

## Sketch of Spatial Modeling of the Rural District of Dialakorodji

<sup>1</sup>Ballo Lassana and <sup>2</sup>Bassam F. Al Bassam

<sup>1</sup>Faculty of Earth Resources, <sup>2</sup>School of Environmental Studies,  
China University of Geosciences, Wuhan, 430074 China

**Abstract:** The present study represents that our world is constantly changing and not all changes are for the better (Rolf de By). Dialakorodji is a rural district north east of Bamako, Mali. Bamako has experienced since 1970 a rapid growth. The lack of space in Bamako created a rush on the surrounding territory demarcated by fuzzy boundaries. This has created conflicts which only maps can resolve. From 1970-2003, many more people occupied Dialakorodji and they built many and more homes and settlements. We have used vector data according MAPINFO software to help configure the geographic boundaries of Dialakorodji. Geographic Information System (GIS) must support decisions for the intelligent use of earth's resources and to manage them. So we created through using vector some relationship allowing us to get a conventional map. Earth's geography changes can have natural or a man made causes.

**Key words:** Rural district, fuzzy boundaries, lawyer acts, karite, néré, land titles, land rush, Dialakorodji soudanian climate

### INTRODUCTION

Data are scarce on space utilization in Bamako urban areas and on its Geographic situation. However, in BERTRAND Monique, 1999 did publish useful information about Dialakorodji. In this study, we have focused on the occupation of space in Dialakorodji given data availability before 1996. Fueled by decentralization in Mali, has its roots in politics and land owners. The present study examines the political evolution of land use in Dialakorodji. Here we want to show to the public opinion and leaders the importance of GIS to solve some social and politic problem (Sémiologie Graphique et conception cartographique, mars 1999; Davis, 2001).

The essence of science of cartography is the combination of different sorts of spatial information on a single map (Mitchell, 1991).

The main aim of this study is to use GIS software to create a real boundary for a new space. So we use computer cartography steps (Clarke and Barbara, 1999) to create concrete map which could be useful.

**Presentation of study area:** Bamako is located at the 12°40' of northern latitude and at the 7°59' western longitude. The northern part of the city extends

horizontally for 15 km between the Niger River and the Manding Mount in an alluvial band that encompasses 7,000 hectares. The city narrows at its eastern and western ends. To the south, the right bank extends for 12,000 hectares and includes the airport of Sénou and the reliefs of Tiénkoulou along the Niger river. The District of Bamako extends 22 km from West to east and 12 km from north to south, on both sides of the Niger River. Its total surface is 267 km<sup>2</sup>, (26 700 hectares) of which 18,200 are currently inhabited. Eighty five square km (85 km<sup>2</sup>) are comprised of river banks, water, surface islands, rocks and reserves of grounds (See map). The city enjoys a northern tropical climate known as soudanian which is marked by one dry alternating with and rainy seasons. The rainy season extends from June at October with maximum rainfall in July and August. The pluviometric average height is approximately 1000 mm (BALLO Lassana, 2003 Memoire de DEA, ISFRA).

Dialakorodji, a rural district south of Bamako is comprised primarily of three villages Téguedo Samassébougou, Dialakorodji and Téguedo Siracoro. Dialakorodji is located in the old cultivable plain wedged between the rock sides of residues of the Mandingue plates (Ballo Lassana, Memoire de DEA, 2003 ISFRA). Today this area does not offer any more high quality

Table 1: Demography of Bamako since 1960 (Annuaire des communes du Mali, 1987)

Years	Population
1960	129 000
1966	164 000
1974	327 000
1976	404 175
1987	658 275
1997	1 096 000
2003	1 613 330

Table 2: Spatial occupation evolution

Years	Population	Common land	Green land	Land built by people	Area/ People
1970	300	36 km <sup>2</sup>	24 km <sup>2</sup>	3 km <sup>2</sup>	8.33
1988	8000	36 km <sup>2</sup>	10 km <sup>2</sup>	12 km <sup>2</sup>	222.2
2003	22 000	36 km <sup>2</sup>	5 km <sup>2</sup>	22 km <sup>2</sup>	611.1

acreage for farming. Here, agriculture is centered on dry cereals such as millet and corn. The focal zone of this study has not been the object of a framing during the rapid period of development. Currently the area is occupied by members of all socio-economic categories including professionals. From its strategic position of crossroads, its economic activities have become the craft industry, small trade based on the sale of the wood to the capital and production of fodder for Bamako animals. Seasonal the traditional gardening generally occupies the women. At the time of Mali's independence the region's population was approximately 120000. In 1987, the population has grown, the town of Bamako counted more than 658 275 inhabitants and 6 000 inhabitants according to last censuses' of 1998,

Evidence the growth Bamako's urban belt can be seen in the Commune of Dialakorodji. During the last twenty years Dialakorodji's population has exploded (Monique, 1999). To the three villages-cradles have been added four new sectors from 1988 to 1996 (Fig. 1).

Indeed in the Republic of Mali, the advent of decentralization can be regarded as a true revolution. In certain cases this phenomenon has created a new social context with the installation of social important facilities (Table 1).

Let us carry out a reading of the Table 2. In 1970, the relatively weak population was on a great space. The year 1970 is remembered by great green extents, fields, for little space occupied by the frame. All these elements contribute to a small ratio population/area. In 1988 we note a light increase in the population implying an increase in space and ratio population/space-In 2003 the tendency noted in 1988 evolves/moves. Thus, the conclusion which is essential in this space modeling on Dialakorodji is that there is a correlation between the frame, the increase in the population and the reduction of farming or green spaces. From 1970 to 1988 the population was multiplied by 23 on a space whose extent did not

vary. The space devoted to the frame was multiplied by 4 whereas farming or green spaces have reduced by 50%. The ratio spaces /population was multiplied by 26.67 From 1988 to 2003 the population has almost triplet. For the same period the parks or farming were reduced of 50 and spaces it devoted to the built increased by 49%, giving a ratio population/area, triple. So, it appears necessary for us to GIS to create a model in order (Clarke and Barbara, 1999) to seize urban sprawl.

## MATERIALS AND METHODS

The Geographic Information System (GIS), concept has evolved through a number of stages. In effect GIS is the marriage of three types of spatially referenced data (mapped information, spatial statistics (Table 3) and remotely sensed imagery), into one integrated system (Collin, 1991). The researchers began their investigation using a questionnaire comprised several modules. Each module we measured aspects which we wanted to investigate. These included the following: Population (human occupation of the ground, demographic pressure and social infrastructures), agricultural productions, spaces and agrarian structures. The purpose of our study investigation is to better understand certain sociological aspects of the development of Dialakorodji and its infrastructures installation. Our data sources include the physical charts of the town of Bamako and its surroundings since 1980 and charts of the space occupation of Bamako over 20 years (Annuaire des communes du Mali, 1987).

The different features on a map have a spatial relationship. Thus, the relationships can be very important (Davis, 2001). Green space, habitations, river and other features existing in Dialakorodji space have been drawn in the map. About the different settlements their appearance is according the moment they have created by the resident people. Based on these data we have established a questionnaire with 2 modules.

**Analysis:** To be capable to solve the problem creating by fuzzy boundaries, we backed our study on some modules.

- The first module relates to the occupation of the space of the commune.

This module measures the development of over time spatial occupation in the different villages which compose the Dialakorodji rural district lead us to a inventory the social and professional activities of the inhabitants of Dialakorodji. Our study revealed that the occupation in three main phases:

Table 3: Inventory of fixtures of installations in the commune of Dialakorodji school sectors structures places of worship centers of health

Secteurs	Schools Structures			Places of cult		Centres de santé	Foundation Date		
	Ec. F.	Ec. C.	Ec. B	Mosq	Church	CSCOM	Ec	L.C	C.S
Kokodi		1	1	2	----	...	1993	1990	2000
Kognoumani			3	1	----		1999	1996	
Siba Saba			1	2	1	--	1992	1986	
Dembelebugu			2	1			1999	1990	
Numubugu	1		1	2			1989	1977	
Dialakorodji-Village	1		1	2		1	1989	1977	
N°Tékédo Sam.	1		---	1	---		1989	1977	1990
N°Tékédo Sir.	Néant						1999	1970	

EcF: Fundamental school; Ec.C: Community school; Ec.B. basic school ;L.C: Place of confessions (church + mosques+ wood crowned)

Table 4: State of hydraulic infrastructures à Dialakorodji

Secteurs	Drilling	Realization year	Observations
Kokodi	1	1999	Realized by an association
Kokognumani	Néant		
Siba Saba	1	2002	Town council
Dembelebugu	Néant		
Numubugu	Néant		
Dialakorodji-Vill	1	1989	Realized by an association CSCOM
N°Tékédou	1	1996	Town council
Samassébugu			
N°Téguédo Siracoro	Néant		

Source : Memoire de DEA, BALLO Lassana, 2003, ISFRA, Bamako, Mali

**Téguédo Samassébougou, the cradle:** The first area inhabited is a plain threatened among mountains. Dialakorodji current occupation started in 1883. At that time Diamoussa, the chief of Mekin Sikoro authorized Samassé Coulibaly, a peasant hunter from Gouana village located on right bank of the river Niger in the rural district of Kalaban-coro to cross the river and settled in Mekin-Sikoro. Samassé discovered that this plain could be a good dwelling place and established a hamlet of culture. The remaining fields are denoted in green (Fig. 1 and 2). The hamlet grew bigger gradually and took the name Téguédo because of its many trees called Tégué. The hamlet's new name could not be bambara because the portion allotted to Samassé was limited to the backwater of Dialakorodji at the border of Mekin-Sikoro and Torodo. Today the villagers explain the limits of Téguédo Samassébougou region as bordering Safo in the east Téguédo Siracoro in north, the backwater of Dialakorodji, in the south and the western limit as Sikoro Koulou. Téguédo Samassébougou occupies the side of the plain, wedged between the hills in the East and the river in the south.

**Sirakoro Téguédo or Niaré Téguédo:** According to traditions the village of Téguédo was established in 1930. The foundation of Sirakoro Téguédo marks the second stage of the occupation of the territory in the rural district of Dialakorodji. It is only a small village located

near Samassebougou at the south, Zorokoro in the East and Sirakoro Niaré, its origin, in the West. Like Samassébougou, Téguédo Sirakoro did not see agriculture or breeding and hunting.

Both Téguédo hamlet in spite of the presence of Bamako remained closed a long time.

**Dialakorodji:** The zone which constitutes today the nerve centre of the rural district of Dialakorodji has been occupied since 1910. The movement of the people of Téguédo towards Dialakorodji village is very recent also shown in Table 4. The village recognizes 2 old sectors.

**Dialakorodji village and Numubugu:** The first old sector to be occupied is located before the river which was controlled by the people of Sikoro who used it for agriculture. In the past this zone was known as Samoubougou (the actual village of Dialakorodji). Today, the area is called Numubugu and is managed by the Coulibaly. Samubugu was first occupied around 1910.

According to interviews with the first inhabitants the primitive site is Komiétou. According to traditions the death of many people in 1945 in Samubugu caused the survivors to move towards the principal axis of communication. They gave the name of Numubugu to the new site. The evolution of Numubugu as an inhabited territory was fast. The space is denoted in violet in the map (Fig. 1 and 2).

**Extension period:** It starts with the installation of people on the cultural space actually called Dembelebugu, Siba-Saba or the three big trees and Kokodi or Cocody or Cocony. As all the surrounding territory, this space was once an ancient field which belonged to the inhabitants of Sikoro. The lack of space allowed its occupation.

**Kognoumani:** It means etymologically the good thing comes from a deformation of "Kô = the thing and gnumani = good. Indeed, on the low plates of Nafadji existed a pond where limpid water did not miss all the year. Then they are the farmers bamanan who watered themselves

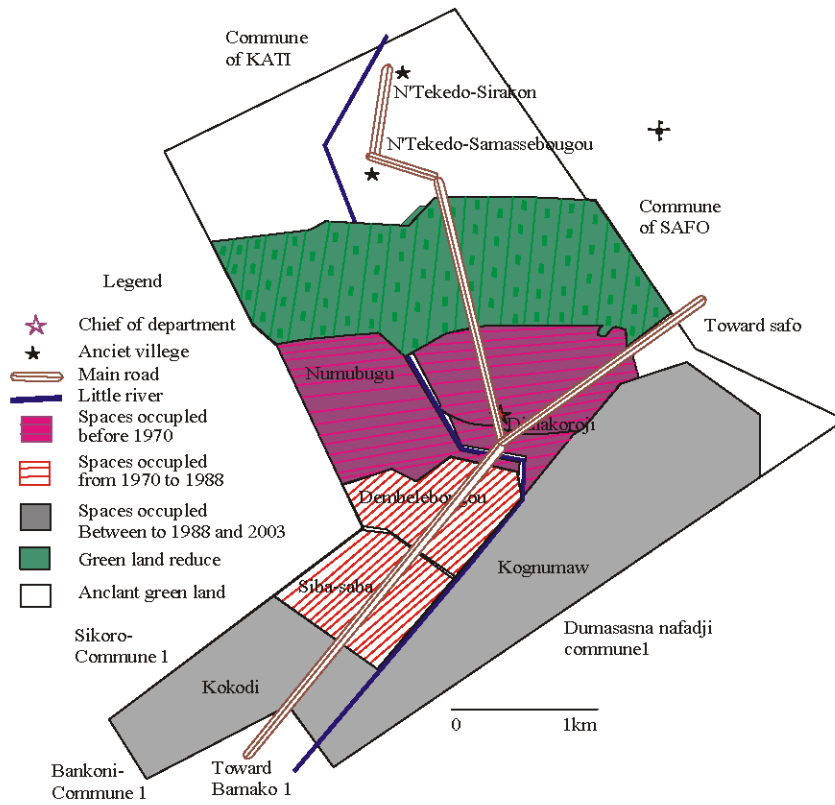


Fig. 1: Dialakorodji spatial occupation steps

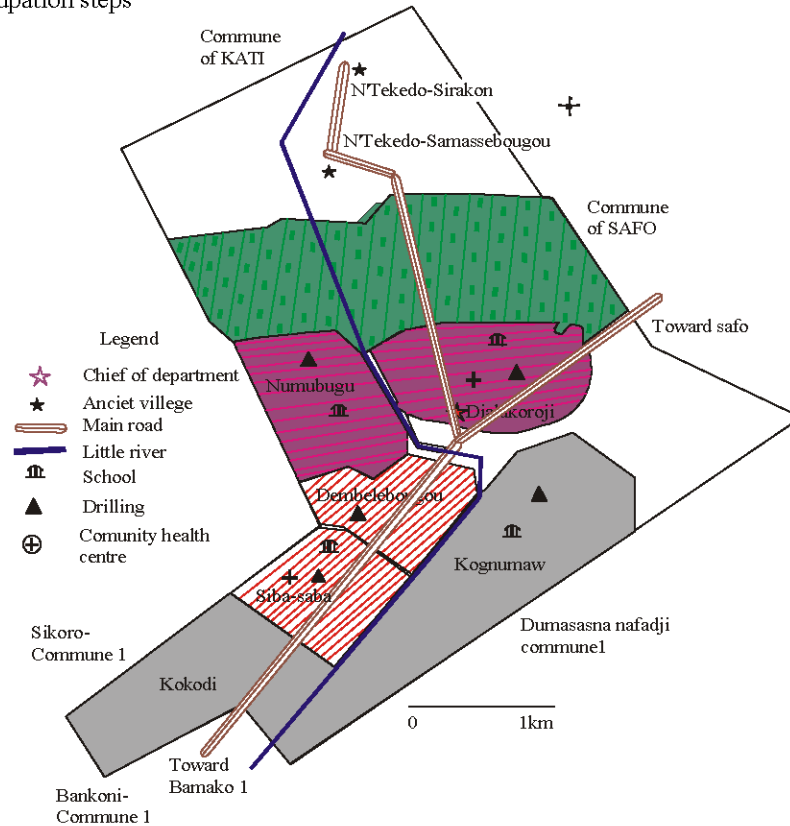


Fig. 2: Dialakorodji settlements

there regularly which gave to this point water the name *kô gnoumani* i.e. the good pond. zone of culture of the natives of Nafadji. The people of Nafadji are the traditional landowners of these fields. In 1987, the town council under the second republic decided to set up this zone in park with cattle.

The second module relates the installation of settlements. After their occupation of space, men have to install different settlements they need for the social development such as schools, healthy centres. The zone of study has been since 1970 the place of a migratory continuous flow. The use of GIS tool (Zeiler, 1999) allows us to have a view about the situation of the migrants in the occupation of space and their role in the economic development of the commune. It allows moreover an exhaustive inventory of the activities in this commune.

Other tools we used are the tables and the maps which allow us to show the different steps of earth andspace occupation.

### CONCLUSION

Maps are uniquely capable for sharing knowledge about our world in many ways. Maps identify what is at a location. You can point to a location on a map and learn the name of the place or object and any other descriptive attribute (Zeiler, 1999).

The availability of information about land resources is a vital factor in their understanding and management

(Mitchell, 1991). It appeared to us since 1970, an irreversible dynamics in the occupation of the rural areas of the commune of Dialakorodji. What led to a notable reduction (in certain cases a disappearance even) of cultivable spaces. Thus, the peasants who exploited these grounds are seen obliged to undertake new economic activities to compensate for the lack of arable lands in Bamako's suburbs. Indeed, 1980 to 1990, 70% of the ground was free acquisition in the commune of Dialakorodji. So, there is a new configuration of Dialakorodji rural space that we can show in the maps (Fig. 1 and 2), the different steps of men installation.

### REFERENCES

- Annuaire des communes du Mali, 1987. Editions Imprimeries du Mali.
- Lassana, B., 2003. Investigations, Mémoire de DEA, ISFRA Bamako, pp: 66.
- Monique, B., 1999. D'une République a l'autre, France.
- Clarke, K.C., S. Barbara, 1999. What is a GIS? NJ: Prentice Hall, pp: 327.
- Davis E. Bruce, 2001. GIS A Visual Approach. 2nd Edn. Publisher Alan Elken, pp: 437.
- Mitchell, C.W., 1991. Terrain Evaluation. 2nd Edn. Singapore Publisher, pp: 439.
- Sémiologie Graphique et conception cartographique, mars 1999 ENSG., pp: 140.
- Zeiler Michael, 1999. Modeling our World, ESRI, pp: 189.