrigation canal, and if it is of low quality, he can't do anything about it".

Other problems explained by the farmers but less obvious to me as a non-irrigation expert included those of water quality, as well as the drainage problems, which for many translate in lower quality soil, lower land productivity and lower agricultural yields. For them thee factors combined result into lower income negatively affecting their livelihoods. The key message of the unheard and marginalised smallholders is; "we need the government to look at us, or for anyone to listen to our problems and needs" (Interviews # 55; #57; #63)).

Accordingly, the corporate involvement through additional pumps did not help this inherent situation, which was already challenging for existing smallholders who had been long there suffering from absence of irrigation water. In other words, water grabs by corporate actors using their technology and financial capital have contributed to the *reproduction of water scarcity* for different water users in an already water stressed context coupled with other structural challenges affecting their livelihoods. This has been confirmed by (Interviews # 2 & #3) indicating that especially for the lands of the small farmers and young graduates such practices cannot take place. Indeed, the existing government program for small farmers (mozare3een) and young graduates (kheregeen) are heavily regulated and do not allow smallholders to do much in terms of accessing water using alternative means but to rely mainly on the water channeled through the conventional government irrigation infrastructure. These structural challenges necessitate pro-poor agricultural policies that take into consideration not only the question of water scarcity, but also other elements related to the smallholders agricultural economy in Old-New lands as well as land reclamation schemes.

6.2.3. Drainage and Environmental Impacts

The question of drainage reflects an even worse logic than this of water abstraction. As I was walking along the tertiary (Al Kassara) canal, I observe two small pipes returning water to the canal as shown in figure 6.6. Upon my inquiry about these, the manager explains to me that this is the drainage water returning back from the farm. Needless to say, this water is full of chemicals and other inputs/fertilisers injected by Al Dahra in its irrigation water. But perhaps all of this is common practice in a context where there is a lack of strong infrastructure, yet what strikes me the most was when I asked about the impact of this drainage water on the “quality” of the water flow in the tertiary canal and downstream water users. The answer was shocking, “if you are downstream, then you are downstream, we cannot help you”. This answer really implied several things which I kept thinking about; (i) the company only cares about its operations and not about water as a public good, (ii) being upstream an irrigation canal is a position of power as opposed to being downstream, (iii) the government does not or cannot approach the company with a clear absence for the role of the ministry of environment, and finally (iv) do the farmers know about this? I guess they do, but then all they care about is to have access to water, so that their crops do not die. This is actually true given that often farmers use waste water to water their crops. As such water quality does not really matter, in a water scarcity context.

Figure 6.6: Water Drainage back to Al Kassara canal from Al Dahra Farm

Source: photo by author field Work Al Dahra Farmland in Al Salheya (March 2016)

6.2.4. Power Asymmetry & Water grabs: Financial, Technological, and Political Capital

Investors perceive themselves as using state-of-the art water management technologies and ‘modern’ agricultural practices. However, it could be argued that in a context of inherent physical and political water scarcity, technology (e.g. pumps) and government connections (e.g. state-capital alliances) facilitate water grabs by corporate actors using their financial, political, and technological capital. Yet, corporate actors often blame smallholders for ignoring the value of water by using flood irrigation techniques, which results in water loss, and unsustainable use of an already water stress situation and a “scarce” resource. According to irrigation experts and government officials, “problems generally arise due to poor understanding of their crops' irrigation requirements leading them to pump as much water as they can afford during daytime along mesqas, regardless of whether or not water won’t reach other tail-end users. Each smallholder mainly cares about satisfying his thirsty land, with no collective awareness” (Interviews #4; #10). As such, investors consistently stress the need for smallholders to find cheap and affordable technologies, which can prevent water losses and “save water for everyone” (Interviews #17; #20). But when asked about who should bare the cost of this technological shift for smallholders there is no clear answer. Investors are aware that smallholders do not have the means to invest and upgrade their irrigation systems, and are also conscious that the government is unable to do so at the farm level, or at the district level.

The technological gap between Al Dahra and other water users reflects issues of equity in water abstraction and distribution. For instance, the question of equity in Al Salheya is reflected from two perspectives; the location of the land being not just at the head of the tertiary canal, but having access to water through three out of its four boundaries, in addition to the easy access to electricity from the main grid despite its inconsistency as discussed earlier. The second issue concerning equity is related to the number and size of water pumps directly abstracting water from the source, thus creating a shortcut which other farmers and small agricultural investors do not have access to. In these locations, inherently, smallholders have been increasingly complaining about water not reaching their fields. This equally applies to those at the head and at the tail of the Mesqa. For those at the head, they complain that the water flow does not reach their canals due to irregular irrigation schedule, thus negatively affecting their crops. For those at the tail, the problem is compounded. In addition to the water delays, their chance of having water reaching their fields is even slimmer as the head farmers over-irrigate their fields in anticipation of forthcoming scarcity, leaving them with almost no water for their cultivations, thus increasing inter-farmer conflict at the local level. Fieldwork in Al Salheya clearly confirmed that it is unheard off that any agricultural company or investor had the "financial means" and the government "blessings" and "connections" to install *additional* "private" pumps directly on the irrigation canal to supply water to its land. In Al Nubareya, the widening of the on-farm irrigation canals to increase water storage is another way the company is attempting to override the system to ensure continuous access of water for its profit oriented operation.

However, "the government can turn its eye on these issues as part of its "investment promotion strategy". According to (Interview# 20) "an investor is allowed to undertake such practices, given its political capital and economic weight, and the favourable treatment the company receives from the state;

"once water does not flow in the company's irrigation canals, management in Cairo calls Abu Dhabi "connections", who in turn call "officials" in Cairo to open the irrigation canals for water to flow in the company's farmlands" (interview #19). This is one of the key forms of power asymmetry amongst small farmers and large corporate investors and a strong manifestation for water grabbing. That is, pumping water as much as they can, using their political capital, as well as their financial and technology endowments unaffordable by other water users. It is also a clear contradiction with the status of smallholders who have been suffering the lack of water to irrigate their fields. This equally applies to those in the middle, let alone the downstream fields on the irrigation canal. It is interesting to note that a foreign investor can get away with such a practice, under the label of "investor", whereas farmers who have been around for years cannot do any similar action without facing serious legal consequences! A clear manifestation that state-capital alliances often overlook the largest and most vulnerable water users, while providing preferential treatment to technology, as well as financial and political capital.

6.3. The Paradox of Surface and Underground Water in Al Dahra farmlands in Al Nubareya

6.3.1. Land Reclamation West of Nile Delta: Al Nubareya

The West Nile Delta region is one of the early desert development schemes since the 1950s. Al Nubareya canal was established at the end of the nineteenth century, named after Nubar Pasha (from Armenian origins) who supported the agricultural development of this area. According to MALR statistics, in 2012 the West Delta reclamation areas made up of Al Nubareya and extensions in Alexandria governorates, had some 1,060,000 *feddan* of irrigated agricultural land, which is about 13% of Egypt's cultivated area (African Development Bank 2016; Sims 2015, p.83). This area is irrigated by underground water aquifer, and by a complex system of large canals and secondary and branch canals fed by pumping stations from the Nile's water. Out of the total land area served by the canal, 746,140 *feddan* are managed under surface irrigation and 335,504 *feddan* under modern irrigation (African

Development Bank 2016). Overall, it is estimated that a total of 1,250,000 inhabitants live in the area irrigated by the Nubareya Canal (Ibid). Today, according to World Bank, this area is a flourishing agricultural economy estimated between US$300-500 million annually, serving both domestic and export markets in the European Union and elsewhere (World Bank 2012).

Al Nubareya canal became the main water source for horizontal expansion projects in the West Delta Region during the Fifties. Initially a 61 km canal was constructed in 1952 to serve 77,700 ha along its right bank (African Development Bank 2016). The canal length and command areas were successively increased to about 118 km to serve 0.42 million ha by 1993, including an additional 62,160 ha which receive supplementary irrigation during the winter. However, water conveyance has decreased over time from 266 m3/s to 221 m3/s due to progressive material accumulation along the canal bed (African Development Bank 2009b). Hence the canal has been repeatedly widened to cope with the increasing demand for water of the newly added command areas. These new command areas added over time are part of the state's horizontal expansion strategy and frontier making in Old-New lands, and a good example of the 'manufacture of abundance'.

Since the 1980s, the growing agricultural investments and commercial private farmlands in Al Nubareya mainly depended on underground water for irrigation. According to a World Bank report (2012), due to the scarcity of irrigation water, these lands depend to a large extent on more efficient and more expensive irrigation systems such as drip or sprinkler. Accordingly, most investors operating medium and large farms were able to adopt water saving systems. Ironically, this rapid development has led to an excessive depletion of the groundwater reserves, with a negative impact on overall water quality (World Bank 2012). Illegal and unlicensed underground water withdrawals have been a main characteristic of Al Nubareya. But even if the wells were licensed, there is no water metering and it is impossible to define the quantity of water withdrawn by each farm (Interviews #16; #22). Consequently, a main result of these practices has been over withdrawal of groundwater, either legally via unmetered wells, or illegally via unlicensed wells used by both farmers and investors. Both practices have had catastrophic implications on the quality of groundwater, especially salinity levels (Interview #10).

In terms of surface water from Al Nubareya Canal and its branch Al Nasr Canal, recent studies indicate that "the main tributaries of Al Nasr Canal are not well cemented by concrete of good quality, thus the water losses in open channel distribution system must exceed the designer allowance of 10%" (Mohamed 2016, p.8). Other environmental challenges relevant to surface water are solid waste in branch canals as well as urban and industrial wastewater significantly deteriorating water quality. Accordingly, a key environmental challenge in this area is water seepage estimated at an average loss of 550 million m3/year according to the African Development Bank's environmental impact assessment in 2014 (African Development Bank 2016). The seepage of excess drainage water led to the rising of water level and groundwater aquifer (Mohamed 2016). As such, underground water quality and soil salinity have been a major source of concern for many farmers and private investors in Al Nubareya. This is mainly due to the negative impacts on their lands' soil quality, water productivity, and the reduced crops' financial return.

6.3.2. Al Dahra Farmland in Al Nubareya

Al Dahra's farmland in Al Nubareya west of the Nile delta is relatively much smaller than Al Salheya, roughly representing 10% of the total land size, with an estimated 320 feddans. Worth noting that Al Nubareya farmland is Al Dahra's first agricultural investment in Egypt. The farmland supplies Grade A fruit products (citrus, grapes, mango) primarily targeting export markets, whereby the rejects are supplied to the local market.

According to (Interview #21), as an agricultural specialist, and based on his previous 20 years of experience in one of the top large-scale export farms in Egypt, "fruit trees need to be continuously served and maintained, they can last up to 20-30 years, depending on the characteristics of each. It all depends on modern management and high-level service for the land, in addition to the availability and quality of water resources to ensure high levels of productivity”. For a successful agricultural operation, there are two key factors that need to be taken into consideration; the first is to select the modern irrigation technique, and the second is the management of the irrigation system (Interview #21). In this respect, “Al Dahra stays up to date with all irrigation and agricultural technologies to remain ahead of other competitors”. For the irrigation manager, it is not enough to have the latest technology without knowing how to use it, making a comparison with someone has the latest model car and cannot drive. From a corporate perspective, according to (Interview #21), water security for Al Dahra entails a detailed planning process which is entirely based on the experience of local staff, “due to the knowledge of the local context, including soil analysis, water analysis, determining the right crops to be cultivated based on these factors and other ones too”.

Figure 6.7. Gate of Al Dahra Farmland in Al Nubareya (photo by author)

Source: photo by author field Work Al Dahra Farmland in Al Nubareya (March 2016)

In Al-Nubareya, the irrigation of Al Dahra farmland depends on a mix of water resources from the Nile via Branch 4 (terriary canal), fed from al Nasr Canal (secondary canal), fed from Al Nubareya Canal (primary canal), as well as underground water from the Nile aquifer west of Delta. Originally, since the start of the company’s operations in 2008, the irrigation of the farmland mainly depended on underground water. Surface Nile water irrigation was only introduced in 2014, and only started to have a stable flow in 2015 according to the farm manager. Unlike Al Salheya, in Al Nubareya, the entire agricultural area suffers from low groundwater quality, which was the principal source of irrigation water west of delta. Similar to Al Salheya farmland, Al Dahra uses modern irrigation techniques and state-of-the-art technology in its fruit farm. Water is delivered to the variety of fruit trees using a double drip irrigation system, relying on Danish pumping technology using "Grundfos" pumps. Al Dahra deploys a control panel system whereby production inputs including water, and fertilizers are automatically controlled (Interview #21).

Figure 6.8: Branch Irrigation Canal (4) feeding Al Dahra Farm in Al Nubareya

Source: photo by author field Work Al Dahra Farmland in Al Nubareya (March 2016)

The introduction of surface Nile water was perceived as an alternative to the underground water quality challenges associated with Al Nubareya and Western Delta agricultural area. With this additional access to surface water, the company was hoping that the Nile's water quality would overcome the inherent issues of land and water salinity associated with the use of underground water wells. According to Al Dahra's farm manager in Nubareya, "each feddan irrigated by Nile water is equivalent to 5 feddan irrigated using underground water in terms of ease of irrigation, and crop productivity", for him, "a feddan irrigated by the Nile water lives more, costs less, and yields more productivity". In terms of water quality, a main distinction between Nile and underground is that the Nile's water is of higher quality due to the Nitrate and Nitrogen components, which are less present in underground water. Additional challenges related to underground water quality include salinity and residues from pesticides especially in the shallow aquifer east and west of Nile Delta (Interview #4).

Ironically however, by depending on the Nile water, a new challenge has emerged during the company's operations, that is; "the inconsistency of the Nile's water supply from the government canals and 'Monawba' (rotation) system … which implies a situation of water scarcity that also harms our land and our crops as much as low quality saline water does" as expressed by company staff. This time, it is the Nile's water quantity that is a burden to Al Dahra's operations, and not its quality.

The Dilemma between 'low quality saline underground water', and the 'scarce good quality Nile water' is a serious issue for Al Dahra's operations. It is important to recognize that the additional Nile water, which started to flow in 2014, helped the farm in depending less on the low quality and highly saline underground water wells. At present in 2016, "our operations equally depend on both sources, half of the land is irrigated by underground water, and the other half by Nile water". "We are only able to do so given our water storage strategy to keep the 'Monawba' water from the Nile in the on farm canals. Without this strategy, and given the lack of reliability and consistency of Al Monawba irrigation system would be forced to depend 75% on the underground water, and 25% on Nile water, hence making our job harder in treating the higher water salinity levels". "In comparison to other water users and farms, we achieve 50% water savings due to our up-to-date irrigation systems. However, as my farm gets older and my trees get bigger, the farm tends to use more water. For this reason it is important that we can maximize the use of our limited existing water given the growing needs of our farm on the one hand, and the scarcity of the Nile water, and salinity of underground water on the other".

Yet, despite the high irrigation efficiency of water resources based on the mix of use from surface and underground water, Al-Dahra is exploring options to adapt to periods of water shortages. One of these options was to expand the on-farm irrigation canals so they can serve as a reservoir for larger amount of stored water on farm. In Al Dahra's farm in Nubareya, the company has developed its own adaptation strategy to be able to cope with periods of water scarcity due to the lack of reliability and consistency of the Monawba system. As proudly explained by the farm manager (Interview #21), Al Dahra has developed its own on farm water storage system using "Canals as Reservoirs". As shown in figure 6.9, the company started by expanding the canal's storage capacity from both sides, so that during periods where water reaches the farm they can store more water; "the purpose of these canal reservoirs is to store excess water to serve as a reserve to make up for the periods where the Nile water does not reach our farm due to the weak and ineffective *Monawba* system". As explained by the manager, "the canals were already there when we leased the land and were ignored, we had to clean them, and we expanded their sides so that they can store an even larger amount of water when it reaches our land". Indeed, Al Dahra receives water on average once a week (instead of every 3 days), which in turn results in withdrawing as much water as possible to irrigate the land, and to store excessive water for the remaining six days, until the next *monawba* arrives. And since Al Dahra is located at the head of Branch 4, it is possible to imagine the impact of this over withdrawal to the remaining water users at the tail of Branch 4. A clear example for the reproduction of scarcity in an inherently water stressed region!

Figure 6.9: Expanding irrigation canal as on farm reservoirs during water shortage periods

Source: photo by author field Work Al Dahra Farmland in Al Nubareya (March 2016)

This situation is quite interesting as it reflects the correlation between surface and underground water. It also holds a contradiction as typically underground water resources were usually used where surface water is not available. Yet, in this case the situation is reversed. By over exhausting the underground aquifer west of Nile delta (Interviews #2; #9), water users now are competing for additional surface water to irrigate their crops, whether for their livelihoods or for profit!

6.4. Nexus Tensions in Old-New Lands (Salheya and Nubareya)

6.4.1. WEF Tensions for water users and investors in Old-New Lands

As indicated by Ghazouani et al. (2014) differences in water availability, inequity in water distribution for different water users, and the impacts of inadequate irrigation on yields and farmers' income have been well documented in Egypt and in many other arid and semiarid regions (see (El-Shinnawi et al. 1980; Skold et al. 1984; El-Agha et al. 2011) . In the past, lifting water was mainly carried out by animal-driven water wheels (sakias), connected to the canal or mesqa by an intake pipe of specified diameter that were licensed by the 'Irrigation Districts'. The farmers' capacity to abstract water from the delivery system was thus restricted by both the number and location of the lifting points and the discharge. In particular, the need to share the use of the sakia with several other farmers in the same sakia "ring" and the limited discharge, combined with the restrictions of the rotation system, meant that farmers were considerably constrained in terms of when and for how long they could irrigate (Oosterbaan 1999). This traditional mode of irrigation changed significantly over the last 25 years as privately owned mobile diesel-driven pumps have progressively replaced sakias. At a particular lifting point, different farmers may take turns to irrigate using different pumps. Farmers with fragmented holdings may use a single pump that is moved between their different plots (Satoh & Aboulroos2017). However, a significant number of farmers do not own pumps, and rent them from others.

Despite the use of modern pumps, water users and farmers face several – challenges whether they rely on ground or surface water to irrigate their lands. For those depending on Nile surface water, they expect to irrigate every 4 days, however water does not reach their farms "due to the inconsistent rotational schedule (*monawba*)" (Farmers Interviews Al Salheya and Al Nubareya). For those depending on underground water, their pumps are too small and can only extract water at 350 meter of depth (Interview #3). As such, as soon as the water levels drop below this level, it is very hard to access water (Interviews#1; #36; #46). But even when water is available for pumping, and where electricity is absent, diesel becomes the crucial factor for accessing water. Diesel has two problematic, its availability, and its price (Interviews #62; #63; #65; #67).

Perhaps one of the most interesting observations I came across during my fieldwork is when I asked farmers in Al Nubareya whether it is better to depend on underground water or surface Nile water. The answer was interesting, denoting that *"in the wells, water exists throughout the entire year, it is just a question of pumping it. As for the irrigation canals, quite often water does not reach the different mesqas and merwas, especially during the summer season"* (Interviews #67; #68). When this situation occurs, farmers can resort to any alternative to save their lands and their crops, even if this means using drainage or sewage water. As such, in both Al Salheya and Al Nubareya, despite the existence of a sophisticated network of irrigation canals and distribution system, the lack of consistent water supply and the exhaustion of physical irrigation infrastructure adds to the problem of water delivery and negatively affects agricultural land productivity (Interview # 2).

In terms of water use (in)-efficiency, flood irrigation for 1 feddan consumes an average of 8000 cubic meter of water per year. On the other hand, with the use of modern (precision) irrigation techniques in the desert lands, one feddan is supposed to use an average of 4000-5000 cubic meter of water per year (Interviews #2; #4). The major problem occurs when flood irrigation is used in desert lands given the nature of the soil, which does not allow water retention due to high permeability. The problem is even compounded if flood irrigation depends on non-renewable underground water resources. These practices also contribute to the loss of fertilizers and soil nutrients; for this reason precision irrigation is preferred and used in desert lands (Interview #16).

Furthermore, according to a recent study addressing issues of water scarcity in Egypt and the challenges associated with 'Spatial and Temporal Water Allocation in the Nile Delta', a key conclusion indicated that "matching irrigation supply with crop demand is currently impossible because there is no real ability to properly measure and regulate water volumes at the distributary canal level (Wolters et al. 2016). Moreover, releases from the High Aswan Dam are made according to crop water irrigation requirements from an estimated cropping pattern, while the actual cropping pattern is free. As crop-demand-based precision irrigation supply is not easily attainable in Egypt, providing water security in the form of guaranteed or agreed water supply may be a possible water allocation principle (Ibid).

Adding to this are cumulative impacts related to drainage and consequently their negative implications on surface and ground water. In this respect, despite two decades of expansion and canal widening, water users and smallholders increasingly complained from negative impacts such as water-logging and salinization especially along areas adjacent to the widened stretches of the Nubareya and Ismailia canals (African Development Bank 2009b). As the Nile River no longer carries and deposits substantial quantities of sediment after the construction of the High Aswan Dam, progressive widening of the canal removes layers of less permeable silt without subsequent replacement, thus resulting in increased seepage (Ibid). Other problems range from deteriorating irrigation infrastructure such as irrigation off takes, regulators, canal obstacles such as bridges, etc. (Ibid).

On the other hand, international investors as a 'water' user also face different land-water-food and water-energy-food nexus challenges. According to Al Dahra's interviewed staff and management, issues of uncertainty related to the company's operations go beyond technical issues of conveying water from one location to the other across the farm, as well as the continuous operational and maintenance costs and procedures. In addition to these daily operations, and despite the massive deployed investments in technological and financial capital, critical issues "outside of the company's control" remain a challenge to daily operations including; 1- secondary irrigation canals gates not opening; 2- following an inconsistent schedule, and 3- increased occurrence of electricity cuts with no reliable current. For Al Dahra, the inconsistency in the irrigation schedule and the fact that gates in the secondary canals do not open imply a serious disruption for the company's operations. "Every missed day of irrigation is a loss for the company, as they have a negative impact on the company's production. Given an operation with the size of Al Dahra, "it is very hard to make up the lost times of irrigation" (Interview #20).

Despite the fact that Al Dahra's investments were mainly driven by the availability of land and water resources in Egypt, the company's executives in Cairo identify the lack of consistent supply of water resources as a main obstacle facing the investments not only in Al Salheya but also in Al Nubareya farm. This situation clearly implies "financial" losses and an obstruction to the massive agricultural "industrial" operation. Accordingly, "the main operational risk is the consistency of water availability, reaching 60% level of lack of water flow" (Interview #19). In other words, the existing available water resources only cover 40% of the company's water resources needs. Hence, despite the large-scale capital and technological intensive investments in land and water resources by Al Dahra, access to water is still an issue.

Furthermore, from the company's operational perspective, the issue of access to electricity and the WEF challenges are viewed differently than smallholders. For instance, in Al Salheya farmland, there are 2 power stations on site; the first station supplies the eight irrigation pumps and the other station supplies the center pivot irrigation system. Almost every night the electricity cuts for one to two hours, which has a negative impact on the center pivot's 380 Volt power supply. The company loses 2 hours of irrigation from each power cut in the center pivot system. On a daily basis, Al Dahra irrigates its farm in Al Salheya on an average for 20 hours. Losing two hours daily implies that in 5 days the company will lose a total of 10 hours of irrigation, which is a significant period of losing irrigation water for the crops. For the farm manager, "every lost time is a waste that we cannot catch up – with this existing rate we lose in 1 week 1 pivot's 100% cycle". When electricity cuts it affects the pivot system, which stands still, however the water pumps still work which can result in over irrigation and over fertilizing certain spots of the land which can be detrimental to the crops, resulting in burning roots and killing the plant. As a result, one laborer has to stay up at night in order to make sure he can stop the pump when electricity cuts the pivot cycle. A clear example of the tensions associated with the water-energy-food nexus.

In addition to the use of advanced technology in their farms, Al Dahra's engineers continuously stress the fact that in order for a system to function properly and to ensure continuous water savings the most effective way to minimize this cost is for the government to undertake regular maintenance and ensure the smart use of available water resources, by; (i) Fixing and treating leaks from pipes; (ii) ensuring pumps are maintained regularly, (iii) maintain a consistent irrigation schedule.

Given all these challenges, the role of the government according to the investors' views should include the following; (i) support small farmers education & awareness (risks, scarcity & losses), (ii) address the hydro political challenges from the demand side by raising awareness about water use efficiency (iii) Regulate groundwater use and ensure government control over available water resources while coordinating land and water use. A suggestion offered by one of the investors was for the government to dig larger wells and then distribute the water amongst the different users (Interview #17). By ensuring that the government controls water resources in desert areas, this can overcome the chaos and lack of control of water use in the wells in desert lands. Everything is controlled by government (i.e. natural gas, oil, etc..), so why not water? For them, water distribution by the state in the new lands is a way to avoid digging random wells and also to avoid water use inefficiencies and its impact on the reduced underground water tables (Ibid). For farmers, the role of the state should be able to support their livelihoods. For investors, the role of the state is to protect water due to its economic value, to ensure maximum economic return and profit. These issues reflect what water security means for each actor. These water challenges also reflect the absent and weak role of the government on the ground, whereby weak regulations and the policy disconnect represent a main factor of uncertainty for both the farmers and the investors.

To address these scarcity and security narratives, proportional division of flow may have the best chances as the basis for water allocation in periods of drought. Instead of dividing water over the area, the water shortage is then divided over the land. There is a lack of awareness about the need to develop the capacity to deal with droughts in the future. The issue of (future) water scarcity has consequences and implications that can no longer be adequately addressed by any one of the Ministries alone (Meeting Notes #2; #4). Many other government departments and agencies must be involved and decisions will have to be made at the highest political level, requiring the integration of policies. There is a need for a "Water Scarcity Action Plan" as well as effective science–business–policy interfaces at the national level (Meeting Notes #4). It is important that all involved realize that food is grown by the private sector (including large farming organizations and small farmers) and this important stakeholder has a prime position in the Egyptian irrigation system (and its new extensions) (Wolters et al. 2016, pp.10–11).

6.4.2. Beyond Water: Smallholders Challenges in Old-New Lands

Issues of water quality and water quantity are not the only challenges facing water users in Old-New Lands. According to (Interview #3), farmers need to have their land register, which is often not the case, as many of them have rented their lands from others, or had it split amongst brothers or other members of the families. For the land, official tenure is required to be able to register 'land ownership' and consequently receive government subsidies, or to be able to sell wheat crops for instance to the government. According to interviewed farmers in Al Salheya and Al Nubareya, there are three main elements necessary for them to sustain their agricultural livelihoods; land, water, and fertilizers. These are basics without which their day-to-day livelihoods cannot go on, and their seasonal income cannot be secured. But within each of these elements lies a hidden ghost. Indeed, land and water resources are key elements for small farmers to sustain their agricultural livelihoods, however they are not the only ones. Fertilizers were also often mentioned as an important one to complement this nexus. Needless to say, one of the main negative environmental impacts of Egypt's High Dam in Aswan was the blockage of siltation behind the Dam and its accumulation in Lake Nasser. As such, agriculture activities in Egypt needed to replace and substitute this loss of natural fertilizer. According to them, the state-subsidized fertilizers are often resold in the black market at high prices, leaving them with no choice but to buy. As a result of this black market practice, they end up paying at least five times more than what they would normally pay if they would get the fertilizers directly from the source (i.e. 50 kg of fertilizers are sold to the state at 5 USD equivalent to 44.5 L.E., but farmers end up buying it at a price of 225 L.E. approx. 25 USD).

According to smallholders (Interviews #64; #67-69), this is mainly due to corruption of the "agricultural cooperatives" employees. The problem is further exasperated by the fact that local production of fertilisers is much lower than the existing demand, a prime instigator for the rise of the black market, often resulting in a gap between supply and demand, and above all "affordability". For the farmers, this is a manifestation that corruption is not only present at the high levels of the state, but everywhere. "Several of these small farmers and graduates struggled in developing their lands due to financial and technical challenges… they ended up renting these lands to farmers from the Nile valley and delta who are more experienced with agriculture and farming" (Interviews # 13; #1). A key challenge for small farmers and young graduates is the long-term nature of the investments and the need for strong financial capabilities. "Everything inside the farm is the responsibility of the developer, everything outside the farm is the responsibility of the state" (Interview #2). For example, the cost of land reclamation per feddan averages 25,000 L.E., whereby production only starts on year 5, and breakeven is achieved by year 10 (Interviews #13; #9). With these challenges facing the majority of water users in Old-New lands, "it is very hard to develop sustainable communities in the desert" (Interview #1); a manifestation of the inherent political and physical water scarcity in Old-New Lands.

According to smallholders, inherent challenges in the Old-New Lands are not only confined to land and water. Additional challenges related to the absence of government services include a weak infrastructure, especially in terms of accessing electricity, shortage of schools, and absence of medical services and health centers (we7da se7eya) near their lands. For many small farmers and young graduates, “Medical services are lacking in our villages, whereas the medical unit is just an empty building with a big sign” (Interviews # 55; 57; 62; 64) which prevents them and their families from accessing basic health care services. Other farmers decided that they do not live in the area given this lack of basic services, and for them commuting from and to other locations near Alexandria (i.e. Ibrahimia) is better for them, than just living in such isolated and service lacking areas. A common problem in this respect is “the confusion we face in dealing with several government agencies to access basic public services; for example, drinking water belongs to one governorate, while access to electricity belongs to another one, whereas the Ministry of Agriculture Directorate, and the Ministry of Education is divided amongst several administrative areas” (Farmers interviews Al Salheya and Al Nubareya). Accordingly, “it is very hard to approach one single administrative entity, which imposes huge bureaucratic burdens on our daily lives”.

Furthermore, following the 25 January 2011 uprising, many farmers lost their crop, as they could not get access to input or even to their fields to water their crops. They then couldn’t pay back the loans (Dixon 2013). These concerns voiced by the farmers have been also confirmed by domestic NGOs and grassroots organizations interacting with local communities in reclamation areas. Although the profile of smallholders in the Old-New Lands and New-New Lands is distinct from the graduates and beneficiaries, the limitations all of them encounter in the production process are quite similar to those faced by small farmers in the Old Lands (Zalla et al. 2000). Graduates, farmers, smallholders and young investors face obstacles such as lack of extension support, limited information on technology, lack of access to both local and external markets, and weak financing required to overcome these obstacles (Interview # 1; meeting notes #5). According to (Interviews # 2, & 3), the role of the state should not only be confined to these issues, but the government should also support farmers in accessing the required inputs for sustainable agricultural development especially in relation to the distribution of fertilisers (al kimawy) similar to system of agricultural cooperatives in the old lands whereby a certain quota of agricultural production inputs are provided at a subsidized price. For others, marketing their agricultural produce should be also the responsibility of the state.

According to (interview # 28a) key policy issues associated with smallholders are agricultural policies that favor large-scale companies and put the small farmers out of production. For example, small farmers producing sesame cannot compete with large-scale investors producing the same crop, as they will put them out of market due to their economies of scale and production advantages. Accordingly, the government needs to adopt policies that do not harm the local farmers and their livelihoods. In other words, these investments should not just benefit the larger companies on the expense of small farmers, rather adopt pro-poor developmental strategies taking into consideration interests of different actors and players. Pro-poor approaches "do not mean we are not promoting free market, rather trying to enforce community based development, and without hurting the rural communities" (Interview # 28a).

According to (Interview # 22), the only solution for water and agricultural productivity and environmental challenges is to address the question of the unity of the land." For instance, interviews # 1, 2, and 3 and meeting notes # 2 confirm that a major structural challenge in the agriculture sector is farmers' income, which is the result of the high level of fragmentation of agricultural land. As a result agriculture production is not based on viable economics, rather it serves self-sufficiency purposes on the family level, which implies negative opportunity cost. Interview # 22 further confirmed that a main challenge facing smallholders is the problem of land fragmentation given that "Egypt has now reached the fourth generation of land owners after the agricultural reform of the 1950s whereby it is impossible to reach the economies of scale. In this respect, developing cooperatives such is the case in different countries is a possible solution to this challenge in order to ensure that agricultural production and crop value are of higher economic returm, thus yielding positive social and economic return to many farmers typically under the poverty line. Cooperatives can also encourage the different agricultural cycles (dawra zera3eya).

Climate Surprises

Another risk facing corporate investments is climate variations. Unexpected climate events and temperature shocks negatively impact the quality of the farm's produce, resulting in a decrease in crop yield. These include issues such as unexpected rain, which actually took place during April and May 2015, or alternatively periods of excess heat and drought during the summer months. "Nowadays 'adaptation' to unexpected weather conditions, vis-à-vis on farm water resources management is a key function for any farm manager". According to (Interview #22), "during periods of drought, we provide the cultivated land with an extra dose of water to minimize the negative effects of a heat wave. If we do not intervene to manage the crops' water need in response to these weather conditions, we risk losing our crops, and our profit".

6.4.3. The absent Role of the State: Risks & Uncertainty for Farmers and Investors

Despite the existence of state-capital alliances, "unanticipated" land-water-energy challenges are ample for investors, often translating into higher cost of production and financial loss. Challenges and tensions associated with infrastructure maintenance, irrigation schedules, and access to electricity in remote desert schemes, etc. facing both, water users and investors reflect the absent role of the state on the ground. In particular, issues of operation and maintenance (O&M) of the irrigation network infrastructure in Al Salheya and Al Nubareya add further pressure on water access to all actors. In the case of Old-New lands, this *absent role could be viewed as a result of the manufacture of abundance. It can be also interpreted as a result from addressing* more attention to new mega projects, at the expense of maintaining the O&M costs of existing schemes in Old-New Lands, and avoiding addressing the inherent challenges in Old Lands.

The MWRI local officials represented in the irrigation directorate (*modireyet al ray),* "provides no support to the farmers to overcome such problems. Instead, farmers are usually the ones to blame" (Interviews #1; #2; #3; #36). Government authorities typically play the blame game, either by pointing at the limited budget to fix exhausted government infrastructure, or to the farmers' unsustainable practices due to over irrigation of their agricultural land. Irrigation engineers suffer and do not sleep based on the numerous problematic faced by water users (Interview #10). This situation is further complicated in the absence of compliance with operational rules and regulations for the operation and management of individual pumping, in addition to the illegal rice cultivations. For corporate actors, this is a pure waste of resources for a common good that is often perceived as scarce, and in fact its conveyance through irrigation channels often delayed to the farmers and investors. Overall, from Al Dahra's perspective the absence of agricultural advisory/extension services for small farmers '*Irshad Zera3y*' (farmer guidance) is a main reason for the challenges facing the farmers. The absence of "Irrigation Guidance" and the weak role of the government are challenging factors, whereby the private sector cannot fill this gap. In this respect, there is a need to make a distinction between 2 eras; the post 1952 agricultural reform movement led by Nasser era and the contemporary agricultural system. During the 1960s Nasser era, the state was very strict with farmers and imposed fines on those who went against the centrally imposed agricultural cropping system, whereby crops were removed from the land. Previously "the irrigation guidance department had more power than the general attorney. Currently it is not the case since the state seized hiring any new ones. As such the last appointed generation of morshedeen zera3eyeen have all retired, leaving no one at present. This results in very weak law enforcement of agricultural/water related laws and regulations" (Interview # 4). Another major challenge is that in the past, the state mainly controlled all agricultural transactions, inputs and outputs. Today, the private sector has a bigger role in providing inputs and marketing outputs, thus leading to a significant change in the agricultural system in Egypt. As a result, today the water related problems are related to the head and tail ends of the canals. Those at the head of the canal have installed high capacity water pumps and withdraw large amount of water resources -while leaving the agricultural drainage open-leading to shortage downstream at the tail. It is important to realize that agricultural practices tend to encourage over irrigation (Interview # 4).

Consequently, the present water situation forces private investors to conduct risk assessment for their activities. The objective of these risk analysis exercises is to determine the impact of current and forecasted demand on water quantity and quality in all of their operations, not only in agriculture but also in agro-industry processing across the different farms, and facilities. Another important factor for private investors is risks and impacts of pesticides use from other farms. Which in turn forces these risk assessment to include analysis on water salinity, iron content, pesticides residues in water from other farms, amongst other factors (Interview #17). Most of these issues represent different hidden social and environmental risks of the land-water nexus, hence representing tensions between farmers' livelihoods and investors' profitable operations. Most of these hydropolitical interactions on the local level were unaccounted for at the time of formulating the state-capital alliance, and reflect the absent role of the state. Securing water comes at a high risk, and cost! Furthermore, "there is a need to avoid exhausting the soil which leads into desertification due to the large scale agriculture by private sector leading to a vicious cycle of exhausting land resources without paying attention to the sustainability of the natural resources" (Interview # 28a).

The government's approach to adapt the situation of water budget deficit resulting in water scarcity reflects the manufacture of abundance for both the farmers and the large investors depends on large-scale infrastructure interventions. As stated earlier, the state in collaboration with the African Development Bank (AfDB) and the African Water Facility (AWF) have commissioned a study for the improvement of both Al Nubareya and Al Ismailiya Canals. Through this approach, physical and management improvements are expected to result in positive impacts on distribution, quantity, quality, and timeliness of water delivery to beneficiaries of these canal systems. By implementing these improvements, the state aims to achieve efficient and sustainable use of land-water resources. However, once more, the state focuses on technical solutions, thus ignoring the limitations of this technocratic approach typically overlooking the larger questions of equity, which represent the very essence of sustainable livelihoods for the largest water users.

6.4.4. Adaptation to Scarcity: Grabs or Security?

Actors respond differently to the absence of water flow. For instance, farmers use several methods to adapt to water scarcity including changing cropping patterns, crafting collective irrigation rules, reusing agricultural drainage water, practicing deficit and night irrigation, and over-irrigating whenever water is available (Ghazouani et al. 2014; field notes). While these issues are widely documented and reflect a variety of challenges and adaptation practices associated with smallholders depending on surface water from the Nile, the engagement of large-scale investors adds stress to this challenging situation. Interesting to observe here that Al Dahra would not resort to this same adaptation solutions, instead it would think about more high tech and capital oriented solutions to grab the already politically and physically water scarce resource.

In the case of Al Dahra, alternative strategies for water security involved installing additional pumps on irrigation canals, and the use of their technological, financial, and political capital to ensure a constant supply of water flow for their ongoing massive industrial agricultural operation. As a way of compensating for the shortage in surface water flow, the company is attempting to re-equip 14 existing wells in Al Salheya farmland to use them as reservoirs. The concept is based on reinstating the low quality saline underground water by re-injecting Nile water from the canals, mixing it with saline wells in their lands to improve its quality, and use it to compensate for periods of water shortage. In addition, the company is planning to build a reservoir in order to store water to supply farm when water is not available. The reservoir is planned over 1 hectare and can supply water for 2 days. Building reservoirs on the farm is function of the opportunity cost of the agricultural land, meaning that if the company builds larger reservoirs, it tends to lose production space, thus presenting an interesting trade-off between water storage and profit generated from agricultural productivity. Other ideas to adapt to periods of water shortage in Al Salheya farm were to attempt to pump water from one canal and hold it behind small dams to make it feed other canals when water does not reach the farm. In Al Nubareya farmland, the company depends on a mix of underground water and surface water. Yet, and as discussed in section 6.3, the company widened its irrigation canals on site to use them also as reservoirs in periods of water shortage.

6.5. Conclusion: The Reproduction of Water Scarcity

In Egypt, land and water are equally important inputs for the state to achieve its hydraulic mission. They are also essential elements for the livelihoods of small farmers, and a source of financial profit for agricultural entrepreneurs, and large-scale investors. Unlike Mega projects in remote desert schemes, Al Salheya and Al Nubareya (east and west of Nile delta) have the comparative the advantage of location and access to export ports. However Old-New lands downstream the Nile River involve a large number of water users. They also entail an *inherent* situation of water stress with resources nexus tensions, reflecting intrinsic physical and political water scarcity.

The chapter discussed how corporate actors using financial and political capital, as well as advanced technology are engaged in “water grabs” to abstract water for the ‘sustainability of their profit’ in an already hydrological stressed context. Nexus risks and uncertainties associated with transnational investments in Old-New lands influence the investors as well as different water users, particularly smallholders. The use of water resources by smallholders and investors is often unregulated and reflects the existence of a parallel economy. Evidence also shows the interplay between the source of water (surface or underground) on the one hand, and water quality and quantity on the other. Each actor however adapts to different nexus tensions differently. Driven by profit, livelihoods, or Mega projects different actors (e.g. investors, smallholders, state) adopt their own approaches towards *securing* water. These adaptation strategies reflect greater competition over a politically and physically scarce resource, and often lead to the reproduction of scarcity.

Based on Al Dahra case study across two different sites east and west of Nile Delta, a primary research finding is that *scarcity affects everyone, but water security is only affordable to corporate actors*. In this respect, local water politics occurring between smallholders and investors reflect inherent nexus tensions, as well as the absent role of the state. Competition over the land-water nexus for food production result in water grabs in an already stressed hydropolitical context, thus adding additional elements of social, environmental and economic risks on the local level. By investing in already water stressed regions, investors have contributed to the reproduction of water scarcity, whereby water grabs by corporate actors shed light on larger questions of equity, social justice, and asymmetrical power.

This reproduction of scarcity raises the question of which is more important, a company to achieve higher profits, or a small farmer to secure his livelihood under constraining poverty challenges. A paradoxical perspective reflecting what "securing" water translates into in reality. For one actor it is less profit, while for another it is a loss of livelihood and a downward spiral of rural poverty. As for the state, while these investments may be endowed with capital and technology, they may not be necessarily addressing its ecological-demographic narrative of crisis, or its hydraulic mission.

While chapters 5 and 6 have examined the water politics of Al Dahra's investments within Egypt on local and national levels, the following chapter examines how non-state actors' investments in other Nile basin countries such as Sudan may also influence hydro politics on the transboundary level.

Chapter 7

Egyptian Water Security and Transnational Land-Water Investments in the Nile Basin: The Case of Sudan

Introduction

It is hard to discuss Egyptian water security without addressing Nile hydropolitics, in particular as it relates to transnational investments in upstream riparian states such as Sudan. In chapters 4, 5, and 6 the role of non-state actors and transnational state-capital alliances was examined as an emerging element of Egyptian water security on the local and national levels within Egypt. This chapter further explores the role of non-state actors and transnational state-capital alliances in upstream countries as an emerging element of Egyptian water security at the transboundary level, with a particular focus on Sudan.

Sudan has been long recognized as the southern strategic depth for Egypt with borders extending across 1273 Km (Abdel Wahab 2011). Accordingly, the security and stability of Sudan represent part of Egyptian national security (Interview #8). The Nile basin is another major unifying factor between Egypt and Sudan. This is especially true given the changing hydropolitical landscape over the last decade, notably as it relates to Sudan's *shifting* position vis-à-vis the Grand Ethiopian Renaissance Dam (GERD) (Nicol & Cascão 2016; Cascão & Nicol 2016). Hence, the importance of Egyptian policy towards Sudan is clear to maintain its stability on one hand, and promote economic integration between both sides on the other (Solieman et al. 2013; Interviews #8; #11).

Fundamentally, it is important to understand that Egypt and Sudan are both downstream riparian countries in the Nile basin, but also share a prominent status in the League of Arab States (LAS). The *Gulf-Nile connection* is therefore founded on the discourse of 'joint Arab economic integration in trade and food security' along with water scarce Gulf (GCC) countries. Sudan is also seeking to revive its vision to be the 'breadbasket of the Arab World' as highlighted by Sadek Al Mahdy in his keynote speech at the Gulf-Nile Conference in Cairo during May 2015 (Meeting notes #8; translated from Arabic speech). A vision that was emphasized during President Bashir's speech at the opening ceremony of Egypt's Economic Development Conference in Sharm El Sheikh on March 13th 2015, where he invited Arab financing to invest in Sudan's available land and water resources stating that "Sudan has the land and water, Egypt has the human resources and expertise, while gulf countries can provide financing" (AlBashir 2015). According to a recent unpublished study by a Dutch consulting firm, Sudan is by far the most prominent target destination for agro-investments by both Egyptian and GCC actors in sub-Saharan Africa (Interview# 35). Probable reasons include the geographic proximity, cultural similarity, the well-established business and investment relations, and the huge agricultural potential of the country (Hillhorst 2015b).

Given this background, the primary purpose of this chapter is to unpack transnational state-capital alliances and the 'land-water-food' nexus in Sudan from three different perspectives; (i) Egyptian 'state' actors; (ii) Egyptian non-state actors, and (iii) international (GCC) state and 'non-state' actors. Given the larger context of Egyptian-Sudanese hydropolitics, the chapter argues that transnational investments and land-water nexus in Sudan and other Nile basin countries represent a venue that brings different risks, opportunities, and uncertainties to Egyptian water security in light of the river basin's changing hydropolitical landscape. The analysis also examines the Gulf-Nile connection and highlights how the nexus is framed as a political-economic commodity in light of the wider regional politics and water scarcity narrative, in the Arab Region (GCC and MENA). In this respect, hydropolitics at the basin level are not only limited to state actors or state-centric debates, but are also influenced by non-state actors (from within and outside the basin) seeking LSLA and access to water rights or water grabs.

Transnational investments in Sudan by the Egyptian State can be situated within the larger discourse of modernization and frontier making (see chapter 3), and an element of the hydraulic mission of the entrepreneurial state (see chapter 4). The 'land-water-food' nexus in this respect is an opportunity to establish bilateral agreements and state-to-state investments especially in the agriculture sector, as an element of Egyptian water/food security. This -unachieved- opportunity can be viewed as an additional element to the existing virtual water trade movement between both countries. This is especially true given Egypt's large food imports (40% of its total food needs), and the potential Sudan can bring to close this food gap (Interview #4). However, evidence indicates that cooperation and collaboration to develop the land-water-food nexus in Sudan by the Egyptian state has been so far an unachieved potential as suggested by different historical and contemporary (hydro)-political bottlenecks.

Transnational investments by non-state actors in Sudan gained momentum over the last decade due to the food and fuel crisis of 2007/08 and 2010/11. For the purpose of this chapter, these are broadly defined in two distinct categories; the first is the category of Egyptian non-state actors investments in Sudan and South Sudan with a particular focus on the example of Citadel Capital in both countries. The second is the category of land-water investments in Sudan by international non-state actors, especially from GCC, demonstrating that the Gulf-Nile Connection is not only present in Egypt, but also extends to Sudan as well as other Nile basin countries such as Ethiopia. In this respect, the importance of the land-water-food nexus is emphasized through regional cooperation and integration, as well as the development of Sudan's untapped resources. Accordingly, Egypt and other Arab countries often frame the investments in Sudan in a way that manifests its potential as the breadbasket of the Arab world, whereby regional politics are becoming more relevant to transnational investments given the growing water and food security narratives. Therefore it is evident to link water resources to regional politics (Interview #52), shaped by food sovereignty concerns and a joint Arab Food Security strategy (Meeting Notes #7).

The question however remains, whether these investments and nexus linkages represent a form of regional integration within the larger framework of Egyptian-Sudanese relations and Arab food security, or do they manifest a new form of water grabs on the transboundary level of the Nile basin, or both? These questions will be addressed in this chapter to shed light on the implications of transnational state-capital alliances taking place on the transboundary level in Sudan and other Nile basin countries, notably from an Egyptian water security perspective.

The chapter is divided into four sections. The first section discusses the importance and potential of the land-water nexus in Sudan's post oil era, and the role of transnational investments to contribute to the 'breadbasket of the Arab world' vision. The second section highlights key milestones in Egyptian-Sudanese hydropolitics notably as it relates to joint investments and attempts for bilateral economic integration. This section explores Egyptian state land-water investments in Sudan, and highlights the unachieved potential of the resources nexus through incomplete agricultural investments and cooperation schemes over the last half a century. The third section identifies Egyptian and international non-state actors' investments in Sudan. The first part presents insights from an Egyptian private equity fund investing in both North and South Sudan. The second part discusses the growing engagement of international non-state actors in Sudan notably from GCC countries. Section four concludes the chapter by highlighting the opportunities, risks and uncertainties associated with transnational investments in Sudan vis-à-vis Nile hydropolitics and Egyptian water security on the transboundary level.

7.1. Transnational Investments and Land-Water Resources Potential in Sudan

A significant part of the Nile basin's ecosystem and its watershed's natural resources within Egypt, Sudan, and South Sudan were under the control of the Ottoman Empire and its succeeding Khedives and Kings since Mohamed Ali's invasion of Sudan in 1821. With the increased British influence in Egypt and Sudan in 1882 and 1897 respectively, coupled with colonial strategic interests in both countries -especially cotton cultivations and trade- (Waterbury 1979), the Nile river flow was governed by the 1929 agreement[24,25].

---

[24] Other treaties took place prior to the 1929 agreement such as the 1902 treaty between Ethiopia and Britain on behalf of Egypt marking the "principle of non-interference with the flow of Blue Nile" confirmed by the tripartite

Sudan eventually gained its independence in 1956 and signed the 1959 Nile Treaty[26] between Colonel Abboud and Nasser, whereby Egypt and Sudan were granted full rights for the utilization of the Nile waters with annual shares of 55.5 and 18.5 billion cubic meters respectively.

From an Egyptian water security perspective, Sudan is an interesting case study for several reasons. First, the Sudan is metaphorically and physically in the middle of the hydro-political complex relations in the Eastern (Blue) Nile river basin. Second, Sudan gains significant importance amongst the other Nile basin countries due to its size and the area of the river basin within its geographical territory. *All parts of Sudan*[27] including both Sudan and South Sudan represent a total area of 2,551,341 Km², whereby *Sudan*'s landmass is 1,911,341 Km² compared to 640,000 Km² in *South Sudan*[28] (Nile Basin Initiative, 2012). In terms of water resources, it is important to note that 2,062,558 Km² equivalent to 80.84 percent of both countries (*all parts of Sudan)* are within the Nile basin, whereby more than 64 percent of the basin's total area (3,176, 543 Km²) lies within both countries (Nile Basin Initiative 2012). Agriculture production is the cornerstone of the economy with a wealth of fertile land representing 47.4% of the total area in 2012 (World Bank 2015), and employs around 60-80% of the work force and contributed nearly 34.5% of the GDP in 2013 (ADB 2015).

The Sudan is also hydro-politically bound to the 10 other Nile basin countries and is also politically committed and plays an active role in the Nile Basin Initiative (NBI) -with a recent project of hydropower for joint electricity generation with Ethiopia and Egypt. In addition, as one of the very few Arab economies where horizontal agricultural expansion is possible due to availability of land and water resources, Sudan is typically labeled as "the

---

agreement of 1906 amongst the colonial powers Britain, France and Italy leading to an exchange of notes in 1925 whereby Italy recognized the "prior hydraulic rights" of Egypt and Sudan and agreed not to construct any works likely to modify the flow of the Ethiopian tributaries of the Nile (Shapland 1997a, p.70).

[25] Sudan was planning to build two dams which led to the development of the 1929 treaty; Sennar Dam completed in July 1925 primarily for cotton irrigation, and Jabal Awliya Dam which was being planned prior to the 1929 agreement, however was completed in 1936 for hydropower and irrigation (Awulachew, et al. 2012)

[26] The Roseires Dam in 1950 triggered Egypt's protests, leading to the 1959 agreement with Sudan.

[27] For nomenclature, *all parts of Sudan* refers to Sudan prior to the split of the country, *Sudan* refers to the northern part of Sudan, and *South Sudan* is the newly independent country.

[28] Sudan lost almost a third of its land size from 2.5 million square km to 1.86 million square km

breadbasket of the Arab World"; a vision that witnessed unsuccessful past experiences in agricultural development and contemporary attempts of revival. In this sense, Sudan can be viewed as wearing two hats; a key country in Africa's Nile river basin, and a cornerstone of the Arab food security strategy emphasized through its participation and role in the League of Arab States (LAS).

Historically, unleashing Sudan's full agricultural potential has been a challenge. Sudan has roughly 650,000 km2 of land with high agricultural potential, but 75 per cent of it is farmed at only 10 to 50 per cent of its capacity, and one quarter of the land that has high suitability is farmed at only 10 per cent of its capacity (Ranganathan et al. 2011). Most agricultural activity has been concentrated in three areas: Khartoum, the central provinces, and the northern region, attracting 86 per cent of FDI partly due to available infrastructure, while other regions east and west of the country have been neglected (Geopoliticalmonitor 2013). According to the FAO, the country's agricultural policy was changed in 1997 in an effort to attain greater food self-sufficiency by reducing the area of cotton production due to irrigation water shortage, replaced instead by wheat and sorghum, which require less water (Mahgoub 2014 p.13).

Yet, successive governments were not able to mobilize financial resources to make use of the country's comparative advantages, consequently leading to a clear contradiction as Sudan relies on imports for its food security. This is often attributed to a few factors; (a) mismanagement of the agricultural economy only enabling the use of a small fraction of its agricultural land, (b) lack of financing as government spending as investments in agriculture and other sectors of the economy were limited and neglected once oil started flowing in 1999 (Siddig 2012), and (c) Lack of expertise in farming especially in terms of skills and use of modern agricultural technology. As such, historically, the Sudan "breadbasket vision" was not achieved.

Despite the past disappointments in Sudan's "breadbasket" vision initially perceived by Numeiry in the 70s (Verhoeven 2015b), the dream of Sudan's agricultural revival is still luring. Sudan has lost a large share of its oil revenue -nearly close to 50% of its budget revenue and 75% of its international payments due to South Sudan's secession in 2011 (ADB 2012). As a key country in the Nile Basin, Sudan is seeking to revive this vision to make up for its lost oil revenue. Despite the availability of land areas solely dependent on the abundance of rain for agriculture, the government aims to attract local and foreign capital, through new infrastructure investments to facilitate easy access to irrigation from the Nile. Prioritizing agriculture for self-sufficiency, the state embarked on an ambitious plan to improve a massive infrastructure and dam development program for hydropower and irrigation using Chinese expertise and credit, as well as Arab financing. Khartoum has staked its political future in the post-oil era on the most far reaching (hydro) infrastructure program in Sudanese history, with Kuwaiti, Emirati and Qatari funding for its dams totaling almost US$10 billion (Verhoeven 2011, pp.695–699; Verhoeven 2013, p.12). Dams are being built throughout the country diverting a large share of water resources towards new irrigation projects. According to the geopolitical monitor, early in 2013 Gulf nations contracted a Chinese firm to expand the Roseires Dam, substantially increasing Sudan's ability to irrigate farmland. This is perhaps similar to earlier investments during the 2000s when the Abu Dhabi Fund for Development (ADFD) lent Sudan a total of US$225 million to support the Merowe and Roseires dam projects (EIU 2015).

Sudan is also seeking to promote an ambitious agricultural investment plan as announced by the Ministry of Investment in 2013 supplying large-scale agricultural lands and water resources. As such, the agriculture sector is receiving more attention to attract the petro-dollars from water-scarce GCC countries (Woertz 2011), as well as other investors such as China, Brasil, and Egypt through large-scale land-water investments, and trade opportunities. In this sense, Sudan is positioning itself as a primary agricultural investment destination due to its abundant land and water resources, often viewed as a cornerstone for a joint Arab Food Security Strategy (Hanna 2016). Furthermore, with the construction of the GERD initiated in April 2011, Sudan is aiming to benefit from both hydropower as well as the regulated flow of the Nile to expand its agricultural schemes downstream (Interview #14; #35; #37; #44). The dam located some 40 km from the border between Sudan and Ethiopia is largest hydro-electric plant in Africa with a height of 145 m, storage capacity of 74 billion cubic meters, and a power generation capacity of 6,000 MW depending on 16 turbines (Salman 2016). According to my interviews with both Sudanese as Ethiopian senior policy makers and technical experts, the GERD aims to benefit all Blue Nile countries, and is not going to harm Egypt's water security interests (Interviews # 14; #15; #72). A view that is widely contested in Egypt, whereby the dam's capacity and filling period represent major concerns for the Egyptian state and society at large (Interviews #5; #7; #8; #11). Others view the construction and operation of the GERD as an opportunity to demonstrate wider political economic benefits from the Nile basin resources including pooling of power resources, co-development of hydropower, and co-management of the basin's resources including land for irrigation (Cascão & Nicol 2016).

Sudan's shifting position about the GERD reflects its potential benefits for its economy. The dam's planned commission date is 2018, whereby a power interconnector between Ethiopia and Sudan has been completed recently. Furthermore, given the Blue Nile's highly seasonal flow, most irrigation schemes in Sudan cultivate only one crop per year (the exceptions are the White Nile pumping schemes and a number of smaller schemes on the Main Nile). In this respect, the GERD will regulate the Nile flow and will facilitate crop intensification and multiple cropping seasons per year, while providing cheap electricity for the pump schemes (Hillhorst 2015b). Hence, it could alter the economic viability – and thus the dynamics – for agro-investments in Sudan (Ibid; Interview #72).

These recent developments reflect the changing hydropolitical landscape in the Nile basin. They could possibly lead to a greater engagement of both state and non-state actors from within and outside the basin to benefit from Sudan's land-water-food nexus through transnational investments. However, while these developments may entail economic benefits notably in the energy and agriculture sectors, they may also have potential impacts on Sudan's utilization of its Nile water share (Nicol & Cascão 2016). While the GERD is perceived as a venue to unlock future economic cooperation and trade (Ibid), it could be also anticipated that large-scale irrigation schemes in Sudan depending on the Nile water may affect the flow downstream, especially if this use exceeds its water quota under the Nile treaty (Interviews #46; #70). Hence these developments may represent both an opportunity and a risk from an Egyptian water security perspective as discussed in the following sections.

7.2. Transnational Investments in Sudan by the Egyptian State: The Land-Water-Food Nexus as an Unachieved Opportunity

Egyptian-Sudanese bilateral relations have been shaped by a Nile Solidarity/Unity discourse, with unachieved plans for joint investments and economic integration since Nasser's era. In 1969, following a bloodless coup d'état in Khartoum, Jaafar Numeiri came to power, and the three socialist republics in the region -Egypt, Sudan, and Libya- signed the `Tripoli Charter' for greater political, military, and economic co-operation (Warburg 1985). Following Nasser's death in 1970, president Sadat intervened militarily to rescue Numeiri's regime in July 1971 and again in July 1976 with both leaders signing 'charters of integration' in 1970, 1974, and 1982, which kept the concept of a united Nile valley on the agenda (Ibid). Anwar Sadat saw the Sudan as an important ally for Egypt, which appeared to be dangerously encircled by pro-Soviet regimes in Libya, Chad, Somalia, and Ethiopia (Ibid).

In return for helping Numeiri to remain in power, Egypt obtained a number of concessions from the Sudan, notably permission to construct the Jonglei Canal in 1976. The first phase of the project was designed to divert part of the flow from the Bor to the mouth of the Sobat, another tributary of the White Nile, in order to decrease the loss of water that occurs, especially from evaporation, when the river passes through the Sudd swamps in southern Sudan (Collins 1990). The proposed second phase, which included dams at Lakes Victoria and Albert, and drainage schemes for the Machar Marshes and Bahr el-Ghazal, as well as the longer Jonglei Canal, could be described as Egypt's master water plan, to supplement the annual flow by 4.7 billion cubic meters of water, of which Lake Nasser's share was to reach 3.8 billion (Ibid).

Eventually, all these plans have not materialized due to political instability and successive periods of conflict amongst different ethnic groups in the North and South of Sudan.

Subsequently, bilateral relations witnessed several attempts to strengthen Egyptian-Sudanese relations. For example, the 'Economic Integration Charter' was signed in November 1982. It established three institutions to handle a mechanism of economic, social, political and military integration between both countries including; (i) 'The Supreme Council for Integration'; (ii) The parliament of the Nile Valley; (iii) The Egypt-Sudan Integration Fund (ESIF). ESIF's mandate was to support financially viable projects whether fully or partially owned by the private sector, with the objectives of stimulating, broadening, and deepening entrepreneurial activities in the private sectors between both countries. A "project approach" was adopted for joint economic activities, instead of the more popular method of tariff reductions followed by coordination economic and trade policies (Hodges 1979). In this respect, the Sudanese Egyptian Agricultural Integration Company (SEAIC) established more than 40 years ago represents the unachieved potential of land-water-food nexus between both countries. SEAIC is the outcome of the integration agreement stipulating the establishment of an agricultural company in Ed-Damazin in the Blue Nile state. Worth noting however the total agricultural land owned by the SEAIC diminished from 250,000 to 92,000 feddan due to the armed conflict in the Blue Nile where the Sudanese army has been fighting the rebel Sudan People's Liberation Movement/North (SPLM-N) since 2011 (Sudan Tribune 2015). However, in August 2015, a new deal was announced to cultivate 92,000 feddan using modern irrigation, and expanding livestock and fish production, by clearing 70,000 feddan of acacia trees in the region (Mada Masr 2015). Efforts to advance this investment were still ongoing up to April 2017 when Agriculture minister Abdel Moneim el-Banna arrived in Khartoum to participate in the SEAIC general assembly, and also to discuss the operational plan of the project.

Other integration attempts included the "Four Freedoms Agreement" signed on September 4th 2004 between both governments. The agreement allows citizens of Egypt and Sudan to move freely across the borders, with rights to reside, work and own property in either country without a permit. An agreement that in appearance reflects the cooperation and integration discourse, however in reality has not been fully realized due to unclear reasons (Interview #12). On the one hand, Sudan has been contesting Egypt's non-abidance by the agreement especially in relation to freedom of movement of goods and citizens (Tawfik 2016). On the other hand, according to the ambassador of Egypt in Khartoum, officials in both countries have been discussing approaches to overcome obstacles facing trade and movement of citizens through the Qastal-Ashkeet border crossing. Negotiations also included a number of barriers hampering the flow of commercial exchanges between both countries, including the certificates of origins and transport. Other issues included exempting Egyptian exporting companies from the Value Added Tax (VAT), in addition to air transport challenges, particularly regarding entry of the Egyptian aviation into the Sudanese air space, and the activation of the freedom of ownership for Egyptians in Sudan (Farmlandgrab 2011c).

In terms of food security and virtual water trade, according to the Egyptian Ambassador in Khartoum, by 2011, Egypt was the third largest investor in Sudan with an investment portfolio of 5.4 billion dollars, whereas bilateral trade stood at 622 million U.S. dollars (Egypt Independent 2015). By 2015, despite US sanctions, Egyptian investments in Sudan reached $11 billion, ranking fourth among foreign investors (Egypt Independent 2015). In this respect, Egypt imports cattle annually from Sudan with a value of US$200 million, with future targets to double this amount (Ibid). The Entrepreneurial state (see Chapter 4) is also developing transportation infrastructure to enhance trade relations not only with Sudan, but the African continent at large. For example, the Argeen transportation project aims to link Alexandria to Cape Town, to increase trade and investment in Africa, due to the absence of water obstacles along the road (Interview #31).

In addition to trade in agriculture, transnational investments in Sudan by the Egyptian state witnessed several modalities throughout the last decade. Grain database indicates that a government-to-government deal was signed in 2010 giving the Government of Egypt access to 400,000 ha of land within the Al Gezira project in Sudan for it to offer to private companies. The deal stipulated that “companies striking agreements with Egypt for portions of the land would also have to sign deals with the Government of Sudan, similar to an earlier arrangement between Jordan and Sudan” (Grain 2012)! following the January 25th Revolution in 2011, Egyptian Prime Minister Essam Sharaf visited Sudan and signed a total of nine agreements to boost bilateral ties. During the visit, the prime minister and Sudanese vice president Ali Osman Mohamed Taha announced an agreement by the joint ministerial committee “to develop food security through different agricultural projects in Sudan”. In this respect, “Sudan and Egypt would focus on establishing companies in vital fields, particularly ‘wheat, oil, sugar and meat’ to achieve self- sufficiency of strategic crops” (Farmlandgrab 2011a). In this respect, joint ‘strategic projects’ confirmed by Sudanese officials included a land deal of 41,000 feddan signed in March 2011 for the White Nile state cattle project targeting food security needs of both countries by investing in all stages of production of processed meats and dairy products (Grain 2012). In December 2014, the government of Sudan announced the allocation of 100,000 acres (40,000 ha) divided into small slots of 10 acres (4 ha) each to small-scale Egyptian farmers as announced by the Sudanese Minister of Investment in Khartoum confirming that “Sudan gives maximum priority to Egyptian investors in the country” (Farmlandgrab 2014d). But similar to other plans, little progress was achieved on ground whereby the status of these projects remains obscure despite their strategic importance.

From a hydropolitical standpoint, the ‘Egypt-Sudan Nile Water Joint Technical Committee’ is “an instrumental mechanism to ensure transboundary water cooperation” (Hodges 1979; Interview # 6). The committee was established as part of the 1959 Nile agreement, and comprises four members from each country. As per the agreement, the functions of the PJTC were to (Hodges 1979, p.79):

> (a) develop projects to increase the yield of the Nile, (b) supervise the execution of such projects as they are approved by the two

> governments, (c) draw up working arrangements for schemes to be constructed either in the Sudan or in other upstream countries, (d) supervise the operation of the mutually constructed works and the related agreements and (e) advise the two governments, when and if required, an arrangement for an equitable reduction in water use in the event that a series of low flow years in the Nile basin reduces the flow below the average.

On November 9th 2017, the committee concluded its meeting in Cairo by key recommendations including; develop and upgrade the measurements stations along the Nile river, provide updated equipment to measurement units, and develop joint technical studies about the water situation in Egypt and Sudan (Al Watan 2017). While the PJTC is a legal and historical vehicle for cooperation between both countries, its role is unclear when it comes to the recent developments in the basin, either as it relates to GERD or even transnational investments.

Furthermore, amidst all these historical cooperation attempts, bilateral relations also witnessed different periods of tensions. In 1995 the assassination attempt of President Mubarak led to a freeze in the relations between Egypt and Sudan amidst accusations of Sudan's involvement. Relations were eventually resumed in 2002. Furthermore, the controversial border issue of the Halayeb triangle has been a contentious one creating tensions to present, whereby Sudan complained to the UN Security Council against Egypt for holding elections in the disputed triangle (Tawfik 2016).

Overall, Egyptian-Sudanese bilateral relations witnessed different periods of co-existence of conflict and cooperation (Mirumachi & Allan 2007) over political, economic issues, as well as Nile basin hydropolitics. The vision of promoting agricultural projects and cultivation of water intensive crops (including sugar, rice, and wheat) through transnational investments outside of Egypt has been potentially a key element of Egyptian water security in order to preserve water resources on the Egyptian side (Interviews #4; #12; #26). However, according to a senior Sudanese official "in comparison to the announced intentions, economic integration plans between Egypt and Sudan on the ground are negligible and not proportionate to the bilateral cooperation discourse" (Interview #14). As such, beyond virtual water trade, transnational investments in Sudan by the Egyptian state represent a missed opportunity and manifest the unachieved potential of the land-water-food nexus between both countries. Yet, another key unanswered question is whether state land-water investments in other riparian countries would be considered as ‘joint Nile cooperation efforts to develop agriculture’, or would they represent a disguised form of water grabs? A potential question for future research! Furthermore, Sudan’s latest stance and shifting role as it relates to the tripartite negotiations around the GERD mark an interesting development in Egyptian-Sudanese hydropolitics. It also raises a key question concerning Sudan’s strategy to fulfill its own development interests vis-à-vis its commitment towards the existing obligations under the 1959 agreement (Nicol & Cascão 2016).

The following sections discuss non-state actors’ investments in Sudan by both Egyptian and international investors, as an emerging trend that entails different risks from an Egyptian water security perspective, notably in light of the changing hydropolitical landscape in the Nile basin.

7.3. Transnational Investments by Egyptian and International Non-State Actors in Sudan

The Landmatrix database identified 37 large-scale agricultural projects in Sudan, including investments by GCC countries such as Saudi Arabia, Kuwait, the UAE and Qatar, in addition to Egypt, Jordan, Lebanon, Turkey, Brazil, Iran and India, and Sudan itself. Land size varies greatly between one deal and another ranging from 10,000 to 100,000ha with a few exceptions exceeding these. For example in Sennar and Northern State – (Harqa and Nour el Dine) land uses can extend over 99 years lease (Interview #26). Not all documented deals have been finalized as indicated in the database by their ‘status of negotiation’; some deals are concluded with the contracts signed, others are just intended with an expression of interest, and some deals failed during the negotiation stage. But even with all the confirmed signed deals, the level of implementation on the ground is significantly low indicating a significant gap, thus ‘underlying the very problem it had set out to resolve: the unreliability of media reports’ (Woertz 2013a).

In another database developed by a consultant working on large-scale agricultural investments in Sudan, the intended size of GCC land investments is 295,359ha, out of which only 16,200ha were in production in 2014 (Hillhorst, 2015). Other databases documenting LSLAs include GRAIN, an international non-profit organization supporting small farmers and social movements, also enlisting 19 land deals in Sudan involving different countries (GRAIN, 2012). Overall, in light of the delayed materialization of agricultural investments, quantifying the actual use of 'water and land resources' and their environmental implications remains a challenge given the obscurity of the deals and the lack of quantitative data regarding the actual agricultural production, water withdrawals and their associated aspects (type of crops, water source, productivity, technology, employment effects, and exports of agricultural outputs). Nonetheless, the following section presents a few examples of large-scale agricultural projects portraying the diversity of investment modalities from the demand side.

7.3.1. Egyptian non-state actors in Sudan

There are two main types of Egyptian non-state actors and private sector investors in Sudan; small and medium agricultural companies, and institutional investors (e.g. private equity funds). For the private sector, the underlying business logic towards the land-water-food nexus and agricultural investments in Sudan is profit (Interview #23; #28b). Exceptionally, some investing companies have the vision of reducing dependence on water intensive crops in Egypt, and therefore find Sudan a convenient environment for their investments, yet this is not always the case (Interview #26). Other investments however can engage in agricultural operations abroad for example to produce sugar in Sudan – for local consumption by Sudanese – which is more profitable than export (Interview #26). Another modality can be to allocate part of the production for local use and the remaining to be exported to Egypt (Interview #26). As such, non-state investments by Egyptian investors in Sudan can end up taking different modalities whereby the end user of the agricultural products can be local or export markets.

Private sector investors are increasingly getting engaged in investments in meat and livestock sector from Ethiopia and Sudan. (Interview #26) explains that in Sudan most land use for agricultural investments is around the Blue Nile, unlike in Ethiopia where agriculture is not necessarily dependent on Nile water, but on resources from other basins. Sudan has 33 million heads of livestock, while Egypt only has 3 million (Interview #26; #31). In this respect, "investment and cooperation with Sudan in the area of livestock and meat is crucial for the Egyptian market and the national food security agenda at large". Investors aim to target the market gap in Egypt to achieve food security and compensate for water intensive process of livestock investments in response to high level of meat consumption in Egyptian market (Interview #26; #31). Egyptian investors in Sudan grow alfaalfa and invest in fridges (cold rooms), as well as border investments in logistics. Other investments include the creation of value chain for fisheries in canals and waterways linking the investor's land to the Nile (Interview #26). Other investors view Egypt as a gateway for Ethiopian meat, given that exporting to Europe is much shorter through Egypt, as the road from Addis to Alexandria, is around 48 hours over land via Sudan which is half the time compared to Djibouti ports. This is primarily due to the fact that much of Africa's trade takes place through land instead of sea using the Sudanese side borders as it makes transportation costs cheaper. It also implies time saving for Ethiopia and opening new markets as well as the creation of a regional hub for trade. As a result, Ethiopian and Sudanese meat is cheaper in the Egyptian market compared to meat imported from other destinations (Interview #26).

Aside from state-led initiatives, and small/medium private sector engagement in Sudan's agricultural investments, evidence suggests that financial investors from Egypt began investing in LSLA and agricultural projects abroad since 2008. An example of financial investors is *Beltone and Mahaseel Fund*. In March 2009, Beltone Private Equity[29] and Kenana Sugar Company of Sudan formed a joint venture, and announced an agreement to launch a $1-billion agricultural investment fund; 'Mahaseel Agricultural Investment Fund' to

[29] Beltone private equity, a subsidiary of Beltone Partners, had over 2.1 billion Egyptian pounds in assets under management at the end of February 2010, mostly in real estate and retail.

address food security in the Arab region, with direct exposure to the agriculture and agribusiness sectors through green-field projects and private equity opportunities in Sudan and Egypt. According to Hazem Barakat, Chief Executive Officer of Beltone Private Equity, “Beltone would provide investment management, corporate finance and strategy capabilities for the fund, which will focus on investments in agriculture; the production and processing of crops and livestock in Sudan, as well as opportunities in food processing and agriculture related businesses in Egypt” (Farmlandgrab 2011a). Very little public information is available about either the status of Mahaseel Fund or the status of the partnership.

Citadel Capital (now Qalaa Holding) is another leading private equity firm in the Middle East and North Africa focusing on building regional platform investments in selected industries through acquisitions, turnarounds, and Greenfield executed via Opportunity Specific Funds (Qalaa Holdings 2017). In 2007, Citadel Capital launched the Wafra Fund as a platform to invest in the Sudanese agriculture sector via a portfolio of companies. Wafra engages in large-scale cultivation of cash crops including sugar, sorghum, maize, sunflower, rice and various grain legumes for sale in the local market. Wafra’s investments for agricultural production in both Sudan and South Sudan include the rights to more than 500,000 feddan of land. Investments fall under portfolio companies Sabina (324,000 feddan in Sudan) and Concord Agriculture[30] (250,000 feddan in South Sudan) according to the company’s website.

Another subsidiary of the private equity firm is Al Nahda project for rice production in Ed Dueim (150km south of Khartoum), Sudan’s first large-scale commercial rice farm planned on 25,210ha (60,000 feddans), and rice will be processed on a site-based mill. The project’s objective is to grow rice primarily for domestic consumption in Sudan, a net importer of rice, with the excess production to be exported to Africa and the Middle East. Land is flooded for up to eight months per year by water held back by the Jebel Al-Awliaa Dam,

[30] Concord Irrigated Crops in Unity, previously known as the Sudanese Egyptian Agricultural Crops Company (SEAC) (250,000 feddans/105,000ha in Southern Sudan)

where earthworks for the farm include the construction of a major levee bank to exclude the water regulated back onto the property (Farmlandgrab, 2010). Worth noting that in November 2011, the US government Overseas Private Investment Corporation provided Citadel with a US$150 million loan package to help expand its subsidiaries, US$115 million of which was earmarked for crop production in South Sudan (EJATLAS 2014).

According to an interview with an executive of the Egyptian private equity firm which considers itself as “a pioneer in the field of agricultural investments in Africa and the Middle East”... “future investments in the sector can be described as the ‘cattle herd mentality’. Investors will follow each other in masses, whereas entities which started investments in agriculture will be considered as leaders and will attract other ‘herds’ to follow resulting in massive investment flows” (Interview #23). In this respect, “investment money usually flows when a sector increasingly attracts more investments”. This clearly implies increased competition over land and water resources by investors and non-state actors; a possible manifestation of water security mercantilism.

However, from an investor’s view, “achieving successful investments in Sudan is doable but needs high level of experience in agricultural investments”. From the investors’ perspective, “private companies and financial investors such as private equity funds are interested to acquire land in Sudan because rent is cheap” (Interview #24). The process of land acquisition in North Sudan entails an annual amount for renting the land, in addition to an initial premium amount paid at the time of signing the contract. According to (Interview #24), “land contracts include ‘rights to use the water’, but these are not specified quantitatively”. The highest cost for investors is the irrigation cost since lands in Sudan were cultivated using traditional agricultural methods since the 1950s. Accordingly, given that the infrastructure and irrigation canals are exhausted, the highest cost of investment for private companies then becomes the Irrigation Canals.

In addition, private sector investors in Sudan face a myriad challenges. Investments imply labor requirements; need to issue compensations for the land acquisition based on partnerships with the state; and face red tape especially as it relates to export clearance (Interview #26). Furthermore, the investment process in Sudan entails addressing both federal requirements at the level of the central government, as well as state requirements since each state has different laws when it comes to land deals. These challenges often result in the weak materialization of investments on the ground. The following section explores in further detail some of these challenges for Egyptian non-state actors by portraying some aspects of private equity (Citadel Capital) investments in both Sudan and South Sudan.

Citadel Capital in Sudan

Sabina is Citadel Capital's Platform Company for investments in Sudan's agriculture sector. Sabina holds Citadel Capital's investment near Kosti, 3.5 hours South of Khartoum, where it has obtained a 99-year leasehold on an area of 254,770 feddan. The highly productive land with strong development potential has 38 kilometers of White Nile frontage, with full irrigation rights. In 2012, Sabina farm completed the rehabilitation of more than 200 km of irrigation canals that will supply water to its own land as well as 13,000 feddan for local farmers. It has also completed demarcation of its 324,000 feddan of farmland that has established clearly defined lines on both topographical maps and on the ground to insure that all stakeholders are aligned (Qalaa Holdings 2017). Crops are intended for sale in Sudan, with the excess exported to Egypt or the international market. According to the company's executives, Citadel Capital in Sudan has access to 2 million mega litres of water, which eliminates its execution risk in terms of access to water resources (Interview #23). However other challenges such as access to electricity, weak infrastructure and logistics represent operational challenges on the ground (Interview #24). The land deal also included land of local farmers, resulting in an increased cost for the investor. Work only took place over 10,000 feddan during the start-up phase, but no progress was achieved since "Wafra struggled because there is a level of minimum competency that was not available throughout the projects start-up phase. In Sudan and South

Sudan, Citadel Capital hired Australian experts - some were incompetent, others were very competent - overall they all end up leaving" (Interview #24). The choice of Australian expats is based on the fact of their expertise because they had a major problem related to water resources and as such Australia developed advanced competencies in agricultural technology and machinery. Nevertheless, it is important to note "even the most successful experts only have experience in managing 40,000-50,000 feddan, which can be considered small scale compared to 200,000 hectares" (Interview #24). By saying so, he implied that the size of land acquisitions itself is a challenges to manage, even by the most experienced expertise.

In this respect, challenges in developing large-scale agricultural projects in Sudan include several factors. First, while the cost of investment for land acquisition and rentals may seem low compared to other countries, the actual cost is very high due to corruption and financial cost associated with the amounts that need to be paid for an operation to take off (Interview # 23). This is especially relevant to local governance at the provincial level given the power and authority of the State governor(s) (*7akem Al wilayah*) and the State's Ministry of Agriculture (*wazeer zera3et Al welaya*). Another factor is the issue of the available expertise on the ground to manage these investments. In this respect, it is important to have capable representatives and qualified managers on the ground, whereby "it is almost impossible to run a size of such an operation remotely". Third, in terms of human resources technical capacity, it is mandatory to master two key areas; the basics of agricultural including management, staff, knowledge of technology, and knowledge of the market for agricultural products (Interviews #23; #26).

As such, not all large-scale Egyptian investments by non-state actors succeed. Overall, some small or medium scale Egyptian investments may perform better than other large-scale Egyptian or Gulf investors due to the question of Egyptian expertise in agriculture, as well as the absence of the language barrier. In this respect, institutional and large-scale private sector investors from different Gulf countries face increasing challenges in the development of their investments in Sudan "because none of them were present on the ground and running their business on a daily basis. They relied on hiring expats and foreigners to manage their projects - these eventually failed due to lack of knowledge of local context, as well as challenges related to dealing with Sudanese labor involved in the agriculture sector" (Interview #24).

But aside from all these challenges, the key issue for private investors in Sudan's agricultural sector the fact that "there is a very high 'execution risk' in implementing large-scale agriculture operations on the ground" (Interview # 24). This means that in terms of project operation, "there is a need for capital and cash flow to keep the operation going". For private investors, "the execution timeline goes backwards, whereby all production inputs such as pesticides, fertilizers and other inputs need to be available". Specifically, in the case of Sudan, importing these inputs has been difficult due to embargo, which consequently resulted in delaying the timeframe for implementation, thus imposing a key execution risk to these operations. These issues remain a key question and an unresolved challenge in the context of Sudan. Furthermore, in light of the embargo imposed on Sudan, any agricultural company that wants to import machinery has to do it via Saudi Arabia, which results in additional costs associated with time delays, as well as higher financial costs for investors. Some investors have resorted to Chinese machinery given its relatively cheaper cost, nevertheless some of this equipment has broken down.

Once more, little public information or official data from the fund is available about the operations in Sudan. However, the company is carrying on its mandate in Sudan to grow staple crops for domestic consumption first, and then sell value-added products regionally and to minimize the need for expensive imports" (Qalaa Holdings 2017). Interesting to note, that in addition to its agricultural operations in Sudan, Al Qalaa acquired one of Egypt's dairy farmlands "Dina Farms" in 2007 with a total size of 9,500 feddan mainly depending on ground water resources "using the world's top irrigation system" according to the company; another manifestation of the diversity of LSLA by non-state actors in both Egypt and Sudan.

Citadel Capital in South Sudan

Large-scale investments by Egyptian non-state actors are also present in South Sudan, however with more dependence on rain fed agriculture. According to (Interview #25) “Initially, Citadel Capital was not interested in agriculture in South Sudan, rather in transportation. However, through the course of its investments in South Sudan, it came to the realization that the cost of transportation was very high from Juba to Bentiu, whereby importing agricultural products into South Sudan was very expensive”. Accordingly, the prices of agricultural products were very high whereby prices increased the further you move from the sea/ports of imports. For instance, the WFP had to transport maize by helicopter to Juba. Given these factors, Citadel Capital started to think about agricultural investments in South Sudan. The Hypothesis of the investment was; “Let’s cultivate these products in South Sudan in order to avoid the high transportation costs”.

For Citadel Capital the main strategy in South Sudan was based on serving the local markets. There is a demand for certain products in some domestic markets leading private equity firms to see the opportunity to modernize the sector. In the case of agriculture it was mainly about mechanization and IT applications in the sector especially as it relates to rain patterns and laser leveling for the land (Interview #25). Investments were in Bentiu – in the North of South Sudan targeting corn as a staple crop amongst others. The price of corn in Juba was a main driver for Citadel Capital decision to invest in agriculture to serve the local market. At the time of the investment, the global commodity price of 1 ton of corn (staple crop) in the Chicago Board of Trade was 200$/ton (up from 130$/ton) reflects an interesting increase in price over the timespan of 10 years. In South Sudan, corn was usually imported from Ukraine and took a long root to reach Juba, whereby its price changed from one destination to another. As such, by the time it reached the Mumbasa Port in Kenya its price reached 240$/ton, and from there to Kampala in Uganda, the price reached 340$/ton. From Kampala to Juba the price of 1 ton of corn reached 420$, and this was the shortest route for the imported agricultural crops to reach Bentiu in South Sudan with not alternatives. In South Sudan, “corn is a main source of caloric intake and is therefore a necessity crop, and our company saw the opportunity to engage in its cultivation" (Interview #23).

The preparation phase for the land to be ready to be cultivated took place between 2009-2011 (almost 3 years), and then production took place for 2 seasons in 2012 and 2013. By the time Citadel developed the investment, "the price of 1 ton of maize at farm gate was 500-600 $ with no marketing efforts. Traders used to come at farm gate to buy the crops. The idea was simply to produce corn at a low cost and sell it locally as opposed to importing it" (Interview#25).

In terms of the academic debate about land grabs, "from our perspective, there was no land grab issues in South Sudan, perhaps it is more relevant in the North. Contractually, in North Sudan each feddan used by investors was supposed to provide another feddan for farmers in return". Based on interviews with different investors, the land grab discourse portrays that "the western mindset and a very screwed perspective about land-water investments. Most of our deals have not harmed local communities". However, given the many operational challenges they face on the ground, "private equity firms and financial investors are primarily concerned with profits, whereby social and environmental implications may not necessarily be an important priority on the ground" (Interviews #25; #28b)! This is an unfortunate perception given the growing social and environmental risks, which are often as serious as operational risks as stressed by several development finance institutions (DFIs) such as IFC and EBRD amongst others.

In fact, contextual challenges and risks for transnational investments in South Sudan are also ample. Political conflict is a major obstacle facing the development of agricultural investments. Other investment challenges included "human resources and labor training… the workforce in these projects in the south is usually from Zimbabwe and is a major obstacle, especially given the absence of skilled labor, not trained to use advanced machinery. Locals were not used to being employed and receiving a salary at the end of the month. Our basic challenge was to get the labor to come to the site – Citadel told them at the beginning that all they need to do is to come regularly to work – then citadel was planning to train them". As simple as it sounds, "we discovered that we needed to philosophically explain what it meant to have a job. Bentiu is very far away from civilization and we had no choice but hire labor from the nearby villages next to the farm" (Interview #25). Furthermore, investors in South Sudan continuously complain about the lack of infrastructure for their investments since farmlands are typically in remote areas. For Citadel, eventually, production stopped because of the war, and the militias took over the company's camp. Almost a repeat of history similar to what happened in Jonglei canal project!

7.3.2. GCC and International Non-state Actors' Investments in Sudan

Between 2000-2008, international agricultural investments in Sudan were mainly from Gulf countries as shown in table 7.2. The Economist Intelligence Unit (EIU) indicates that Sudan's National Investment Board issued a report in February 2015 claiming that UAE investments in Sudan amount to US$6.7 billion, out of which Emirati investments in agricultural schemes were US$5.7 billion in total, with 19 projects (ten in Khartoum state, and nine in the central states of Gedaref, Nile, Northern and White Nile) funded between 2001 and 2013 (EIU 2015). Saudi Arabian investments are also targeting Sudan. In January 2014, Ibrahim Al-Khidir, governor of the Northern region, announced the entry of four Saudi companies (Al-Safi, Al-Marai, Tabuk Agriculture Co and Al-Jouf Co) in the field of agriculture covering an area of approximately 4000 acres in Sudan's northern region (Arab News 2014). According to the governor, the Northern region attracted a total of 32 investment projects from Gulf countries, covering an approximate area of 14 million acres depending on surface and ground (Nubian aquifer) water resources, as well available infrastructure, including Dongola Airport, a road network, and a power transformer station with Arab financing (Ibid). Other operating Saudi investors include Al-Rajhi's Al Kafa2a project established near Barabar city in the River Nile State of the Northern region (see chapter 5). In the same State, the Qatari Hassad Food project in Abu Hamad is a

US$205 million agricultural investment, supported by a 310km power line, which includes four transformer stations, Berber, Al Ghbash, Abu Hamad and Hassad, inaugurated on 23 June 2013 by Sudan's president and a Qatari delegation (Gulf Times 2013). However this latter project has not been operational due to electricity access challenges (Hillhorst 2015b).

Table 7.2. International investments in Sudan by country of origin 2000-2008 (% of total FDI)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Share of Near East Countries									
Egypt	93.1	86.6	78.0	83.8	67.4	58.6	52.6	83.0	85.2
Sudan[15]	100.0	n/a	n/a	100.0	75.4	55.0	80.8	98.4	98.7
Morocco	n/a	0.7	12.4	1.7	7.4	5.0	8.3	16.8	n/a
Share of Other Countries									
Egypt	6.9	13.4	22.0	16.2	32.6	41.4	47.4	17.0	14.8
Sudan[15]	0	n/a	n/a	0	24.7	45	19.2	1.6	1.3
Morocco	n/a	99.3	87.6	98.3	92.6	95	91.7	83.2	n/a

Source: (Elamin & Tanyeri-Abur 2011)

Financial investors and private equity firms are also involved in land and water investments in Sudan. A good example under this category is GLB Invest SAL, a Lebanese offshore company operating in the trade of agricultural raw materials. Initiated in 2011, GLB Invest acquired 87,200 hectares and is developing a center-pivot irrigated alfalfa farm in North Sudan (Farmlandgrab 2014c; GLB Invest 2014). The first phase has already been completed whereby the project is planned over five phases ending in 2018, with planned production capacity to reach 40,000MT in 2014, to be sold primarily to the UAE and Saudi Arabia. In December 2013, Bemo Securitisation (BSEC) and Bemo Saudi Fransi Finance (BSFF) acted as joint sell-side advisers to GLB Invest SAL and facilitated an acquisition of a minority stake by M1 Harvest in a deal worth US$16.5 million. Badra, the chairman of GLB Invest SAL, had declared in May 2013 during an investment conference in Khartoum that his investments in this project will reach $800 million by 2019 (Business News 2014).

Other modalities of investments also exist. For example, according to the Arab Brazilian Chamber of Commerce, during the Brazil–Africa integration seminar conducted on 29 August 2014 in Ceará–Fortaleza, two projects involving Brazilians and Arabs were presented involving investment by the Algerian company Cevital in Brazil, while the other entailed the Brazilian Agro-Industrial Company in Sudan (Farmlandgrab 2014b). The chairman of the company Paulo Hegg presented ongoing agricultural projects in Sudan, including growing grains and cotton, whereby 'the company's planted area increased from 7,300 hectares in 2011 to 11,000 hectares in 2014 with projected revenues to reach US$22 million' (ANBA 2014).

There are several factors facilitating GCC investments in Sudan. In terms of regional politics, Saudi investments in Sudan are a *quid pro quo, a* reward mechanism for Khartoum's military-Islamist Al-Ingaz (Salvation) regime for its participation in the war in Yemen. In November 2015 both countries signed four agreements that committed the kingdom to fund three big dam projects, as well as the cultivation and irrigation of more than one million acres (Verhoeven 2016). These agreements were further expanded in February 2016 when Ibrahim Al-Assaf the Saudi finance Minister travelled to Sudan and committed US$5 billion in dam project finance to Sudan's Dam Implementation Unit, in addition to concessions for a thermal power plat, as well as rural development initiatives (Ibid). This is a clear example for the intersection between regional Arab politics, and the 'land-water-food' / 'water-energy-food' nexus in the Nile basin. Other factors facilitating GCC investments in Sudan include the regional proximity with eastern Africa representing a logistic advantage because of lower shipping costs whereby savings could reach US$ 30 per ton for export to the UAE, and higher for export from Sudan to Saudi Arabia (Hillhorst 2015b). However, challenges for investment development in Sudan and most sub-Saharan Africa (in contrast with Egypt) include poor infrastructure and logistic constraints, often resulting in high transport costs from farm-gate to seaport in the exporting country which could be overcome by establishing (Hillhorst 2015b). These logistical challenges can be overcome through transport corridors from the Atbara region in Sudan to Saudi Arabia to export of alfalfa (Ibid). These factors combined can further facilitate transnational land-water investments in Sudan and other Nile basin countries, notably under the joint Arab food security strategy. However, they may be perceived as a risk for Egypt's water security and Nile hydropolitics and may represent a growing aspect of competition over land-water resources for food production (Interviews # 70; #6; #29; #44).

7.4. Conclusion

Nile Hydropolitics & Transnational Investments in Sudan: Water Grabs or Economic Integration?

Egyptian-Sudanese hydropolitical relations have witnessed several events of cooperation and tension over the last half a century. Despite different political cycles throughout the postcolonial era, both countries have historically formed an alliance to maintain the hydro-political status quo. However, Sudan's *changing* position in relation to Ethiopia's GERD marks a significant shift in Nile hydropolitics, as it will benefit from the largest hydropower structure in Africa, both in terms of electricity, as well as regulating the Nile flow, thus allowing for more agricultural investments downstream (Nicol & Cascão 2016; Hillhorst 2015b). These events could represent a good example of the "*co-existence of conflict and cooperation"* in trans-boundary hydropolitics (Mirumachi & Allan 2007; Earle et al. 2010), albeit from a state-centric standpoint.

Given the changing hydropolitical landscape in the Nile basin, the chapter argued that transnational investments and land-water nexus in Sudan and other Nile basin countries represent a venue that brings different risks, opportunities, and uncertainties to Egyptian water security. The chapter examined state-capital alliances and land-water-food nexus in Sudan from three different perspectives; (i) Egyptian 'state' actors; (ii) Egyptian non-state actors, and (iii) international (GCC) state and 'non-state' actors. Worth noting, in Sudan investments depend on underground and Nile water supplemented by rainwater in some locations, while in South Sudan, they mostly depend on rainwater.

However, several contemporary attempts are taking place by the Egyptian state to facilitate trade and transportation with Sudan and Africa at large.

Trading in meat and livestock is the most common economic activity by the Egyptian private sector in Sudan, which entails a significant amount of virtual water. Beyond this water-food-trade sub-nexus, evidence indicates that transnational investments by the Egyptian state in Sudan as well as other Nile basin countries, have been long proposed, however little progress has been achieved on the ground (Tawfik 2016). As such, despite the long-standing policy discourse on economic integration and joint food security strategy under the Nile basin or the joint Arab food security strategy, state-to-state agreements to develop the land-water-food nexus have not materialized and represent an unachieved potential from an Egyptian water security standpoint.

In terms of the Egyptian and international non-state actors' investments in the Nile basin, evidence indicates that these have increased in number over the last decade, however the reflect a significant implementation gap. Transnational state-capital alliances in Sudan by non-state actors' especially from GCC countries reflect the Gulf-Nile connection, driven by both strategic objectives, as well as profit. In this respect, it is important to separate between private equity firms, sovereign wealth funds, and international private sector companies supported by their home government. Furthermore, transnational investments in North and South Sudan by Egyptian non-state actors may not necessarily contribute to Egyptian water security despite their potential. Egyptian non-state actors' land-water investments in Sudan and other Nile basin countries mostly serve the domestic markets. Financial investors and private sector may sell their produce locally (as in the case of Citadel Capital in South Sudan), or may export it to Arab region, or alternatively to other destinations. A key finding in this respect is that Egyptian investments by private sector in Sudan are usually profit and market oriented, whereby agriculture produce does not necessarily reach Egypt, hence does not contribute to its food security. In fact, "Egyptian and international investments in Sudan can be harmful to Egyptian water security and indeed to the Nile basin at large notably where high water consuming crops are cultivated and exported outside of the Nile basin" (Interview #6). This implies that the nexus may potentially represent a risk negatively affecting Egypt's water security vis-à-vis the Nile basin's already contested upstream water resources.

The (positive or negative) *implications of transnational investments in Sudan on Egyptian water security and Nile basin hydropolitics are not yet defined. However, according to (Interview #70), "Sudan is already using its Nile water share and therefore any new large-scale irrigation investments depending on the Nile automatically imply additional water requirements". This has been also confirmed by senior water resources officials in Egypt stressing the* importance of understanding the implications of transnational investments (Egyptian and Arab) on Nile hydropolitics. What are the precautions and preconditions necessary to avoid negative impact of water quality and quantity issues especially in light of growing Arab water security concerns and the role of League of Arab states in Africa?" (Interviews #6; #8). These concerns are primarily due to the fact that non-state actors' investments are financially driven by profit and market dynamics, and can represent a form of water grabs on the transboundary level, whereby the destination of final agricultural produce and the water embedded within may not necessarily be directed towards Nile countries. State-capital alliances may be framed as economic integration under the Arab food security strategy or bilateral economic agreements, yet they may well represent a form of disguised water grabs.

Hence, from an Egyptian water security perspective, transnational investments in Sudan and other Nile basin countries may represent different opportunities, risks, and uncertainties associated with land-water-food nexus for both state and non-state actors. In this respect, the land-water-food nexus in Sudan as framed by different state and non-state actors may entail water grabs, which could represent a new variable in Nile hydropolitics. This could be viewed as another form of water security mercantilism, whereby technology, financial, and regional politics are involved in Nile water grabbing; for profit and larger strategic objectives.

Chapter 8

Synthesis & Conclusion

A Multi-level Analysis of Egyptian Water Security & Transnational State-Capital Alliances

8.1. A broadened view of Egyptian Water Security & Transnational Investments in the Nile Basin

Conventionally, the question of Egyptian water security focused on transboundary hydropolitical analysis within the larger context of the Nile river basin. Analytical endeavors typically concentrated on state actors and their (hydro)-political interactions on bilateral, regional, and international levels. This dissertation explored a different aspect of Egyptian water security beyond this 'state-centric epistemology', typically focusing on a singular scale of hydropolitical analysis. The presented research explored the water (hydro) politics of 'transnational state-capital alliances' and the role of non-state actors in the -silent- appropriation of land-water resources, through investments in farmlands abroad, within Egypt, as well as other Nile basin countries, notably in Sudan.

This research scope was explored in light of the wider contexts of the food and fuel crisis of 2007 and 2011, as well as the political context in Egypt post 2011 uprising and its regional implications. Globally, following the food-fuel crisis in 2007, prices dropped by the end of 2008, but they never resumed their pre-2008 levels, and began to rise in 2009 and spike by the end of 2010 (Dixon 2013). These factors put tremendous fiscal and political pressures on countries such as Egypt who depends on wheat imports to feed a growing population. Furthermore, Egypt's economic challenges escalated after four years of instability in the aftermath of the January 25 2011 revolution, as well as its military operations against terrorist groups in Sinai, and its diplomatic and military engagement in regional conflicts (Tawfik 2016). Furthermore, largely since the 2007- 2008 food-fuel-financial crises, the corporate agri-food system has been expanding regionally, as finance capitalists began acquiring (and attempting to acquire) agricultural land and food processing companies in neighboring countries(Dixon 2013). At the regional level, this led to an alignment with GCC countries, notably Saudi Arabia and the UAE to support Egypt politically and economically, and to actually contribute to its national Mega projects such as the 1.5 million feddan, amongst other investments. While Egypt witnessed all these political-economic changes during post-2011 uprising, these events contrasted with the relative stability and economic rise of Ethiopia, thus creating new power imbalances in the Nile basin, notably with the launch of the GERD in April 2011 (Tawfik 2016).

To be able to examine the hydropolitics associated with transnational investments, the analytical lenses of 'land-water-food' nexus and water grabs were deployed within a multilevel water security framework. This analytical approach is based on recognizing the presence of different actors (polycentric) that interact across multiple scales (multi-level) (Bakker & Morinville 2013). While each scale of analysis represents a unique perspective, a multi-level water security approach towards transnational investments allows to broaden out hydropolitical analysis beyond the territorial trap of methodological nationalism (Agnew 1994). Hence, adopting a multisite case study methodology, the presented analysis sheds light on common patterns and contradictions of transnational state-capital alliances and land-water investments across different hydropolitical scales, to understand the interrelation between local dynamics, domestic politics, and international relations (Menga 2016). To examine the hydropolitics of transnational investments within Egypt on local and national levels, the research presented the case study of the Emirati Al Dahra Agricultural Company. To examine transnational investments and Nile hydropolitics, the analysis focused on the case of Sudan with a particular emphasis on transnational investments by the Egyptian state on the one hand, as well as investments by non-state actors including both Egyptian and international (GCC) investors.

Therefore, it is argued that the water (hydro) politics of transnational state-capital alliances and land-water investments are manifested through;
(i) multi-scalar linkages with hydropolitical implications across the local, national, and transboundary levels potentially influencing one another;
(ii) 'land-water-food' nexus linkages and water grabs which expand and broaden out the classical perception of state-centric water (security) from a singular element of the political economy towards polycentric water security governance reflecting the changing role of state and non-state actors towards land-water resources; (iii) implications on social justice notably in relation to the largest water users (e.g. farmers), often overlooked by state-capital alliances framings of the land-water-food nexus as a '*political-economic commodity*'.

This chapter synthesizes the research findings by presenting them in three distinct categories. Following this introduction, Section 8.2 highlights how transnational state-capital alliances in both home (GCC) and host (Nile basin) manifest the Nile-Gulf connection driven by a particular framing of the 'land-water-food' nexus as a political-economic commodity; a venue for capital accumulation, modernization, and non-traditional security. In this respect, land-water investments take several shapes and forms within Egypt, but also in Sudan and other Nile basin countries. Section 8.3 discusses how the land-water-food nexus in Egypt is founded on the manufacture of abundance often reflecting tensions associated with multiple nexi, for both investors and smallholders. These tensions reflect the absent role of the state which negatively impacts different water users. Section 8.4 presents a multi-level analysis of transnational investments. It shows how state-capital alliances within and outside of Egypt represent various forms of water grabs across multiple landscapes. It argues that water politics of transnational investments different scales represent an emerging element in Egypt's water security debates, and manifest a growing role for non-state actors in Nile hydropolitics. Section 8.5 concludes the chapter by highlighting how transnational state-capital alliances and the growing role of non-state actors in land-water investments denotes the shift from the hydraulic mission to water security mercantilism. In this respect, state-capital alliances have served primarily the financial mandate of investors, either by accessing the land-water nexus for production of strategic crops to be sold in the local market, or by exporting strategic crops to their home countries and international market. In all cases, non-state actors achieve financial profit by accessing land-water resources in host (Nile basin) countries, thus intensifying competition to secure water amongst different water users, notably the farmers at the local level, and the riparian countries at the transboundary level. These elements combined represent new variables in the Egyptian water security equation beyond state-centric hydropolitics.

8.2. The Gulf-Nile Connection: State-Capital Alliances and the Land-Water Nexus as a Political-Economic Commodity

8.2.1. Political Economy of Trans - (national) State-Capital Alliances: Changing role of state and non-state actors

The sharp increase in LSLA and consequently the appropriation of water resources through investments in farmlands abroad is often attributed to the food and energy crisis of 2007/08 and 2010/11. However, transnational investments have been sustained long past the market turbulence. In fact, these global events led water scarce countries from the GCC and MENA regions to realize “the risk of not securing enough food imports at *any* price even if their pockets are lined with petrodollars leaving an immense psychological impact” (Woertz 2011) . Indeed, scarce water resources in the Arab World and limited opportunities for the expansion of arable land are often perceived as key obstacles for domestic food production. As the invisible ‘virtual water’ trade system failed them, the threat of export restrictions led importing countries with severe physical water scarcity indices, to become concerned about their food security, and “to consider ways to by-pass global food markets by engaging directly in food production” (Li, 2014). Furthermore, with Saudi Arabia and the UAE phasing out wheat and alfalfa production, dairy and poultry producers in the GCC are continuously looking for alternative supply sources for feedstock (Hillhorst 2015b).

As a result, different investors from these regions have been seeking opportunities for large-scale investments in Egypt, Ethiopia and Sudan, amongst other countries within the Nile basin and elsewhere globally. Interestingly enough, Egyptian state and non-state actors themselves are also seeking investment opportunities in other African and Nile basin countries. Investments often take place on a bilateral basis or under the umbrella of regional platforms (COMESA; League of Arab States).

Land-water acquisitions by non-state actors imply new investment modalities in search of water and food security, founded on state-capital alliances. Alliances encompass different types of non-state actors aiming to grow their farmlands abroad, including financial investors and international private sector companies supported by their home governments, notably from GCC. State-Capital alliances and transnational investments also reflect a changing role of the state towards land-water resources, and consequently water and food security as observed on two different fronts; (i) the first in home countries (typically water scarce) between state and non-state actors/national investors capable of investing in farmlands abroad to address the state's larger strategic objectives of water/food security (supply of strategic crops). (ii) The second front consists of 'state-capital alliances' taking place in host countries, between the state and international investors/non-state actors aiming to appropriate land-water resources through large-scale investments. Both venues however are not mutually exclusive. For instance, while GCC investments in Egypt typically represent both types (national and transnational alliances), Egyptian investments in Sudan can vary between either state-to-state, or, independent private sector (small, medium or large), as well as institutional and financial investors (e.g. private equity).

As discussed in chapter 5, there are different institutional arrangements to coordinate between home governments, international investors, and host governments. Examples of 'national state-capital alliances' include the arrangements between Gulf government agencies or programs (ADFCA, QNFSP, KAISAIA) on the one hand, and their domestic private sector capable of investing in farmlands abroad on the other. In this respect, GCC agro-investors aim at enhancing national food security and vertical integration of the supply chain. Non-state actors and investors also pursue the greater objectives of profit maximization, and long-term asset management to provide income for an after-oil age (Interview # 35). KAISAIA aims at providing funds, credit and logistics to Saudi Investors to invest in farmlands abroad. Its strategy is founded on establishing a strategic reserve for basic food commodities, to meet the Saudi food needs and avoid a future food crisis. In the case of UAE, investments rely more on the private sector and state-owned funds, whereby LSLA by private investors are more informal compared to other GCC investors (Woertz 2013a). The state-owned Abu Dhabi Fund for Development (ADFD) or the commercially motivated Dubai World subsidiary for investment in natural resources adopts an equity-oriented approach (Ibid). Abu Dhabi Food Control Authority contracts qualified local firms engaged in agricultural investments abroad notably in the market of fodder production to strengthen domestic Emirati agricultural and livestock sectors (ADFCA 2016). For example companies such as Jenaan Investments and Al Dahra Agricultural Company undertook investments in Egypt and Sudan, as well as other countries globally "to supply ADFCA a variety of fodder items that have been scarce in the market".

In host countries, transnational investments represent a venue for state modernization to achieve socio-political and economic objectives. In Nile basin countries, LWI serve the state's objectives to maximize its revenues from foreign currency by renting land and granting rights to use water resources by international investors. Under this arrangement, from the state's perspective, FDI is typically a sign of modernity, job opportunities, and economic growth. In the case of Egypt, transnational investments are also conceived to play a more significant (political) role via the hydraulic mission of the state and its horizontal expansion plans. In Sudan, infrastructure and agricultural investments represent an opportunity to unleash the country's underutilized potential of land-water resources, and to revive the vision of 'the breadbasket of the Arab world'. It is also a source of foreign currency after Sudan's loss of oil revenue after separation with South Sudan.

As such, the land-water-food nexus represents a venue for "national" socio-political projects, corporate profit, and non-traditional security. Hence, state-capital alliances frame the land-water-food nexus as a political-economic commodity. Many of these investments in the Nile basin are founded on a joint Arab food security strategy, and take place in Arab countries such as Egypt and Sudan, who also happen to be Nile basin countries. Both countries are perceived as contributors to the larger vision of water and food security amidst an alarming regional water scarcity narrative. Within this regional framework, transnational investments support host countries achieve agricultural sector modernization. In Egypt, investors position themselves as contributors to the state's investment strategy and Mega projects. In Sudan, investors claim to support the larger vision of the breadbasket of the Arab World. However, this nexus framing often overlooks the already stressed Nile basin hydropolitics, and imposes a new element to the Egyptian water security equation. State-capital alliances also manifest the role of political and financial capital associated with transnational investments in grabbing water resources for their own profit as well as larger strategic objectives. In other words, transnational state-capital alliances serve larger political-economic objectives, thus shaping a new modality of water security mercantilism.

8.2.2. Diverse Modalities of Land-Water Investments

As shown in Annex 3, investments involve a multitude of actors, and take several shapes and forms across different geographic locations within the Nile basin countries (Egypt, Ethiopia, and Sudan), depending on a variety of land-water resources, and production strategies. In particular, in relation to Egyptian water security debates, the analysis focused on two broad categories of transnational investments; (i) within Egypt; (ii) in other Nile basin countries notably in Sudan.

Transnational Investments in Egypt

Despite being the most downstream country in the Nile basin, empirical evidence indicates that several transnational investments have materialized in Egypt. Investors target Egypt as an attractive destination for large-scale agricultural projects due to its infrastructure, business climate, labor, and proximity to European and Gulf markets. Yet, large-scale projects only materialized on a small portion of the leased lands due to a number of factors and nexus tensions as discussed in section 8.3. Al Dahra case study further showed that LWI within one country (Egypt) can vary in land size, water sources, and type of production, as well as other factors such as –but not limited to- access to electricity, transportation, logistics, and strategic location.

Land deals taking place on the national level between the "entrepreneurial state" and the investors within Egypt are not only LSLA. As shown in Al Dahra case study, the company's four different farmlands within Egypt targeted both; LSLA in remote desert areas of Mega Projects in 'New Lands' notably in Toshka and East Oweinat, as well as much smaller farmlands in 'Old-New Lands' in Al Salheya and Al Nubareya located east and west of Nile delta respectively. Al Dahra's diverse farmlands modalities shed light on the variance in the nexus production elements across different sites as discussed in chapters 5 and 6. This diversity in location and size of farmlands allowed the company to access the comparative advantage across two generational models of land reclamations. Despite their relatively small size, investments in Old-New lands benefit from several advantages such as location, proximity of export ports and ease of logistics. This implies that financial profit through the appropriation of land-water resources is not only limited to LSLA, but can also take place in small/medium scale farms.

Each of these sites depends on different water resources, and target certain types of crops. For example, in Al Dahra's two acquired farmlands in Old-New Lands, water is sourced mainly from the Nile (i.e. Al Salheya) depending on Nile water from Al Ismailia Canal, or as in Al Nubareya depends on a mix of water sources, originally from underground water, supplemented by water from the Nile, which only started to flow to Al Dahra's farms in 2014, conveyed through Al Nasr Canal, a main branch of Al Nubareya Canal. In this respect, Al Dahra developed a niche in Al Nubareya, despite the small land size (320 feddan), the farm production is mostly high value crops (citrus) exported to the European market. Al Salheya farmlands contain a mix of crops such as alfa-alfa, wheat, and citrus. In Farmlands of western desert Mega projects such as Toshka, irrigation depends on water from Lake Nasser, expected to be complemented by underground water resources from the Great Nubian Sand Aquifer, while in East Oweinat, farming mainly depends on energy intensive water abstraction from the same aquifer. *In this respect,* desert farmlands in Toshka and Sharq Al Oweinat adopt economies of scale approach by establishing large size crop plantations, whereby the company has engaged with more strategic crops such as wheat and alfa alfa, whereby the former is sold in the local market and the latter is exported to the UAE.

Crops have different market destinations. As shown from the case study, transnational LWI direct their production to 3 different markets; (a) the European market typically demanding high value crops (fruits and vegetables) which often translate into foreign currency profit for the investor; (b) the home country based on previous deals conducted with state agencies, in the case study that was Al Dahra's agreement with ADFCA to supply alfa-alfa and animal feed as discussed in chapter 5; (c) local market, whereby the transnational investor supplies the state with wheat as a way to contribute to its food security objectives, given that Egypt is the largest importer of wheat.

However, each generational category of land reclamation schemes (Old-New Lands vs. New Lands) also entails some resources nexus tensions. For instance, in New Lands, Al Dahra faced different legal difficulties especially following the January 2011 Revolution in Egypt. These were mostly related to politics of land allocation in New lands during the Mubarak era, however caused significant delays and financial cost on the ground. Other nexus tensions are related to remoteness of desert sites, access to electricity, and high cost of logistics and transportation. In Old-New lands, despite the various advantages, investments are situated in a downstream geographical context east and west of Nile Delta (Al Salheya and Al Nubareya) with inherent challenges for different water users. As such, Al Dahra faced the classical challenge of water availability, estimated to be only 40% of the company's actual irrigation needs. This situation clearly reflects the water politics associated land-water nexus tensions on the local level, and often leads to water grabs by the political, financial, and technological capital endowments of the investors. Additional investments in Egypt include other investors from Saudi Arabia and the UAE with LSLA in Toshka, East Oweinat, as well as the recently launched '1.5 million feddan project'.

Transnational Investments in Sudan and the Nile Basin

Sudan remains the riparian country with most potential for land-water resources in the Nile basin. Investments in Sudan do not only depend on Nile water, but also on underground water resources, often supplemented by rainwater. For example, Egyptian investments in Sudan by both state and non-state actors depend mostly on Nile water. While in South Sudan, LWI by Egyptian non-state actors depend on rainwater such as the case of Citadel Capital. In this respect, the land-water nexus in Sudan represents an opportunity for different state and non-state actors to invest in agriculture either for profit or for larger strategic objectives such as food security. The Sudanese state has also benefited from Chinese and Gulf investments to develop its under utilized land-water resources, notably by financing infrastructure, dams, reservoirs, canals, irrigation and agriculture technologies. The construction of the Grand Ethiopian Renaissance Dam (GERD) in Ethiopia and its large storage capacity may change future water allocation policies in Sudan, favoring agricultural intensification in existing irrigation schemes in the country (Hillhorst 2015b). In 2013, the Sudanese National Investment Authority and the Presidency Office issued the Directory of Proposed Investment Projects, including 323 projects in different economic sectors with a total investment cost of US$30 billion. Out of these 323 projects, 117 projects are in the agriculture sector, totaling 8 million acres distributed among 12 states (National Investment Authority 2013). However, little investments have materialized in Sudan. Evidence indicates that the operational acreage from the recent GCC investments is small compared to the existing irrigation schemes (16,200 versus 1,701,000 ha). However, the intended GCC - MENA projects (about 300,000/500,000 ha respectively) cover a sizeable area and would lead to a substantial expansion of the irrigated area in Sudan.

8.3. Manufacture of Abundance: Nexus Opportunities, and Tensions in Egypt

8.3.1. Land-water-food nexus as the manufacture of abundance

For the Egyptian state, water security is often synonym to horizontal expansion, frontier making, and modernization. As discussed in chapters 2 and 3, under the rule of Mohamed Ali and Nasser – known as the founders of modern Egypt, the 'developmental state' strongly intervened in the economy to achieve deep social and economic transformations (Farah 2009). This role was manifested in advancing the hydraulic mission (defined as mastering nature and controlling the flow of water) through storage, hydropower, and irrigation infrastructure. In addition, the state aimed to develop the 'water and agriculture' economy through large-scale land reclamation schemes for horizontal expansion and expanding Egypt's Nile watershed.

It could be argued that the state's hydraulic mission has evolved to the level where it is *trying to do too much with too little*, thus leading to the "manufacture of abundance". In other words, "the current use of water resources for irrigation is higher than what is actually needed" (Interview # 1). Egypt's total agricultural land is 8 million feddan. Originally the Nile's watershed within Egypt serves 5.6 million feddan known as the 'Old Lands'. Since 1952, and more progressively following the construction of the Aswan High Dam, the state's 5-year socio-economic plans (*Khetta Kahmseya*) embarked on a massive horizontal expansion plan, which added 2.4 million feddan of what is known as 'Old-New Lands' and 'New Lands'. Hence, in post-colonial Egypt, the dream of greening the desert and horizontal expansion through state-sponsored land reclamation projects has been an essential element in fulfilling the hydraulic mission on the national level. There is a contradiction however between "reclaimed lands" and actual "productive" land. Evidence indicates that figures do not match whereby an implementation gap exists (Sims 2015). Furthermore, despite the state's investments in massive land reclamation schemes, Egypt's 'ecological-demographic narrative of crisis' still prevails with its twin challenges;

demographic redistribution, and increased food production for the unachieved objective of self-sufficiency.

The role of the 'developmental state' towards its hydraulic mission and land reclamation changed across time. With the liberalization of the economy during the late 70s and 80s, followed by a period of structural adjustment programs during the 1990s, the role of the developmental state (as understood under Ali and Nasser) gradually faded. It transformed into a predatory role (Evans 1989; 1995) with increased private sector participation in the economy, and no exception the 'water and agriculture' sectors. During this period of economic liberalization, post-colonial land reforms were partly reversed by Law 96 issued in 1992, through which the agrarian land was liberalized often at the expense of smallholders' land rights mostly in Old Lands. During this period of agrarian reform policy called "privatization of state land", the Ministry of agriculture started selling its land, thus promoting greater private sector participation in the agriculture sector.

As discussed in chapter 4, national data shows that over the last 30 years private sector investments in agriculture witnessed significance growth, representing over 90% of total new investments with a continuously diminishing share for the state. This growing private sector contribution to the agricultural economy mostly took place through export of high value crops. In this respect, over the last few decades, the agro-food industry has been conceived as a "frontier" for capital accumulation as argued by Dixon (2013). Hence, the predatory state focused more on the commercialization of agriculture for financial gains and economic growth, while overlooking the problems of small farmers entrenched in physical and political scarcity. Furthermore, the participation of domestic private sector in farming high value crops for export to European market created a *parallel* water economy mainly depending on underground water resources especially in Old-New Lands; the first is the economy of farmers and small landholders from youth and graduates mostly depending on surface Nile water deteriorating in terms of quality, quantity, and distribution. The second is the economy of private sector investors endowed with technology and capital, which typically vary in size, location, and markets, mostly depending on underground water resources, due to its better quality matching European exports requirements. Ironically, with the liberalization of the water and agriculture sector, and the relative withdrawal of the state, the immature private sector has significantly exhausted underground water resources (higher water salinity and digging deeper wells hence higher cost of energy), from which they were the first to suffer. Furthermore, while private sector engagement created a parallel water economy for the export market, it did not address Egypt's ecological-demographic narrative of crisis (Sims 2015), nor the unreachable goal of self-sufficiency. As a result, the country's physical and political (water) scarcity narratives have deepened further.

Ironically however, while the share of private sector investments in agriculture increased, it was still considered as insufficient for the growth of the Egyptian agricultural economy. Consequently, by the end of the twentieth century (circa 1996-present), the state shifted its horizontal expansion strategy in pursuit of modernization dreams and 21st century hydraulic mission, by establishing national Mega Projects in remote desert lands (e.g. South Valley- Toshka & Oweinat; Al Salam project). Additional drivers for this evolving approach towards land reclamation included the cumulative challenges associated with Old Lands where small farmers dominate, as well as the mixed results achieved in the Old-New lands associated with historical baggage and inherent water user challenges. Mega projects also aimed at the expansion of the agricultural economy to achieve the paradoxical objectives of self-sufficiency and the growth of agricultural exports.

To address these inherent challenges, the changing role of the "entrepreneurial state" (Mazzucato 2011a; 2013b) aimed at promoting the engagement of new players in its National Mega Projects. This entrepreneurial role is founded on *de-risking* land reclamation and horizontal expansion through infrastructure investments in remote desert areas (e.g. largest pump in the world, access to electricity, irrigation infrastructure, roads, ports, etc.…). This new approach towards the state's hydraulic mission aimed to attract domestic and international investors endowed with capital and technology, capable of developing large-scale agricultural production schemes in remote desert areas, to advance its horizontal expansion plans and frontier making processes. On the other hand, for the investors, securing water is an essential production input and an important element to achieve both profit, and in some cases fulfill larger strategic objectives such as food security. Conceptually the thesis situates large-scale corporate and financial investments in land and water resources as a key factor of the hydraulic mission of the 'Entrepreneurial State', thus representing an emerging element of water security on the national level.

As such, transnational state-capital alliances reflect the changing role of the state towards its hydraulic mission. While post 1952 the state was the main sponsor, developer, and operator of large-scale desert development schemes, today, land reclamation and water use are not confined to state actors, small farmers or domestic investors. Rather, new international investors have been also appropriating land-water resources by investing in Egypt's Mega desert reclamation schemes. In this respect, these alliances entail a myriad of interactions between capital, technology, global commodity market, as well as regional political and economic interests.

Mega schemes and transnational investments attracted many criticisms domestically as well as internationally; politically in terms of water shares, socially in terms of benefit to the larger population, and environmentally in terms of resources exhaustion, commercialization of natural resources, and dependence on non-renewable water resources, thus facilitating virtual water grabs. In this respect, Warner (2013) indicates that foreign development experts accepted the questionable assumptions legitimizing developmental mega schemes (Mitchell 1995; 2002). Experts from the World Bank and Arthur Anderson made economic cost-benefit analyses apparently believing the promise of full reclamation made by Gulf investors. As such, infrastructural megaprojects sought to make up for an almost complete disconnect between state and society (Dorman 2007).

Little success was achieved during the first decade (1996-2006) of Mega projects implementation, marked with the presence of a few controversial transnational investments by Gulf (Saudi) investors such as KADCO owned by Saudi Prince Walid Ibn Talal. However, despite the challenges associated with early transnational investments in Toshka, additional Gulf investments targeted land-water resources and Mega projects in Egypt during the last decade. Many of these were driven by the food and fuel crisis of 2007/08 and 2010/11, mostly from Gulf companies such as Al Rajhi from Saudi Arabia, as well as Jenaan, and Al Dahra from the UAE.

Furthermore, under the 'Egypt 2030 Sustainable Development Vision', the state's strategy implemented by the Ministry of Investment promotes FDI in the agriculture sector as a promising area of growth. The state's objective is to further pursue horizontal expansion to expand Egypt's agro-ecological zones and urban centers from the current 8 million feddan to 12 million feddan (AL Ahram 2015). To achieve this plan, the entrepreneurial state launched the '1.5 million-feddan project' in 2015, which offers additional opportunities for international investments (as part of a larger national project to reclaim 4 million feddan). The research labels this latest episode of Mega projects as 'hydraulic mission 3.0'.

However, amidst an inherent context of water stress, and given the state's water budget, the objectives of frontier making and horizontal expansion are mostly founded on the 'manufacture of abundance'. Hence state-capital alliances reproduce the inherent context of physical and political scarcity, which not only negatively influence the largest water users, but also investors' profit, and ironically the state's hydraulic mission itself. For the state, the land-water nexus is often synonyms to paradoxical policy objectives such as –but not limited to- horizontal expansion, demographic redistribution, agricultural sector modernization, economic development in terms of employment and GDP shares, FDI, self-sufficiency, and growing agricultural exports. Land reclamation and the establishment of large-scale farms in both Mega projects and Old-New Lands depend on both Nile water, as well as underground water resources from underground aquifers. However, in an already water stressed context, large-scale projects require water quantities which often surpass the existing water budget. Given the inherent politics of water allocation and distribution (Barnes, 2013), these additional amounts will be either extracted from non-renewable aquifers in the desert, hence contradicting the very essence of sustainable use of resources, with a high probability to affect future generations. Or alternatively, if large-scale investments rely on already stressed surface water (e.g. Nile river), they will most likely come at the expense of other users. In both cases state-capital alliances are founded on the abundance of a politically and physically scarce resource. As such, this raises the question of opportunity cost of water use in desert areas and Mega projects, thus bringing back the opinions of Roushdi Said who advocated the use of water in the desert for industrial use given its economic return compared to agricultural activities.

Furthermore, there is an important link between food security and the different uses of water resources – for example wheat and rice are highly consumable crops in Egypt, which use a lot of water resources for their cultivation. There is a need to make a political decision of whether to cultivate these crops despite their high consumption of water resources, or whether the water should be directed to other low water consuming/high value crops and in this case rely on importing rice and wheat. It may be cheaper to import rice and wheat and use the water resources in other high value cultivations – however this may have negative implications on Egypt's food security as rice and wheat are staple crops necessary in the Egyptian diet.

In conclusion, it could be argued that the "manufacture of abundance" is equivalent to "trying to do too much with too little", often leading to the reproduction of scarcity in areas of inherent stress. In this respect, Egypt's water budget imposes certain limitations and constraints on the use of its renewable water resources from the Nile, which often contradicts with the state's horizontal expansion plans. Furthermore, Mega projects entail a contradiction with the state's hydraulic mission. On the one hand the entrepreneurial state is advancing frontier making through transnational investments in remote desert locations, while on the other losing the most fertile agricultural land in the Nile valley and Delta. This implies that the more attention is needed to farmers and smallholders in order to conserve existing fertile land, as opposed to imposing more stress on existing renewable water resources or by exhausting non-renewable underground water resources.

8.3.2. Resource Politics, Risks, and Uncertainty: Nexus tensions for water users and investors

As discussed earlier, state-capital alliances often frame the ‘land-water-food’ nexus as a ‘political-economic commodity’. They represent a venue for capital accumulation and profit, as well as larger socio-political and (non-traditional) security objectives for both state and non-state actors (Gulf/Arab states and Nile countries). Little questioning however takes place about the social, environmental, and hydro-political risks as well as resources nexus tensions associated with these investments. Furthermore, this framing of the nexus tends to overlook the largest water users and their inherent challenges.

Between the People and Water, the entrepreneurial state wants to attract the investor by mobilizing capital, technology and large-scale investments as a key aspect of modernization, while neglecting smallholders. A possible interpretation is that smallholders do not generate the same source of foreign currency as the investors. An unfortunate perception, since most of Egypt’s local food supply comes from local farmers who are “feeding Egypt’s population by their local production, compared to other commercial farming either exporting or producing to high value commercial chains (i.e. Carrefour, Niche markets, etc…) unaffordable by most population” (Interview # 4). Furthermore, state-capital alliances do not necessarily reflect a linear or fair process, given that they are often unregulated whereby private investors are not subject to the same restrictions imposed on smallholder and beneficiaries of state land programs.

According to both, the state and investors, smallholders often lack financial and technical skills to fully develop their reclamation projects. From their perspective, there is no water value in Egypt, which is opposite to California for example, where the state takes shares from investors depending on amount of water used, even in the case of rainwater. The vicious circle between traditional flood irrigation, cost of modern precision techniques, unauthorized withdrawals and pumping, cost of fuel, and access to markets amongst other factors are longstanding challenges facing the largest segment of water users. For different experts and investors, a more active role by the state is required. Experienced investors claim that they can play a role in providing technical advice to small investors, often under the umbrella of corporate social responsibility as in the case of Sekem for instance. However, this type of initiatives diverts attention from the key core questions of distribution, equity and social justice.

In this respect, transnational investments are not just about the state and the investors. Nexus framings by state-capital alliances often overlook the largest water users; the farmers. As the largest users, the land-water-food nexus is the foundation of their livelihood, not only in Egypt, but also in Sudan as well as other Nile basin countries. There are ample of inherent and existing challenges associated with land-water resources for smallholders notably in Old-New lands. As original beneficiaries of the state's land distribution programs, smallholders are heavily regulated, lack support and suffer from weak infrastructure (Interview #1); this is also confirmed by smallholders who often describe their start-ups in desert lands as very tough given the limited resources and the government regulations and restrictions. Water quality and quantity are also a major problem in both new and old lands (Interview # 3). Water losses often result from leakage in irrigation canals distribution network inefficiencies, while chemical fertilizers often influence water quality and hence the reuse of drainage, in some cases mixed with sewage. In addition, issues of electricity in terms of access and cost are considered a big burden for smallholders. Despite being the largest water users, the neglect of smallholders by the state *reproduces* the inherent conditions of physical water scarcity and stallholders' challenges, which negatively affects their livelihoods.

For the investors, even with the diversity of land-water resources, their investments faced several challenges related to water, energy, and other issues. In the New Lands of Toshka and Sharq Al Oweinat, Al Dahra faced several challenges related to land, water, and electricity as discussed in chapter 5. On the other hand, and as shown in the case study, in Old-New lands, nexus tensions for the investors are manifested in irregular water flow as a face of 'scarcity' resulting from the continuous added pressure on the Nile River, especially where irrigation depends on surface water. While Al Salheya and Al Nubareya farmlands lands may have a comparative advantage in terms of infrastructure (e.g. irrigation canals, roads, ports, access to electricity), two key factors challenge a profitable agricultural operation; the first is the insufficient amount of water resources, which only covered 40% of the company's water needs to undertake its ambitious investments. However, the power of political connections in UAE plays a role to irrigate the investors' farmlands in Egypt "when high level connections are made to ask for the water flow to reach the company's farmlands" (Interview #20). The second challenge is the lack of proper maintenance of existing infrastructure, which in turn negatively affects the company's operations on the ground and translates into high cost. As discussed in chapter 6, this was clearly manifested in the water-energy-food nexus challenges faced in Al Salheya operation, whereby the inconsistent electricity supply resulted in lost irrigation time, and consequently lower productivity, which ultimately translates into financial loss.

Investors are not farmers. While financial investors and non-state actors can mobilize the funds to undertake a massive agricultural operation in farmlands abroad, they do not necessarily implement successful agricultural operations due to their lack of technical expertise and experience (Interviews # 24 & 19). This has been confirmed by both; international investors in Egypt as well as Egyptian financial investors abroad, especially in Sudan. Many investors identified the lack of technical knowledge, suitable to the local conditions of the acquired lands as a main obstacle towards developing large-scale agricultural investments. Consequently, once issues of cash flow and lack of finance occur at the surface, most of these investments significantly slow down, and may shut down. This is primarily due to a business strategy which depends on initial investment to develop 10% of the land size, whereby the revenue generated from this first phase of project development will be reused to develop additional plots of acquired lands. As investments face risks and tensions on the ground, project implementation is often delayed in many of these farmlands due to several technical, political, cultural, and bureaucratic factors. This can be a possible explanation to the slow materialization of LSLA and farmlands vis-à-vis the announced figures of land deals.

In this respect, the manufacture of abundance affects the rich investors and the struggling smallholders. Given the multitude of actors, and despite the diversity of investment modalities depending on the land-water nexus, competing interests create tensions between different resources and actors. They also reflect the absent role of the state on the ground. As such, different political economy factors, as well as sovereign, operational and socio-environmental risks affect and are affected by these investments such as; water availability and the inconsistent water flow for different water users, in addition to issues of water quality and quantity, access to electricity, weak operation and maintenance (O&M) of irrigation infrastructure, transportation and vicinity to ports. Additional factors of pressure include the uncertainties associated with climate variability and shocks. State-capital alliances also draw attention to questions of water grabs, equity and social justice for smallholders. These tensions represent a new variable in Egypt's water security equation not only for the smallholders, and investors, but also for the state itself.

Sovereign, Environmental, and Social Risks for Investors

Unlike other countries globally, several transnational investments materialized in Egypt. However, once the large-scale irrigated farms were operational, the government of Egypt imposed an export tax of 300 Egyptian pounds (~43 US$) per ton. Consequently, this tax rendered the foreign companies' operations non-feasible from an economic standpoint, and forced the project operators to grow wheat for local consumption rather than fodder for export. While producing for the local market is profitable, it changed the original objective of the investments. It also reflects a different side of water security mercantilism.

While this export tax represents a form of sovereign risk, investing companies continued their engagement, as they were also producing high value crops for export to European markets, from which they can generate profits as shown in al Dahra case study. The continuation of Emirati investments in Egypt reflect larger political questions of alignment with Egypt's regime to support the government's efforts in feeding its growing population to support stability in the country following the events of 2013 which led to ousting of the Muslim Brotherhood. Investments in agriculture were not however the only form of Emirati support to Egypt, which was and still are manifested in several projects across different sectors.

Other risk elements of LSLA and investing in farmlands abroad include the environmental and social aspects of the investments. Investors are becoming increasingly conscious that if companies do not respect the environment, local communities, and social dimensions of the investments, the company could face several challenges. To address these social and environmental challenges associated with large-scale investments, FAO adopted the Responsible Investment Principles (Interviews #28b; #29). These principles signed on October 15th 2014 aim to match responsible investment practices on the ground with principles of sustainable agriculture. However, FAO realizes that these principles only exist at the policy level, yet they need to be implemented by the investors. In this respect, there is still a lack of detailed operational guidelines, which are needed to provide clear guidance to the investors regarding sustainable investment practices. These factors combined represent contextual risks, which will be increasingly important elements for any future investment decision in farmlands abroad.

8.4. Water Grabs & the Hydropolitics of Land Investments: A multilevel Analysis of Egyptian Water Security

Few studies drew the linkage between [the] nexus/grabs literature and hydropolitical debates in transboundary river basin contexts. The appropriation of land-water resources through international investments often denotes a form of resources extraction, referred to as "water grabs". Water grabs is a continuous act, unlike land grabs. Whether abstracting from surface or underground water, withdrawals by international investors are a necessary production input for large-scale agricultural operations. Furthermore, water grabs do not necessarily imply land grabs. Often land deals especially in desert lands such as in Egypt are not labeled as land grabs, since they do not necessarily entail any negative impacts on local population, since there is no economic activity on most desert lands (with exceptional cases related to pastoralism). Yet, these land deals often represent water grabs as transnational investors seek to acquire water resources as a key input of production.

Water grabs manifest themselves in different ways across multiple hydropolitical scales. On the local level, the irregular flow of water affects all actors. However the use of technology and capital by investors often leads to an unfair competition over water extraction, and may lead to water grabs and the reproduction of water scarcity for financially and technically marginalized farmers. As such, there is a clear disconnect between securing water for livelihoods, and securing water for maximum profit. The role of capital, technology, and political power reflect the existence of parallel water economies and the neglect of largest water users. Transnational investments also raise the question of virtual water grabs on the national level as well as transboundary water grabs with potential implication on Nile hydropolitics and Egyptian water security.

Al Dahra case study shows how water security translates to different actors, notably farmers' livelihoods, and investors' profit. In light of the inherent challenges in Old Lands and Old-New Lands, Mega projects depend on the manufacture of abundance by relying on additional surface water resources, or non-renewable ground water resources. This in turn may result in increased competition over water resources on several fronts; first nationally, where water allocations for Old lands and Old-New Lands (typically downstream) may be affected by withdrawals upstream for Mega projects. Second, in locations with existing water stress within Old-New lands where the flow of irrigation water is already inconsistent as decided by the hydrocracy at the central level.

8.4.1. Local scale hydropolitics: The Re-Production of scarcity

Water politics in Old-New Lands are manifested in different forms across various sites representing several paradoxes for both the livelihoods of small farmers as well as different elements of risks for the investors. As discussed in chapter 6, national water security policies and discourses are contested at the local level, whereby farmers see these investments as unfair competition. With the irregular water flow in Old-New Lands, the main government irrigation network is not supplying irrigation water *(monawba)* to different users. From the company's point of view, "the irrigation system is not working well, there is a lack of understanding on how to operate the government pumps, resulting in physical water scarcity to be a key problem for all water users" (Interview #19). Yet, the investors have installed additional pumps to grab water from irrigation canals serving their farmlands. As such, water security for private investors may come at the expense of small farmers, who are "the most important given their contribution to food production locally" (Interview # 3), and most importantly sustaining their livelihoods. In this respect, water user associations have proven to be a dysfunctional platform due to power asymmetries between large investors, medium sized farms, and small farmers.

Ironically however, foreign and private investments fail to secure the needed water resources for their massive agricultural operations. Yet, investors have the technology and experience to overcome periods of 'physical' water scarcity where water does not flow in the irrigation canals. Larger companies do have financial and technological means to adopt alternative approaches to adapt to periods of water shortage. As shown in the case study, in Al Nubareya (West Delta), the company relies 50% on ground water and 50% Nile water. According to the farm manager, "each feddan irrigated by Nile water is equivalent to 5 feddan irrigated using ground water in terms of ease of irrigation, and crop productivity.....a feddan irrigated by the Nile water lives more, costs less, and yields more productivity". To adapt to periods of water shortage, the company has widened its on farm irrigation canals to enable the storage of additional water when the government network does not convey irrigation water. On the other hand, in Al Salyeha where the company's farmland mainly depends on surface water, adaptation to irregular water flow is still a challenge, however the company is planning to recharge unutilized saline underground wells by Nile water. By doing so, the company is planning to use these wells as reservoirs to compensate for periods of water shortage due to inconsistent government schedule (monawbat).

Large-scale investments endowed with technology and capital do raise questions of inequity on the local level, with a high potential of creating conflict between small farmers and large corporate actors, often manifested in different forms including; water use/water quantity, water quality due to drainage and downstream environmental impacts, political and financial capital, role of technology, and power asymmetry especially in the setting of water users.

A key finding is; while both the state and the investors have framed water security to serve their own interests, these investments may have contributed to the reproduction of water scarcity for the small farmers, thus imposing a new hydro-political element on the local level. As such, in investment locations where physical water stress exists, large-scale investments endowed with political, capital, and technological power, result in water grabs on the local level, affecting the largest and most vulnerable water users; the farmers, thus negatively influencing their livelihoods. This is especially the case downstream the Nile basin (east and west of delta), whereby transnational state-capital alliances reproduce political and physical (water) scarcity narratives. As such, there is a clear disconnect between securing water for livelihoods, and securing water for maximum profit. The role of capital, technology, and political power reflect the existence of parallel water political economies and the neglect of largest water users.

As such, while nexus framings and investment processes are rooted in larger narratives of security and profit, the tendency is towards the commercialization of natural (land-water) resources by both the state and the investors. These investments entail Social & Hydropolitical Risks often resulting in water grabs. Thus, they often result in reproducing political and physical (water) scarcity narratives.

The Water-Climate Nexus

Empirical evidence also shows that climate change pressures and implications on water resources availability (quality and quantity) add to the hydropolitical tensions on the local scale as shown in the case study. These dynamics also reflect the clear disconnect between political economy dimensions of state-capital alliances on the one hand, and the resource challenges impeding the development of land-water investments on the ground. The climate implications on land-water investments include; different levels of water consumption between winter and summer seasons. For example, a Citrus tree needs on average 600 liters of water per week during summer and 250 liters of water per week during winter. During summer Irrigation schedule needs to adapt to the rise in temperature. More irrigation intervals for fewer hours to avoid high levels of evaporation. During winter, unexpected rain is a problem, especially in surprise events of flood or cold weather, typically unusual but increasingly happening. Hence, climate risks add to the hydropolitical tensions on the local level.

8.4.2. The National Hydraulic Mission: Virtual Water Grabs

As indicated earlier, water grabs are not only limited to questions of equity and social justice. Despite transnational land-water investments and FDI being perceived as a positive contributor to the state's hydraulic mission and frontier making process it can have negative implications on Egypt's 'national' water security, in two ways; (i) Transnational Land-water investments do not, and will not address Egypt's ecological-demographic narrative of crisis. Even with the engagement of international investors and transnational land-water investments, these projects did not resolve the state's concern about demographic re-distribution. (ii) Transnational Land-water investments entail a contradiction with the state's food security and self-sufficiency objectives. This is especially true in the case where transnational investments export crops with high water footprint, thus representing a key contradiction with Egypt's security and scarcity narratives.

While international investments are framed as a source of economic growth through FDI, they may not necessarily contribute positively to the persistent ecological-demographic narrative of crisis. Large-scale investments are perceived to contribute to the hydraulic mission of the entrepreneurial state and its Mega projects through FDI and agriculture sector modernization. Yet, while these investments may develop state-of-the-art farmlands in line with the state's Mega projects and horizontal expansion plans, they have not resolved the question of population density and demographic redistribution within the Nile valley, or the larger question of self-sufficiency and closing the food import gap. This is mostly due to the sheer fact that transnational land-water investments are capital and technology intensive, with little labour requirements, notably for the agricultural production aspects. Many of these projects are capital and technology intensive, mostly depending on mechanization for agricultural land development. Accordingly, the employment impact of these transnational land-water investments is minimal, as on average 50 feddan can employ two workers. Furthermore, since most investments export raw agricultural products, few labor-intensive value chains have developed, beyond packaging, transportation, and logistics. Consequently, large-scale investments in New Lands end up being isolated farmlands in the desert, with little impact on the larger landscape of Mega projects, such as the case in Toshka for instance.

In fact many of these investments may represent a risk to Egyptian water security. Transnational investments may also denote a form of virtual water grab on the national level, especially in the case where foreign investors cultivate high water consuming crops for export. In the New-New Lands, with significantly larger farmlands than old-new lands, virtual water grabs may also occur through the export of both high value crops to Europe, and alfa-alfa and other cash crops to GCC. This is especially true given that international investments often receive investment facilitations and tax breaks, which are often not applicable to domestic investors. Additional water security risks entail the reliance on non-renewable underground water resources in remote desert areas, or investing in farmlands in locations where there is already water stress especially in Old-New Lands downstream of the Nile delta.

However, in some cases the state was able to mitigate this risk by imposing an export tax on alfa alfa. This in turn has rendered the business operations into loss, thus forcing transnational investors into producing wheat for the local market. While these measures may have prevented the question of virtual water grabs, they represent a modality of water security mercantilism, since the state has to buy the agricultural produce grown with its own water from the international investors who ultimately make profit from Egypt's water.

8.4.3. Transnational Investments and Nile hydropolitics: The Nexus in Sudan as an Opportunity and a Risk for Egyptian water security

The case of Sudan shows that transnational state-capital alliances on the transboundary level of Nile basin represent an emerging element of Nile hydropolitics, notably from an Egyptian water security perspective. While investments in Egypt are founded on the manufacture of abundance and infrastructure investments in Mega projects, the situation in Sudan is quite contrary. Sudan's hydraulic mission is dependent on the surplus of unutilized land-water resources, not only from the Nile but also other surface, underground and rainwater. Gulf and Chinese financing support Dam improvements and erection, as well as irrigation infrastructure for large-scale projects. For Sudan, transnational investments represent an opportunity to generate foreign currency through maximum use of land-water resources to compensate for the lost oil revenue following separation with South Sudan. As indicated by President Bashir during his 2015 speech in Cairo, Sudan is trying to revive its vision as the breadbasket of the Arab World, depending on its land-water resources, along with gulf capital, and Egyptian agricultural expertise.

Empirical evidence indicates that transnational investments in Sudan have significantly increased over the last decade. Egyptian as well as Arab GCC investments in Sudan entail several elements of regional politics including;

historical Egyptian-Sudanese hydropolitical relations, a water scarcity/food sovereignty narrative in the Arab region, a Saudi-Sudanese reward mechanism from participation in the war in Yemen. Overall, transnational investments in Sudan by both Egyptian and regional investors are often framed under the umbrella of Joint Arab Water and Food Security Strategy (Sudan-GCC-Arab nations), or Nile cooperation (especially Egypt and Sudan).

From a water security perspective, Egyptian state investments in Sudan could be viewed as an extension of the hydraulic mission of the entrepreneurial state and frontier-making process to the transboundary level. Egyptian-Sudanese bilateral investments are established as joint economic projects for the mutual benefits from the basin's land-water resources, often framed as an economic integration discourse. Furthermore, the state attempted to promote private sector engagement in Sudan through a number of transportation projects and trade corridors to facilitate investments with the southern neighbour. The Cairo-Cape Town Road is also a regional project aiming at increasing intra-African trade. However, Egyptian State investments in Sudan have not yet materialized. Despite a long-standing discourse on Egyptian-Sudanese integration, experts and officials from both countries agree that joint projects and agricultural investments have not reached their desired goals. With a handful of attempts to establish joint projects in Sudan, many of these remain unachieved whereby the action on the ground is still negligible.

On the other hand, the growing non-state actors' LSLA in Sudan depending on Nile water can represent a risk in terms of water quotas. While transnational investments may depend on a variety of land and water resources, evidence indicates that surface water from the Nile plays a significant role in corporate farms. As indicated by (Interview #70) it is acceptable and necessary to anticipate larger impacts of transnational investments in Sudan on Nile transboundary hydropolitics, "since Sudan is already almost using its entire quota from the existing Nile agreement of 1959, and therefore any additional investments depending on surface water from the Nile will increase its water withdrawals and use" (Interview #70). In this respect, the research anticipates that the increase in the number and size of these investments, especially those depending on Nile water for irrigation, may also have negative implications on Egyptian water security.

This is especially more likely to happen with the completion of Ethiopia's GERD as it will regulate the Nile flow in Sudan and allow for more irrigation of fertile lands throughout the year. For existing large public gravity schemes in Sudan GERD will: (i) make it possible to grow 2 or even 3 crops per year, (ii) dramatically reduce maintenance (dredging) costs because of the much lower sediment content of the irrigation water, and (iii) facilitate livestock rearing because fodder is now available all year round (Hillhorst 2015b). Hence, the GERD may result in higher profitability of farming operations in the existing gravity schemes and may influence future water allocation decisions in favor of the existing public schemes (with hundreds of thousands of farmers and their dependents) at the expense of the large-scale private operations further downstream on the Nile owned by foreign investors (Ibid; Interview #35; Interview #37).

Consequently, this will make additional large-scale investments possible in new locations depending on the regulated flow of Nile water. Upstream-downstream water allocations within Sudan and the amount of water reaching lake Nasser could be affected significantly. The hydropolitical implications of transnational land-water-investments in Sudan on Egyptian water security are still unclear but can be expected to increase tensions and competition for the economic and political use of land-water-resources across the Nile basin. This is especially true given that the existing state-centric transboundary mechanisms such as the Nile basin initiative have not yet incorporated any guidelines to the participation of non-state actors in transnational investments in Nile riparian countries (Interviews #38; #40). An area of policy development, which deserves further attention, especially in relation to social and environmental risks.

The question however remains whether transnational Investments in Sudan are Water Grabs or basin wide integration? Furthermore, it is unclear whether Egyptian state-to-state agricultural Investments in Sudan would be labeled as water grabs, or whether they would fall under the umbrella of bilateral cooperation or larger regional arrangements such as the Nile Basin Initiative and upstream-downstream joint projects. The answer could probably be both. Transnational investments are indeed forms of economic/regional cooperation, especially to achieve Sudan's vision of the "Breadbasket of the Arab World". However they often result in water grabs for farmers, the state, as well as other downstream countries of the Nile basin.

To summarize, despite being framed as a form of economic integration, Egyptian and Arab investments in Sudan have not reached their potential. In this respect, state-to-state investments are subject to larger geopolitical questions amongst Egypt and Sudan on the one hand, while on the other private investors (from Egypt and elsewhere) face a myriad of 'executional' challenges. In terms of Nile hydropolitics, Egyptian state and non-state land-water investments in Sudan may entail different risks, opportunities, and uncertainties from an Egyptian water security perspective, and can be viewed as a variable, which can influence the hydraulic mission of the entrepreneurial state both positively and negatively. These investments however can represent a form of commodification of natural resources at the level of the river basin, leading to a form of water security mercantilism.

8.5. From the hydraulic mission to water security mercantilism

Based on the different categories of findings, the thesis of this dissertation argued that the engagement of non-state actors through transnational state-capital alliances and land-water investments in farmlands abroad denotes a transition from the hydraulic mission towards water security mercantilism. That is, state-capital alliances frame the land-water-food nexus as a political-economic commodity, primarily serving financial and strategic objectives for both state and non-state actors, while overlooking the largest water users. These practices reflect the very essence of "mercantilism' known to serve primarily the generation of wealth and capital accumulation for the state and its allies.

Ironically however, while for the state investments represent opportunities for sector modernization based on the introduction of industrial agricultural production modes, these alliances have only served the interests of private investors. In Egypt, while the changing role of the 'entrepreneurial' state aimed at benefiting from the technological and capital endowments of international investors, transnational investments have not fulfilled its hydraulic mission nor resolve its ecological-demographic narrative of crisis. In Nile basin countries, particularly in Sudan, despite the weak materialization of investments, state-capital alliances also draw attention to the intersection of regional and resource politics towards the unachieved vision of 'the breadbasket of the Arab World'. In both cases, these political economy dynamics founded on state-capital alliances left the hydraulic mission of the state unachieved. Transnational state-capital alliances have served primarily the financial and strategic mandates of investors, either by accessing land-water resources for production of strategic crops to be sold in the local market (wheat sold to the state by the investors for profit!), or by exporting strategic crops to their home countries and international market which represents a form of water grabs, also for profit. In this respect, state-capital alliances re-shape our understanding of water security, primarily to serve financial goals, instead of larger public goals, through a particular understanding of land-water-food interdependencies depending on private interests.

Hence state-capital alliances facilitate non-state actors' mandate to achieve financial profit by accessing land-water resources in host (Nile basin) countries, potentially leading to intensifying competition to secure water amongst different water users, notably the farmers at the local level, and the riparian countries at the transboundary level. These patterns shed light on potential commercialization of land-water-food nexus and growing competition over land-water as strategic resources amidst inherent physical and political scarcity narratives and contestations within Egypt, the Nile basin, and the Middle East and North Africa region.

Consequently, through water security mercantilism, private actors override the existing hydraulic mission of the state, and existing water governance mechanisms (Conca 2006). These processes represent an emerging element in hydropolitical debates, beyond singular-scale state-centric views, towards a multi-level polycentric view of water security. Given land-water nexus politics associated with transnational investments, the understanding of Egyptian water security can be claimed to witness profound changes with implications on the state's hydraulic mission, farmers livelihoods, as well as agricultural and virtual water trade within and outside the Nile basin.

These elements combined represent new variables in the Egyptian water security equation and the larger context of the Nile basin, beyond state-centric hydropolitics. These state-capital interactions between different actors across multiple scales are critical for understanding change and continuity – and inevitable inconsistencies and contradictions – in the political constructions of water (Mosse & Sivan 2003).

Implications on Nile Hydropolitics

The acquisition of land-water resources by non-state actors for profit or larger strategic objective could have several implications on Egyptian water security and Nile hydropolitics. First, adopting capital and technological intensive business strategies, non-state actors gain a leveraging power in water politics which can influence both, state actors and existing water users locally, nationally, and on a transboundary level. Second, this engagement of non-state actors in Nile hydropolitics takes place outside of the Nile Basin Initiative (NBI), which leaves its role questioned in terms of inclusiveness of all stakeholders from within or outside the basin. The presence of investors and corporate actors in the NBI may be an important element in the sustainable use of the basin's natural capital and resources. Third, the implications of the GERD filling and operation in light of the growing appetite for land-water investments should be further examined, specially where Sudan will become an attractive destination for transnational LWI. This aspect needs to be examined based on existing water quotas. Finally, the role of external actors such as China or other BRIC countries need to be explored further as the global race for land and water resources intensifies. These factors combined can further deepen the water mercantilism approach in the Nile basin.

Bibliography

Abdel Wahab, A., 2011. *Water Security in the Nile Basin: Controversies of Development and Stability. Al Amn Al Ma2y Fi 7od Al-Nil: Ishkaleyat Al Tanmeya wal Istekrar. Cairo, Egypt*, Cairo: Ahram Center for Political and Strategic Studies.

ADB, OECD & UNDP, 2012. *Sudan African Economic Outlook (AEO) 2012*, Available at: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Sudan Full PDF Country Note.pdf.

ADB, OECD & UNDP, 2015. *Sudan African Economic Outlook 2015*, Available at: http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2015/CN_data/CN_Long_EN/Sudan_GB_2015.pdf.

ADFCA, 2015. ADFCA signs fodder supply contracts with a number of local firms. Available at: https://www.adfca.ae/English/MediaCenter/News/Page [Accessed January 22, 2016].

ADFCA, 2016. Deals worth AED3.8 billion signed as SIAL 2016 wraps-up. Available at: https://www.adfca.ae/English/MediaCenter/News/Pages/News081216A.aspx [Accessed March 2, 2017].

Adriansen, H.K., 2009. Land reclamation in Egypt : A study of life in the new lands. *Geoforum*, 40(4), pp.664–674. Available at: http://dx.doi.org/10.1016/j.geoforum.2009.05.006.

African Development Bank, 2007. COMPREHENSIVE STUDY AND PROJECT PREPARATION FOR THE REHABILITATION OF THE NUBARIA AND ISMAILIA CANALS APPRAISAL REPORT AFRICAN WATER FACILITY (AWF). , (August).

African Development Bank, 2009a. *Egypt Private Sector Country Profile 2009*, Cairo, Egypt. Available at: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Brochure Egypt Anglais.pdf.

African Development Bank, 2016. *Environmental and Social Impact Assessment (ESIA) - Integrated Water Resources Management of the Nubaria and Ismailia Canals*, Available at: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Environmental-and-Social-Assessments/Egypt_ESIA_Summary_2016_final.pdf.

African Development Bank, 2009b. *MASTER PLAN STUDY FOR THE REHABILITATION/REPLACEMENT OF MAJOR HYDRAULIC STRUCTURES ON THE NILE*, Cambridge University Press. Available at:

https://www.cambridge.org/core/product/identifier/CBO9781107415324A009/type/book_part.

Agnew, J., 1994. The territorial trap : The geographical assumptions of international relations theory The territorial trap : the geographical assumptions of international relations theory. *Review of International Political Economy*, 1(1), pp.53–80.

Agnew, J.A., 1989. The devaluation of place in social science. In J.A.Agnew & J.S.Duncan, eds. *The Power of Place: Bringing Together Geographical and Sociological Imaginations*. Boston, MA: Unwin Hyman.

AL Ahram, 2015. Egypt's Sisi to launch 1.5 million feddan project in late December. *14 December*. Available at: http://english.ahram.org.eg/NewsContent/1/64/173472/Egypt/Politics-/Egypts-Sisi-to-launch--million-feddan-project-in-l.aspx [Accessed March 10, 2016].

AL Ahram, 2018. MWRI Reduces Size of Rice Cultivations. *27 January 2018*, p.1.

Al-Borsa News, 2015. Savola. *October 27*. Available at: http://www.alborsanews.com/2015/10/ / /صافولا-تختار-استصلاح-الأراضى-مقاولا 27 [Accessed January 22, 2016].

AlBashir, O., 2015. Speech President Al Bashir At Opening Ceremony of Egypt Economic Development Conference, Sharm El Sheikh.

Allan, J.. A., 2001. Virtual Water- Economically Invisible and Politically Silent: A Way to Solve Strategic Water Problems. *International Water and Irrigation Journal*, November.

Allan, J.A., 2002a. *The Middle East water question*, London: I.B. Tauris.

Allan, J.A., 1999. the Nile Basin : Evolving Approaches To Nile Waters Management. *Water Resources*, (June), pp.1–11.

Allan, J.A., 1997. "Virtual water": a long term solution for water short Middle Eastern economies? *London: School of Oriental and African Studies, University of London.*, (September), pp.24–29. Available at: http://www.ciaonet.org/wps/aln02/.

Allan, J.A., 2003. Virtual Water - the Water, Food, and Trade Nexus. Useful Concept or Misleading Metaphor? *Water International*, 28(1), pp.106–113. Available at: http://www.tandfonline.com/doi/abs/10.1080/02508060.2003.9724812.

Allan, J.A., 2005. Water in the Environment / Socio-Economic Development Discourse: Sustainability, Changing Management Paradigms and Policy responses in a Global System. *Government and Opposition*, 40(2), pp.181–199.

Allan, J.A., 2002b. Water Security in the Middle East: The Hydro-Politics of Global Solutions. *Water*. Available at:

http://kms1.isn.ethz.ch/serviceengine/Files/ISN/6839/ipublicationdocument_singledocument/44A0A220-A9CD-49EB-9778-F55C0E85CBEB/en/doc_6841_290_en.pdf.

Allan, J.A. (Ed.)., 2013. *Handbook of land and water grabs in Africa: Foreign direct investment and food and water security*, Routledge.

Allan, J.A. & Mirumachi, N., 2010. Why negotiate? Asymmetric endowments, asymmetric power and the invisible nexus of water, trade and power that brings apparent water security. In J. (eds) Earle, A., Jägerskog, A. & Öjendal, ed. *Transboundary Water Management: Principles and Practice*. Stockholm: Earthscan.

Allan, T., 2011. *Virtual water*, London: IB Tauris.

Allan, T., Keulertz, M. & Woertz, E., 2015. The water–food–energy nexus: an introduction to nexus concepts and some conceptual and operational problems. *International Journal of Water Resources Development*, 31(3), pp.301–311.

Allouche, J., 2010. The multi-level governance of water and state-building processes: A longue duree perspective. In *The Politics of Water*. London: Routledge, pp. 45–67.

Allouche, J., 2011. The sustainability and resilience of global water and food systems: Political analysis of the interplay between security, resource scarcity, political systems and global trade. *Food Policy*, 36(SUPPL. 1), pp.S3–S8. Available at: http://dx.doi.org/10.1016/j.foodpol.2010.11.013.

Allouche, J., 2005. *Water nationalism: An explanation of the past and present conflicts in Central Asia, the Middle East and the Indian Subcontinent?* Institut universitaire de hautes études internationales Université de Genève; Geneva; Switzerland.

Allouche, J., Middleton, C. & Gyawali, D., 2014. *Nexus Nirvana or Nexus Nullity? A dynamic approach to security and sustainability in the water-energy-food nexus*, Brighton.

Allouche, J., Middleton, C. & Gyawali, D., 2015. Technical veil, hidden politics: Interrogating the power linkages behind the nexus. *Water Alternatives*, 8(1), pp.610–626.

Altenburg, T. & Lütkenhorst, W., 2015. *Industrial policy in developing countries: Failing markets, weak states*, Cheltenham: Edward Elgar.

ANBA, 2014. Arabs participate in Brazil-Africa integration/ *Translated by Gabriel Pomerancblum. *Brasil Arab News Agency*. Available at: http://www2.anba.com.br/noticia/21864760/agribusiness/arabs-participate-in-brazil-africa-integration.

Arab News, 2014. Four local firms acquire Sudan agricultural lands. Friday 24 January 2014. Available at: http://www.arabnews.com/news/514411

[Accessed April 2, 2015].

ArabFinance, 2017. New 20MW solar plant in Toshka inaugurated. Available at: https://www.arabfinance.com/en/news/details/egypt-economy/415376 [Accessed December 8, 2017].

Awulachew, S.B. et al., 2014. *Nile River Basin* A. M. Melesse, W. Abtew, & S. G. Setegn, eds., Cham: Springer International Publishing. Available at: http://link.springer.com/chapter/10.1007/978-3-319-02720-3_23/fulltext.html.

Bakker, K., 2003. A Political Economy of Water Privatization. *Studies in Political Economy*, 70(Spring), pp.35–58.

Bakker, K., 2012. Water Security Research: Challenges and Opportunities. *Science*, 337, pp.914–915. Available at: http://books.google.com/books?hl=fr&lr=&id=XixuNvX2zLwC&pgis=1%5Cnhttp://216.92.126.55/publicaciones/climate-change-water-sp.pdf%5Cnhttp://www.citeulike.org/group/14742/article/8861411%5Cnhttp://www.ipcc.ch/publications_and_data/publications_and_data_tech.

Bakker, K. & Morinville, C., 2013. The governance dimensions of water security: a review. , (September). Available at: http://dx.doi.org/10.1098/rsta.2013.0116.

Barnes, J., 2012. Expanding the Nile's Watershed: The Science and Politics of Land Reclamation in Egypt. In *Water on Sand: Environmental Histories of the Middle East and North Africa*. Oxford University Press, pp. 251–267. Available at: http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199768677.001.0001/acprof-9780199768677-chapter-11.

Barnes, J., 2010. *Governing Flow: The Politics ofWater Distribution and Use in Egypt*. Columbia University.

Beaumont, P., Blake, G. & Wagstaff, J., 1988. *The Middle East: A Geographical Study*, London: David Fulton Publisher.

Beck, U., 1995. *Ecological politics in an age of risk*, Cambridge: Polity Press.

Beck, U., 1992. Introduction. *Risk Society: Towards a New Modernity*, pp.1–8.

Bell, B., 1975. Climate and the History of Egypt: The Middle Kingdom. *American Journal of Archaeology*, 75(3), p.251.

Benedikter, S., 2014. Extending the Hydraulic Paradigm : Reunification , State Consolidation , and Water Control in the Vietnamese Mekong Delta after 1975. *Southeast Asian Studies*, 3(3), pp.547–587.

Berger, M.T. & Weber, H., 2011. *War , Peace and Progress in the 21st Century: Development, Violence and Insecurity*, Routledge.

Bishop, P. et al., 2012. Multi-Site Case Study. , pp.588–590.

Biswas, A., 1993. Management of international waters: Problems and perspective. *Water Resources Development*, 9(2), pp.429–441.

Bloomberg, 2016. Egypt Has 88 Million Reasons to End Bust-Up With Wheat Trade. Available at: https://www.bloomberg.com/news/articles/2016-02-08/egypt-has-88-million-reasons-to-end-bust-up-with-wheat-traders [Accessed April 11, 2016].

Borras, S.M., Kay, C. & Lahiff, E., 2013. *Market-led agrarian reform.*, Routledge.

Brenner, N., 1999. Beyond State-Centrism? Space, Territoriality, and Geographical Scale in Globalization Studies. *Theory and Society*, 28(1), pp.39–78.

Bridge, G., 2001. Resource triumphalism: postindustrial narratives of primary commodity production Environment and Planning. *Environment and Planning*, 33, pp.2149–73.

Bulkeley, H., 2005. Reconfiguring environmental governance: Towards a politics of scales and networks. *Political Geography*, 24(8), pp.875–902. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0962629805000880.

Bulloch, J. & Darwish, A., 1993. *Water Wars: Coming conflicts in the Middle East*, London.

Bush, R., 2011. Coalitions for Dispossession and Networks of Resistance? Land, Politics and Agrarian Reform in Egypt. *British Journal of Middle Eastern Studies*, 38(3), pp.391–405. Available at: http://dx.doi.org/10.1080/13530194.2011.621700.

Bush, R., 2002. Land reform and counter-revolution. In R. Bush, ed. *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform.* Malaysia: Zed Books, pp. 1–31.

Bush, R., 2007. Politics, power and poverty: twenty years of agricultural reform and market liberalisation in Egypt. *Third World Quarterly*, 28(8), pp.1599–1615. Available at: http://dx.doi.org/10.1080/01436590701637441.

Bush, R. & Ayeb, H., 2012. *Marginality and exclusion in Egypt*, London: Zed Books.

Business News, 2014. Mikati group invests in Sudan ,. *by Leila Rahbani*. Available at: http://www.businessnews.com.lb/cms/Story/StoryDetails.aspx?ItemID=3758 [Accessed March 27, 2015].

CAPMAS, 2017. *Egypt in Figures 2017*, Cairo, Egypt.

Cascão, A., 2009. Changing power relations in the Nile River Basin: unilateralism vs. cooperation? *Water Alternatives*, 2(2), pp.245–268.

Cascão, A., 2017. *Food, Fodder and Flowers: the critical role of global and regional virtual water trade in the Nile Basin. Presentation at the Nile Basin Development Forum, Kigali, Ruwanda, 23 October 2017*, Kigali.

Cascão, A.E., 2008. Ethiopia – Challenges to Egyptian hegemony in the Nile Basin. *Water Policy*, 10(S2), pp.13–28.

Cascão, A.E. & Nicol, A., 2016. GERD: new norms of cooperation in the Nile Basin? *Water International*.

Chang, H.-J., 2010. How to "do" a developmental state: political, organizational and human resource requirements for the developmental state. In O. Edigheji, ed. *Constructing a democratic developmental state in South Africa – potentials and challenges*. Cape Town: Human Science Research Council Press, pp. 82–94. Available at: http://www.iag-agi.org/IMG/pdf/downloadpdfpeb26.pdf#page=11.

Clapp, J. & Helleiner, E., 2012. International political economy and the environment: back to the basics? *International Affairs*, 88(3), pp.485–501. Available at: https://academic.oup.com/ia/article-lookup/doi/10.1111/j.1468-2346.2012.01085.x.

Collins, R.O., 2006. Negotiations and exploitation of the Nile waters at the end of the millennium. *Water International*, 31(1), pp.116–126.

Collins, R.O., 1990. *The Waters of the Nile : hydropolitics and the Jonglei Canal*, Oxford.

Conca, K., 2006. *Governing Water: Contentious Transnational Politics and Global Institution Building*, Cambridge, MA: MIT Press.

Cook, C. & Bakker, K., 2012. Water security: Debating an emerging paradigm. *Global Environmental Change*, 22(1), pp.94–102. Available at: http://dx.doi.org/10.1016/j.gloenvcha.2011.10.011.

Al Dahra Agriculture, 2018. Al Dahra Holding Company Overview. Available at: http://www.aldahra.com/ [Accessed February 28, 2018].

Dinar, A. & Wolf, A., 1994. International markets for water and the potential for regional cooperation: Economic and political perspectives in the Western Middle East. *Economic Development and Cultural Change*, 43(1/1994), pp.43–66.

Dinar, S., 2002. Water, Security, Conflict, and Cooperation, SAIS Review, Volume 22, Number 2, Summer-Fall 2002, pp. 229-253. *SAIS Review*, 22(2), pp.229–253.

Dixon, M.W., 2013. *The Making of the Corporate Agri-food System in Egypt*. Cornell University.

Dorman, W.J., 2007. *The Politics of Neglect. Cairo 1952–1998. Ph.D. dissertation.* University College London, London.

Dunne, M., Pryor, J. & Yates, P., 2005. *Becoming a researcher: A research companion for the social sciences: A companion to the research process*, UK: McGraw-Hill Education.

Earle, A., Jägerskog, A. & Öjendal, J., 2010. *Transboundary water management principles and practice*, Earthscan, London.

Egypt Independent, 2015. Egypt, Sudan agree to remove obstacles facing development projects. *Al Masry Al Youm*. Available at: http://www.egyptindependent.com/egypt-sudan-agree-remove-obstacles-facing-development-projects/ [Accessed February 15, 2016].

Eid, H.M., El-Marsafawy, S.M. & Ouda, S.A., 2007. Assessing the Economic Impacts of Climate Change on Agriculture in Egypt A Ricardian Approach. , (July).

EIU, 2015. *Sudan Economy:Quick View - UAE Loan Agreed*, Available at: http://search.proquest.com/docview/1659818246?accountid=14182. Accesed March 9th 2015.

EJATLAS, 2014. Citadel Capital/Sabina and Al Nahda for Integrted Solutions Irrigated Crops in Sudan. *Environmental Juctice Atlas*. Available at: http://ejatlas.org/conflict/citadel-capital-sabina-and-al-nahda-for-integrated-solutions-irrigated-crops-in-white-nile-state-sudan.

El-Agha, D.E.., Molden, D.J.. & Ghanem, A.M., 2011. Performance assessment of irrigation water management in old lands of the Nile delta of Egypt. *Irrigation and Drainage Systems*, 25, pp.215–236.

El-Haddad, E., 2005. *Some environmental studies on water and sediment of Ismailia Canal from El-Mazallat to Anshas Region*. Al-Azhar University, Egypt.

El-Ramady, H.R., El-Marsafawy, S.M. & Lewis, L.., 2013. Sustainable agriculture and climate changes in Egypt. In *Sustainable agriculture reviews*. Springer Netherlands., pp. 41–95.

El-Shinnawi, S.A.A.., Skold, M.D.. & Nasr, M.L., 1980. *Economic costs of water shortages along branch canals. Egypt Water Use and Management Project (EWUP). EWUP Project Technical Report No. 9*,

Elamin, N.H. & Tanyeri-Abur, A., 2011. *International Investments in Agriculture in the Near East*, Food and Agriculture Organization.

Elhance, A.P., 1997. Conflict and cooperation over water in the Aral Sea basin. *Studies in Conflict and Terrorism*.

Evans, D., Gruba, P. & Zobel, J., 2011. *How to write a better thesis*, Melbourne: Univ. Publishing.

Evans, P., 1995. States and Industrial Transformation. *Embbedded Autonomy; States and Industrial Transformation*, pp.1–20.

Evans, P., 1997. The Eclipse of the State? *World Politics*, 50(October 1997), pp.62–87.

Evans, P.B., 1989. Predatory, Developmental, and Other Apparatuses-A Comparative Political Economy Perspective on the Third World State. *Sociological Forum*, 4(4), pp.561–587.

Evans, P.B., 1995. Rethinking Embedded Autonomy. In *Embedded Autonomy: States and Industrial Tranformation*. pp. 227–250. Available at: http://lib.myilibrary.com/Open.aspx?id=273833.

Evans, P.B., 2014. The developmental state: Divergent responses to modern economic theory and the twenty-first-century economy. In M. Williams, ed. *The end of the developmental state?*. New York: Routledge, pp. 220–240.

Evans, P.B. & Heller, P., 2015. Human development, state transformation and the politics of the developmental state. In & M. L. (Eds. . S. Leibfried, F. Nullmeier, E. Huber, ed. *The Oxford handbook of transformations of the state*. Oxford: Oxford University Press, pp. 691–713.

Falkner, R., 2003. Private Environmental Governance and International Relations: Exploring the Links. *Global Environmental Politics*, 3(2), pp.72–87.

FAO, 2014. Principles for responsible agriculture and food investments are approved. *Food and Agriculture Organization of the United Nations*. Available at: http://www.fao.org/news/story/en/item/260518/icode/ [Accessed November 17, 2017].

FAO, 2005. *Rapid Assessment Study - Towards Integrated Planning of Irrigation and Drainage in Egypt in supprt of the Integrated Irrigation Improvement and Management Project (IIIMP)*, Rome. Available at: http://www.fao.org/docrep/008/a0021e/a0021e05.htm#TopOfPage.

Farah, N.R., 2009. *Egypt's Political Economy: Power Relations in Development*, American University in Cairo Press. Available at: http://www.jstor.org/stable/j.ctt15m7dxh.

Farmlandgrab, 2014a. Arab Investors and land grabbers wanted by Egypt. Available at: http://www.farmlandgrab.org/post/view/23427-arab-investors-and-land-grabbers-wanted-by-egypt [Accessed March 20, 2015].

Farmlandgrab, 2014b. Arabs participate in Brazil-Africa integration. Available at: http://farmlandgrab.org/post/view/23936-arabs-participate-in-brazil-africa-integration. [Accessed February 17, 2015].

Farmlandgrab, 2011a. Beltone and Kenana establish a new agriculture fund. Available at: https://www.farmlandgrab.org/post/view/19849-beltone-and-kenana-establish-a-new-agriculture-fund [Accessed December 2, 2016].

Farmlandgrab, 2011b. Egypt seeks food and water security in Sudan. Available at: http://farmlandgrab.org/post/view/18360#sthash.9JaR1qnv.dpuf [Accessed March 12, 2015].

Farmlandgrab, 2011c. Egyptian PM's visit to Sudan achieves fruitful results. *Xinhua General News Service*. Available at: http://farmlandgrab.org/post/view/18360#sthash.9JaR1qnv.dpuf. [Accessed July 2, 2017].

Farmlandgrab, 2014c. MoU signed for agricultural Investment fund. Available at:

http://www.farmlandgrab.org/post/view/24248-mou-signed-for-agricultural-investment-fund [Accessed March 20, 2015].

Farmlandgrab, 2013. Overseas farm projects to be insured. Available at: https://www.farmlandgrab.org/post/view/22980-overseas-farm-projects-to-be-insured [Accessed October 15, 2015].

Farmlandgrab, 2014d. Sudan allocates 100,000 acres to Egyptian farmers. Available at: http://farmlandgrab.org/post/view/24316-sudan-allocates-100-000-acres-to-egyptian-farmers [Accessed March 20, 2015].

Farmlandgrab, 2014e. UAE firm set to produce 300,000 tonnes of wheat in Egypt's Toshka. Available at: https://www.farmlandgrab.org/24128 [Accessed July 12, 2016].

Friedman, M., 2009. *Capitalism and freedom*, University of Chicago press.

Geopoliticalmonitor, 2013. Sudan's Agricultural Sector Sees Investment Opportunities. Available at: http://www.eurasiareview.com/17102013-sudans-agricultural-sector-sees-investment-opportunities-analysis/ [Accessed March 22, 2015].

Geriesh, M.H., Balke, K.D. & El-Rayes, A.E., 2008. Problems of drinking water treatment along Ismailia Canal Province, Egypt. *Journal of Zhejiang University Science B*, 9(3), pp.232–242.

Ghazouani, W. et al., 2014. *Understanding farmers' adaptation to water scarcity: a case study from the western Nile Delta, Egypt*, Colombo, Sri Lanka. Available at: http://www.iwmi.cgiar.org/publications/iwmi-research-reports/iwmi-research-report-160/.

Gladman, A., 1997. Massive Nile river diversions planned. *World Rivers Review*, 12(June).

GLB Invest, 2014. GLB Invest Alfalfa Farm Sudan. Available at: https://www.youtube.com/watch?v=L8PC171MyMQ&index=67&list=PL9C410C53273FA514.

Gleick, P., 1993. *Water in Crisis: A Guide to the World's Freshwater Resources*, New York: Oxford University Press.

Goher, M.E. et al., 2014. Evaluation of surface water quality and heavy metal indices of Ismailia Canal, Nile River, Egypt. *The Egyptian Journal of Aquatic Research*, 40(3), pp.225–233. Available at: http://www.sciencedirect.com/science/article/pii/S1687428514000740 [Accessed March 15, 2016].

Google Maps, 2018. Al Dahra Agriculture/AlSalhya - Google Maps. Available at: https://www.google.co.uk/maps/place/Al+Dahra+Agriculture%2FAlSalhya/@30.6719872,31.9159...=!3m1!1e3!4m5!3m4!1s0x14f83c055ccc1c75(0x2cfba46a2d3fa95f!8m2!3d30.6767135!4d31.8911041.

Grain, 2012. GRAIN database for Land grab deals. *Grain*, p.62. Available at:

http://www.grain.org/.

Grain, 2010. World Bank report on land grabbing: beyond the smoke and mirrors. Available at: https://www.grain.org/article/entries/4021-world-bank-report-on-land-grabbingbeyond-the-smoke-and-mirrors [Accessed May 15, 2015].

Griffiths, J.., 1966. Hecataeus and Herodotus on" A Gift of the River". *Journal of Near Eastern Studies*, 25(1), pp.57–61.

Gulf News, 2015. Indian company to invest Rs50 billion in Egypt's agro sector. *September 13*. Available at: http://m.gulfnews.com/business/sectors/markets/indian-company-to-invest-rs50-billion-in-egypt-s-agro-sector-1.1583289 [Accessed March 10, 2016].

Gulf Times, 2013. Qatari delegation in Sudan for inauguration of Hassad Food Company's project. Available at: http://www.gulf-times.com/qatar/178/details/357175/qatari-delegation-in-sudan-for-inauguration-of-hassad-food-company's-project.

Haftendorn, H., 2000. Water and international conflict. *Third World Quarterly*, 21(1), pp.51–68.

Al Hakim, M., 2015. *Drought in Egypt*, Cairo, Egypt.

Hanafy, S., 2015. *Patterns of foreign direct investment in Egypt: Descriptive insights from a novel panel dataset at the governorate level*,

Hanna, R. & Allouche, J., Water Nationalism in Egypt: State-building, nation-making and Nile Hydropolitics. In Erik Swyngedouw and Filippo Menga, ed. *Water, Technology and the Nation-State*. Routledge Earthscan.

Hanna, R.L., 2016. Transboundary water resources and the political economy of large-scale land investments in the Nile: Sudan, hydropolitics and Arab food security. *Land and Hydropolitics in the Nile River Basin. Challenges and new investments*, 2025, pp.117–149.

Hansen, B., 1991. *The political economy of poverty, equity and growth. Egypt and Turkey.*, Oxford: Oxford University Press.

Hilhorst, T. & Zoomers, A., 2011. How can Large-scale transnational land acquisitions contribute to inclusive and sustainable growth? *European Report on Development*, p.35.

Hillhorst, B., 2015a. *Data base GCC Agricultural Investments in Sudan*, Doha, Qatar.

Hillhorst, B., 2015b. *GCC Agro-Investments in sub-Saharan Africa Synthesis Report*, Doha, Qatar.

Hodges, R.C., 1979. The Egypt-Sudan Permanent Joint Technical Commission for Nile Water. *Canadian Water Resources Journal*, 4(4), pp.71–83. Available at:

http://www.tandfonline.com/doi/abs/10.4296/cwrj0404071.

Hoekstra, A.Y. and P.Q.H., 2002. *Virtual Water Trade: A Quantification of Virtual Water Flows Between Nations in Relation to International Crop Trade. Value of Water Research Report Series No 11.*, Delft, The Netherlands: IHE.

Hoff, H., 2011. Understanding the Nexus. *Background Paper for the Bonn2011 Conference: The Water, Energy and Food Security Nexus.*, (November), pp.1–52.

Homer-Dixon, T.F., 1996. Environmental scarcity, mass violence and the limits to ingenuity. *Current History*, 95(604), pp.359–365.

Homer-Dixon, T.F., 1995. The ingenuity gap: Can poor countries adapt to resource scarcity? *Population and Development*, 21(3), pp.587–612.

Isaacson, W., 2014. *The Innovators: How a Group of Inventors, Hackers, Geniuses and Geeks Created the Digital Revolution*, New York: Simon and Schuster.

Jägerskog, A. et al., 2012. *Land Acquisitions : How will they Impact Transboundary Waters? Report 30*,

Jägerskog, A., 2012. Land acquisitions: how will they impact transboundary waters. *International Conference on Global Land Grabbing II*. Available at: http://www.cornell-landproject.org/download/landgrab2012papers/jagerskog_cascao.pdf.

James, J., 2013. Export oil, import water- the Middle East's risky economics. *IRIN News*.

Jazan, 2015. Jannat Agricultural Investment Company. Available at: http://www.jazadco.com.sa/english/portal/detailed.aspx?id=1412 [Accessed January 18, 2016].

Jobbins, G. et al., 2015. To what end? Drip irrigation and the water–energy–food nexus in Morocco. *International Journal of Water Resources Development*, 31(3), pp.393–406.

Johnson, A.J., 2004. *Restructuring Rural Egypt: Ahmed Hussein and the History of Egyptian Development*, Cairo, Egypt: The American University in Cairo Press.

Julien, F., 2012. Hydropolitics is what societies make of it (or why we need a constructivist approach to the geopolitics of water. *International Journal of Sustainable Society*, 4(1), pp.45–71.

Kalin, M., 2006. *Hidden Pharaohs: Egypt, Engineers and the Modern Hydraulic. Master of Philosophy dissertation, Oxford.* University of Oxford. Available at: http://users.ox.ac.uk/~metheses/Kalin Thesis.pdf.

Karajeh, F., Oweis, T. & Swelam, A., 2011. Water and Agriculture in Egypt: Technical paper based on the Egypt-Australia-ICARDA Workshop on On-farm Water-use Efficiency. , (July).

Katz, D., 2011. Hydro-political hyperbole: Examining incentives for overemphasizing the risks of water wars. *Global Environmental Politics*, 11(1), pp.12–35.

Keulertz, M. & Woertz, E., 2015. Financial challenges of the nexus: pathways for investment in water, energy and agriculture in the Arab world. *International Journal of Water Resources Development*, 31(3), pp.312–325.

Khalifa, E., 2015. *National Reclamation Project 1.5 Million feddan: Updates and Way Forward. Presentation at Donor Partners Group Meeting, Cairo November 2015*, Cairo.

Kliot, N., 1994. *Water Resources and Conflict in the Middle East*, London.

Landmatrix, 2015. The Land Matrix Global Observatory. Available at: www.landmatrix.com [Accessed March 20, 2015].

LeMarquand, D., 1977. *International Rivers: The Politics of Cooperation*, Vancouver: Westwater Research Center.

Li, T.M., 2014. What is land? Assembling a resource for global investment. *Transactions of the Institute of British Geographers*, 39(4), pp.589–602. Available at: http:https://doi.org/10.1111/tran.12065.

Lowi, M., 1993. *Water and Power: the politics of a scarce resource in the Jordan river basin*, Cambridge: Cambridge University Press.

Mada Masr, 2015. Egypt revives agriculture scheme in Sudan’s strife-ridden Blue Nile State. Available at: http://www.madamasr.com/news/environment/egypt-revives-agriculture-scheme-sudan’s-strife-ridden-blue-nile-state [Accessed March 8, 2016].

Mahgoub, F., 2014. *Current Status of Agriculture and Futue Challenges in Sudan*, Nordiska Afrikan Instituetet, Uppsala.

Al Masry Al Youm, 2007a. Roushdy Said: Relocating to the desert is accepted but hard to achieve. *Issue 2078*. Available at: http://today.almasryalyoum.com/article2.aspx?ArticleID=62334.

Al Masry Al Youm, 2007b. Roushdy Said Calls to Transform Toshka to Industrial Project. *Issue 1017*. Available at: http://today.almasryalyoum.com/article2.aspx?ArticleID=52611 [Accessed August 17, 2017].

Al Masry Al Youm, 2009. Saudi KADCO in Toshka. *Issue 2023*.

Al Masry Al Youm, 2016. The 1.5 million Feddan Project: The Largest Agricultural Industrial Urban Project in Egypt’s History”. *Issue 4373*, p.8.

Mazzucato, M., 2011a. *The entrepreneurial state*, London: Demos. Available at: http://www.ingentaconnect.com/content/10.3898/136266211798411183.

Mazzucato, M., 2011b. Introduction. Thinking big again. *The entrepreneurial* *state*, pp.1–20. Available at: https://marianamazzucato.com/wp-content/uploads/2017/02/US-ES-intro.pdf.

Mazzucato, M., 2013a. Mariana Mazzucato: Government -- investor, risk-taker, innovator | Talk Video | TED.com. *TED.com*. Available at: http://www.ted.com/talks/mariana_mazzucato_government_investor_risk_taker_innovator.

Mazzucato, M., 2013b. *The Entrepreneurial State: Debunking the Public vs. Private Myth in Risk and Innovation*, London: Anthem.

Mazzucato, M., 2015. The Green Entrepreneurial State. , 28, p.37. Available at: https://www.sussex.ac.uk/webteam/gateway/file.php?name=2015-28-swps-mazzucato.pdf&site=25.

Mazzucato, M. et al., 2015. *The Green Entrepreneurial State*, Available at: https://www.sussex.ac.uk/webteam/gateway/file.php?name=2015-28-swps-mazzucato.pdf&site=25.

McMichael, P., 2013. Land grabbing as security mercantilism in international relations. *Globalizations*, 10(1), pp.47–64.

Mehta, L., 2003. Contexts and constructions of water scarcity. *Economic and Political Weekly*, 38.

Mehta, L., Franco, J. & Veldwisch, G.J., 2013. The Global Politics of Water Grabbing. *Third World Quarterly*, 34(9), pp.1651–1675. Available at: http://www.tandfonline.com/doi/abs/10.1080/01436597.2013.843852%5Cnhttp://www.tandfonline.com/doi/abs/10.1080/01436597.2013.843852#preview%5Cnhttp://www.tandfonline.com/doi/abs/10.1080/01436597.2013.843852#.UpQ6l8RmiSo.

Mehta, L., Veldwisch, G.J. & Franco, J., 2012. Introduction to the Special Issue: Water Grabbing? Focus on the (Re) appropriation of Finite Water Resources. *Water Alternatives*, 5(2), pp.193–207.

Menga, F., 2016. Domestic and International Dimensions of Transboundary Water Politics. *Water Alternatives*, 9(3), pp.704–723. Available at: http://www.water-alternatives.org/index.php/alldoc/articles/vol9/v9issue3/322-a9-3-17/file.

Meyer, G., 1998. *Economic changes in the newly reclaimed lands: from state farms to small holdings and private agricultural enterprises*,

Mirumachi, N., 2015. *Transboundary water politics in the developing world.*, New York: Routledge.

Mirumachi, N. & Allan, J., 2007. Revisiting transboundary water governance: Power, conflict cooperation and the political economy. *... Adaptive and Integrated Water ...*, pp.1–21. Available at: http://www.newater.uni-osnabrueck.de/caiwa/data/papers session/F3/CAIWA-FullPaper-

MirumachiAllan25Oct07submitted2.pdf.

Mitchell, T., 1991. Mitchell - Limits of the State.pdf. *American Political Science Review*, 85(1), pp.77–96.

Mitchell, T., 2002. *Rule of experts : Egypt, techno-politics, modernity*, Berkeley, Calif.: London: University of California Press.

Mitchell, T., 1995. The object of development: America's Egypt. In J. Crush, ed. *Power of Development*. Padstow: Routledge, pp. 129–157.

Mohamed, A.K., 2016. Application of DC resistivity method for groundwater investigation, case study at West Nile Delta, Egypt. *Arabian Journal of Geosciences*, 9(1), pp.1–9.

Molle, F.. et al., 2010. Villains or heroes? Farmers' adjustments to water scarcity. *Irrigation and Drainage Systems*, 59(4), pp.419–431.

Molle, F., Mollinga, P.P. & Wester, P., 2009. Hydraulic bureaucracies and the hydraulic mission: Flows of water, flows of power. *Water Alternatives*, 2(3), pp.328–349.

Moneim, A.A.A., Zaki, S. & Diab, M., 2014. Groundwater Conditions and the Geoenvironmental Impacts of the Recent Development in the South Eastern Part of the Western Desert of Egypt. *Journal of Water Resource and Protection*, 06(04), pp.381–401. Available at: http://www.scirp.org/journal/doi.aspx?DOI=10.4236/jwarp.2014.64040.

Mosse, D. & Sivan, M., 2003. *The rule of water: statecraft, ecology and collective action in South India.*, Oxford University Press.

Mourshed, M., 1995. *Rethinking Irrigation Technology Adoption: Lessons from the Egyptian Desert*,

Mulligan, M., Keulertz, M. & Mckee, M., 2017. WORKING PAPERS ENVIRONMENTAL FACTORS IN THE MENA REGION : A SWOT ANALYSIS. , (4).

MWRI, 2005. *National water resources plan for Egypt – 2017*, Cairo, Egypt.

MWRI & HCWW, 2011. *Wastewater reuse in Egypt: opportunities and challenges.*, Cairo.

National Investment Authority, 2013. *Directory of Proposed Investment Projects*, Available at: http://sudaninvest.biz/nia/images/documents/pdf/Projects_Book2013.pdf .

National, T., 2012. Egypt's new Nile Valley: grand plan gone bad.

Nicol, A. & Cascão, A.E., 2016. Sudan,'kingmaker'in a new Nile hydropolitics: Negotiating water and hydraulic infrastructure to expand large-scale irrigation. In *Land and Hydropolitics in the Nile River Basin*. Routledge, pp.

105–132.

Nile Basin Initiative, 2012. *OneRiver One People OneVision*, Entebbe: NBI.

Norman, E.S., Bakker, K. & Cook, C., 2012. Water governance and the politics of scale : How thinking critically about scale can help create better water governance. *Water Alternatives*, 5(1).

Oosterbaan, R.J., 1999. *Impacts of the Irrigation Improvement Project on Drainage Requirements and Water Savings in Egypt*, Wageningen. Available at: https://www.waterlog.info.

Oxford Business Group, 2013. Saudi Arabia: Overseas investments to boost food security. Available at: http://www.oxfordbusinessgroup.com/news/saudi-arabia-overseas-investments-boost-food-security. [Accessed November 25, 2017].

Pahl-wostl, A.C., Gupta, J. & Petry, D., 2008. Governance and the Global Water System : A Theoretical Exploration. *Global Governance*, 14(December 2008), pp.419–435.

Pahl-Wostl, C., 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19(3), pp.354–365.

Parkes, L., 2013. The Politics of 'Water Scarcity' in the Nile Basin: the Case of Egypt. *Journal of Politics & International Studies,*, 9(Summer), pp.433–480.

Pearce, F., 2012. Saudi Arabia Stakes a Claim on the Nile. *National Geographic News*. Available at: https://news.nationalgeographic.com/news/2012/12/121217-saudi-arabia-water-grabs-ethiopia/ [Accessed November 15, 2015].

Postel, S., 1996. Sharing the rivers. *People & the planet*, 5(3), pp.6–9.

Qalaa Holdings, 2017. Wafra. Available at: http://www.qalaaholdings.com/subsidiaries/wafra [Accessed June 5, 2017].

Ranganathan, R., M, C. & Briceño-Garmendia, 2011. *Africa Infrastructure Country Diagnostic (AICD), Sudan's Infrastructure A Continental Perspective*, Washington, DC.

Rap, E., Molle, F. & Al-agha, D.E., 2015. *Branch Canal Water User Associations in the Central Nile Delta*,

Reed, M.G. & Bruyneel, S., 2010. Rescaling environmental governance, rethinking the state: A three-dimensional review. *Progress in Human Geography*, 34(5), pp.646–653. Available at: http://journals.sagepub.com/doi/10.1177/0309132509354836.

Regeni, G. & Auktor, V.G., 2017. *The Developmental State in the 21st Century: Calling for a New Social Contract*, Available at: http://www.diegdi.de/uploads/media/DP_5.2017.pdf.

Ribot, J., 2004. *Waiting for democracy: the politics of choice in natural resource decentralization*, Washington, DC.

Saad, R., 2002. Egyptian politics and the tenancy law. In R. Bush, ed. *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform*. Malaysia: Zed Books, pp. 103–125.

Saber, K., 2006. *Agrarian policy, legislation and violations of Human Rights in Egypt: Land privatization and farmers evictions in Egyptian countryside*, Cairo, Egypt. Available at: http://base.d-p-h.info/en/fiches/dph/fiche-dph-6922.html.

Sadler, M. & Magnan, N., 2011. Grain import dependency in the MENA region: risk management options. *Food Security*, 3(S1), pp.77–89.

Salman, S.M.A., 2016. The Grand Ethiopian Renaissance Dam: the road to the declaration of principles and the Khartoum document. *Water International*.

Sandstrom, E., Oestigaard, T. & Jägerskog, A., 2016. Changing challenges: new hydropolitical landscapes in the Nile Basin. In *Land and Hydropolitics in the Nile River Basin*. Routledge, pp. 17–29.

Satoh, M. & Aboulroos, S., 2017. *Irrigated Agriculture in Egypt* M. Satoh & S. Aboulroos, eds., Cham: Springer International Publishing. Available at: http://link.springer.com/10.1007/978-3-319-30216-4.

Schmeier, S., 2010. Governing International Watercourses - Perspectives from Different Disciplines: A Comprehensive Literature Review. *SSRN Electronic Journal*. Available at: http://www.ssrn.com/abstract=1658899.

Scoones, I. et al., 2013. The politics of evidence : A response to Rulli and D ' Odorico. *The Journal of Peasant Studies*, 40(5), pp.911–912.

Scott, J.C., 1998. *Seeing Like a State*, Yale University Press. Available at: http://www.jstor.org/stable/j.ctt1nq3vk.

Sebastian, A.G. & Warner, J.F., 2013. Geopolitical drivers of foreign investment in African land and water resources. *African Identities*, (June 2014), pp.1–18. Available at: http://dx.doi.org/10.1080/14725843.2013.868669.

Selby, J., 2003. Dressing up domination as 'cooperation': the case of Israeli-Palestinian water relations. *Review of International Studies*, 29(1), pp.121–138.

Shapland, G., 1997a. *Rivers of discord: international water disputes in the Middle East.*, London: Hurst.

Shapland, G., 1997b. *Rivers of discord: international water disputes in the Middle East. London : Hurst*,

Siddig, K.H., 2012. *Agricultural Oil and Agriculture in the Post-Separation Sudan*

Working Paper Series, Khartoum.

Sims, D., 2015. *Egypt's Desert Dreams: Development Or Disaster?*, American University in Cairo Press.

Skold, M.D., El Shinnawi, S.A.A.. & Nasr, M.L., 1984. Irrigation water distribution along branch canals in Egypt: Economic effects. *Economic Development and Cultural Change*, 32(3), pp.547–567.

Smith, A.D., 1979. *Nationalism in the Twentieth Century*, Oxford: Martin Robertson.

Smith, S., 1986. Drought and water management: the Egyptian response. *Journal of soil and water conservation*, 41(5), pp.297–300.

Sojamo, S. & Larson, E.A., 2012. Investigating food and agribusiness corporations as global water security, management and governance agents: The case of Nestlé, Bunge and Cargill. *Water Alternatives*, 5(3), pp.619–635.

Solieman, N., Othman, A. & M.Hassan, 2013. The possibility of activating the economic integration between Egypt and Sudan. *Middle East Journal of Agriculture Research*, 3(4), pp.186–195.

Sowers, J., 2011. Remapping the Nation, Critiquing the State: Environmental Narratives and Desert Land Reclamation in Egypt. *Environmental Imaginaries of the Middle East and North Africa*, (September), pp.158–191. Available at: http://www.scopus.com/inward/record.url?eid=2-s2.0-84904078736&partnerID=40&md5=f9226042a4f34f4223778ad63d319aa5 .

Springborg, R., 1979a. Patrimonialism and policy making in egypt: Nasser and sadat and the tenure policy for reclaimed lands. *Middle Eastern Studies*, 15(1), pp.49–69.

Springborg, R., 1979b. Sayed bey marei and political clientelism in Egypt. *Comparative Political Studies*, 12(3), pp.259–288.

Srivastava, S. & Mehta, L., 2014. *Not Another Nexus? Critical Thinking on the New Security Convergence in Energy, Food, Climate and Water*, Brighton.

Stahl, R. & Ramadan, A.B., 2008. *Environmental Studies on Water Quality of the Ismailia Canal, Egypt. Scientific Report, Forschungszentrum Karlsruhe in der Helmholtz-Gemeinschaft Wissenschaftliche Berichte FZKA 7427, p. 58.*,

Standard Bank, 2012. *EM10 and Africa: Saudi Arabia - Africa's food potential draws attention*, South Africa.

Sudan Tribune, 2015. Egyptian President calls for promoting agricultural cooperation with Sudan. Available at: http://www.sudantribune.com/spip.php?article55679 [Accessed March 5, 2016].

Swedberg, R., 2015. The state, the market, and society. Contexts. , 14(3), p.58–59.

Swyngedouw, E., 1999. Modernity and Hybridity: Nature, *Regeneracionismo,* and the Production of the Spanish Waterscape, 1890–1930. *Annals of the Association of American Geographers*, 89(3), pp.443–465. Available at: http://www.tandfonline.com/doi/abs/10.1111/0004-5608.00157.

Swyngedouw, E., 2007. Technonatural revolutions: The scalar politics of Franco's hydro-social dream for Spain, 1939-1975. *Transactions of the Institute of British Geographers*, 21(1), pp.9–28.

Tawfik, R., 2016. The Grand Ethiopian Renaissance Dam: a benefit-sharing project in the Eastern Nile? *Water International*.

The National, 2012. Abu Dhabi firm sets sights abroad to grow animal feed. Available at: https://www.thenational.ae/uae/abu-dhabi-firm-sets-sights-abroad-to-grow-animal-feed-1.386459?videoId=5585868180001 [Accessed November 24, 2017].

The National, 2011. Egypt revives Abu Dhabi company's $500m project cancelled after revolution. Available at: http://www.thenational.ae/featured-content/channel-page/business/middle-teasers-list/egypt-revives-abu-dhabi-companys-500m-project-cancelled-after-revolution [Accessed July 12, 2016].

The Worldflio, 2015. An agricultural revolution by Amtaar Investment. Available at: http://www.theworldfolio.com/news/an-agricultural-revolution-by-amtaar-investment/3733/ [Accessed October 10, 2015].

Tignor, R., 2010. *Egypt: A Short History*, Princeton University Press. Available at: http://www.jstor.org/stable/j.ctt7rjf4.1.

Timmerman, M.N., 2013. *WATER CONSUMPTION IN THE MIDDLE EAST AND NORTH AFRICA (MENA) REGION : A VIRTUAL WATER APPROACH A Thesis Submitted to the Public Policy and Administration Department*. The AmericanUniversity in Cairo.

Turton, A., 2000. *A Cryptic Hydropolitical History of the Nile Basin for Students of Hydropolitics. Study Guide for Pretoria University. Pretoria*,

Turton, A., 2008. A South African perspective on a possible benefit-sharing approach for transboundary waters in the SADC region. *Water Alternatives*, 1(2), pp.180–200.

Turton, A. et al., 2007. *Back to the future: A South African perspective on Mar del Plata and beyond. Paper presented at the Second International Experts Meeting, Thirtieth Anniversary of Mar del Plata: Achievements and Expectations, Zaragoza, Spain, 12-14 March 2007*,

Tutwiler, D.R. et al., 2013. Impact of Population Growth and Climate Change in Lebanon on Water Scarcity, Agricultural Output and Food Security. *Submitted to FHI360 as part of larger study involving American University in Cairo and Columbia University and funded by the USAID (grant number 4345-03-FOG-2013-01*, (December).

United Nations, 1978. Register of international rivers. *Water Supply and Management*, 2(1), pp.1–58.

USAID, 1992. *Country Program Strategy FY 1992 – 1996: Egypt*, Cairo.

Verhoeven, H., 2016. Briefing african dam building as extraversion: The case of sudan's dam programme, nubian resistance, and the saudi-iranian proxy war in yemen. *African Affairs*, 115(460), pp.562–573.

Verhoeven, H., 2011. Climate Change, Conflict and Development in Sudan: Global Neo-Malthusian Narratives and Local Power Struggles. *Development and Change*, 42(3), pp.679–707.

Verhoeven, H., 2015a. The nexus as a political commodity: agricultural development, water policy and elite rivalry in Egypt. *International Journal of Water Resources Development*, 31(3), pp.360–374. Available at: http://dx.doi.org/10.1080/07900627.2015.1030725.

Verhoeven, H., 2013. The politics of African energy development: Ethiopia's hydro-agricultural state-building strategy and clashing paradigms of water security. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 371(2002). Available at: http://rsta.royalsocietypublishing.org/content/371/2002/20120411.abstract.

Verhoeven, H., 2015b. *Water, Civilisation and Power in Sudan*, Cambridge University Press.

Vimeo, 2014. *Al Kafa'ah Project*, Available at: https://vimeo.com/90346182.

Warburg, G.R., 1985. Egypt and Sudan: Studies in History and Politics. In London, pp. 65–70.

Warner, J., 2013. The Toshka mirage in the Egyptian desert – River diversion as political diversion. *Environmental Science and Policy*, 30, pp.102–112. Available at: http://dx.doi.org/10.1016/j.envsci.2012.10.021.

Warner, J., 2012. Three lenses on water war, peace and hegemonic struggle on the Nile. *International Journal of Sustainable Society*, 4(1–2), pp.173–193.

Warner, J., Sebastian, A. & Empinotti, V., 2013. Claiming (back) the land: the geopolitics of Egyptian and South African land and water grabs. *Ambiente & Sociedade*, XVI(2,), pp.1–24.

Al Watan, 2017. Egyptian-Sudanese Nile Joint Committee Concludes meeting in Cairo. *Issue 2022 - November 11th 2017*.

Waterbury, J., 1997. Between Unilateralism and Comprehensive Accords: Modest Steps toward Cooperation in International River Basins. *Water Resources Development*, 13(3), pp.279–289.

Waterbury, J., 1979. *Hydropolitics of the Nile valley*, Cambridge.

Wehr, K., 2004. *America's fight over water: The environmental and political effects of large-scale water systems*, New York and London: Routledge.

Wichelns, D., 2001. The role of 'virtual water'in efforts to achieve food security and other national goals, with an example from Egypt. *Agricultural Water Management*, 49(2), pp.131–151.

Willcocks, W. & Craig, J., 1913. *Egyptian Irrigation* 3rd ed. 2., London New York: E. & F. N. Spon Ltd; Spon & Chamberlain.

Wittfogel, K. a, 1953. Oriental Despotism. *Sociologus*, 3(2), pp.96–108.

Woertz, E., 2011. Arab Food, Water, and the Big Landgrab that Wasn't. *The Brown Journal of World Affairs*, xviii(1), pp.119–132.

Woertz, E., 2013a. Explaining the Implementation Gap: Money, Water, and Politics. In O. S. Online, ed. *Oil For Food*. Oxford.

Woertz, E., 2013b. The Governance of Gulf Agro-Investments. *Globalizations*, 10(1), pp.87–104. Available at: http://www.tandfonline.com/doi/abs/10.1080/14747731.2013.760932.

Wolf, A., 1998. Conflict and cooperation along international waterways. *Water Policy*, 1(2), pp.251–265.

Wolf, A., 1999. The Transboundary Freshwater Dispute Database Project. *Water International*, 24(2), pp.160–163.

Wolford, W., 2013. Special Issue on "Governing the Global Land Grab: The Role of the State in the Rush for Land." *Development and Change*, 44(2).

Wolters, W. et al., 2016. Issues and Challenges in Spatial and Temporal Water Allocation in the Nile Delta. *Sustainability*, 8(4), p.383. Available at: http://www.mdpi.com/2071-1050/8/4/383.

World Bank, 1983. *Arab Republic of Egypt: Selected Issues in Agriculture, Irrigation, and Land Reclamation*,

World Bank, 2015. Sudan Metadata World Development Indicators. Available at: http://data.worldbank.org/country/sudan.

World Bank, 2012. *West Delta Water Conservation and Irrigation Rehabilitation Project*, D.C.

Worster, D., 1985. *Rivers of empire: Water, aridity, and the growth of the American West*, Oxford: Oxford University Press.

Worster, D., 1983. Water and the flow of power. *ECOLOGIST, 13(5), 168-174.*

Xenos, 1989. *Scarcity and Modernity*, London: Routledge.

Yin, R., 1984. *Case Study Research*, Beverly Hills.

Zain, M.E., 2007. *Environmental Scarcity, Hydropolitics and the Nile*. Institute of Social Studies.

Zalla, T. et al., 2000. *vailability and Quality of Agricultural Data for the New Lands in Egypt". Monitoring, Verification, and Evaluation Unit, Agricultural Policy Reform Program, Impact Assessment Report No. 12*,

Zeitoun, M. et al., 2013. Introduction: A battle of ideas for water security. In *Water Security: Principles, Perspectives, and Practices*. pp. 3–10.

Zeitoun, M., Allan, J.A. (Tony) & Mohieldeen, Y., 2010. Virtual water 'flows' of the Nile Basin, 1998–2004: A first approximation and implications for water security. *Global Environmental Change*, 20(2), pp.229–242. Available at: http://dx.doi.org/10.1016/j.gloenvcha.2009.11.003.

Zeitoun, M. & Jagerskog, A., 2009. *Confronting power: Strategies to support less powerful states. Getting Transboundary Water Right: Theory and Practice for Effective Cooperation*,

Zeitoun, M. & Warner, J., 2006. Hydro-hegemony - A framework for analysis of trans-boundary water conflicts. *Water Policy*, 8(5), pp.435–460.

Zetland, D. & Möller-Gulland, J., 2012. *The political economy of land and water grabs*, Available at: PERC Research Paper, (12-21).

Annex 1

List of Fieldwork Interviews

Interview Reference #	Interviewee /Data Source	Date/Location
Interview # 1	Water and Agriculture NGO I /Academic Researcher	November 17th, 2015 – Cairo
Interview # 2	Water and Agriculture NGO I/Senior Water and Irrigation Specialist	December 10th 2015 – Cairo
Interview # 3	Water and Agriculture NGO II/ Activist	November 11th 2015 - Cairo
Interview # 4	Egypt Senior Policy Maker 1	October 13th & October 22nd 2015 – Cairo
Interview # 5	Egypt Senior Policy Maker 2	November 2015
Interview # 6	Egypt Senior Policy Maker 3	March 15th, 2015 – Cairo
Interview # 7	Egypt Senior Policy Maker 4	November 2016
Interview # 8	Senior Advisor / think tank (quasi official)	February 8th & June 4th 2015 – Cairo
Interview # 9	Egypt Government –Technical Officer Agriculture Research Centre (ARC)	June 20th 2015 – Ministry of Agriculture - Cairo
Interview # 10	Egypt Government Senior official MWRI Planning Sector	September 28th, 2016 – Cairo - MWRI
Interview # 11	Government Interview Foreign Affairs 1	February, 26th, 2016 – Cairo - MFA
Interview # 12	Government Interview Foreign Affairs 2	September 14th, 2015 – Cairo
Interview # 13	Egyptian-German Water Management Reform Program (WMRP)	January 4th, 2016 – Cairo – Ministry of Agriculture
Interview # 14	Sudan Senior Policy Maker	August 30th, 2016 Stockholm- Sweden
Interview # 15	Ethiopia Senior Policy Maker	September 1st, 2016, Stockholm- Sweden
Interview # 16	Egypt Private Investor Agri 1 Largest Solar-water pumping	November 1st 2015 – Cairo
Interview # 17	Egypt Private Investor Agri 2	November 22nd, 2015 – Cairo/field
Interview # 18	Gulf Private Investor 3 in Egypt – senior Egyptian manager	February 24th 2016
Interview # 19	Gulf Private Investor 4 in Egypt - expat	March 2nd, 2016 – Cairo
Interview # 20	Gulf Private Investor 5 in Egypt - expat	March 8th, 2016 – Al Salheya
Interview # 21	Gulf Private Investor 6 in Egypt - senior Egyptian manager	March 13th, 2016 – Al Nubareya
Interview # 22	Egypt domestic Private Investor 7	March 17th, 2016 – Al Nubareya
Interview # 23	Egypt-Africa Private Equity Fund 1	November 5th 2015 – Cairo
Interview # 24	Egypt-Africa X CEO Private Equity Fund - Sudan Investment 2	June 10th 2015 – Cairo
Interview # 25	Egypt-Africa Private Equity Fund – Investment Officer – South Sudan 1	April 2015 - Cairo
Interview # 26	Egyptian private sector agricultural investor in Sudan (small/medium)	January 10th 2015 – Cairo
Interview # 27	Sudanese large-scale Private Sector Investor in Sudan	December 13th 2016 – Khartoum
Interview # 28a	Senior FAO Specialist	February 4th, 2015 – FAO

		office Cairo
Interview # 28b	Senior FAO Specialist	October 25, 2015 – FAO office Cairo
Interview # 29	FAO Investment Officer – Near East and North Africa	October 25, 2015 – FAO office Cairo
Interview # 30	FAO Water Scarcity Initiative – Near East and North Africa	April 6th, 2016 - – FAO office Cairo
Interview # 31	COMESA	February 8th, 2015 – Cairo
Interview # 32	Principal Irrigation Officer – Regional Development Bank	March 5th, 2015 – Cairo – African Environmental Ministerial Conference
Interview # 33	Land Matrix	December 11th, 2014; March 23rd, 2015 – email and skype
Interview # 34	Specialised Egyptian Consulting Firm Feasibility Studies Mega Projects and Infrastructure	December 8th, 2015 – Cairo
Interview # 35	Dutch Consulting Firm	January 20th, 2015 – Skype/email
Interview # 36	USAID Egypt Water and Agriculture Specialist	June 2nd 2016 Cairo
Interview # 37	Sudan and Water Specialist Academic - Arab Gulf University (Gam3et Al Khaleej Al Arabi)	March 4th 2015 – League of Arab States – Cairo
Interview # 38	NBI Secretariat 1	Skype 2015
Interview # 39	NBI ENTRO	September 2016 Stockholm
Interview # 40	NBI Secretariat 2 – Executive Director	December 2016 Khartoum
Interview # 41	Sudanese Civil Society / Activist	August, 30th 2016 Stockholm- Sweden
Interview # 42	Egypt Journalist 1 – Reporter Water and Nile issues	September 2nd, 2016 Stockholm- Sweden
Interview # 43	Egypt Journalist 2 – Reporter Water and Nile issues	September 2nd 2016, Stockholm- Sweden
Interview # 44	Int'l Water Law Expert	September 1st 2016, Stockholm- Sweden
Interview # 45	Uganda civil Society	September 2nd 2016, Stockholm- Sweden
Interview # 46	ODI/Egypt & Water Specialist	December 3rd, 2014 - Skype
Interview # 47	PhD Researcher Sudan	August 4th, 2015 – Skype
Interview # 48	Financial and Natural Resources Research Fellow – MENA region	February 26th 2015 - skype
Interview # 49	Academic/Sudan Specialist	March 11th, 2015 - Skype
Interview # 50	PhD Researcher Mega Projects	August 2nd 2015 & November 26th 2015 - Skype
Interview # 51	Academic / Research Expert Egypt US based	June 1st 2016 - Skype
Interview # 52	Professor / Research Expert Egypt US based	September 1st 2015 - Skype
Interview # 53	SIWI	September 30th, 2014 – Skype/email
Interview # 54	Al Salheya water user/ Site Interview	March, 2016 - Kassara
Interview # 55	Al Salheya water user/ Site Interview	March, 2016 – Kassara
Interview # 56	Al Salheya water user/ Site Interview	March, 2016 - Kassara
Interview # 57	Al Salheya water user/ Site Interview	March, 2016 - Kassara
Interview # 58	Al Salheya water user/ Site Interview	March, 2016 Kassara
Interview # 59	Al Salheya water user/ Site Interview	March, 2016 Kassara
Interview # 60	Al Salheya water user/ Site Interview	March, 2016 Kassara
Interview # 61	Al Salheya water user/ Site Interview	March, 2016 Kassara

Interview # 62	Al Salheya Site Interview	March, 2016 Kassara
Interview # 63	Al Salheya Site Interview	March, 2016 Kassara
Interview # 64	Al Nubareya Site Interview	March, 2016– Al Nubareya
Interview # 65	Al Nubareya Site Interview	March, 2016– Al Nubareya
Interview # 66	Al Nubareya Site Interview	March, 2016– Al Nubareya
Interview # 67	Al Nubareya Site Interview	March, 2016– Al Nubareya
Interview # 68	Al Nubareya Site Interview	March, 2016 – Al Nubareya
Interview # 69	Al Nubareya Site Interview	March, 2016 – Al Nubareya
Interview # 70	Interview Australian Academic and Water Expert	Kigali October 2017
Interview #71	Interview IFPRI	November 11th, 2014 - Skype
Interview #72	Senior World Bank Expert / Academic Sudan	Khartoum December 12th 2016
Field Notes and Official Meetings		
Meeting Notes # 1	Sustainable Consumption and Production Action Plan Water Sector I	June 21st, 2015 - Meeting in Ministry of Environment (note: Meetings 1 to 6) Senior Policy Makers WorkGroup Meeting under Switchmed-UNEP SDG)
Meeting Notes # 2	Sustainable Consumption and Production Action Plan Agriculture Sector I	Meeting in Ministry of Environment – July 5th 2015
Meeting Notes # 3	Sustainable Consumption and Production Action Plan Energy Sector I	Meeting in Ministry of Environment – June 21st 2015
Meeting Notes # 4	Sustainable Consumption and Production Action Plan Water Sector II	Meeting in Ministry of Environment – June 24th 2015
Meeting Notes # 5	Sustainable Consumption and Production Action Plan Agriculture Sector II	Meeting in Ministry of Environment – August 24th 2015
Meeting Notes # 6	Consumption and Production Action Plan Energy Sector II	Meeting in Ministry of Environment - August 19th 2015
Meeting Notes # 7	GIZ-League of Arab States Nexus Roundtable – Arab Region	March 4th 2015 – League of Arab States – Cairo
Meeting Notes # 8	Nile COMESA Meeting	Meeting in Cairo May 28th 2016

Annex 2

Infrastructure Investments by the Entrepreneurial State

	Toshka	**East Oweinat**	**North Sinai**
Area	540,000 feddan	500,000 feddan	620,000 feddan
Water supply	▪ Mubarak pump station : 24 pumps ▪ El-Sheikh Zaied Canal : main Canal of length 52 Km ,divided into four branches 40 Km. each . ▪ Irrigation water free from waste with degree of salinity 200 particles per million . ▪ 7 wells /each well irrigates 30-50 feddan with degree of salinity between 600-800 particles per million	Wells, by using pivotal irrigation systems .	▪ El-Salam Canal crossing to Sinai through four tunnels underneath the Suez Canal ,with length extending 87 Km inside the peninsula. ▪ El-Sheikh Gaber Canal,175 Km. length inside Sinai.
Electricity	Power grid available + 20 MW solar power station (only inaugurated in November 2017)/ prior to that, investors complained from reliability of access to electricity	Not specified	Grid
Roads	Roads connect Toshka to Aswan (200 km) and Abu Simble Airport (50 Km) and 700 Km from Safaga Maritime Port.	Airport East Owainat	6,000 Km. roads and railway project with unclear status
Cost of infrastructure	The Government paid L.E 5,780 million on infrastructure as follows: Pumps station L.E 1,480 million; El-Sheikh Zaied Canal L.E 4,000 million; high voltage transforming station and connection grid L.E 300 million.	Not specified	Not specified
Cost of land and services	▪ Price of feddan: L.E 50 ▪ Price of water : 16 cents /m3 ▪ Infrastructure / feddan : L.E. 12-15 thousand. ▪ Operational costs: L.E 350 ▪ Electricity :3.4 cents / K.W .H		

(Source: Unpublished GAFI data)

Annex 3. Compiled Table GCC Investments in Nile Basin

Location	Investor / Home Country	Water Source	Production Size (ha)	Potential Size [ha]	Crop	Comments
Egypt / Sharq Al Oweinat	Jenaan UAE	Underground water / great Nubian Sand Aquifer	Exact production size not know but is large;	20,000	Wheat	Water is pumped from the Nubian Sandstone Aquifer; wheat production for local markets
Egypt/ Toshka	Al Rajhi KSA	Nile Water / Lake Nasser	6,300	42,000	Wheat Alfa alfa	
Egypt/ Al Salheya	Al Dahra UAE	Nile Water/Ismailia Canal	3,200	4500	Wheat Alfa alfa Citrus	
Egypt/ Al Nubareya	Al Dahra UAE	Nile Water/Nasr Canal + underground water	300	300	Citrus	
Egypt/ Toshka	Al Dahra UAE	Nile Water / Lake Nasser	20,000	100,000	Wheat Alfa alfa	
Egypt/ Sharq Al Oweinat	Al Dahra UAE	Underground water / great Nubian Sand Aquifer	15,000	50,000	Wheat Alfa alfa	
Sudan /Berber	Al Rajhi Int. Investment /KSA	Underground water	3,800	20,492	Fodder/Food Crops	Operated by Masstock UK
Sudan /Zayed al Khair; Wad Raway	Al Anhar / UAE	Blue Nile Water	5,200	16,800		Project is visible on Google Earth
Sudan/ Al Heemrat	Al Dahra UAE		-	34,802		project implementation has been postponed until further notice

						(interview with Al Dahra executive)
Sudan / Al Dabbah	Jenaan / UAE	water is sourced from the Nubian Sandstone Aquifer;	2,000	31,100		Projects operated by Suidwes Agriculture (RSA);
Sudan / Wadi Hamed	Hassad Food Corporation / Qatar	NA	NA	101,172		Project funded through funds allocated by GoQ for Sudan; electricity shortages are delaying project implementation
Sudan/Wadi Hamid	GLB Invest/Lebanon		~2,000	87,200	fodder	Project visible on Google Earth; recent website: www.glbinvest.com
Sudan/Kosti	Citadel Capital / Qalaa Holding/Egypt	Nile water	7,000	131,000	fodder	Sabina

Source: Author compilations based on (Hillhorst 2015b; Hillhorst 2015a; Landmatrix 2015)