Вопросы истории технических наук

HISTORY OF THE TOPOGRAPHY IN BENIN: THE OUTSETS OF THE TOPOGRAPHY AND ITS REALIZATIONS IN DAHOMEY (1850 to 1955)

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The origins of the topography in Benin, (ex French Colony of Dahomey) result from the necessity to the future colonist to know in detail the territory which he desires to establish his military strategy of conquest. Then, the topography came in Dahomey by the missionaries to assist at first the campaign and the military expedition of Danhomey and then to assure the development, the reorganization and the territorial management of the new colony at the beginning of 1900s. So the Department of Topography, created for that purpose and animated periodically by different French land surveyors took an important part in the plan of towns and the construction of infrastructures.

KEYWORDS: Topography, missionaries, colony, development, reorganization

Today as yesterday, the obvious fact is that the topography stays and remains a necessity and a tool of development. We turn to it before, during and after the planning and the construction of any socioeconomic infrastructures. It is upstream and downstream to any technical studies in Building and public works (architecture, Civil Engineering, hydraulics, geotechnics, roads) of which it sometimes assures the control and the supervision. The history of this discipline in Benin (ex Dahomey) goes back to the moment when, in the different kingdoms, the need to delimit and to attribute lands was felt. So, before the colonization, several methods are used by our forefathers to estimate or quantify the surface of the picketed lands. The surface of those picketed lands for most with defined and only plants, (called in the South of BENIN «kpati» or «Ayanti») is determined by traditional means of measure named by « kanti». In these practices used to proceed to the division of grounds clings to the one that consists in launching a stone to picket or extract an extent of ground in other purposes (gift, farm, transfer etc.). All those practices which correspond to the functioning of a society of feudal type and not monetary, are effective that rarely in certain rural zones and partially. Mostly, their functioning is caused to degenerate because of the development of the topography in the society and the progress of the individualism.

So, the French missionaries exploited several scientific methods and especially topographic one to master the knowledge of DAHOMEY on the geographical and environmental plan (communication channels, ground, vegetation, climate, river system and variation of streams, relief, houses, foods, different seasons, roads, population, zone of resistance etc.) before the imperialist expansion of 1892. So, as in several other professional fields, the topography showed its first ability in BENIN at the beginning of 1900s, after the conquest of DAHOMEY and after its dependences by the French Colony on June 22nd, 1894. From then on, Dahomey is incorporated in the French West Africa (FWA) on December 18th, 1904. It's in this point of view that the practice of the topography was introduced in Benin by the colonizer according to the order of May 26th, 1903 (constituting a Topographic Department) of the General Government of the F.W.A) with the creation from a Topographic Department and from the Land registry (1904) which was connected with the Inspection of the Public Works of the F.W.A. As a consequence, this Department is connected with the Direction of the Public Works of Dahomey since 1906 until the day before the independences before being set up as National Institute of Cartography (NIC) in 1978 and today as National Geographical Institute (N.G.I) of Benin. It's also in this colonial period that the need to educate native technicians to help the French executives of the period was smelt. The alone formative school of Land Surveyor during the 1900s was in DAKAR. It is at first under the name of Training Center that the first professional school was born in our country. In small step, the exercise of the topography marked the time by its works.

It's to make discover the importance of this discipline in the history and the evolution of Benin (Dahomey for example) where the present study was introduced to fill not only this space but also show the role which this discipline played in the integrity, the development and the economic rise of DAHOMEY since the colonial imperialism until the eve of independences. So, from the genesis of the topography in Republic of Benin, we shall strive to describe its organization, its application, the processes and the techniques used to highlight the operating methods which survived in time.

I- TOPOGRAPHIC TESTS DURING THE PRE-COLONIAL PERIOD

With the ban on the trade of slaves from 1840s, the business relationships became intensified with the king of Abomey. Embassies followed one another with kings Guezo (1818-1858) then Glele (1858-1889) to convince them to stop the trade of slaves and to develop the one of oil, to protect and to facilitate the the Christian missionaries action of evangelization who arrived in the 1860s. However, the end of the reign of Glele and the one of Gbehanzin's son are marked by the French claiming about Cotonou, the French protectorates of Porto-Novo and Grand Popo. It's in this context that are situated the first reconnaissance missions of the inside of Dahomey which preceded the military campaign of 1892. Their aim was to recognize the ways, irregularities of the ground and nature of grounds as well as vegetation. These collected data relative to topographic knowledge are at the origin of the cartography of DAHOMEY established by the missionary F. BORGHERO in 1865 which contains five categories of information:

- the communications channel among those forbidden to Europeans,
- the populating, by establishing a hierarchy from cities to villages and by indicating the limits supposed between the States,
- the river system which remains largely unknown,
- the vegetation, because it also mentions the existence of woody or cultivated zones. The depression of Lama is seen as a wooded swamp. The drawing seems to symbolize a forest zone around Allada,
- the topography of the country, because it includes a topographic profile, drawn on BURTON's indications with some level of altitude which contain errors.

Indeed the difference in elevation marked for the depression of Lama is too much stressed in the contact of the plateau of Abomey in the North. There isn't 240 m of difference elevation between Cana and Abomey, distant from about ten kilometers. An error was committed thus either in the survey, or by the draftsman who did not know the ground. The map of BORGHERO [1] already joins in a different political and economic context, where the geographical knowledge of the unexplored territories begins to become important and represents one of goals to the conquest of DAHOMEY. If Europeans had a vision relatively stretched by these West-African regions, this one was little exhaustive. Their geographical knowledge of the country was not better. Surely, most of the papers contained statistical data, but their information were based on more or less reliable evaluations, with very limited methods and materials.

These operations and topographic data collected on the ground are the ones in particular coming from the first real penetration of Haut-Oueme in 1887 [2] on the instructions of Doctor Jean BAYOL, then in mission in Porto-Novo. He will put Edouard FOA in charge of it and he who left, gone with Siciliano and with Maignot, respectively chief agent, and leader of the counter of Porto-Novo, of the business company Regis. The first one had to make an ethnographical study at the same time as topographic rises, the second, took care to make accept the French protectorate to the waterside "independent" Chiefs of OUEME and the last one, to study the trading of the region and to develop the exchanges with Porto-Novo. The results of this exploration pushed until the border of Danhomey (Agbomè) proved that Oueme, commercial way between the coast and the interior, also constituted an axis of political penetration towards Abomey. From these reports relative to topographic surveys, four (4) important missions were sponsored by the French authorities to direct the military campaign better. It is about expeditions of:

- Mr. ANGOT in October, 1889 appointed by Doctor Jean BAYOL, Governor of the rivers of the South of Senegal for a recognition of the unexplored territory of the kingdom of Porto-Novo. He has to study the roads of Porto-Novo in Oueme near the border of the Glele kingdom, to note the nature of the ground, the villages which have a strategic position, the populations, the resources in foods, cattle, cultures, the crossed streams and the swamps, in order to know if there is possibility or not for an expeditionary column to go directly and in good conditions to border of Dahomey;

- Jean BAYOL, in Abomey (November-December, 1889), to try to solve peacefully the question of Cotonou, namely the respect for the treaty of 1878 which authorized French to take up Cotonou and to establish a customs there. Although the purpose of this mission was diplomatic and political, BAYOL wrote a " report of road " and ANGOT, member of the mission, established a sketch of the followed way;

- Victor BALLOT, in November, 1890, then resident of Porto-Novo, made a geologic mission in "Decame" (plantation of palm trees), by going back up Oueme. This recognized partial way, already holds attention of French authorities;

- AUDEOUD, from February 9th to March 25th, 1891 which is in charge of bringing presents to king Behanzin on behalf of the President of the French Republic, SADI CARNOT. Under this "diplomatic cover", the mission had in fact for purpose to collect information about the country.

It is exactly the results and the conclusions coming from these collected topographic data about the country (in very difficult conditions: sketch of marking, measuring instruments to be informed, not counted, identification of the royal palaces) from these missions that the roads from Cotonou to Abomey by Ouidah were excluded from the expedition[1] according to the report of CHASLES in 1891 [3] which recommended the road of Oueme, « *which consists in going back up Oueme until the level of Abomey. In this place the lands are more raised and it is possible to reach the capital in six or eight hours* ». It's this road that will be chosen by DODDS in September, 1892, and the climatic conditions which were also studied carefully determined the most favorable moment to a military campaign which is the small dry season from August to September. Indeed, during the big dry season, the river Oueme is not navigable, and during July and October, les waters are too high and the current is too fast. The military expedition began in September, 1892. The choice of the way and of the season was determined by the preliminary observations made during the reconnaissance missions of the country. So, this study [4] allowed to show the importance and the role of topographic knowledge during the military expeditions for the conquest of DAHOMEY in September, 1892. All the presented documents, whether they are maps or reports, give information about the topography and the geography of the country (road, ground, vegetation, climate, relief, house, population, zone of resistance etc.) whose knowledge was essential for the success of the envisaged military operations.

II- REALIZATIONS OF THE TOPOGRAPHY DEPARTMENT IN THE COLONIAL DAHOMEY

After the conquest of DAHOMEY by decree of June 22nd, 1894 of the President of the French Republic, Marie-François SADI-CARNOT, the expansionist visions quickly gave way to an economic and scientific management of the new country. Ever since, several activities knew their birth in DAHOMEY by the colonists. The establishement of the topography in Benin indeed dates, from the beginning of 1900s on the day after the expansion of the French imperialism in West Africa. At first, the topography stays in the service of the public works. It mainly intervenes in the execution and the realization of the works of railroad (1903-1918), road and track, of bridge and culvert, of hydraulics, irrigation and purification, aeronautics, and building etc.

[1] *The roads of Cotonou to Abomey by Ouidah are «to avoid in a way absolute in case of expedition, because they are partially covered with wood and with thick forests in which the ambushes would be very easy to hide without we can do nothing against them. They are cut by swamp, by streams difficult to cross, at the exit of which a less numerous crowd could very easily arrest a line ahead. The swamp of Lama, not far from Abomey is particularly difficult. In brief, an expedition, especially on foot, from Kotonou or Wydah would become ruined if the enemy was around*

The topographic department thus takes an important part in the conduct of these operations. It is by the order of May 26th, 1903, constituting a topographic service department of the Government of the French West Africa that the topographic department was established. Ever since, Mr ANGLADE, land surveyor of 3rd class was sent to the topographic department in 1904, assisted by the Draftsman BONNEMAZOUN. However, certain topographic operations are led by land surveyors committed by the General Governor of the French West Africa and given to every colony for a punctual mission. It's in this point of view that the colony of Dahomey benefited during January, 1905 of the service of the first land surveyor missionary of 1st class, by answering in the name of Mr MARION. He was committed for the establishment of the fragmented plan of PORTO-NOVO. The report coming from the execution of this task allowed to glimpse the methods of surveys used at this beginning of 1900s for the realization of the topographic works. It is about the triangulation, about the progress of precision or polygonation, about the trilateration, about the Marking out. It is to note that Mr MARION wasn't able to pursue his mission. On the way of return in France, he died on May 20th, 1905 aboard the liner ″City of *Maceio*″, consequences of paludal cachexy. Also, Mr ANGLADE, falling ill, was able to do no service and leaves the topographic department to the draftsman BONNEMAZOU before the arrival in February, 1906 of Mr CAILLAUD Jean-Baptiste Alphonse, Land surveyor of 1st Class was put at the disposal of the topographic department of DAHOMEY on January 27th, 1906. He will be joined by Mr BERGERET, Land surveyor of 4th class on June 21st, 1906. Then, the section of the topographic department and the land registry is managed from then on by an Engineer Land surveyor (Chief Service) who is assisted by another engineer, his Assistant. Under their authority and by their successors, several striking activities were executed. Except the operations and the relative interventions in general way in the public works, the topographic department assures some works connected to his institution. What shows the group report on the Topographic Department course of 1910.

The topographic department worked during the year 1910 assuring in what concerns it the execution of the decree of 1906 on the land regime, and this according to the provisions of the local order of September 03rd, 1907. So, various works were executed for the administration of the colony. In Porto-Novo we distinguish: the projects of rectification and rehabilitation of Porto-Novo, the fragmented plan of the surroundings of the lagoon, the plan of development and extension of the avenue Victor Regis, the plan of alignment and extension of the street of captain OUDART, the Project of avenue hugging the lagoon, the project of building of the avenue DODDS, those of the avenue DOUMERGUE and the avenue Victor BALLOT to the lagoon, the lots to SADOGNON and ATTAKE.

In Cotonou the department executed the staking of axis of the streets of the european city, the alignments, the lots and the marking out of lots in the european city and in the native city. In Abomey the plan of lot of the surroundings of the market was drawn up as well as that of the accesses of the station in Bohicon. In this year of 1910, marking out of buildings at the end of registration were executed in the different circles. The comparative board 1 below gives the exact number of these operations and allows to make easily the comparison with the previous three exercises.

CIRCLES	1907	1908	1909	1910	FOR REGISTRATION	OBSERVATIONS
ABOMEY	1	17	-	-	-	
ALLADA	-	18	9	10	10	
COTONOU	2	8	8	22	22	
GRAND-POPO	3	8	9	5	5	
OUIDAH	2	30	28	13	13	
PORTO-NOVO	50	50	29	34	38	
SAVALOU	-	8	-	4	4	
SAVE	-	-	-	1	1	
ZANGNANADO	-	6				
TOTAL	**58**	**145**	**83**	**89**	**93**	

Board 1.

The European staff which assured the execution of these different works understood three land surveyors who worked respectively during 12; 11 and 7 months. A draftsman was their assistant for five and half months. In a parallel direction, the purchasing of new parcels of land (often coming from lot) takes place by a procedure of auction. The process is that the adjudication took place by auction and by the extinguishing of lit fires for the circumstance.

In this point of view, the execution of the topographic works took the process of the events and played completely its role in the construction and the structuring of DAHOMEY. We have for proof the annual reports about the functioning of the Public Works Service. They make case every year of the led topographic activities. So, several activities took place. In a sporadic way, we can mention:

- After the construction of the Wharf[2] (current Autonomous Port of COTONOU) in 1891, several topographic operations favored its modernization especially in 1910, 1926, 1928 and 1950.
- From 1900 till 1936, realization of railroad from Cotonou to Parakou, 438 km.
- 1912, sketch of plan of road in Cotonou with project of administrative and sociocommunal infrastructures to know catholic mission (current Church Notre-Dame of Cotonou), Prison, Former cemetery etc.
- 1933, Preliminary project of the rehabilitation works of the city of Porto-Novo which was proposed further to the conference (led by Mr BERT Administrator-Mayor of Porto-Novo) which took place on Thursday, October 26th, 1933 in the city hall of Porto-Novo.
- 1935, realization of a construction project of an aircraft hangar in COTONOU, draft drawn up by the engineer T.P M.ELU, verified by the Main Engineer in COTONOU, Mr REFFAY on July 2nd, 1935. The project is then presented by the Main Engineer put in charge of the exploitation of the urgent currents Businesses in Cotonou, Mr LESCANNE, on July 3rd, 1935.
- In February 17th, 1937 development and reparation made to the superior primary school "Victor Ballot".
- 1937 to 1938, Aeronautics works of and reinforcement works of the runway of Cotonou, finished at the beginning of the year 1938 in the topographic domain according to a report of Mr MANENT, the Main Engineer, Chief of the Sections of Public Works and Studies.
- 1946, from a ministerial decree, it was decided to endow the Cities of Cotonou and Porto-Novo of a town planning scheme, on August 08th, 1946.
- 1948, license to construct a building in materials of the country delivered to the native Alfa Aboudou ZAKPA on January 30th, 1948 by the Administrator Mayor of the City of Porto-Novo. That proves once more, the necessity for the colonist to organize the housing environment.
- 1951, the main plan of the city of Cotonou, studied by the Architect CALSAT is made executory by order of May 17th, 1951;
- 1952, the plot plan of the residential zone of Cotonou and the annexed regulation were made executory by local order of January 17th, 1952,
- 1955 a report about the localities endowed with a town planning scheme specifies:
  - *the administrative zone*

The architect CROUZAT was put in charge, by contract of studying in the administrative zone the grouping of the main administrative departments of the territory, the printing office of the government, the court and the palace of the territorial Assembly.

  - *the industrial zone*

The plot plan and the annexed regulation were made executory by local order of JUNE 27TH, 1952.

  - *the port zone*

The grouping of the installations of the Wharf is in progress. However the incertitude which still presses on the creation of a port in Cotonou didn't allow to make progress the study of the port zone.

[2] *The Wharf is a metallic footbridge moved forward in the sea to beyond the zone perturbed by the bar; so the operations could be made in relatively quiet water.*

- *the zone reserved for the African housing environment*

A lot was reserved in the area AKPAKPA. All the planned constructions will be ended before the end of the year 1955. The extension of the lot not being possible any more in this area; some grounds in the North-West of the city were reserved for new constructions.

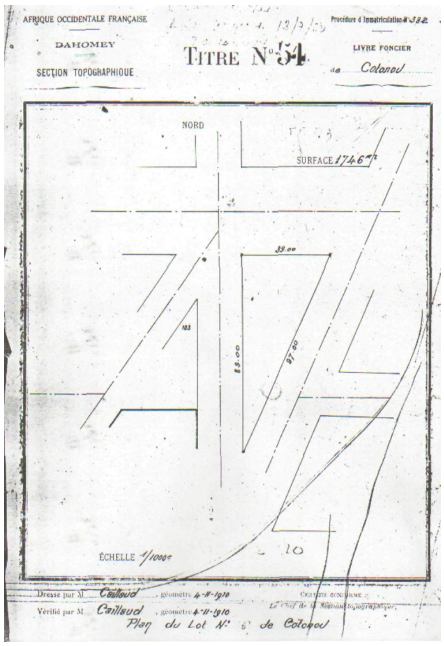

Fig. 1: A plan of 1910 without coordinates

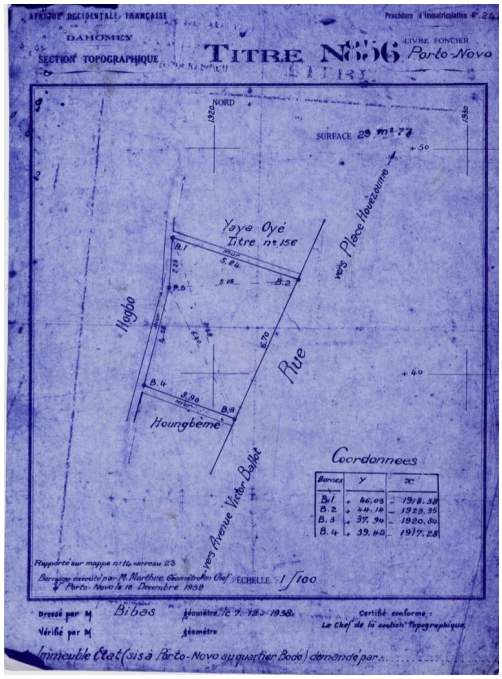

Figure 2 : A plan of 1938 with the coordinates

- *the lot of GBEGAMEY*

A plan of extension of the lot of GBEGAMEY was applied. This extension covers 82 hectares.

In Porto-Novo, the main plan which was studied by the Architect CALSAT is made executory by order of May 17th, 1952. So, the lot of the area FOUN FOUN located between the Victor BALLOT school and the exterior boulevard was the object of a new study during the year of 1955. It's the same of the area OUINLINDA. An extension of the survey at 1/2000 of the city was planned to allow to undertake other studies.

At the level of the land management, the requests notices of registration (according to requisition) and the marking out notices are regularly published in the official journal. This is the way the Conservative, Mr P. De FEYSSAL, according to the decree of July 24th, 1906, published in the official journal of 1912, several requests notices of registration and the marking out notices. A report of 1906, specifies moreover that the registration was not applicable to the buildings of private individuals. It was only intended for the colony people. Likewise, the tools used until there (year 1927) according to a report of the driver of the clerk of the Public Works Mr LOUBERT were mainly constituted of Circles, of levels, of tacheometers, of feet, of rods and of chains.

III-ANALYSIS OF GEOGRAPHICAL DATA

At the beginning of 1900s, the realized SURVEYS are essentially plans or sketches of way, domain or marking out of registration. Indeed, the plans coming from marking out of registrations edified us on the presentation of these surveys and the transfer methods of data.

- *The presentation of plans* **:**

In the analysis of the collated plans (of the National Geographical Institute, the Direction of Domains, the Recording and the Stamp and the National Archives) we can distinguish three (3) categories of plans:

* the plans without coordinates nor level (distances) registered , from 1900 till 1905;
* the dimensioned plans without coordinates (X, Y), of 1905 at the beginning of 1930s (Fig. 1)
* the plans with the positive and negative coordinates, until 1955 (Figure 2)

- The transfer methods of data:

For the transfer of data, the exploitation of map of the world regularly updated by the technicians or the draftsmen agents was appropriate.

- *At the level of the geodesic points*, we note an absence of points Doppler. The reference points remain the relative data to map of the world.

- On the altimetrical plan, there exists no another densification of the system or the points. It is envisaged so that the surveys of altimetrical studies and or land of the land registry can be made in a homogeneous system.

CONCLUSION

Having served to know the geography of Benin to facilitate the conquest of the kingdom of Danhomey and the colonization of all Dahomey, the studies and the topographic works allowed the colonial administration to extend its influence on the colony. Indeed, since its creation in 1903 by the colonial administration, the Topographic Department realized several works contributing to the creation of modern cities by the lots, the plan of ways, implementation of infrastructures (Wharf, Railroad etc.) on one hand but also in the land management by the marking out of building and other projects of development, town planning and establishment of main plan. So, until the middle of the 1950s the topography so stayed, in service of the administration to allow it to reach its goals regarding rehabilitation, development and management of the territory. During all this colonial period at the beginning of which the Topographic Department was created, its works were executed by French missionaries land surveyors who came to assure the performances during some periods going from 3 months to 1 year, and even more. This first part of the history of land surveyor's work in Dahomey, today the Republic of Benin showed the importance of the geodesic sciences for the construction and the organization of a country. The second part, through the study of the organization and the evolution of the Topographic Department, will allow to know the role that this institution had to play in the management by France from this colony which Dahomey represented.

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ИСТОРИЯ ТОПОГРАФИЧЕСКИХ ИССЛЕДОВАНИЙ В БЕНИНЕ: СТАНОВЛЕНИЕ ТОПОГРАФИИ В ДАГОМЕЕ И ЕЕ РЕАЛИЗАЦИЯ С 1850 ПО 1955 ГОД

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Возникновение топографии в Бенине, бывшей французской колонии Дагомеи, связано с необходимостью для будущих колонистов детально знать территорию, на которой они желали установить свое военное присутствие. Когда возникла необходимость в топографии в Дагомее, сначала миссионеры помогали группам и военным экспедициям, а затем для дальнейшего развития в 1900-х годах была проведена реорганизация и территориальное разделение новой колонии. Таким образом, Департамент топографии, созданный для вышеуказанных целей и реорганизуемый различными французскими колониальными властями, создал основную часть планов городов и инфраструктуру страны.

КЛЮЧЕВЫЕ СЛОВА: топографические исследования, миссионеры, колония, развитие страны, реорганизация территориального деления Дагомеи, геодезия.