

P A R T I I

T H E N I L E D E L T A

CHAPTER III

PHYSICAL FACTORS AFFECTING RURAL LAND USES

The area to be dealt with comprises not only the land lying between the two branches of the Nile, but also includes all the alluvial lands on both sides of the delta as far as the Suez Canal region in the east and the Western Desert in the West with the whole area forming an inverted triangle with its apex near Cairo and its base stretching along the Mediterranean coast.

Topography:

The Delta is a flat fan of land occupying what would otherwise be a nearly triangular bay of the Mediterranean, extending over 200 kilometres along the coast. The level of the land-surface of the Delta falls by some 17 metres between Cairo and the sea, with an average slope of about 1 metre in 10 kilometres. On either side of the Delta, the deserts rise gradually as rolling tracts of gravel and sand (See map No. 5)

A feature which will at once strike the eye on glancing at the Delta on Map (No. 5) is the large area of alluvial land still unreclaimed along its northern border. This land lies at so slight an elevation above the sea that its drainage by free flow is impracticable; it will ultimately be reclaimed by pumping operations on a large scale.

Geology:

The gradual accumulation of sands and clays brought down by the Nile has resulted in the formation of the Delta, in which the uppermost layers present considerable variations in the surface strata.

From borings made in the river bed at Esna, in Cairo, and near the large towns of the Delta situated on the branches of the Nile, it has been found that the channel is almost entirely composed of sands, and that the Nile mud is either extremely thin or non-existent. Away from the river, on the other hand, the Nile mud attains a considerable thickness, the sands not being reached before a depth of 10 metres (30 feet).⁽¹⁾

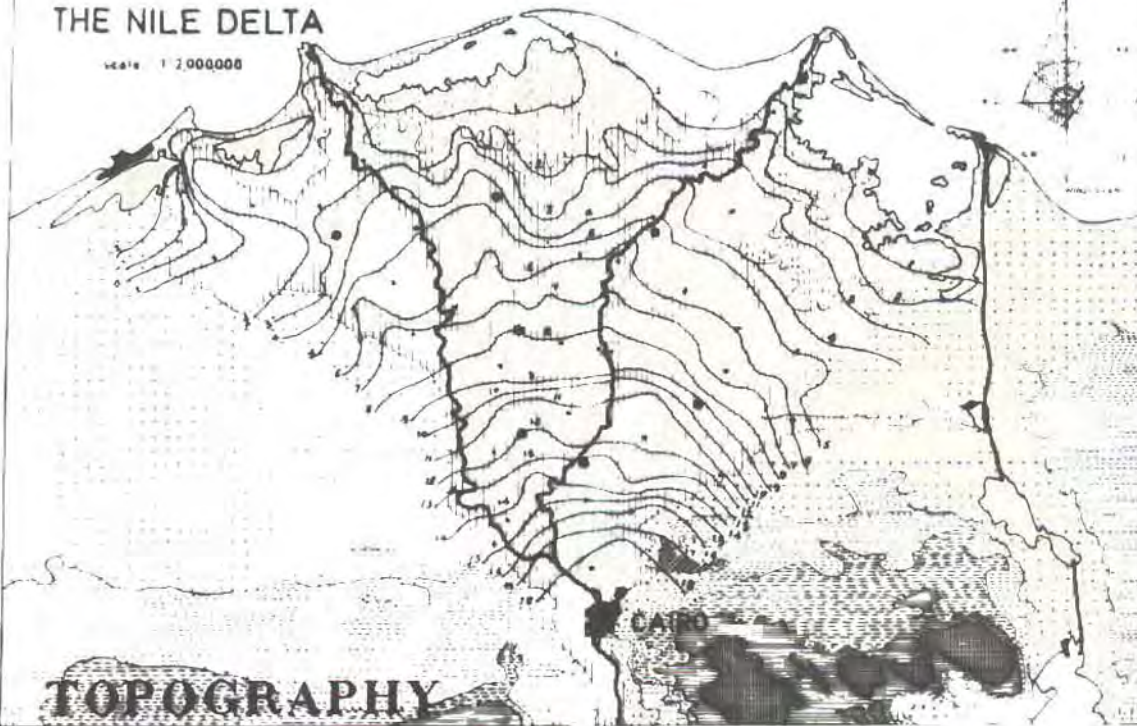
Through the long ages during which river-terraces were being formed in the

(1) Ball, J. 'Contribution to the Geography of Egypt' Government Press Cairo 1939. page 17

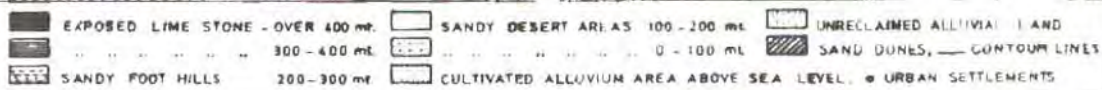
THE NILE DELTA

scale 1:2,000,000

MAP NO 5



TOPOGRAPHY



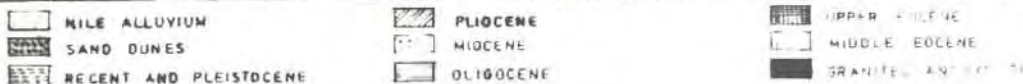
THE NILE DELTA

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MAP NO 6



GEOLOGY



The Valley, immense quantities of gravel and sand were carried by the Nile into the sea, where they became spread out around the river's mouths in the form of a delta, the surface of which became increasingly uncovered and subjected to erosion by the river as the sea-level fell. For the most part these deltaic gravels and sands are now concealed beneath a later covering of Nile mud, where they are frequently styled 'the Sub-deltaic deposits'; but here and there, especially in the more easterly parts of the Delta, they rise through this later covering of mud, forming the rounded gravelly banks known as the 'turtle-banks.'

The mud that covers the flat floor of the Nile Valley and most of the surface of the Delta and forms the arable land of Egypt has all been deposited by the flood-waters of the river in the course of the recent geological period. (see map no. 6) The Nile mud proper, that is to say the uppermost part of the deposit, averaging some 9 metres in thickness and composed of very finely divided mineral matter with comparatively little admixture of sand, has probably all been laid down within the last 100,000 years or so. (1) Beneath this uppermost accumulation of almost pure Nile mud is a considerable thickness of mixed sand and mud, deposited by the river during the transition-period between Palaeolithic and Neolithic times. In the Delta this mixed sand and mud overlies the sub-deltaic deposits already mentioned.

The process of the present day surface's building was at a yearly rate of 0.9 millimetres. (2) This meant that the building of the Delta lasted for about ten thousand years. Today the amount deposited in the Delta has decreased after the controlling of the river and the introduction of perennial irrigation. The present Delta is said to receive only one third of the amount deposited on lands still under basin irrigation and flooded every year. This amount will be affected markedly after the building of the High Dam south of Aswan.

In the Delta there is considerable variation in the relation between sands and clays. In the south near Cairo the relations are similar to those of the Nile Valley where coarse gravels appear at depths of from 30 to 50 metres, (3) but

(1) Ball, J. 'Contribution to the Geography of Egypt' Government Press Cairo 1939 page 17.

(2) The Rate of Advance of the Delta was calculated at 7 metres per annum. These changes usually take place at the mouths of the two branches of the Nile.

(3) Willcocks, Sir W and J Craig. 'Egyptian Irrigation' 1st vol. London 1913

pockets of clay are more frequently present in the lower sands. In the north of the Delta, on the other hand, pockets of sand are intercalated in the clays, or in some cases alternate with them.

In many parts of the Delta very stiff black clays are intercalated in the sands at varying depths. Stiff black clays of a similar nature are widely distributed in the extreme north of the Delta on the borders of the line of the great lakes fringing the Mediterranean.

Soil Types:

The soil of the Delta down to a contour of 7 metres above the Mediterranean is practically free from any excess of salt.⁽¹⁾ Below the 7 metres contour, however, bad drainage is always accompanied by salt efflorescence. Below the 3 metre contour, salt is everywhere in excess, and land needs very careful drainage and frequent washings. Below the 1.50 metres contour, very little land has been reclaimed. When it is considered that the bottom deposits of the Nile alluvium have always been in sea water, and that up to 1.50 metres above sea-level they are frequently washed by the sea, it is not to be wondered that capillary attraction brings salt easily to the surface in the northern parts of the Delta. Above the 6 metre contour, wells are frequently used for irrigation and draw their water from 3 to 6 metres below the surface. The wells in the Delta depend for their water supplies as much on the main canals as on the Nile itself.

Sir W. Willcocks in his book 'Egyptian Irrigation' recognized four classes of soil, noting:

1. The well-known dense black clay soil of a depth of over 6 or 7 metres, which is very rich and especially suitable for cotton.
2. The next class of soil is a dense black clay of 1 to 3 metres in depth, overlying sand.
3. The third class of soil is a sandy clay, especially suitable for maize and root crops.
4. The fourth class is almost pure sandy or gravelly soil.

The Delta soil is very uniform in its general composition; it is very rich in potash, somewhat less rich in phosphoric acid; and poor in nitrogenous compounds.

(1) Willcocks, Sir. W. and J. Craig. 'Egyptian Irrigation' vol.1, London 1913

Mr. Roche, (1) has classified the soil types according to the percentage of clay present, as follows:

1. Very light 'safra' - yellow - 20%
2. 'Safra' - 20% to 30%
3. Intermediate medium - 30% to 40%
4. Strong 'soda' - black - 40% to 60%
5. Very strong 'soda' - 50% to 60%

The physical constitution of the soil is of more importance than the chemical. The chief effects of the physical character are those on the quantity of water which can be held in the different seasons of the year with respect to the Nile flooding.

Natural Resources:

Apart from the cultivated land of the Nile Delta, it is hard to find any other natural resources; except fishing in the shallow lakes of Maryout, Edko, El-Barellus and El-Manzala in the north. Minerals are unknown in the Delta; consequently agriculture is the dominant feature of the economy of the area.

Climate:

Temperature: On the Mediterranean coast the range of temperature during the day is small and fairly constant throughout the year. It is least in the summer when its value is 7°C . (40° - 33°), and greatest in April and May when it is 9°C . in Cairo the diurnal range is 10°C . in the winter and amounts to 15°C . in May and June. (30° - 15°)

The wet-bulb temperature in Alexandria and Cairo is lowest (10° - 12°) in January, and increases to a maximum of 23°C in August.

The grass minimum temperature at Giza near Cairo fell to freezing point on 23 nights in January and February 1927, and on 21 nights in the same period in 1929, while in 1924 it fell to zero on one occasion only. In the seven years 1924 - 1930 the lowest grass-minimum temperature recorded was 4° below freezing point. (2)

(1) Roche, J. 'Agricole d'Egypt - Cairo 1923.

(2) Atlas of Egypt. Survey Department - Cairo 1928

Humidity: The climate of the Mediterranean coast is damper in summer than in winter, the relative humidity increasing from a little below 70% in winter to 75% in July and August. The air is more humid in the Delta in winter (relative humidity 80%) than elsewhere in Egypt. As the weather becomes warmer the humidity at all inland places in the Delta rapidly diminishes, reaching a minimum in May and June, the annual range amounting to between 20 and 25%. Near Cairo, the humidity falls from 70% in December to below 50% in May. In April, May and June during the passage of 'Khamasin' depression across the Libyan Desert the easterly winds which then traverse Lower Egypt are extremely dry, and humidities well below 10% are not infrequent.

At Alexandria the diurnal range is small, being between 15 and 20% throughout the year. In Cairo there is a large diurnal range, amounting to 25% in winter and 50% in the middle of the summer. Towards the end of the 'Khamasin' period the increase in humidity when the hot southerly wind is replaced by the west or northwest wind following the passage of a desert depression is rapid and very pronounced. A change in the mean-of-day value from 14% to 55% on successive days has been registered. (1)

Winds: The average mean-of-day velocity a few metres above the ground of the southerly current which prevails in the Delta in summer is about 9 kilometres per hour. Strong winds, sometimes reaching gale force, are not uncommon in the Delta during the passage of depressions along the Mediterranean sea in winter or across the Libyan desert in spring. Velocities of 120 kilometres per hour at Alexandria and 103 kilometres per hour at Helwan have been recorded. Gales usually blow from a southerly or westerly quarter. (2) These gales have helped in many cases the spreading of fires from one village to another. Although the prevailing northerly winds do not as a rule rise beyond moderate strength, nevertheless, they sometimes increase from almost calm in the morning to strong in the afternoon, dying away again in the night.

There is a large variation of direction during the day at Alexandria in winter; the mean direction is 20° south west at 8h., while twelve hours later it

(1) Atlas of Egypt - Survey Department - Cairo 1928.

(2) *Ibid.*

is 50° north west. At Helwan (south of Cairo) the resultant wind in January veers completely round the compass, being east at 4h., south at 11h., west at 13h., and north at 19h. (1) The wind is steadier in direction in summer when the northerly current is established. (See Winstar on Map No. 5).

Rainfall: Rainfall in the Delta is in few places of economic value though its importance is by no means negligible. The rainiest locality, viz. the vicinity of Alexandria, receives only an average of 200 millimetres per annum. The amount recorded there in individual years has varied between 387 and 59 millimetres. December and January are the rainiest months; there is a long period of summer drought. Rainfall decreases so rapidly with increasing distance from the coast that its value for agricultural purposes soon disappears. In the middle of the Delta the yearly amount is about 75 millimetres, while in Cairo although in one year 90 millimetres was recorded, the normal quantity is only about 30 millimetres.

Land Utilization:

The Nile Delta has an area of about 22,000 square kilometres. Of this total area, however, only a little more than half is at present cultivated, the remainder which includes most of the northern portion, being in part occupied by extensive shallow lakes and marshes and in part consisting of low-lying salty ground that has not yet been wholly reclaimed.

The rich agricultural lands of the Delta have been entirely formed by the deposition of suspended matter on the flood plains of the river in the course of a long succession of annual inundations; and although the Nile is no longer allowed to overflow its banks in the Delta, the soil still receives annually a minute addition to its thickness, by deposition from the irrigation-water that is led over it by canals from the river.

The cultivated area of the country now stands at 5,500,000 feddans, but as a result of the change over from basin to perennial irrigation, leaving less

(1) Atlas of Egypt, Survey Department - Cairo 1928

than one million feddans under basin irrigation, the crop area rose from 7,717,000 feddans in 1912 to 9,165,000 feddans in 1948. It should be added that owing to the fact that Egypt now relies on a steady water-supply, its total cultivated and crop areas show practically no variation from year to year, though the proportion under different crops fluctuate in response to the prices.

The following table shows a schedule of the provincial areas in feddans including cultivated and arable lands in 1952.⁽¹⁾

Table (6) Provincial areas - Cultivated by Arable Land.

Province	Total Area	Cultivated Area	Arable Land
1 - Beheriya	1,098,459	787,050	311,409
2 - Daqahliya	625,830	554,020	71,810
3 - Gharbiya	797,647	629,520	168,117
4 - Kafr El-Scheikh	861,340	487,791	373,549
5 - Sharqiya	1,371,830	661,577	710,253
6 - Qalubiya	234,387	355,119	29,611
7 - Menufiya	377,319	347,151	30,168
Total	5,364,223	3,669,106	1,695,117

In the Delta there are about 60,000 feddans under orchards and 186,000 feddans under vegetables.

The principal trees found in the Delta are : 'Sant' (Acacia arabica) which flourishes wherever it can find water, the Lebbeck (Albizia Lebbeck), much used for shading roads, the Sycamore (Ficus sycamorus), Tamarisk, Willow, Poplar Eucalyptus, and Bamboo. Many other ornamental and timber trees have been introduced and thrive well. There are about two million palm trees in the Delta.

Practically all the towns and villages of Egypt are situated in the Nile Valley and Delta. Cairo, the capital, situated on the river at the point where the valley begins to open out to the Delta has a population of about 2.5 million. Alexandria and Port Said, the two principal seaports, are situated at the western

and eastern corners respectively of the Delta; Alexandria (population about 1 million) is the entreport for import and export trade of the country, while Port Said (population about 189,000) derives its importance from being a place of call for all ships trading between Europe and The East by way of the Suez Canal. In addition to the large towns already mentioned there are in the Delta area, some twenty two towns with populations of more than 10,000 persons, ranging from Baltim with a population of 14,000 to Tenta with a population of approximately 141,000, situated on the centre of the Delta (See appendix no. 3)

Administrative Divisions:

The Delta is administered through seven Provinces (Mudiriya) excluding that of El-Tahreer (the new Liberation Province) and the Governorates of Cairo and Alexandria and Damietta. (See map no. 7) These provinces are: El-Behera, Kafre El-Sheikh, El-Gharbyia, El-Menufyia, El-Daqahlyia, El-Sharqyia and El-Qualubya. The Provinces are divided into towns (banders) and districts (markaza) which are subdivided again into villages (hahyas). It may be well, however, to guard against a misconception to which the use of the word 'village' may give rise. The administrative area of the 'hahya' may, and frequently does, comprise several agglomerations of houses, to each of which the name of village is more apt, or again where only one such agglomeration is included in the circumscription, it may be of a size that warrants the appellation of town rather than village. The village is governed by the 'Omda' (mayor) assisted by the Sheikhs of the different clans of the village and a number of Ghafars (policemen). The 'Omda' is appointed by the government or in some cases elected by the villagers themselves.

Communications:

Railways: Egypt was one of the first countries to have railways, the oldest line being that which connects Alexandria and Cairo via Tanta and Benha. (1) The second was that which connects Cairo with Ismailia via Zagazig. From these other two main lines branch the other railway lines of the Delta, forming a network spreading out fan-wise from Cairo and connecting the main cities, towns and larger villages of the cultivated lands of the region. (See map no. 8)

There is marked absence of direct East-West routes across the Delta which is particularly noticeable in the northern part of the Delta where the lateral distances are greatest and where the distances between the radial routes also increase

(1) Constructed in 1851

THE NILE DELTA

MAP NO. 7

Scale 1:2,000,000



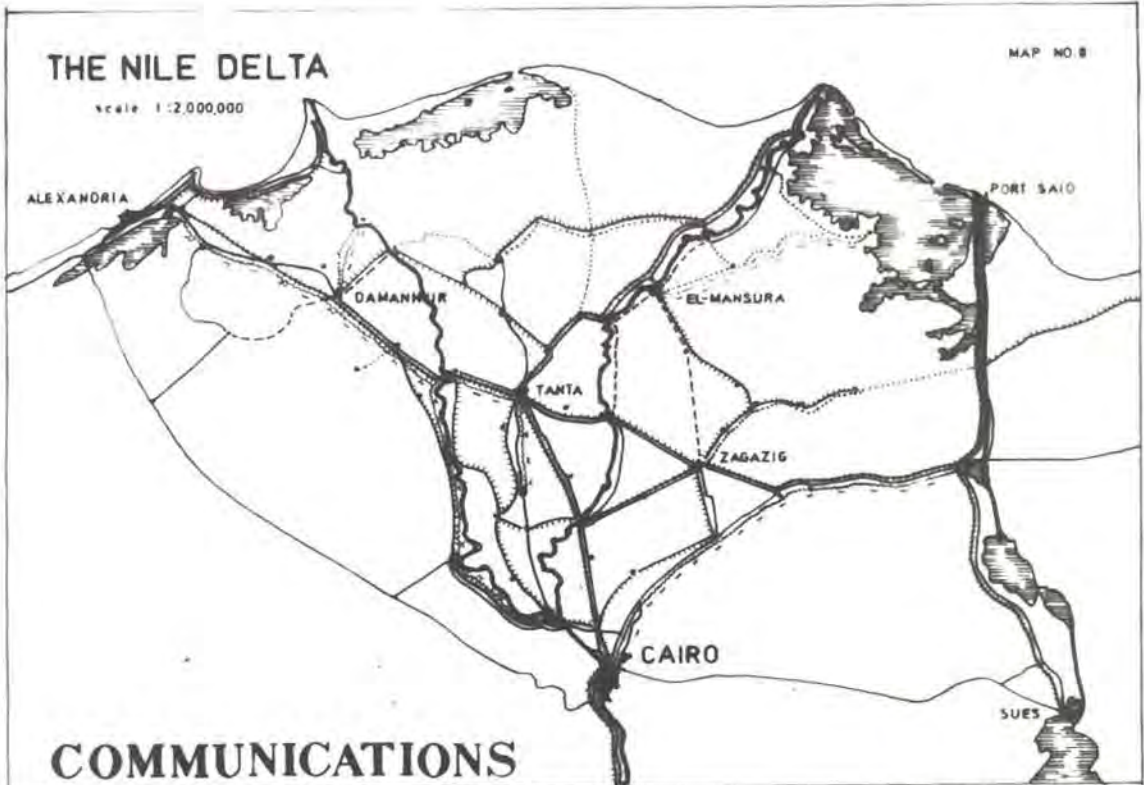
ADMINISTRATIVE DIVISIONS

- PROVINCE BOUNDARIES
- DISTRICT (MARKAZ) BOUNDARIES
- GOVERNORATE (CAIRO, ALEXANDRIA, DAMIETTA & SUEZ)
- PROVINCIAL TOWN (MODIRIYA)
- DISTRICT TOWN (MARKAZ)

THE NILE DELTA

MAP NO. 8

Scale 1:2,000,000



COMMUNICATIONS

- ROADS
- EXISTING METALLED HIGHWAYS
- - - MAIN HIGHWAYS UNDER CONSTRUCTION
- EXISTING EARTH ROADS
- RAILWAYS: MAIN LINES
- - - SECONDARY LINES
- WATERWAYS
- FIRST CLASS NAVIGATION CH.
- - - SECOND

There are about 3,000 kilometres of the State Railways carrying more than 40 million passengers every year. The 977 kilometres of the Delta Light Railways (narrow gauge) carry about 19 million passengers every year in the northern parts of the Delta. (Fouwa-Rosetta, Abu-Qir - Rosetta, El-Mahalla El-Kubra- Baltin and Fouwa - Kafr-El-Sheikh). The Low Egypt Light Railway has 252 kilometres and carries 3 million passengers every year between Benha - Mit Ghamr, Mit^hhamr-Mansoura, and Mit-Ghamr - Zagazig).

Roads: The different cities, towns and villages of the Delta are also served by a network of roads and tracks. Although the majority of these roads are not well constructed, their earthy surface makes them, in a way, passable for vehicles of all kinds. Most of the main roads which connect the different settlements of the Delta occupy the banks of the canals running northward. It is also to be noted as in the case of railways, that there is a lack of main motor roads across the Delta from East to West.

The average length of roads per person in the habitable areas in Egypt is still very low compared with other advanced countries. While we find that one kilometre of roads in the U.S.A. serves 30 persons, we find the same length serves about 1500 persons in Egypt. ⁽¹⁾ The roads in the northern areas of the Delta become inadequate during the rainy season in winter, and speaking generally the roads throughout the country are unable to cope with its economic and social needs.

The Council of National Production has initiated a scheme to pave 2500 kilometres of roads in the Delta, in addition to improving the condition of another 10,000 kilometres.

Densities of traffic and categories of roads will be studied in detail in the defined rural area (Markaz Ashoun) which will be dealt with later in Part III. Map No. (8) shows the constructed roads together with those which are under construction.

In 1947 there ~~have been~~ ^{were} 1,191 kilometres of first class roads and 5,737 kilometres of second class roads serving the different parts of the Delta, excluding the desert roads.

(1) Council of National Production Report of its Programme-Cairo 1955

Water-Ways: A considerable amount of internal communications and commerce between towns and villages situated on the river and the main canals are carried by sailing craft, which make use of the prevalent northerly wind to ascent the river, and the current to float downstream. Motor vessels are also used on the river Nile and the main canals especially the Ismailia Canal (connecting Cairo with Ismailia) and El-Mahmoudiya Canal which branches from the Rosetta branch of the Nile at El-Mahmoudiya and runs as far as Alexandria.

The Internal Navigation Authority has at present 450 marine units (vessels and boats) of a capacity of 100,000 tons. These units can carry more than two million tons of goods per year. This emphasizes the great importance of the water-ways to the national production and the national economy.

One of the main schemes under construction for improving the internal navigation, is the completion of the water-way connecting Cairo and Alexandria through the Rosetta Branch, Rayah El-Behery, El-Khandak Canal and then El-Mahmoudiya Canal.

Another scheme, now under way, is to connect Shebin El-Kom, Tanta and Kafre El-Zayat with an efficient water-way through Bahre (canal) Shebin then El-Qased Canal up to Tanta and then the construction of a new navigation canal from Tanta to connect El-Bajouriya Canal at Kafre El-Zayat and then to the Rosetta Branch. The existing water-way network and these two new schemes are shown on Map No. (8).

Throughout the Delta run 1,112 kilometres of canals and 433 kilometres of drains suitable for light navigation.