

# SPATIAL PRESSURE AND ENVIRONMENTAL DEGRADATION WITHIN YAOUNDE AND ITS SUBURBS

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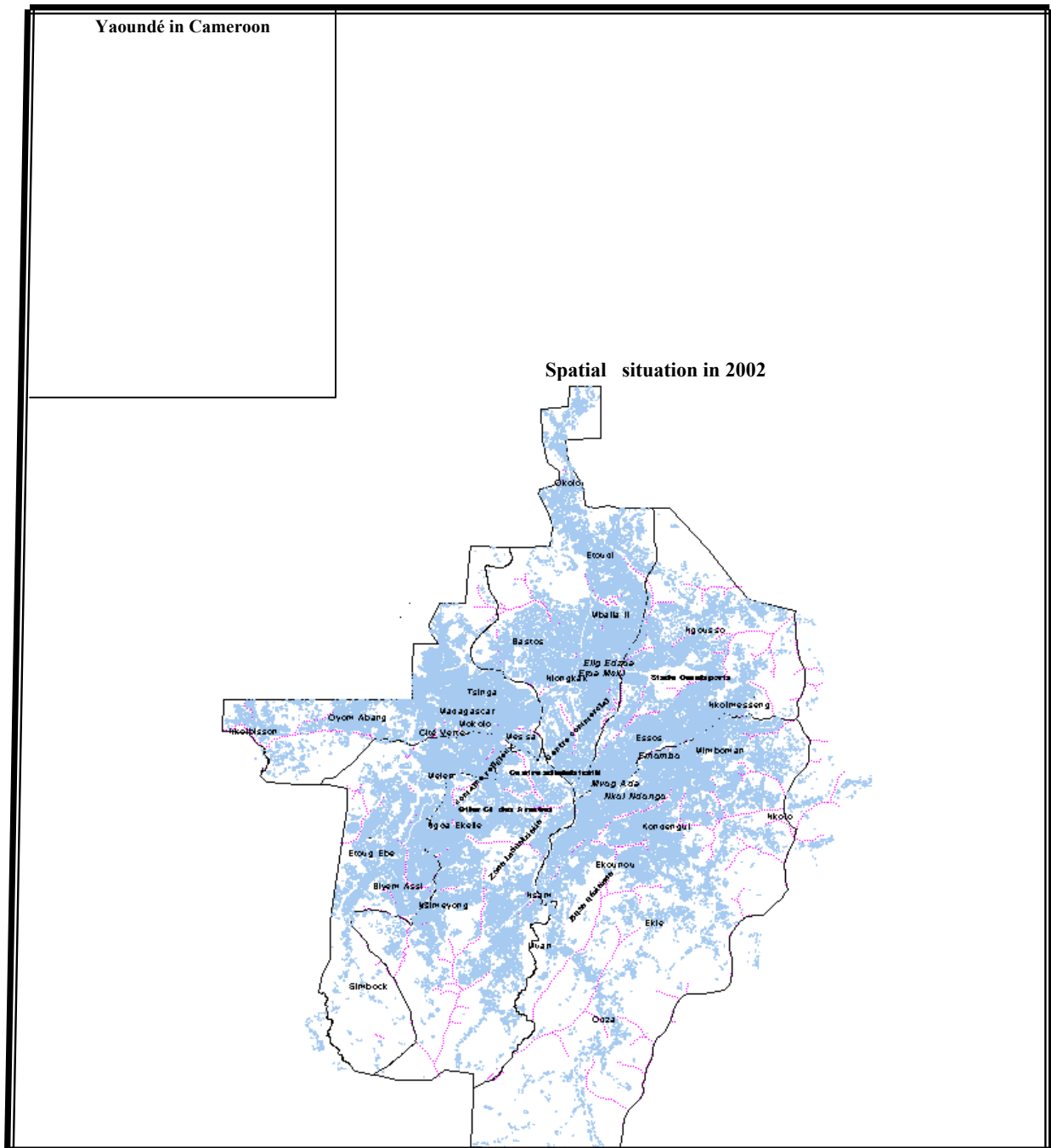
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## **Introduction**

Yaoundé, capital of the Cameroon Republic, is built on the vast central African plateau which stretches from the North of Congo to the South of Cameroon. Situated between latitude 3°5'N and longitude 11°35'E, and about 200 kms of the atlantic coast, the climate which is sub equatorial is temperate because of the continental nature and of altitude of the city site. In fact, with the average of 23,5°C, temperatures vary between 18°C-28°C in the wet seasons, and between 16°C-31°C in the dry seasons. The average rainfall is 1,650 mm per year and the vegetation formerly made of forest is disappearing, even in its margins areas.

**Fig. 1: Localisation maps**



Source: [www.ita.com](http://www.ita.com) ; Yaounde urban council.

In the two past decades, Yaounde was subject of huge demographic growth along with a noticeable space expansion, leading its actual boundaries beyond the officially established ones. The configuration of the site on which the town was built led to an excessive utilization of the space and pressure over marginal spaces freed, due to their non aedificandi character. The present study, based on our personal observations and direct field enquiries aims to display various forms of physical pressure on space along with the consequences on the inner and surrounding environment of the town.

## **I – THE VARIOUS FORMS OF SPATIAL PRESSURE ON YAOUNDE.**

For more than twenty years ago now, the inner and surrounding urban spaces of Yaounde have been undergoing huge pressure, proving the human capacity to act on earth interface, to transform and to use it for his needs. These actions are of two types: the anthropization of valleys and the colonization of mountain slopes.

### **I.A. ANTHROPIZATION OF VALLEYS**

#### **I.A.1. The logic of the population settlement in the valleys.**

Settlement of populations on these sites classified as risky by the public authorities is a result of the town urbanization in three phases:

- After the independence of Cameroon in 1960, Yaounde was subject of rapid growth consolidated by a significant space conquest. The populations coming from rural areas first settled on the plateaus as they were well drained, well ventilated and easily accessible<sup>1</sup>.
- The plateaus been occupied, the continuing flow of migrants did settle on slopes creating spontaneous and unruly quarters expanding irrespective of any administrative rules with the implicit agreement of legal authorities.
- In the 1980's the rural exodus towards the town continues as a consequence of the development effect, as Cameroon was experiencing a prosperity period. The town got structured and the role played by the hills strengthened: Initially political and administrative, Yaoundé gained additional intellectual, cultural, industrial, economical and religious functions, all located on the highlands and smooth slopes. These ones been saturated, the latter migrants in search of proximity had no other choice than colonizing marshy areas of the valleys. This latest movement completed the colonization process displaying a deep pressure on Yaounde intra muros space, with a particular focus on homing density and market-garden agriculture.

#### **I.A.2. Signs of physical pressure within the intra-muro urban space**

##### **I.A.2.a. Overcrowding of the habitat**

It is the main expression form of space pressure in Yaoundé, and is most obvious in the marshy valleys of the town. Nowadays, nearly 80% of the total surface area of the valleys in Yaounde are occupied by buildings of various dimensions and use. In these areas, new coming migrants push the vegetation forward, shorten the bed of rivers to build, in a very big mess their houses. Here, houses are too close one another and many of them do not possess courtyards, kitchens and even toilets! The collection of household garbage is made by the running water through narrow paths. The high density of houses and therefore of inhabitants (*figure 2*) observed here has led to a total residential promiscuity<sup>2</sup>.

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<sup>1</sup> These areas host not only people residences, but also public administrations such as the national Assembly, the University and the Cameroonian Military Headquarters among others.

<sup>2</sup> For example, at Elig Edzoa and Obili-Etoug Ebe quaters that we've investigated, we've identified respectively 813 and 721 inhabitants/ha .

**Fig. 2:** A dense and spontaneous residential area in Yaoundé: Mvog Ada.



Map: Yaounde urban council and field observations, 2003.

#### **I.A.2.b. Informal activities**

The shallows of valleys in Yaoundé are areas where the development of hand-crafted activities is predominant. Most of them are dirty and polluting. Taking advantage of the lack of any regulation and sanction, many garages, slaughterhouses, traditional breweries grew up in a total mess regardless of any hygiene rule.

#### **I.A.2.c. Agriculture and Livestock**

These two activities are less carried out as the former ones have almost occupied the whole space available. Where some free land are found, people will use it for market and house gardening irrespective of the size of the ground. Still due to the lack of space, pens are built on the beds and banks of rivers, used as cowsheds for the livestock of hens, pigs, fowls and ducks.

### **I.B. COLONIZATION OF SLOPES MOUNTS.**

This is the salient point of physical pressure on the urban space of Yaounde. These areas, where it is officially and technically not possible to have houses built, have been colonized. The mounts Akok Ndoe, Messa and Mbankolo are most concerned with this situation. In fact, the continuing and massive presence of human beings in these areas is getting more noticeable. The messy occupation of spaces seems like a draughtboard of which the draughts could be neglected spaces here and there. But, we must recognize that the occupation of these rocky faces did not start today. To have a better comprehension of the situation, we will first analyse the reasons which have led to the colonization of the slopes.

#### **I.B.1. Conjunctural factors explaining the settlement of slopes.**

The colonization of mounts appears to be the result of three combined factors: *the saturation of the whole intra urban space likely to be built, the eternally demographic growth and the economic crisis.* The city, continuing its growth with a 9% rhythm in 1980 and 8,7% seven years later, the space conquest movement will appear. But, this movement will be limited in the space, because though noticeable but not harsh in other sectors of the city, this newlands conquest phenomenon is more characteristic of the NW and the SW. Unfortunately, both latter sectors are made of high mounts normally not accessible, that is mounts Akok Ndoe, Messa, Mbankolo and Febe of which the slopes are higher than 20% which means not

likely to have houses built on, as very risky. Despite the aforesaid risks, these slopes will be continuously occupied by the vague of migrants in search of vital space.

At the climax of the economic crisis, the intensification of space colonization will continue and during the decade between 1990 and 2000, Yaounde will undergo a new kind of demographic movement: the withdrawal of town dwellers severely touched by the crisis, towards surroundings grounds; which here were these slopes mounts, as urbanization could not express elsewhere<sup>3</sup>.

### **I.B.2. Short presentation of these colonized areas.**

These new lands are made of western margins of the town bordered by inselbergs with steep slopes containing gneiss and other minerals. Actually, they are made of multiform residual relief, generally fleecy and peak-like<sup>4</sup>. All these mounts have the specific tendency to elongate in a structural direction just like an ellipse of about 40 km over 20 km. As their altitudes show<sup>5</sup>, we can say it is the case for non significant residual relief with regards to high mounts such as the Andes cordilliers ( 6958 ) or the Himalayas (8848 m). But it seems that for the local populations, these are true mounts which because are situated at the hinge of the rural and urban space , present urban and rural interfaces with limited advantages.

Within the frame of the present study, we were interested in the mounts Akok Ndoe, Messa and Mbankolo:

- The mount Akok Ndoe: Situated between 3°48' – 3°52' N and 11°23' – 11°25' E, it rises up to 967 m. Its northern slope dominates the Oyom Abang neighbourhood whereas the southern one divided in two parts stands between Etoug Ebe and Nkolzie. Both slopes are multi convexes, strongly steeped where lithology and tectonic are supplementary (Kana, 1997).
- The Mount Messa: Situated between 4°30' – 31° N and 11)30' – 11°31' and oriented East – West, it elongated on about 200 m with a nearly height of 10 m. Sometimes convexes and some other times concaves, the slopes are indented by less depth valleys. (Abah,1973)..
- The Mount Mbankolo: Located between 4°31' – 4°32' N and 11°29' – 11°31' E, it shows a sigmoidal west slope. Lightly flat on its top, it does have a rectilinear form up to 850 m before taking a new concave shape.

These three mounts are the ones where human action is noticeable and very entrusted.

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<sup>3</sup> Two main reasons account for the movements to conquer space towards the N.W. and S.W.:

- Saturation of intra muro urban lands: in 1990, the urban perimeter extends on 12 300 ha and all the existing space including marshy areas couldn't more accomodate the new migrants.
- Official constraints: reference is made on the construction of the Presidential palace in the North, on creation of the industrial zone in the South, on creation of the international airport in the South East and communal residential houses in the East. All these structures then limited the advancement of urbanization towards these concerned areas.

<sup>4</sup> Called Horts or Sugar-loafs by Tricart J.(1966), they're referred here to Domes or rocky massifs (Kuete M. quoted by Kana C., 1997)

<sup>5</sup> Nkolondom mountain (1221 m), Eloundem(1169 m), Mbankolo I & II (1020 m & 1098 m), Febe (1077 m), Messa (1015 m), Akok Ndoé ( 967 m).

**Fig.3 : A view of those mounts.**



Nguendo-Yongsi, August 2003

### **I.B.3. Manifestation of physical pressure on the Yaounde surrounding urban spaces.**

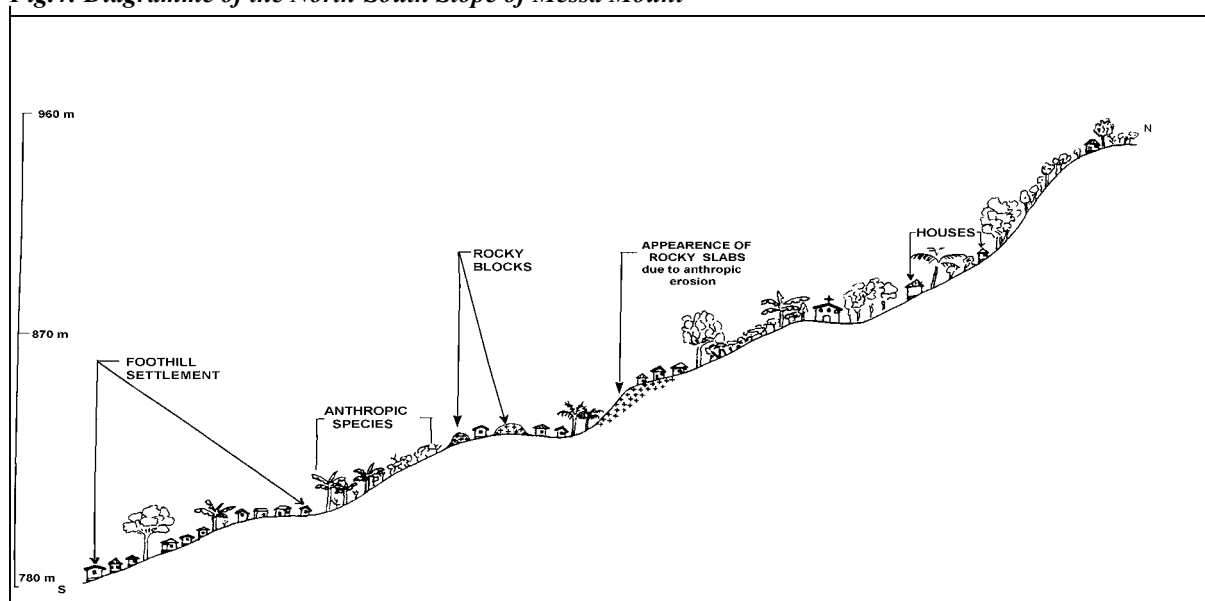
#### **I.B.3.a. An early occupation**

The colonization of these rocky mounts at the western side of Yaounde is not a recent phenomenon. In the past, these mounts hosted indigenous people. According to opinions collected during our direct field enquiries, those mounts, as they were covered by a dense layer of forest, were taken as hunting zones, croplands and provider of heating wood. As a part of their cultural patrimony, these native people did settle in less rude areas such as foothills. Steeped slopes and the top of mounts were avoided. The new coming migrants will colonize the latter spaces for their various activities.

#### **I.B.3.b. The current forms of land occupation: An over use of land.**

From the foothill to the top of the mounts the human occupation is as follows: houses, farming, hunting, forest and rocks exploitation .

**Fig.4: Diagramme of the North-South Slope of Massa Mount**



Source: Field observations, 2003,

### ***I.B.3.b.1. Settlement of a spontaneous and dense habitat***

When observing those mounts, one is attracted by the rudeness of slopes. But one is more surprised by the amount of houses which like bird nests are hanged on the slopes. It is just like a paradox because, even though this area is a very uneven ground, that is very risky as instable, a very massive flow of urbanization is evolving there. Limited in former times to the foothills, nowadays, the houses have invaded steeped slopes. This progressive colonization gets bigger as the city receives new coming migrants and that the cost of land is low for older migrants of which life cost is low as well. Anyway, we deal here with a dense, spontaneous and poor habitat.

**Table 2: Some characteristics of habitats in the sub urban mountainous area of Yaounde.**

Study area	Number of houses /ha	Total population	Number of households	Households sampled	house construction materials				Site of houses sampled		
					mud	plank	Semi solid	solid	foothills	slopes	summit
Akok Ndoé	17	769	110	15	05	07	03	00	08	07	00
Messa	64	18196	4570	70	23	24	13	10	21	38	11
Mbankolo	43	2696	588	50	24	09	11	06	15	29	06

Source: Field Investigations,

### ***I.B.3.b.2. Farming***

- ❖ Agriculture is the most performed traditional activity. The rapid growth of the population of Yaounde having like direct consequence a high request for food crops, the natives and some speculators did not hesitate to exploit the slopes. This agricultural activity is so important that inhabitants, specifically new comers<sup>6</sup>, had no other choice than invading the slopes to cultivate. So, the food crop domain extended towards the top hills where human presence was not than noticeable. Using traditional growing techniques, those people are able to produce enough quantity of vegetable, beans, corn, tuber crops, banana and plantains.
- ❖ Hunting is becoming less important because of the deforestation. Practiced by young and elder people on the top of mounts, it provides additional animal protein to families. The animals hunted are: porcupines, wild boars, monkeys, squirrels, rats, snakes and birds.

### ***I.B.3.b.3. Forest and Rock exploitation.***

These activities are performed by the adults and some young graduated who have been disappointed with the job situation in the city intra muros. They stepped back on these slopes to exploit their resources. On the stripped sides of these mounts and on the isolated rocky blocks, many of them, using hammers break the massive rocks into stones and gravel sought for building purposes.

On the top of mounts, forests are also subject of massive exploitation as they contain sparse wood species used for hand-crafted works or heating, and liana or herbs appreciated for their traditional healing properties.

## **II. IMPACTS OF HUMAN PRESSURE ON THE INTRA AND SURROUNDING ENVIRONMENT OF YAOUNDE.**

As demonstrated before, the physical pressure undergone by yaounde had negative consequences on environment. It did generate in both sub spaces concerned many

<sup>6</sup> In majority poor people coming from the city, victims of the economic crisis.

environmental issues that vary within the space depending on whether we are in the intra muro town or in the surroundings.

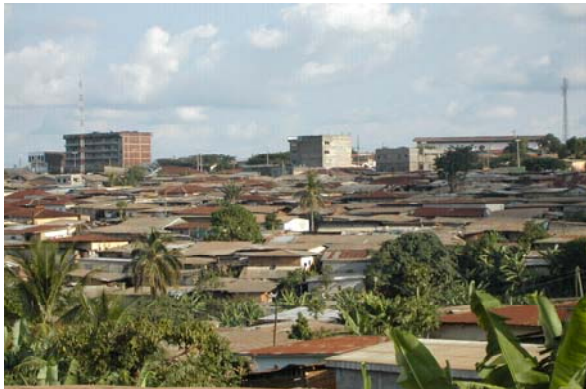
## II.A. ENVIRONMENTAL DEGRADATION FORMS WITHIN THE INTRA MURO TOWN.

This issue concerns the consequences of human pressure within the physical space of the valleys. Diverse and serious, these issues are:

### **II.A.1 – Poverty and overcrowding of habitat.**

Further to the excessive gathering of massive amount of people within these reduced spaces, the situation resulted in an overcrowding due to excessive closeness of small and shapeless houses. At Elig Edzoa, one of the best representative of this situation there are up to 79 house per hectare, which allows only 5 square metres per individual roughly, against 89 square meters on the plateaus. As a result of this overcrowding, houses are of a very poor quality. In fact, 91% of inhabitants of those valleys live in crumbling houses. Built with Carabottes<sup>7</sup>, poto poto material<sup>8</sup> along local wood or with scavenge material<sup>9</sup>, most of these houses are neither with water nor electricity connections, and good toilets.

**Fig.5 : Life in a marshy valley in inner Yaoundé**



Nguendo Yongsi, 2003-07-22

Overcrowding and ...



... Poor quality of houses

### **II.A.2 – Scarcity of drinking water.**

Globally, those neighbourhoods do not have access to drinking water just because they are considered as non aedificandi zones, and therefore not supplied by the SNEC<sup>10</sup> network. Not only there isn't direct connection to the water network, but also public drinking fountains are quite scarce. Most have been closed by public authorities in 1993. A closure which obliges people to walk over long distances, spend a lot of money and time to find drinking water<sup>11</sup>. For those who cannot afford it, they have no other choice than using water from wells and springs.

<sup>7</sup> Wood spliced and sawn into flat surface.

<sup>8</sup> A kind of red lateritic soil mixed with water to make blocks or to plaster the walls of bamboo houses.

<sup>9</sup> Reference is made to stocks of broken metal drums, old corrugated iron sheets, and old wooden crates held together with nails.

<sup>10</sup> Société nationale des eaux du Cameroun ( national water network).

<sup>11</sup> At Obili and Mvog Ada valleys where water problems are acute, household members travel for over 400 m to buy pipe borne water from tap owners located on the plateau. At Elig Edzoa district where the chief has installed a private tap, the distance to carry water is reduced for the nearest residents, but a bucket of 15 litres water is 2.6 times dearer than pipe borne water which cost 15 fcfa for the same quantity of water.

Fig.6: Drinkable water resources



Nguendo-Yongsi, 2003-07-22

Wells...

and



Springs...

Unfortunately, it appears that, these water supply sources are dangerous for health. In fact, bacteriological analyses of springs and wells water of those quarters did show very important concentration of pathogenic agents concluding that those wells and springs water are not of good quality and therefore incorrect for consumption.

Table 2 : Bacteriological analyses results of some water supply sources within the Obili marshy occupied valley in Yaoundé<sup>12</sup>.

Water Supply Sources	CT/100 ml	CF/100ml	SF/100ml	ASR/100ml	Isolated pathogens
Well 1	300	100	100	1000	<i>Pseudomonas sp.</i>
Well 2	250	100	100	1000	<i>Salmonella</i>
Well 3	100	100	100	5000	<i>E.Coli, P.Vulgaris</i>
Well 4	100	100	100	2000	<i>K. Pneumonia</i>
Well 5	300	100	100	800	<i>Acineto Bactérium</i>
Well 6	100	100	100	500	<i>Edwardsiella, Morganella M.</i>
Well 7	238	100	84	100	<i>Shigella, Pseudomona Ps..</i>
Well 8	150	100	100	100	<i>E. Coli</i>
Well 9	200	100	100	1800	<i>Levinea, K. pneumonia,</i>
Well 10	300	100	100	1000	<i>Edwardsiella</i>
Well 11	100	100	100	2700	<i>Ps.aeruginosa, K.Pneumonia</i>
Well 12	300	100	100	1000	<i>Flavio Bactérium, E. Vulchéri</i>
Drinking fountain 1	0	0	0	0	...
Drinking fountain 2	0	0	0	0	...
Drinking fountain 3	8	0	0	0	<i>P.Vulgaris</i>
Spring 1	135	100	100	300	<i>Serratia, K. Oxyta, P.mirahilis</i>
Spring 2	162	100	100	2500	<i>K. Pneumonia</i>
Spring 3	290	5	0	0	<i>Ps.aeruginosa, K.Pneumonia</i>
Spring 4	420	3040	0	0	<i>E.Coli, Citobacter Freundi</i>
Spring 5	100	100	0	4000	<i>E. Asburiae, salmonella</i>
Spring 6	200	100	14	2000	<i>K. Pneumonia</i>

Source: Field investigations, July 2002.

<sup>12</sup> Those data are parts of the results of a recent study we carried out on the bacteriological quality of drinking water in Yaounde. Water samples were collected by us and analysis done within the Laboratory of Hygiene and Environment of Centre Pasteur du Cameroun, where i was granted a 2 months research stay.



### **II.A.3. Unhealthiness and all sorts of Pollution.**

Unhealthiness issues here are relating to:

- Household garbage collection: Due to the lack of structures, valleys neighbourhoods are invaded by piles of refuses. Any vacant space, regardless of its size is used as a waste-reception centre. For their prolonged accumulation and biodegradability, they are source of multiple irritations. Not only they are cause of visual and smelling disagreement, but also they are true channels of diseases transmission through pigs, rats and insects to which they serve as feed.
- Waste water draining and permanent floods: Lacking gutters, drains and water treatment stations, household waste water is sometimes thrown in the river and sometimes in the court-yard. Since the said valleys are of 'U' shape (flat), part of these waste water do not run. They remain in the court-yard and host mosquito larva; whereas the others stream through houses carrying various refuses. Moreover, these people live a nightmare of permanent floods (figure). When rain falls, it becomes quite difficult to get access to houses. With soaked furniture and domestic disturbances, these stricken people sometimes sleep out or are hosted by some generous neighbours. Due to the wet and muddy nature of the ground, movements are almost impossible unless they use planks as small bridges to walk on.
- Various pollutions: The uncontrolled drop of liquid waste causes soil and rivers pollution. This pollution is so important that industrial fat and waste water are made of noxious nitrates and acidic substance damaging for health.

*Fig.7: Flood in a marshy residential valley : a permanent phenomenon*

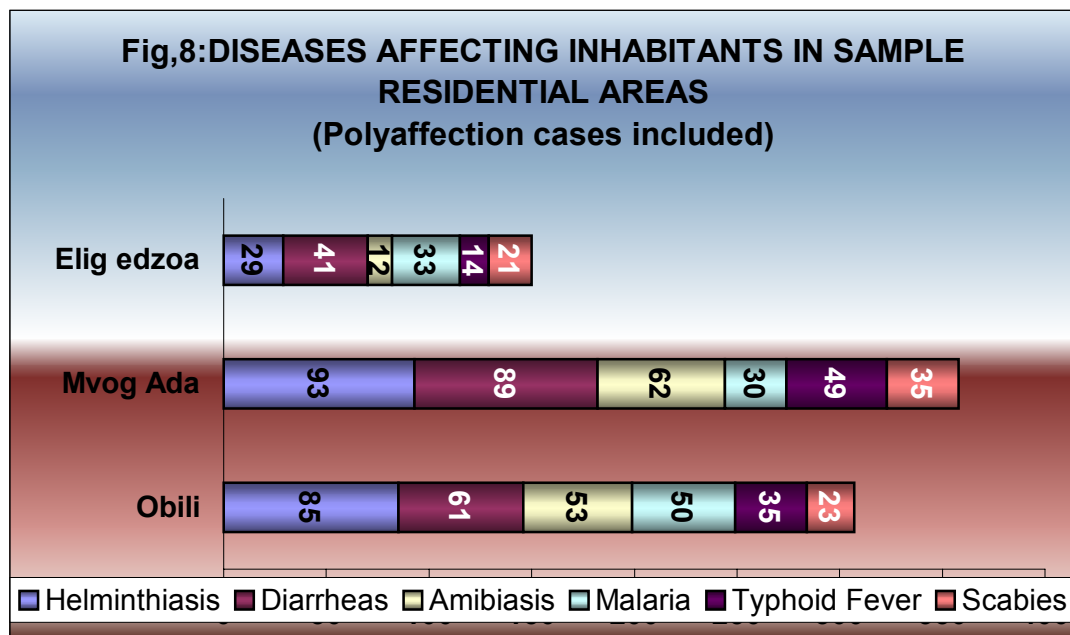


Nguendo Yongsi , 2003-07-22

### **II.A.4. A distressing healthy situation.**

Marshy areas in Yaounde intra muros are favourite frame for the development of pathogenic microbes as it appears there is a relationship between diseases and physical and human factors. From the facts observed on the field, it comes out that there are many pathogenic agents damaging human life or being obstacle for a human blooming. Through our enquiry

questionnaire, we did want to know the main diseases for which most people went to see a consulting physician for the last three months preceding our arrival.



Source: field investigations, july 2002

The above figure reveals that, all are infectious and parasitic diseases, caused by three main factors, that is promiscuity of the habitat, general unhealthiness and lack of personal and collective hygiene. From these observations, we can bring out two pathogenic risks of these areas: the pathogenic risk bound to vectors (water borne diseases), and the pathogenic risk linked to urban management and residents life style (water ingestion diseases).

## **II.B. FORMS OF ENVIRONMENTAL DEGRADATION IN YAOUNDE EXTRA MURO**

In this paragraph, we aim to display the effects of human pressure on the surrounding environment of Yaounde, that is, on the outskirts slopes of the town.

### **II.B.1 – Reduction of land cover and fallowlands scarcity.**

The intensive use of physical space of slopes and summit of mounts has led to a diminution of land cover. In fact, the stretching of built spaces has destroyed forests on vast areas. For example, it is estimated that between 1965 and 1992, 3080 ha of forests have been destroyed around Yaounde for various building works. The most glaring case being Mt Messa where the forest initially covering 1200 hectares in 1952 is now estimated to 44 hectares (Ministry of Environment and forest, 1995).

The fallowlands themselves are subject to considerable reduction. For the three mounts, the fallows did cover 455 hectares in 1952. But today, they are reduced to only 92 hectares in advantage of crops culture and habitat (Ministry of environment and forest, 1995).

### **II.B.2 – Disappearance of wood, barks and fauna.**

On top of this deforestation, reduction of heating and building wood is to be added. As a result of the intensive felling of trees on those slopes and summits, one observes a disappearance of some species which for their healing properties are very useful for traditional medicine. It is the case for:

- *Esegang*, which is said to fight amebiasis
- *Dzin*, which against constipation
- *Acoui*, actually powerful against bronchitis and female sterility
- *Essigang*, which might have an influence against malaria
- *Nyom*, which might heal bleedings.

Other species useful for building purposes and home furniture are also disappearing. It's the case of *Iroko*, *Sapelli*, *Bubinga*, *Bété* and *Ngolong*.

In addition, since few years, we have been noticing the extinction of some species of animals (wild boars, monkeys), birds (parrots), specially rodents (hedgehogs) and giant termites of which the importance and the role within the trophism and the biomass renewal is established. Bearing in mind the utility of those plant and animal species within the equilibrium of the local ecosystem, the Ministry of forests and environment forbade any felling of trees and animal hunting in those spaces since 1996, without explicit authorization. But, this decision is not appreciated by the concerned populations who do not observe it.

**Fig.9 : Human pressure on slopes and summit mounts and disappearance of landcover/fallows.**



Photograph: Nguendo Yongsi, 2003-06-20

### **II.B.3. – Loss of agricultural lands.**

With the city stretching towards the outskirts, surrounding agricultural lands are continuously occupied. In fact, with the urgent needs to urbanization spaces, the natives of these city outskirts sell their lands to individuals and companies for housing, company headquarters and for socio-urban equipment purposes. According to the Ministry of forests and environment, between 1965 and 1990, the town of Yaounde have gained 3950 hectares of agricultural land. Presently, the stretching rate is too fast that, it starts rising the problem of city dwellers as important part of farmlands of neighbouring regions<sup>13</sup> are already invaded.

### **II.B.4 – Soil erosion .**

The surrounding urban space of the NW of Yaounde has been subject to intensive erosion for many years. This is bound to overcrowding and to the destruction of land cover. Whilst

<sup>13</sup> Reference to the Lekie, Mefou Akono and Mefou Afamba divisions.

reducing the soil permeability, the high density did increase the quantity of water on the surface. The resulted erosion is manifested by the ravine dug on the slopes and the accumulation of mud at the foothills. With deforestation, the streaming increases and since we are in an equatorial environment, effects are diverse: rapid soil erosion, rocks falling, mudslide and catastrophic earth sliding like the one occurred in 1989 at Oyom Abang on the eastern slope on Mount Messa, and which destroyed houses and killed seven people.

### **Conclusion**

From the preceding study, it comes out that the pressure exerted on valleys and slopes broadly participate to the degradation of their environment. In fact, due to high human pressure related to the densification of the habitat and to agriculture and other activities, the inner and surrounding urban spaces of Yaounde have been for many years, subject to two major environmental problems: degradation of life condition within the inner part of the town and deterioration of natural resources in the suburbs . Crudely speaking, the current environmental situation of studied areas is:

1 – Disastrous, regarding the quarters of the valleys, on both the hygienic and healthy conditions, due to the manifest lack of purification and distribution infrastructures of drinking water. It is more significant of sorrow social and economical conditions in which many households live, i mean at the mercy of pathogenic risks.

2 – Very worrying for the residential areas situated on the slopes as for people security and for the protection of the ecosystem.

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