UNITED NATIONS

# ECONOMIC and SOCIAL COUNCIL

Distr.
LIMITED

E / CN.14 / CART / 256
5 November 1970

Original: ENGLISH

ECONOMIC COMMISSION FOR AFRICA

Seminar on Cadastre

Addis Ababa, 25 November - 9 December 1970

## CADASTRAL SURVEY AND LAND REGISTRATION IN UNITED ARAB REPUBLIC

(Submitted by the Government of the United Arab Republic)

M70-2084

# CADASTRAL SURVEY AND LAND REGISTRATION IN UNITED ARAB REPUBLIC

BY

Eng. R.M.L. El Kirdany, Director, Cadastral Surveys, UAR

## Introduction

The science of "survey" was known to ancient Egyptians. Drawings and paintings on the walls of temples and tombs, and writings on papyrus, prove that ancient Egyptians practised surveying long ago. Paintings on the temples of Thebes display land-surveyors using linear instruments. Writings on the Saqqara tombs prove that ancient Egyptians knew property registration since about 3000 B.C. The property of "Methen" of the third dynasty, for example, was recorded on the walls of his tomb stating that his property had been registered in the royal archives. This proves that there were some developed methods of measuring the land, computing its area and recording it in a registry. Courts referred to such registries whenever property disputes occurred. In case the court was not satisfied enquiry or expert missions were authorized to investigate the matter. In due time, survey work progressed and better registers were developed. They included such basic information as: name of owner, size of area owned, geographical location and tax levied on the land. Old inscriptions prove, in addition, that ancient Egyptians registered deeds for transferring ownership.

During the Greek and Roman rule in Egypt, no important changes happened in surveying methods. The same continued after the Arab conquest of the country. It is true that detailed land surveys were carried out from time to time, measuring both dimensions and size of each land property in each village, but no attempt was made to record this information cartographically, a matter that led to many difficulties whenever disputes arose. During the Arab, Mamluks and Ottoman rule, the same state of affairs continued. It was not until early in the nineteenth century that modern Egypt (now UAR) started to recognize the map as an important reference in land ownership. It is true that Napoleon assisted by scientists accompanying his military campaign, started to develop the first topographic survey maps of Egypt near the end of the eighteenth century; it is also true that these maps still have some historical value and are being used sometimes as reference in land disputes, but it was only when Mohamed Ali ruled Egypt that detailed survey maps, at a convenient scale, were developed. These maps served both as a record for private and State land-ownership and also as reference for tax collection.

Several attempts were made to develop cadastral maps for Egypt during the first ninety years of the nineteenth century. These started with the maps of Mualem Ghale and Mr. Masi (1813-1822), followed by topographic maps of Mahmoud Pasha El Falaki (1861-1874) and then followed by detailed surveys for some parts of the country (1878-1888). These attempts, however, were not particularly successful due to the lack of scientific supervision and control, lack of technical personnel, lack of precision standards beyond which work should not have been allowed to fall, lack of funds and pressure

from authorities to finish the work within a limited period of time. All this is particularly important in Egypt because of the thousands of small private land holdings congested in a very small area.

First Cadastre 1898-1908

In due time, the Egyptian Government saw the importance of establishing a special survey department. Two main reasons were behind this step:

1. The primitive methods adopted by the cadastral survey of 1878 did not allow the Government to exercise enough control on the detailed survey of the country.

2. The experience of the Government, while surveying State lands in 1892, made it obvious that there was a need for extending the survey to cover the rest of the land. This process had special importance to the Government because of its relationship to land tax estimates.

So, in 1898, a Survey Department was established under the Egyptian Ministry of Finance. The Department included a Directorate for State Lands, a Directorate for Hydrographic Surveys, and a Cartography Office (from the Ministry of Public Works).

The first task that faced the department was to adopt a plan of operation. The logical method was to start with triangulation of the highest precision, and to follow this by triangles of shorter sides and more moderate accuracy until sufficient points have been established to control field measurements made with the chain. It is not often, however, that this degree of perfection can be attained, since it usually happens that there are other considerations of greater weight that influence the situation. Even if technically correct approaches prove to be cheaper in the long run, than other approaches, which can be improved during the course of time; still the country's immediate need for reasonably accurate maps is sometimes so great that it would be wise to sacrifice a degree of precision and some expense in order to provide reasonable maps at the right time.

This, however, should not be allowed to interfere with the development of an accurate triangulation network that can assist in controlling detailed surveys and thus prevent errors from accumulating to an unpermissible degree.

That was the problem that confronted the responsible staff of the Survey Department when established in Egypt late during the last century: a reasonably accurate cadastral survey, with appropriate registration, of about seven million feddans 1/ (about 29,000,000 hectares) of highly fractioned land (40 per cent of the land was divided into pieces of half fedden or less) was urgently needed. This called for an annual work load

1/ A feddan is approximately 4,200 square metres.

of 500,000 to 800,000 feddans. This was to be done without any legal authorization that compels landowners, who usually did not live on the land, to be present to assist in indicating their land boundaries, while their representatives and tenants lacked the incentive to assist in the job.

This was the first complete cadastral survey carried out in Egypt on sound legal and topographical basis. Earlier surveys were accepted with the measurement and registration of the size of each land ownership without fixing its location on a map, a matter which gave a chance to some landowners to encroach on their neighbours' land and claim more land from others.

As maps were needed immediately to re-estimate land taxes, the only practical method, thus, was to push on with triangulations of second and third order and at the same time introduce improved methods whenever possible, with the objective of developing reasonably accurate maps at a scale of 1:2500 1/.

A complete survey of all agricultural lands in the country, except for the oases, was successfully carried out. Registries were prepared, including name of owner and size of land owned for each of the plots of villages. Maps were lithographically printed at the same scale and published for public use. The job was completed between 1898 and 1908. In two provinces, however, where work was not carried out on the technical basis that guarantees sufficient precision, the whole job was redone. For these two provinces, the work was finished in 1912.

Second Cadastre or Resurvey 1924

There was no legal reference that compelled landowners to register their deeds until 1924 when the Egyptian parliament passed a special law for that purpose. As a result all unregistered deeds became legally unrecognized. At this point, the need arose for developing new and sufficiently detailed maps to represent the actual ownership situation and to allow for the indication of sub-division of plots. As more than a quarter of a century elapsed since the first cadastre, this came as a normal step.

Although precision in surveying is of utmost importance, yet the nature of the region surveyed as well as the objectives behind the project undertaken both influenced the degree of accuracy expected. Exaggerated accuracy in situations that did not call for such accuracy is exactly like lack of accuracy in situations that call for a high level of precision. Adoption of the method of survey that leads to the required result is considered to be economically sound.

---

1/ At the beginning, the scale adopted was 1:4000 but after finishing about one-third of the work it was decided to alter the scale to 1:2500.

A broad line study of the land survey profession at the various periods from the days of the ancient Egyptians to the present time is of interest and practical importance; but the scarcity of information and the occurrence of gaps in the subject prevented us from having a complete picture. However the existing information shows very strikingly how the geographical conditions of the Nile valley affected the methods of survey adopted.

With all the modern scientific developments: accurately divided circles for angular measurement, new telescopes that assist in pointing and ranging, advanced mathematical methods to compute and eliminate errors; with all these highly developed instruments and scientific knowledge, it is astonishing to note that, when it comes to the detailed survey of small holdings, surveyors face the same difficulties faced by ancient Egyptians 5,000 years ago. In this particular part of the subject, few improvements have been introduced, but these improvements are vital as they deal mainly with the mathematical consideration of the non-right angles, computation of areas and definition of the relative position of various points with great degree of accuracy.

The first cadastre provided a complete data that helped to a great extent in carrying out the work in the resurvey or the second cadastre as those informations were considered as reference in all the stages followed. The responsible staff in charge of the second cadastre had a number of points to consider for preparation of cadastral maps serving both judicial and fiscal purposes; for registration and transfer of ownership and for tax collection evenly imposed on the equi-fertile lands; constructing such maps with introduction of the improvements found as a result to the first trial. The points were as follows:

1. The point of origin. The point of origin in the first survey corresponded to the intersection of longitude 31° E and latitude 30° N, at the great pyramid. The country was then divided into four quadrants resulting in complicated computation operations and probable errors as a result of negative co-ordinates.

2. Scale of maps. The scale of the maps of the first cadastre was 1:4000 and then changed to 1:2500. The maps were printed to the latter scale.

3. Demarcation and delimitation marks. The marks were from limestone blocks.

4. Connexion to triangulation points. Connexion to triangulation was done after the traverse work in the first cadastre was completed.

5. Instruments used and methods of computation. Theodolites and tapes were used; computation and plotting were done by hand.

6. Map printing. Printing was done lithographically on stones.

It was decided that the scale of the original maps should be 1:1000 and that of printed maps 1:2500. The point of origin was accepted to correspond to the intersection of longitude 25° E and latitude 22° N, so that the whole country falls in the first quadrant and all co-ordinates are positive. The demarcation marks were made from heavy old rails for the first; less heavier beams to the latter. Triangulation nets of different orders were fixed and observed before carrying out the survey work and thus each higher order triangulation controls the lower orders until triangulation control is connected to the traverse work. Modern theodolites were used and improvements on computation methods were introduced either by the use of calculating machines or mathematical methods for checking and elimination of errors.

The work in the second cadastre 1924 was not confined to field mapping work, but was continued by formation of registers containing the informations of areas of plots, names of landowners, position of each plot, the type of ownership. As the Second Great World War started in 1939 the programme of work gradually diminished and at last ceased completely due to different reasons either for financial reasons or for the lack of the iron marks or for the shortage of technicians. Maps were prepared for about 50 per cent of the area of the country and these maps are now considered as a very important reference for registration. The deeds are recorded on the original maps whereas the changes in ownership are recorded on special files complementary to the survey register. Areas of plots are computed from the original maps with great accuracy.

Future prospects

It was hoped to complete the second cadastral survey just after the end of the war. But as a result of the Revolution of 1952 many new responsibilities were added to the survey department, especially those concerning the implementation of the agrarian reform law; the distribution of the land which its ownership was transferred to the State to the landless farmers, together with hundreds of other similar tasks delayed the programme of work of the resurvey. The increasing interest in providing new cadastral survey in the settlement of the matter of land ownership, made it necessary to form a special administration within the survey department to produce plans and related registries. Survey education was given greater care to produce technical staff to complete the job. The directors of survey administrations in UAR are especially interested in the following problems and it is hoped that solutions can be found in this seminar especially if any of the participating countries met similar problems and found solutions for them. These problems are as follows:

1. Traverse lines measurements. These are now done by means of calibrated steel tapes. Can it be substituted with light wave instruments to save time and lessen the errors of measurement? Again what is the limit of accuracy if such instruments are used? It has been noted that most of the revision of work is due to incorrect linear measurements.

2. Survey education at different levels. The source of the higher level education is now the Civil Engineering Faculty. Lately highly specialized courses were introduced in certain institutions, but as the survey profession is a tough profession without a prosperous future and not enough income no students wished to join such courses. What is the proposed solution?

On the other hand, in the secondary level of education would it be general or specialized? And another problem of no less importance is the source of the complementary technicians such as handwriters and draughtsmen, especially since the official pay is low and cannot satisfy those types who consider themselves, more or less, artists and can have higher income if they use their profession in the open market.

3. Calculating machines. Can calculating machines be replaced by electronic machines? Is the time saved by using such devices worth the difference in cost?

4. Suitable scale for maps. What is the most suitable scale for printed maps as they are in reality illustrative maps? All subdivisions, area computation, and similar work are done on the original maps 1/1000.

5. Relationship between maps and deeds. Between 1924 and 1946, the survey department was the sole authority responsible for both survey and legal revision of deeds. In 1946, a legal division was established under the Ministry of Justice and took over all legal responsibilities originally entrusted to the survey department. This complicated matters in the eyes of the public as registration of deeds, under the new system, called for more formalities and additional routine work.

The question now is: What is the ideal system? Should all legal and survey matters be put together under one Ministry, or should they be under separate Ministries?

6. Survey marks. For demarcation of traverse points and delimitation of plots, the survey department used several kinds of reference survey marks. Lately, the department used reinforced concrete marks instead of the steel rods used earlier. It is true that these reinforced concrete marks are cheaper, but with all efforts made, they did not hold firmly to the ground, resulting in inaccurate traverse observations and successive repetitions leading to delay of work. Landowners, on the other hand, who were used to the old, strong, well-fixed steel marks questioned the accuracy of the new type.

The question is: What is, in your experience, the most suitable kind of survey marks that can be used and of which material should they be made, having in mind that land in Egypt is mostly flat, ownerships are mostly very small and the soil differs between sandy clay and firm clay?

7. Printing machines. Are the improvements made in map printing machines vital? Do they save time? Does it pay economically to install new machines? Which, from your experience, are the most advanced countries in this field?

8. Regional co-operation. Exchange of experts and visits among developing countries with similar conditions is extremely important. Can the United Nations and the Economic Commission for Africa promote such a well-needed programme?

Decisions on the above-mentioned issues and questions would certainly contribute to the survey work in the UAR, and would assist in carrying out future cadastral surveys accurately with minimum cost and in the quickest possible time. An economic benefit can be gained by the production of detailed maps which are vital for the execution of any engineering or development projects even if the cost of survey does not change.

- - - - -