

# الأراضي الزراعية و النمو العمراني



# AGRICULTURE

## SKIN OF THE URBAN ORGANISM

### FRAGMENTED FIELDSTRUCTURE

**Comparison of Agricultural Indicators**

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# AGRICULTURE SKIN OF THE URBAN ORGANISM

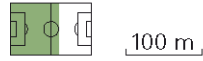
The agricultural area of Egypt is like a skin which constitutes a matrix for the growing urban network. Fertile agricultural land in the Nile Valley is bordered by the desert and occupied by settlements. Agriculture is an important economic sector in Egypt and has a low productivity because it is divided into small sections. Inheritance modes of acquisition leads to the continuing fragmentation of the area, and the resulting small parcels constitute the substructure of urbanisation. The fast-growing population causes an expansion of villages onto agricultural area. Land reclamation is a compensation for lost agricultural land and increasing population, which is however limited through natural resources.



## FRAGMENTED FIELDSTRUCTURE

The agricultural surface is divided into small parcels, and the small holdings are again subdivided into fields of different cultivations like wheat, clover, vegetables and fruit. Characteristic are the narrow, long fields, which stretch between infrastructure of streets and watercanals. A few generations before, the fields were large, but increasing population and subsequent inheritances to many sons of farmers divided the land into fragmented fieldstructure.





### Feddan Size

1 feddan = 4201 m<sup>2</sup>  
 60% of a soccer field  
 FIFA Norm 105x68 m



### Egypt

Assiut  
 Agricultural Area:  
 3.5%  
 %GDP of Agriculture:  
 14.1%  
 Agricultural Labor Force:  
 30%  
 Average Holding Size:  
 2 feddans

### Switzerland

Solothurn  
 37%  
 1.3%  
 3.8%  
 28 feddans

### Germany

Sachsen-Anhalt  
 49%  
 0.9%  
 2.2%  
 96 feddans

### USA

Kansas  
 45%  
 1.2%  
 0.6%  
 425 feddans

### Comparison of Agricultural Indicators

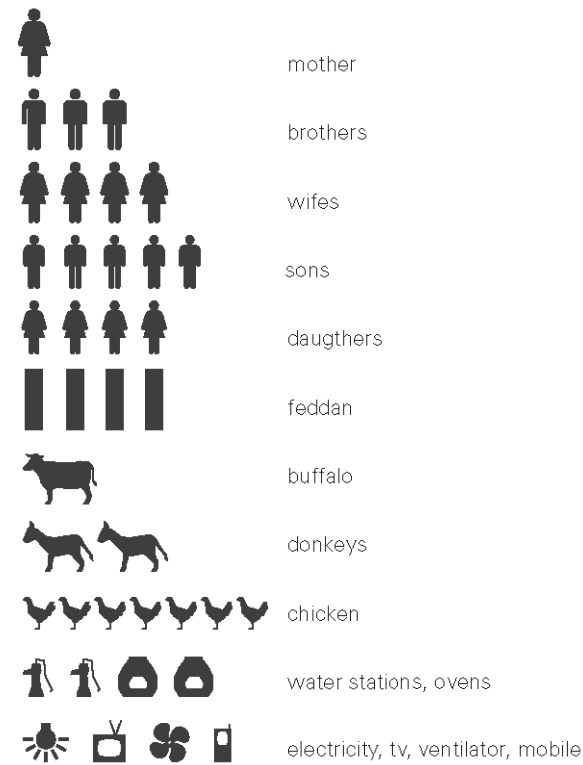
The small scale of Nile Valley fields becomes apparent in comparison with other countries. Egypt has less agricultural area, a large percentage of GDP devoted to agriculture, and 30% of its labor force is agricultural-related. These contrasting figures illustrates the low productivity of labor in this sector.



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# LAND AND ACTORS

Small fieldstructure shows that agricultural land bordered by the desert is owned by many peasants. In the past and today, politics and inheritance have influenced the development of ownership and holding distribution. Policies showed different approaches and sanctions on how to handle problems of land distribution. One example is the field fragmentation into small parcels which results from inheritance. Another problem is the agricultural land lost to settlements on still arable land. The main task for the future to resolve fragmentation and limitation of agricultural land.



## Samir Hammam, El Fayma farmer

Samir Hammam, 40-years-old, lives with his large family in the old house of his father. Their fields are on the other side of the street, where they plant wheat, corn, clover, onions, garlic, potatoes, and tomatos. In the courtyard, they cultivate a nebeg fruit tree and salad. They do fieldwork by hand and work every day from 7 am until 3 pm. Sometimes they rent machines for the harvest from other farmers in the village. The family sells 90% of their wheat to the cooperative, where they buy seed and fertiliser. They consume the other 10% of wheat, along with the fruits and vegetables, and also produce bread and cheese in their house.



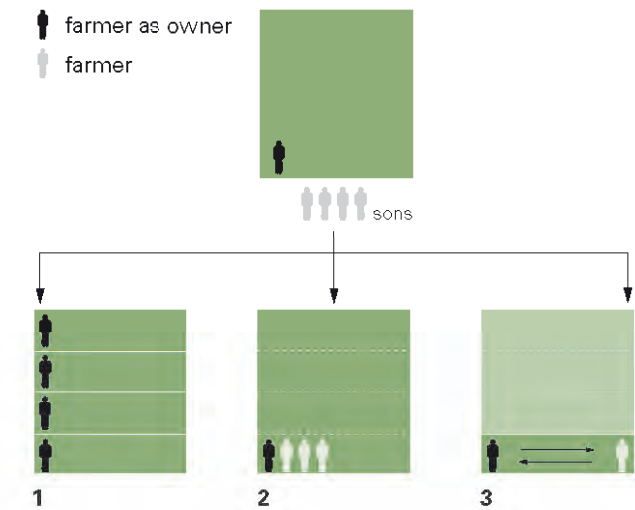


### Samir Hammam, 40-years-old, farmer

“My three brothers and I inherited 4 feddans of agricultural land from our father, who inherited it from his father. Our family has lived many generations in El Fayma as farmers. I’m documented as the owner now, but we share the land and the fieldwork in the family. We don’t have much money. Abd El Basit, one of my brothers, went to Alexandria and works in a water company. His wife and children don’t want to live in our village. He comes every year for ten days and helps us with the harvest.”

### Fragmentation through Inheritance

Farmers pass on land to their sons, who can choose how they want to administrate the heritage. Inheritance over generations produces many small fields. What results are problems with supply; farmers are forced to supplement their earnings with a second profession or go work in the cities.



### Inheritance Process

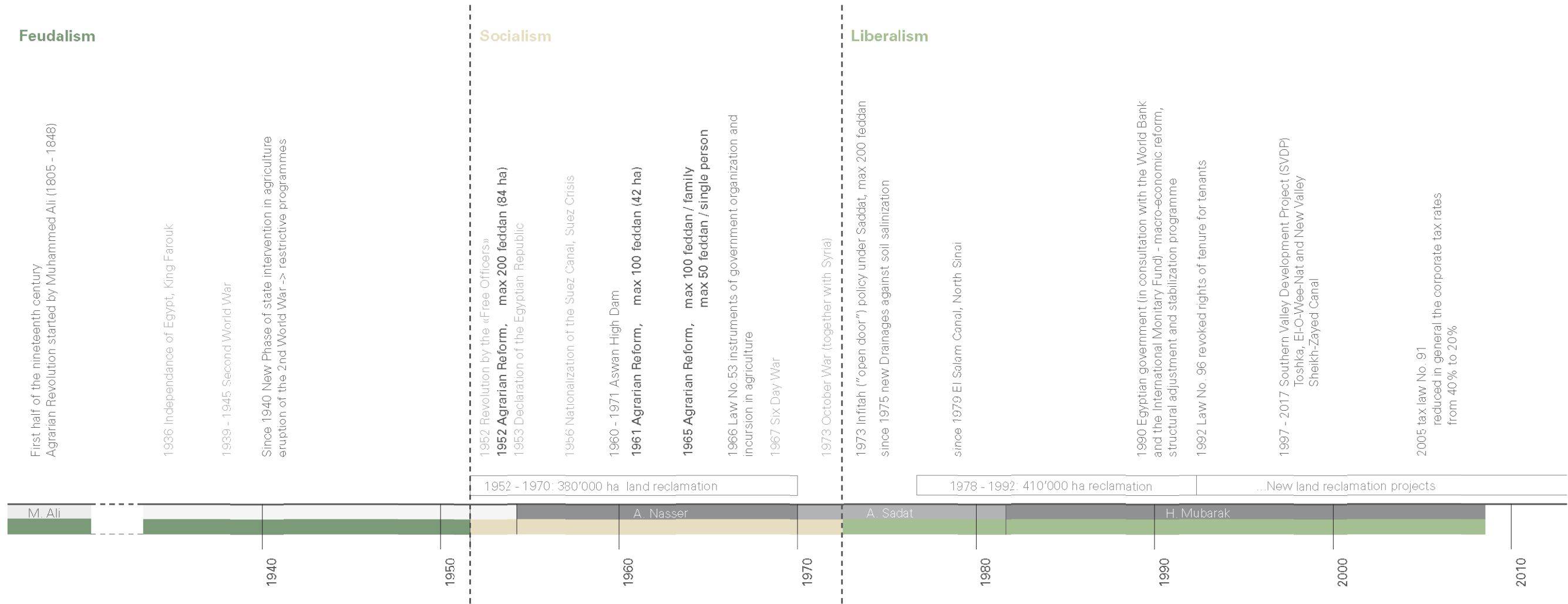
1. Sons divide the land and each of them is registered as owner of his part and cultivates it alone.
2. Sons cultivate the land of their father together and only one of them is registered as owner.
3. Sons rent/sell their part of the heritage to other farmers.



### Holding Card

Once a year, every farmer is required to go to the cooperative which issues/updates a holding card describing the farmer’s inventory, including amount of land and crop species. Not only an ownership licence, a holding card must be filled by tenants as well. The government enacted the use of holding cards in 1966 to control land and production.

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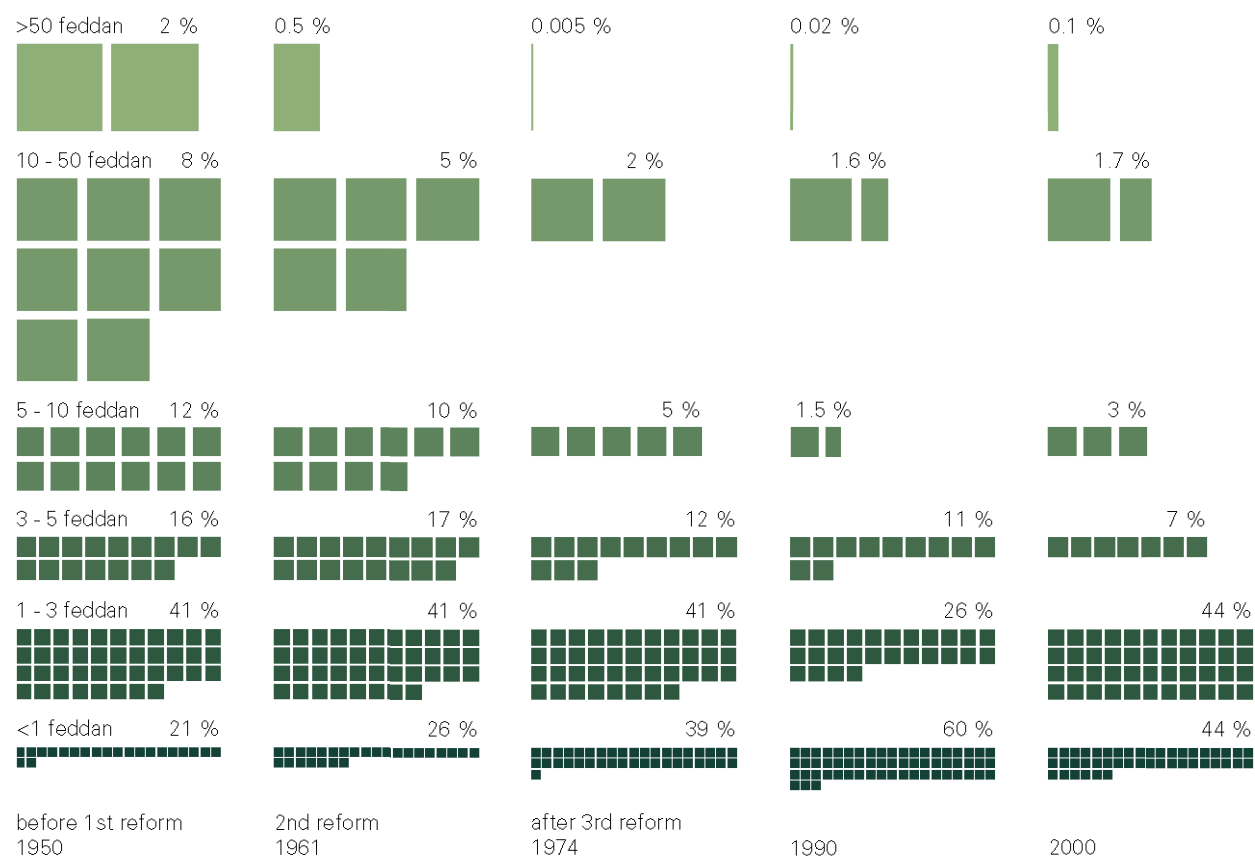
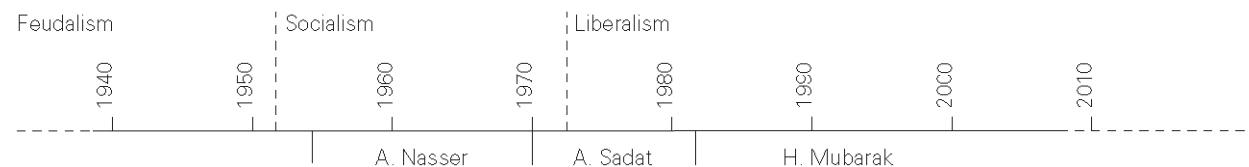
### Fragmentation through Politics

**FEUDALISM:** In the 19th century, a select few people owned large estates and exerted political and economic power. The majority of farmers had to rent land and were dependent on the landowners. The owner could evict the tenants without security or chance for the farmers to stay. During this period, private property rights in land were consolidated and permanent irrigation was extended.

**SOCIALISM:** 1952 the “Free Officers“ revolted against the social and political situation. They started the first Agrarian Reform, which regulated tenancy agreements and limited land ownership. Law No. 178 also fixed the land rate for unlimited tenure. In this time, cooperatives were created as an intermediary between the government and farmers, and they started with reclamation projects. In 1971, under President Nasser, the Aswan High Dam was built, which stopped the annual flood and made a permanent irrigation possible. The land could be better used, but the natural fertilisation from flooded soil was lost, thus resulting in large consequences for agriculture and urbanization.

**LIBERALISM.** President Sadat reduced governmental influence on the economy with the 1973 “Open Door” policy. He opened Egypt economically to the West. In the late 80s reclamation projects started in North Sinai and in other regions at the edges of traditional land. President Mubarak purposed a combination policies from Nasser and Sadat. He continues the liberalism of Sadat and slows the retirement of state control. But the 1992-issued Law No. 96 revoked the rights of open-ended tenure and permanent land tax for tenants. Landowners supported this law, because it gives them the possibility to sell their land at market price. The tenures, in contrast, called it “the law for throwing out tenants from their land,” because the rent increased more than threefold. Many farmers lost their rented land and their house on it. The government put down the farmer rebellion against this tenure insecurity. An ambitious intention of Mubarak is the Southern Valley Development Project (till 2017). It starts with large land reclamation by the Toshka Lake and will create a second valley through the oases.





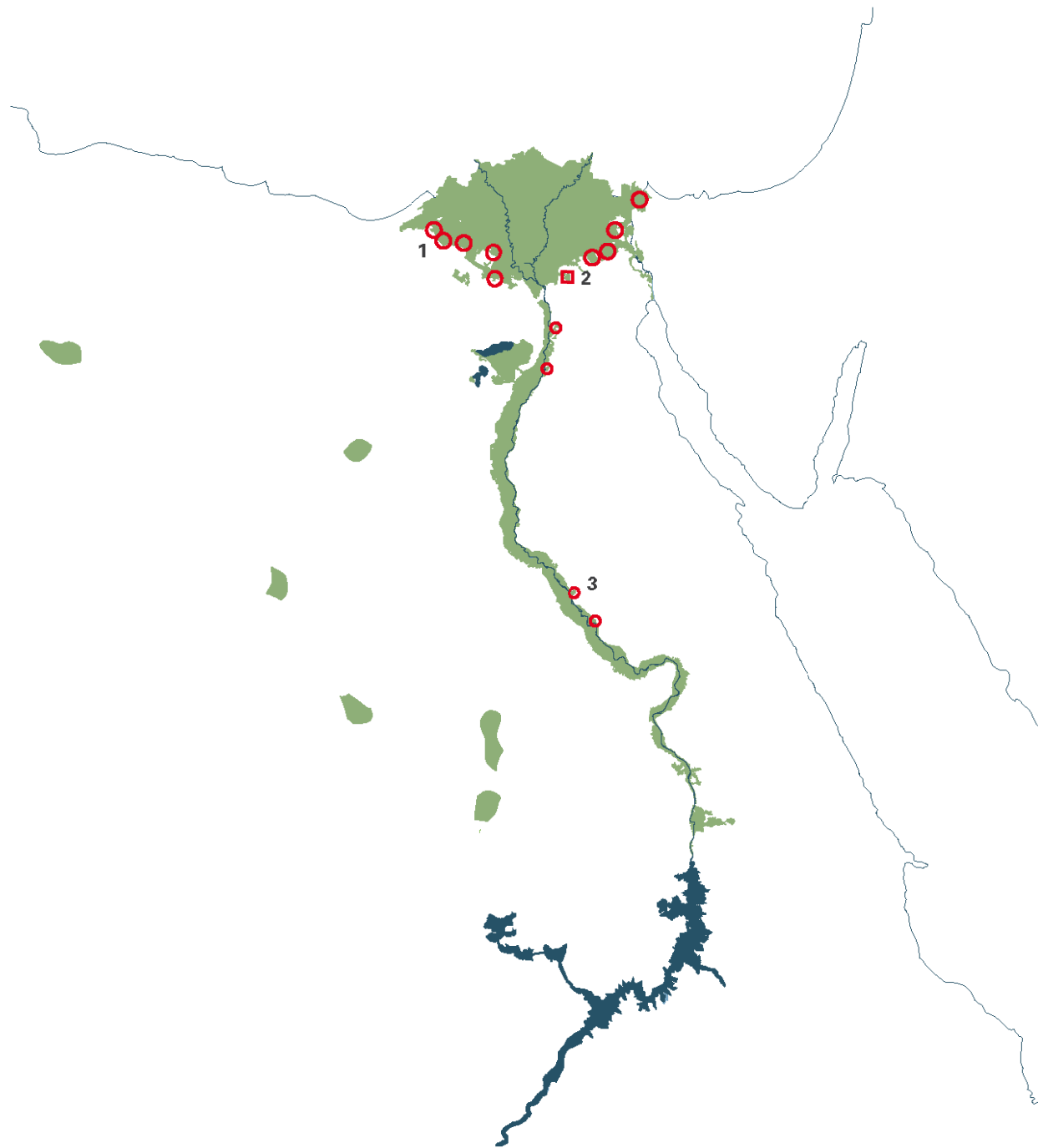
### Development of Holding Distribution

One result of the agrarian reforms under President Nasser was the decrease in the number of medium and large holdings. The small holdings also increased because of inheritance. Since the enactment of liberal policy, large holdings increased again; Sadat enlarged the maximum holding size to 200 feddan per holding. Today, 95% of the holdings consist of less than 5 feddans.



### Portraits of Presidents

Images of Nasser and Sadat hang on a wall in a farmer's living room next to a picture of his grandfather.



1



2



3



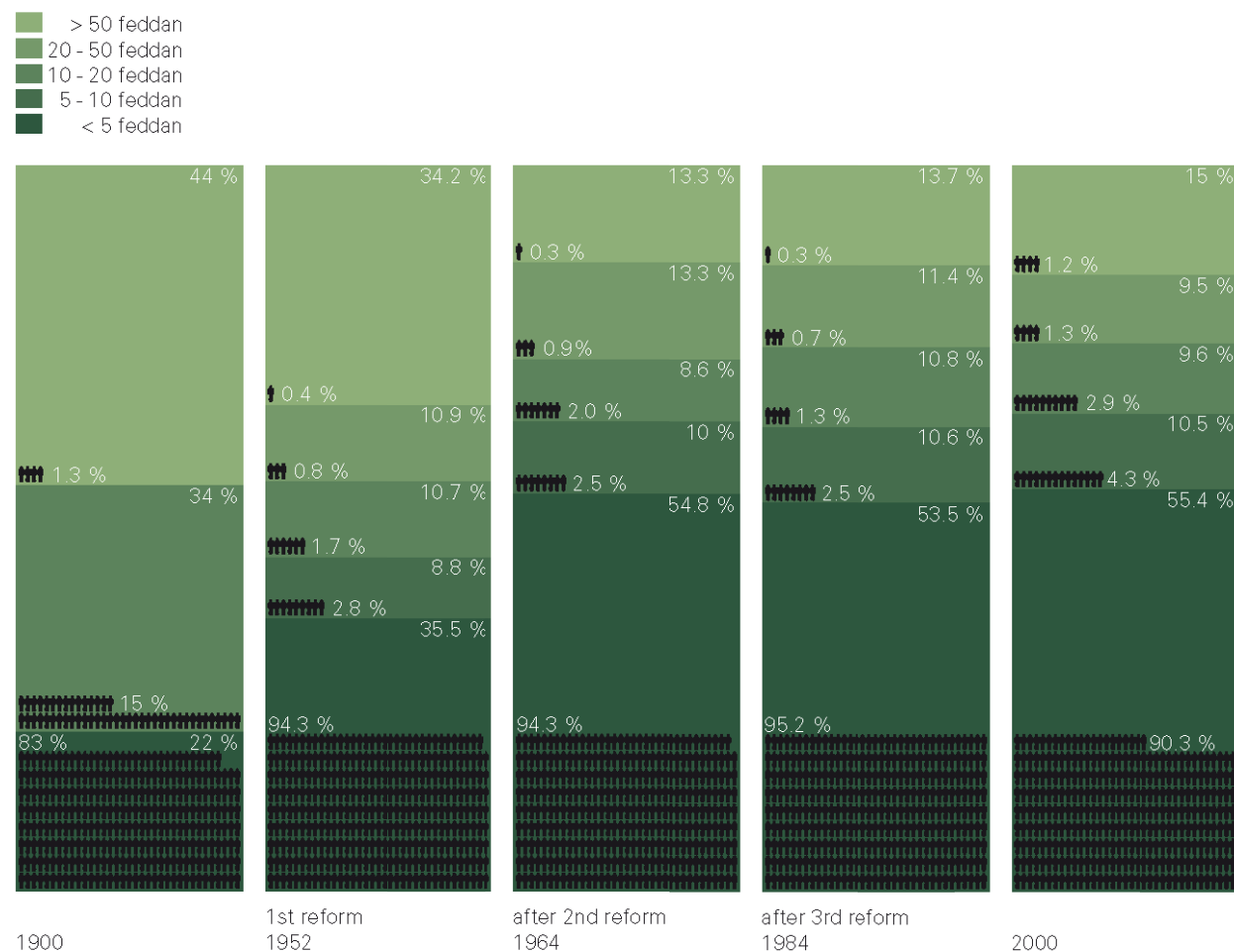
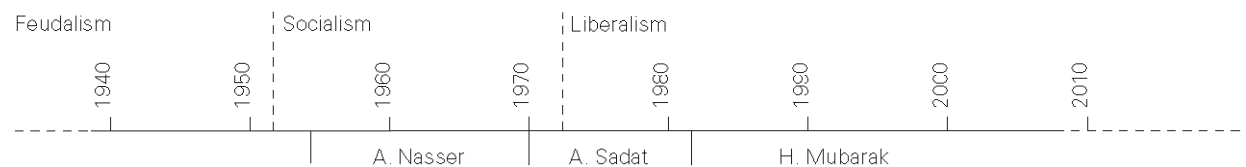
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200 m

- 1. Edge of the Delta: large holdings with modern technology (like in Kansas, USA)
- 2. Edge of Cairo: villas with swimming pools and fruit plantations in the reclaimed area next to Cairo
- 3. Edge of the Nile Valley: large holdings in the reclamation area along the Valley
- 4. Nile Valley: many small farms because of inheritance in the old, traditional land

### Holding Typologies

Large farms from private investors or from the government can be found in reclamation areas at the borders along traditional land. Large holdings are characterized by constructed, geometrical fields with modern irrigation technology. In the traditional old land, holdings are much smaller and the field structure fragmented over generations.



### Ownership Distribution Development

In the beginning of the 20th century there were a few land-owners who tenured about 80% of the agricultural land. The agrarian reforms aim to regulate this disparity of land distribution. After the reforms the percentage of farmers with much land stayed constant, but they owned less land than before. At the same time, the number of peasants raised. Today, around 90% of owners hold less than 5 feddans of land. The number of farmers without land rose since the first census in the 1950s.



Farmers without land:  
rent land or are employed as workers at a holding



Farmers with some land:  
sell wheat and plant fruits for self-sufficiency



Employees with some land:  
sell wheat and plant fruits for self-sufficiency



Farmers with much land:  
sell fruits, vegetables and wheat, employ workers



Employees with much land:  
employ workers or rent the land to farmers

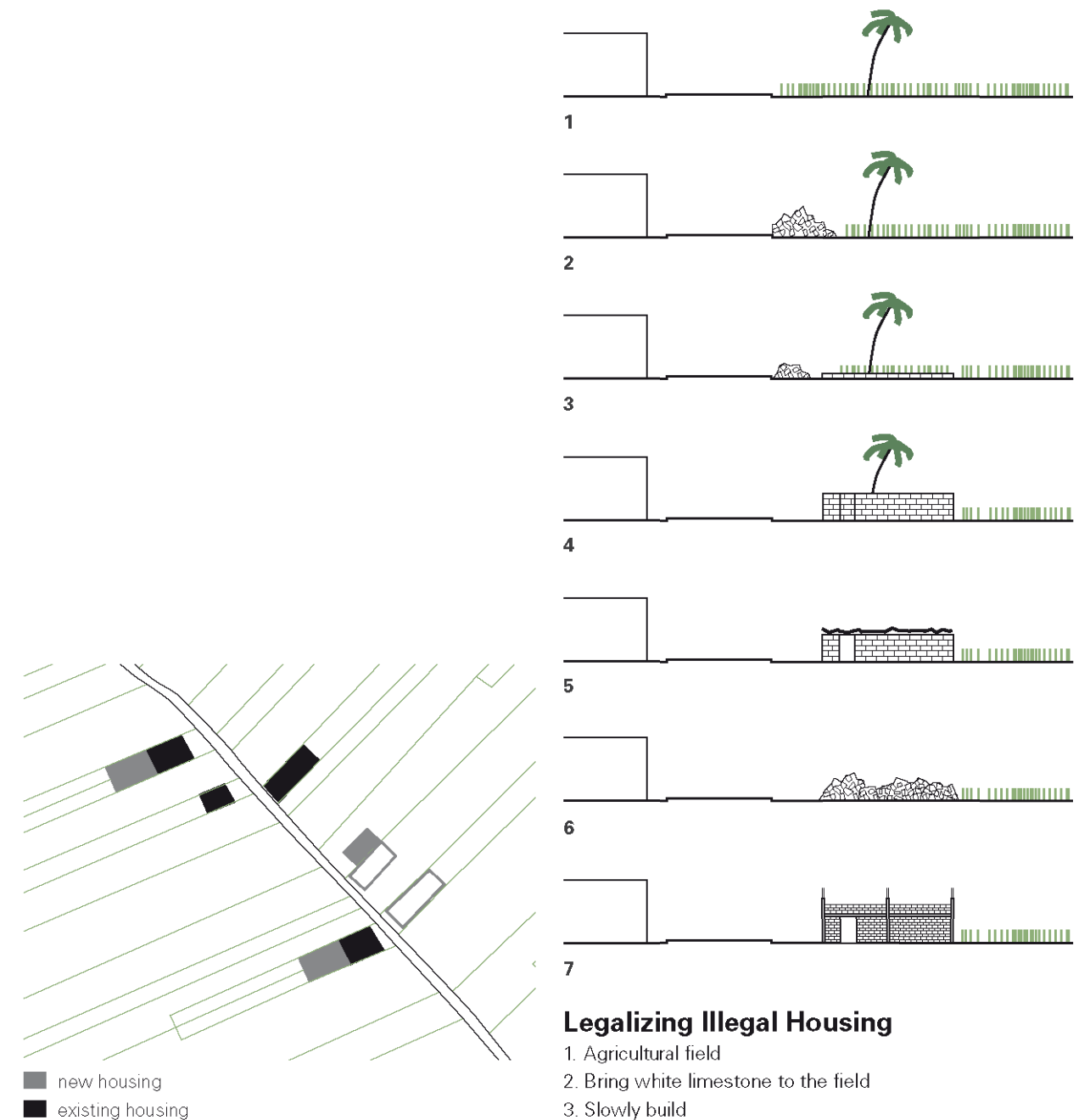


### Ismail, 29-years-old

"I got some land from my father, but I'm not a farmer. I work as an assistant at the university in Assiut. I can't really use the land and rent it to farmers. The area is near to Assiut city. I'm waiting until my agricultural land will turn into a housing zone. Then I will sell it, because you get more money for housing areas."

### Urbanisation on Agriculture

It is illegal to build houses on agricultural land because they displace land for cultivation. However, the large families of the farmers need space to live. For that reason, they build illegal houses near their fields. There are different steps of building the houses. First, limestone walls are constructed. The farmer use the unfinished buildings as storage for crops or as a cot for animals. Then, the government demolishes the illegal house. A process of legalization follows. The farmers explain that they need the house and plead for its cause in a court. After legalizations the farmers rebuild the house with a concrete frame and bricks. Houses get built along the streets, at the edges of the fields.



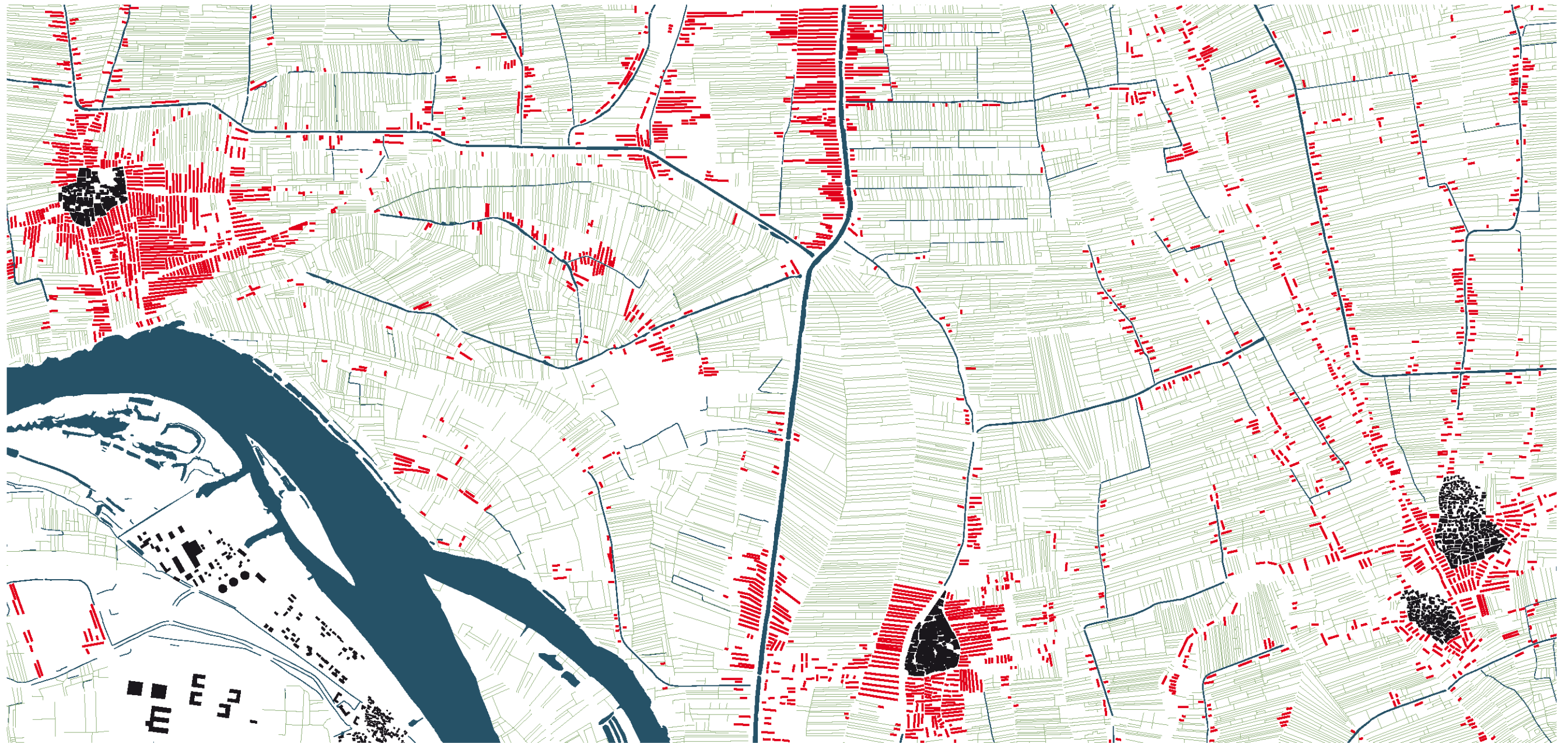
### Houses on Agricultural Field Parcels

Houses are built along the streets at the edges of the fields and sprawl into the agricultural parcels.

### Legalizing Illegal Housing

1. Agricultural field
2. Bring white limestone to the field
3. Slowly build
4. Use finished walls as storage or a cot
5. Construct roof with dried maize
6. Government demolishes house, legalization ensues
7. Legal reconstruction with concrete and bricks

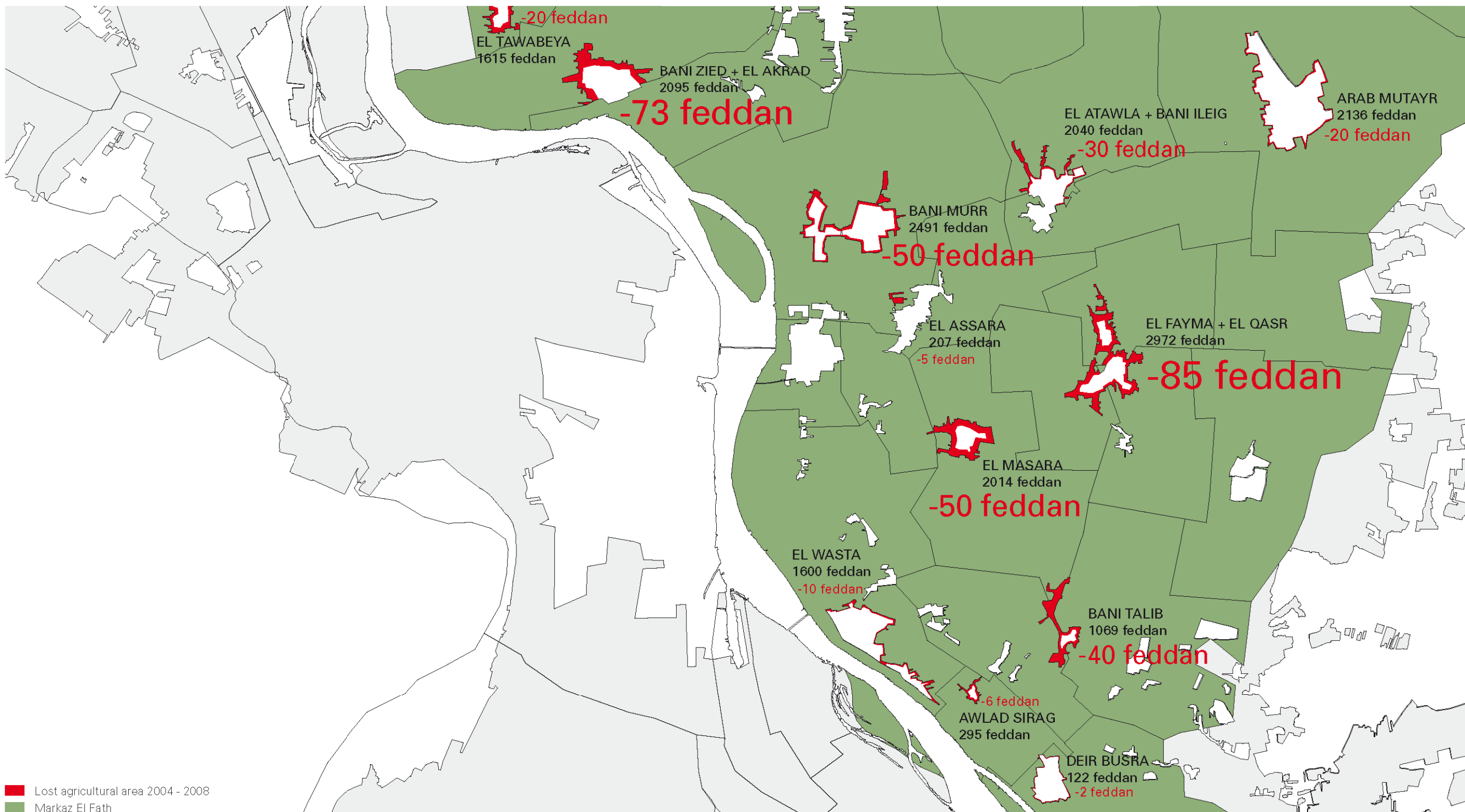
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- Housing in agricultural structure
- Old village cores and industry

### Housing Follows Subdivision

The agricultural structure of the fields influences urbanization. Houses sprawl on the fieldstrips around the villages and along the streets. Old village cores are clearly visible. New houses, which follow the fields, are long and narrow.



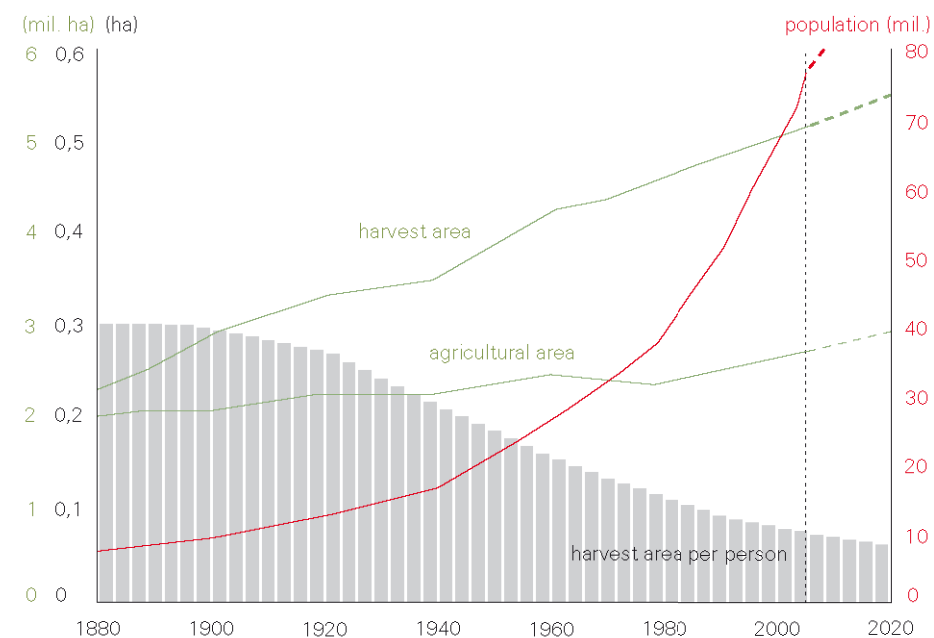
■ Lost agricultural area 2004 - 2008  
■ Markaz El Fath

**Agricultural Area Lost by Housing**  
 Agricultural area displaced by housing in the last four years (2004-2008) in the region of El Fath totals 391 feddans. This number is comparable to 280 soccer fields.

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# SUPPLY

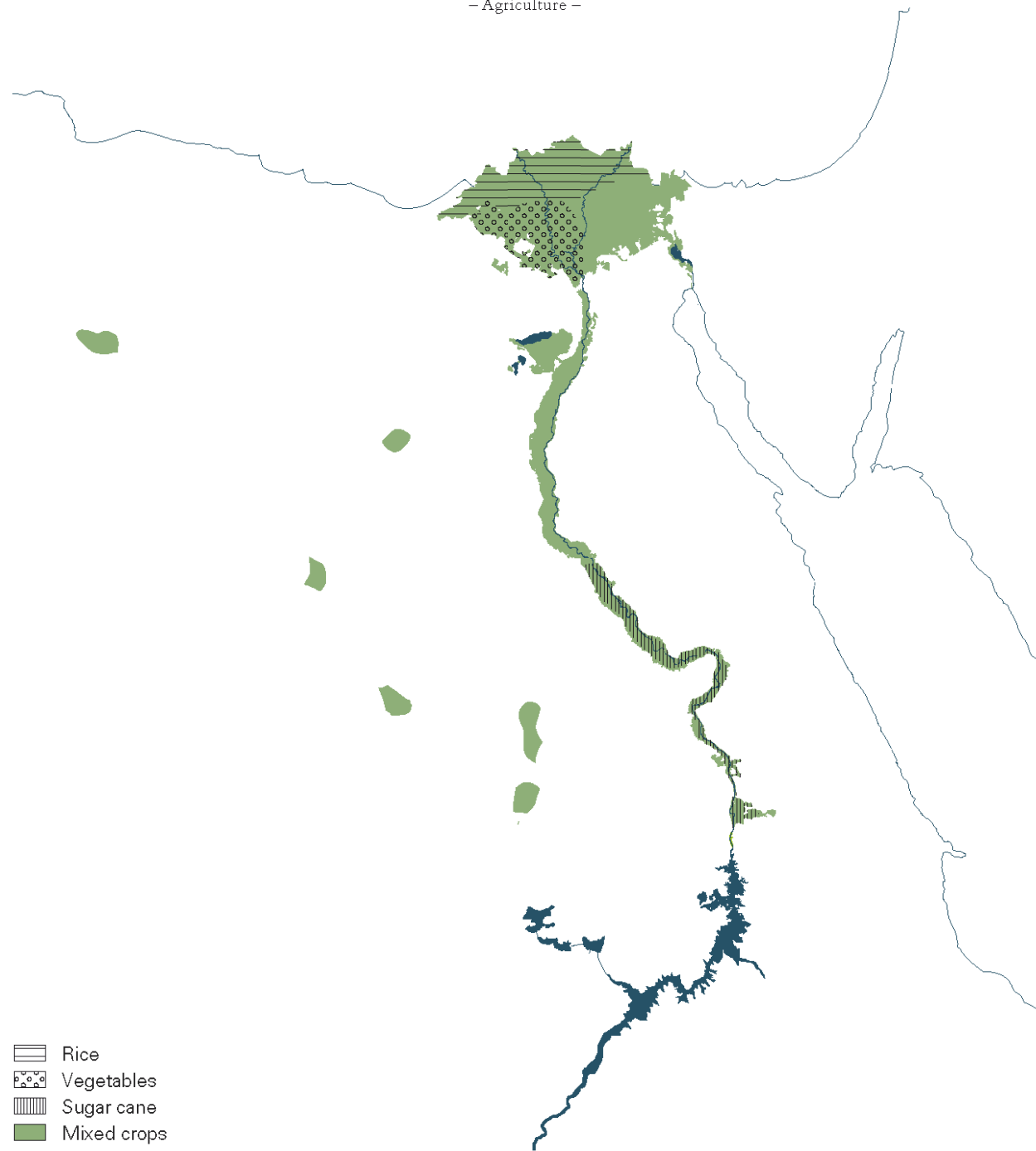
The enormous increase of the Egyptian population has led to an insufficient agricultural supply. In spite of expansion of the agricultural economy through land reclamation and more efficient cultivation, the harvest area per person is decreasing. In addition, farmers with small holdings farm old traditional land with obsolete cultivation methods and inefficient seedbed preparation and irrigation. To use the agricultural land in the most efficient way, new farming techniques and greater mechanization are required. Livestock breeding and aquaculture are critical practices to close the gap between production and consumption. New land reclamation provides another opportunity to raise the production rate. The present Southern Valley Development Project aims to create a new focus for agriculture, industry, settlement communities and tourism.







### Harvest Area per Person

The yield per feddan could increase from better utilization of the agricultural area. But because of the high population growth, the harvest area per person decreases.

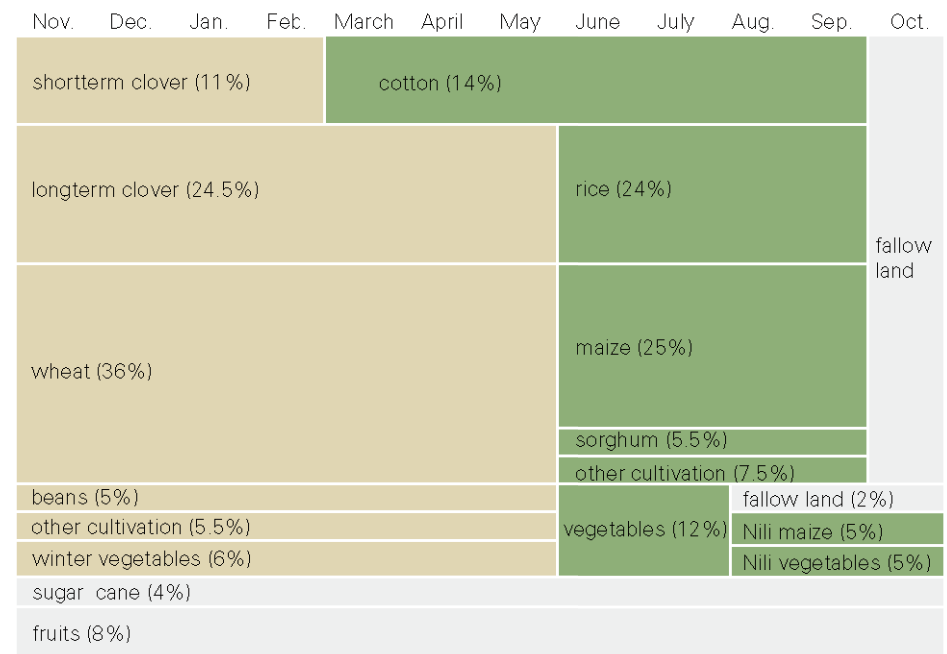




-  Rice
-  Vegetables
-  Sugar cane
-  Mixed crops

### Cultivation

Agricultural area covers only 3% of Egypt's surface. The highest agricultural production is in the Delta, which is also the most populated region. Less mechanization causes a low productivity. The Valley holds mainly mixed crops like wheat, clover, cotton, maize, vegetables and fruit. In the Delta regions are more likely to grow rice and vegetables. In upper Egypt, sugar cane constitutes an important crop. Alternative cropping patterns can increase profit, reduce water use, and increase self-sufficiency. Profit-making export commodities like fruits, vegetables, cut flowers, medicinal and aromatic plants should be supported for increased efficiency, whereas traditional cultivation of rice and sugar cane should be reduced or substituted because they require much water.



### Seasonal Cultivation

The main crops in winter are wheat and clover, which together composes about 70% of the agricultural area. In the summer, maize, cotton, rice and vegetables are grown on 75% of the agricultural land.





Clover is used as animal feed and can be cut and harvested several times per season.



Wheat is one of the main crops in Egypt and Assiut, vital for making bread. The big harvest is in May.



Banana plantations can be found next to the Nile because they require plentiful water and fertile soil.



The construction for grapes, which consists of stone pillars and palm leaves, is built by the farmer.



Farmers with fruit plantations normally hold more feddans than wheat farmers. Oranges mature in September.



Most vegetables in Assiut are cultivated next to the village of Durunka. Onions are sold to other governorates.



### Cultivation in Assiut

In spring, wheat and clover fields grow all around Assiut. In summer, cotton and maize dominate. Next to the Nile, one finds many fruit plantations with bananas and grapes, mangos, oranges or citrus, with a few sugar cane fields.



- Palms
- Banana and fruit tree plantations

### Cultivation Pattern in Assiut

The map shows subdivision of the fields into different field-crops. The area has mixed cultivation and fields with fruit trees between wheat and clover.





Only large holdings have tractors. Small farmers can rent them from other farmers to treat their fields.



Wheelbarrows are useful to bring crops from the field to a path or a street.



This machine is owned by a farmer with much land and is used to scuff the ground before seeding.



Tradesmen mostly use donkey carts to transport the goods to the market and sell them directly on it.



This special machine for the big wheat harvest is required in May.



The sickle is primarily used for clover harvesting. Farmers sometimes employ workers for this exhausting fieldwork.

### Working Tools

Most work on the fields in Assiut is done by hand. Many peasants do not have machines, but are able to rent machines from other farmers for the big wheat harvest. Transportation tools include wheelbarrows and donkey carts.



In sheep breeding, milk production is less significant than meat and wool production.

### Livestock Husbandry

Due to the lack of rangeland, livestock breeding is sparse. However production is increasing because of growing meat and fish consumption in Egypt. The domesticated livestock are an important element for increasing food production to supplement dwindling crop quantities. In general, every farmer family in Assuit has a buffalo and chicken for self-sufficiency. In the Delta, large fish and poultry husbandries increase the per-capita consumption of animal protein.



Donkeys are useful for transportation. They carry crops from the fields to the farmer's house.



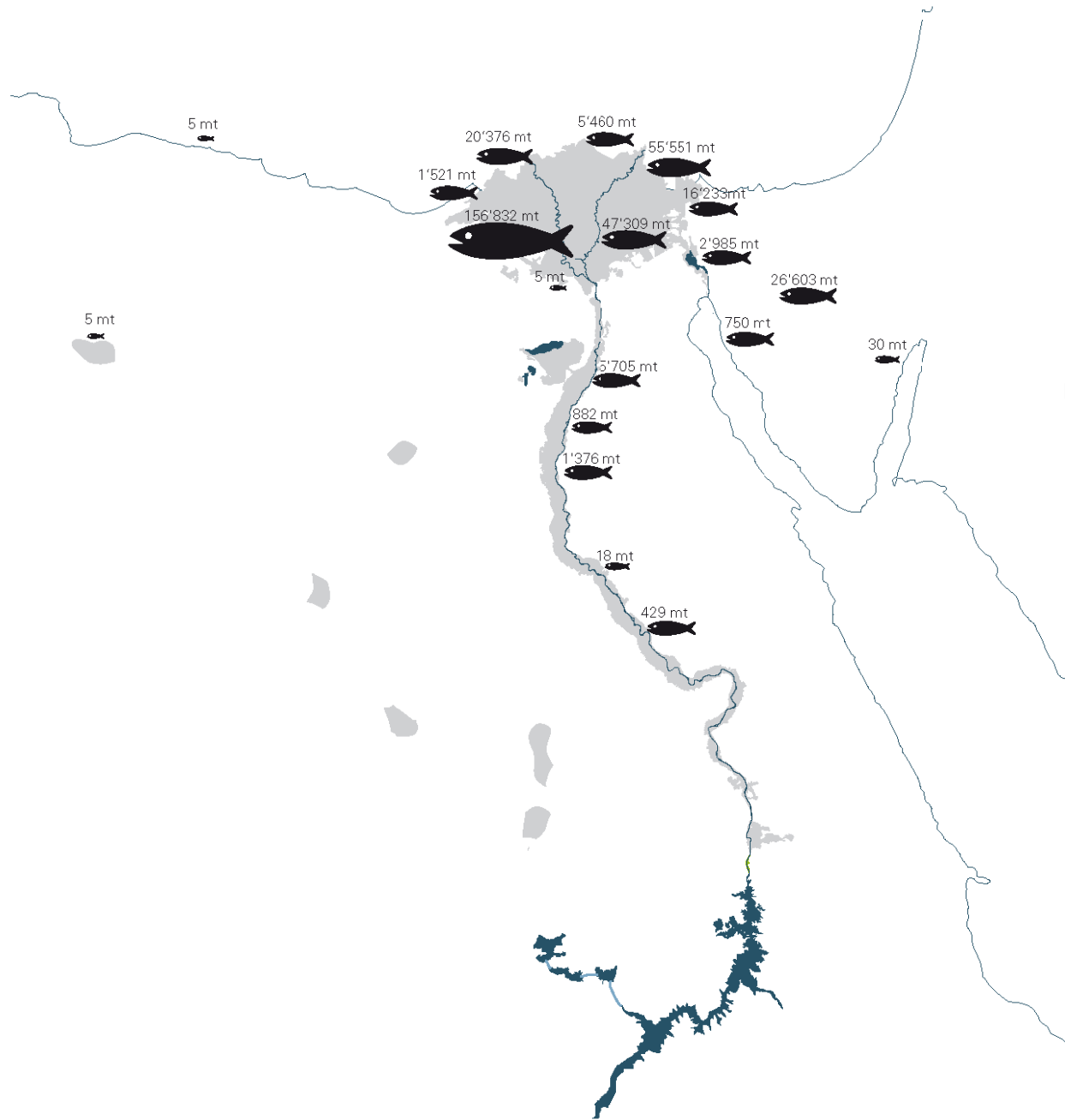
Chickens can be found in the farmer's house. Their eggs and meat are eaten by the family.



Buffalos and cows are the most important animals for milk and meat production. Normally every farmer has a buffalo.



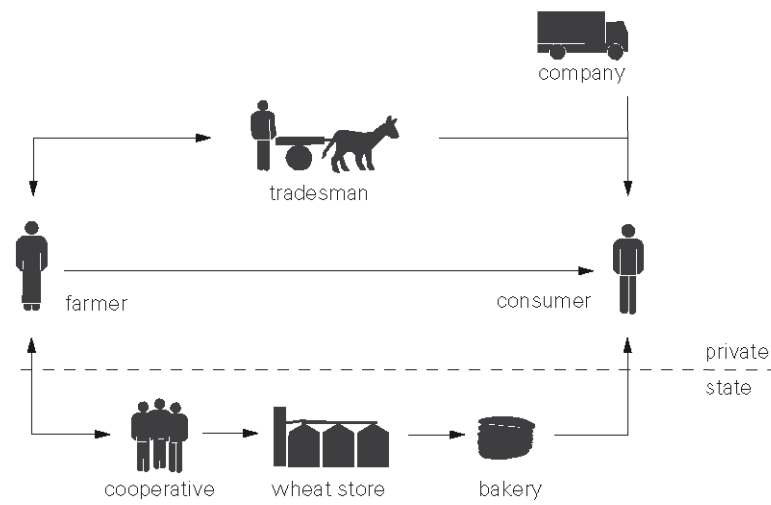
Camels are also used for transportation. But there are only a few in Assiut, because they are very expensive.



### Increasing Aquaculture

Aquaculture is the largest source of fish supply in Egypt. The production records a rapid growth in the last few years. Most farms with aquaculture are located in the Delta region. Aquaculture is an opportunity to close the gap between the fish consumption and fish production in Egypt. The Ministry of Agriculture and Land Reclamation plans to increase Egypt's total fish production from 0.5 million tonnes to 1.5 million tonnes by 2017.





### Farmer Trading Opportunities

Farmers have three different ways to sell their goods. They can sell them to tradesmen or to cooperatives, or vend their fruit, clover or cereals at the market in their village. Small farmers use a larger percentage of their production for themselves. Another source for consumers or tradesmen is the big market in Assiut city which sells both local goods and imports from other governorates.



### Souk for Vegetables and Fruit

This open market is next to the canopied souk in Assiut. The tradesmen are not required to pay for their booth.

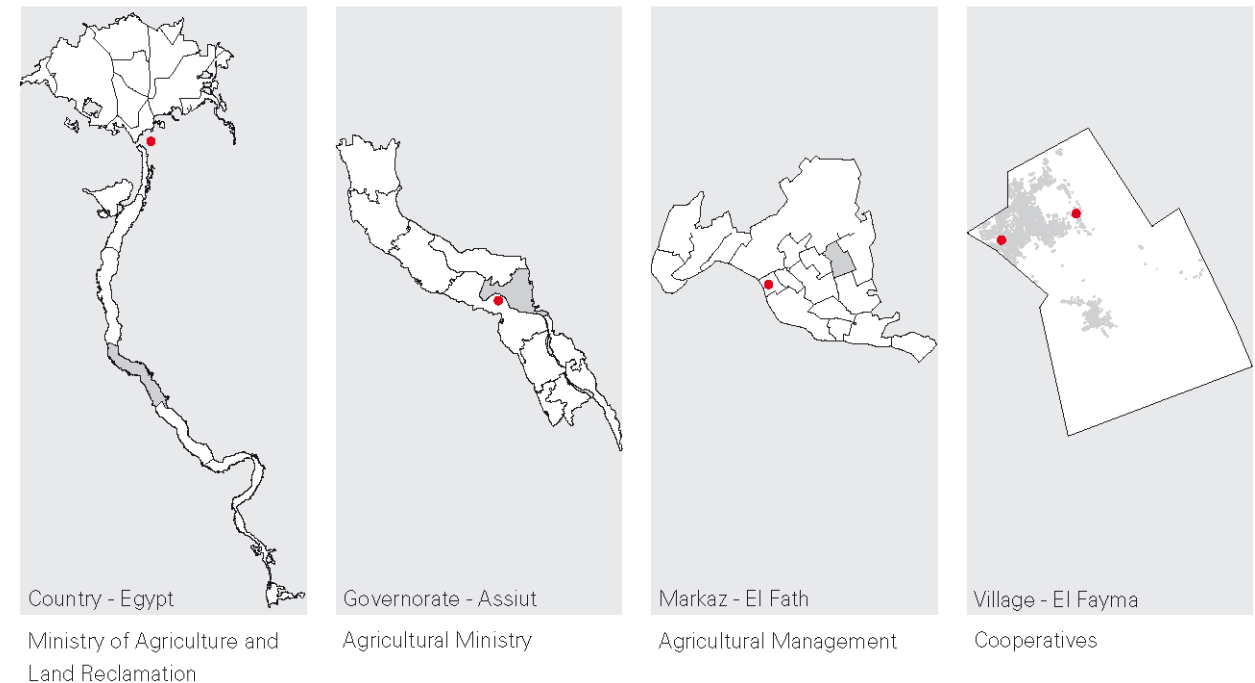


The picture shows the central wheat store in Assiut.



### Cooperative Support

Cooperatives serve as the connection between government and farmer. Farmers can buy subsidized seed and fertilizer there, when they are registered as land holders. The cooperative sells only a limited amount of fertilizer per feddan. The farmer must often buy more expensive fertilizer on the market because the sold amount is not enough. Every village holds one to two cooperatives that buy wheat from farmers and bring it to the big wheat store in Assiut. Next to the cooperative is a government bakery where the wheat is directly processed to bread.



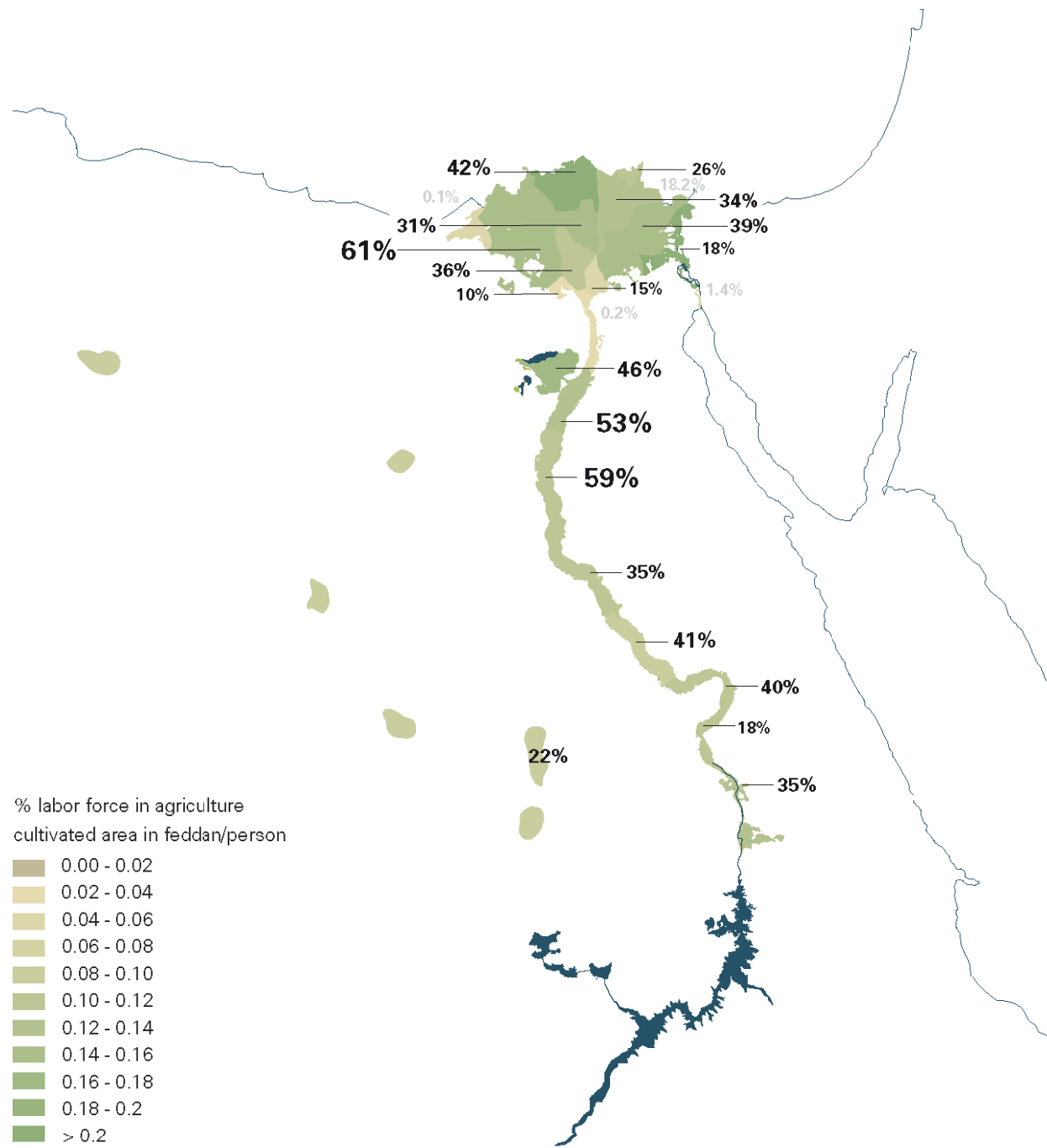
### Ministry Structure for Agriculture

The domicile of the main Ministry for Agriculture and Land Reclamation is in Cairo. It holds authority over the Agricultural Ministries in the governorates. Each governorate is subdivided into smaller regions, Markaz, with own Agricultural Management. This Agricultural Managements are responsible for the cooperatives, which are in every village.









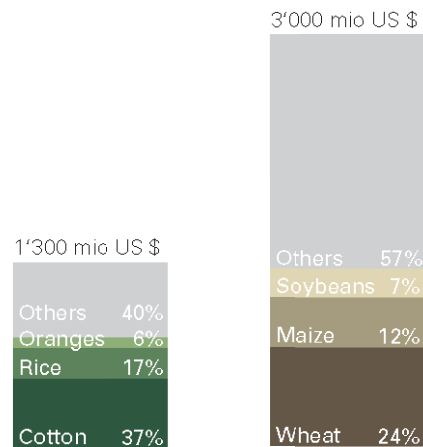
### Internal Trade Indicators

Egypt governorates have an unequal distribution of cultivated area per person. The lowest are located near large cities like Cairo and Alexandria, which impacts internal trade. The largest labor force in agriculture is in El Minya. The share of agricultural labor force of the GDP is generally high in Egypt.



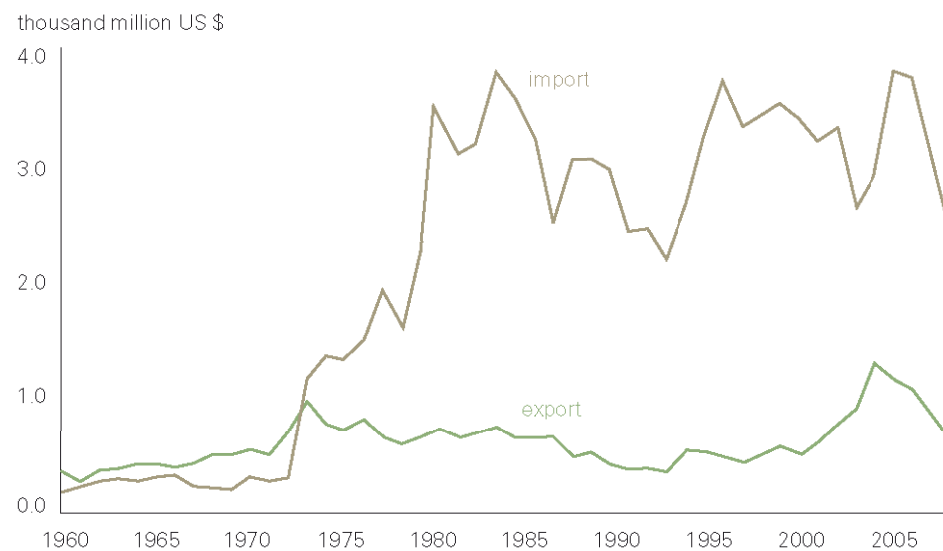
### Tradesmen from the Delta

The oranges in Assiut mature in September. In the spring, tradesmen import them from the Delta where there are greenhouses with fruit plantations.



### Shares in Imports and Exports

The major commodities in agricultural exports are cotton lint, milled rice and oranges. The major agricultural imports are wheat followed by maize and cake of soybeans.



### Negative Agricultural Trade Balance

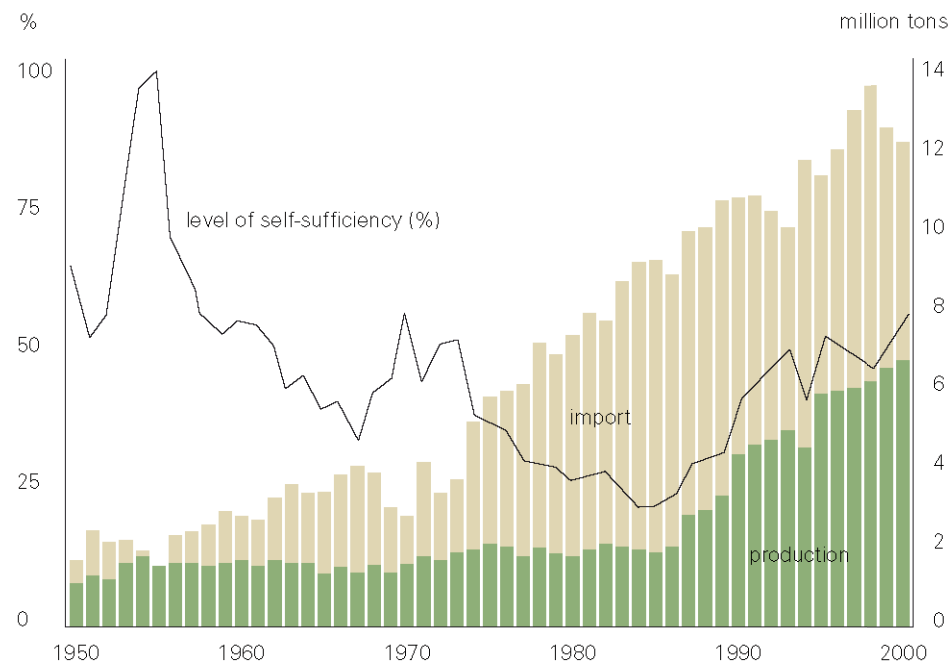
Since the 80s there exists a large gap between agricultural imports and exports, generated by Egypt's large population increase. Since 1973, the trade balance of agricultural goods has been negative, reflecting a dependence to the world market price and Egyptian trade partners.





### Agricultural World Trade

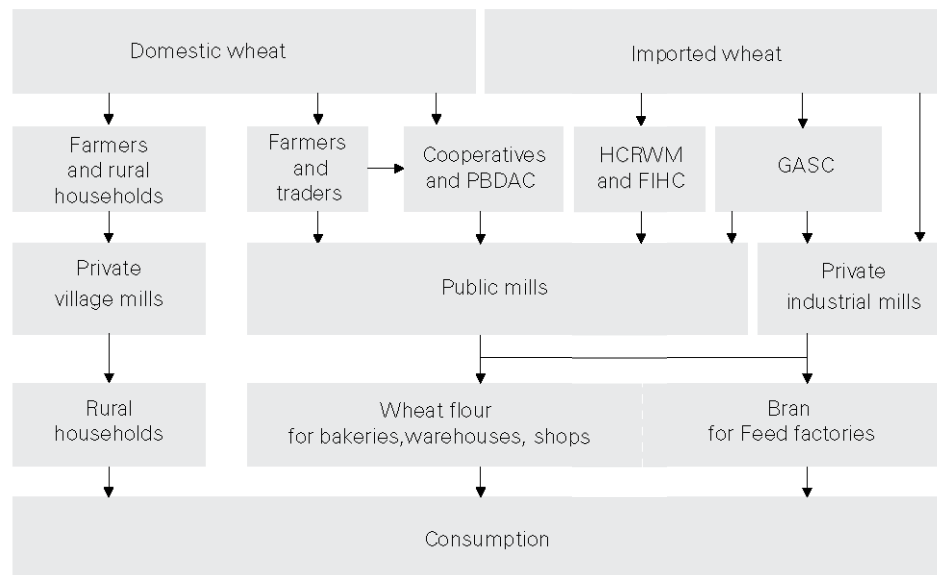
The main agricultural trading partners of Egypt's exports, like cotton lint, rice, oranges, potatoes, onions and vegetables, are the European Communities, Saudi Arabia, United Arab Emirates, Jordan, and Russia. The major agricultural imports to Egypt are wheat, maize, soybean cakes, palm oil, sunflower, beef, tobacco, broad beans and sugar. 60% of Egyptian exports go to European countries.



### Low Self-sufficiency of Wheat

Wheat is the most important agricultural element in Egypt. Although Egypt's wheat production could have tripled since the 80s, it covers only the half of demand because of the extreme population growth. The average size of wheat farms is about two feddans, while 50% of the wheat farms are smaller than one feddan. The small holdings consume about 70% of their own production.





PBDAC = Principal Bank for Development and Agricultural Credit  
 GASC = General Authority for Supply Commodities  
 HCRWM = Holding Company for Rice, Wheat and Wheat Mills  
 FIHC = Food Industry Holding Company

### Structure of the Wheat Industry

In Egypt there are equal parts domestic wheat and imported wheat. Domestic wheat is mainly consumed in the villages. Rural households use what they farm for self-sufficiency. Some domestic wheat goes to traders or cooperatives, which take the wheat to the public mills. The imported wheat goes to public mills, but also to private industry. Private industrial mills and public mills produce bran and about 77% of the nation's wheat flour. The wheat flour is processed and sold in bakeries, warehouses, food processing factories and shops. The bran is used in feed factories, bakeries and by poultry producers and traders.



Mill factory in Assiut



### Self-sufficiency in El Fayma

El Fayma clearly illustrates the infrastructure of a self-sufficient village. There are two cooperatives in the village which are the contact point for the farmers to buy fertiliser or seeds from the government. Three private mill machines produce flour which gets directly processed for consumption in the village. In the main lanes of the village, farmers sell harvested crops to their neighbors.



The main lanes hold water stations for free drinking water. One of the boys has brought some traditional bread.



The village inhabitants and farmers sell fruits, vegetables and clover at small booths and on donkey carts.



Private mill machine in the center of El Fayma, where farmers can mill wheat for their own use.



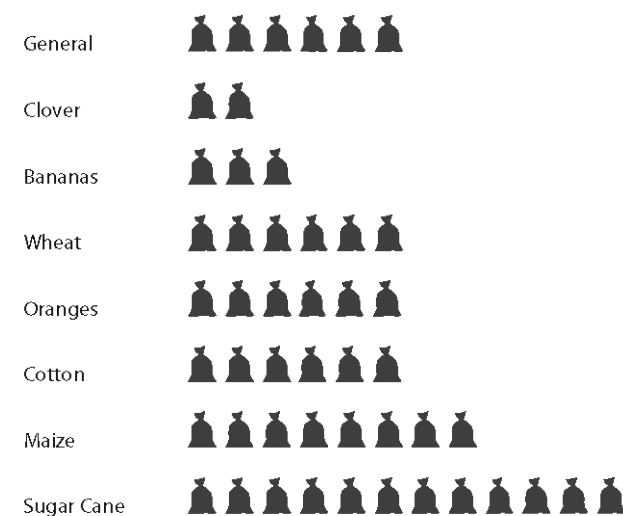
In El Fayma, there are two cooperatives, one serves the old land, the other one serves the reclamation area.





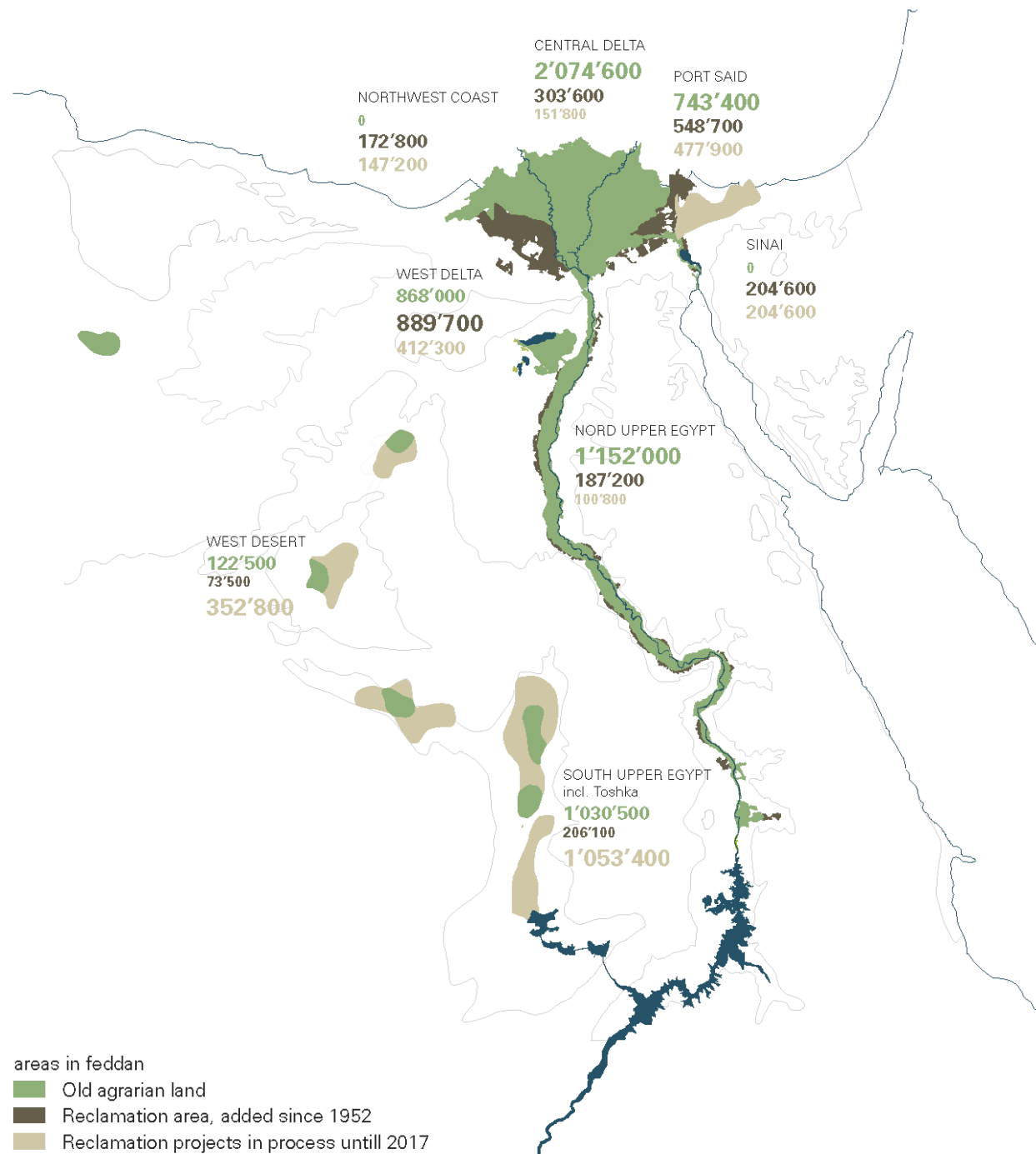
### Sanctions to Increase Yield

Production has grown at a noteworthy rate since the 80s. Sanctions to increase yield include fertilization, new irrigation systems, and the adjustment of crop rotation from a rhythm of three annual rotations to two. In spite of new chemical fertilization methods, animal dung is also used as a fertiliser.



### Yield Increase through Fertilization

Fertilizer is sold by the cooperatives or by tradesmen. Some crops, like sugar cane or maize, need more fertilizer. The graphic shows how much fertilizer is used per one feddan. The average usage is 300 kg per year, with one bag holding 50 kg. Since the Aswan High Dam was built in 1971, the farmer have required more fertilizer since the dam stopped the annual flood that normally deposited fertile soil.

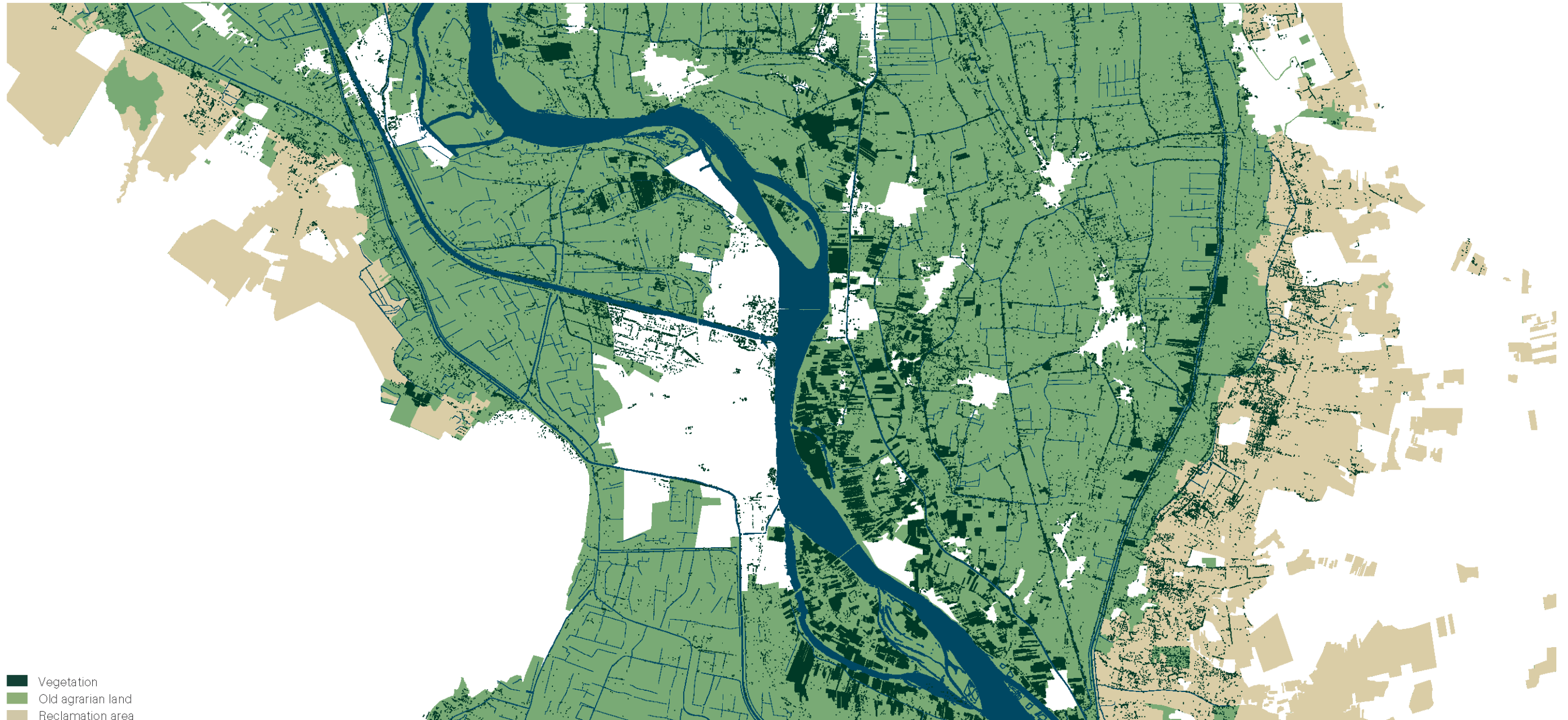


### Expanding Cultivated Area

All cultivated land added since 1952 is called reclamation land. Today, cultivated land amounts to about 9 million feddans, which includes 3 million feddans of reclamation area. Egypt started a long-term strategy until 2017 to add a further 3.4 million feddans to the agricultural land. One main reclamation project is the Toshka Project, an integral part of the much larger Southern Valley Development Project which plans a second valley in the Western Desert for the growing population.



**DRAFT**  
 © ETH Studio Basel



- Vegetation
- Old agrarian land
- Reclamation area

### Old Land

The fertile soil of the old land, in comparison with reclaimed land, requires less irrigation. Divided into small parcels and allotted to many owners, the distribution of fragmented land is not very conducive to large interventions. The old land, at 100,000 LE/feddan, is quite expensive, while irrigation is for free for all lands old and new.

### New Land

The government reclaimed new land into the desert, where soil is stony and infertile. Land cultivation requires more work; farmers must fill the ground with soil and dung and irrigate often. However, the land is inexpensive and costs only 10,000 LE/feddan. After 10 years of cultivation, the land begins to produce an average crop yield.



**Sa'ad Mohammed, 35-years-old, farmer**

"I sold some of my small fields in the old land for a good price so that I could buy much more cheap land in the reclamation area. The cultivation in the first years is hard, but after 10 years my family will have the same crop yield like in the old land. I do this for my children."



1



2



3



4



5



6

**Process of Land Reclamation**

- 1 Bring infrastructure and water to the fields
- 2 Flatten the ground
- 3 Clear soil from rocks and stones
- 4 Fertilize land
- 5 Plant and irrigate crop
- 6 Buy or rent the land from the government



## Prospect

Egypt's urban organism flexibly uses limited resources of water and fertile soil. Agriculture is like a skin and compensative element between the inner pressure of the population growth and the bounded expansion into the desert. The peasants and the habitants must be adaptable, as the fragmentation of fields through inheritance has progressed far. Most family holdings are too small to nourish the next generation. The liberalism of the current policy leads to an economic pressure on the smallest holdings because must compete with large companies. Some farmers are forced to leave their land and work in the cities in other occupations. The government purposes to raise the low self-sufficiency through higher mechanization, new irrigation systems, alternative cropping patterns, and land reclamation. But the planned reclamation projects are not possible without more efficient water usage. The largest project for land reclamation, which is the Southern Valley Development Project, not only seeks to create new harvest area, but it aims to create a second valley for settlement, industry, and tourism. The exploitation of the ground with resources leads to new problems like salinization and pesticide poisoning. It is questionable how elastic and stable the agricultural skin will perform in the future.



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## IMAGE CREDITS

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Olympia Georgoudaki and Argyro Poulivali

## ACKNOWLEDGMENTS

Special thanks go to the Egyptian students Mona, Sara, and Ahmed of the Assiut University for supporting us in our fieldwork and translating the interviews with the Egyptian farmers and employees.

We also thank everyone from the villages, ministries, and Assiut University for agreeing to interviews and offering warm hospitality.