
آليات ترميم الصحراء



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THE MECHANICS OF CONQUERING THE DESERT

The combination of very rapid population growth during the second half of the 20th century and a geographically limited arable area around the Nile Valley and in the Delta Region led Egypt, since the 1960's, to embark on a policy of reclaiming desert land for agriculture. Since then, Egypt has invested effort and money to expand into the desert, putting heavy pressure on the edges of the Nile Valley, and in some ways insinuating that expansion is the only solution to the demographic problem. While it is almost impossible to tell if this is the case, what can be considered as fact is that Egyptians have meanwhile developed their own mechanics of conquering the desert.





Eastern Edges

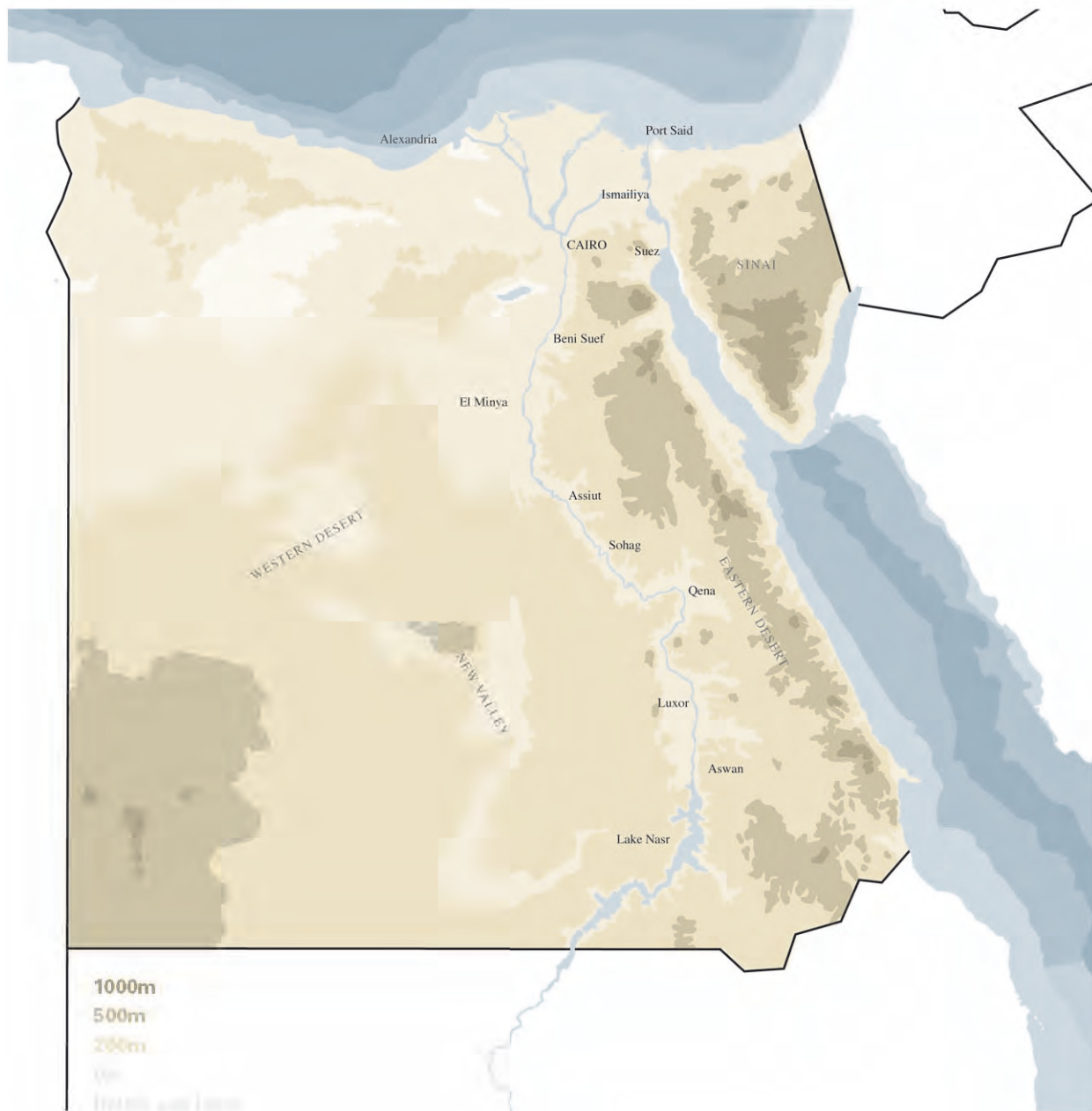


Western Edges

NATURE

Nature is the first element that forms the edges. This is a prerequisite in order to understand the methods of expansion in the edges of the Nile Valley. All of Egypt's ambitious plans for expansion are based on the morphology of the landscape and limited by the scarce resources of water. After all, this specific topographic section of Egypt, created over millennia by fertile alluvial deposits brought by the Nile, is exactly what allowed life in the Valley.





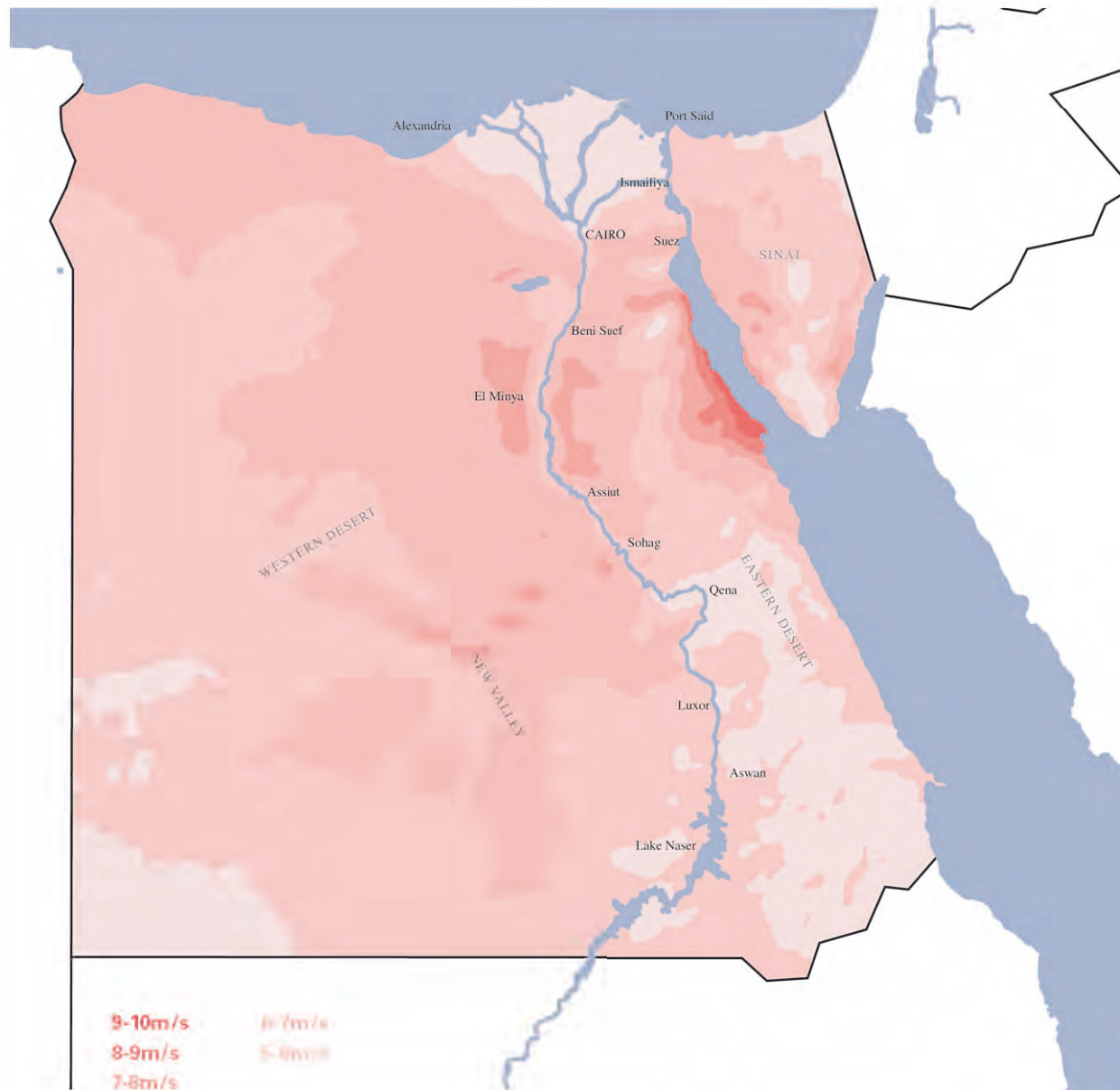
Topography of Egypt

Egypt is primarily a limestone plateau with the exception of the Nile River. Without the topographic channel that permits the Nile to flow across the Sahara, Egypt would be entirely desert. One can read the topographic contour lines as another water level. In Upper Egypt, the raised topography limits the Valley to a narrow strip, but further north towards the Nile Delta the surrounding topography flattens and allows the expansion of arable land both east



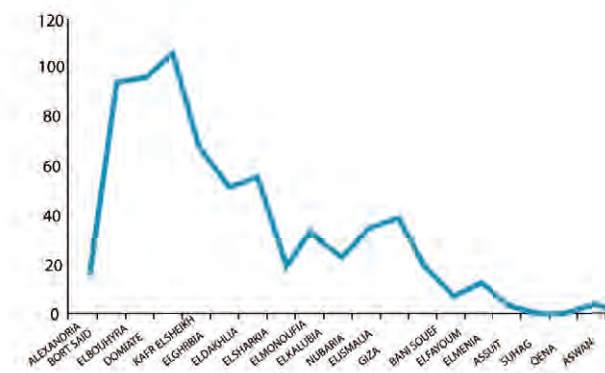
Significance of the Valley

Illustrations like this one above of Nicolas Sanson D' Abeville, Royme, Et Desert de Barca et L'Egypte, in 1679 highlight the importance of the Nile Valley for Egypt as a container of life. The distinction between the flat Valley and the desert is sharp; the valley edges are defined as raised ridge topography of barren hills. Throughout history, the edges were a preferred location for villages since the raised terrain served as protection from the annual floods.



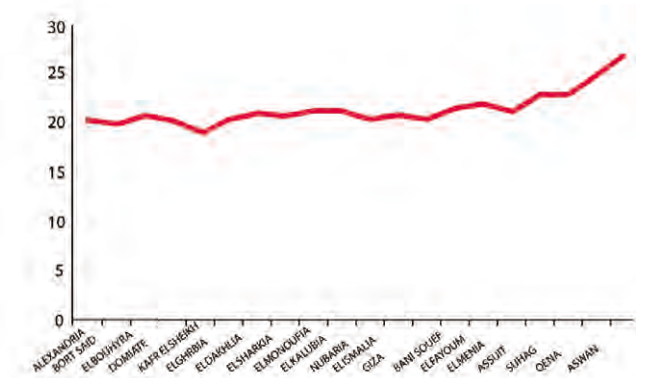
Wind as an Obstacle

Wind can limit agricultural development. A hot spring wind blows across the country and usually arrives in April, March and May, forming small but vigorous low-pressure areas in the Isthmus of Suez and sweeping across the northern coast of Africa. Unobstructed by geographical features, the winds carry large quantities of desert sand and dust. These sandstorms, often accompanied by winds of up to 140 kilometers per hour, can cause temperatures to rise as much as 20° C in two hours. The winds blow intermittently for days, causing illness in people and animals, harming crops, and occasionally damaging houses and infrastructure.



Precipitation

The average annual precipitation in Egypt is very low, with the exception of the Mediterranean coastline. Egypt receives less than 80 mm of precipitation annually in most areas, especially in Assiut, where rainfall is nearly non-existent. This fact indicates the significance of underground water in land reclamation for agricultural use.



Mean temperature

The temperature in Egypt is steadily high, making water evaporation a key issue. As such, it is prohibited by law to use surface irrigation systems in the desert soil. Throughout Egypt, days are commonly warm or hot, and nights are cool. Egypt has only two seasons: a mild winter from November to April and a hot summer from May to October. The only differences between the seasons are variations in daytime temperatures and changes in prevailing winds.



The Nile Valley diminishes into a narrow strip in Assiut, with a width of 13 km. Limestone cliffs on both sides rise 230 m above sea level. In the southwestern edge, topography defines a sharp border between the Valley and the desert. In the eastern edge, gradual topography allows agricultural expansion. The Wadi El Assiuti (Valley of Assiut) is located eastward, between two mountains 10 km from one another. Before turning northwest for 160 km to Assiut, the limestone plateau forces the Nile to change course to the southwest for 60 km. Northward from Assiut, escarpments on both sides diminish; the valley widens to 22 km.

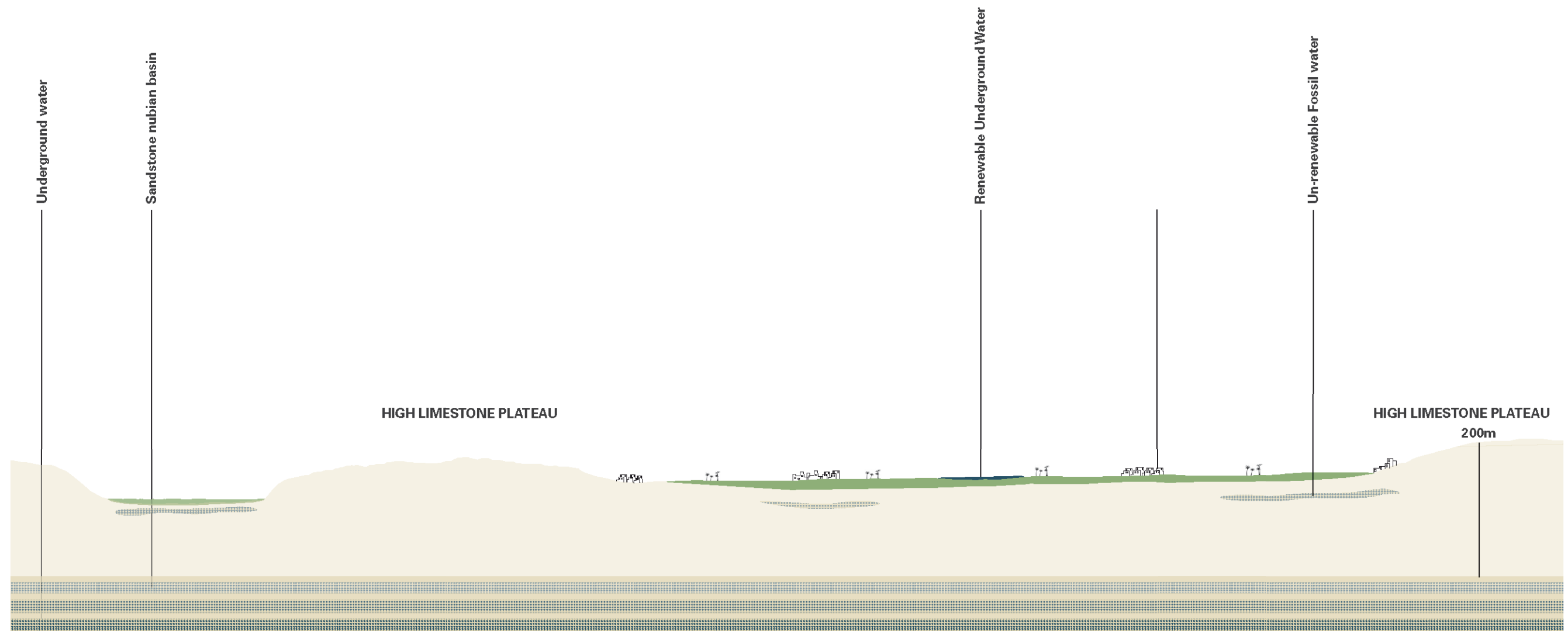
200m above sea level
100m above sea level
50m above sea level

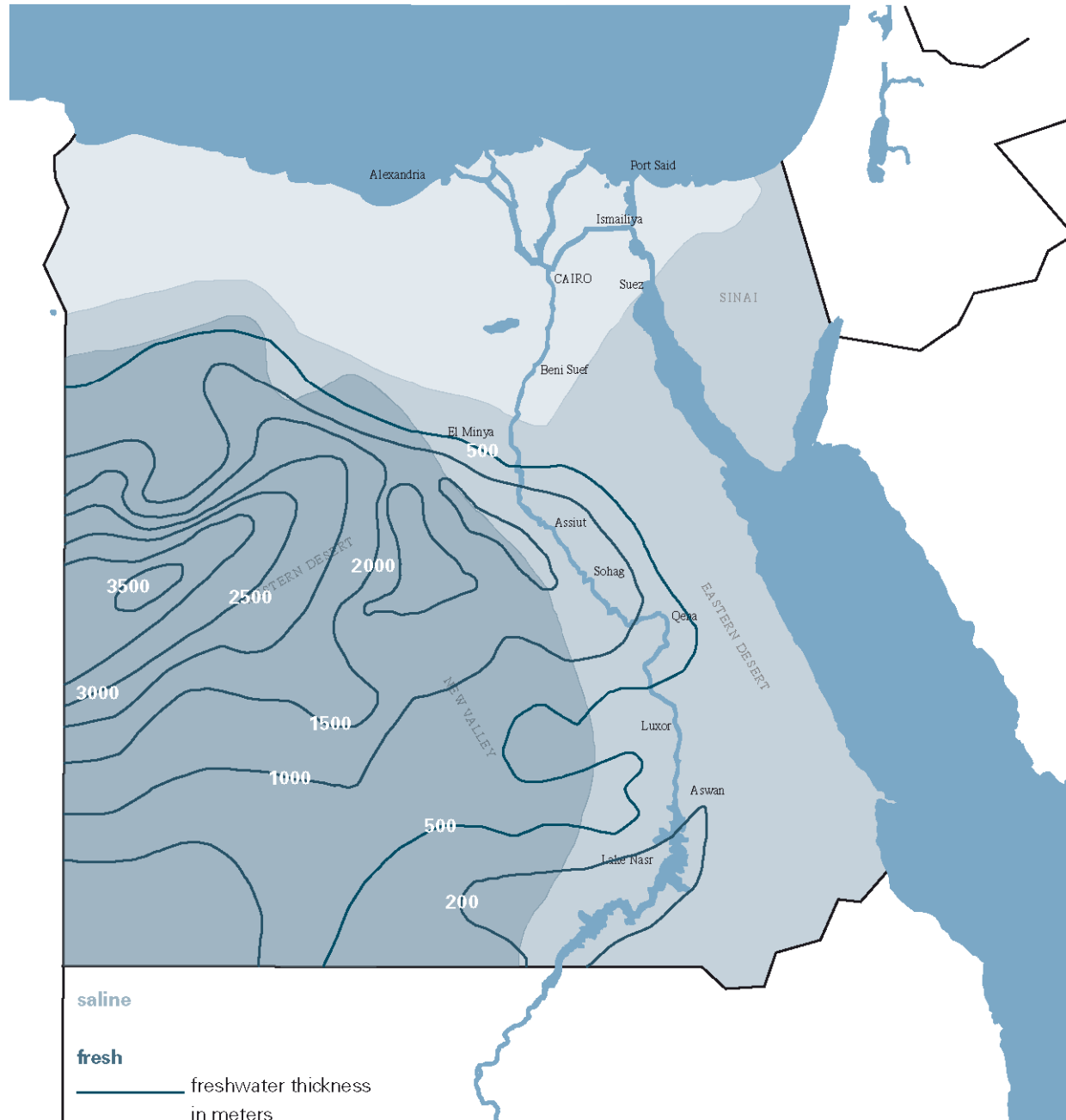


Wadi El Assiuti

SCARCE WATER RESOURCES

It seems to be common knowledge in Egypt that any land can be reclaimed regardless of the soil quality and the wind force as long as you can find water. Water is the basic ingredient in the physical reclamation process. The main water resource in the old lands is Nile water. But when it comes to reclamation, underground water is key. The three main types of underground water are fossil water, underground water which is renewable by the Nile, and deep underground water, the so-called Nubian basin.





Nubian Basin as Water Storage

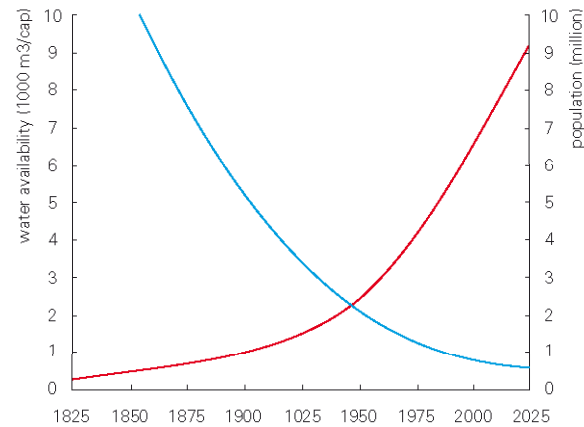
Egypt shares the Nubian Basin underground water layer with Sudan and Libya. It is estimated that the Nubian Basin stores 200 billion m³ of water. Egypt's share is around 66 billion m³ in a level of 0-3 km below the surface.



Deep Aquifer in North Africa: Nubian Basin Layer

Source	Water Quantity		
	1990	2000	2025
Nile water	55.5	55.5	55.5
Reuse of agricultural drainage water	4.6	7	7
Deep groundwater	0.5	2.5	3.8
Treated water	0.2	1.5	1.5
Winter closure water	—	1.0	1.5
Water harvesting (rains etc)	—	—	1.5
Reducing evaporation losses from High Aswan Dam	—	—	2.5
Sea water desalination	—	—	1.5
Total	60.8	67.5	74.3

Main Water Resources in Egypt



Growth in Relation to Water Availability

The population of Egypt in 2025 is estimated at around 9 million, whereas the water availability at less than 1 cubic meter per capita, underlining the extent to which the water resources of Egypt are limited.

How many feddans can be cultivated with the existing water resources?

6mm/ day * 4.2 = 25.2m³ / feddan / day → Daily average of water consumption in Egypt for agricultural use

25.2m³ / feddan / day * 300 days = 7560 / feddan / year

Utilizing 85% of the 74.3 Gm³ agriculture = 63.3 Gm³ → Sum of water resources in Egypt

This amount may irrigate 63.3 Gm³ / 7560 m³ = **8.333 Mfeddans**

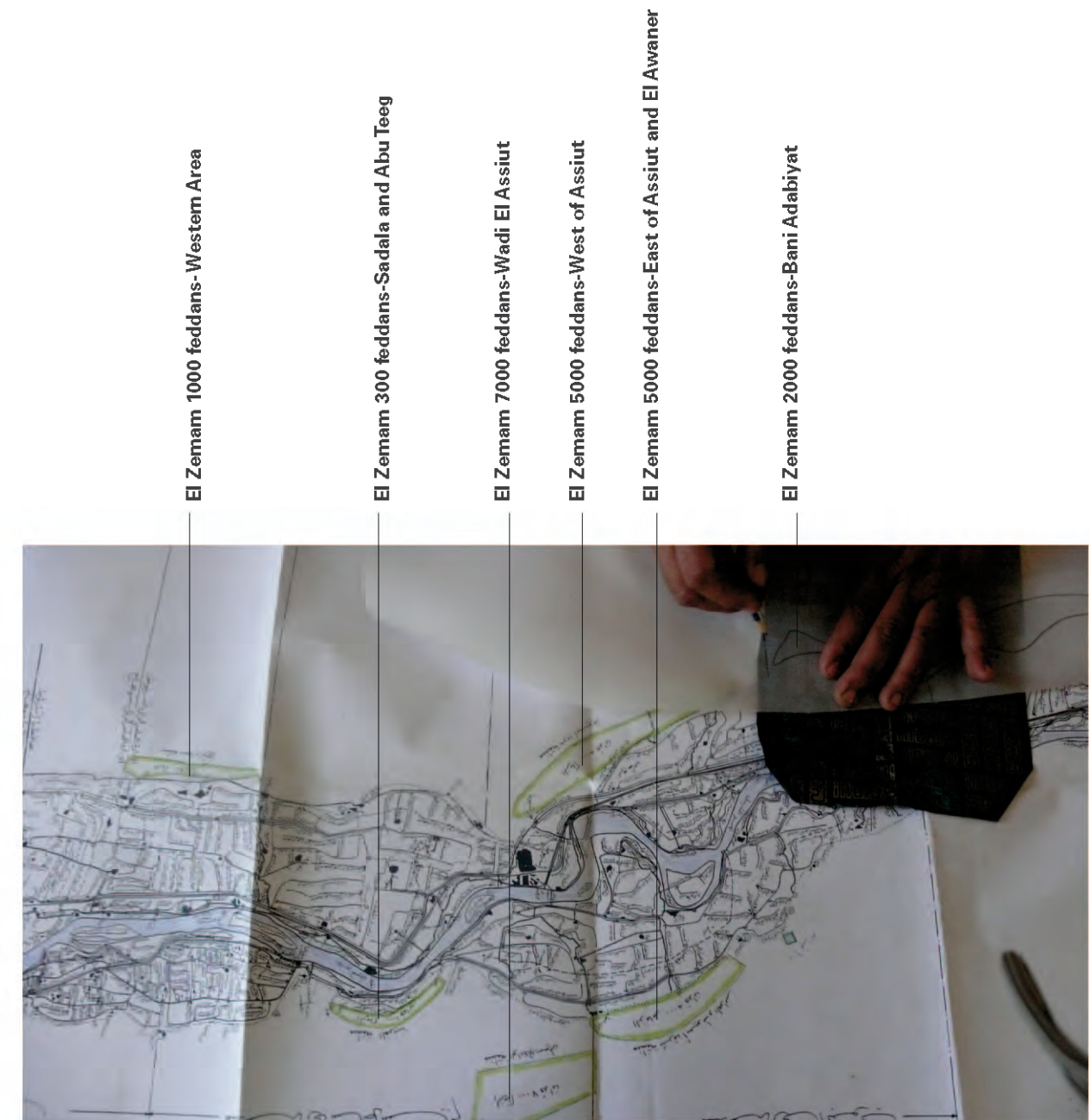
This is the already cultivated land in Egypt.
10 Mfeddans is the limit.

To expand further into the desert:

- modify their irrigation methods and save as much water as possible
- start producing types of plants with high tolerance in salinity wind and waste water

There is a Limit to the Expansion

According to Dr. D. Mohsen Gameh of Assiut University's Soil and Water Sciences Department, this is the mathematical estimation of Egypt's expansion limits based on available water resources and already reclaimed land. Although, it was impossible to confirm these numbers, due to complex and inefficient data collection system in Egypt and the inevitable uncertainty that the numbers correspond to reality, they indicate critical circumstances in Egypt regarding agricultural expansion.



New Lands on an Old Map

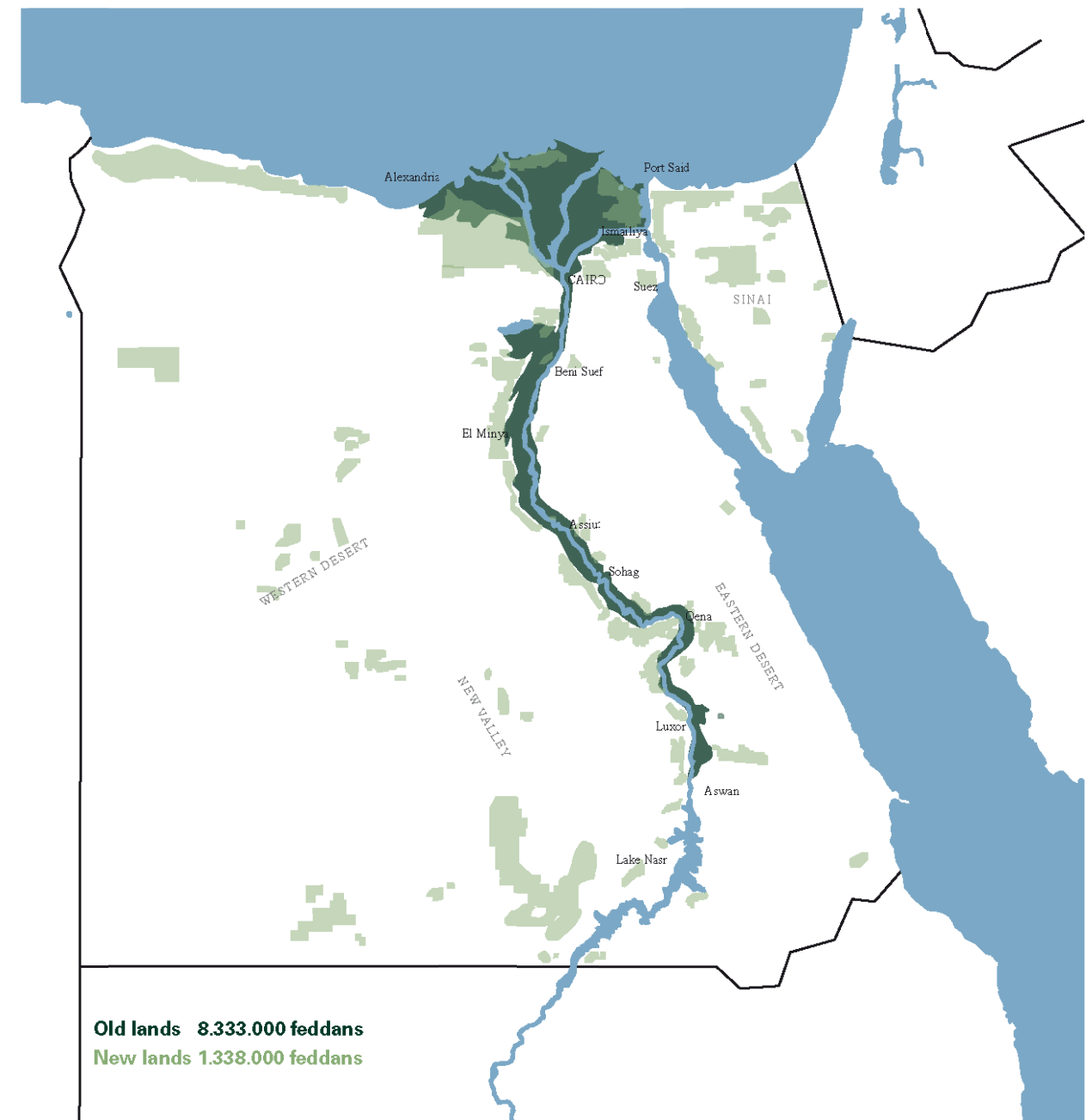
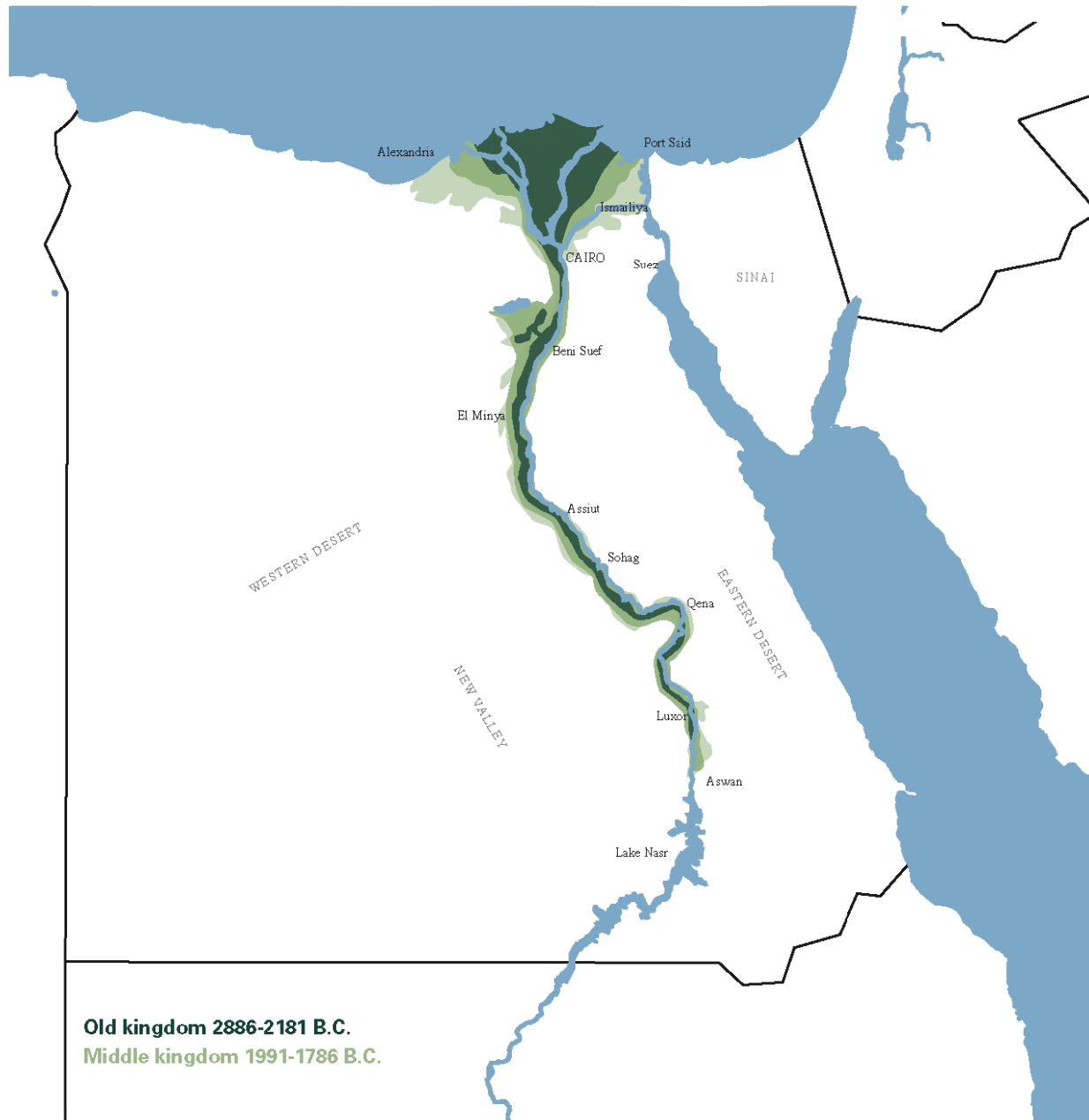
The "Pen for drawing" branch office of Assiut's Ministry of Water Management and Irrigation is planning ongoing governmental projects on a map drafted in 1965. The areas inside the green perimeter are land reclamation projects, with dimensions and geographic information, yet small-scale informal land reclamation is not noted. By using this outdated map as a base, Egypt is mapping the future on the past and that easily leads to false management.



Struggle for Water in Wadi El Assuiti

This almost anthropological image of the Nile Valley with clear distinction between desert and agricultural land no longer exists. On the edges, Egyptians have set themselves free from tradition. Since the 1960s, agricultural reclamation policy of Egypt and all of its consequences—laws, ownership reforms, rules, institutional and physical processes—have formed a new culture of expansion that has greatly impacted life on the edges of the Nile Valley.

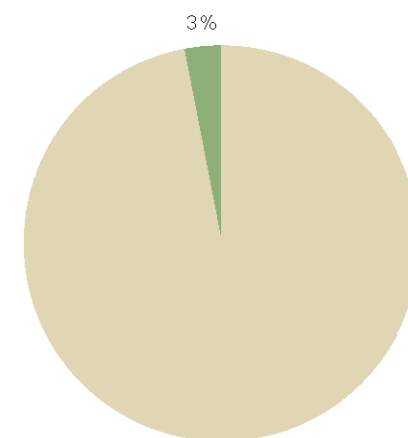
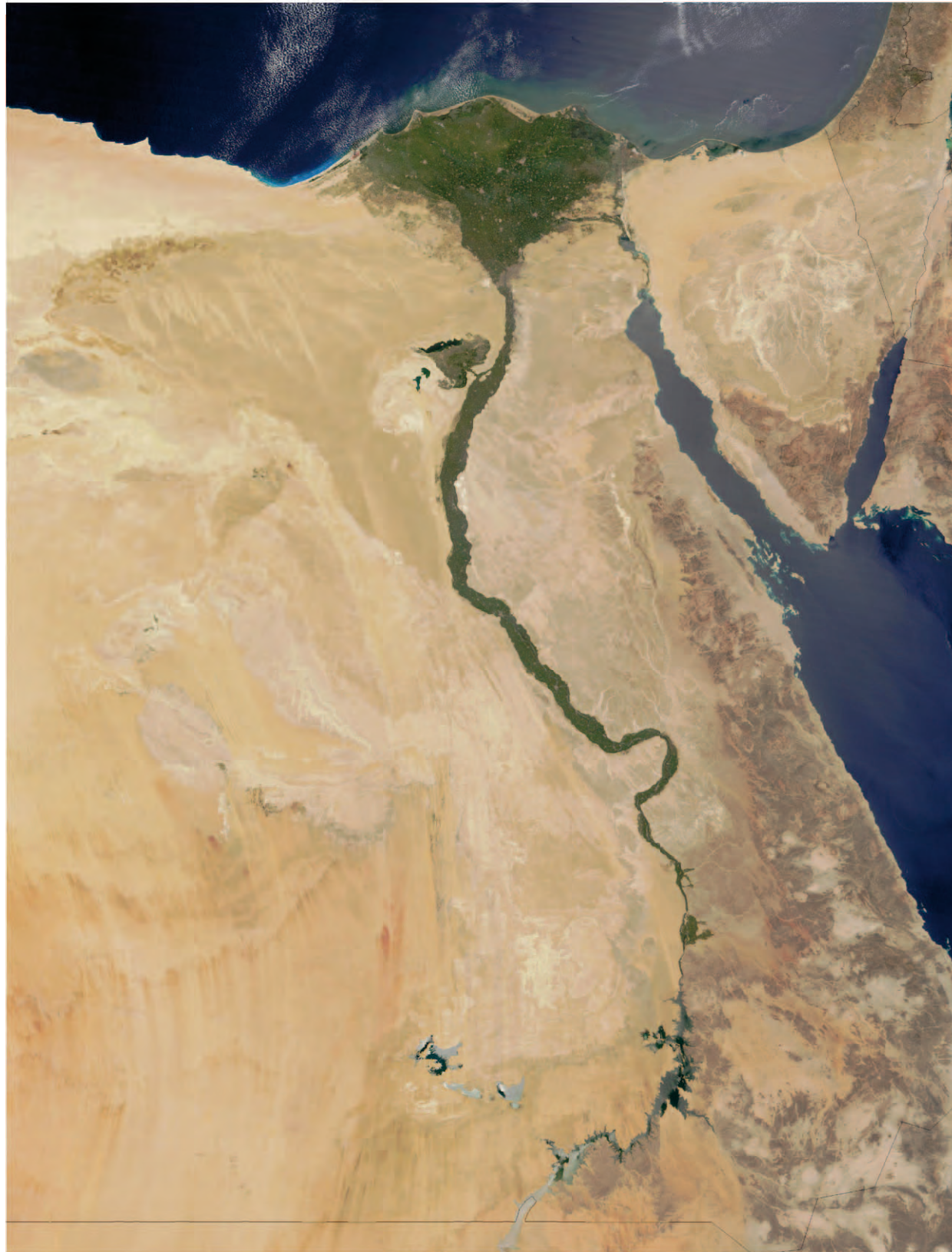




Stages of the Expansion

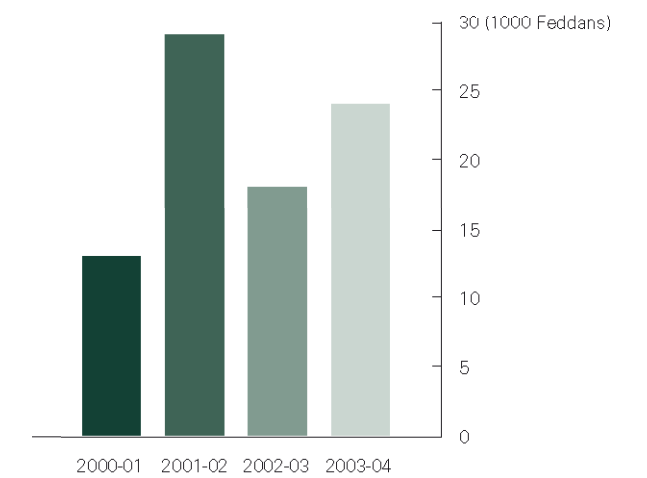
Land reclamation is a process that has been known in Egypt since ancient times, are taking place today as more aggressive activities. Reclamation in the past always depended on Nile floods and developed along the Valley. It is worthwhile to note the contradiction between this map illustrating the expansion during the old and middle kingdom of the pharaohs and the national development plan for agricultural use today. Nowadays, expansion is not just an offset of the existing valley; green islands appear in the desert, enabled and dependent on underground water.

This ambitious plan is part of a long-term programme to reclaim about 3.4 million feddans by the year 2017, at an annual rate of 150,000 feddans. This number represents the official projects held by the Government of Egypt, which compose only 25% of all land reclaimed since 1988.



Cultivated Land in Egypt

The total arable land area within the Zemam constitutes only 3% of Egypt's total land area. In numbers, this means 996.450 sq km out of 1.001.450 sq km.



Rate of Reclaiming Land

The rate of reclaiming land for agriculture was around 20,000 feddans per year between 2000 and 2004, in governmental projects. Given a loss of agricultural land to urban expansion at an estimated rate of 30,000 feddans per year, the total land area under cultivation has more or less remained constant.



Domus of the Edges

The urban encroachment inside the Nile Valley is subtracting agricultural land, which Egypt is trying to regain in the Edges. The expansion is not just a linear row of fields, but also includes holes within it depending on topography and land use, e.g. graveyards.



Mapping the Expansion

The “New Lands” can be divided into three different categories, based on interviews with farmers conducted during the field research, maps of Assiut illustrating old borders of the valley, colors of the fields in Google aerial images and the proximity of fields to old canals. It is important to mention that at an institutional level, there is no clear definition of “New Lands” accepted by all crucial participants in the MARL data collection and reporting system. New lands are not taxed—only the Zimam are. This is probably the clearest definition of “New Land” from a legal perspective.

0-15 years

30-50 years

Old lands



English Map of 1907

Survey Department controlled by the British
Survey in 1905-1905 / 1:50.000

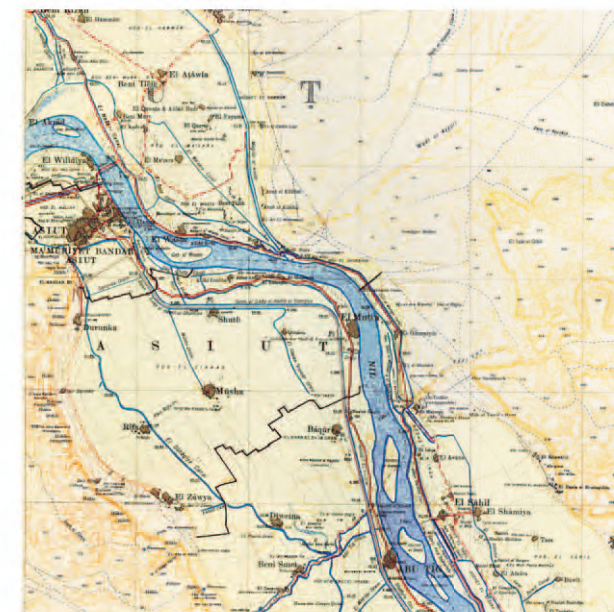
Historic Argumentation

These maps were used as tools to understand the evolution of the Nile Valley in a broader time span. Cemeteries were always located on the edges of the Valley, together with villages, such as Arab Mitteir and Durunka. It was also possible to trace the Zimam line of the Valley of Assiut. Zimam generally refers to the boundaries between cultivated and uncultivated agricultural lands that have been historically surveyed by the Egyptian Survey Authority. The border of the valley has not been transformed because of the topography. On the contrary, it is obvious the big transformation of the eastern edge with the agricultural expansion. It is easily distinguishable the bigger structure of the agricultural fields, underlining the repeated subdivision of the plots that followed later on due to inheritance from one father to a lot of sons. In the Russian map, one can also observe the Wadi El Assuiti forming itself between two limestone cliffs eastwards.



Russian Map of 1972

1:500.000



German Army Map of 1940

Survey period 1934-1941/ 1:100.000



Thirty-years-old Land at the Eastern Edges



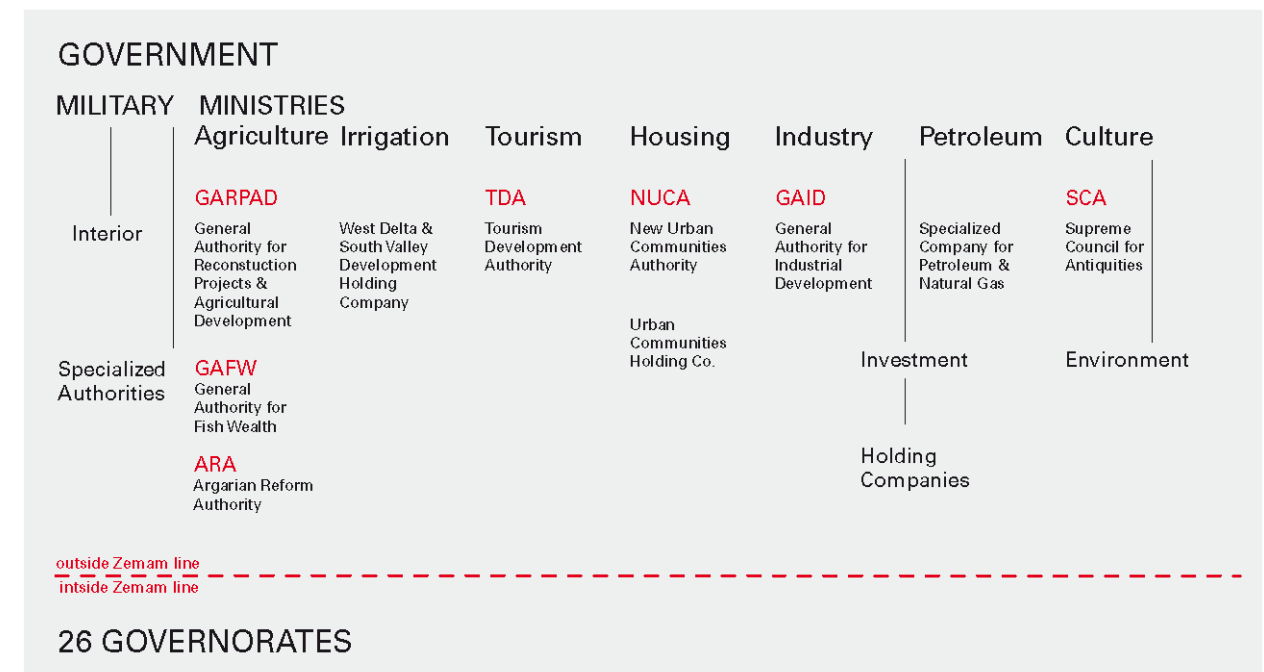
Employees in the New Lands Office in Assiut, Egypt are unable to find planning documents.

Law and No Order

The institutional framework governing control over public land in Egypt is highly fragmented. The government entities empowered to control public land are divided along sectorial and geographic lines; therefore, their control depends on location and planned use. In the case of desert lands, control can be transferred to any relevant authority by presidential decree once a land use has been approved. By law, the hierarchy of control over desert lands traditionally rests within three main entities according to the following descending order: military, GARPAD and NUCA. In this context, efficient control, planning, availability, and quality of agricultural data in new lands become almost impossible. It does not come also as a surprise that competition between authorities to gain access to such land has been uncovered several times in the past.

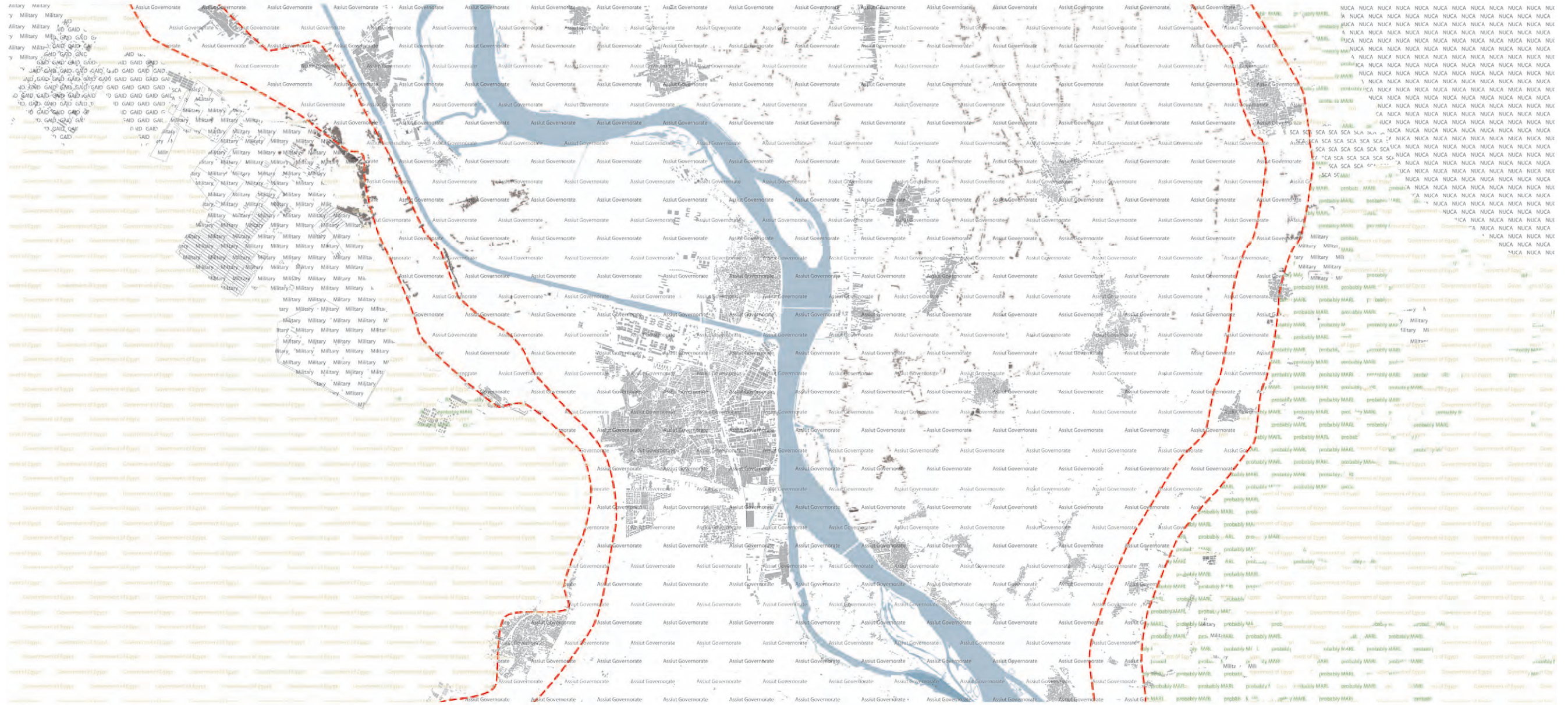


Hierarchy of Control Over Public Desert



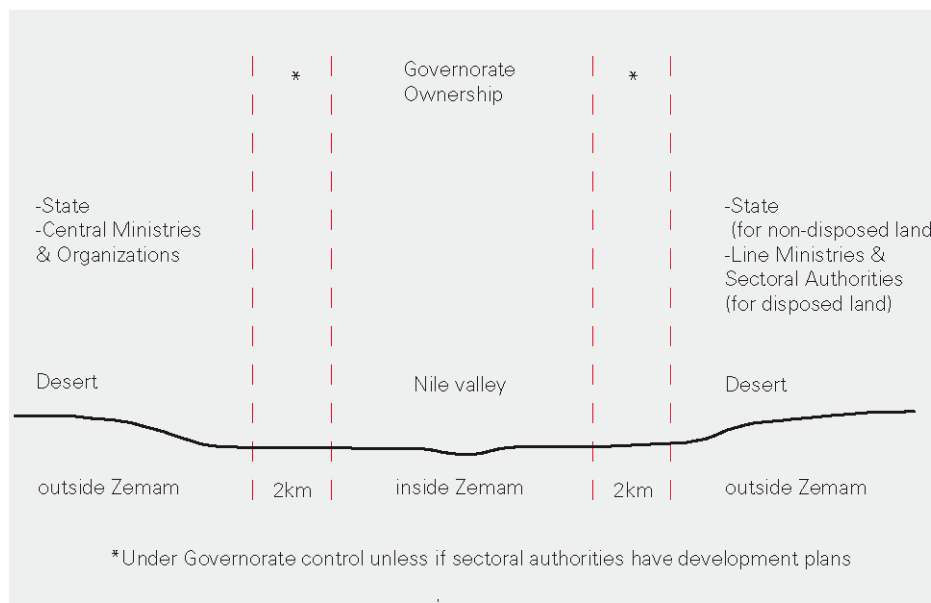
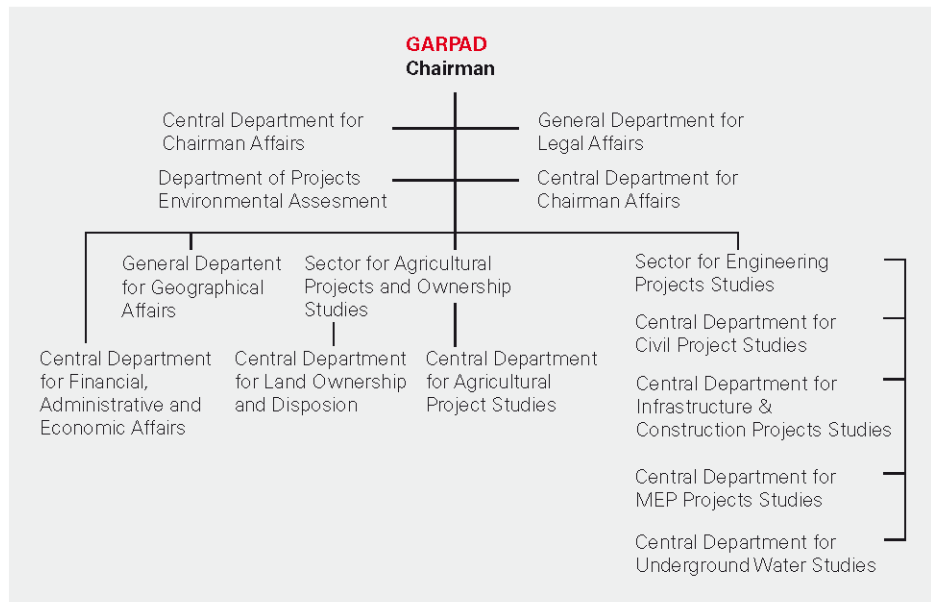
Sectorial Division of Land Control

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Land Control in Assiut

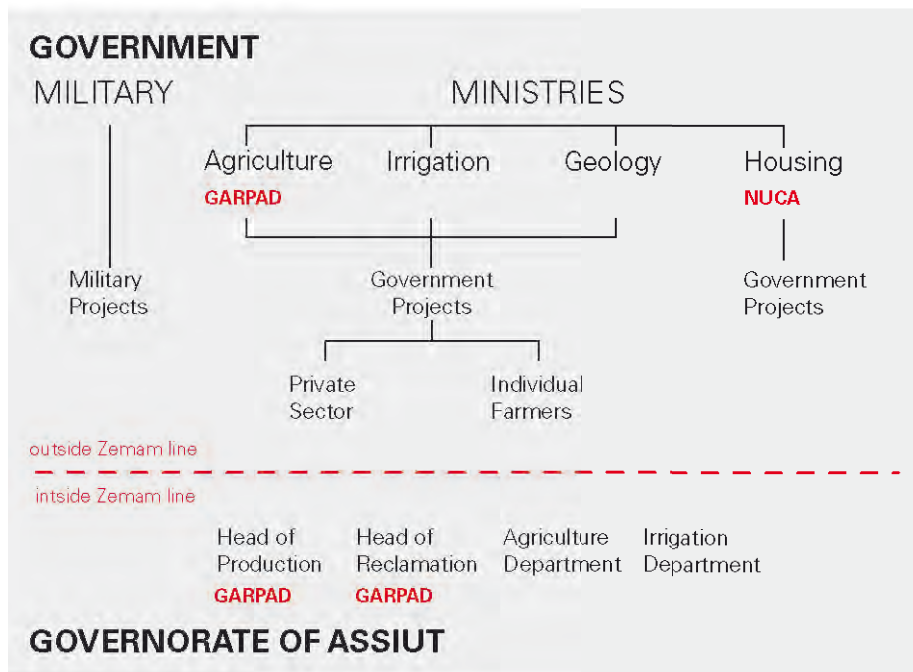
Governmental actors placed on the map of Assiut reveal a complex and unclear institutional landscape, evidenced by overlapping elements on this map.



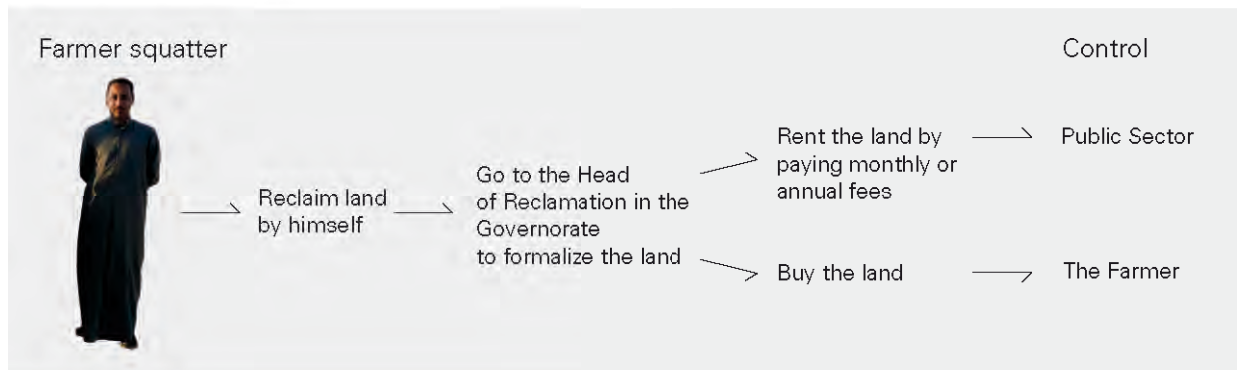
Geographical Division of Land Control



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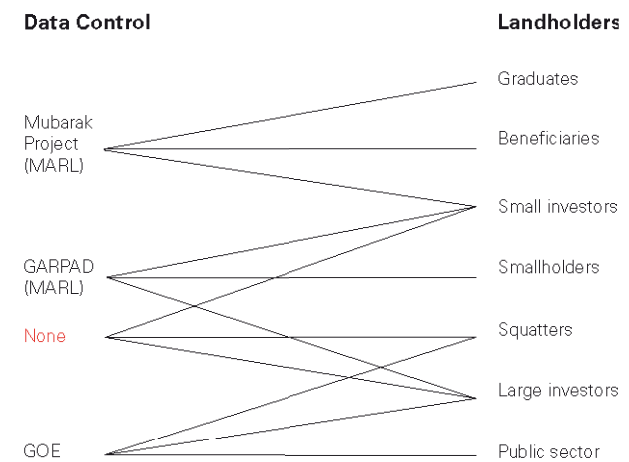
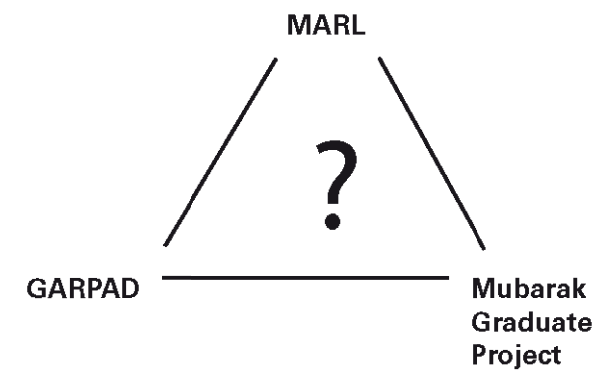
Network of Actors





Farmers participating in the Mubarak Graduates project.

The coverage of available data on New lands is very incomplete and inaccurate. It appears that at least half of the New Lands in the Nile Valley are either misclassified as old land or go unrecorded. Data reported and published for the New Lands only cover the Mubarak Graduates project, which accounts for merely 25% of all land reclaimed since 1988. Many of the problems with data coverage on New Lands arise from a lack of coordination and cooperation between the Graduates projects, GARPAD and the technical sectors of the MARL at the governorate level. Until recently, both GARPAD and the Graduates project were coordinated outside of MARL. Even now incorporated into MARL, they remain mostly independent and while they report on their activities, the information that the groups share—governorate and district statistics, sampling, and horticultural data—do not always align in definition. As a matter of fact, at the present time there is no complete system for collecting data on the New Lands and important parts of New Lands are not covered by any agricultural administration.



Data Coverage

The major groupings of land holders into which existing New Lands fall, and for which separated data may be desirable for planning purposes.

Size of Land Holdings

Smallholders	10-20 feddans
Graduates.....	5-10 feddans
Beneficiaries.....	5-10 feddans
Small investors.....	50 feddans
Large investors.....	20-30 feddans or 80-200 feddans
Squatters.....	almost 15% of all reclaimed land
Public sector.....	all reclaimed land that has not yet been allocated to one of the groups above

Smallholders: These are farmers with small holdings, landless laborers and others who received initial or redistributed allocations of reclaimed land in the valley.

Graduates: Initially these included recent university graduates, however, there is evidence that currently this group is primarily composed of high school graduates.

Beneficiaries: This group consists of various disadvantaged groups which have been targeted for special assistance, but have been resettled on to newly reclaimed land. Beneficiaries include veterans, and landless laborers.

Small investors: This group is difficult to define. It appears to mean a private investor who uses his own money to purchase and develop reclaimed land from the government.

Large investors: This group is composed of industrial and military farms and large farms owned by individuals.

Squatters: These landholders can range from holders of small parcels along canals who steal irrigations water to farmers who sink wells and invest in expensive surface irrigation systems completely under their own control.

Squatters make very large investments in reclamation and development activities and then petition the government to sell the land to them at a fairly low price. The squatters do not pay real estate taxes and their property rights are recognized in at least some form.

Public Sector: This group holds all reclaimed land that has not yet been allocated to one of the other holder groups. It cannot be ignored because this is where squatters make their inroads.

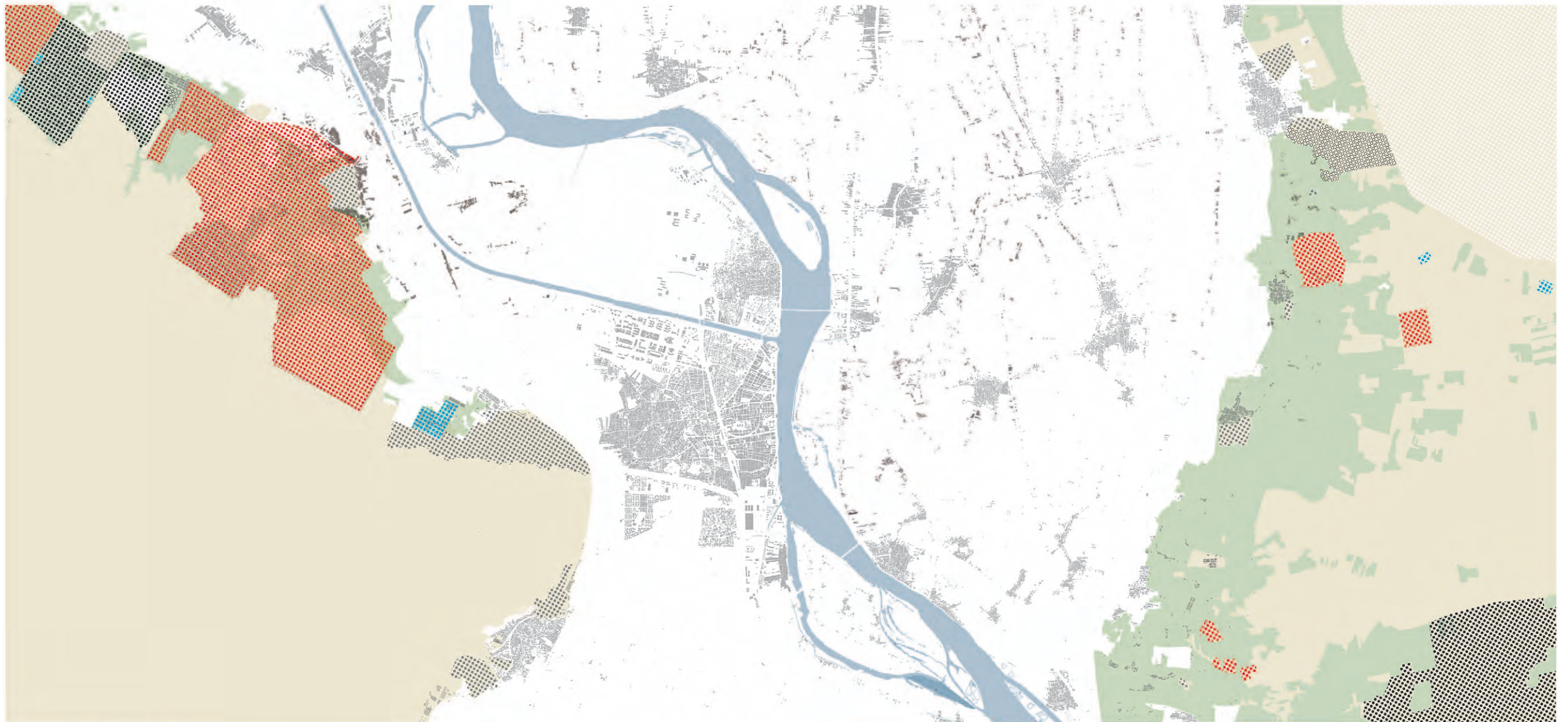




Land Ownership Along the Edges




Public or State land is divided into the State's public domain that cannot be alienated, and private domain, which can be alienated through sale and via lease (Takhsis or Haq Intifa). This category includes agricultural land rented by farmers and informal land considered as desert. By law, all desert land belongs to the Government of Egypt. Private land, such as desert city settlements and arable land bought by farmers, may be transferred freely. Waqf land is held as a trust/endowment for religious or charitable purposes. Military ownership as an exceptional case. Grey zones signify informal lands that are neither public nor private.





Land Use Along the Edges

This map was used as a tool to extract necessary information concerning land ownership and control in the greater region of Assiut. Apart from this, it is also important to mention that the large area occupied by military infrastructure was physically inaccessible.

- | | |
|--|---|
|  Desert city |  Military infrastructure |
|  Antiquities |  Production |
|  Waste Water Treatment Stations |  Cemeteries |



Land Use on the Edges





Western Edge of the Valley from the Coptic Monastery



1



2



5



6



3



4



7



8

How to Conquer the Desert

1. Go to the desert.
2. Dig a well at least 30 meters deep or steal wastewater or join Mubarak's Graduate project.
3. Get a tractor and flatten the land.
4. Clear the soil of rocks and stones .

5. Mix the filtered soil with fertilizers or soil from the Nile.
6. Water the field together with seeds and let dry.
7. Repeat step six 2-3 times.
8. Petition the Government to sell the land to you at a low price in recognition of the improvements you have made.



Informal Land Reclamation on the Eastern Edge



Modernity

It appears that regarding the edges of the Nile Valley, Egyptians have managed to let go of a socio-cultural image of the Valley with its sharp borders—a symbol of a traditionally agricultural economy. Also, the fact that the expansion does not occur via a linear set of fields, but acts through a complex structure depending on different factors, shows a new perception of the space they are acting in. A struggle to conquer the desert has started; whether it is able to solve the demographic problem or not, it is probably the only expression of modernity in Egypt.



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MAPS

P. 324 Topographical map

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P. 325 Barca et l'Egypte 1679

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P. 326 Wind map

Wind Atlas for Egypt: Measurements, Micro- and Mesoscale Modelling, 2003, Numerical Wind Atlas, Figure 4

P. 334 Nubian Basin map

Januar 2005, National Water Resources Plan 2017 Nubian Sandstone Aquifer, Figure 2-11

P. 335 Deep aquifer in North Africa map 1991 Shata

P. 337 Historical map

1: 2.000.000

P. 343 2017 National Development Map

Egypt Public Land Management Strategy Vol. 1 Document of THE WORLD BANK, (Report No. 36520), p. 78, Figure 5.2

P.350 Napoleon's map 1826,1:100.000 Carte topographique de l'Egypte et de plusieurs parties des pays limitrophes, Paris

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P. 352 English map 1907, 1:50.000 Survey Department controled by the British (Survey in 1905)

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P. 353 German map 1940 1:100.000 (Survey period 1934-1941) Central Library Zurich

P. 353 Russian map 1972 1:500.000

IMAGE CREDITS

All graphics and photos by Olympia Georgoudaki and Argyro Poulivoli, except where noted.

P. 327 Precipitation, Mean Temperature
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P. 335 The main water resources in Egypt
Water Resources Management and Policies for Egypt, Dalal Alnaggar. Director (RCTWS), Ministry of Water Resources and Irrigation center-eg.vcom.

P. 336 Population growth in relation to water availability, Atef Hamdy presentation, March 2007

P. 344 Satellite Image NASA

P. 345 Cultivated Land in Egypt
Ministry of Agriculture and Land Reclamation (MALR), 2002, Land Use in Egypt, Figure 2

P.32 Rate of reclaiming land
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P. 345 Division of land control along sectoral lines
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Document of THE WORLD BANK, (Report No. 36520), p.16, figure 2.1

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P. 368 Division of land control along geographical lines
Egypt Public Land Management Strategy Vol. 1
Document of THE WORLD BANK, (Report No. 36520), p.20, figure 2.2

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