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ROLE OF THE CARTOGRAPHIC SERVICE  
IN THE OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER  
(Document submitted by the French Government)

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The purpose of the Office de la Recherche Scientifique et Technique Outre-Mer, which was set up in 1943, is:

- to determine the basic data of natural and human environments;
- to undertake and develop all kinds of fundamental research relating to plant and animal production in the non-temperate areas of the globe, and more particularly in the inter-tropical and arid zones.

This brief mention of aims gives but a bare idea of the tasks which the 650 scientists and technicians of ORSTOM have had, and still have, to confront. The scientific disciplines and techniques are numerous and nearly all have marginal interests in common. The organization which enables this system to function without watertight compartments is composed of the following three main elements:

1. A vertical scientific organization of disciplines or groups of related disciplines for the training of research workers, preparing research programmes, checking the progress and results of the work undertaken, whatever the origins of such work;
2. A horizontal or geographic organization which, in the Institutes, Centres and Missions, whether permanent or temporary, groups and administers the research workers of the ORSTOM by co-ordinating their activities. These widely different working groups rely to a great extent on the Scientific and Technical Centre of ORSTOM (Bondy) (France), which serves, in a way, as their "supply base".
3. Services, including a Central Documentation Service, common to the first two.

The Cartographic Service of ORSTOM (thematic cartography) forms part of the last named.

These very general considerations were necessary in order to allow a proper understanding of the position occupied by this service in a multi-purpose organization engaged in fundamental research in the inter-tropical zone for the last twenty years.

There are few scientific areas in which ORSTOM research workers are engaged that do not require the preparation of maps. The following disciplines, in particular, however, manifest their results wholly or partially in this manner, or else demand the preparation of certain thematic maps for their further progress:

Human sciences (geography, demography, sociology, ethnography);  
Pedology;  
Geophysics;  
Medical and Veterinary entomology; and  
Phytogeography.

Moreover, each of these general themes covers operations, the very great variety of which is attributable either to the working methods of the research workers or to the ends to be attained in the course of a given programme.

Most often, synthetic, small-scale maps, the rate of production of which is slow, are suitable for fundamental research and the need to process uncorrected data and classify facts; medium and large-scale maps, often very limited in space, more quickly prepared, account being taken particularly of the techniques used, suit directly applied research, resulting very often from agreements with Governments.

The practical aspect of these latter studies is made increasingly manifest by the complementary subjects presented by the general theme derived from a precise scientific discipline. Thus, the pedologist will emphasize and facilitate the practical interest of his soils map by charts showing the potential and utilization of the soils, and in some cases by geological or phytogeographical diagrams.

In the Human Sciences, the development of the ORSTOM's cartography has been as follows:

- as long ago as 1944, small-scale diagrammatic maps (1/5,000,000) attempted to synthesize the documentation available at that time in certain areas limited to West Africa (population density, housing, animal breeding ...);
- latterly, and particularly since 1950, the field missions and the activities of the Centre and Institute research workers, both increasing, have leaned towards basic inventory themes (Pastoral atlas of Mauritania and Senegal, ethnic and demographic maps ...);
- currently, syntheses are being made, based this time on a sufficient number of field studies to justify them: such as the ethno-demographic 1/1,000,000 maps which are to cover the French-speaking Central African States.

The work of the Cartographic Service of ORSTOM in pedology is particularly important.

Here, two principal types of map have to be considered:

- (a) depending on the scale and technical and scientific use to which it is adapted

they are:

- synthesis, or general, maps, going from 1:1,000,000 to 1:5,000,000 (sometimes 1:500,000 may be included); they include "syntheses" of fragmentary or provisional knowledge (e.g., the 1:2,000,000 Atlas of the Cameroun, as well as nearly definitive complete maps which resume, by co-ordinating from numerous data permitting an accurate general representation of soil groups or sub-groups over the whole area of a territory (e.g., the 1:2,000,000 of the Ivory Coast).

- inventory maps, most often regional: they are base documents, for they prepare the way for studies of detail or practical application and also constitute the material that can be used for the syntheses. The most usual scales are sometimes 1:500,000, but more often 1:100,000 and 1:200,000. In some cases the 1:50,000 may be classified under this heading.

Maps of this scale have been prepared in all French-speaking African States and in Madagascar.

- application or detail maps, going from 1:50,000, or even to 1:2,000; they relate to small administrative territorial units, rural settlement areas; they are just as much "pocket handkerchief" maps (beds of pool, experimental stations) as maps of vast irrigation surfaces.

(b) depending on their content, the nature of their scientific, technical or practical data

there are soil maps more properly called for the utilization of lands which are determined according to "their agronomic value characterized by their intrinsic fertility potential, in terms of their possible mode of utilization ...".

In Geophysics, maps rely on the results of surveys made by the ORSTOM research workers and technicians at the Centres at M'BOUR (Senegal), BANGUI (CFA) and LOME (Togo and by the missions.

The observations bear essentially on gravimetry and magnetism, and, subsidiarily, on the isostatic anomaly.

These data contribute to a complete knowledge of the subject, add to the knowledge of the large geological groups and facilitate the use of the compass. Synthesis maps are small-scale (1/5,000,000) and generally monochrome; a very interesting trial in colour represents the + or - variation of  $g$ . (gravimetric map of West Africa).

Medical entomology maps, which are very closely concerned with the human environment, respond to two main considerations:

- to plot the geographic areas and limits of the principal vector insects (anopheles, glossinae), either by repeated use of symbols or by square degrees;
- to represent globally the simultaneous elements or the successive phases of eradication campaigns (of malaria in particular).

Whence the publication of maps of the distribution of the anopheles, and glossinae, at first in a more or less provisional manner within the limits of States, then in printed form for large geographical areas (West Africa, Equatorial Africa).

In phytogeography, four 1/200,000, maps have been published which are made on much the same principles as those followed by Professor GAUSSEN; the division sheets of LONGA, THIES (Senegal), BOUAKE (Ivory Coast), DIAFARABE (Mali).

1/1,000,000 maps of DAKAR and CONAKRY are at present in the press.

Finally, the ORSTOM Cartographic Service must be credited with the preparation of atlases, the first of which, still incomplete, is that of Cameroun.

That is a question of syntheses which must subsequently and regularly be brought up to date, but the balance of which in the operational plans and techniques (scales, graphs, etc....), is greatly facilitated as much by the cohesion of the teams of research workers or technicians, both those belonging to ORSTOM and those outside ORSTOM, working in the Centres of States, as by that of the central team of thematic cartography.

Moreover, it is obvious that the quality and importance of cartographic work depends to a great extent on collaboration between the research workers and the cartographers. Three methods are used to facilitate this collaboration:

- the initiation of the research workers in certain techniques or in certain subjections proper to cartography in the specialized field of each one; this contact is facilitated by the installation of the

Cartographic Service in a Scientific Centre where research workers of several disciplines are present, or passing through;

- conversely, the initiation of cartographers in certain aspects of the methods of thematic surveys, in the difficulties encountered in field work, by sending some of them on courses of varying duration in Overseas Centres or Institutes. This method offers in addition, the considerable advantage of giving advanced training to the African draughtsmen or assistant draughtsmen of those Centres;
- finally, consideration is being given to the conditions under which some of these draughtsmen or assistant draughtsmen will be enabled to improve their cartographic techniques for the purposes of particular themes (geology, human sciences).

In conclusion, mention should be made of the preparation Overseas, by research workers of ORSTOM of thematic maps of a provisional nature, in limited numbers, illustrating or concluding urgent convention work; most often these maps are used again in definitive syntheses. Similarly, many very small-scale maps, illustrate articles, studies for specifications or memoranda: they are, for the most part, prepared by the Cartographic Service of the ORSTOM.

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