Sustainable urban development of small settlements in Ivory Coast: planning of the city of Ayamè

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Abstract: - The paper shows the results of a research settled to find a standardisable strategy of Urban Development for middle-size settlements in Ivory Coast; it is a primary step toward a constructive dialogue with local Administration in order to brake the fast conurbation toward big towns (in particular Abidjan), with the unavoidable creation of insalubrious and socially unacceptable slums. The strategy of urban development has been verified in the city of Ayamè, which in the last 10 years grew very fast because of the building of a new Hospital, with particular attention to the preservation of the actual urban and social features and to the reorganization and best utilization of the existing infrastructures.

Key-Words: Urban Development; Sustainable Development; City planning; Rural settlements development

1 Introduction

In Abidjan, ex capital of the Ivorian Coast and part of one of the area with the highest levels of urbanization in the West African region, approximately the 20% of inhabitants are dwelling in slums.

As shown in "Understanding Slums: Case Studies for the Global Report 2003" [1], in Ivory Coast the development strategy adopted from 1960 on focused on the integration of the Ivory Coast's economy into the world market, the support and promotion of agricultural exports and the demand for foreign capital and manpower. These basic choices led to the concentration of activities around the port and to a "demographic dynamism without precedence; another result is the a splintered city, marked by an important imbalance between habitat zones and working areas" [1].

The density in slums of Abidjan is very high varying from site to site: Zimbabwe area has 340 inhabitants per hectare; Zoé Bruno, 254.5 inhabitants per hectare; Vridi-Canal, 206 inhabitants per hectare. In addition, public health diseases (in particular SIDA diffusion) and hygienic issues are focal problems hard to be solved.

Even since the 1980's slums regularization has been implemented with assistance from the World Bank (aiming at: basic infrastructure provision; improvement of land security; development of economic activities and promotion of community development), the problem of fast conurbation has to be faced also with a regional and national strategy of reinforcing the attractive of small settlements and middle size cities in which all urban, environmental, social, health and economics facets can be planned and controlled with more effectiveness.

2 Regional and national planning strategy

The historical and economic reasons of the fast growth of Abidjan slums, are similar to many other examples in the world wide metropolitan contexts, and solutions to the problem concerned strategies at the urban and regional scale [2] [3].

The research started from the realization of the economic structure of the Ivory Coast, which is still strongly characterized by the agricultural sector: neither industry nor tertiary sectors are developed enough to sustain the Ivorian economy. In rural areas almost all of employees are planters and agricultural workers, and in Abidjan they represent a very high share of population.

In this context, small and medium cities located in cropped regions assume a fundamental role for the whole national urban development: a first goal is to improve these cities, to attract inhabitants and to parcel out the population in a wider territory, simplifying the control of settlements dimension, population density, public facilities efficiency and in general the quality of

life; moreover in this way the process of conurbation should decelerate without interferences in the economic process.

Essential for this process is the back of infrastructural connections among all this urban centers.

Better life conditions of smaller cities (than in the slums) and health assistance are focus basis of each single urban plan.

2.1 Sustainable development: not only an environmental matter

The regional planning strategy here proposed, goes in the direction of a real sustainable development: aside from an analysis of the bad environmental conditions in metropolitan slums, one of the main purpose of the sustainable development is to solve social and health emergencies [4].

With the creation of more human scale urban settlements, this planning strategy also permits:

- a natural integration among actual citizens and new ones (in general people who lived in small villages since many generations)
- the holding of traditional folk customs
- the maintaining of the classical family structure.

Moreover, in slums areas this strategy implies a general decrease of soil consumption, which has worse consequences in a saturated context - such as the very dense city – than in void regions (with the obvious attention to preserve natural assets).

How to develop small cities respecting their main characters and traditions?

3 Case study: the city of Ayamè

The case study is the city of Ayamè, sited in the up-country 157 Km far from Abidjan, in the middle of 7 small hills, and crossed by the Ano Assuè river.

Climatically Ayamè is situated in a humid tropical zone with a high and relatively uniform temperature throughout the year with an annual average of 26 ºC. Annual rainfall varies between 1,500 and 3,000 mm, with an average of approximately 2000 mm.

The main characteristics of the climate are a long rainy season from March to July with monthly rainfall levels which can reach 700 mm and a short rainy season during the months of October and November.

The relative humidity remaining very high with the seasons, with an annual average of 64 per cent. The permanent humidity associated with heat gives a 'heavy' climate.

The area of Ayamè has about 8.000 inhabitants, the urban area is 77 hectares wide with approximately 650 buildings, mostly residential.

One of the first problem to be faced is the lack of precise data about population size and characteristics, also caused by precarious census analysis and returns. For this reason, all forecast scenarios must provide a significant flexibility and variability.

Moreover, the political instability allows to foresee scenarios only at short and medium term.

3.1   1982: a new hospital in Ayamè

In 1982, with the contribution of Italyn volunteers, an hospital was built in Ayamè first as neonatal ward, than as General Hospital of Ayamè. Nowadays the Italyn NGO Agency n°1 of Pavia helps the local Municipality in the management, the construction, the medical assistance and the provision of the Hospital [5].

The presence of this fundamental facility, caused a very fast growth of the settlement [6], which passed from 5.000 to 8.000 inhabitants since 1992. This trend of growth is supposed to increase, and demographic projections deal to almost 20.000 inhabitants in 2020.

For this reason, Ayamè is a perfect case study and the actual phenomena of urban enlargement need a careful development plan respecting the actual urban features in new residential zoning and new public spaces.

The existing settlements need a more efficient "land use management" while it is not necessary to provide a complete transformation plan.

Considering the difficulty in obtaining certain values and the unpredictable political situation, the city has been planned for the next 8/10 years, supposing a population growth until 15.000 persons.

Figure 1 shows a map of Ayamè in 2005: the natural morphology (hills and river) define the spaces occupied by buildings, mainly residential.

Localization of urban functions, streets and sewer lines are determined only by practical reasons, basically following the natural slopes.

The main urban functions are: General Hospital (1) and market place (2). A small public square is located in front of the City Hall building (3).
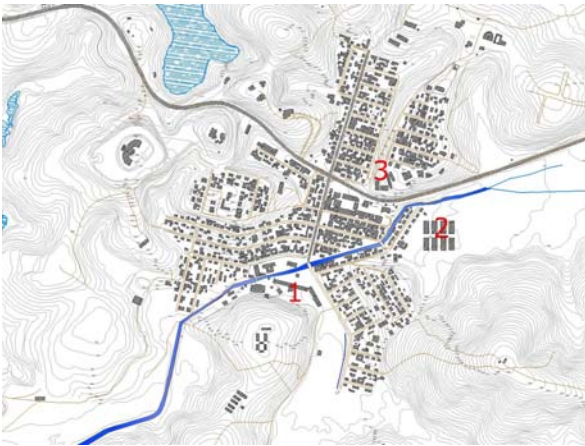
Fig. 1: Map of Ayamè: existing buildings and main urban functions

3.2   Planning the city: density and land tenure

Today the urban part of Ayamè has a medium density equal to 80 inhabitants per hectare, with buildings mainly one floor high: in order to saturate the soil and avoid the construction speculation in the next future (and the uncontrolled growing), the first insediative choice for new residential zoning is to raise the existing density to 90/100 inhabitant per hectare. Such density has to be realized with a designed composition of quarters made by one and two floors buildings.

The plan is dimensioned for 7.000 new inhabitants; with the defined density of 100 inhabitants per hectare it means an occupation of 70 hectares of void soil (almost equal to the actual size of the city).

The density, variable from 90 to 100 inhabitant per hectare, can be distributed in different typologies creating a morphologic richness of built spaces.

The tenure of the land is not clearly regulated: it is necessary to define a precise public/private soil system in order to urge the attachment of the citizen to "their" city [7].

Moreover, the creation of a diffuse private propriety system can guarantee a better level of maintenance of urban spaces if the Municipality defines, in the land grant contract, that each new proprietor must preserve in good conditions his proper land and a defined parcel of public spaces and streets [8].

3.3   Planning the city: site searching

Because of the specific morphology of the urban territory of Ayamè (not a flat country with some steep hill side), the choice of new residential area is bind. Moreover, the lower part of the land close to the river is theatre of water-flood in raining seasons, and the sites for new urbanization must be found in safe and flat zones, considering the unsustainable cost of building new embankments or providing a reclamation of marsh land.

As working hypothesis three main sites have been found: south-east zone, south-west and south zone (as shown in Figure 2).

Fig. 2: Map of Ayamè with working hypothesis for new residential zones

3.4   Planning the city: infrastructure

Ayamè has an hydraulic and sewer infrastructure built in asbestos cement, and with an ordinary maintenance can support 20.000 inhabitants [9]. The question of substituting the existing infrastructure has been evaluated with negative response because of the problems of disposal of asbestos, and because the material is in good conditions (non powder).

The capacity of the net is sufficient for the whole development but, because of the section of the pipes, the new areas can be linked only to two branches in two specific sites: the south-eastern and the south-western areas can be linked, while the southern needs a new line.

This is an acceptable solution, considering the possibility to develop the existing infrastructure instead of building a new one.

Streets and infrastructure are appropriate to the mobility typology: most of the people moves on foot and the only two paved road are sufficient for goods and medical distribution.

Figure 3 shows the South-Eastern new zone, Figure 4 the South-Western new zone, and Figure 5 the Southern new zone. Note that the different distribution of buildings create a various set of quarters, in which void and built spaces dialogue with natural slopes.
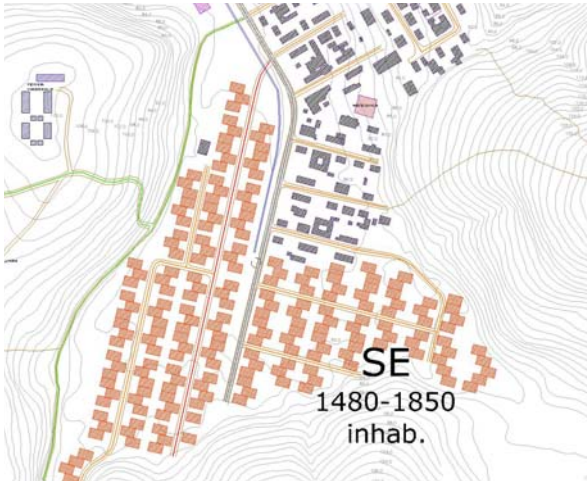
FIG. 3: South-Eastern new residential zone

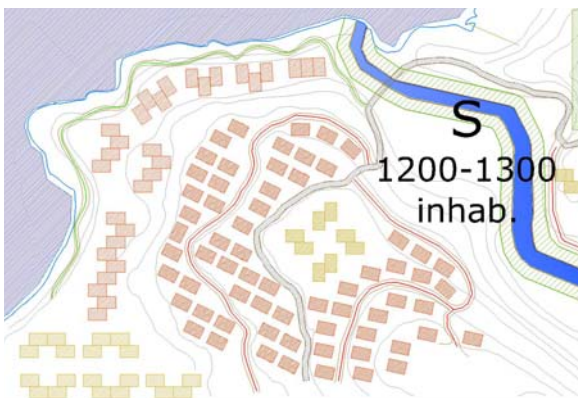FIG. 4: South-Western new residential zone with new water purifier

FIG. 5: Southern new residential zone

3.5   Planning the city: public services and facilities

As shown in 3.1, the most popular public site are the City Hall square and the marketplace, which is located in a wide and flat area in the east of the city in a void flood zone (for this reason can be occasionally enlarged without constraints).

Actually the city has schools and colleges which receive students from the entire region, and the buildings can be enlarged being located in quite wide void area.

In the South-West zone a new water purifier must be provided.

3.6   Designing the city: quarters and housing

The existing urban texture (in figure 6 are shown two examples of blocks), follows the division in parcels due to the streets trace and the placement of the building, their dimension and relation is completely irregular.

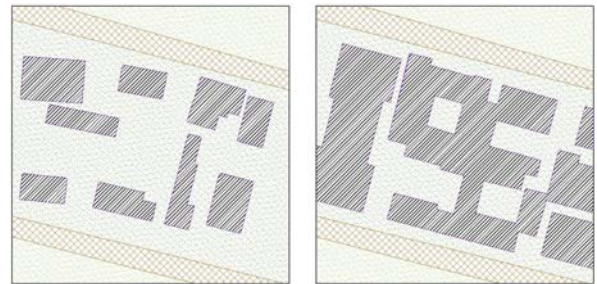The void spaces, except the streets which are public, are unregulated.

Fig. 6: Examples of existing urban morphology

Quarters are designed to follow naturally the contour lines (simplifying the preliminary works), and to create semi-public spaces (dedicated to neighborhood units which always could be constituted by components of the same family).

In the next figures of quarters schemes we have:

1. residential buildings
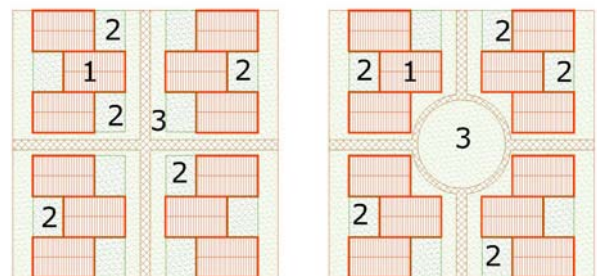2. private space
3. public space

Fig. 6a: SE scheme

This intensive line-up houses scheme has a density around 100-110 inhabitants per hectare, so in the South-Eastern part it is possible to forecast among 1480 and 1850 inhabitants depending on the number of persons per family. This scheme is mostly used in a flat area.

The trace of lots is contingent on a rational grid of streets and residences are disposed to create small private gardens in front or in the backyard of each building.

The un-aligned fronts of the houses enrich the urban morphology and enable the creation of circular public spaces to be used as meeting place.
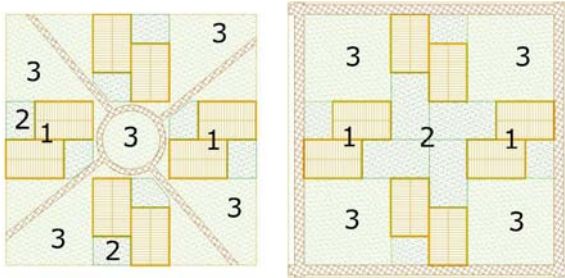

Fig. 6b: SW and S scheme

The scheme in Figure 6.b has a medium-low density (80-90 inh./hect.) in which public spaces have great importance, though each building has a private influence zone.

Houses are disposed two by two and four by four allowing the join of bigger familiar groups.

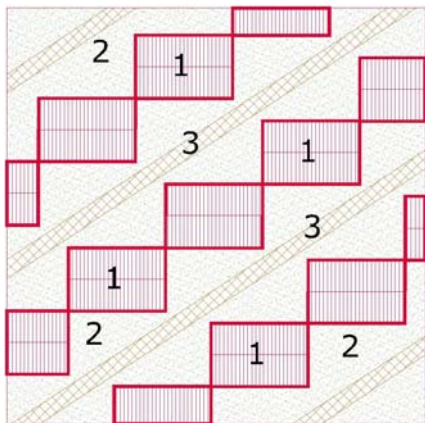The scheme is adequate to flat land and land with a slight slope.

Fig. 6c: SW slope scheme

The scheme in figure 6c is adapted to high slope land and has a low density due to soil feature; each house is independent and has a small parcel of private space, while public space is restricted to streets (which follow the slope lines).
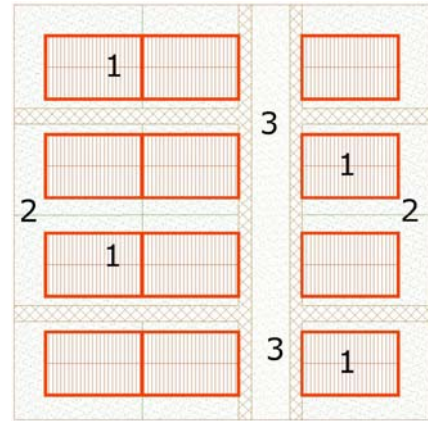

Fig. 6d: SW and S scheme

The scheme showed in Figure 6d has a medium density (90-100 inh./hect.) with two types of houses: single block and double block, both with small private green. A public green corridor is foreseen between the streets.

The new areas have been designed considering one fundamental aspect: most of the residential buildings are self-built by the citizens [10] [11]. The choice is to maintain this traditional way of participating to the growth of the city, and the new building have been designed composing simple and traditional materials such as wood, clay bricks and concrete bricks with the goal to obtain a satisfying internal climate even without the use of air conditioning. For the same reasons a green roof is also promoted [12].

Each single house is dimensioned to host until 8/10 persons (all the families are enlarged parental groups) and the internal typology respects the typical distribution and use of the spaces: big room as living and eating room, external kitchen, 2 bedrooms, one double (matrimonial) for parents, one bigger for 6 persons and two small bathrooms connected to the closer sewer pipes.

A typical character of African houses is the relation between internal and external spaces: many functions (such as kitchen) are commonly located outside. The porch becomes an important architectural element to maintain traditions with more hygienic conditions.
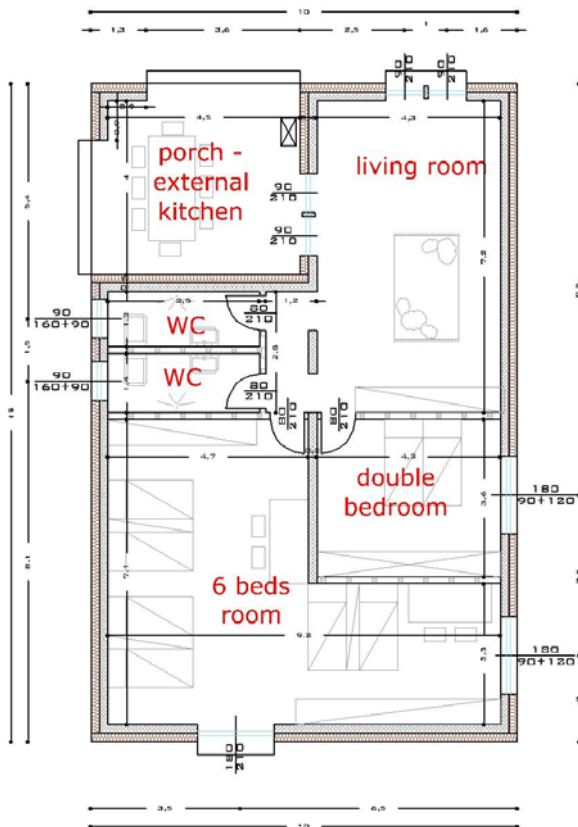
Figure 7: plan of a residential building.

4 Conclusions

The research proved an application of a classical planning methodology in which the regional and territorial goals, defined in a general context of sustainable development (social, economic, environmental), deal to the planning of a city and the design of quarters and buildings.

This method has been applied to a particular small settlement in Ivory Coast (Ayamè), trying to propose a development extremely careful of the actual features of this kind of cities, which can become a real strategic solution to the problem of the conurbations and slums.

References:
[1]   Appessika K., Urban Slums Reports: The case of Abidjan, Ivory Coast, *United Nations Human Settlements Programme*

(UN-Habitat), 2003, website: http://www.ucl.ac.uk/dpu-projects/Global_Report/cities/abidjan.htm

[2]   Saevfors I., *Maxaquene: a comprehensive account of the first urban experience in the new Mozambique*, UNESCO, March 1986.

[3]   Tiepolo M., *Urban Land: An Annotated Bibliography for Developing Countries, 1999-2003*, Turin, L'Harmattan Italy, 2004

[4]   Tiepolo M., *Bissau, Louga, Niamey, Praia. Gestione urbana a rischio in Africa Saheliana*, Turin, L'Harmattan Italy, 2005 – in Italian

[5]   Grieco M., Lenci S., *La cooperazione decentrata: oltre l'aiuto. Gli attori locali nella ridefinizione dei rapporti Nord-Sud*, Turin, L'Harmattan Italy, 1999 – in Italian

[6]   Artuso M., Urbanisation and public health: the case of Commune 3 in Niamey, Niger, *Association American Collegiate School of Planning*, Portland, USA, 2005

[7]   Piermay J.-L., *Cittadini e suoli urbani in Africa Centrale*, Turin, L'Harmattan Italy, 1997 – in Italian

[8]   Tiepolo M., Processo di decentramento e implicazioni su demanio e fiscalità immobiliare a Niamey (Niger), *Centro Città del Terzo Mondo, Working Paper n. 11 – 2005*, Turin, Italy, 2005 – in Italian

[9]   Fioretto T., *Sviluppo urbano della cittadina di Ayamè, Costa d'Avorio*, Degree Thesis, Supervising Professor: Prof. Roberto De Lotto, University of Pavia, Italy, 2006 – in Italian

[10] Arecchi A., *Mozambico. Villaggi-comuni e autocostruzione,* Terzo Mondo, n° 37-38, Milan - Italy, 1979, p. 33-55. – in Italian

[11] Arecchi A., Maputo opération Maxaquene. Un exemple de mobilisation populaire pour aménager une banlieue urbaine en autoconstruction*, Session de reflexion sur les alternatives pour l'aménagement environnemental*, ENDA, Dakar, nov. 1979. – in French

[12] Mattone R. *et al*, A green roof to improve comfort in low-cost homes, *Centro Città del Terzo Mondo, Working Paper n. 15 – 2006*, Turin, Italy, 2006